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Section One

INERT MATTER

Moon Exploration: the Evolution of Goals, Concepts, Projects, and Technologies from Observations to Total Colonization

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The paper considers the philosophical, historical, practical, and futurological aspects of the whole complex of relationships between human and humanity with the Moon from being an object of cognition, exploration, usage, and development to total colonization in the paradigm of the global future and expansion into outer space. A “comprehensive” definition of the concept of “Moon exploration” is given. The article provides periodization and a brief description of the history and prospects of the exploration of the Moon in the context of evolution of goals, concepts, projects, and technologies. The concept of total exploration and colonization of the Moon is developed, which includes: a general model of the exploration process; a general super global project covering many individual projects; environmentally friendly technologies and projects (their general classification and examples). The main conclusions are formulated.

Keywords: history, classification, concept, space, research, exploration and colonization of the Moon, project, humanity, evolution, environmentally friendly technology

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Introduction

Consider the philosophical, historical, practical and futurological aspects of the whole complex of our relationships with the Moon as an object of cognition, exploration, usage, and development of its natural resources up to the total, “absolute” colonization in the paradigm of the global future, the expansion of human and humanity into outer space ¹.

Moon exploration is a goal-oriented process of human activity on an exploration of the Moon embracing study, research and usage of the Moon, all attributes of it, of its surface, subsoil, resources with the aim of survival and development of human and society on Earth and beyond Earth, on the Moon, reaching the point of total exploration and total colonization of the Moon, — after (Krichevsky & Bagrov, 2019: 37-38).

Let us give the most complete definition of the concept of “Moon exploration” in an interdisciplinary discourse.

Moon exploration is a comprehensive process of cognition, research, development, colonization, usage, application of the Moon by human and humanity in all forms and fields of activity, from individual to public consciousness, from the first observations to total mastery of the Moon as a physical object, its resources and space covering its relationships with Earth, Sun, and the entire Solar system, etc. ²

In an extremely broad statement, “philosophy of the Moon,” “philosophy of the relationships between human and humanity with the Moon”, “philosophy of Moon exploration,” and their various aspects are worthy of attention, purposeful research, reflection, inclusion in the scientific picture of the world, in the general culture of humanity, including those reflected in the “subculture of the Moon,” which exists and develops in literature (especially in science fiction and poetry) and art.

Objectively, the Moon is an “eternal” witness, actor and object in the system of relationships between man and humanity with Earth and outer space as the closest extraterrestrial celestial body to Earth and the second most important actor influencing Earth (lunar phases, tides, eclipses, etc.) and all of us (the Sun is the first).

The exploration of the Moon in the “comprehensive” interpretation proposed above is an “eternal”, super global complex problem for human civilization, for science, education and practice.

The Moon as a natural satellite of Earth has unique properties. Its research is complex and relevant, has a long history, theoretical and practical aspects.³ The study of the process of the research and exploration of the Moon is necessary for analysis, forecasting, correction of space activities to the benefit of humanity on Earth and beyond it, for the transition to new technologies and expansion into space.

¹ The article is based on materials and research results of the author over the period of 2017-2020, including his 2 reports: 1) “Moon Exploration” at the Seminar of the SETI Scientific and Cultural Center at the State Astronomical Institute named after P. K. Sternberg of Moscow State University named after M. V. Lomonosov, Moscow, November 22, 2019; 2) “The evolution of concepts, programs, technologies for the research and exploration of the Moon” at the 26th International scientific annual conference at S. I. Vavilov Institute for the History of Science and Technology of the Russian Academy of Sciences, Moscow, April 2020. See also (Krichevsky, 2018; Krichevsky, 2019; Krichevsky & Bagrov, 2019).

² The author first gave this definition in a report on November 22, 2019, see in footnote 1.

³ In the article, the author does not consider the genesis and evolution of the Moon as a celestial body, specific astronomical, physico-chemical and other characteristics. See (Galimov, 2010; The Moon, 2011; Travels to the Moon, 2019; Zeleny et al., 2012; Zeleny & Mitrofanov, 2015).

The evolution of ideas, concepts, programs, and technologies for the study and exploration of the Moon is reflected in natural philosophical texts, works on astronomy, in science fiction works, in publications, patents, projects in the theory and practice of space activities. Let us single out the works of Aristarchus of Samos, Galileo Galilei, Jules Verne, Konstantin Tsiolkovsky, Herbert Wells. There exist a lot of ideas, studies, projects, technologies, publications of supporters and participants in the process of research and exploration of the Moon throughout 20th–21st centuries, among them: Neil Armstrong, Vladimir Barmin, Wernher von Braun, Eric Galimov, Valentin Glushko, Sergey Korolev, Alexei Leonov, Ilon Mask, Eugene Cernan, Boris Chertok, Vladislav Shevchenko, Leo Zeleny, etc.⁴

In 2019-2020, the issue of research and exploration of the Moon became even more important in connection with the anniversary dates and new achievements in practical astronautics, in the domain of space activities: successful launch of the first lunar automatic interplanetary stations Moon-1, Moon-2, Moon-3 in 1959; the first landing of the Apollo-11 manned spacecraft and the first man's exit to the lunar surface in 1969; delivery of the automatic space rover Lunokhod-1 and its operation on the Moon in 1970, etc.⁵ For more information, see Section 1, subsection "The second period."

In the 21st century, the problem of Moon research and exploration is considered to be bigger, more complex and more important than in the 20th century; it becomes one of the main directions of space activities and a priority in the process of space exploration, the next step and the leading edge in the process of expansion from Earth into outer space, exploration of the Solar system for the survival and development of man and humanity.⁶

Eric Galimov calls for introducing the Moon into the economy of humanity: "It is necessary to change traditional thinking, which regards the Moon as a distant astronomical object. The Moon should be included in the economical turnover of Earth. Moreover, this is not a dream; it is an inevitable and urgent economic task that must be solved until the end of this century" (Galimov, 2010: 268).

According to the academician of the Russian Academy of Sciences Boris Chertok, "modern technology is quite capable of colonizing the Moon. However, there are socio-political and international problems ... The Moon is a territory belonging to planet Earth ... it is a celestial body where people can live using local lunar resources. It is quite accessible to humanity and it will not require any new scientific discoveries." He also highlights the military aspect, which greatly complicates the process of the Moon exploration by humanity: "Lunar bases, unlike the ISS⁷, can have a triple purpose: scientific, industrial-technological and military-strategic. It is possible to create a single Lunar Base for Earth only after overcoming the division of the world into military-political groups." (Cosmonautics of the 21st century, 2010: 27).

An academician of the Russian Academy of Sciences Lev Zeleny and Igor Mitrofanov emphasize an important role and potential of the Moon, call for a transition from research to exploration: "Is it possible to imagine the future development of terrestrial civilization without exploring and using the Moon? ... definitely not. The Earth-Moon system is a unique

⁴ See (Cosmonautics of the 21st century, 2010; Galimov, 2010; The Moon, 2011; Merzhanov, 2018; Travels to the Moon, 2019; Tsiolkovsky, 1989; Website of NASA; Website of the Roscosmos; World Manned Cosmonautics, 2005; Zeleny et al., 2012; Zeleny & Mitrofanov, 2015).

⁵ See (Krichevsky, 2019; The Moon, 2011; Travels to the Moon, 2019; Website of NASA; Website of the Roscosmos; World Manned Cosmonautics, 2005; Zeleny et al., 2012).

⁶ See (Cosmonautics of the 21st century, 2010; Krichevsky, 2018-2020; Krichevsky & Bagrov, 2019).

⁷ ISS — International Space Station.

astronomical object ... It is likely that the giant tides caused by the Moon, which was much closer to Earth 4 billion years ago, played an important role in the origin of earthly life. ... Space engineers consider our natural satellite as a future space continent of terrestrial civilization.” They also believe that “the main direction for the coming decades is the exploration of the Moon through the integration of both manned and unmanned automatic means ... including those for working out the most important elements of Martian expeditions” (Zeleny & Mitrofanov, 2015: 66-67).

In the 21st century, humanity returns to the Moon: programs for sustainable exploration of the Moon, sustainable ways of living on the Moon, their scientific and practical aspects are discussed and created.⁸ New programs and projects are implemented. Among them, the NASA’s Artemis program takes the lead, and in 2024, 2 astronauts (a woman and a man) must land and start working on the Moon.⁹

The projects of lunar bases are being developed in the world, including the “Moon Village,” etc., as prototypes of promising human settlements at a new stage of Moon exploration: “A human return to the Moon is now imminent following recent changes in NASA’s future exploration directions. Other nations may well follow and, like the International Space Station (ISS), this approach could involve collective national initiatives. European Space Agency (ESA) Director General, Jan Woerner, is among those enthusiastic over the ‘Moon Village’ idea, which would have nations clustering together in adjoining domes located at the lunar south pole” (Spall, 2018).

The situation is interesting, complex and contradictory. The Moon is an ideal object for exploring “from scratch”: almost untouched surface and environment, without a biosphere, territorial political and economic borders. However, humanity has not yet agreed on how to explore the Moon, and the process of its development is already underway.

Successful and effective Moon exploration requires new “rules of the game,” a common strategy and a general super global project, significant funds and new technologies, the unification and distribution of efforts of the world community, the cooperation of space and other states, in balance with the solution of pressing problems on Earth.¹⁰

1. Periodization of the process of research and exploration of the Moon

The first period — before the beginning of the Space Age (until the end of the 1950s)

It is characterized by visual and instrumental observations of the Moon from Earth (from its surface, then from aircraft in the atmosphere), the emergence of ideas, concepts, hypotheses, theories, calculations, measurements, and estimates related to the origin, evolution and properties of the Moon.

Targeted exploration of the Moon began more than 2,200 years ago based on visual observations and mathematical calculations. It is a matter of common knowledge that in the 3rd century BC, Aristarchus of Samos determined the distance to the Moon and its diameter. In 1610, Galileo Galilei was the first person to look at the Moon through his telescope and to

⁸ See (Meet the ESA experts, 2020; Olszewski & Locke, 2020; Spall, 2018; The Scientific Context, 2007).

⁹ See (The Artemis Accords; Website of NASA).

¹⁰ See (Krichevsky, 2019).

discover mountains and craters on it.¹¹ Then, the detailed maps of the surface of the visible side of the Moon were compiled, which were based on photographs since the middle of the 19th century.¹²

The second period — the Space Age (since 1959)

In addition to exploring the Moon from Earth, the use of unmanned and manned spacecraft, and the flights of people around the Moon and onto the Moon began.

In 2019, there were a number of important dates: 60th anniversary of the first flights of automatic stations to the Moon — Moon-1 flew ~ 6,000 km from the Moon, Moon-2 reached its surface, Moon-3 took and transferred the first photographs of the far side of the Moon (1959, USSR); 50th anniversary of the first landing of people on the Moon and the first human step on it (astronaut Neil Armstrong, 1969, Apollo-11, USA).

The period of the 1960s–1970s was marked by the “moon race” with the participation of the USSR and the USA competing for priority in the exploration of the Moon and delivery of the first human and the national flag onto it. The USA won it by successfully implementing the Apollo program. The USSR worked on and developed lunar programs, projects, and technologies: 1) flights of people around the Moon and to the Moon (astronaut Alexei Leonov was preparing to fly, and he could become the first person on the Moon); 2) delivery of lunar soil; 3) lunar rover Lunokhod; 4) creation of lunar bases, settlements (“Barmingrad” and others). Nevertheless, only points 2) and 3) were implemented. Moreover, it was 50 years ago: Moon-16 (soil delivery to Earth) and Lunokhod-1 (1970). The last person on the Moon was US astronaut Eugene Cernan (1934–2017). He left the Moon on December 14, 1972, and since then, it has been waiting for new people for almost 48 years.¹³

At the end of the 2010s, in the third period of the Space Age, a new second world “moon race” began with the participation of the USA, EU, China, Russia, India, Israel, Japan and other countries. Its supertask is the “second coming” of human to the Moon, the creation of permanent infrastructure, scientific bases, settlements, industry, space economy in addition to the earthly, extraction and use of resources, as well as colonization of the Moon in the paradigm of space exploration, creation of cosmic humanity.¹⁴

There are other approaches to the periodization of the process of Moon exploration and to estimating the beginning of the second lunar race, etc.

Lev Zeleny and Igor Mitrofanov believe that “the second period of lunar space exploration began in the 90s of the last century and has continued until the present ... Lunar projects of the leading space agencies that began in the first decade of this century, almost all are aimed at the transition from the research tasks to exploration” (Zeleny & Mitrofanov, 2015: 67, 70).

A number of independent experts in the field of space activities, for example, Andrei Ionin and Ivan Moiseev (Russia), believe that objectively there has been no second lunar race yet, but there is a PR campaign, and it tends to be wishful thinking under the absence of real economic opportunities, programs and technologies for large-scale and energetic exploration of the Moon, especially with the participation of people.¹⁵

¹¹ See (Berri, 1946: 44–45, 136–137), cited after (Krichevsky, 2019: 19).

¹² See (Krichevsky, 2019; Travels to the Moon, 2019).

¹³ See (Krichevsky, 2019; Krichevsky, Bagrov, 2019; The Moon, 2011; Merzhanov, 2018; Website of NASA; Website of the Roscosmos; World Manned Cosmonautics, 2005; Zeleny et al., 2012).

¹⁴ See (Krichevsky, 2018, 2019, 2020; Krichevsky & Bagrov 2019; Mayboroda, 2019; Medvedev, 2019).

¹⁵ See (Medvedev, 2019).

2. General classification of goals, concepts, programs, technologies and the process of their evolution

Let us present a general classification of goals, concepts, programs, and technologies for the study and exploration of the Moon (based on the formalization of “target functions”) and the process of their evolution in the form of three interconnected and “incremental” stages (first + second+ third):

First stage. Observation and description of the Moon for cognition, the use of its properties on Earth.

Second stage. Purposeful, systematic research of the Moon to create its adequate, complete model as a celestial body, including the genesis and evolution of the Moon, communications, interactions with Earth, the Sun, using the space technique and technologies in the 20th century, including contact research, for the development of science and education, as well as practical activity on Earth and in outer space.

Third stage. Development and use of natural resources, the features of the Moon for terrestrial civilization, including the colonization of the Moon, and for further expansion into outer space.

Moreover, the evolutionary process goes from individual private research to integrated long-term national and international projects and programs.

First stage — beginning of >3000 BC. Observations of the Moon, its phases, etc., creation of astronomical methods, technologies, and techniques for Moon exploration, calculations, knowledge accumulation.

This was the period of creating foundations and options for concepts, programs, projects, gaining experience in solving practical problems: calendars, eclipses, tides, etc.

Second stage is purposeful creation of descriptions, maps, globes, and other models of the Moon. Since the 1620s — observations through telescopes, discoveries, descriptions of structures and phenomena on the Moon; since the middle of the 19th century — photographing in combination with other technologies, research techniques, recording and filing; the 20th century was completed with radio communications, radar, computing and space technology, and the Internet.

Due to the rapidly growing flow of information, the process of accumulation, systematization of knowledge about the Moon, creation of new concepts, projects, and technologies accelerated. The period of 1960s–1970s was extremely important: photographing of the far side of the Moon became possible, and remote methods and technologies were supplemented with contact research of the Moon using space technology, especially during the flights of people to the Moon. The third stage began, but the process was stopped, “frozen” and “hung up” on the development of concepts, programs, projects, technologies for the period of approximately 40 years, during which the goals and objectives of the second stage were realized.

Third stage — since the 2020s. Moon exploration, its colonization (in perspective). New concepts, programs, projects and technologies, and corresponding new “rules of the game” are needed.

In connection with this, the author developed a new concept, investigated environmentally friendly technologies and projects, see Section 3. Main legal aspects of Moon exploration are highlighted and briefly reviewed: 1) human rights; 2) licensing; 3) intellectual property protection; 4) natural resources extraction and usage; 5) environmental protection; 6) new

technologies and technical activities regulation and safety; 7) natural and cultural heritage preservation (together with Alexander Bagrov (June 30, 1945 — August 20, 2020)).¹⁶

The world is creating new “rules of the game,” programs, projects for Moon exploration, usage of its resources and space in the context of national and international law, important political, legal, technological initiatives and innovations are appearing. This can lead to a significant change in international space law and accelerate the process of Moon exploration.¹⁷

More and more attention in outer space research and exploration is paid to the transition to space mining — the extraction of extraterrestrial resources, especially on the Moon.¹⁸ According to Tatyana Ursul and Arkady Ursul, “... the first space deposit, most likely, will be the Moon, on which water will become the primarily produced resource used for the livelihood of people and as fuel for rocket and spacecraft. The need to use lunar natural resources to create lunar bases and to build space infrastructure there for the purpose of further space exploration testifies in favor of the speedy exploration of the Moon.” They also draw attention to the fact that “having created an industrial and energy base in outer space (primarily on the Moon), it will be possible to transfer both energy-intensive and environmentally harmful production from Earth” (Ursul & Ursul, 2020: 19-20).

However, this is hardly possible with existing technologies, primarily because of the low efficiency of space transport: the cargo flow between the Earth and the Moon is limited, which will not allow solving the problems of transferring industrial production from Earth to the Moon until the transport problem is solved. In addition, space mining may impose restrictions on the extraction and use of natural resources, industrial production on the Moon owing also to the properties and characteristics of its environment. “For instance, condition of total processing, utilization of associated waste must become an absolute restriction on mining of mineral resources. On the Moon, natural conditions and mechanisms of degradation of human waste are principally different in comparison with those on Earth. Thrown away broken mechanism will lie on the Moon for millions of years in the same state. ... On the Earth we have already faced ecological consequences of waste piling with which natural recreational mechanisms do not cope. And on the Moon, where there are no such mechanisms at all, the problem of waste utilization must be solved with the first steps of its development. The problem of human waste utilization is partly solved on inhabited space stations; this experience must be used on the Moon, too. Different kinds of mineral waste can be used for lunar construction works. This implies simple and clear rule: you can mine as many resources as you can utilize waste from mining” (Krichevsky & Bagrov, 2019: 43).

The opportunities and prospects of creating permanent lunar bases and settlements of people on the Moon, the upcoming long and constant life of people and new risks raise a set of questions, new ideas, projects and technologies for ensuring safe and decent living conditions for people throughout the entire life cycle of a “cosmic” human beyond Earth, in communities on the Moon: from reproduction, conception, birth, further development, actualization, and up to death. This requires extensive scientific research and implementation of extremely complex, dangerous, and expensive practical activities of people in space, taking into account the risks and limitations of the process of Moon exploration, its conditions, properties, and characteristics of the lunar and near-Moon environment.¹⁹ It includes the effects of new

¹⁶ See (Krichevsky, 2019; Krichevsky & Bagrov, 2019).

¹⁷ See (Executive Order, 2020; Krichevsky & Bagrov, 2019).

¹⁸ See (Executive Order, 2020; Ursul & Ursul, 2020; Krichevsky & Bagrov, 2019).

¹⁹ See (Cosmonautics of the 21st century, 2010; Galimov, 2010; Krichevsky, 2020; The Moon, 2011; Mayboroda, 2019; Medvedev, 2019).

hazardous factors, physical and chemical, electromagnetic and other phenomena and effects (for example, lunar dust plasma can adversely affect both the work of space technology and human health, i.e. moon dust is a significant risk factor²⁰).

3. The concept of the total exploration and colonization of the Moon

The author has developed the concept of total exploration and colonization of the Moon, which includes a general model of the process of Moon exploration, a superglobal project, and environmentally friendly technologies.²¹

In essence, this concept is simultaneously philosophical, practical, and futurological, synthesizing in the ultimate formulation of basic ideas, concepts, projects, and technologies aimed at total, “absolute” exploration of the Moon as a celestial body, its space and natural resources.

Hypothetically, in the future, the Moon can be used by humanity completely, up to its radical transformation and processing, for example, to restore and protect Earth or to ensure the existence or protection of extraterrestrial cosmic humanity, including with the aim to create a structure like a Dyson sphere, etc. However, at the same time, dangerous, irreversible consequences for the environment will arise, so the question of the possibility and admissibility of such transformations remains open.

3.1. General model of the process of Moon exploration

In addition to the existing models of the Moon as an object of research and exploration, a “General model of the process of Moon exploration” is required, which must cover the main scenarios, priorities, prospects, etc.

In contrast to the well-known strategies, concepts, research projects and industrial exploration of the Moon in the resource paradigm for supplying Earth, as well as providing fuel and other resources for the process of expansion into deep space, to Mars, etc.²², the author proposes a “comprehensive” approach and a superglobal project for total exploration and colonization of the Moon by humanity (see also subsection 3.2).

Scenarios. There are two main scenarios of Moon exploration:

First scenario. Balanced, “deductive”. Development and adoption of general “rules of the game,” permissions and restrictions on the exploration of the Moon, its surface, subsoil, and resources taking into account priorities, zoning, stages, environmental and other aspects, creation of common institutions under the auspices of the UN, joint activities on the Moon under the control of international institutions, while minimizing contradictions and conflicts.

Second scenario. Extreme, “inductive”. Slowing down and / or ignoring the general “rules of the game”, chaotic exploration of the Moon, its territory and resources in the traditional way of exercising the “first-to-file” and “first-to-use” rights — by analogy with the experience of expansion on Earth, such as the “gold rush.” “Moon rush,” aimed at allocation, capture and monopolistic predatory use of the most valuable sites and resources will give rise to many contradictions and acute conflicts, including military ones.

The second scenario is more likely, which in fact was already proclaimed by the United States in 2020, implemented in the paradigm of their leadership and the formation of new

²⁰ See (Zeleny & Mitrofanov, 2015: 69-70).

²¹ See (Krichevsky, 2018, 2019).

²² See (Galimov, 2010; The Moon, 2011; Zeleny et al., 2012; Zeleny & Mitrofanov, 2015).

“rules of the game” and cooperation in the exploration of the natural resources of outer space and the Moon. This leads to the transformation of international space law, which is excessively conservative and has long hindered the process of space exploration and development of its resources. However, there is a risk of an imbalance of relationships due to the formation of new rules that do not take into account a number of important aspects and interests of all participants.²³

There are various implementation options for each scenario. We will conditionally single out the minimum, optimal, and maximum options that can be worked out, taking into account the priorities, risks, restrictions, and other aspects of Moon exploration.

Priorities for Moon exploration must be formed and adjusted on the basis of value approach, taking into account zoning of its territory, stages, risks, restrictions, economic and technological capabilities, and prospects, etc.

Zoning of the territory for effective Moon exploration is necessary in order to: 1) accommodate scientific, industrial, residential, and transport infrastructure, as well as a system of protection against asteroid-comet hazard; 2) extraction of minerals; 3) protection and restoration of the environment; 4) search for and preservation of objects and items of natural and cultural heritage (these include unique natural objects — landscapes, rocks, craters, mountain peaks, caves, meteorites, etc.; the first technical objects on the Moon and traces of its exploration).

In Russia and the world, zoning of the Moon’s territory is being carried out on the basis of mapping, surface and subsurface sounding, prospecting, mineral resource assessments, including distribution of water, metals, etc. There were preliminarily determined the best places for permanent lunar bases, human settlements in the area of the South Pole, taking into account a complex of factors (landscape, topography, lighting, direct visibility from Earth, presence of water and other minerals, etc.); important sites in the areas of the poles and the far side of the Moon, etc.²⁴ “The projects of the first stage should provide the solution of two practical problems for the preparation of the future exploration of the Moon: to select the most favorable region in the vicinity of the South Pole for the location of the Lunar test site with the subsequent construction of the attended lunar base on it and conducting of detailed physical and chemical studies of the polar regolith” (Zeleny & Mitrofanov, 2015: 71). Moreover, it will primarily be the research with the help of automatic spacecraft followed by manned flights and the activities of people on the Moon in the places attended by people, and then in permanent lunar bases and settlements.

The prospects for Moon exploration we will present as an optimistic forecast of three stages:

First stage. Creation of scientific, industrial, inhabited infrastructure, permanent scientific bases, industrial facilities, human settlements, space economy on the Moon, information, energy, transport communications in the Earth + Moon system, using new technologies (robots, 3D printing, etc.), as well as the space reserves, archives, etc. to preserve the earthly and lunar natural and cultural heritage of humanity throughout the 21st - 22nd centuries.

It includes the creation of “cosmic” human and “reserve” humanity²⁵ on the Moon for the survival of a human species of *Homo sapiens* and restoration of humanity in the event of a global catastrophe on Earth (moreover, primarily on the Moon, in contrast to a famous Chinese project with the code name ““1000 Chinese on Mars”, the purpose of which is

²³ See (Executive Order, 2020; Krichevsky & Bagrov, 2019).

²⁴ See (Krichevsky, 2019; Krichevsky & Bagrov, 2019; Medvedev, 2019; Zeleny & Mitrofanov, 2015).

²⁵ See (Krichevsky, 2020).

to create a colony of people on Mars for the subsequent return to Earth and restoration of humanity after a global catastrophe on Earth”²⁶).

Second stage. Total inclusion of the Moon, its space economy in the economy of the earthly civilization of humanity since the 22nd -23rd centuries.

Third stage. Creation of an autonomous cosmic civilization — cosmic humanity with a permanent life of people on the Moon since the 23rd — 26th centuries.

Risks and restrictions in the process of Moon exploration: political, economic, technological, military, biomedical, social, sociocultural, environmental, etc. Their management is of particular importance for the safety and survival of people on the Moon including its colonization and reproduction of people in the future.

“An academician of the Russian Academy of Sciences Nikita Moiseyev, after speaking at the Polytechnic Museum of Moscow (1999), when answering my question about further space exploration by humans, resettlement beyond Earth, said that it was a damping process: human existence and long life further than the Moon were impossible. We are earthly creatures, and in order to live in space, it is necessary to become different, but these creatures will no longer be people. Consequently, further than the Moon, Space can be mastered only by using automatic machines (here is not a quote, but the meaning of what was said is stated, *authorial*)” (Krichevsky, 2020: 41).

Thus, our “lunar future” is unstable and contradictory: the Moon as a new fulcrum can “invert” Earth and the fate of human and humanity, become a new “assemblage” and unity point for humanity on Earth and in space, using fundamentally new technologies to open a “window of opportunity” and a new space for the future cosmic human and humanity. Nevertheless, it may turn out to be a limit for the expansion and evolution of earthly human, provoking catastrophic scenarios of destruction and degeneration of “traditional” human, owing also to the negative impact of the environment during long life on the Moon. Otherwise, after a person is supplemented with anthropomorphic and other robots, cyborgs, they will be replaced with a quasi-man, posthuman, “cybernetic immortal man” or “universal man,” etc.²⁷

3.2 Unified super global project “Moon Exploration”

The superglobal project “Moon Exploration,” proposed by the author in 2018 (Krichevsky, 2018: 98-99), covers the entire set of projects for Moon exploration and will be implemented by humanity for centuries, up to its full development (optimistic forecast).

The purpose and super task of a super global project: full inclusion of the Moon in the sphere of space activities for research, usage of its natural resources, resettlement of people, development of new technologies, equipment, vital systems, safety, and for expansion to Mars, etc.

This super global project needs to be implemented in a “comprehensive” setting, according to the first balanced scenario in the form of three stages described in Section 2 “General model of the process of Moon exploration.”

It is necessary to go to deep space, to Mars, etc. through the exploration of the Moon: making imminent its incorporation into the space economy in addition to the earthly one, as well as into the structure of the Earth’s protection system from an asteroid-comet hazard (it is to be created in the Earth + Moon space), etc.

²⁶ After Boris Chertok (Cosmonautics, 2010: 29), cited by: (Krichevsky, 2020: 36).

²⁷ See (Krichevsky, 2020).

It is advisable to use the experience of the Moon research throughout the 20th-21st centuries, new knowledge, technologies, projects, and capacities. Not only the leading space states can be the leading actors in the process of Moon exploration, but also new space communities, associations, unions, e.g., the World Space Union, which will be created under the auspices of the United Nations in the paradigm of “united humanity” (the author proposed this idea in 2019).²⁸

To implement the super global project “Moon Exploration,” first it is necessary to create new “rules of the game,” institutions of society, technology, including those for life and safety of people on the Moon. It is advancing further on — reliable, effective communications, interaction with Earth, scientific, industrial activities based on the local resources, then — permanent bases, human settlements on the Moon, organizing usage, protection, restoration of the environment, taking into account the characteristics of the Moon, near-Earth, and near-Moon spaces, using new environmentally friendly, clean technologies and projects.²⁹

3.3 Environmentally friendly technologies and Moon exploration projects

Methodological aspect. The author has purposefully researched environmentally friendly, clean, “green” technologies and Moon exploration projects since 2018.³⁰

Environmentally friendly technologies and projects — meeting environmental standards or even outstripping them, not harmful to the environment, human life and health, or having less negative impact when compared to others.

The classification of environmentally friendly, clean technologies and projects for Moon exploration, taking into account their intended use, covers the entire spectrum of space activities and includes the following main sections: 1) exploration of the Moon and near-Moon space; 2) transport; 3) creation of infrastructure on the Moon; 4) energy (both for Earth and the Moon); 5) support of people’s life and safety; 6) extraction, processing, and use of natural resources; 7) protection and restoration of the environment; 8) preservation of natural and cultural heritage.

Historical aspect. The source of research into the greening process is disclosed in the publications on the exploration of the Moon, patents and projects, a significant part of which is available on the Internet. The source base has been compiled, including more than 100 publications and about 100 patents and projects related to Moon exploration in Russia and the world throughout the 20th -21st centuries. Currently, systematization is carried out, and the most important ones are identified and investigated.

Practical aspect. The study of environmentally friendly, clean technologies and projects is necessary for the greening of the process of Moon exploration, environmental assessment, and correction of space projects and programs in Russia and in the world. Until present, environmentalization of space activities in the study and exploration of the Moon has not been given due attention. However, there are many examples of environmentally friendly technologies and projects worthy of study and active practical use.

Examples of environmentally friendly, clean technologies and Moon exploration projects developed throughout the 20th - 21st centuries. Five important examples can be singled out:³¹

1. “Space elevator.” There are many projects and technologies of creation, including those based on cable systems. The project of the “Earth — Moon” transport

²⁸ See (Krichevsky & Bagrov, 2019).

²⁹ See (Krichevsky, 2018, 2019).

³⁰ See (Krichevsky, 2019).

³¹ See (Krichevsky, 2019: 22-23).

system is of particular importance. Moreover, the upper terminal of the elevator is fixed on the Moon, and the lower is above Earth, above the dense layers of the atmosphere. The authors of the project are Alexander Bagrov, Andrey Bagrov, Vladislav Leonov, Russia, 2012.³² Unlike other projects of space elevators created on Earth, “tied” to it and intended mainly for its maintenance, the new project is focused on Moon exploration. However, as with all space elevators, there are risks of collision of space debris with structural elements, damage and destruction of the elevator.

2. *Solar power station on the Moon*. “Lunar Ring” made of solar panels (~ 400 km wide, ~ 11000 km around the equator of the Moon), Shimizu Corp., Japan, 2013. This ambitious, innovative project aims to fully provide all civilization on Earth with clean electric energy received from the Sun on the Moon and its constant transmission to Earth. Its implementation is planned since 2035. Its focus is on “aiming for a new sustainable society through a paradigm shift on energy. There is a shift occurring from the existing paradigm of conservation of the limited resources on Earth to the concept of producing nearly limitless clean energy, and freely using the abundance of clean energy ... The Sun’s energy is perpetual and will not have an adverse impact on the Earth’s environment, no matter how much energy we use. The massive energy of the Sun will give us a beautiful Earth and an abundant lifestyle in the future” (LUNA RING).
3. *Creation of structures on the Moon from local resources (regolith)*. 3D printing technology. Since the 2010s, such promising technologies and projects are being developed in the USA, EU, Russia, China and other countries.³³ “Multi-dome lunar base being constructed based on the 3D printing concept. Once assembled, the inflated domes are covered with a layer of 3D-printed lunar regolith by robots to help protect the occupants against space radiation and micrometeoroids” (Spall, 2018).
4. *A promising version of the lunar base with artificial gravity identical to Earth’s gravity*. GraviCity centrifuge of AVANTA Company, Alexander Mayboroda, director of Company, Russia (2014-2019). Variants of a constant lunar base in the form of a centrifuge are proposed. The project of the lunar base “Barmingrad,” developed in the USSR in the 1960-1970s, became the prototype for a number of ideas and structural elements of this project.³⁴ “A lunar colony on the basis of a lunar base with artificial gravity provides conditions for people’s life ... without restrictions on the duration of their stay, until the establishment of a settlement with colonists who arrived for permanent residence without returning to Earth. ... Long-term colonies suggest a family way of life for their inhabitants ... the birth of people beyond Earth and the appearance of the first “cosmic human” and then a new “cosmic race” become highly probable. From an economic point of view, a base with artificial gravity solves the problem of reducing the extremely high costs of delivering crews to the Moon and returning them to Earth” (Mayboroda, 2019: 43). This project includes technologies for protection against radiation with a regolith layer, artificial magnetic fields similar to the earthly ones, etc. At the same time, the project implementation, reliable and safe operation of the centrifuge base

³² See (Patent, 2012).

³³ See (Krichevsky, 2019; Krichevsky & Bagrov, 2019; Mayboroda, 2019).

³⁴ See (Krichevsky, 2019; Merzhinov, 2018; Mayboroda, 2019).

on the Moon will require simultaneous creation of two systems: the main and the backup, necessary to replace the main one during the repair period and in other situations.

5. *Space reserves on the Moon.* The project of zoning of the Moon surface and near-lunar space, also including libration points in the Moon-Earth system, with the allocation of territories, spaces for wildlife conservation in the environment, with a regime of restriction or a complete ban on technical activities and nature management in order to preserve the integrity and purity of the natural environment, to protect and conserve unique objects of natural and cultural heritage, including artifacts and monuments of science and technology on the Moon related to the history of its development. This must be done by analogy with the approaches, rules, and experience in creating and operating nature reserves and other protected natural territories on Earth.³⁵ There are new ideas and technologies for protecting the environment of the Moon and its usage, including for the preservation of unique artifacts, objects and copies, archives of the natural and cultural heritage of terrestrial civilization in special storage facilities on the Moon, under its surface, in the structures made of solid basalts. Exceptional stability of lunar constructions from local solid basalt lets create on Moon extremely reliable storage of cultural values of mankind, — after (Krichevsky & Bagrov, 2019: 43-47).

Why do we need the Moon, what are the risks, what do we want to get from Moon exploration, and how can we get it? What will we gain and lose without going to the Moon? What new problems and prospects can appear during the development and permanent life of people on the Moon? How to control the exploration of the Moon? These and other issues will be discussed and solved by humanity in the process of total exploration and colonization of the Moon, developing and correcting knowledge, attitudes, ideas, concepts, projects, technologies, and activities on Earth and in outer space.

Today it is obvious that in moving from Earth to outer space, humanity needs a new fulcrum and a new cutting edge, which the Moon naturally becomes.

Moon exploration can unite humanity, give a new chance to the earthly human of a Homo sapiens species and our civilization to survive on Earth, and create a “cosmic” human and “reserve” cosmic humanity beyond Earth, and then become a full-fledged cosmic civilization.

Main conclusions

1. A brief review of the history and periodization of the process of research and exploration of the Moon was made, as well as an analysis of the prospects for total Moon exploration and colonization by humanity in the future global paradigm was performed.
2. Moon exploration in the 21st century is becoming a priority for space activities of the leading space states and the world community, one of the main directions of the new space exploration strategy to be developed.

³⁵ The first publications of the author devoted to it dated back to 2003-2012, after (Krichevsky, 2019: 23).

3. There were proposed: a new “comprehensive” concept of Moon exploration; a concept of total Moon exploration and colonization, including a general process model, a general super global project, and environmentally friendly technologies.
4. Humanity needs to combine efforts and resources, jointly explore the Moon according to a general super global world project, new “rules of the game,” including political, economic, technological, military, biomedical, sociocultural, environmental, and other aspects, preservation of natural and cultural heritage.
5. It is necessary to develop and adopt a new lunar social contract — an international agreement on the exploration of the Moon, a unified strategy for Moon exploration as a part of a general strategy for space exploration balanced with the solution of terrestrial problems.
6. There is a need to create “reserve” humanity on the Moon for the survival of the human species of *Homo sapiens* and restoration of humanity in the event of a global catastrophe on Earth.
7. For effective Moon exploration and maintaining a balance with the environment, it is necessary to develop and use fundamentally new environmentally friendly technologies and projects.
8. It is proposed to create an International Institute for Moon Exploration and its laboratory on the Moon as part of the first international lunar base.
9. It is necessary to organize interdisciplinary studies of the philosophy and experience of Moon exploration, followed by the use of their materials and results in science, education and practice.

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Martin Heidegger and the Being and Time of Black Holes

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*Scientific narratives about cosmology often present black holes as frightening objects of both creation and destruction, the centres of which are concealed behind event horizons. According to studies, black holes are capable of distorting time and tearing apart anything that plunges toward them. This article asks what the latest knowledge about the properties of black holes can contribute to philosophical understandings of being and time. Drawing on both scientific and narrative constructions of black holes in books written by physicists, the article analyzes black holes in relation to Martin Heidegger's philosophy of ontology in *Being and Time*. The article argues that the topics of concealment, time, and mortality form interrelated points of intersection among scientific constructions of black holes and Heidegger's philosophy. First, scientific commentaries on the concealment of singularities speak to Heidegger's interpretation of the ways being is concealed in modern society. Second, with regard to time, the phenomenon of gravitational redshift invokes Heidegger's criticisms of clock time and, by extension, notions of infinitude. On the other hand, theories about Hawking radiation and the decay of black holes also invoke Heidegger's thesis that time subsists predominantly as a passing away toward the cessation of existence. Third and finally, Heidegger's renowned and controversial explication of mortality helps frame black holes symbolically as forward-projections toward the impossibility of existence. Bringing these three subjects together, the article concludes that, as Heideggerian symbols of being and time, black holes represent projections toward the possibility of impossible modes and forms of existence. In this sense, black holes emblemize a relationship between being and time that marks the potential limits of existence, as humanity and science understand it.*

Keywords: Black holes, Martin Heidegger; being, time, mortality, concealment, singularities

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Introduction

This article explores intersections between scientific narratives about black holes and Martin Heidegger's philosophy of ontology in *Being and Time*. Drawing on current knowledge about black holes and figurative representations of them in books written by scientists, the article locates three interlinked points of comparison between black holes and

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Being and Time: concealment, time, and mortality. The first part of the article addresses these subjects by examining how scientific commentaries depict black holes as concealed objects of destruction and creation, which speak to ideas of both infinitude and inevitable decay and dissipation. The second part charts crosscurrents between these portrayals of black holes and Heidegger's interpretation of temporality, death, and the concealment of being in *Being and Time*. Heidegger's philosophy situates being specifically in relation to individual experience, working against contemporary developments in science, including Albert Einstein's theories of relativity. Yet a Heideggerian reading of present-day scientific narratives about black holes helps reframe the philosophical significance black holes carry as cosmic objects that proffer insights into the nature of being and time. Building on Heidegger's understanding of being as a forward-projection in time toward unrealized possibilities, the article argues that black holes symbolize, in Heidegger's terminology, the possibility of impossible modes of existence. In this way, as philosophical tropes, black holes capture a relationship between being and time that marks the potential limits of existence, as humanity and science understand it.

Black Holes: Destructive, Creative, and Concealed

Often regarded as the “weirdest things in the universe” (Musser, 2015: 24), black holes have a reputation for extremity, danger, and demonic power. When writing about black holes, physicists deploy a range of metaphors and similes to capture these qualities, likening them to invisible monsters (Galfard, 2015: 28; Harland, 2003: 193; Musser, 2015: 161), giant spiders (Geach, 2018: 133; Gubser and Pretorius, 2017: 66), and “brooding, hulking beast[s]” (Scharf, 2012: 99). Many physicists also explicate black holes by describing hypothetical descents into them, which typically include graphic portrayals of horrible deaths and even sometimes analogies to descents into hell (Susskind, 2008: 36; Impey, 2010: 177). Neil deGrasse Tyson writes, “Without a doubt, the most spectacular way to die in space is to fall into a black hole. Where else in the universe can you lose your life by being ripped apart atom by atom?” (2007: 283). Similarly, Brian Greene guides his readers through the experience of falling into a black hole, writing, “you would be stretched with a force that would quickly tear your body to shreds” (1999: 80). Physicists also tend to emphasize that the singularity of a black hole is the locus of its dangerous power. Leonard Susskind writes, “No place is as nasty as the singularity of a black hole” (2008: 32). Steven Gubser and Frans Pretorius describe a singularity as a “terrible, infinitely compressed kernel of matter” (2017: ix). Fred Adams and Greg Laughlin state that a “singularity is a point where, roughly speaking, all hell breaks lose” (1999: 137). The figurative language physicists call upon to describe singularities complements but also diverges from their constructions of black holes. Whereas black holes are akin to monsters, spiders, or rapacious beasts, singularities are usually analogous to “open wound[s]” (Seife, 2000: 183) or “devastating rift[s]” (Greene, 1999: 343) in spacetime. These descriptions and image patterns present black holes as diabolical creatures, the hearts of which encapsulate breakdowns in spacetime. In a literary sense, black holes are like monsters that demarcate the limits of the universe.¹

In scientific narratives, singularities are associated with danger and destruction, but relatedly, they are also allied with concealment and threats of exposure. For instance, terms like “cosmic censorship” and “naked singularity” suggest that singularities are akin to obscene objects that must be covered up. As far as science knows, all black holes contain

¹ Some physicists directly invoke the idea that black holes mark the limits of the universe. See for instance Greene (1999: 344), Seife (2000: 184), Adams and Laughlin (2000: 112), and Tyson (2007: 284).

event horizons, which means that none of their singularities are “naked.” Most physicists treat this cosmic censorship, as Roger Penrose dubbed it, not only as a natural phenomenon but also as a protective device against something horrible. Charles Seife writes, “the singularity of a black hole is so ugly, so dangerous, that nature tries to shield it, preventing anyone from seeing the zero at the center of a black hole and returning to tell the tale. Nature has a ‘cosmic censor’” (2000: 183). As mentioned, Susskind refers to singularities as the nastiest places in the universe, comparing the potential effects of “their alien and brutal properties” to “any torture Dante imagined” (2008: 37), but he also emphasizes that they are safely contained, describing them as “tightly sealed vault[s]” (2008: 184). Scharf imagines a dire scenario in which an “event horizon would be torn apart, and the true singularity would be exposed and naked,” before proceeding to affirm that “Singularities are best kept hidden behind event horizons. If they weren’t, then, in technical terms, all hell would break lose” (2012: 108). Finally, Paul Davies comments that “singularities are so obscene they will always be decently clothed by black holes” (2001: 57). In these examples, the destructive and excessive capacities of singularities work in lockstep with their necessary concealment. Singularities are not merely wounds or tears in spacetime; they are hideous if not obscene reservoirs of destruction, comparable to the deepest pits of hell, which the universe does well to hide from humanity and everything else.

Notwithstanding the connection between the sinister properties of singularities and images of concealment, physicists also speak about black holes as centres of creation linked to the origins of the universe. Case in point, the latest evidence indicates that all galaxies have supermassive black holes at their centres, and moreover, the existence of quasars suggests that black holes play the lead role in the formation of their hosts.² Neil deGrasse Tyson and Donald Goldsmith write that, although supermassive black holes account for “less than 1 percent of a large galaxy’s total mass,” they nevertheless “dominate the energetics of galaxy formation” (2004: 138). Cosmologists have discovered that quasars already existed less than 700 million years after the Big Bang, so it appears that supermassive black holes are tied to the earliest structural formations in the universe.³ In fact, scientists like Musser (2015: 197), Carol Rovelli, and David Harland have wondered if the Big Bang may have developed in conjunction with a black hole, perhaps one that inhabited another universe. For example, Harland asks whether the “Big Bang is really no more than an internal perspective of the formation of a black hole?” (2003: 229). Rovelli diagrams how the process through which “Matter gets squashed, but not all the way to an infinitely small point” in singularities may correspond to the Big Bang: “Quantum gravity generates a huge pressure that makes matter bounce out, precisely as a collapsing universe can bounce out into an expanding universe” (2017: 200). Thus, in scientific narratives, black holes have a certain duality, with their

² Quasars are ultra-luminous objects created when the friction and viscosity of interstellar gas plunging toward an event horizon cause huge levels of electromagnetic radiation emission. Despite the small size of supermassive black holes compared to their host galaxies, the “intense energy output” of quasars, which includes not only their luminosity but also the “powerful ‘wind’” from their accretion disks, can transfer enormous amounts of “energy or momentum into the surrounding interstellar medium,” triggering the development of new stars (Geach, 2018: 143).

³ One of the chief conundrums in contemporary studies of black holes involves the question of how and why supermassive black holes formed so early in the history of the universe. As far as science knows, black holes form through the collapse of large stellar remains, but the oldest black holes seem to have appeared around the same time that stars were forming, raising questions about the chain of causality. For considerations of this mystery, see Gubser and Pretorius (2017: 74; 113), Kidger (2007: 37), Scharf (2012: 179-80), and Hawking (“Classical,” 2010: 4).

monstrosity and concealment playing off of their stature as central engines in the universe. As Galfard suggests, a duality between the centrality of black holes and their inimical qualities is not contradictory, at least when juxtaposed with other massive bodies: “Take the Earth. Its centre is the densest, hottest, harshest place there is (within the Earth). Take the solar system. At its centre lies the Sun, the densest, hottest, harshest place there is (within the solar system)” (2015: 28). In scientific commentaries, black holes may be analogous to infernal pits that are so awful they must be draped behind event horizons, but they also correspondingly represent the centres of not only galaxies but also perhaps universes. Speaking symbolically, black holes signify a centrally-located dialectic between terrifying destruction and originary creation.

The dramatic language scientists use to describe black holes dovetails with their depictions of the impact black holes have on the structures of time. There are different types of black holes, but the common definition of them is that they are “regions of space where the gravity is so high that the fabric of space and time has curved back in on itself, taking the exit doors with it” (Tyson, 2007: 283). A black hole has no distinct surface, but it does have a “point of no return,” the aforementioned event horizon, which is the region where the exit velocity required to escape the gravitational pull of the black hole exceeds the speed of light. One of the bizarre facets of black holes is that, due to their intense gravity, the passage of time slows down considerably near their event horizons, a phenomenon known as gravitational redshift. Capitalizing on this phenomenon, physicists often construct fantasies about time-travel by envisaging people in spaceships orbiting close to an event horizon.⁴ What is perhaps even stranger about black holes is the theory that “It takes infinite time to fall into a black hole, measured from the frame of someone outside” (Muller, 2016: 83). To illustrate this point, Susskind sketches a picture of an individual watching a companion falling toward a black hole, asserting that, from the perspective of the observer, her friend would appear to become “more and more lethargic, slowing almost to a standstill” while seeming never to cross the point of no return (2008: 45). The person falling into the black hole *would* experience a transition over the event horizon, but extricating herself from this region would be tantamount to travelling backwards in time. As Greene asserts, one of the speculative theses that has grown out of these conceptualizations of black holes concerns the passage of time within them: “since all of the matter that has crossed the event horizon is inexorably drawn to the center of the black hole, and since once there the matter has no future, time itself comes to an end at the heart of a black hole” (1999: 344). Among other things, such speculations acknowledge that it is impossible for anything, even light, to convey information about the workings of a black hole from beyond the event horizon. The lack of naked singularities means that science has no verifiable theory about what happens to matter and energy beyond the point of no return.

If time “comes to an end at the heart of a black hole,” then black holes may appear to be infinite objects, somehow exempt from the temporal workings of the universe. However, contemporary science indicates that, in actuality, black holes emit heat and thus display entropy, slowly losing mass before finally evaporating to nothing. Stephen Hawking was the first scientist to identify this process. His discovery was startling, in part because, for

⁴ For example, Rovelli imagines a rocket ship positioned close to the event horizon of a black hole: “If the rocket stays near enough to the horizon for one hour, and then moves away, it would then find that, outside, in the meantime, centuries have passed. The closer the rocket stays to the horizon, the slower — with respect to the outside — time runs for it. Thus, travelling to the past is difficult, but travelling to the future is easy” (2017: 196-97). For similar examples, see Adams and Laughlin (2000: 116-17), Susskind (2008: 71-72), and Davies (2001: 36-40).

all their terrifying qualities (and in fact *because* of these qualities), black holes appear to be remarkably simple objects. They consume their entire past histories, leaving nothing but the censoring event horizon and three potential properties, mass, electric charge, and rotation rate.⁵ However, Hawking discovered that black holes can radiate photons due to the entanglement of quantum and thermal fluctuations near their event horizons — entanglements that cause black holes to lose energy.⁶ As Musser puts it, “Hawking’s startling point was that decay is the rule of nature. Almost everything in this world eventually dies. Black holes are not exempt” (2015: 27). Black holes carry associations of infinitude, not only due to their radical distortion of time but also because of their potential links to the Big Bang. In a related vein, scientists have also described the “infinite density” of their singularities — though quantum gravity suggests that there are limits to density, even in a singularity (Rovelli, 2017: 200; Susskind, 2008: 134-39). Nonetheless, although black holes invoke notions of infinite time, they do not stand outside of time. They may well emblemize the limits of the universe, but evidence indicates that they are still bound up with the entropic decay that afflicts all things embedded in time.

A Heideggerian Analysis of Black Holes: Concealment, Time, and Mortality

How do scientific constructions of black holes overlap with Martin Heidegger’s existentialist philosophy in *Being and Time*? There are three main points of connection, based on the subjects of concealment, time, and mortality. The first topic, concealment, accesses both scientific and philosophical questions about the nature of being. In scientific narratives, the hidden monstrosity and obscenity of singularities works in concert with the centrality of black holes and their roles as catalysts in the formation of galaxies, if not universes. In *Being and Time*, Heidegger argues that the heart of all creation and existence in the universe is concealed from people. What is concealed for Heidegger, however, is not an object, but the concept of being. Heidegger writes, “that which remains *hidden* in an egregious sense, or which relapses and gets *covered up* again, or which shows itself only ‘*in disguise*’, is not just this entity or that, but rather the *Being* of entities” (1962: 59). Heidegger makes a distinction between phenomena that are covered up because they are “quite *undiscovered*” (1962: 60) and those that are buried under social forms of elision, which revolve around everyday perspectives on humanity, the world, and reality. In one sense, the singularities of black holes are concealed because they are undiscovered — scientists know that they exist based on the influence they have on their surroundings, but they have been unable to observe them first-hand. Yet Heidegger’s point that “Being and the structure of Being lie beyond every entity and every possible character which an entity may possess” (1962: 62) reorients the relevance of his interpretation to black holes.

From Heidegger’s standpoint, the concept of being lurks behind singularities (as it does for anything), but importantly, singularities are also central engines in the creation of being, as modern science understands it. As mentioned, the presence of primordial black holes implies that they served as original components of the early universe. What is more, scientists

⁵ The stark simplicity of black holes is known as the “no-hair theorem.” For further considerations of this theorem, see Adams and Laughlin (2000: 112), Gubser and Pretorius (2017: 72), Greene (1999: 335), and Hawking (“Quantum,” 2010: 39).

⁶ For discussions of this process, see Susskind (2008: 168-74), Krauss (2012: 155-56), Rovelli (2017: 197-99), Greene (1999: 336-37), Harland (2003: 227-28), and Adams and Laughlin (2000: 131-33).

have speculated that the Big Bang could have emerged from an antecedent black hole (such as in Rovelli's example of crushed matter "bouncing out" from a singularity). In this way, black holes are not just *any* entity in the universe; they are objects that might stand at the core of being itself. In the context of *Being and Time*, the concealment of singularities takes on a symbolic resonance. As with any entity, the being of singularities is "hidden" or "covered up" due to a variety of factors; but as potential loci of being itself, singularities also offer a tangible example of the way being is intrinsically hidden in the cosmos. In other words, through their inherent properties, singularities concretize Heidegger's thesis that being tends to be concealed.

At the same time, in Heidegger's philosophy, being is concealed not because it is naturally obscene, destructive, or monstrous, but because it is buried under collective, everyday perspectives that compel people to focus on more immediate, trivial concerns. Having said that, the element of danger allied with singularities does intersect with Heidegger's investigation of the ways society covers up the meaning of being. To understand this intersection, it is necessary to consider the second point of connection between black holes and Heidegger's philosophy, the subject of time. As James Demske (1970: 50), Sean Ireton (2007: 240), Martin Weatherston (2002: 149), Richard McDonough (2006: 6), and Emmanuel Levinas (1996: 13) have pointed out, one of the principal theses of *Being and Time* is the notion that time is not a feature or property of being, but rather constitutes the "*fact of being itself*" (Levinas, 1996: 13). For Heidegger, investigating being is synonymous with investigating time, and vice versa. However, although Heidegger's career overlapped with Einstein's theories of relativity, he adopts the stance that modern physics is complicit in the process of covering up the intimate relationship between being and time. As David Scott considers, Heidegger regards physicists as participants in an inauthentic perception of time that construes it as "reversible, cyclical, and iterative" — a perception grounded on the ways modern technologies, specifically clocks, keep track of time (2006: 196).

Heidegger declares that clocks reduce time to "an uninterrupted sequence of 'nows'" devoid of either a "beginning" or an "end" (1962: 476). For Heidegger, because the hands on a clock point constantly to a "now" which is "always *already* a 'forthwith' that is no longer," they create the sense that time stretches across an infinite, circular series of "nows." Every "now" is always simultaneously a "not-yet-now" and a "no-longer-now," so each "now" is essentially indistinguishable from any other. In short, clocks treat the passage of time as a ceaseless progression that has neither a point of commencement nor a terminus. Yet if, as Heidegger declares, modern physics buys into this perspective, then the scientific depiction of black holes at least offers a unique take on so-called clock-time. To an exterior observer, anything crossing an event horizon would get suspended in a frozen "now," creating a portrait of infinitude in which the past and future are separated by an eternal present. A person witnessing somebody falling into a black hole could observe a true "now" extricated from the interplay between "not-yet-now" and "no-longer-now." On the other side, that black holes are themselves finite objects suggests that they do have both starting points and endpoints, meaning their existence ultimately falls outside of an endless sequence of "nows." The tension between Heideggerian ideas about clock-time and the finitude of black holes underlines the symbolism black holes carry as objects representative of being and time, a point I return to below.

The finitude of black holes also introduces the third and final connection between *Being and Time* and black holes, the topic of mortality. Heidegger's main complaint about the clock-time model is that it exemplifies how "world-time and accordingly temporality, in general,

have been levelled off and covered up” (1962: 476). Clocks contribute to the concealment of temporality by hiding the ontological relationship between being and time in the life of the individual.⁷ For Heidegger, clock-time artificially separates time from the individual’s experience of the world, presenting it as an external and infinite continuum. Heidegger counters that, for any individual, the basic meaning of time is that it is always passing away and refuses to “let itself be halted” (1962: 478). In this view, the individual does *not* experience time as an infinite movement of interchangeable “nows”; instead, she experiences time as a passing away toward an end, namely the end of her life. What society, physics, and modern technology conceal is the existential threat at the core of time, the individual’s mortality. Furthermore, the individual’s death — something that arrives inevitably through time — cuts to the core of being since it accesses the most fundamental questions about the individual’s existence in the world.

Heidegger’s interpretation of mortality reinstates the question of how scientific narratives that portray singularities as hidden sources of danger tie into his theories about social concealments of being and time. Heidegger argues that society conceals the meaning of mortality by demanding that any given individual view death as an outside danger consigned to the distant future. From the social standpoint, death is a “mishap” (1962: 296) or a “threat” (1962: 297) that besieges others and *may* eventually imperil the individual. The upshot is that the public crafts a narrative which tells individuals they should have the courage to view death with tranquility and indifference. Consequently, an “evasive concealment in the face of death dominates everydayness” (1962: 297), cultivating the notion among people that, although death certainly does happen, *their* deaths can always be avoided for the time being. John Williams asserts, “The ‘when’ of death is put off to the remote future, and so the fact that death is possible at any moment is covered up” (2006: 107). Heidegger argues that an “authentic” view of mortality begins with the admission that death is in fact both certain and indefinite. The individual certainly will die, but she does not know when. This simple formula buttresses Heidegger’s argument that death is a state people occupy from the start of their lives, even if they never reach it *in* their lives: “Death is a way to be, which Dasein takes over as soon as it is. ‘As soon as a man comes to life, he is at once old enough to die’” (1962: 289). When Heidegger says that clock-time covers up being, his point is that clock-time feeds into the notion that, for the individual, mortality is a remote event of no real concern — a possible calamity trapped forever in an abstract “not-yet-now.” Clocks create the impression that every “now” is simultaneously already past and forthcoming, but the “now” of death remains perpetually forthcoming, as though it is a static moment that somehow exceeds the infinite circle of time. For Heidegger, though, what time truly represents is the individual’s relentless movement toward a confrontation with her own mortality, which is nothing less than a confrontation with the question of her being in the world.

Taking these points into account, the connections between scientific discourses about black holes and Heidegger’s theory of mortality bring another layer to the topic of concealment. Scientists tend to underline the dangerous power of black holes by imagining

⁷ Heidegger uses the term *Dasein* (“being there”), but for the sake of clarity, I adopt “the individual” as a translation. Heidegger’s concept of *Dasein* emphasizes that any question of being, no matter how far-reaching, is inseparable from the question of how humans understand being. Richard Sembera writes, “Heidegger informs his readers that answering the question of Being is equivalent to explaining how it is possible for Dasein to understand Being at all” (2008: 142). Related to this question is the follow-up query of what being means for the singular individual, though Heidegger does keep open the possibility that *Dasein* could invoke a collective body. See Stroh (2015) and Fynsk (1982: 187-88) for evaluations of whether “*Dasein*” necessarily refers to a single individual.

people falling into them, picturing them suffering incomparable levels of torture before being “squeezed like toothpaste from a tube and elongated into many fragments, extruded like biological spaghetti” (Impey, 2010: 177). In scientific narratives, imagery centred on the diabolical power of black holes works together with the concealment of singularities behind event horizons. In *Being and Time*, societal delineations of death conceal the significance of the individual’s relationship to mortality, asking her to regard death as something external and distant, which is “not-yet-now.” For Heidegger, however, the demand that individuals view death as remote and unthreatening only strengthens the impression that death is fearful. For Heidegger, fear is a situational emotion that arises when death appears to be drawing closer to a person (such as in dangerous situations, old age, or illness), but society insists that individuals stamp out their fears by telling themselves that death is avoidable, irrespective of the circumstances. In the public reckoning, death is nothing *but* a terrifying event that the individual needs to put off at all costs. Therefore, in both *Being and Time* and scientific commentaries on black holes, concealment works together with fears of death. Yet the key point is that, in these narratives, concealment accentuates the terror of death only to demonstrate that the individual should *not* fear it — at least not yet. The scientific narratives state that a black hole could eradicate the entire Earth,⁸ but they also make the point that, fortunately, black holes are distant, scarce, and covered up, and thus not an immediate threat. Relatedly, in Heidegger’s reading, society recognizes that death is menacing and may well lead to the cessation of the individual’s existence, but the public also maintains that, for any individual, death is distant and scarce — a “mishap” or “accident” that only happens to others, not to oneself. The paramount difference in this comparison is that, whereas the concealment of singularities can be seen as a natural protection against the deadly carnage of black holes, society’s concealment of death obfuscates the simple reality that the individual definitely will die and could do so at any time.

Black Holes as Heideggerian Symbols of Being and Time

Scientific understandings of black holes and Heidegger’s comprehension of mortality overlap but also diverge from one another, so what do the cross-sections reveal about being and time? The first step to answering this question is to outline what a Heideggerian exploration of mortality ultimately says about the individual’s relationship to being and time. One of the key axes of Heidegger’s argument is the claim that death never arrives in the individual’s life. He refers to death as the “*possibility of the impossibility of any existence at all*” (1962: 307). In these terms, what death represents for the individual is the potential loss of any actualization at all — a possible loss of the very notion of possibility: “Death, as possibility, gives Dasein nothing to be ‘actualized,’ nothing which Dasein, as actual, could itself be . . . the possibility reveals itself to be such that it knows no measure at all, no more or less, but signifies the possibility of the measureless impossibility of existence” (1962: 307). From Heidegger’s standpoint, death is not an event in someone’s life, nor is it a process of accretion; rather, it is a possibility that the individual approaches through time and yet never reaches. The reason she never reaches it is that death fails to present her with any recognizable mode of existence. Heidegger asserts that this conception of mortality reveals a fundamental truth about the individual’s relationship to being and time, namely that she

⁸ Adams and Laughlin provide a hypothetical description of a black hole approaching the Earth, outlining a sequence of events that includes deformations to the planet, earthquakes, and tsunamis, a process of obliteration that would culminate with the planet being “pulled like taffy into a disk of vaporized rock which forms a whirlpool in its stampede to enter the impinging black hole” (2000: 128).

exists as a forward-projection into unrealized possibilities. As Charles Guignon phrases it: “that my basic possibility is one that cannot be actualized involves recognizing that what I *am* at the most basic level is a reaching forward into possibilities, not an actualizing of possibilities” (2011: 197). For Heidegger, the anticipation of possibilities *and* the inability to fulfill them are core components of the individual’s relationship to being and time.

The second step to answering the question of what confluences between Heidegger’s philosophy and black holes reveal about the relationship between being and time is to revisit the topic of clock-time and finitude. Black holes may be central, cosmic objects that signify a dialectic between creation and destruction, but they can also be taken as Heideggerian symbols of being and time. As remarked above, from one perspective, black holes appear to offer a new angle on clock-time, which might in fact work against Heidegger’s criticisms. For Heidegger, the problem with clock-time is that every “now” indicated on a dial is at once forthcoming and yet already past, a process of tabulation that artificially flattens time into a span of infinite points moving in a cycle. Black holes seem to undercut this criticism by showcasing that the essence of time can indeed be located in a synthesis between “now” and infinitude. From an outside observer’s standpoint, anything falling into a black hole would slow and then grind to a halt, remaining caught in an endless “now.” One could say that this gravitational redshift captures a breakdown in time, but alternatively, one could argue that the distortion would equip a hypothetical observer to see time as it exists in itself. One of the challenges science faces when examining elementary particles such as electrons involves the difficulty of extrapolating them from their surroundings and scrutinizing them in isolation; but if the basis of this challenge is that subatomic wave-particles tend to be entangled with their environments, time is even more hopelessly entangled with *its* environment, existence itself. Observing something (even a person) about to cross an event horizon might be the closest equivalent to seizing hold of time — to slicing it, freezing it, and putting it under a microscope, so to speak. Such an experiment might reveal that, when time truly does occupy a genuine “now,” it becomes infinite. Yet this result would suggest that the meaning of clock-time is accurate: time really does inhere as an infinite sequence of “nows.” After all, if one tries to pinpoint time as an exact “now,” it reveals itself as infinitude — which is, according to clock-time, the same essence temporality has when it is flowing forward.

On the other hand, that black holes are finite and perishable pushes back against the correspondence between them and clock-time while also recalling Heidegger’s thesis that, for individuals, being shows itself as a forward-projection into unrealized possibilities. Given that the universe is 13.8 billion years old, all black holes, including primordial ones, must have had points of origin within that timeframe. A blackhole in another universe may well have served as the impetus for the emergence of *this* universe, but although this possibility does hint at an infinite multiverse,⁹ it does not imply that any one black hole should be eternal. So too, if black holes do eventually radiate away to nothing, then they also have points of terminus. How long, though, is the lifespan of a supermassive black hole? The simple answer is, vastly longer than the current age of the universe. Musser writes that a “black hole equal in mass to our sun” might decay over “trillions of years” into a “jumbled, formless spray of particles” (2015: 27). Supermassive black holes can be millions or even billions of times more massive than the Sun, and some estimates indicate

⁹ When writing about the Big Bang, Lisa Randall describes the possibility that this universe is “one of many universes that grew out of a universe/multiverse that has always existed” as the “least unsatisfying” answer to questions about what preceded the Big Bang or why this universe seems to encompass all of existence (2015: 30-31).

that they will evaporate over gargantuan timescales measured in googols (Frautschi, 1982: 217). Supermassive black holes are finite in the sense that they, like everything else, decay and disperse, but their lifespans are so vast that it is difficult to conceive of the future they will inhabit. In relation to *Being and Time*, such black holes do not symbolize the stasis of an eternal “now,” but rather capture a forward-projection into what is, for science, an unrealized possibility: a universe that could be up to 10^{100} years old. For Heidegger, an individual experiences time as a forward-projection in part because death does not arrive as a known mode of existence — as long as she is alive, death remains outstanding. Black holes, meanwhile, encapsulate the Heideggerian dynamics of time because they subsist as unfathomably long-lived mortal objects, the deaths of which hint at forms of existence unknown and inaccessible to current knowledge about the universe.

Heidegger’s appraisal of how individuals can develop what he calls an “authentic” understanding of mortality adds one final dimension to a comparative analysis of his philosophy and black holes. Heidegger claims that only by recognizing her mortality as the “*possibility of the impossibility of any existence at all*” (1962: 306-7) can the individual make a decision to choose existence over nothingness. For Heidegger, “freedom towards death” (1962: 311) revolves around embracing the anticipatory and contingent “thrownness” of existence.¹⁰ In this way, the individual is free to affirm existence as it is, which includes her pursuit of unobtainable possibilities, or she can choose the possibility of impossibility, the potential nullity of death. Of course, black holes cannot make such a choice, but humanity can perhaps draw on what black holes represent ontologically to understand cosmic relationships between being and time. Viewing black holes as symptomatic of a forward-projection into unrealized possibilities means accepting that everything in existence, no matter how powerful, is afflicted with death and decay, but it could also be tantamount to accepting that there are forms of existence which are not just unknown but impossible for humanity. Existence as science understands it commenced with the Big Bang, so anything that happened before that moment is inaccessible. One could say that nothingness preceded the Big Bang, but a Heideggerian way to rephrase this statement is to assert that what came before the Big Bang is the possibility of the impossibility of existence — that is, the possibility of modes of existence that form no part of existence, as humanity experiences it or as science interprets it. Also, although science can chart future developments in the universe by tracking past and current patterns, it may eventually run up again against the possibility of impossibility — forms of existence beyond anything it could even begin to grasp.

Conclusion

As objects that encapsulate being and time, black holes hint at notions of infinitude, but in a Heideggerian analysis, they also embody a projection toward the limits of possible existence. Speaking figuratively, the fearsome destructive power of black holes and their corresponding concealment underscore their roles as tropological gatekeepers at the limits of the universe, but what are concealed in them are not just singularities but also relationships between being and time that are impossible. Indeed, theories of general relativity break down and give way to quantum physics in studies of black holes, but consequently, the actual

¹⁰ In Heidegger’s terminology, “thrownness” refers to the way any individual, by being born, is “thrown” into a world full of history, frameworks, and modes of being that she did not choose. On a fundamental level, the individual grasps that coming into existence is *not* a possibility for her — she is, by definition, always already in existence.

workings of singularities remain mysterious. Theories of general relativity also break down in investigations of the originary moments of the universe, specifically the Planck era, further suggesting a relationship between an antecedent black hole and the Big Bang. Thus, if black holes mark the limits of the universe, they do so not by proving that existence writ large has a beginning and an end but by suggesting that *their* beginnings and endings intersect with impossible forms of existence. In the context of *Being and Time*, black holes are more than reminders that everything deteriorates and falls apart over time. They also remind humanity that the impossibility of existence is not interchangeable with absolute nothingness. The black holes at the middle of galaxies might, in their own ways, be moving relentlessly toward impossibility, leaving humanity and perhaps even this universe behind in their march forward through the thrownness of being and time.

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The Pandemic, the Crisis of Modernity, and the Need for a New Semantic Project of Civilization

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In the article, the modern pandemic is considered as one of the signs of deep crisis of our civilization, as the answer of the first and second nature to the character of its development. The author believes that the pandemic stands in line with technogenic disasters, but that it is unlikely that after the pandemic, the world will change, as mankind has not realized the reasons for what is happening. In a modern situation, it is possible to look differently: optimistically and pessimistically, as on the civilizational crisis caused by the end of the semantic project of a modernist style. The basis of this project is analyzed: the idea of nature acquirement, the creation of natural science and engineering, the task of building the state, law and society. It is affirmed that the project of modernity was implemented, giving rise not only to modern life and sociality, but also to the Mont Blanc problem. In order to demonstrate the transformation of reality as a result of the project of modernity, the author discusses what happened to the concepts and concepts of nature, technology, personality, economy, state and society. This analysis allows him to argue that the mainstays (principles, pictures and scenarios) on which modern was built, have changed dramatically. They can no longer perform the function of a semantic project of civilization and, therefore, a new project is needed that corresponds to the existing reality, new challenges of the time, new forms of sociality, and development trends. The main trends of social development are characterized: formation of new technologies, the crisis of coherent concepts of modern, the formation of Webcieties and maticultures, convergence of capitalism and socialism systems, formation of new morality and vision of reality. At the end, the author discusses the features of the new semantic project of civilization: the need to recognize the completion of the project of modernity, to formulate on three levels of ideas that could capture our contemporaries (the corresponding hypotheses are expressed), to discuss the conditions of such a project.

Keywords: civilization, culture, nature, society, personality, project, implementation, sociality, crisis, law

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Introduction

The planet is large, somewhere, for example, in Russia, the pandemic is approaching a plateau, and in some countries, quarantine and self-isolation regimes are already beginning. They are preparing for the opening of borders. Increasingly, the question is, what will happen next — will the world change or not? Many commentators and analysts were sure that, yes, the world would change dramatically. But I, as well as the well-known Russian sociologist and economist Vladislav Inozemtsev, believe that although some progress will occur, nothing will change significantly, because mankind has not yet really realized what has happened or why it is impossible to live as before (Rozin, 2020).

Vladislav Inozemtsev on *Ekho Moskvy* says, “I am one of the few who believes that nothing will change ... Look at the world economy. It has been formed over the past 20 years precisely in the hopes and assumptions that everything will develop as it is. Let us imagine — now in America, there are 35 million unemployed, in Europe there are also a lot of them — let us imagine that now the structure of the economy, which was, is not recovering. What happens to these people? What happens to, say, the millions of migrants who are in Europe working in the service sector? What will happen to those people who are still employed? What does it mean the world will change? It remains the same for now. Yes, it will change very radically in the next 10, 15, 20 years, because people have caught this signal that there are much more real dangers in the world than it seemed. And the economy is going to adapt. But in the short term, it will recover in the forms in which it existed, because it has no other forms.

As for Russia, again, we have seen perfectly well over the past 12 years that the standard of living of the Russian population is declining ... We have no sources of growth. This became apparent after the crisis in 2008. Yes, oil helped a little bit. But the growth has faded in the last years of Medvedev’s presidency. It is impossible to wait for it to grow. We are going in a long, downward trend. Now it is going to accelerate.

...I cannot say that people are used to it, but in general, they do not understand how this trend can be changed. It can be changed only by destroying this state. People are afraid of this, because everyone can remember the 91st year; they do not understand what will happen if it all collapses. And therefore, there will be a very serious line that many will not want to cross... with the current system of management, with the current system of economic management, it is impossible to hope for any growth” (Inozemtsev, 2020).

Most people think that in a year or a year and a half, a vaccine will be developed that will be vaccinated to the willing and unwilling, everything will go into its rut, and the world and the economy will rush forward again. In the worst case, the doctors calm down, the coronavirus will tread the globe like a normal flu. I think the situation is much more serious. The Coronavirus pandemic is better compared not with natural disasters, earthquakes, and tsunamis (remember, in 2004, approximately 200,000 people died in Sri Lanka), but with technogenic disasters like Chernobyl. Technogenic disasters are human-made, well, maybe not in the literal sense of the word (these are not terrorist acts like September 11). Nevertheless, they are conditioned by human activity, which has become not only commensurate in scale with planetary tectonic processes.

Note that the rapid spread of COVID-19 has been facilitated by intensive international economic activity, trade, tourism, hugely increased population density and contacts, the development of new nutritional technologies that allow for the consumption of previously inedible foods, experiments and developments with genetic material, and strangely enough, even methods of treating diseased people. So many clinics have become foci of

coronavirus infection. Who would have thought, says Konstantin Remchukov, editor-in-chief of “*Nezavisimaya Gazeta*,” that “the virus will come from somewhere,” everyone flies by planes... “In Wuhan, 20 years ago, 18 million tourists visited this whole province, and 288 million tourists in the 18th year. There are airplanes flying to 54 countries, 82 cities in China. And, you know, if they fly out of this Wuhan, go to the market, eat... And so around the world... Of course, these are factors predetermined by the level of globalization” (Remchukov, 2020).

Does not a pandemic contribute to the rapprochement of the biosphere with the technosphere, to their interpenetration into each other? More precisely, a human through his activity, which has become global and planetary, changes the living conditions of almost all biological organisms, not excluding his own. They begin to behave unusually. It even seems that some, like coronavirus, are specially created by man either for the purpose of possible superprofits or as a potential weapon against their enemies (by hearing, more than a dozen conspiracy theories of coronavirus). Suddenly, the enemy was the whole of humanity. It appears that the coronavirus pandemic is the answer of the first and second nature on the character of the development of our civilization. But it is clear that not only a pandemic forces nature take revenge on man, technogenic disasters are added to it, and even ahead of it, also, however, as well as less noticeable changes — damage to the environment (for example: pollution, warming), increased risk of falling sick or dying, all this in general leads to dissatisfaction of many people with life.

But, has it always been so, enough to remember the cholera epidemic in the Middle Ages, which took millions of lives? But indeed, modern man has created an effective science and medicine. Now he can not only see his enemy in the “face” (in the microscope), but also develop a vaccine against him, and vaccinate everyone. The price for this development is indeed such a transformation of the environment and human life, which generates the subsequent problems, risks and epidemics. But indeed, the average life expectancy of humans has increased significantly, and in general, he began to live better. Modern human lives more comfortable, richer, more interesting. Well, of course, not all, but has it ever been so that everyone on earth as well? At the same time and in this respect, life has become better: the redistribution of the national product is increasing from workers and successful in competition to nonworkers and less successful. Today, as we know, millions of people in different countries live on allowances and grants, and earlier, they would simply die of starvation or disease. Indeed, many are still dying today, especially in Africa and backward countries.

From a project of modernity to a project of post-civilization

In short, you can look at the current situation in two ways. On the one hand, to say that despite all the problems and crises, human life expectancy increases, life itself becomes better and more comfortable, very slowly, but still social fairness is established on earth. On the other hand, pandemics and technogenic disasters, dissolution of morals and social inequality, rabid economic competition and struggle for influence, insistence on the priority of their ideological and national ideas have put our civilization on the verge of death. A couple of steps and irreversible processes will start, if not already started. And then the COVID-19 pandemic will seem to us not so terrible, just another call that we did not pay attention to.

I am not going to take one or the other side, but rather I will consider how the world in which we live, and what happened to the “foundation” on which it still stands. This world received the name from the humanities “New European Culture,” from sociologists

“modern,” and is based on the project and principles outlined in the 15th — 17th centuries. Here is also the principle of religious tolerance, approved during the reformation. And the idea that nature, not God, is the source of human well-being. And the social scenario, formulated by Francis Bacon, according to which the main goal is to master nature by creating natural science, engineering, and industry based on them. This also includes the task of building a non-estates society and a state. It must take over the protection of its citizens, as well as the regulation of economic and social relations. To these principles it is necessary to add both the cult of a free, enterprising and rational person, who should solve all these tasks, and the idea of a society, which should balance the state, making sure that it does not subjugate its citizens by depriving them of their freedom (Rozin, 2020).

All these principles and concepts set the “semantic project” of modern, which took the place of the *semantic project of culture of the Middle Ages*. The latter was a belief in the existence of the Creator in three persons, who created the world and humans. The idea that this world will pass, and there will be a second advent of Christ and the Last Judgement. The project also included a scenario of remaking an ancient man into a new Christian. Around the 14th — 15th centuries, this semantic project was implemented: the majority of the European population adopted Christianity and lived according to the principles of the Holy Scriptures, and the church removed the idea of the Last Judgement into an uncertain future. The man lived more and more with earthly concerns. The class society collapsed; the Catholic world was in crisis.

A new semantic project was needed, which was created. In this case, the reality within which the existence was thought, from heaven was transferred to earth. In the center of the world and creation was man. As stated in the treatise of Pico Della Mirandola, “Then God accepted man as a creation of an undefined image and, putting him in the center of the world, said: “...I place you at the center of the world so that from there it would be more convenient for you to view everything that is in the world. I have not made you either heavenly or earthly, mortal, or immortal, so that you by yourself, a free and glorious master, shape yourself in the image that you prefer” (Mirandola, 1962: 507, 509).

The united space of the Christian Catholic faith was divided into different confessions (Catholics, Lutherans, Calvinists, Anglicans, Baptists). Earth reality was increasingly interpreted as nature, the laws of which were studied in natural sciences, it was nature that was seen as a source of strength, energy, and well-being of man. The engineering industry was called upon to realize this vision, which in turn, creating a new technique involved in the laws of nature. Decomposition of medieval class society, secularization process, trade, and industry created conditions for individual freedom and formation of mass audience (communities) of producers and consumers. Law, economy, and state are created to bring them into the social framework; in parallel, society is being formed as a force commensurate with the state, designed to control it, which history has shown to be rare and difficult.

It was the content of the conceptual project of the modernist style, which began to be implemented from the 16th — 17th centuries. By the twentieth century, the project of modernity had not only been implemented. Still, it was also seriously criticized, as new problems and various negative consequences of the project of modernity were implemented. The end of the second millennium can be qualified as the beginning of the transition from modern to post-European civilization. It is characterized not only by criticism and denial of the project of modernity, but also, by the growth of crisis phenomena. While at the same time, no one of the states was going to give up the project of modernity.

On the contrary, the main trend of development is to squeeze out of this project as much as possible. The attitude to return to the previous directions of development and values after the coronavirus pandemic testifies to the fact that we continue to live in captivity of the ideas of the project outlined here. Let us consider how the ideas on which the project of modernity stands have changed.

Nature. When the project of modernity was just taking shape, we were talking only about the “first nature.” Nature was thought of as “written in the mathematical language,” as obeying eternal and invariable laws, as containing hidden forces and energies that can be mastered and controlled, provided that the natural sciences discovered the appropriate laws and the creation of engineering devices operating within the framework of these laws (Rozin, 2017). Usually understood nature (outside the window) was reduced to this image, which, by the way, led to the ignoring of consequences uncalculable by engineer. On the contrary, space, which was largely deprived of its sacral beginning, was seen as an ideal example of the laws of nature, because here the processes were not distorted by human intervention or unique earthly conditions.

Nowadays, the perception of nature has changed significantly. It seems that we have already discovered the basic laws of the first nature (one of the last areas still unexplored is biological reality). In addition to the first nature, in the late 19th and early 20th centuries, the concept of “second nature” was introduced (for example, as part of the distinction between “nature and spirit sciences”). Today, the second nature is primarily a social and human phenomenon. Concerning nature, it is already difficult to speak, written in the language of mathematics. The second nature, as I show it, is grabbed, ended in schemes rather than in mathematical constructions (Rozin, 2017: 233). Nature is no longer seen as a source of our well-being. Yes, it gives much, no one denies it, but at the same time, it is a source of serious destruction and risks (environmental crisis, technogenic disasters, etc.). As a result, nature can no longer be seen as a basic reality of our existence and well-being. And space is now understood differently. The question of its exploration has shriveled before the exploration of the solar system (which, indeed, is quite real), and outside it, man is more likely to deal with the first nature, but uncertain and singular. In fact, in relation to this nature, he does not know what to do. Today the space is perceived mainly as a challenge to our usual notions of cognition, science and thinking.

Technique. Again, during the formation of the modernist design, the technique was understood quite differently than it is now. These are mechanisms and tools later in the 18th — 19th centuries of the machine. And the main technique with the easy hand of engineers was thought as operating on the basis of the laws of nature, as calculated and designed, and therefore, as a means of targeted controlled human activity. But already Nikolai Berdyaev, discussing the phenomenon of the machine, guessed that the technique enters the life of man on a completely new basis, that it can not be reduced to either human activity or nature, it forms a new reality that rises between the two (Sadykova, 2018). At present, this has become evident — in addition to nature and sociality, technology forms an independent reality that has as much influence on human life as the first nature.

If in 18th — 19th centuries it was engineering that was the leading type of technical activity, today it is technology. At the same time, I show that the essence of modern technology is not so many procedures and operations based on the processes of the first nature (this type of technology I call “technology in the narrow sense”) as co-organization of different activities (scientific, engineering, design, organizational, managerial, etc.), caused by socio-cultural factors (respectively, “technology in the broad sense”). These two points (organization of

different types of activities and socio-cultural factors) make technology in the broad sense, an extremely important factor in the development of our civilization (modern and post-modern). Since these moments are aspects of modern's sociality, technology in the broad sense is linked to social projects and systems. This explains why modern states link their well-being with the development of technology.

Personality. Free, enterprising, standing above nature, reasonable — such a person declared Bacon, Descartes, Pascal, Kant, and such a person was required to learn the laws of nature, to build natural science and engineering, to create a national state, law and society.

The modern personality is a lot of different types of personality (“unique personality,” “mass,” “moral,” “deviant,” etc.) (Khmil & Popovych, 2019). But most importantly, before it does not open, as before the person of the beginning of the era of modern, not yet known nature, do not lighthouse plans for a new world (state, law and society), a more just and orderly world. In that era, this perspective inspired the individual, gave energy, forced to create. Today, on the contrary, everything looks already known, on the one hand, and therefore little interesting, on the other hand, complex, uncertain and therefore dangerous. Moreover, it is the knowledge of natural regularities that indicates a greater probability of mankind's death. It does not matter whether it is so or not. Unfortunately, the modern personality has been deprived of life perspective, cultural meaning of existence.

Maybe it is possible to live without such a perspective, without knowing how the world is actually arranged and what awaits us? “Einstein, — notes the famous philosopher of antiquity Pierre Ado — delighted with the laws of nature, assuming a transcendental mind, and the order of the world, corresponding to the order of thought. One could say in this regard: it is not clear that the world would be understood ... the question of providence and the order of the world have little meaning. Epicurus did not believe in it, and, by the way, the Stoics' views are not very far removed from some modern concepts after all” (Ado, 2005: 240).

It must be admitted that, indeed, many people nowadays live without knowing the order of the world. It is true that for the average person, not a subtle philosopher, such life is unbearable. However, in order to live normally and act in harmony, such a person needs a picture of reality that is understandable and corresponds to his or her aspirations. We have called the semantic project of culture.

The economy. This reality takes shape quite late, only in the second half of the 18th century, although the market and economic activity appeared in the Ancient world. The formation of the economy was caused by the problems of calculating and forecasting, on the one hand, the financial activities of the then-emerging state (taxes, profits, maintenance of the army and yard, etc.) and, on the other hand, business activities, including trade. Economic technologies began to be invented — market regulation, capital accumulation, accounting, crediting, stock exchange activity, and others. They made it possible to solve these problems, determining whether the planned enterprise would be unprofitable or profitable. Whether the state would be able to make ends meet, and whether it would find funds for another war or the construction of a luxury palace. Already at this stage, the economy contained a layer: the first, economic and entrepreneurial activity, and the second, economic technology. So far, there was a relative balance between these layers. Of course, in times of crisis and war, it was possible to turn on the machine and print the right amount of money. Still, experience and negative consequences showed that this is the right way to economic ruin and the emergence of new, even more, unsolvable problems.

In the modern economy, the relationship between these two layers is different. The second layer has developed and outgrown a number of new ones. We may say secondary,

economic technologies: for example, the economic policy of the state and industrial and financial groups, the creation of financial markets, the establishment of monopolies and others. It is not society and law that has long been the “invisible hand of the market” and the quite observable hand of the state, but new economic actors in the person of industrial and financial groups, economic speculators of different kinds, communities and individuals who have seized power in the state. It is not easy to understand the economic policy of the state, but in times of social crises and pandemics, it becomes more visible. This is, for example, the current situation in Russia.

“A commercial state, — says Inozemtsev on *Ekho Moskvy*, — is a system in which formal instruments of state management are fully subordinated to the task of multiplying the wealth of its leader, his close associates, their friends and relatives, as well as all those whose political loyalty is necessary for the *big boss* to maintain his power and ensure his own security. Here it is pointless to talk about corruption in the generally accepted sense of the word, as it is an attempt to earn on one’s position in the political system, which implies serving public interests. At the same time, in a commercial state, this task is not even set. Enriching the political top is the highest goal of the system, and taking advantage of its position is its fundamental imperative” (Inozemtsev, 2019). “In Russia, the state and its employees believe that all that has come into the budget is their own. Even when Putin does not want to give the population what Navalny is offering, it is exactly the same psychology: “This, excuse me, is mine. The National Welfare Fund is Vladimir Vladimirovich’s pocket. It has nothing to do with the people of the Russian Federation. “If I want to give something to someone, you will first ask very humiliateingly — I will give you something” — this principle is reduced to the entire system of bureaucratic hierarchy ... The Russian state is an accumulating structure that works in the interests of its own bureaucracy. It has always worked like this, and as soon as it gets the chance, it will continue to work” (Inozemtsev, 2020).

The state. Social studies of recent years show that it is the state that forms the essence of modern, in the sense that its construction has drawn, on the one hand, the need for the formation of other formations of modern (nations, economy, New European law, society, etc.), as well as predetermined such processes as ideological rivalry of countries and world wars. The state constantly forgets (often consciously) about its role and mission — to serve society, not to turn it into its own means. Martin van Creveld writes, “The state closely linked to the fall of the medieval world and the subsequent civil and religious wars, was originally conceived primarily as a tool for establishing law and order in the relations between people and groups among themselves <...>. The transformation of the state from an instrument into an ideal would never have happened if it had not increased its control over society, far exceeding everything that its predecessors had only tried to do in the early New Age ... Every European state, and later any other state after 1789, wanted to be sure that its daily activities were under its control and, as far as possible, served the purposes of that very state. The most important means of achieving this were the police and prison apparatus, the education and social security systems” (Creveld, 2006: 165-166, 331).

Nevertheless, the states, especially the democratic ones, were the engine of the formation and development of modern, they owe it to the rapid development of modern industry, science, education, healthcare; without the initiative of the state many reforms would not have taken place. But the state gave birth to bureaucracy, the establishment, and the industrial and financial elites. In Creveld’s view, the state is now becoming ineffective and has to cede its functions to other social institutions. Loginov says, “The crisis of the state is expressed in the loss of levers of governance, in the blurring of sovereignty and the catastrophic fall of the

legitimacy of state power... The disappearance of the nation state has the flavor of catastrophe, capture, occupation of once sovereign territory... the state is increasingly relieving itself of responsibility for the situation in society, minimizing the “social burden”. (Loginov, 2011). “The state,” writes Crevelde, “which was the most significant and characteristic institution in the modern world since the middle of the 17th century, is in decline. Everywhere — from Western Europe to Africa — many of the existing states either voluntarily or involuntarily unite to form larger alliances or disintegrate. Whether they are disintegrating or uniting, many of their functions are already being intercepted by various organizations, which, whatever their nature, are definitely not States” (Crevelde, 2006: 3; McCann & HAdhmaill, 2020; Rouet & Ušiak, 2019).

But if the state leaves, then the society, which was created as a force proportional to the state and designed to control it, must also weaken, which is what we are witnessing, except for a few democratic countries. Various communities and groups are beginning to come to the fore, trying to seize power and redistribute goods and services produced in the country and partly in the world (Buroňová, 2019; Hollenbach, 2020; Fitzsimmons, 2020).

Thus, it must be recognized that the main pillars (principles, pictures and scenarios) on which the modern was built have changed dramatically. They can no longer serve as a semantic project of civilization (Avery, 2017). Probably, a new project is needed that corresponds to the existing reality, new challenges of time, new forms of sociality and development trends.

A few words about the latter: the first trend is well known. Technologies are rapidly developing, including, as modern research shows, those that allow the social structures established in modern times to be misused, in fact, for selfish purposes by various communities or even individuals. The second trend is the crisis of basic schemes and coherent (i.e., common to many people) ideas of modern. In particular, the law is devalued. The importance of limiting ontologies of nature and personality is decreasing. However, there is an increasing understanding of the role of human activity and activity as a source of many problems and challenges of modern. The third trend is the formation of network communities based on the Internet and mobile communications, for which space no longer matters. The fourth trend is the formation of meta-cultures, which include national cultures and states (for example, the Common Market or the United States with its oriented countries, or China, etc.). An important social trend is the convergence of two types of social systems — capitalism and socialism. Almost all states are gradually becoming hybrid in that, on the one hand, they develop the market and capitalist production and, on the other hand, they are increasingly moving towards centralized management and distribution of the national product (from working to partially working and not working at all, from successful to less successful in terms of competition). Whereas previously, socialism was only tilted by capitalist states during world wars, it is now also tilted by pandemics. If we assume that pandemics will multiply, this is indicated by a lot, will the process of convergence not accelerate in this case? Another trend is the formation of new moralities and visions that deny the labor and ethical principles of modern. Instead of them are proclaimed rather unusual, for example, “the opportunity to live without working at all,” because a small part of society, relying on modern technology and robotics, is able to feed all the others, or “correctly to force the rich and working to share with others the fruits of their labor,” or “fairly not what corresponds to the right and contribution of the individual, but the balance established in the struggle of interested subjects,” etc. Well, as a commonplace: there is a growing conviction among thinking people that our civilization is rapidly approaching its demise, that we live in a crazy world.

Let us return to the problem of the formation of a new semantic project of post-European civilization (Brown, 2019). From what we have written here, we can conclude that the Semantic project of modernity is complete, giving birth to both the culture in which we live and a new social reality that no longer fits into the project of modernity, fraught with numerous problems, up to the threat of human existence. This situation is aggravated by the belief that the basic principles of the modern era are correct, and therefore it is necessary to continue implementing them. From our point of view, one of the tasks, if we have in mind the formation of a new semantic project, to show that the project of modern is curtailed, and that it gave birth to post-European civilization, which is characterized by complex, difficult to solve problems (Rozin, 2019).

If we talk about a new semantic project, then, first of all, the task of “saving our civilization,” which implies a gradual change like development, values and perceptions. Not mastering nature, a strong state and power, not comfort and entertainment, not gaining advantages over others, but confidence in preserving life on earth, understanding what is happening, including the need for restrictions on a number of their own fundamental desires and goals, cultivating the values of a healthy life, love, help to others, confrontation with evil and selfishness.

Conclusions

To ensure that the attitudes expressed to save civilization are not perfect, and so that they can be implemented, at least three circumstances need to be taken into account. Firstly, the current reality and the social trends mentioned above. Both cannot be ignored. Otherwise, social change will go in the wrong direction as planned. Reality and social trends need to be thought through and challenged in order to develop an attitude towards them. For example, is it right to live without working at all? What can this lead to? Is it right when emigrants from another culture move to yours, to everything ready, while insisting on preserving their own culture and lifestyle? Is it right to deprive the producer of most of his profit on the pretext that he should share with others, because everyone has the right to a decent standard of living?

Secondly, it is necessary to take into account the real state of consciousness of the population and communities involved in social changes and rescue of civilization. How not to remember Plato from his cave image. Plato understands that a person who is not ready for changes cannot be moved to a new way of life. He writes in the “State” “If somebody will forcefully drag him upwards by the steepness, to the mountain and would not let him go until he takes him to the sunlight, would not he suffer and resent such violence? And when he came out into the light, his eyes would be so shining that he could not see a single object of which he is told to be true” (Plato, 1994: 296). It is clear that different communities and groups, even individual individuals, have different ideas about the world, as well as about what to do, where to go. Here there are both grounded realistic concepts and more aerial and cosmic ones (Krichevsky, 2020).

Third, since the characteristics of the new world are unknown and cannot be obtained from the summation of existing desires or imposed on others, as they are obvious, these characteristics must be found, searched, based on philosophy, modern science, art, based on the collective discussion of all social actors concerned.

The conceptual design of the Middle Ages and modern was developed at three different levels. The first-level “set the whole.” For the Middle Ages, it was the idea of a Christian god and the scenario of the transformation of an old man into a Christian. For the new time,

the whole indicated the tasks of mastering nature, creating natural science and engineering, building a new type of sociality. On the second level, the state, law and other social institutions were created, and society was formed. At the third (anthropological) level, scenarios of individual life were formed (the medieval idea of human transformation and salvation, New European idea of enlightenment and earthly well-being).

We can assume that the new semantic project will also be developed on three levels. The whole here will be assigned, on the one hand, to the idea of salvation of our civilization, on the other hand, to the definition and formation of such a form of life that solves the problem of salvation and simultaneously works for man and culture, both of which are not given in advance. Still, it must be found in the processes of problematization, research, practical experiments, collective discussions, the work of man in relation to himself. At the second level, two types of institutions are likely to be created — the state, but re-subordinated to society (in order to make it impossible to usurp the power of the state), and institutions of “horizontal links,” within which, with the help of new information and digital technologies, business relations and communication between individuals from different countries, faiths and beliefs will be built. At the anthropological level, it is necessary to redefine scenarios of individual life, to define the meaning of life of an individual at different stages and cultures of his or her life path (childhood, adolescence, adulthood, old age), and to correlate this meaning with the requirements of the whole and social institutions.

I am well aware of how many readers will perceive the proposals outlined here as utopia and subjective views. But I, as a philosopher, am simply doing my duty. I believe that without attempts to create such projects, without the competition of different projects, there will be no real project that will seem attractive and realistic and will begin to conquer the minds and the world.

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Space Doctrine and Guidelines for Long-Term Sustainability of Outer Space Activities as Basis for Sustainable Earth Development

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The need for the development and adoption of outer space doctrine is becoming more and more evident. Daily space operations are conducted in a doctrinal void, and this void makes it difficult to predict how well-regulated space activities will be in current conditions and how sustainable it will be. Moreover, the tragic events of the present (pandemic outbreak) have shown that the world, despite all its adaptability, is not ready for such a scenario. Therefore, the issue of sustainability of all systems is relevant. The sustainability of outer space activities is no exception. Long-term sustainable space activities require a common approach to policy, theory and doctrine. This article describes how to achieve this balance. In spite of novelty of the processes described in this paper, they will be useful for establishing ideas on policy, theory, and doctrine in order to enable a coherent strategy for the development of space activities.

Keywords: doctrine, military doctrine, outer space doctrine, outer space activities, sustainability, international principles, guidelines, space commercialization, sustainable development

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Introduction

The world is no longer bipolar, but rather multipolar, since many States and non-public actors are actively involved in space activities; competing interests have become more diverse (Jakhu et al., 2017). States have become less willing to obey the new international binding standards. As a result, the United Nations and its specialized agencies have been unsuccessful in negotiating new space treaties. Instead, the number of mandatory soft law provisions has increased, as well as the number of entities involved in their creation, sometimes in parallel and sometimes controversially.

Space laws, enacted at an earlier stage, focused more on the public side of space activities, which were mainly regulated by the UN through UNCOPUOS. The rapid development of space commercialization has led to a decentralization of space law. First, the UN is no longer the only platform for the adoption of space laws; other international organizations become involved increasingly in the legislative process. Second, the legislation takes the form of both hard and soft law. Finally, international space law is actively supported and supplemented by national space law (Zhao, 2018). This contributes to the conclusion that space law acquires new features. That is, the meta-law derives from a complex branch of law (Ursul, 2013).

It is clear that since the adoption of the first acts, space legislation has been gradually updated, as evidenced by the presence of relatively modern international instruments. However, most contemporary issues are still outside the scope of international space law, as it falls outside its scope. Therefore, the regulatory framework for international space law needs updating, as it no longer controls the dynamics of space activities.

The rapid development of technologies and the transience of processes occurring in space markets require clear and consistent steps based on real opportunities and understanding of their priorities. Although today the private sector in the field of space activities is filling some technological gaps, using the concept of an unconventional approach to risk in order to achieve low cost of space products and services, taking into account the needs of consumers. But the sphere of space activities can achieve sustainable development only by institutionalizing space programs through the creation of a cost-effective strategic roadmap. This space doctrine should take into account, in addition to supply and demand, the security factor, innovation, inclusiveness, international cooperation and environmental friendliness.

Sustainable development of space activities: features of genesis

At the present stage, the key missions of the legal regulation of space activities are security in the military aspect, the safety of people and the environment, and sustainability in the use of outer space in the long run. All three tasks are interrelated and complementary (Hitchens, 2017). Therefore, sustainability, or lack thereof, is a complex and dynamic feature of communities and regions. It is both a process and an outcome that requires to: anticipate threats, reduce vulnerability, mobilize resources and assets, and plan for a better future.

Discussions about the balance between security factors, economic development, and international environmental protection, which began in the 1970s, had not attracted much attention, until 1987, when the concept of sustainable development was first used in the well-known Brundtland Report. It stated that this development should meet the needs of the present, with due regard for the needs of future generations, and further defined that sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Report, 1987: 41).

Since then, the concept of sustainable development has appeared in various international documents (Report, 1992), in the scientific literature (Lélé, 1991) from different perspectives, and has even been recognized as a general principle in the 1990s in the EU (Agreement, 1994). The global spread of sustainable development, combined with adverse changes in the space environment in the 1990s, has also attracted the attention of space scientists and practitioners (Mikesell, 1994) of the space community. Several issues required to be addressed immediately: the use of outer space for military purposes, the reduction of space debris, space traffic management, long-term exploration and exploitation of outer space, space weather, nuclear pollution, and radio frequency interference. Moreover, these challenges were more or less related to each other, but no optimal mechanism was developed to address them.

Therefore, the development of a more sustainable, innovative, and inclusive concept covering and addressing all of the above issues is required.

Therefore, the Long-Term Sustainability of Outer Space Activities (A/AC.105/L317, 2019) project has been included in the agenda of the UN Committee on Space since 2010. It includes four expert groups, established to address the following topics: Subgroup A “Sustainable Space Utilization supporting Sustainable Development on Earth,” Subgroup B “Space Debris, Space Operations and Tools to support Collaborative Space Situational Awareness,” Subgroup C “Space Weather,” Subgroup D “Regulatory Regimes and Guidance for Actors In the Space Arena” (Long-term, 2019).

In September 2015, the UN adopted a landmark 2030 Development Agenda, outlining Roadmap for Sustainable Development of World Society of 17 Sustainable Development Goals (SDG) to be achieved by each country by 2030 (17 Goals). These goals are an extension of the Millennium Development Goals (MDG) (Millennium, 2000) and continue to address poverty in the world and include a set of unique tools that will help address the challenges of protecting the planet from negative impacts, equal access to resources, meeting a range of social needs, etc.

In order to implement the SDGs in space activities, a Working Group on Long-Term Sustainability of Outer Space Activities was established at the UN, which executed the first arrangements for the twelve Draft Guidelines for Long-Term Sustainability of Outer Space Activities, announced at the Committee on the Peaceful Uses of Outer Space Fifty-ninth session in 2016 (A/71/20, 2016). At the session, the representatives of the countries reaffirmed their commitment to the principles previously adopted for the exploration and use of outer space for peaceful purposes and stressed their importance (A/71/20, 2016). Some delegations stated that transparency and confidence-building measures could make an important contribution to improving the security, reliability, and sustainability of outer space activities. To strengthen international cooperation in space, to establish standards of responsible behaviour across the entire spectrum of space activities, to commit to the principle of non-interference with peaceful exploration and use of outer space, to promote equitable access to outer space, and to enhance the transparency of outer space activities, it would be accurate to develop a renewed treaty on space that is to be negotiated within the United Nations (A/71/20, 2016; Long-term, 2019).

Notwithstanding the statements mentioned above by most countries, only twelve principles have been agreed upon. Others are still under negotiation. For example, the preamble and nine other principles were agreed in 2018 at the fifty-fifth session of the Scientific and Technical Subcommittee of the Committee on Peaceful Uses of Outer Space (A/AC.105/C.1/L.348, 2016). As with all international principles, the application of the Guidelines for Long-Term Sustainability of Space Activities is voluntary. It is hoped that States understand the importance of principles accepted for present and future generations that are the framework for a renewed space doctrine (Long-term, 2019).

As of early 2020, Part A of the Guidelines for the Long-Term Sustainability of Space Activities contained pre-agreed texts of 21 principles, and Part B included seven Guidelines. Others are still under discussion. The analysis of principles’ harmonization reveals that most of the discussions have arisen on issues related to the legislative regulation of a set of key aspects of space operations security. About the safe conduct of operations for the active removal or destruction of space objects in an emergency, with regard to a number of other precautions and self-restraints that States should, in good faith, use in the interests of operational security in space. That is because the unique nature of the space environment

means that the outer space activities of any participant easily influences the activities of others. For example, space debris, regardless of its country of origin, poses a serious threat to safe operation for each space object produced and launched or planned to be launched into outer space. Therefore, a number of issues to prevent and eliminate it would be successful provided cooperation and coordination between all space entities. In addition, outer space is a public domain that is accessible to everyone and therefore requires harmonization of rules to eliminate potential collisions due to the increasing number of satellites. In this regard, the UN should adopt rules to coordinate the space activities of its member countries.

Moreover, it should be noted that “sustainability” must include not only the technical component but also the political will (Sokiran, 2019). In other words, not only a technical capability to explore and use outer space in the long run, but also a political readiness to do so is required. In this respect, the Guidelines for Long-Term Sustainability of Outer Space are a concept that includes the five legal elements of sustainable development: the principle of equality, non-wasteful use, equality between generations, integration (cooperation) and peaceful exploration of outer space, all of them closely interconnected with existing international principles of space activities. ,

At the UNISPACE+50 International Conference (A/RES/73/6, 2018), the Committee on Peaceful Use of Outer Space identified seven thematic priorities in the use of space technologies for sustainable development, such as a global partnership in space exploration and innovation; regulation of the legal regime of outer space and global space governance; enhanced information exchange on space objects and events; international framework for space weather services; strengthened space cooperation for global health; international cooperation towards low-emission and resilient societies; capacity building for the 21st century (Hedman, 2019).

Next year, at the sixty-second session in Vienna of 12-21 June 2019, the strategic document was adopted, the Zero Draft of the “Space-2030,” and the plan for its implementation. UNOOSA presented this document as a comprehensive and promising strategy aimed at consolidating and enhancing the contribution of space activities and space technologies to the implementation of global programs and addressing the long-term sustainable development for the benefit of all mankind (A/AC.105/L317, 2019). Therefore, ensuring the long-term sustainability of space activities requires efforts at national, regional and global levels. That is, efforts by regional intergovernmental organizations can be one of the three main ways of strengthening by the regional level, thus complementing national and global efforts. Indeed, cooperation at the regional level seems to be more effective in practice than at the global level, since there are often fewer conflicts of interest, such as geopolitical, cultural, or economic ones.

Therefore, guidelines are voluntary rules, not binding laws. However, somehow their implementation may be an ideal way of solving complex problems associated with space activities. Since no international agreement has been concluded to address these issues at present, and the adoption of a treaty that would suit all parties requires a lengthy stakeholder discussion. In this regard, the bottom-to-top development of national space doctrines on the basis of the Guidelines for the Long-Term Sustainability of Outer Space Activities can help create a sustainable international space doctrine and adopt a new Space Convention, to be signed by most countries, ideally by all.

Categorical and conceptual interpretation of space doctrine in the discourse of scientific knowledge

A new doctrine in science derives from original ideas to solve certain problems of law and State, which originates from the formation of the relevant theory or teaching. Therefore, evidently developing a new doctrine requires to use the doctrinal provisions of the philosophy of law first. According to Sergey Maksymov, the analysis of legal doctrine as a special way of understanding and existence of the law, which has special ontological and epistemological foundations, methodological means, philosophical and legal substantiation and a special place in the structure of legal reality (i.e. both law and the levels of its reflection, such as the branch of legal science, theory of law and philosophy of law) (Maksymov, 2013) enables to rethink the legal doctrine and the formation of its meta-theory (Patsurkivskiy & Savkina, 2017).

An important component of a legal doctrine is its assessment and prognostic element, which contains programmatic provisions of a recommendation-oriented nature and is the result of a critical analysis of the practice of State and law-making. Mark Van Hoecke and François Ost studied this issue specifically, in particular, the interrelation between systematization, interpretation of law and legal doctrine. From his perspective, systematization provides for and includes the interpretation of legal prescriptions, principles, concepts, legal constructs, etc. that are systematized. However, interpretation is impossible without a certain conceptual basis, which is, at the same time, a necessary basis for any legal rule, as well as legal argumentation. This basis is formed by legal doctrine (Van Hoecke & Ost, 1998: 197; Semenikhin, 2016: 28).

Some scholars argue that the key objective of legal doctrine is to provide a theoretical framework for new ideas and concepts, strategies that do not require fixation in any document (Puzikov, 2013). However, the fundamental value of legal doctrine is precisely in its practical application to society, since it is oriented to the solution of practical problems in law, that is, it is of practically significant nature (Semenikhin, 2016). In addition to the fact that legal doctrine is a system of theoretical and science-based provisions of law that have a compelling force and applicability (Emelin, 2015: 11), the State should legitimate it, as a source of law, in the form of a legal regulation.

An attempt to regulate legal public relations through the creation and adoption of relevant branch doctrine is not sustainable. However, over the last five years, the place and role of doctrinal regulations have been reconsidered to shape Ukraine's long-term and sustainable policy in various areas. Since the declaration of Ukraine's independence, the following doctrines have been adopted: Military Doctrine of Ukraine (Military, 2004), expired, updated doctrine being developed (Military, 2015); National Doctrine of Education Development (National, 2002); National Doctrine of Physical Culture and Sports Development (National, 2004); Doctrine of Information Security of Ukraine (Doctrine, 2017); Military Medical Doctrine of Ukraine (Military, 2018); Maritime Doctrine of Ukraine up to 2035 (Maritime, 2009).

All Doctrines are the source of law. They are sanctioned by the State, designed to regulate the most important social relations (security, education, public health, etc.), provide strategies for resolving these fields and relations in the context of their long-term sustainable development, are always established by the highest authorities, mostly by Presidential Decrees, the latter (Military Medical Doctrine of Ukraine and Maritime Doctrine of Ukraine up to 2035) by Resolutions of the Cabinet of Ministers of Ukraine.

Moreover, the legal doctrine is considered from the perspective of its grouping into scientific, legal doctrine, and public regulatory doctrines. For example, according to Elizabeth Yevhrafova, such grouping will give a more accurate and clear understanding, since scientific, legal doctrine is not necessarily predetermined by the nature of the political and legal culture of society, but it is an autonomous, self-contained phenomenon, action and influence thereof are not limited by the time and boundaries of national States (Yevhrafova, 2013: 54). In turn, regulatory doctrines must be based on the achievements of law study in general and scientific legal doctrine, in particular.

We advocate that the doctrines should be science-based. For this purpose, well-known experts, both of law and of other fields, are invited. An example of such cooperation is the development of the study “UKRAINE 2030: Doctrine of Balanced Development” (UKRAINE, 2017), the developers of which were different specialists.

Therefore, the legal doctrine is a set of ideas, concepts, principles, development vectors of a specific socially significant legal phenomenon or process, organized into a coherent structure that meets the requirements of the present, that provides prospects for further improvement and the basis (in the case of its legislative consolidation) for the regulation of a range of relevant social relations. Consequently, the phenomenon under analysis is of a dual legal nature: first, the purely theoretical property of legal science, objectified in the form of its specific area; second, a full-fledged source of law, designed properly.

It should be noted that the analysis of the world scientific opinion on the space doctrine and its application in practice reveals that practically all existing scientific developments on this issue have been related to military or defense purposes. For example, Space Doctrine for the 21st century, a research paper developed by Robert D. Newberry for graduates of the Research Department of the US Air Command and Staff College, states that the doctrine includes the tenets of space power, the operational art of space warfare, and implementation strategies for space forces (Newberry, 1997). In his paper, he used the works of other researchers in the field of military doctrine, such as Robert Frank Futrell (Futrell, 1971), Barry R. Posen (Posen, 1984), David E. Lupton (Lupton, 1988). All of them viewed “military doctrine” as part of a grand strategy directly related to military means.

Therefore, all studies of space doctrine were conducted with a focus on its military purpose, without considering its importance for the sustainable inclusive and innovative development of space activities. The combination of both areas (military and civil) is reasonable for updating space doctrine.

The legal nature of space activities as the basis of space doctrine

To uncover the specificities of space doctrine, the essence of its basic element, space activities, should be explained. In addition to the term “space activities,” other words and phrases are often used, in particular, “space sphere,” “space industry,” “space industry,” “rocket and space industry,” “cosmonautics,” “public space activities,” “national space activities,” “space exploration,” “cosmisation of law,” which require a doctrinal interpretation in order to further consolidate them in legal regulations. They should not only fulfill their basic purpose, promote the unambiguous interpretation of international legal norms, establish clear limits of application of these norms, but also meet the realities of today, facilitate the formation and implementation of a conceptual apparatus for a unified approach to understanding the problems being solved at the international level, in the development and further improvement of the international legal regulators of this market (Biehli, 2000). In this study, the etymology and interpretation of all these phrases

are not discussed. Instead, the terms “the sphere of space activities” and “space activities” are used as equivalent.

Accordingly, the logical question is, what is an activity? In general, activity is considered to be a specifically human form of relation to the outside world, the content of which is the expedient changes and transformations of things and phenomena depending on human needs (Pryshchak & Matsko, 2011). Human activity is always social, conscious, active, and manifests itself in a system of expedient actions aimed at achieving the goal (Varii, 2007).

In international documents, *kosmichna diialnist* (in Ukrainian) is translated as “space activities” (A/68/189, 2013), that is, activity implies activeness. Human activeness is the source of its development, determines its activity, being its driving force (Bazaluk & Balinchenko, 2020). The fundamental difference between these concepts is that activity comes from the need for the object, and the activeness comes from the need for activity. In addition, activeness seems to precede activity in time: before the activity starts, we actively choose what is desirable, freely plan, think, by what means to achieve something. Nevertheless, the activeness not only precedes activity, but also “accompanies” it throughout the process. Optimal activity devoid of activeness cannot be imagined (Varii, 2007). Therefore, activeness is an element of the activity.

For the first time, the phrase “space activities” appears in the UN General Assembly Resolution 2221 (XXI, 19 December 1966) “... the recommendation of the Committee on the Peaceful Uses of Outer Space that the objectives of the Conference shall be to examine the practical benefits of space programs on the basis of scientific and technical achievements, and the opportunities available to non-space Powers for international cooperation in space activities, with special reference to the needs of developing countries” (A/RES/2221, 1966). That is, according to the document notes, the concept of “space activities” is related to the term “use,” but not identified.

Further, Article III of the Treaty on the Principles of the Activities of States for the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (adopted by General Assembly Resolution 2222 (XXI) of 19 December 1966) states that space activities are activities in the exploration and use of outer space, including the Moon and other celestial bodies (A/RES/2222, 1966). Space activities should be carried out in accordance with international law, including the UN Charter, in the interests of maintaining international peace and security, promoting international cooperation and understanding. Furthermore, Article IX of the Treaty states that “in the exploration and use of outer space, including the Moon and other celestial bodies, States Parties to the Treaty shall be guided by the principle of cooperation and mutual assistance and shall conduct all their activities in outer space, including the Moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty” (A/RES/2222, 1966).

Specifically, space exploration and use activities are the basis of space activities and their structural elements.

Some authors argue that the terms “outer space activities” and “outer space exploration and use” should be used as equivalent. This approach is used especially to avoid repeating the established expression of space law, such as “exploration and use of outer space” (Stelmakh, 2016).

For example, Olga Stelmakh in his thesis equates the concept of “exploration and use of outer space” with “space activities,” arguing that in a certain context (when differentiating basic concepts is not of fundamental importance) the concept of “space security” is used to identify “the security of the exploration and use of outer space” (“the security of space

activities”). Furthermore, the author states that the concept of space security covers, but is not limited to, the concept of space activity security (the security of exploration and use of outer space). The security of space exploration and use considers the same processes, but mostly in terms of the mutual impact of space activities on the outer space and the threat of outer space on anthropogenic activities carried out in outer space. Therefore, the focus is on the exploration and use of outer space as a basic element, which differentiates the concept of “space activity security,” among other components of “space security” (Stelmakh, 2016).

Doctor of Law, Professor Nadiya Armash also advocates this perspective in determining that international space law has historically originated as a set of special rules and principles of general international law, intended to regulate the relations of subjects of activities in the exploration and use of outer space and other celestial bodies (or abbreviated “space activities”) (Armash, 2017).

We agree with the authors and argue that the exploration and use of outer space is human activities in outer space aimed at meeting the needs, so they should be considered as elements of the term “outer space activities” and used as equivalent.

At the national level, national space law development requires to take into account the common interests, on the one hand, the fundamental function of the State in these activities (public interest), the interests of private players (private interest), as well as the interests of all other international actors. International regulations and recommendations state that space activities should be carried out, taking into account the common interests of all countries of the world and all participants in such activities (A/RES/18/1962, 1962).

Lung-Chu Chen, an international Public Law Researcher, groups common interests into inclusive and exclusive. Inclusive ones are the needs and expectations of activities that impact on society and are also characterized by transnational and global effects. Exclusive interests, for their part, relate to the needs and expectations of activities that affect mainly the people of a single territorial community (Chen, 2000: 85).

Therefore, space activities are a unique kind of human activities, which today have an impact on almost all spheres of human life, on the one hand, they are transnational, global, and on the other, national and individual, and consequently consists of a set of inclusive, exclusive and individual interests.

Moreover, it should be noted that in various international instruments, in speeches at international events, as well as in scientific literature, together with the terms “outer space,” “space exploration and use,” the term “space development” is used. We argue that the term “development” is a comprehensive concept that includes the activities of space exploration, examination and exploitation of minerals, the organization of space tourism and space station settlements both in orbit and on the surface of celestial bodies and so on. That is, according to Sergey Krichevsky and Alexander Bagrov, it is a purposeful process (Krichevsky & Bagrov, 2019: 36), aimed at adapting outer space and celestial bodies for exploration and use for the needs of human civilization. Nevertheless, all of them are types of space activities. Ultimately, the co-development of space, including the human mission to Mars, will require many agreements and memoranda of understanding of various types, including a detailed description of space activities, international and national institutions involved in this process.

The specificity of space activities is the forced adaptation to the unusual environment, as a rule, the opposite of the earth, i.e. (non-terrestrial) environment of outer space. Nowadays, international documents do not define what outer space is, where it begins and where it ends. All this also does not add stability in space activities. The difference between airspace and

outer space has long been debated. Since outer space is an area without definite boundaries, many questions of legal jurisdiction arise.

Without going into discussion, outer space (cosmos) means interplanetary space beyond the earth's atmosphere and other celestial bodies, which is not under the sovereignty of any State and is not subject to national appropriation, within which space activities are possible, an environment in which the main force affecting a space object is gravity (Malkov, 2005).

Therefore, the above mentioned and the existing legal discourse on what is "space activities" enable us to formulate the author's original definition of this term. Outer space activities are any activities conducted by those involved in outer space activities that take into account the common interests of mankind, with due respect for international principles of sustainable development and national standards and rules.

So, the enhancement of space activities around the world and the emergence of new actors (including new space start-ups and commercial companies), as well as new concepts (such as large satellite constellations, miniaturization, satellite service in orbit, artificial intelligence, etc.) pose new challenges to the security, sustainability and stability of space activities, which in turn forces countries to develop (or update, if any) the space doctrine that has not been defined and generally recognized.

Therefore, space doctrine is a set of beliefs striving to transform the strategies and policies of sustainable, secure, innovative and inclusive promotion of space activities into specific space goals; develop the most effective space strategies to achieve these goals; and to create appropriate space organizations, systems and tactics to achieve them. Consequently, the space doctrine functions at both conceptual and operational levels, applied to different phases of the life cycle of space activities (design, production, launch, satellite deployment, neutralization operations, etc.) using different ownership forms (international, national, private) and is designed to achieve specific results.

Accordingly, these results (goals) are: 1) ensuring the long-term sustainability of space activities by mitigating the negative impact on the use of budgetary resources, environmental impact, etc.; 2) improving the security of operations in orbit by reducing the risk of collision and interference (space traffic); 3) addressing issues related to globalization, intensification and diversification of space activities and increasingly congested outer space (space debris); 4) space demilitarization; 5) implementation of the principles of inclusivity and innovation of space activities.

Therefore, the space doctrine is a set of science-based strategic areas and policies for the long-term sustainable innovative and inclusive development of space activities, taking into account national interests.

Conclusions

The mechanism of the legal regulation of outer space is a set of:

- 1) declared international guarantees for the development of outer space, based on its recognition as a value that cannot be nationalized, appropriated or damaged;
- 2) national legal means of influencing space relations that arise in the exercise of space activities by a particular country or its representatives;
- 3) the rules of private space law, which is at the stage of formation.

International norms for space exploration and use are inherently international guarantees for the development of outer space, a set of established rules that represent the freedom of outer space and its celestial bodies from any conflict situations based on the responsibility for wrongdoing, including violation of the order of carrying out research activities and the

use of outer space other than intended. In the modern paradigm of space study, they require updating in terms of their flexibility and adaptability to current practical challenges.

Adoption of the agreed Guidelines for the long-term sustainable development of space activities is intended to support the development of national and international space security practices and frameworks, while providing flexibility to adopt such practices and frameworks to specific national circumstances. Moreover, they shall support States and international intergovernmental organizations developing their space potentials in a way that does not harm the environment and the security of space operations.

The guidelines for ensuring long-term sustainable development of space activities are voluntary and have no legal force under international law. However, they may be official because States may decide to incorporate elements of the guidelines into their national legislation, as in the case of the COPUOS space debris guide.

Guidelines for the long-term sustainability of space activities should become the legal framework for a new space doctrine, based on universal international principles, which is the key to the security, stability and progressive development of world space activities in the long term that is the main goal of the global space community. In turn, the Space Doctrine aims to develop a long-term and sustainable policy for the future, to take into account existing problems and to resolve them, namely: to cover both organizational structures and operational functions; to create advanced capabilities (data, services, technologies) to support secure and sustainable operations; to determine the procedure for implementation and verification of technical and regulatory requirements (laws, regulations, standards, best practices); to provide for enhanced coordination (decision making, exchange of information) among various entities (governmental, commercial, international).

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Chinese Perspectives in the “Space Race” through the Prism of Global Scientific and Technological Leadership

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This study provides a philosophical analysis of the Chinese Space Program and its connection to the embodiment of “China’s Dream” in the 21st century. China’s current achievements and main challenges in the “space race” are observed in comparison to others’ “space superpowers” practical steps. The given analysis includes reflections on geopolitical and scientific-technical aspects of China’s space program and a brief history of the latter, on the development of manned spaceflight carried out by the PRC, and such projects as “Shenzhou,” “Tiangong,” “Beidou,” “Tianhe,” “Chang’e.” Special attention is paid to the review of a variety of Chinese space assets like communication satellites, navigation satellites, meteorological and oceanographic satellites, remote sensing satellites. Also, the national security implications of the the PRC national space program are considered as a security guarantee for China’s peaceful development. It’s arguing that Chinese strides in advancing space technologies have a direct connection to the fulfillment of “China’s Dream” in dimensions of scientific and technological leadership and social-economic prosperity.

Keywords: China’s space program, technological development, increasing competitiveness, Chinese Dream, global leadership, national security, scientific leadership

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Introduction

Space exploration and development have both geopolitical and social potential today. China, as one of the most influential countries in the world, has long recognized the need for a confident presence in the vanguard of the few countries that are intellectually and technologically capable of exploring and developing extraterrestrial space. But what are the driving motives for China's participation in this complex and very capital-intensive, resource-intensive, and knowledge-intensive process? We assume, that a whole set of aspirations, such as further growth of welfare, sustainable development, strengthening of Chinese positions in the fields of science and new technologies, diversification of the national economy, active participation and taking even more significant positions in global politics, ensuring national security — in short, everything that conceptually fits into the concept of the “Chinese Dream.”

The purpose of this article is to analyze the space program of China, the features of its implementation at different stages of socio-economic transformation of the PRC, with real successes in certain areas of space research, as well as with the near and distant prospects for the development of the Chinese space program. An important task is to understand how the achievement of individual results in the field of space research and development affects the implementation of socio-economic, socio-cultural, and political tasks of the PRC, conceptualized in the “Chinese Dream.”

The “Chinese Dream” is expressed in different formulations, due to its polysemantic nature. Summarizing all the many statements on this subject, we can assume that the true realization of this dream will be considered to be the multiple strengthening of China's position in the modern dynamic and the highly competitive world; the growth of Chinese national welfare through successful external and internal cooperation (economic, political, technological); the satisfaction of the growing personal interests of ordinary Chinese while preserving social harmony and national unity; the preservation of China's cultural identity with its active participation in the processes of globalization.

Obviously, for this whole kaleidoscope of such complex and diverse Chinese interests to form the desired picture for the PRC, it is necessary to include it as much as possible in geopolitics, using various tactics. As practice shows, in the 21st century, the role of a successful player in the field of geopolitics is successfully combined with the status of a “space superpower.” Such powers need not only to have their space program but also to actively update and develop it. In this study, the author's attempt to analyze the prospects of China in the “space race” through the prism of global scientific and technical leadership will be carried out.

Strategic, scientific and technical aspects of China's space program

In the face of the challenges that 2020 has brought to the world community, the developed countries of the world are forced to take decisive steps to strengthen the innovative component of the economy and modernize development strategies for the near and long term. Among the innovative approaches that are most likely to contribute to the growth of economic well-being and strengthen leadership positions in the global community, China sees the further development of aerospace innovations.

It is no accident that Xi Jinping, at a ceremony attended by taikonauts of the Shenzhou-10 space mission, stressed that they “carried the nation's space dream.” In particular, when they were orbiting the Earth in the Tiangong-1 space module, President Xi told them the following: “...The space dream is part of the dream to make China stronger. With the development of

space programs, the Chinese people will take bigger strides to explore further into space" (Xinhua, 2017). This conversation took place in June 2013. Next, we will focus in more detail on how China's national space program is developing.

The launch of the "policy of reform and openness" has significantly contributed to China's progress in the development of space technologies. However, the Foundation for the country's development in this direction was laid earlier. So, in 1956, the Fifth Academy of the Ministry of Defense was created, which was later headed by the scientist Qian Xuesen, who returned from the United States. He created the preconditions for the launch of Chinese satellites. At the same time, at this stage, China was very dependent on extensive cooperation with the Soviet Union, which contributed to the development of Chinese space research and development.

The USSR granted China a license to manufacture the R-2 ballistic missile, which allowed the launch of Project 1059. Technical assistance from the Soviet side contributed to the development of the Dong Feng-2 and Dong Feng-3 ballistic missiles. After testing the Dong Feng-4 rocket in 1970, China developed on its basis and successfully launched its first carrier rocket, Chang Zheng-1, which launched the first Chinese communication satellite, Dong Fang Hong-1. The launch was successfully completed on April 24, 1970, and demonstrated the effectiveness of the PRC in launching space satellites. So the "Chinese space age" opened.

Guided by considerations of national prestige, economic growth, and trying to consolidate the existing technological maturity, China has identified the need to create an orbital constellation of satellites (satellite constellation). Besides, expectations in terms of using space technologies for national security purposes have had an additional impact on strategic decision-makers in the PRC: "Deeply influenced by techno-nationalist ideas, Chinese officials considered technological progress, particularly in the field of space, as means to foster national economic growth, gain international prestige and strengthen the country's military capacities" (Al-Rodhan, 2012: 128). These interests determined the priority choice in China's development of its system of remote sensing, communication and navigation satellites. The Chang Zheng series of liquid-fuel space launch vehicles (CZ-2, CZ-3 and CZ-4) created in the PRC allowed China to create an orbital satellite grouping, through which the functions of navigation, communication, remote sensing of the Earth, collecting meteorological data, and maintaining national security are implemented.

From a technical point of view, having your group of satellites provides a wide range of opportunities for different types of presence in space. A satellite constellation is a group of an average of 30 artificial satellites working together as a system. Unlike a single satellite, their constellation can provide constant global or near-global coverage, so that at least one satellite is "visible" on Earth at any given time (Walker, 1984). Artificial satellites are usually placed on special orbital planes and communicate with globally distributed ground stations. They can also use inter-satellite communication.

China launched experimental communications satellites in 1984, but their widespread production and operation began in 1988. China's initial goal was to intensively introduce this type of satellite for radio, television, and mobile communications. There was a demand to create more advanced space platforms with extensive capabilities for broadcasting and telecommunications satellites of the new (third) generation. In particular, the geosynchronous satellite Dong Fang Hong-4 (DFH-4, 2006-2016) met these technical challenges. Also, it reduced the dependence of the Chinese space sector on other countries. Later, China Aerospace Science and Technology Corporation (CASC) and its state-owned subsidiary, China Satellite Communications, modified the entire DFH-4 satellite series. The most famous

Chinese satellite communication brands, ChinaSat and SinoSat, launched commercial offers for foreign customers, placing satellites in geostationary orbit on the order of other countries.

In the past decade, China has made significant progress in creating satellite systems for fixed, mobile communication and data transmission. The commercialization of this sphere and the entry of the PRC into the international space market contributes to the creation of added value in many civil areas of China, such as education, management, transport, financial and commercial sectors, not to mention the growth of quality in the provision of broadband services and broadcasting technologies (Ma & Soroka, 2020).

Such technological capabilities increase the geopolitical potential and contribute to strengthening security (Al-Rodhan, 2013: 221; Sekerin et al., 2019). “An interplay between outer space security and terrestrial global security” (Al-Rodhan, 2018) is followed. China’s expansion of its space potential is also reflected in its leadership positions in world politics: “Over the past two decades, China has risen to become the second-largest economy in the world and impressive military power. The assumption is that China will seek to replace the United States as the hegemon in the international system” (Chau & Kane, 2014: 112).

Communications satellites have paved the way for many satellites of other applications, such as meteorological and navigation satellites. China began developing its weather satellites in the 1970s. The first satellite of the “Fengyun” series was launched into orbit in 1988 and raised the PRC to the status of the third country in the world with a meteorological satellite. Fengyun-1 entered a polar orbit, and Fengyun-2 entered a geosynchronous orbit.

The presence of such satellites in China was not just a matter of prestige. These were achievements that had practical significance for the state, allowing it to solve problems that often the large agricultural sector faces (natural disasters, especially forest fires, droughts, storms, floods). This aspect is even specifically mentioned in the “White paper on China’s space activities in 2016” (The State Council, 2016). Currently, the Fengyun-3 weather satellite is equipped with sensors to receive weather data in all weather conditions, which coincides with the interests of civil society in China, and with the benefits of national security. Thus, the weather satellites of the Fengyun series are equipped with high-precision sensors that can be used in the event of threats to national security.

Fengyun-3 (FY-3) is launched into orbit by the Chinese Chang Zheng 4C (CZ-4C) launch vehicle. Individual space technology experts point out that “the satellite structure is based on a separate bay design, combined structure of center supporting cylinder and guest board for service module and propulsion module, and a combined structure of baffle plate and truss. The FY-3 series satellites are designed and developed by the Shanghai Aerospace Administration” (Barbosa, 2013). Chinese meteorological satellites thus make an essential contribution to the national economy, allowing them to mitigate or even prevent the consequences of extreme weather events and prevent the onset of natural disasters. The last of the launched weather satellites are engaged in round-the-clock monitoring of threats such as sand and other storms, showers, thunderstorms, hail.

Navigation satellite systems occupy an equally important place in the Chinese space program. Currently, China is close to completing the deployment of its own Beidou satellite navigation system (BDS, also known as COMPASS), and this achievement will significantly strengthen China’s position in the satellite navigation sector. In the international space services market, the Beidou system will become a serious competitor to the American Global Positioning System (GPS), the Russian Global Navigation Satellite System (GLONASS), and the European Galileo satellite navigation system. However, China is also actively involved in the development of the latter, along with South Korea, Israel, and Ukraine.

The official web portal of the Beidou project covers the current state of this navigation system in sufficient detail. In particular, it is specified: “On March 9, 2020, China successfully launched the 54th BDS satellite by a Long March-3B launch vehicle from the Xichang Satellite Launch Center. BDS satellite successfully entered the designated orbit, and will be commissioned after completing the in-orbit test and evaluation. The BeiDou Navigation Satellite System (BDS) has been developed following a three-step development strategy. BDS-3 is only one step away from completion. It is comprised of 30 satellites, containing 24 satellites in Medium Earth Orbit (MEO), three satellites in Inclined Geosynchronous orbit (IGSO) and three satellites in Geostationary Earth Orbit (GEO). The satellite launched during this mission is the 29th constellation satellite” (BeiDou, 2020).

While the experimental Beidou-1 (1994-2007) initially lacked accuracy and reliability, the second-generation system was significantly refined, and subsequently focused on providing positioning, navigation, and synchronization services in the Asia-Pacific region. As the number of China’s BDS-3 satellite constellation has reached 29 satellites by 2020 (out of 30 planned), the system now provides China with high-quality global coverage.

The introduction and improvement of satellite navigation systems in China contribute to the implementation of internal tasks, such as providing emergency management and control, navigation, and monitoring of vehicles in Chinese megacities. At the same time, Beidou contributes to the technological support of the Belt and Road Initiative. Beidou navigation satellites will offer location, speed measurement, and synchronization services to foreign customers in the Asia-Pacific region. In the future, the system will cover all countries located along the “Silk Road Economic Belt” and the “21st century Maritime silk road,” integrating ground and orbital control systems. Official sources of the PRC emphasize the following: “The Beidou Navigation System is multifunctional. It is widely used in transportation, maritime fisheries, hydrological monitoring, weather forecasting, surveying and mapping, forest fire-prevention, time synchronization of communication, power dispatching, disaster reduction and relief and emergency rescue, influencing all aspects of people’s life and production, and injecting new vitality into global economic and social development” (The State Council, 2016).

Remote sensing satellites are considered one of the main areas of China’s space program. Their peculiarity is that “remote sensing provides information about an object without making direct physical contact. Thus, remote sensing is used in numerous fields of human activities and studying the Earth. Maps of land cover from thematic mapping can be used to prospect for minerals, detect or monitor land usage, detect invasive vegetation, deforestation, and examine the health of indigenous plants and crops, including entire farming regions or forests” (Ran et al., 2017).

The use of this type of satellite is particularly relevant for urbanized societies. So, “nowadays, cities across the world are spreading into their surrounding landscapes, sucking food, energy, water, and resources from the natural environment and profoundly changing global ecosystems. Urban ecosystems are among the most dramatic manifestations of anthropological impacts. The advantages of remote sensing — such as relatively low cost, large-area coverage, and repetitive observations — and also the growing interest in urban ecosystems have promoted the application of remote sensing in monitoring the urban environment” (Guo et al., 2013). Remote sensing of the Earth by space vehicles equipped with various types of survey equipment greatly facilitates economic tasks, given that “urban land-use patterns are complicated and heterogeneous, especially in China’s megacities. For example, many multifunctional land uses are mixed with living and commercial functions, which increases the difficulty of land use identification” (Liu et al., 2017: 1691).

Both electro-optical and radar satellites developed in China can transmit images of the Earth's surface and other geo-information data in real-time. These technologies are in demand in agriculture, exploration, and monitoring of mineral and other natural resources, and forecasting of natural disasters. Electro-optical satellites were launched by China in 1987 (starting with Fanhui Shi Weixing-1).

The Huanzin series of satellites are used for observing sea and land targets in the microwave range, but mainly for observing the environment. These satellites use SAR (synthetic-aperture radar), which allows you to obtain radar images of the Earth's surface and objects located on it, regardless of weather conditions and the level of natural illumination of the area with detail comparable to aerial photographs. This series of satellites is a useful tool for monitoring potential targets over vast territories, thus strengthening China's position in the Pacific.

Haiyang Oceanographic satellites (HY), along with Shiyan topographic satellites, are designed to support marine operations, promote fishing, and explore the sea and ocean floor. Together, the Haiyang, Shiyan, Gaofen, Yaogan, and Tianhui satellite series allow China to conduct space mapping, land, ocean, and atmosphere observations, with high and low resolution, at the national and global levels.

From space exploration to global technological leadership

China's creation in the distant 1970s of the Long March series launch vehicle, also known as Chang Zheng (CZ), based on the Dong Feng-4 ballistic missile, laid the technological prerequisites for China to become the world's third country with human spaceflight technologies almost three decades later. On this path, Chinese society, in particular, scientists and politicians, had to overcome many obstacles of a financial-economic, scientific-technical, and socio-political nature. As it is rightly noted, these obstacles are related to the fact that "human spaceflight is technically very demanding, and this is indeed one of the reasons why it is so expensive. However, for this very reason, engaging in human space activities must necessarily act as a stimulus for employment, skill development, and technical innovation in the participating industries. This expansion of technical capabilities is likely to find applications in other areas of the wider economy. Note that this would be true even if the research conducted in space did not itself yield economic benefits, whereas, in fact, some industrially beneficial applications of microgravity research can already be foreseen" (Crawford, 2005: 256).

China's first space program aimed at creating a manned mission was Shuguang (also known as Project 714), which was implemented since the late 1960s. It was to be replaced by the Fanhui Shi Weixing (FSW, literally "returnable satellite") program. Although the project-714 "Shuguang" was discontinued before reaching a practical result, however, the CZ-2A carrier rocket was brought to operation, and large three-ton FSW satellites with reentry vehicles were created on the basis of developments on the Shuguang ship. The FSW program worked in the period 1974-2006, putting into space (and 22 times successfully returning back) satellites for various purposes. Most of the FSW satellites were intended for conducting photographic remote sensing of the Earth. Unfortunately, the project to implement manned flights in China, under Fanhui Shi Weixing, was not successful, and this part of the program was closed around 1979. Nevertheless, an important result of the second Chinese manned program was the overcoming of an important technological milestone in this complex evolutionary process by the Chinese space industry: "the conception of "Evolution" comes from the field of biology, and usually it is used to describe the constitution and succession of

community. However, the spacecraft dynamics system also shows behaviors similar to those found in biology” (Yang & Liu, 2019: 128).

A new manned space program was proposed in 1986 by the Chinese Academy of Sciences as Project 863 (Astronautics plan 863-2). The project involved the creation of a manned spacecraft (Project 863-204) designed to deliver taikonaut crews to the space station (Project 863-205). As a result, Project 863 was transformed into Project 921, starting in 1992. Since then, the third manned space flight program of the PRC — Shenzhou has been developed (until 1999, it was called Project 921-1), within which as of today, 11 missions have been completed, including the flight of the first Chinese cosmonaut (2003, Shenzhou-5 mission); the first taikonaut spacewalk (2008, Shenzhou-7 mission); the expedition of the first female taikonaut and the first docking with the Tiangong-1 orbital station (2012, Shenzhou-9 mission); the docking with the Tiangong-2 space laboratory orbiting station, with the participation of the crew (2016, Shenzhou — 11 mission).

Over the past few years, as part of project 921-2 (creating a multi-module manned space station similar to the ISS, only smaller), China has been building the Tianhe (OI, or core of the CCM cabin module)-the basic 20-ton module of the future Chinese space station, designed for the long-term stay of three taikonauts. Shen 2021 Shen Shenzhou is the 12th, but the last one is still on Earth. “The main Tianhe module and two experimental capsules, wentian and mengtian, responsible for the assembly and construction of the basic configuration of the space station in orbit, will be launched” (Yun, 2020).

The manned space program, whether in China or any other country, does not bring a quick and immediate socio-economic effect. Unlike launching civilian satellites on a commercial basis. The value of manned missions is expressed in other ways: in the development of engineering and high technologies at the expense of the aerospace sector, increasing international prestige and recognition of the country’s status as a “space superpower” with a unique scientific and technical potential. These characteristics help to legitimize leadership positions on a global scale.

The implementation of the Tiangong program will make China the owner of a national orbital station for a permanent presence in space in the coming years. The strengthening of leadership positions and independence in space exploration has become an incentive for China to create its own space station in orbit. At the same time, the life of the existing International Space Station is coming to an end (14 participating countries have agreed to operate the ISS through 2024, and an extension of the operation period to 2028-2030 as a maximum is considered). Therefore, it is possible that the multi-module orbital station currently being created in China for a specified period (from the mid-late 2020s) may make China the only owner of a multi-purpose space research complex in earth orbit in the world. In any case, one necessary technical condition for launching the Tianhe base module into low-earth orbit has already been achieved: in May 2020, the test of the upgraded long March-5B (CZ-5B) heavy launch vehicle was successful.

One of the most impressive recent achievements of Chinese cosmonautics is the sending of robotic Chang’e missions to the Moon. The lunar research program began with the launch of two vehicles into selenocentric orbit in 2007 and 2010, to prepare for a soft landing of spacecraft on the surface of the Moon and delivery of lunar rovers. In 2013, Chang’e-3 (BK-3), a Chinese automatic interplanetary station for the study of the Moon and outer space, made the first soft landing on the visible side of the Moon since 1976 (the last time this was done by the Soviet automatic interplanetary station “Luna-24”). Mission, THUS, became the third power in history, after the USSR and the United States, to make a soft landing

on the Moon (Krichevsky & Bagrov, 2019). “The CE-3 mission also created an excellent opportunity to observe the lander in the absolute sense, that is, with the standard geodetic VLBI (very long baseline interferometry). This effort was implemented within OCEL by observing the Chang’e-3 lander using the VLBI program” (Klopotek et al., 2019: 1-2).

January 3, 2019, for the first time in the history of mankind, made a soft landing on the backside of the Moon launched by China AMS “Chang’e 4”, consisting of a stationary lunar station, carrying the lunar Rover “Yutu-2”. The main difficulty in carrying out this expedition was the CE-4 communication technology with the earth control center. On the other side of the Moon, direct communication with the Earth is not possible, since the Moon blocks any signals. Communication must pass through a communications relay satellite located in a location that would have a clear “view” of both the lunar landing site and the Earth itself. As part of the lunar exploration program, specifically for the Chang’e-4 mission, CNSA launched the Queqiao relay satellite at the L2 Lagrange point in May 2018.

Some scientific publications explain why the study of the reverse side of the Moon is so interesting for modern cosmology and basic science in general. First of all, “the lunar far-side is a virgin land and a unique scientific platform on which no humans or robots have ever landed. The Moon preserves the earliest rocks and craters after the formation of the Earth-Moon system, which could not be found on the Earth’s surface, and the oldest crust locates on the lunar far-side. Hence high-precision in-situ mineralogical and geochemical data of the far-side could make great contributions to the formation and evolution of lunar primordial crust and the evolution theory of terrestrial planets” (Wang & Liu, 2016: 678).

Secondly, the testing of the created innovative technology on the spot was no less important for the Chinese space industry. After all, no one before among the space powers has sent missions to the other side of the Moon: “Similar to Chang’e-3 (CE-3), three types of sensors were employed by CE-4, including a laser ranging sensor, a microwave ranging and velocimeter sensor, and an optical imaging sensor, and a laser imaging sensor” (Li Shuang et al., 2016).

Thus, the active development of near-earth space, despite its very high cost, can ultimately further contribute to the socio-economic development of China. The value orientations of Chinese society play an important role in this process, which was partially explored in our previous publications (Stovpets, 2019a; Stovpets, 2019b; Svyrydenko & Stovpets, 2020).

Contribution of the national space program of the PRC into the support of national security

China considers the strengthening of national security, including through the continuous modernization of the military space forces (PLA Air Force), as a guarantee for the continuation of its peaceful development and the realization of the “Chinese Dream.” The fact is that military conflicts taking place in the modern world demonstrate the successful use of space-based surveillance tools. The experience of conflicts has finally convinced China of the need to develop national security tools with the active integration of space technologies.

The National Security Law defines space components as one of the crucial segments of national security and defense capability in the current information technology realities. Related to this is the need to develop concomitant factors: “The state shall strengthen the building of capability of independent innovation, accelerate the development of independent and controllable strategic new and high technologies and core technologies in important fields, strengthen the utilization and protection of intellectual property rights, and the building of science and technology secrecy capability, and guarantee the security of major technologies and projects” (NSL, 2015: article 24).

For most Chinese and international military researchers, it is evident that future conflicts go beyond the traditional land, sea, and air dimensions. Any local conflicts, as well as the peaceful life of the world community, will inevitably take place in the conditions of informatization and digitalization. The ability to collect, analyze, transmit, and use information is becoming an effective tool for ensuring national security, and the level of development of space technologies plays a unique role in it. In this context, we agree with the following thesis: "Certain states are currently pursuing the development of more advanced missile defense capabilities that will employ space-based interceptor components to compliment sea- and ground-based missile defense systems as part of a layered defense designed to intercept missiles at three separate points of their flight trajectory. The use of this military space technology is purported to be a stabilizing force in international relations" (Sariak, 2017: 56).

Conclusions

China, as shown in this study, is committed to developing its space program in all possible directions. We are talking about: launching satellites of various purposes for civil, military and combined tasks of the PRC itself; launching satellites for other countries into space (on a commercial basis); implementing a program of controlled space flights; working on the creation of its own multi-module long-term orbital station; serious success in the study of extraterrestrial spaces (in particular, the Lunar program, with the prospect of sending taikonauts to the Moon); issues of strengthening the level of national security of the PRC through the development of space infrastructure and advanced aerospace technologies. At the same time, China has repeatedly stressed on the peaceful orientation of its space research and its readiness for broad international cooperation with both recognized space powers and third countries.

China demonstrates leadership in the quantity and quality of space technologies. And if at the beginning of this path, the success of the development of the Chinese space program largely depended on various foreign partners, today's China focuses on its strength, intensively increasing its innovative potential in this area. However, it also continues to strive for productive and mutually beneficial scientific and technical cooperation. As the space sector develops, China is making progress in implementing the principles of an innovative economy. The prospect of China's monetization of various segments of the national space program (first of all, the use of the future orbital space station; expansion of commercial launches for foreign public and private customers; introduction of the Chinese global navigation system), gives grounds to assert China's leadership potential in the post-industrial era. After all, we are talking about occupying one of the critical niches in the global technology market, where only a few countries can compete today.

China considers achievements in space exploration and development as a vital competitive advantage that carries both image and socio-economic dividends. After all, the further application of the implemented space projects becomes an accelerator for the technological, economic, and social development of the PRC. The full implementation of the "Chinese Dream" implies continuous technological development, raising the standard of living of the population, and expanding international cooperation. Space projects play an essential role in the implementation of these aspects of this national strategy, and their role will become more significant over time.

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On the Path to Space Mining and a Cosmic Sustainable Way of Socio-Natural Interaction

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The transition of the world community to sustainable development will require not only the achievement of global sustainability, but also the same type of development outside the planet, especially in the case of space mining. By joining the cosmonautics, sustainable space mining will contribute to the formation of an extraterrestrial basis for the future wide exploration of space by mankind and a new way of social and natural interaction. This will be, on the one hand, a continuation of earthly material production, but on the other hand, a completely new process due to the interaction of man with the extraterrestrial environment. A mode of production will begin to take shape, increasingly different from the current “planetary-production” way, which is appropriate to give the name of “production — cosmic” and the main features of which have yet to be identified. However, since humanity will simultaneously continue to inhabit the planet and settle beyond it, the aggregate way of interaction between nature and society will be their mutual earth-space combination (complex).

Keywords: space resources, space mining, cosmonautics, planetary and production way of evolution, production and space way of development, way of social and natural interaction, sustainable development

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Introduction

After the United Nations Conference on Environment and Development (UNCED) in 1992 in Rio de Janeiro, the world community set a goal and adopted a strategy for transition from spontaneous to globally managed sustainable development (SD) as the main way of civilization survival. A definition of the SD concept was given in the book “Our Common Future,” known as G.H. Brundtland, and devoted to the scientific substantiation of the need for the transition to SD. It was drawn to the future: “Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission, 1987: 54). Thus, in particular, was defined as the main goal of the necessity of transition to sustainable development — the future survival of mankind.

Preservation of the biosphere and survival of mankind is the cardinal purpose of the transition to sustainable development. The best-case scenario for the future of our planet and mankind living on it involves the preservation of the biosphere as the natural basis of life of all the living and sophont (Bobylev, 2017).

Moreover, this includes the life of the population and a significant part of the biodiversity in such vulnerable ecosystems as mountainous regions (for example, 43 constituent regions of the Russian Federation have mountain ranges and uplands, and the total area occupied by them is 53.6% of the territory of Russia). The mountains occupy about one-fourth of the planet’s surface and are home to 12% of the world’s population. They affect all processes in the rest of the planet. Mountainous areas are important for the existence of civilization, and for the evolution of the entire global ecosystem, which was highlighted in the Agenda 21 adopted by UNCED.

Mountainous areas more than other habitats are affected by the adverse effects of climate change, as well as the consequences of disasters in mountainous areas, such as flash floods, including floods from mountain lakes, as well as landslides, mudflows and earthquakes. At the same time, the mountains are sources of mineral resources and sources of fresh water supply, as well as hydropower resources (70% of fresh water reserves and 50% of deposits of precious and non-ferrous metals are concentrated in the mountains).

This feature of mountainous areas requires severe special restrictions on economic activity and the implementation of “sustainable mining development” (Resolution, 2007). Therefore, in the documents of the UN dedicated to SD strategy, special attention was paid to the mountainous areas. Mountainous regions are characterized by the fact that they are one of the most ecologically vulnerable areas, and at the same time, they are the ones that are affected by the development of the most large-scale environmental management processes that cause negative impacts on the surrounding nature and people. “Sustainable mountain development” and “sustainable development of mountainous areas,” although close, but not the same concepts. The latter concept focuses on mountainous areas, while the term “sustainable mining development” characterizes SD as mountainous areas and other territorial areas where sustainable mining can take place, for example, on plains or even outside the planet. This difference appears due to the fact that mining is associated not only with mountains and hills, but with a special human activity in the development of the Earth’s interior in any other place on the planet, i.e., underground mining of minerals. Therefore, mining as an activity for the development of the Earth’s interior allows both its planetary-terrestrial and cosmic expansion.

Mining, as a rule, is considered as a field of activity on the use of the Earth’s crust for the extraction of minerals, their primary processing, as well as related scientific research.

However, this term has recently become used not only in the meaning of mining, but in the production of bitcoins and other crypto-currencies on mining farms and platforms. In the article, the concept of mining will be used in the context of mining, rather than crypto-currency. Thus, a number of key concepts that originated and were used in the mining engineering receive their new, space and information, expansion. Humanity is now interested in mining SD not only in the “planetary-underground,” but also in the space perspective since in the future, these two processes will occur not only in parallel, but also cooperatively. Although the journal has already considered possible ways of further development of the mining industry, for which non-standard ideas and forecasts of scientists and entrepreneurs are used, however, we will continue these ideas in the cosmic dimension.

SD can be implemented in two main variants — in the global-terrestrial one, in accordance with a modern concept, and space one, as proposed by the founder of astronautics, Konstantin Tsiolkovsky (Tsiolkovsky, 1954). In the article, continuing the ideas of Tsiolkovsky, we will talk about the formation of a new method of socio-natural interaction, different from the “planetary-production” method, due to the interaction of man with the extraterrestrial environment, which is appropriate to give the name “production and cosmic way.”

Sustainable Horizons of Extraterrestrial Mining

The beginning of the interaction between mining engineering, mining, and astronautics did not come by accident at the present time of space exploration. It became obvious that space activities would not continue to develop effectively without the “support” of the mining industry and its emergence beyond the terrestrial atmosphere. Along with this, both further space exploration and geospace safety promotion, i.e., protection of the planet against threats from space, will be impossible without the development of space mining. It is appropriate to recall that Konstantin Tsiolkovsky proved the necessity of space exploration proceeding not only from the demands of social and economic development but primarily from the need to ensure the safety and preservation of mankind. He also reckoned the emergence of an “industry in the ether.” Therefore, the development of mining, and through it, the other industries, is in line with the reduction of anthropogenic pressure on the biosphere under the conditions of the population growth.

The development of space resources and their processing outside the Earth, directly in space, drastically changes the principles and trajectories of space missions, as well as the ways of creating space technology, bringing this technological process beyond the biosphere. The priority of space resources is water. It can be found in circumterrestrial asteroids in the amount of several trillion tons. If it becomes possible to extract water from natural cosmic bodies (which decomposes under the influence of an electric current to oxygen and hydrogen) and other necessary products for space technology and to produce fuel outside the planet on the basis of hydrogen, it will reduce the price of further space development by twenty times.

It is believed that the first space field is likely to be not asteroids (which may contain rare earth elements, platinoids, and other rare and precious metals) but the Moon, where the priority extracted resource will be the water used to provide life support to people and fuel for rockets and space vehicles. The need to use lunar natural resources for the creation of lunar bases, the construction of space infrastructure for the purposes of further space exploration, including mine shafts, tunnels and other underground structures, especially for refueling space vehicles, attests to the early development of the Moon (Krichevsky, 2020; Krichevsky & Bagrov, 2019; Mayboroda, 2018; Slyuta, 2017).

However, more than a thousand asteroids are flying near the Earth, and they can be achieved much more easily than the Moon. At the same time, some of them represent a very serious threat to our planet, which is often reported by the media. However, the Moon still does not significantly affect the problem of geocosmic safety, while some asteroids and comets constitute a threat to the planet on a short-term horizon. It is evident that the asteroid-comet hazard has to be prevented, and it can fundamentally affect the choice of further ways and methods of space activities since security is always more important than commercial and other activities. In fact, it is also necessary to stand secure in order to develop the economy.

The basic idea of SD in its terrestrial and space variants is to ensure the safe existence of mankind (Ursul, 2016). It is important not to place in jeopardy the ability of future generations to meet their needs and, above all, the basic need for a safe existence and sustainable development on the Earth and in space. After all, the more space and objects of space will be mastered on a larger scale, the greater the chance of a further continuation of mankind existence (Ursul & Ursul, 2019).

Konstantin Tsiolkovsky assumed the idea of creating his space version of sustainable development beyond the planet. The recently deceased British physicist Stephen Hawking and American entrepreneur Elon Musk, who founded SpaceX company in 2002 in order to colonize Mars, came to the same ideas. This colonization, in his opinion, will turn mankind into a multi-planetary species and increase the probability of the survival of our civilization if some global space catastrophe occurs on Earth (Musk, 2017). Space mining can be the “key” to survivorship, which will destroy (or deflect from the planet) a dangerous asteroid, as it was already in art form demonstrated in the American fantasy film “Armageddon” at the end of the last century.

It is important to pay attention to a kind of “reverse effect” of new mining technologies developed for space needs: many traditional mining technologies cannot be used in the space mining industry since space conditions fundamentally affect these technologies. The application of new physical principles and fundamentally new approaches to the creation of equipment will be required for space mining technologies. For example, in the future, there may be technologies for direct metal extraction, bypassing mining, processing, and metallurgical processing, as is customary in “terrestrial” mining technologies. These new technologies seem to be more cost-effective in terms of the cost-benefit ratio, but what counts most is that they are environmentally friendly and less material-intensive. This makes them more acceptable in case of implementation in terrestrial conditions, so the space mining options will significantly contribute to the transition to mining SD on a global scale.

Mining space technologies in the conditions of our planet in the coming decades can have a revolutionizing effect on the entire terrestrial mining industry. Therefore, when there arises an image of the mine of the future, it is important to consider the possibility of deploying space mining and its influence on underground works and structures.

Paying attention to the problem of material intensity, one should not overlook the energy problem, which is more fundamental and acts as one of the main ones in the process of transition to the SD. It is known that over a million tons of helium-3 isotope accumulated in the surface layer of the lunar soil (the regolith), which can be used as fuel for future thermonuclear reactors and which is sufficient to provide humanity with energy for many thousands of years. Since such fuel produces few carbon and toxic wastes, its environmental benefits attract the attention of power engineers, and because of the helium-3 isotope, in the not too distant future, the Moon can become one of the main space mines.

However, it is unlikely that the entire stock of these energy commodities will be sent to the planet and will continue to build up terrestrial energy production (Puchkov, 2015). The geocentric vision of “sustainable energy” development does not allow a significant and long-term extension of mankind’s evolution. There is a limit to the production of energy on our planet because of its overheating, and this limit should not exceed a thousandth of the energy received from the Sun. Consequently, the further growth of energy used by mankind is expedient only with the wide development of energy processes outside the Earth. The creation of an industrial-energy base in space (primarily on the Moon) will make it possible to transfer both energy-intensive and environmentally harmful products from the Earth. This is a fairly obvious imperative and the goal of transition to space SD: the exploration of outer space should promote a global transition to SD, and the space activity itself also has to become a sustainable process.

In the near space future, mankind will have to massively ship the production of energy and materials outside the planet, instead of deploying this industry in undeveloped territories, for example, in deserts, the Arctic, the Antarctic or in the oceans and seas. The main reason for the relocation of the energy and some other industries outside the Earth is related to the transition to SD and especially with a number of environmental issues, such as global warming and depletion of the world’s fossil fuel and energy resources with the increase of energy consumption. Therefore, the development of any new terrestrial territories, for example, the ocean, is economically inefficient and environmentally impractical. In the case of the development of space bodies, a new anthropogenically-space method and a method of preserving the terrestrial biosphere, as well as the creation of it of the most favorable conditions for the existence of mankind and other forms of life, appear. Therefore, those projects that in the acceptable future can be implemented in space are hardly worthwhile to implement on the planet.

A fundamental conclusion about the need for the future to “split” production into terrestrial, mainly agricultural and space, mainly industrial, between which the products of activity can and will be exchanged has already been made on the basis of an analysis of current trends in the environmentalization of economic and other anthropogenic activities in the context of achieving global sustainability. Agricultural production in the perspective of the transition to SD should fit into the biosphere, using intensively-ecologized methods of economy management (Bazaluk et al., 2020). The strategic perspective of the global-space production split is the most natural and effective one and is understandable in terms of ensuring eco-and geo-security of the civilization’s existence (Zhuchenko & Ursul, 1983).

The relocation of the industry, including mining, beyond the planet, is based on its intensive xenobiotic action on the biosphere. However, it will no longer harm the biosphere outside the planet. The relocation of certain enterprises and even industries to space or their further development on the planet will be determined, first of all, by considerations of the optimal achievement of the global-space stability of the “man-society-nature” system.

It is, therefore important to use space objects and their resources in order not to violate international law. This way of development of the space mining industry is not only more in line with modern space international law, but also a further transition to SD in its global and extraterrestrial directions. If the development of scientific trends and industries engaged in exploration activities and mining operations goes along the “merchant path,” then its prospects will be very dangerous for the transition of the world community to SD. Getting an opportunity to do business with space resources at a certain stage can even promote these private developments. But in the future, it is fraught with littering of the planet by space

resources, which, after use, will become terrestrial waste, and which will significantly impede the achievement of global sustainability.

It has already been noted that the achievements of archaeometallurgy of recent decades add qualitatively new evidence in modern ideas about the development of the Neolithic revolution, make it possible to single out a separate community of miners-metallurgists and put it next to farmers and pastoral communities as an important component of the progress of the Neolithic revolution (Haiko, 2013; Ursul, 2020). Further prospects of mining development will be associated not only with the expansion of underground space, the introduction of new methods of exploration, the use of borehole geotechnologies, the development of deposits on the seabed, and large-capacity deposits. Now we can expect that an equally important role can be played by space mining as an important part of a new, already extraterrestrial revolution in the formation of a new way of socio-natural interaction.

Formation of the Cosmic Way of Socio-Natural Interaction

The development of production in space, especially resource production, is a new radical transformation in the development of all previous material production. Space production is likely to differ from terrestrial production no less than material production from hunting and gathering. The basis for this opinion is that these latter developed on the planet, in fact, in the same natural conditions, differing mainly in the ways and technologies of interaction with the Earth's nature. These methods were endogenous-anthropogenic nature, and space production will develop in fundamentally different natural conditions outside the Earth, and this exogenous factor will significantly affect all production activities.

In our opinion, the removal of products from the planet to a new natural environment will have such a significant impact on the evolution of this main civilizational process that it raises the question of the possible formation of a new way of social and natural interaction. This will be, on the one hand, a continuation of earthly material production, but on the other hand, a completely new process due to the interaction of man with the extraterrestrial environment. A mode of production will begin to take shape, increasingly different from the current "planetary-production" way, which is appropriate to give the name of "production-cosmic" and the main features of which have yet to be identified. However, since humanity will simultaneously continue to inhabit the planet and settle beyond it, the aggregate way of interaction between nature and society will be their mutual earth-space combination (complex).

In the future, as has already been shown, there will be a split of modern terrestrial social production on Earth, mainly agricultural and space, mainly industrial, between which the exchange of products of activity will be carried out (Zhuchenko & Ursul, 1983). The strategic perspective of the earth-space bifurcation of material production is the most natural and effective, understandable from the standpoint of ensuring the ecological safety of the further existence of civilization. After all, only in this bifurcation will open up new opportunities for a significant reduction of anthropogenic pressure on the biosphere, the transition to further comprehensive intensification and sustainable development. This does not mean that we are talking about the "landing" of agricultural production, which is most organically linked to the biosphere. In the future, the space direction of its development is expected, but it will be formed much more difficult and slower than the industrialization of extraterrestrial space.

It is advisable to leave the planet to develop those industries, which are agriculture, ie directly affect the adaptive intensification and increase of efficiency of agriculture, livestock, and neoliberalist, allowing you to more effectively solve the food problem in the long term

of mankind's transition to sustainable development. Thus, the consideration of space factors in the evolution of social production shows that, along with the widespread use of space means, earth factors will also be used in a new way, space and earth directions and forms of development and security will be intelligently combined.

The removal of industry, including mining, outside the planet, is primarily associated with its intense xenobiotic impact on the biosphere: after all, outside the planet, it will not harm the biosphere. The relocation of certain enterprises and even industries to space or their further development on the planet will be determined, first of all, by considerations of the optimal achievement of the global space stability of the "man-society-nature" system.

It is important to note that, so far, space activities have been sent to Earth, mostly information about space and about the planet from space. In the resource target, this was mainly the information phase of space exploration, which contributed to the transition to SD. If the Earth, in addition to information, will be delivered to the material and energy resources, such geocosmic activity in its commercial version, will only bring the ecological collapse of the biosphere. Meanwhile, progress on the way to SD is, in principle, focused on the reverse movement-from Earth to space: therefore, the beginning of space exploration and the transition to SD occur approximately in the same historical period, including in human activities new ways and ways of survival of mankind. Wide space exploration by mankind is necessary for the further continuation of progressive evolution in the Universe, the formation of its new, more complex and high levels of stages (Bazaluk, 2016; Ursul, 2019).

Conclusion

A global world should be construed as a state (and process) of civilization and its interaction with nature fulfilled in the global dimension through a transition to sustainable socio-natural development. The perception of a global world through the lens of global sustainability leads to the identification of two stages in such global development.

The first stage is already being implemented in the unsustainable development model when this kind of world is starting to take shape but is fundamentally incapable of attaining the required coherence and security and can even be wiped out as a result of an environmental or any other man-made disaster. This is why the ultimate creation of a global world should be expected at the second stage after securing global sustainability (Ilyin & Ursul, 2019).

The making of a global world is associated with two opposite trends. On the one hand, the realm of social and socio-natural interactions is expanding to the extent of the planet's biosphere. On the other hand, this expansion is obstructed by planet-scale (primarily, biospheric) constraints engendering certain limits and conflicts on the path of further global development.

These conflicts include the essential socio-natural conflict when the Earth's biosphere is increasingly less capable of meeting mankind's soaring needs. This is why it is crucial to ensure that sustainable development is supposed to resolve this conflict, acquires a global dimension, and turns into global development and that the latter turns into SD. Further sustainable development with a clear need leads to space exploration on a large scale using space mining.

Thus, it can be considered that mining beyond the planet might become more actively involved in space activity and can become its most important component and give a new impetus and direction for the development of extraterrestrial spaces. It is possible to talk about such interaction between astronautics and extraterrestrial mining when in a certain sense, they are able to become components of each other in the foreseeable future.

If in the first stage of human space expansion, the “starting base” was the Earth and its resources, then in the foreseeable future, not only the planet, but also celestial bodies, not only their information, but also real-energy resources will be relevant. This is made possible by the predicted development of space mining, which will divide the history of space exploration into two historical stages — before the emergence and development of space mining and the continuation of space activities with the development of mining outside the Earth (although there are other classifications of the stages of space exploration). Thus, space mining will contribute to the sustainable development of space exploration on an extraterrestrial basis, which will open unlimited possibilities for the penetration of mankind into the Universe.

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Section Two

INTELLIGENT MATTER

The Techno-Humanitarian Balance and Modernity

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The authors studied the problem of techno-humanitarian balance. A difference was found in approaches to the study of technological progress and its impact on the development of society. The ideas of transhumanism, existential risk, etc. suggested by Nick Bostrom, David Pearce, etc. provided a utilitarian attitude towards new technologies. The representatives of transhumanism proceeded from the idea that any technology is part of human nature and expanded its presence in life. Nazaretyan's ideas were based on the opposite premise. Namely, man and technology have a different nature of origin. Hence, the need arises to adapt to a non-native environment and create certain restraining mechanisms. The societies that failed to adapt to the exponential spread of information and communication technologies in time undermined the natural and/or geopolitical foundations of their existence. In turn, the societies that have adapted to new technologies have achieved sustainable development and prosperity. The authors used the comparative method of research, as well as methods of modelling, analysis, and synthesis. The study resulted in the testing of two models of the relationship

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between society and technology, built on the Nazaretyan hypothesis and the Bostrom concept. The test results proved the effectiveness of the model, built on the concept of Bostrom. The model presents the general dynamic nature of man and technology.

Keywords: techno-humanitarian balance, Akop Nazaretyan, philosophy of transhumanism, techno-engineering, existential risk, Nick Bostrom, process philosophy

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Introduction

The hypothesis (sometimes the law) of the techno-humanitarian balance was proposed by Akop Nazaretyan in 2001 (Nazaretyan, 2001). Subsequently, the author refined its interpretation several times (Nazaretyan, 2003; 2005). The most common one is the following definition of Nazaretyan's hypothesis: the more powerful the technology is, the better quality detergents are needed to maintain the social system (Nazaretyan, 2001).

Nazaretyan was one of the few Soviet philosophers who promoted his ideas in leading English-language scientific publications after the collapse of the USSR. In 2003, he published an article in the *Journal for the Theory of Social Behavior*, in which he revealed a causal relationship between the three variables: technological potential, cultural regulation quality, and social sustainability. He formulated the hypothesis "that the higher production and war technologies' power, the more refined the behaviour regulation means (consolidated values and norms, etc.) that are required for self-preservation of the society" (Nazaretyan, 2003).

In 2005, Nazaretyan published an article in the *Journal for General Philosophy of Science*, in which he pointed out the fundamental difference between the approaches to Big History in Western and "Soviet" culture. Nazaretyan wrote, "The non-equilibrium approach in the context of modern control and self-organization theories, alters the portrayal of the past, and still more dramatically, estimation of the civilization's potential perspectives" (Nazaretyan, 2005). The hypothesis of techno-humanitarian balance was presented in the article as an opportunity to assess human evolution in relation to scientific and technological progress.

The Nazaretyan hypothesis was formalized as a general relationship between the ability of society to avoid man-made disasters, i.e., Internal Sustainability (Si), the quality of self-regulatory mechanisms (Regulation functions — $f_1(R)$) and technological potential (Technologies functions — $f_2(T)$).

$$Si = \frac{f_1(R)}{f_2(T)} \quad (1)$$

An analysis of scientific publications suggests that the Nazaretyan hypothesis did not affect Western discourse. However, it caused a great resonance and discussion in the post-Soviet space. For example, Evstifeeva et al. used the hypothesis as the basis for creating a practice-oriented approach to study the personal potential of modern engineers, development of their personal qualities by means of socio-humanitarian technologies, and reflexive approach used in the educational process (Evstifeeva et al., 2012).

Cheshko et al., on the basis of Nazaretyan's hypothesis, created the co-evolutionary concept of the tri-modal stable evolutionary strategy (SESH) of Homo sapiens. The concept based on the principle of evolutionary complementarity of anthropogenesis: value of evolutionary risk

and evolutionary path of human evolution is defined by descriptive (evolutionary efficiency) and creative-teleological (evolutionary correctness) parameters simultaneously, that cannot be instrumentally reduced to other ones (Cheshko et al., 2014; Cheshko et al., 2015).

Zhelmin used the Nazaretyan hypothesis to explain the phenomenon of sociobiological crisis. He proved that as a result of “information inflation,” the human psychic appears the object of systematic stress, which may lead not only to an increase of mental disorders but also somatic ones (Zhelmin, 2014).

Sokolov used the hypothesis of techno-humanitarian balance to reason humanistic model of the noosphere man, “as it can provide techno-humanitarian balance in post-industrial civilization” (Sokolov, 2019). Sokolov considered the possibilities of the cultivation of noosphere person and the role of libraries in this pedagogical process.

Krichevsky studied the theoretical and practical aspects of the problem of creating a new “cosmic” human in the paradigm of space exploration and the creation of cosmic humanity. In his opinion, the hypothesis of techno-humanitarian balance plays an important role in solving the problem of the future human and humanity (Krichevsky, 2020).

In the article, the authors examine techno-humanitarian balance as a problem. The importance of this problem is explained by the consideration of the role of information and communication technologies in the sustainable development of society. The determination of human nature and technology with subsequent modelling of the relationship between them comes first.

The philosophy of transhumanism

Nazaretyan created the hypothesis of techno-humanitarian balance in an already existing discourse, which was caused by an international cultural movement called transhumanism. The primary source of the idea of transhumanism originated in Ancient Greece. It was formed by the difference of meanings implied by the terms “sophia” and “technē.” Namely, between the qualities those Gods endowed man with at birth and the technical skills that man learned throughout life (Bazaluk, 2019).

Since then, the original Greek meanings have been substantially changed. However, the source of the problem has remained unchanged. In modern language, its meaning can be conveyed as a fundamental transformation that “fundamentally transforms the human condition through radical technological enhancement” (Ross, 2020). The source of the ideas of transhumanism is in the contradiction between the nature of man, i.e., *what* forms the essence of human being, on the one hand, and *technē*, i.e., products that man has created to take care of himself and his way of life, on the other hand. For several millennia, the essence of man and the essence of things created by man were considered different. However, starting from the second half of the 20th century, after the studies of Julian Huxley, Fereidoun M. Esfandiary, etc., a different vision of this problem appeared. There was an understanding that the essence of things created by man is a continuation of the essence of human beings. Arguments appeared that allowed an essential unity between the being of humans and the being of things created by them (Bostrom, 2003).

In 1998, Nick Bostrom and David Pearce founded the World Transhumanist Association (WTA). Transhumanism began to be positioned as a legitimate subject of scientific inquiry and public policy (Bostrom, 2003). David Pearce stated, “biotechnology will abolish suffering throughout the living world. Our descendants will be animated by gradients of genetically preprogrammed well-being that are orders of magnitude richer than today’s peak experiences” (Pearce, 2007). In 2008, the World Transhumanist Association rebranded and became known as Humanity +. In the new organization, political goals receded into the

background, and “the ethical use of technology, such as artificial intelligence, to expand human capacities” came to the fore. In other words, we want people to be better than well. This is the goal of transhumanism” (Humanity +, 2020).

The philosophy of transhumanism is of primary interest to our study. It offers a special discourse on the meaning of being human in anticipation of radical technology. Its reflection is based on the assertion that a person is not just open to the outside world, of which technology is an important part. Man is part of the outside world. He is essentially present in it. Therefore, the essence of techno-engineering is a certain part of the essence of humans. This is their nature. Hence, greater-than-human machine intelligence, mind-computer interfaces, gene-editing, and nanotechnology are the natural necessity and indisputable utility of upgraded humans.

The consequence of this reflection was the discovery of a new space of human self-actualization. This is an additional and virtual world created by technical means. Human being in these worlds has become a reality.

The Philosophy of Transhumanism uses the philosophy of neuroscience and neurophilosophy (Bickle et al., 2019; Lin & Bazaluk, 2020) as the basis for research. Both disciplines reveal the complex relationships that have developed between neurosciences and psychology, as well as the role of digital technologies in these relationships. Modern models of the human brain functioning are no longer limited to the field of neuroscience. New models have been created and are being studied that examine the involvement of the brain in cosmic consciousness and cosmic evolution (Kastrup, 2018), planetary evolution (Smirnov & Odintsova, 2019; Sokolov, 2019), and global geopolitical processes (Bazaluk & Balinchenko, 2020; Lifková, 2019), etc. It was found that self-sufficiency of the brain or neurobiology of resilience is primarily provided by neurobiological processes (Cathomas et al., 2019). Their quality guarantees not only the functioning of the body, but also modern technology. The latter creates the unity of neurobiology of resilience and sustainable development of society. These may be the technologies that control human health and mental state (Lifková, 2019); educational technology (Lin & Bazaluk, 2020); artificial intelligence and space technologies (Soroka & Kurkova, 2019); etc.

Modern neurobiological models exclude the essential difference between the neural structures that determine the functions of consciousness and digital technologies that expand the functions of consciousness. They prove their essential unity. Consciousness and digital technology determine the quality of each other’s presence. Cybernetic organisms are a good example in this case. Namely, “integration of out-of-body and inside-the-body nanoscale devices with a human, that is, creation of augmented human” (Koucheryavy et al., 2017).

The philosophy of neuroscience and neurophilosophy provide an essential empirical basis for the research on the philosophy of transhumanism. The philosophy of transhumanism focuses on the ethical use of technologies such as artificial intelligence, nanotechnology, nanomedicine, biotechnology, stem cells, and gene therapy (Humanity +, 2020). The philosophy of the World Transhumanist Association and its successor Humanity + is the philosophy of pragmatism that sets specific goals and determines the ways to achieve them. The priority is the search for answers to questions of the expansion of neurobiological and biological processes due to new technologies, as well as the argumentation of the ethics of this action.

An existential risk

The end of the 20th century has brought with it the rethinking of the essence of human nature and technology. The generally recognised division has lost its evidence. Information and communication technologies as a product of human activity turned out to be *a continuation*

of human nature in reality. The nature of man and technology began to be studied as one in its essence.

Studies of this kind have encountered ethical limitations. The value norms and rules that determined human behaviour and their attitude to the products of their labour did not allow their essential unity. They predicted technological disasters, the threat of the destruction of civilization, personal and social crisis, etc.

Around this time, Nazaretyan proposed the hypothesis of techno-humanitarian balance. Nazaretyan's hypothesis was based on the traditional point of view, which affirmed the different essence of human beings and the existence of information and communication technologies. This difference gave rise to antagonism: the being of technology opposed the being of man. To emerge victorious in the current confrontation, a person had to continuously improve the means of constraining technology (Nazaretyan, 2001, 2003, 2005).

However, in the Western discourse, the traditional point of view on the essence of man and technology became less and less popular. Technogenic disasters and cataclysms did occur. However, they did not have the regularity and the consequences for humanity that were predicted, *inter alia*, by the Nazaretyan hypothesis. At the same time, new technologies have increasingly become part of everyday life. The complementary and virtual world has become a reality in which more and more people have found a space of self-actualization (Pinto et al., 2013).

The promotion of views on the unity of the essence of man and technology is associated with the concept of existential risk. In 2005, Nick Bostrom founded The Future of Humanity Institute as part of the Faculty of Philosophy and the Oxford Martin School. In early 2010, he developed the concept of existential risk, in which he proposed a new way of thinking about the ideal of sustainability (Bostrom, 2013). Bostrom claimed the following (Bostrom, 2013):

1. An existential risk is a concept that can focus on long-term global efforts and sustainability concerns.
2. The biggest existential risks are anthropogenic and related to potential future technologies.
3. A moral case can be made that existential risk reduction is strictly more important than any other global public good.
4. Sustainability should be reconceptualised in dynamic terms, as aiming for a sustainable trajectory rather than a sustainable state.
5. Some small existential risks can be mitigated today directly (e.g., asteroids) or indirectly (by building resilience and reserves to increase survivability in a range of extreme scenarios). Still, it is more important to build capacity to improve humanity's ability to deal with the larger existential risks that will arise later in this century. This will require collective wisdom, technology foresight, and the ability when necessary to mobilize a strong global coordinated response to anticipated existential risks.
6. Perhaps the most cost-effective way to reduce existential risks today is to fund analysis of a wide range of existential risks and potential mitigation strategies, with a long-term perspective.

The concept of existential risk is the exact opposite of the hypothesis of techno-humanitarian balance. Bostrom acknowledged the risk associated with potential future technologies and the fact that the cause of the risk was man himself. However, Bostrom did not associate the sustainable development of society with technology containment in

order to preserve the social system, as Nazaretyan suggested. Bostrom argued that society and technology have a single entity, so they should be reconceptualised in dynamic terms. Bostrom proposed that human beings and technologies not be regarded as sustainable states that complement or oppose each other. He suggested exploring them as a process having a common nature. In essence, Bostrom's argumentation of the unity of the essence of man and technology was based on the research of process philosophy. Techno-humanitarian balance began to be viewed through the prism of process philosophy.

Techno-humanitarian balance in process philosophy

Process philosophy is based on the premise that being is dynamic and that the dynamic nature of being should be the primary focus of any comprehensive philosophical account of reality and our place within it (Seibt, 2020). The dynamic nature of being, which is studied by process philosophy, offers the opportunity to test two models of techno-humanitarian balance:

1. A model that provides for a different essence of man and technology. The balance between them is provided by the Nazaretyan hypothesis.
2. A model that provides a single entity of man and technology. It is based on the Bostrom concept.

Consider the first model. The stability of the model based on various entities is provided by a system of complex restraining balances. They are determined by the Nazaretyan hypothesis. From formula 1, it follows that the technological potential ($f_2(T)$) should always be lower than the quality of self-regulatory mechanisms ($f_1(R)$) if society wants to avoid anthropogenic disasters. Sustainable development of society is provided by its ability to anticipate and protect itself from future technologies. However, in fact, the technological potential is ahead of the mechanisms of self-regulation created by man. This is evidenced by the studies of migration processes caused by technogenic or other factors (Bazaluk & Balinchenko, 2020). Bazaluk and Balinchenko proved that the mechanisms of social regulation are formed after the beginning of the migration process. The created mechanisms regulate the ongoing process or eliminate the consequences of an already completed event. In a study by Churin et al., it was proved that operation of the system to redistribute mineral extraction revenue occurs upon completion of the technological revolution and is its consequence, but not vice versa (Churin et al., 2019). Yakushik draws attention to the necessity of dialogue and mutual understanding between different civilizational layers in national States and in inter-State relations (Yakushik, 2019). However, the need to create mechanisms of self-regulation is a consequence, not a cause. The reason for regulation is an anthropogenic factor. Soroka and Kurkova have shown that the exponential growth of artificial intelligence and space technologies is a reason for rethinking legal and ethical norms, and not their consequence (Soroka & Kurkova, 2019).

The above studies prove that in the vast majority of events, the value of technological potential ($f_2(T)$) is always higher than the quality value of self-regulatory mechanisms ($f_1(R)$). This means that if we follow the Nazaretyan hypothesis, then humanity should have perished in anthropogenic disasters.

Studies by Balinchenko, Churin, Soroka, Yakushik et al. prove that:

- a) the high value of the technological potential ($f_2(T)$) does not cause the growth of anthropogenic disasters;
- b) self-regulatory mechanisms ($f_1(R)$) are created post factum. They are the result, and not the cause of the growth of technological potential;

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- c) sustainable development of society cannot be determined by the ratio of the quality of self-regulation mechanisms (Regulation functions — $f_1(R)$) and technological potential (Technologies functions — $f_2(T)$), since in most cases the technological potential causes the creation of self-regulation mechanisms and determines their value.

Consider the second model based on the Bostrom concept. Its main feature is that the dynamic nature of being of man and technology is considered as essentially united being. Bostrom does not formalize his concept. He defines it as “a concept that can focus long-term global efforts and sustainability concerns” (Bostrom, 2013). Existential risk is any risk that can lead humanity to complete destruction. Existential risks can be natural (supervolcanoes, asteroid impacts, any other destructive influence of space processes), and anthropogenic (nuclear war, climate change, artificial intelligence, etc.). Bostrom does not oppose man and technology. On the contrary, he considers technology as an important part of the confrontation between man and cosmic processes. Even when it comes to the existential risk of anthropogenic nature, Bostrom speaks of the transformation of man, and not of man’s self-preservation from technology. According to Bostrom, it is man who is the cause of existential risk, not technology. Therefore, for the sustainable development of society, it is necessary to educate a person. Plato considered the cause of all people’s troubles to be their ignorance (Bazaluk, 2019). Therefore, Bostrom sees the prevention of the existential risks of anthropogenic origin in the fight against human ignorance, and not in the creation of restraining mechanisms of self-regulation. The Bostrom concept envisions the use of technology in the prevention of existential risk.

The second model allows considering “psychology of social expectations of a personality as the unity of the mental process, mental state and properties of expectations” (Khmil & Popovych, 2019). The Bostrom model reveals the unity of human life and the role of information and communication technologies “in spatial planning, urban modelling and simulation, acquisition of information using different sensors and model spatial processes, the use of data to create more capable visualization tools, and the use of virtual models to simulate real environments and plan and manage other aspects of the built environment such as energy” (Pinto et al., 2013).

The Bostrom concept forces us to rethink a traditional political perspective on the nature of power, which has always been linked to force, domination, and sovereignty issues. Lifková proved that “As the new devices come to light, a new frontier of power emerges in the digital sphere — a power that is exercised with subtlety and disguised as a voluntary” (Lifková, 2019). The study by Lifková proves that technology does not oppose human nature, but improves it.

Conclusions

Thus, techno-humanitarian balance was investigated as a modern issue. As a result, two opposing approaches were discovered in the study of the essence of human beings and technology, which determine the role of technological progress in human life. The first approach is the hypothesis of the techno-humanitarian balance proposed by Nazaretyan. The hypothesis formalizes the traditional point of view on the different natures of man and technology. It follows from the hypothesis that the sustainable development of society depends on the importance of self-regulation mechanisms (Regulation functions — $f_1(R)$) that hold back the technological potential (Technologies functions — $f_2(T)$). This allows the social system to adapt to the technological process and not be destroyed by it.

The second approach is due to transhumanism and a new understanding of the essence of man and technology. This new understanding is fully apparent in the concept of existential risk proposed by Nick Bostrom. In the Bostrom concept, human nature and technology are united. Existential risk is due primarily to human ignorance, which must be overcome, inter alia, using new technologies. There are no contradictions between the social system and technological progress. They cause each other's development. These are the two parts of a whole that allow speaking of a social system as a cosmic civilization (Krichevsky, 2020).

The considered models and their consequences allow concluding that the second approach corresponds to the present time. The studies of Bostrom, Khmil, Pinto, Lifková, etc. prove its truth. The first approach contradicts modern research on the sustainable development of society. Perhaps that is why Nazaretyan not only refined his hypothesis several times, but also used it with great reservations in his studies of the last years of his life (Nazaretyan, 2020).

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Philosophy of Language and the Language of Philosophy: a New Approach to Functional Classification of the World's Languages

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The purpose of the article is to describe the author's approach to the classification of a special group of the world's languages, performed independently of their ethnic origin but according to their functions, which are realized in the speech and language activities of people. The paper suggests the psycholinguistic bases, which were previously unknown in the philosophy of language, for grouping the world's languages (natural and artificial languages; state; official; national; regional languages; languages of national minorities; native language, interethnic language; international

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language; the language of business; the language of interethnic communication; the language of international communication; the language of science; the language of philosophy, etc.) in the areas of their functioning in the communicative and speech experience of each person both in individual polyethnic, multicultural countries and on a global scale, regardless of one or another particular ethnic language.

The paper describes each of the language varieties, united in one functional group according to their psycholinguistic purpose. The presented functional and psycholinguistic classification of languages is characterized by taking into account constant and variable factors that influence the relationship between language and each person in a society. Such factors include the functions performed by a particular type of language in the speech activity of its subject, people's social assessment in relation to functionally oriented types of languages, the scope of their implementation in life and human activity. A characteristic feature of the described classification is the consideration of higher mental functions of man, the implementation of which is carried out through these types of languages, and through specific means for each of these languages.

Psycholinguistic paradigm in the classification of languages by their functional psychosocial orientation allows us not only to present the problems of philosophy of language in a new perspective, but also to create prerequisites and conditions for maximum verbal harmonization of planetary society, its evolution through functionally oriented languages, and to achieve "appropriate communication," ensuring realization of language rights and freedoms of every person.

Keywords: language, philosophy, classification of languages, functionally oriented languages

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Introduction

Studies of the nature, origin, and use of language traditionally belong to the field of philosophy of language, which is represented in modern analytical philosophy in such scientific aspects as: 1) the nature of meaning, its origin, the issue of word senses, ways of constructing sentences, etc.; 2) the functions of language in communication and ways of using language in society; language learning, creating speech acts; 3) the ratio of language and intellect of a speaker and interpreter; grounds for quality translation of words and a text; 4) finding out how language and meaning relate to the truth and the world (New World Encyclopedia, n.d.; Wolf, 2006). According to the *British Encyclopedia of the Study of the Problems of Philosophy of Language*, analytical philosophy may include, in addition to the issues of the nature of meanings, those exploring intentionality, reference, sentence building, and interpretation of concepts; learning and thinking (*Encyclopedia Britannica*, n.d.).

The findings of reasoned studies of the nature of language, the relationship between language, its users and the world are widely presented in fundamental reference works (Lepore & Smith, 2006; Lycan, 2008; Soames, 2010).

Within the philosophy of language, such classification systems are traditionally distinguished as: a) genetic (genealogical); b) areal (geographical); c) typological (morphological); d) cultural and historical; e) functional.

Functional classification of languages is a group of languages of the world, which is based on the areas of their functioning. According to the roles that languages play in communication processes, the following criteria of functional classification are distinguished: (a) existence of languages in current alive use (both living and dead languages); (b) connection of languages with ethnic communities (tribal languages, minority languages, national languages); (c) spread of languages beyond ethnic territories (local, regional, international, global);

(d) language roles in the modern world; (e) presence of writing in a language; (f) ways of origin of languages (natural, artificial); (g) performance of social functions by languages; (h) forms of language existence (territorial, dialect, vernacular, slang, literary languages) (Ferguson, 1968).

There is no complete functional classification of the world's languages today. A common functional classification is considered to be a functional-typological classification of languages, according to which the distribution of the world's languages is carried out according to certain taxonomic headings according to the number of social functions performed by them. According to the functional-typological classification, all languages of the world can be represented as a pyramid, which is based on languages with a minimum amount of social functions, and at the top there are several "world languages" that serve all areas of communication, including international (Ferguson, 1977; Stewart, 1968).

With the development of psycholinguistic science since the 1950s, there have appeared other opportunities for the functional classification of languages. New philosophical-linguistic-anthropological bases for grouping languages come to the fore. Man, their speech and language skills, the functions of the world's languages in their everyday communicative practice are in the center of functional classification, changing the approach to the functional classification of the world's languages in view of their social functions to the approach according to which the classification is based on individual, subjective, and personal functions of these languages. *Functional-psycholinguistic bases* for the classification of the world's languages are becoming a new reality in philosophical science, creating preconditions for convenient and comfortable use of different types of functionally oriented languages to achieve individually meaningful specific communicative goals and the realization of its specific linguistic values. This applies both to the whole modern polylingual world and to the conditions of a separate, especially polyethnic and multicultural, society.

By the *area* of language implementation, which is the basis for their functional-psycholinguistic classification, we understand the role of functionally oriented languages in the processes of human speech communication.

Our functional-psycholinguistic classification of languages is defined as a special, individually convenient, and comfortable for the use by each person functional group of world languages, based on the scope of implementation of these languages in the psycholinguistic world of their speakers.

Thus, *the purpose of the article* is to present a description of the classification of a special, independent of ethnic origin, group of the world's languages according to their functions, which are implemented in the speech and language activities of people.

Traditional classification of the world's languages in the philosophy of language

At the intersection of philosophical issues of the language origin, there is an important anthropological issue of the origin and functioning of linguistic classification systems in the minds of scientists. Most classification schemes are based on vernacular languages (Aikhenvald & Dixon, 2001). Any philosophical and linguistic classification system is based on *vernacular languages*, which are alive and belong to a certain language community. Living languages are systematically and constantly used in communication. When a language is alive, it undergoes certain changes during its use. What matters for vernacular languages is the fact that they are currently used, but not the number of people using them. *Vernacular languages* are *natural* vocal languages. Natural languages are communication languages as opposed to

formal ones and other sign systems. Their grammar and vocabulary are determined only by the practice of application and are not always formally fixed. Natural languages are never created purposefully. They are real, original, and natural. *Artificial languages* are created in a synthetic way to convey any specific information (programming languages, musical notation, Morse code, digital systems, Esperanto, jargon, etc.). Some languages are at the intersection of artificiality and naturalness (retro-Germanic language in Switzerland, Czech and Hebrew are revived languages). Living natural language is called vocal because it arose spontaneously in human society as a system of discrete sounds that are constantly evolving. Vocal language is perceived by the ear and is a means of communication. Sound in natural languages is the “matter” of language; the bricks from which a living functioning language in human speech is formed. In contrast to natural (vocal) language, written language is, to some extent, an artificial one, a kind of code of living sound codes already existing in the human mind. Thus, a vocal language is the first code — the verbal equivalent of objects and phenomena, the connections between them, a substitute for existing events and situations. In contrast, written language is the code of codes.

Classification schemes based on vernacular languages cover not only living languages, but also those that are endangered, as well as languages that have disappeared (become extinct). The estimated number of spoken languages ranges from 3,000 to 10,000. There are languages spoken by several communities, but these languages still remain uncertain. Some living languages have different names in different cultures, and there are those that do not have names at all. Sometimes a society uses the term “dialects” as a synonym of the word “language.” In some national communities, a name is used to denote a language group or a language. Several languages have sign forms and are sign languages. Some of the living languages have writing systems (Anthropology, n.d.). With such a large number and variety of spoken languages, their classification is becoming much more complex.

Different grounds for the classification of languages are due primarily to its specific purpose set by its author. One such goal is to register all the world's languages. Other goals of grouping languages are to demonstrate cultural and intercultural patterns of interaction. For example, Parker (1997) performed a statistical analysis of 460 language groups in 234 countries, linking language cultures with nine language problem areas (demography, economy, etc.) and key variables for each industry (railways, water resources, etc.). Some classifications were performed according to their use between cultures and between peoples. Special classifications of languages are those that are grouped by distinguishing language changes by their authors, disappearance, and revival of languages as a basis for their classification. In this respect, the illustrative publication is the *Atlas of the World's Languages in Danger of Disappearing* (Wurm & Heyward, 2001). For example, in Papua New Guinea, there had been 75 endangered languages and 16 extinct languages out of 820 local languages by 2001.

A systematic approach to language classification involves the division of spoken languages into “families” and tracking each language by its possible origin or by the geographical location in which the presence of branches of the parent language has been historically documented (Anthropology, n.d.). The Indo-European family of languages comes from the “Proto-Indo-European” parent language. The languages in this family were created throughout Europe and parts of South Asia. The Indo-European language family is divided into subordinate subcategories (e.g., Germanic, West Germanic, North Germanic), as well as languages (e.g., English, Dutch).

The Cambridge Encyclopedia of Language (Crystal, 1997) lists 29 language families in the world. It also singles out languages called “isolates” based on linguistic analysis,

which showed the lack of features common to any particular scheme of existing families, such as the Basque language family, Australian Aboriginal languages. A detailed analysis of the classification of spoken languages, its goals, changes in languages, their extinction, the permanence of spoken languages (such as Ewe in Togo and Ghana, which is spoken by more than 4 million people and is one of the two indigenous languages) is contained in the fundamental reference and monographs (Campbell, 2000; Garry & Rubino, 2001).

In the *Encyclopedia of Languages and Linguistics* (Blake, 2006: 446), the most satisfactory way of grouping languages for professional linguists and general readers is called genetic classification. This classification is based on the prediction of the common origin of languages and the use of basic vocabulary, sound correspondences and, where possible, grammatical (essentially morphological) data as classification criteria (Chirkova, 2013). According to Michael Noonan (2008), genetic classification is not always useful for providing information about the structure of language, especially at higher taxonomic levels, but it is important for historical linguistics and the theory of language change. At the same time, the scientist emphasizes that *“Genetic classification has proven a boon to historical linguistics, providing the superstructure around which theories of language change have developed over the last two centuries. Such classifications also, potentially, provide information of considerable historical value. Typologists use genetic classifications to explain similarities among languages and as a consideration in constructing crosslinguistic samples. And, of course, most of us find satisfying the classification of familiar things: typically, the first thing a linguist will ask on being told of an unfamiliar language is: “What family does it belong to?” (p. 4).*

In addition to genetic linguistics, there are two main (most common) systems for classifying languages: areal and typological (Blake, 2006; Campbell & Poser, 2008).

Areal classification of languages is based on the grouping of languages depending on their regional location. However, it is not always possible to include each individual language in the family structure, such as Hungarian, Finnish, Estonian, which are not part of the Indo-European genealogy with nine branches. These languages are related to the Finno-Ugric family. There are languages like Euskara, which is spoken by the Basques in Spain; they are isolated and do not belong to any family of languages. However, some of them have common features that can be attributed to phenomena such as borrowings, which occur due to closeness or long-term influence (Campbell & Poser, 2008).

The dominance of genetic classification of languages over other types of classifications may stem from the fact that *“classification based on evolution, which is in turn responsible for the existence and structure of natural languages, is imbued with explanatory power. Due to the deeply entrenched connection between explanation and theory in science, explanatory (viz. theoretical) analyses and frameworks are routinely valued higher than descriptive ones.”* (Dryer, 2006: 212-214).

Such classifications of the world’s languages as cultural-historical and functional have also become widespread.

In recent years, the functional classification of the world’s languages due to the existence of multifactorial grounds for their division into functional classes on common grounds is of particular interest to the philosophy of language. Multifactoriality in the choice of criteria for grouping languages not only arouses the interest of language philosophers, but also creates certain obstacles in creating a more or less complete functional classification.

In order to proceed to the classification of the world’s languages united by their functional purpose, we must first turn to the statement of Noam Chomsky, who notes that there are many questions we can ask about language, and the most fundamental of them is “What is

a language?” “What conditions should one’s best theory of language satisfy?” (Chomsky, 2015: 92).

It is clear that the concept of “language” is ambiguous. Language, in its broad, abstract sense, is regarded as *a universal means of speech communication, semiotic (sign) system — a system of hierarchically organized units, a system of signs, sounds and letters, a system of codes (oral and written)*. The term “language” is known to have two interrelated meanings: 1) language in general as a certain class of sign systems; 2) specific, ethnic or (idioethnic) language. However, these definitions of language are not directly related to its speakers and their language competencies. In the *Dictionary of the Ukrainian Language* (Bilodid, 1973), the term “language” is revealed in six meanings, one of which is semiotic, associated with sound signs, and five other meanings are identified with a person’s ability to speak, to express thoughts, with speech and manner of speaking, with the content of speech and someone’s words, expressions, with the ability to talk about someone, about something, with public speaking or speeches (pp. 178-196).

Language is similarly interpreted in the *Academic Interpretative Dictionary of the Ukrainian Language* (1973), i.e., as the ability of a person to speak, talk and as a set of randomly reproduced sound signs generally accepted within the given society for objectively existing phenomena and concepts, as well as the generally accepted rules of combining them in the process of expressing opinions.

Citing prominent linguists of the past centuries (Bloomfield, 1926; Saussure, 1916) and presenting the “influential view” of modern scholars (Enfield, 2010; Neidle et al., 2000) on language, Noam Chomsky, taking into account the provisions he analyzed, regarded natural language as I-language, an internal biological object for a person. The scientist notes that “*By language in these remarks I will mean I-language, a biological object internal to an individual, and considered in intension. That is, we are interested in the actual nature of the system, not just in its external manifestations. Adapting David Marr’s terminology for processing systems, such a study of I-language can proceed at the level of computation, algorithm, or mechanism, all of course interrelated*” (Chomsky, 2015: 92).

Thus, as evidenced by the examples of these definitions, language is identified in its psycholinguistic interpretations with human speech, people’s ability to use language means in utterances, to communicate using oral and written codes (signs). Therefore, the classification of the world’s languages should be carried out primarily on the basis of the social needs and the needs of man for language in the process of their life in the society. Therefore, the advantage of functional and psycholinguistic classification of the world’s languages over functional and social classification is obvious.

An attempt to functionally classify different types of languages of the world with the choice of new for modern philosophical science grounds for their division

Further content of this article reflects the realized idea of the authors to make an attempt to classify different types of the world’s languages with the choice of new grounds for their division, which were previously unknown in philosophy. Such grounds were provided by the psycholinguistic functions of languages in the communicative-speech activity of man in society. The generic concept in this case is the term “functional languages,” which covers the total of the classification items — varieties of languages — that are equal to the scope of this generic concept.

In this regard, we present a new view of *language* as a *biopsycholinguosocial* phenomenon and, accordingly, create the preconditions for other theoretical positions, including functional-psycholinguistic one, to approach the choice of the grounds for classifying ethnolanguages according to their functions in individual human speech behavior. The functional type of the world's languages has recently required the formation of an independent psycholinguistic concept "*functional languages*" and its allocation to a separate group under certain taxonomic headings in accordance with the number of functions they perform in the psycholinguistic world of man. Until now, the term "functional language" has been used only in the context of programming as a language that supports and encourages a functional style of programming. We propose to use the term "functional languages" *to nominate and group different names of languages (abstracting from specific ethnic languages) according to their functional role in the communicative-speech activity of an individual.*

Thus, if we consider language as a person's ability to generate utterances, perceive and comprehend information (psycholinguistic approach), then the basis for the classification of the world's languages, based on this approach, will be the functions performed by a variety of an ethnolanguage in human life. Therefore, the classification of languages can take place not only by ethnic (English, German, Russian, etc.), but also by functional-psycholinguistic criteria (Fig. 1).

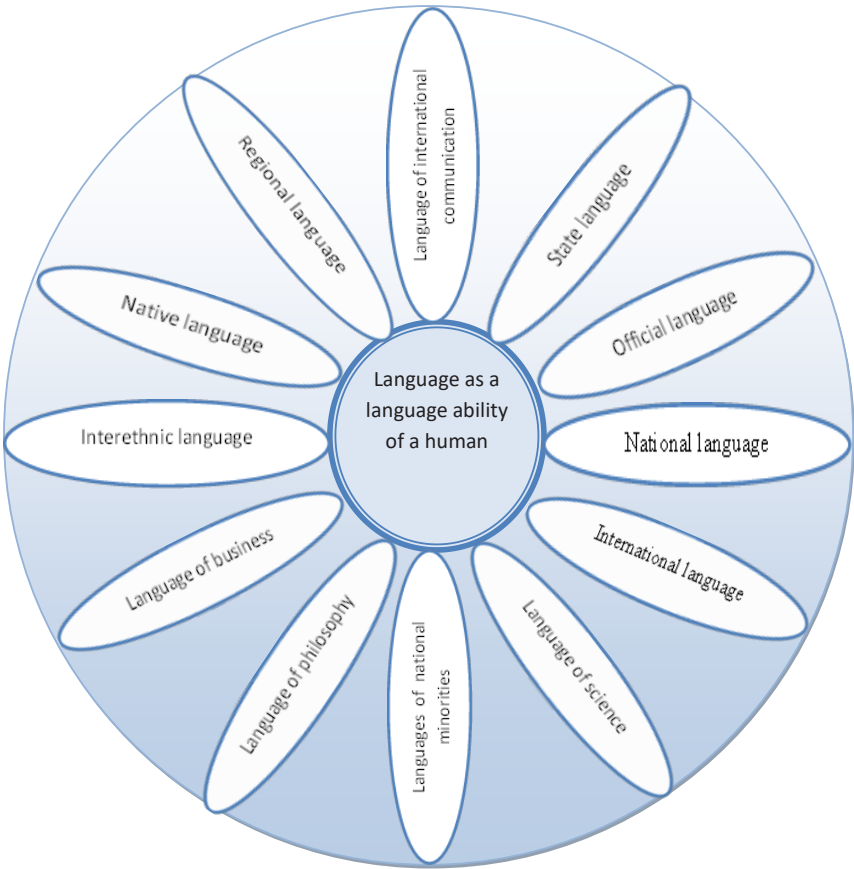


Fig. 1. Classification of the world's languages by functional-psycholinguistic criteria

As evidenced by Fig. 1, in accordance with the functions performed by ethnolanguages in organizing human mental activity in various spheres of their social life and social existence, it is possible to distinguish at least the following functional languages: a) state; b) official; c) national; d) regional; e) languages of national minorities; f) native language; g) interethnic language; h) the language of interethnic communication; i) international language; j) the language of international communication; k) the language of business; l) the language of science; m) the language of philosophy. The names of these types of functional languages are at the same time the nomination of those functions that are performed by these languages. All these and other, not named in this context, types of languages are functional and can be combined into one typological group in accordance with *higher mental functions*, performed by means of these types of languages in people's lives and in various activities of the subjects, regardless of the country and ethnic language. The higher mental functions in psycholinguistics include speech, thinking, memory, and perception — the leading mental processes, the dynamics of which occur through the implementation of natural languages and due to the functions that are situationally performed by these languages in human life.

Functional psycholinguistic characteristics of the world's languages

What is a *State Language*? What function does it perform in relation to a person as a citizen? The state language is the main language of the state recognized by the Constitution or law, which is obligatory for use in legislation, business correspondence, court proceedings, education, etc. (Commentary on the Constitution of Ukraine, 1998). *The Ukrainian language: Encyclopedia* (Rusanivskyi, 2004) states that the state language is a language enshrined in tradition or law, the use of which is mandatory in state authorities and business correspondence, public bodies and organizations, enterprises, state educational, scientific, and cultural institutions, communication and information areas.

Thus, the state language is considered primarily as the language of the Constitution of the country, and therefore it is believed that the nations that do not have a codified constitution do not have the state language.

Switzerland is a country with four official languages (German, French, Italian, Romansh). The presence of 4 national and four official languages in Switzerland does not mean that every local citizen in the country speaks all four languages simultaneously. In most cases, one of the four languages dominates within a particular territory. At the household level, local dialects are used almost everywhere, which are significantly different from "High German." Switzerland is a stronghold of European neutrality, a non-aligned state. In its various cantons, one or another national language is used as the state language. Different state languages are not the reason for the disintegration of this country into separate parts due to the balanced language policy, which provides for equal respect for all languages, takes into account the opinion of the minority, and allows many issues to be resolved locally rather than by the federal center. The Constitution of the Swiss Confederation enshrines four languages as the national state ones (Handelssprachen). These four languages are also official at the confederation level (Article 70 of the Swiss Constitution "Languages").

In Canada, English and French are recognized by the Constitution of Canada as "official." All laws at the federal level are required to be passed in both English and French. The same applies to the services of federal authorities, i.e., they must be available in both languages. Canada has a large number of indigenous languages, immigrant languages and dialects originating in the country, as well as hybrid languages. Since the 1960s, Canadian legislation,

social policy, and special terminology have emphasized its multiculturalism and the growing number of languages supported by the state, local authorities, and private initiatives. The principles of Canadian bilingualism are protected by Articles 16–23, adopted in 1982 by the Canadian Charter. Canadians speak 25 most common languages. At the level of provinces and territories, they have their own language policy in the field of education and business correspondence. Only one province (New Bransunk) is officially bilingual. All the three Canadian territories have declared several official languages.

The debate over whether English is the only state language has been going on in the United States for many years, but no answer has been found yet. Back in the 18th century, John Adams proposed the US Continental Congress to adopt English as the state language. Such a proposal received a verdict of “anti-democratic and threatening the freedom of an individual.” Despite this and the fact that the Spanish-speaking citizens amount to about 50% in the United States, English is accepted as the official language in 27 states (out of 50 states). In the USA, 322 languages are spoken, 24 of which “walk” around all states. Granting the status of the state language to one of the languages would limit the rights of full citizens who do not speak English. *The Civil Rights Act of 1964* was written to support these citizens.

It is believed that the state language is the legal status of a particular ethnic language; its use is mandatory in official documents and, in general, in public spheres of social life in the state (legislation, administration, jurisdiction, education, etc.). The state language is regarded as the language of ethnic group, which has identified itself as the most common in this polylingual state, is characteristic of the majority of the population, and is their native language. However, not for all citizens — native speakers — the state language coincides with their native one. This phenomenon of non-coincidence of languages in some totalitarian states and the states prone to radical nationalist tendencies provokes heated debate, disputes in parliaments, in the mass media, among politicians and just citizens. The main contradictions concern how many state languages there should be, what their sphere of functioning is, in what relations the state language should be with other ethnic languages of the state citizens, etc. These are topical issues that concern people in connection with the violation of their language rights and freedoms. At the same time, the judgments of particular politicians expressed in the discussions mostly do not contain the necessary argumentation and validity, are subjective and emotional in nature, and, as a rule, are an expression of political expediency of individual political parties. Language issues also imply the factors of political culture, self-consciousness, and preferences of the citizens of certain states.

Official language is a concept related to that of “state language,” but is not synonymous with it. However, some authors interpret these concepts equivalently. In the *Oxford Companion to the English Language*, official language refers to the language used in government (jurisdiction, legislation, and administration) (McArthur, 1992: 722). In *Oxford Companion to the English Language*, it is stated that the *Official Language* is “the language or one of the languages that are accepted by a country’s government, is taught in schools, used in the courts of law, etc. (Cambridge Dictionary, n.d.); “... as means of expression of a people cannot be changed by any law” (Muñiz-Arguelles, n. d.).

In 27 states of the USA where English is recognized as an official language, citizens must comply with the provisions of the *Civil Rights Act of 1964*, which requires important documentation to be written in all languages of those citizens who receive any privileges from the government. Also, for many years, this document has prescribed the requirements that all public economic organizations that receive support from the state, must carry out

document circulation in all languages of their clients. Thus, the differences between the state and official languages lie primarily in the constitutional plane and in their federal or territorial status. The term “official language” is usually applied not to the language used by citizens, but to the government of the country; it is the language in which acts of bodies of international and supranational organizations are published and which are recognized as authentic; the language that can be officially used in state or local self-government bodies next to the state one and in which citizens have the right to address the relevant bodies.

In some countries, in accordance with their Constitutions, the parallel use of the terms state language and the official language is allowed (Belarus, Canada, Finland, and Switzerland). In Ukraine, according to the Constitution, only the term “state language” is allowed to be used.

There are official EU languages and official UN languages. *The Special Eurobarometer (386) “Europeans and their Languages”* (2012) states that the official languages of the EU are 23 languages in which the texts of the founding treaties of the EU are written. The status of an official language stipulates that: 1) regulations and other official EU documents must be published in all 23 languages; 2) EU citizens have the right to address orally or send written inquiries or complaints to all EU institutions in one of the official languages and to receive a reply in the language of their choice. Today, there are 24 EU official languages (EU official website). The official languages of the United Nations are the six ethnic languages that the organization uses during intergovernmental meetings and in its documents: English, Arabic, Spanish, Chinese, Russian, and French. The Secretariat uses two working languages: English and French. The speeches at the official meetings are simultaneously interpreted into other official languages of the relevant body by a UN interpreter. In addition, the German language has the status of the “language of office” (UN official website).

National language is the language of the sociohistorical community of people, the common language of the nation, which, along with other features (sharing common regional territory, culture, household, economy, etc.) characterizes the mentality of a particular nation. The national language shows a constant tendency towards ethnic unity and necessarily has its own literary form of existence. The national language is a language that is formally or de facto associated with a certain group of people occupying a certain territory; it can represent, for example, the identification of a nation or place of residence. The national language is not the official language of the country. There are cases when a nation is in a situation that does not allow defining any official language at all because it does not have its own state (Kurds, Cherokees). However, such nations have their own national language. Some national languages have official status in one country and are deprived of such status in another, for example, the official languages of Malta are Maltese and English, and the national language is only Maltese; Finland has two official languages, Finnish and Swedish, and its territory is inhabited by Sámi, who speak Sámi as their national language.

National languages arise in the process of their development, have several forms of existence: literary (oral and written), vernacular and colloquial varieties and dialects. The term “national language” means the language of the sociohistorical community of people and is included in a range of the following concepts: “tribal dialect (language),” “minority language,” and “ethnic language.” It is also a means of written and oral communication. The national language is formed during the transformation of nationality into a nation — a historical community of people characterized by a common language and territory. The national language of any state, as a rule, is its state language. It is possible for the same nation to have two or more languages, as is the case in Luxembourg, where Luxembourgish, French and German are national languages.

The national language is not equal to the literary language, because it contains vernacular variant, folk dialects, and jargons in addition to the codified language (Yartseva & Vinogradov, 2002).

There are cases when two or more nations have one national language, for example, in the United States, Great Britain, Australia, New Zealand, where English (its national variants) is the national language. The national language of a state is mostly its state language. The national language is created by the people and serves them through different generations. In its development, the national language goes through several stages and depends on the degree of development of the ethnic group. In the early stages of ethnos formation, a tribal language is formed, then the language of the nation and finally the national language.

Regional languages are used by the citizens of a country within a certain territory: region, province, state, federal district, province, canton, municipality, district, village, or other administratively established regions of the state along with the official or state language operating throughout the state. The official status of a regional language is enshrined in the legislation of one or more administrative-territorial entities. This is usually a smaller group of people than the rest of the citizens of this state. In different countries, the geographical areas in which a particular regional language is used, encompass a sufficient number of people to take various actions for the protection and development of these languages by the state. In some countries, regional languages also have the status of official languages. The regional language does not mostly apply to the dialects of the official language (languages) of the state and to the languages of migrants. The *European Charter for Regional or Minority Languages* (1992) proclaimed the principle of recognizing regional languages as “a means of reflecting cultural wealth.” Recognition of regional languages is associated with demographic, linguistic, and politico-economic problems and is therefore not always smooth and consistent. There are cases when more than 30% of the population of the territory speak a certain national language, or ethnic language is on the verge of extinction, but even in such cases, these languages do not have the official status. There are cases when the official language of one state is regional in the neighboring regions of another state for various historical reasons. The status of a regional language is granted in order to preserve distinctive features in the dialects of the official language to maintain linguistic and tourist attractiveness, emphasize cultural identity, such as Walloon, Gallo, Provencal, Scottish, Shirland, Frisian, Cantonese, Basque, Serbo-Croatian, etc.

Languages of national minorities are considered to be widespread among the population of the country (except the state language) and are not the languages of its indigenous peoples. As sign systems and a way of intragroup communication of citizens who are representatives of national minorities in a polyethnic country, the languages of national minorities are a means of both preserving and developing identity, performing a mental and cultural function. The Council of Europe *Framework Convention for the Protection of National Minorities* (1995) and the *European Charter for Regional or Minority Languages* provide for the protection of language rights, the use of mother tongues, the guarantee of free development of national minorities and prevention of their disappearance. Representatives of a certain ethnic group who live in the country and are its citizens, but do not belong to the indigenous ethnic group, perceive themselves as a national community and objectify their ethnic language as the native one, reflect it as a means of preserving their specific features and culture. Through their ethnic language, members of the national minority try to maintain their identity and give it a more vivid expression, demonstrate a sense of national identity and community among themselves (European Charter, 1992).

Native language in the psycholinguistic sense is the language in which a child uttered his first words (Leontiev, 2003). This is the first time when the first neural connections and neural networks began to form in the cerebral cortex by means of this language. Alexander Kozintsev writes that "... *language seems to wander through the cortex choosing, depending on the circumstances, where it "takes root."* For little children, the loss of even a greater part of the left hemisphere does not interfere with language acquisition" (Kozintsev, 2004: 41-42). According to Tatyana Chernigovskaya, human brain is not the sum of billions of neurons and their connections, but the sum plus individual experience that shaped this tool — our brain — and tuned it; it is the most complex of all possible structures and the question of "what exactly is inherent in it genetically and to what extent, and most importantly, how the external environment and experience adjust this tool, remains open" (Chernigovskaya, 2012: 6). In addition, the brain is a complex system: some connections are rigid and may be related to modularity, while others are soft, providing compensation, restructuring, and adaptation to a rapidly changing speech environment (ibid.). A unique *map of the localization of human language and speech functions* is presented in the work of Natalya Lyakh (1996). Discussions of localizations of these functions are also contained in the works (Deglin, 1975; Chernigovskaya, 1993, 2006; Chernigovskaya & Deglin, 1984).

The child's native language does not always coincide with the nationality of their parents. There have been numerous cases where the children born in tragic circumstances or in other situations have been adopted by families from other countries. In such cases, a foreign language became the child's mother tongue as they began to speak the language of their new parents. There are numerous and even natural cases of language acquisition by the children in the families where parents are representatives of different nationalities and speakers of different native languages. In such cases, the child has heard two languages simultaneously since birth. In any case, they will start speaking one of the languages earlier, saying their first words. This indicates that there was an actualization of the language gene pool and the primary localization of language functions in the child's brain, the formation of the first neural networks, sufficient not only to understand this language, but also to speak it. The child will speak the language of the second member of the family a little later. Thus, the first language will become the child's native, and the second language — non-native, secondarily acquired, the activation of which will indicate the formation of a new neural network required for the functioning of the second in the ontogenesis child's language. The ontogenesis of the native language is discussed in a number of articles and monographs, which present different strategies for mastering the natural language by preschool children (Kalmykova & Novikova, 2018; Kharchenko, 2017; Villiers & Kenyon 2015).

By the national character of its native speaker, mother tongue does not always coincide with the state language that often leads to disputes between politicians regarding compulsory education of children in the state language, or, for example, rejection of certain provisions of the *Law on Secondary Education* by the citizens (16.01.2020) in some regions of Ukraine concerning the transition of these children to learning in the state language. Such misunderstandings also lead to conflicts at the international level. After all, a child, whose native language was other than Ukrainian before going to school, finds it difficult to immediately learn Ukrainian, that is explained by the natural psychophysiological and neurolinguistic reasons, i.e., the lack of child's speech and language neural networks, multilevel organization and sensory correction of motor processes. This is due to the fact that speech, in addition to all its functions, is primarily a rather complex motor process. The multilevel organization of motor speech function is the result of long-term evolution —

both in phylogeny and ontogenesis (Bernstein, 2012). Therefore, the child's transition into a language in learning that is foreign to them becomes at the same time extremely psychologically and psychophysiologicaly painful, and using a non-native language as a medium for learning becomes unproductive.

The concept of "natural language" is functionally related to the concept of "native language" and is close to its content. Natural language is interpreted as the language used to communicate with people. It is not created purposefully; it performed communicative and metalanguage functions. By its structural complexity, natural language is the most complex of all sign systems. The ethnicity of natural language is one of its properties, which is manifested in an integral and two-way connection with the ethnos. Natural language is the main and historically primary means of communication. It is a system of signs and symbols, which arose naturally as a vocal language. Both in phylogeny and in ontogenesis, the origin of a language begins with sounds, as material carriers of human speech. Therefore, the native language that a child learns since birth can be called a natural language in this sense.

Artificial languages are specialized languages in which language units have been specifically designed to serve specific purposes. The purposefulness of these languages distinguishes them from natural languages. Artificial languages are also called fake languages. There are more than a thousand such languages. The reasons for their creation are as follows: facilitating human communication, giving fiction additional realism, linguistic experiments, communication in a fictional world, language games, etc. The term "artificial language" is also used to nominate the constructed languages for human communication to avoid the derogatory connotation of the word "artificial" that exists in some languages. *Constructed language* means a set of rules relating to natural languages in order to unify (standardize). In this sense, even natural languages can be considered artificial. The languages such as Latin and Sanskrit are based on the rules of codification of natural languages. Such rules are an averaged option between the language natural evolution and its construction through formal description. Due to the declining role of Latin in the world in the 17th–18th centuries, an idea of creating a new language of international communication began to emerge. Initially, these were mostly projects of rational language. Later these were projects based on the model and material of living languages, such as "Universalglot" (Jean Pirro), "Volapük" (Johann Schleyer). The most famous artificial language was Esperanto, which spread and united around itself many adherents of the international language.

Esperanto is an artificial international language created by the Polish physician Ludwik Zamenhof (1887). This language is characterized by simplicity of word formation and grammar, built on the principles of agglutination, has practical application in various fields (unlike other artificially created languages). *Interlingua* is an artificial language, the first version of which was created in 1908 by the Italian mathematician Giuseppe Peano, the second — in 1950 by the International Auxiliary Language Association, headed by Alexander Gown. The proponents of artificial languages believe that Esperanto and Interlingua are simpler because they lack verbs that are exceptions to the rules, as well as some grammatical rules.

There are the following types of artificial languages: a) programming languages and computer languages; b) information languages; c) formalized languages; d) international auxiliary languages (constructed); e) languages of non-existent peoples; f) languages for communication with the extraterrestrial mind; g) philosophical and logical languages (Lojban, Toki Pona, Ilakt); g) auxiliary languages (Esperanto, Interslavic, Lingua Franca, etc.). The most common in the world are such artificial languages as Esperanto, Interlingua, Volapük, Loglan, Solresol, Ithkuil, Toki Pona, the Klingon language, tags.

With the advent of new native speakers of an artificial language, the language develops, and therefore loses the status of artificial.

It is important to note such four types of functional languages as: 1) interethnic language, 2) language of interethnic communication, 3) international language, 4) language of international communication.

Interethnic language is a functional language type used for communication between speakers of different languages in conditions of limited social contacts.

The language of interethnic communication is a language used as a means of communication by people of different nationalities within one country. It is a mediating language in a multinational country for mutual understanding and interaction. The language of interethnic communication is mostly the state or official language.

International language is used to communicate with a large number of people around the world (*global languages* — a synonymous name). In the modern world, there are up to 10 international languages. An international language can also mean an artificial language. An international language can be characterized by the following features: 1) a large number of native speakers consider it their native language; 2) a large number of communicators speak it as a foreign or second language; 3) this language is spoken in many countries, on several continents, in different cultures, etc.; 4) it is studied at schools as a foreign language in different countries; 5) it is used as an official language by international organizations. International status is held by the following languages: English, Chinese, Spanish, French, Arabic, Russian, Portuguese, German. The boundaries between an international language and the language of international communication are quite blurred.

The language of international communication, the *international world's language* is a language used for communication at the international level, is studied as a second or third language, which is mostly completely absent in the natural language environment and is mastered only in the learning process. The language of international communication is considered to be one of the most popular languages in the world; it is spoken by millions of people in different countries, and many people begin to study it every year, which is connected with the trend of the modern world towards globalization and according to the definition of the global language that will connect people around the world no matter what they do and which language is their mother tongue. This is English that is claimed to play the role of such a global language in the modern world. It is the main language of the media, information and computer technology, the language of business, the language of telephone conversations, and business correspondence. English is one of the languages of modern culture, the language of compulsory study at schools. The issue of identifying the language of international communication is a matter of the unification of language education in different countries in order to simplify international communication, which has both positive results and negative consequences.

Currently, English is considered to be the language of international communication in the world. However, the most common language in the world is Chinese, which has 1.3 billion native speakers, and English — less common — only 600 million; Hindi — 490 million; Spanish — 427 million; Russian — 267 million.

The language of business is a kind of literary language that has its own means of expression, methods of nomination, and peculiar means of expressiveness. These are not bureaucracies or stamps. Observing the norms of business language is based on the objectively created tradition of constructing written and oral speech in accordance with the expressed content and circumstances. Any expression in the language of business is based on tradition, on

established forms and manners, such as writing applications and other business papers. Such a well-established form is expedient and justified in official business communication. Business language is completely equal to other varieties of literary language and other styles, playing an important role in the development of literary languages of different ethnic groups and cultures. The language of business functions in the form of oral speech (speeches at meetings, sittings, receptions, reports of state and public figures) and written speech (the language of decrees, resolutions, orders, directives, etc.). This type of language, with its specific official functions, “serves” extremely important areas of human relations: the relationship between the state authorities and the population, between countries, individuals and society. The language of business excludes any ambiguity and divergence in interpretation, and is characterized by its belonging to a certain more or less limited range of topics. The full range of linguistic means of expression and ways of their construction in business language is used in the regulated speech. The rigor of the content presentation, the use of words in their literal meaning, the lack of imagery, the minimal presence of tropes — all these emphasize the formality of the language of business. The absence of something specific and personal in the speech — impersonal — is a distinctive feature of the language of business. These features contributed to the “cementing” of traditionally established means of linguistic expression and the formation of communicative-speech forms and techniques of expression.

The language of business is represented by two types: 1) language of official documents (the language of diplomacy, language of laws, decrees, and resolutions); 2) applied business language (official correspondence, business papers in the field of legal relations and administration).

The language of science is represented by a system of concepts, signs, and symbols. It is created and used by one or another branch of scientific knowledge to obtain, express, process, preserve, and apply knowledge. As a special language of specific sciences, a certain fragment of a natural language is used, enriched with additional signs and symbols. The language of science differs in the accuracy of its concepts, even “mundane” (Vygotsky, 2000) concepts due to the language of science take on meanings that are much more complete and accurate, and even paradoxical in view of common sense. The language of science uses both the concepts of natural language and terms that refer to abstract, idealized objects to the objects in which their properties and connections are revealed. The language of science is primarily an instrument of knowledge of a particular area of phenomena. Its specificity is determined both by the features of the studied field and the methods of its cognition. The language of science is largely devoid of ambiguity of terms, vagueness, uncertainty of their content, the dual meaning of expressions, semantic isolation, etc. The language of science, as a specific sign system, serves as a material expression of the results obtained in the course of cognitive activity. Both natural and artificial languages act as such a system. The language of science is able to transmit the information, which in some cases cannot be transformed by means of natural language. *“Whatever the interpretation of certain features of the language of science is, it presupposes general significance, impersonality, and intersubjectivity. More problematic, although also very characteristic features of the language of science, are such as its universality, invaluableness, impartiality”* (Ankin, 2003).

The language of philosophy is a set of views on what philosophical language is. As it is noted in the *Cyclopædia: or, An Universal Dictionary of Arts and Sciences*, philosophy throughout its history has failed to create its own specific formalized language, and what is now called *philosophical terminology*, according to one interpretation, is an incoherent set of terms from various philosophical doctrines, schools and directions of all periods of

philosophy development. Despite V. Bibikhin's objections to the existence of the language of philosophy, when claiming that "philosophy carries language in itself" (Bibikhin, 2007), in our opinion, he asserts the existence of the language of philosophy as one of the varieties of different branches of knowledge.

The peculiarity of the language of philosophy, in comparison with all existing natural and artificial languages, is that it is the maximum possible metalanguage in relation to any theoretical language. Metalanguage does not generate new meanings; it contains new artificial terms needed to describe the source language. "Philosophy is metadiscourse designed to describe and analyze the symbolic. Discourse is "language within language," but it is presented in the form of a special social fact. The metalanguage of philosophy is the "semiotic basis of philosophical reflection" (Kalashnikova, 2008).

The language spoken by philosophers is determined by its innate nature, subject, the specifics of philosophical knowledge, as well as the role it plays in the spiritual culture of society. The language of philosophy has a categorical nature, i.e., a whole variety of philosophical concepts can be reduced to a certain set of categories (Anokhina, 2010). Thus, the language of philosophy is not only an objective phenomenon, one of the subjects of the study of philosophy, but also a *psycholinguistic reality of a researcher of philosophy and a means of describing and presenting the "queen" of science.*

The identification of the concepts "philosophy of language" and "the language of philosophy" is inaccurate in the scientific sense. To clarify the differences between them, it is necessary to gain an understanding of what philosophy studies in relation to language, and what special inherent verbal means it uses, — the means by which it verbalizes philosophical positions, patterns and what exactly the discursive, grammatical, metaphorical and lexical features of the language of philosophy are.

Within the framework of this article, it is indisputably impossible to characterize all the existing varieties of functional languages in the modern world that perform specific functions for each of them. However, on the basis of some functionally oriented types of languages, for the first time, an attempt was made to combine functionally different types of the world's languages into one group according to their role in the neurolinguistic, psycholinguistic and psychosocial spheres of human existence, presenting the languages of the world according to the functional-psycholinguistic classification as a biopsycholinguistic-social system, as well as to change the status position of the existing functional classifications of languages.

Conclusions

The results of the functional analysis of the world's languages described in the article allow us to draw the following conclusions.

1. Modern philosophy of language should go beyond traditional approaches to the classification of languages, develop and present new worldviews related to the description of today's existing numerous functionally centered types of languages, the emergence of which is currently due to many factors, the leading of which are man, globalization, informatization and at the same time the language rights and freedoms of each person. Philosophical studies should currently focus on the problem, which is almost unexplored (excluding individual articles, scattered in various journals and sites), i.e., the problem of the language of science in general and the language of philosophy in particular.

2. Analysis of the types of the world's languages, carried out on the principle of performing certain functions in the lives of people in society by each of them and their interaction in society and the world as a whole, revealed that: different types of languages, united by their

functional purpose, present the current area of scientists' interest, who represent various branches of science. Among these sciences, there are philosophy, sociolinguistics, ethnology, political science, cybernetics, computer science, semiotics, culturology, law, etc. All the above-mentioned and not mentioned in this context varieties of languages, "scattered" around different sciences, are described from the standpoint of their "own" scientific interests in accordance with the subjects of research and in accordance with existing methods of solving scientific problems. Thus, there is a certain fragmentation in understanding functionally different languages, regardless of their ethnic origin. With the development of civilization, other types of languages will naturally appear, which will differ from those already known by their new functions, reflecting new linguistic realities, functionally important for solving communicative problems in society both within one state and on a global scale, taking into account bilingual or multilingual factors, international relations, education, culture, the uniqueness of the national composition, the role of languages in public life, civic-mindedness of native speakers, family, science, industry, specific language situation in countries, language policy in the country and the world, etc. To find solutions to these problems, the philosophy of language must play a leading integrative role, suggesting new philosophical and methodological principles for the functional classification of the world's languages.

3. One of such methodological positions is the functional-psycholinguistic approach proposed in the context of this article, which provides for consideration not of social functions of language in the classification system, but of individual subjective and personal language functions in human speech experience. The languages, which are determined from the standpoint of a new functional-psycholinguistic classification, i.e., their functions in human life in a particular country and the world, can be nominated as "functional languages." In this regard, anthropology and philosophy of language can become a science that should present methodological principles for their scientifically substantiated association into one group according to their important functions in human life; psycholinguistics, the subject of which is speech and language phenomena of an individual, human personality, the processes of language acquisition, internal and external language generative systems and many other important anthropological psycholinguistic problems, should be devoted to carrying out a direct classification of the world's languages, functionally oriented to solve human psycholinguistic problems. After all, a language in any of its functions is primarily a "biological object," "biolinguistic program," "generative process, neurally encoded" (Chomsky, 2013; 2015), "constellation of cognitive abilities" (Enfield, 2010), a tool of "thinking and speaking" (Vygotsky, 2000), "human heritage, the means of people's existence in society" (Zalevskaya, 2007).

4. The phenomenon of "functional languages" cannot be studied in isolation from the psycholinguistic development of man, beyond their psyche, diverse, and multicomponent activity in society. Therefore, we consider all types of functional languages in two meanings: 1) in a narrow sense — as a biosocial phenomenon, genetically inherent and socially developed in ontogenesis; 2) in a broad sense — as a biopsycholinguosocial object, represented by a kind of individual linguistic means of externalization and internalization when expressing intentions in the process of generating statements, their perception and comprehension.

5. The psycholinguistic paradigm in the functional classification of languages (by their functional orientation) allows not only posing and solving the problems of language philosophy actualized in this context, but also creating prerequisites and conditions for maximum verbal harmonization of society, ensuring implementation of the language rights and freedoms.

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An Anthropocentric Perspective in Posthumanist and Transhumanist Discourse

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Posthuman and transhumanist discourse plays an essential role in shaping modern science. A successive redefinition of the concept of “human” takes place, broadening it to axiological and epistemological aspects. Postmodern reflection on this issue boils down to creating a new term “posthuman,” which today is the subject of research by scientists representing various perspectives — philosophical, cosmological, anthropological, and cultural. Nevertheless, the topicality of this issue goes hand in hand with the increasingly emerging problem of extending human existential space. This possibility appears with the exit into the extra-terrestrial sphere. The cosmos becomes a place that today becomes the object of particular interest and exploration by man. Therefore, the author of the article presents a philosophical and cosmological perspective of the process of redefining the concept of “human” by implementing these considerations in the posthumanist and transhumanist discourse. It has been indicated the basic premises shaping this matter — technological, political, ideological, and economical. At the same time, he emphasizes that despite technological and scientific achievements, the anthropocentric model still occupies a central place in the scientific discourse, which boils down to the claim that man is the determinant and indicator of this process.

Keywords: posthumanism, transhumanism, technological development, anthropocentric model of the world, cosmic existential space

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Introduction

The contemporary scientific debate more and more often reaches for the subject of the concept of “human,” focusing on the process of its redefinition, which is a consequence of the changes that took place in the 20th and 21st centuries on the ontological and epistemological level. The implication of scientific and biotechnological achievements that accompanied the development of postmodern philosophical thought was the creation of the term “posthuman.”

It is an umbrella term covering various perspectives (philosophical, cosmological, anthropological, cultural, and sociological) of most existential spheres of man, starting with posthumanism and transhumanism, and ending with a diverse panorama of anti-humanism or meta-humanism (Ferrando, 2013: 26-28). In July 2019 in Lille held an international scientific conference *Critical Posthumanism and Transhumanism. The Posthuman Paradigm Shift*, the central message of which concerned the change of the current humanistic paradigm. Among the topics discussed during the conference sessions was the issue of the future of man as a “citizen of the Earth.” The subject of the process of redefining the term “human,” apart from its topicality, raises a lot of controversies.

Further international scientific initiatives are planned to resolve the disputed issues. The main task of such activity will be to develop a pragmatic approach allowing reaching the consensus on many levels. In 2021, there will be two significant events related to the issues at hand. The first is the international conference in Tokyo scheduled for April 2021, the theme of which will be *Cyborg Anthropology and Posthumanism*. In November, however, another international conference will be held in Cape Town, which will, in a way, continue the April initiative. Scientific and technological development in this context is a determinant influencing the appropriate positioning of a man in the structure of the world. One of the dominant approaches in the scientific discourse today is the anthropocentric model, which presents the human being at the center of the research process. Learning about human nature has been a fundamental goal of many generations of scientists. Nevertheless, its existence is primarily related to the cosmological perspective of the existence of the world (Lupisella, 2020: 97-98).

Today’s understanding of the concept of “human” in his existential essence significantly goes beyond the image of a human being established over the centuries. This resulted in the appearance of such phenomena as posthumanism and transhumanism in the scientific discourse. The selective approach of the author of this article to this issue is dictated by the fact that the current of posthumanism and transhumanism coexist together as two dynamically developing scientific perspectives, between which there is no clearly defined line separating one from the other in terms of their conceptual scope. Therefore, making a thorough scientific reflection, taking into account these two perspectives of redefining the term “human,” is an indispensable factor shaping the scientific debate in this area.

The author’s assumption is to present the philosophical and cosmological perspective of human existence in the Universe. In the context of this article, the philosophical component refers to the inner sphere of man, which determines his nature. On the other hand, the cosmological aspect is primarily the external sphere, which, as a result of successive scientific discoveries, widens the existential space of man (Dick, 2015: 41-43). Therefore, the aim is to indicate the potential directions of development of the existence of a human being within the framework set by scientific and technological achievements. The world is rational, which manifests itself primarily in the possibility of its rational perception by man. In 1936, the Journal of the Franklin Institute published an article quoting Albert Einstein’s words that “The eternal mystery of the world is its comprehensibility ... The fact that it is comprehensible is a miracle” (Robinson et al., 2018). But getting to know the world requires an intellectual effort, which comes down to both being interested in the nature of being and in the relationships between specific beings. Therefore, this article has been divided into two main parts. The first presents a philosophical approach to understanding posthumanism and transhumanism, which is a direct reference to the axiological and ontological sphere of human functioning. In the second, the author referred to the cosmological perspective

of human existence and significance in the Universe, thus emphasizing the anthropocentric perspective of scientific discourse in this area.

Posthumanism And Transhumanism In The Scientific Discourse

Posthumanism and transhumanism began to gain importance in the late 1980^s and early 1990^s. Nevertheless, posthumanist and transhumanist reflections appeared in the scientific discourse several decades earlier. In postmodern literature, the term “posthumanism” appeared in 1977 thanks to the work of Ihab Habib Hassan called *Prometheus as Performer: Toward Posthumanism Culture?* (Hassan, 1977: 831-835). In turn, transhumanism was a phenomenon discussed by Julian Huxley in his work *New Bottles for New Wine: Essays*, which was published in 1957 (Huxley, 1957: 31-37). These two trends are derived from the broadly understood postmodern reflection, for which Bauman’s concept of postmodernity is close. It is related to the belief that man does not have a permanent nature and that his identity exists as an unfinished project. The concept of “human” is in constant transgression, undergoing various kinds of scientific and biotechnological processes. Zygmunt Bauman pointed out that postmodern reflection gets rid of the need for any theories of morality — ethics, philosophy, religion, worldview, because postmodern society funds itself morality without referring to science and recommendations. Bauman’s description of postmodernity is a clear portrait of the desacralization and secularization of contemporary culture in Western societies. There are a gradual decay and the sudden collapse of some modern illusion; belief that human fate will become fully transparent as soon as we have all the necessary knowledge; belief in complete mastery of the future. This fact underlines the anthropocentric model that determines the development of contemporary scientific discourse (Bauman, 2000: 41-43; 108-112).

Posthumanist and transhumanist thought, however, did not fully develop until the first half of the 1990s, thanks to feminist theorists in the field of literary theory and literary criticism, which in later years also became known as critical posthumanism. During this period, these issues found themselves in the sphere of interest in philosophical, cosmological, and cultural studies. Significant contributions to the development of this idea were made, among others, by Judith Halberstam and Ira Livingston through their work *Posthuman Bodies*, Neil Badmington through the work of *posthumanism*, and Andy Miah by publishing the book *A Critical History of Posthumanism*.

The end of the 1990s was, in turn, the time of a redefinition of the meaning of the term “human,” which took place in the context of the scientific and biotechnological achievements to date, often proving a departure from the classical anthropocentric philosophical thought. Such a move is nothing new in the history of science, because the Copernican revolution, introducing the cosmic heliocentric model instead of the geocentric model prevailing in medieval thought, significantly influenced the position of man in the Universe. Nevertheless, Nicolaus Copernicus, with his work *De Revolutionibus Orbium Coelestium*, already had his predecessors in the context of departing from the anthropocentric model. Clive S. Lewis, in *The Discarded Image*, described the cosmological approach to understanding the concept of “human” in medieval literature. He refers to the works of, among others, Alain de Lille, who, using the metaphor of the “medieval city,” by implementing the Universe in this image, indicated that the place of man in this structure is outside that “city.” Dante Alighieri applied a similar invective to the concept of “human.” This author pointed out that the world is geocentric and theocentric, but anthropo-peripheral (Lewis, 2010: 63-68; 72-74). The anthropocentric model returned only thanks to Renaissance artists, including Leonardo da Vinci with his *Vitruvian Man*.

Thus, the scientific discussion in its various configurations on the question of human nature is not a new topic, but has a long history. Nevertheless, the prefix “post” in this context means broadening the understanding of what is “human,” also including other beings (Braidotti, 2013: 61-67). According to the idea of posthumanist thought, it is based on the denial of any hierarchy of beings and their evaluation. Moreover, the aforementioned prefix “post” indicates a change in the meaning of the concept of “human.” It postulates the extension of the idea of emancipation also to beings that are not representatives of the *Homo Sapiens* species. This is one of the manifestations of a transgressive tendency, which indicates that posthumanism is affirming in nature, consisting in a progressive striving to “go forward” and treating the emancipation process as permanent and implementing in this process also species distinct from man (Mix, 2020: 58-60).

The issues of posthumanism and transhumanism are present not only in the scientific sphere, but also have political and ideological connotations. Since posthumanism emphasizes the variability and relativity of the concept of “human,” it is necessary to reflect on what is “human” and what deserves “human” treatment (Zawojewski, 2017: 69-71). It follows, one of the fundamental problems of posthumanism arises, referring to a philosophical current that is not only ethical and normative but, above all, political. In the introduction to the book *Vibrant Matter: A Political Ecology of Things*, Jane Bennett writes about the philosophical and political aspect of her work, implementing it in the broadly understood issues of posthumanism and transhumanism: “The political project of my book is, most ambitiously speaking, to encourage a more intelligent and balanced commitment to relationships with living matter and living things. The guiding question, then, is how would political responses to public problems change if we took the vitality of inhuman bodies seriously?” (Bennett, 2010: VI-IX).

The political nature of posthumanist discourse often boils down to questions of a religious nature. It happens due to the fact that the assumptions of posthumanist thought are not compatible with religious thought. This approach implies some tensions between the state, the Church, and science, identifying scientific institutions that conduct research on the essence of human existence with this concept (Heller, 2020: 12-17). The fundamental question in this regard boils down to the place that religion or morality should take, in the context of posthumanist and transhumanist reflection?

So, should the religious beliefs of a specific community/nation interfere with the scientific development of that community/nation? Referring to the content recorded in the Book of Genesis, regarding the fact that man was created in the image of God and is the most perfect of all creatures, it provides a canvas whose violation refers to the essence of the contemporary ideological debate in some countries, especially in those where the Church/religion occupies a significant place in the institutional hierarchy. How to treat, for example, the process of cloning living creatures consisting in the creation of organisms having the same genetic information as the donor? Perhaps as long as this phenomenon is confined to non-human mammals, the axiological and ethical aspects of cloning will remain unattended by the Church/religion. Nevertheless, when in 2004 the world heard about the success of a human nuclear transfer by a South Korean research team, it was met with an ambiguous reaction from political, religious, and scientific circles in many countries around the world (Tamkins, 2004: 623).

The desire to have full knowledge of human nature dates back mainly to the Renaissance when the anthropocentric model in science returns. At that time, there was a belief in the divine perfection of man. One’s body was a form of perfect symmetry boiled down to the

claim that it had been coded according to the most sophisticated mathematical relationships and proportions. This reflection was the basis for the shaping of, among others, the digital turn, which today plays an essential role in scientific and technological development. The mathematical nature of this phenomenon boils down to the claim that the world is a system of digital codes. This narrative also applies to a human being because it treats genetic matter even as a kind of code. This position has a significant impact on the understanding of genetics, which is often equated with the development of digital design. Thus, if DNA is considered code in the cybernetic sense, this kind of finding allows you to program and manipulate genetic atoms of particles in the way possible with various types of software being a tool in the hands of specialists (Celiński, 2013: 14-15; 23-25).

Thus, posthumanism and transhumanism share a common interest in technology. However, the way of reflecting on this issue is different, which is manifested in the structural matter of these trends. Posthumanism does not treat technology as its primary goal and value, which allows its theoretical foundations to be reduced to forms of essentialism and technological reductionism. Technology, in this context, is not attributed to divine qualities. In contrast, transhumanists regard technology as a valuable element of development. Therefore, mentioning the mathematical nature of perceiving the world — perceiving reality as a code system — it is possible to interfere with the genetic code and modify it through appropriate technologies. Katherine Hayles points out that the element connecting transhumanism and posthumanism in the sphere of technology is the concept of techno genesis (Hayles, 2011: 217-220).

Technology appears in the posthumanist debate through feminism, which refers to the concept of cyborg introduced into the scientific discourse by Donna Haraway. The idea according to which scientific and technological development appears in posthumanist discourse concerned, first of all, the deconstruction of dualisms and divisions which were reduced to, among other things, groups: human and non-human animals, biological organisms and machines, or to physical and non-physical reality (Haraway, 2000: 51-55). Posthumanism is a kind of practice that often carries out imaginary visions, treating them as real in the future. The posthumanist approach boils down to “How to do this?” It primarily refers to technological and scientific achievements but treats them only as necessary tools to achieve its goals. Posthumanism, for example, does not oppose the idea of cosmic migration. Still, because of its postmodern and postcolonial roots, it cannot unequivocally endorse the concept of cosmic migration, or to use a different term — colonization — which is often found in transhumanist literature. This is an exemplification of how posthumanism and transhumanism implement the same topic in their narrative while referring to different scientific perspectives based on different theoretical heritage (Ferrando, 2013: 31-33).

The Cosmological Context of the Posthumanist and Transhumanist Narrative

Posthumanism refers primarily to the actual construction of a human being. Representatives of this trend are increasingly departing from aspects related to feminism, racial criticism, queer or postcolonial issues. However, they focus their attention on non-human beings, such as robots, biotechnological chimeras, or “beings” with artificial intellect (Bailey, 2005: 87-94). Contemporary posthumanist researchers try to avoid reflections related to the hybrid of human existence, thus finding themselves in a scientific dilemma between strictly human and non-human beings (Hooks, 1984: 45-51). On the other hand, transhumanism, as has been emphasized many times in this work, refers to the biological and technological

evolutionary potential of a human being. The central tendency of transhumanist reflection is striving for the improvement of man. The implementation of this goal is based on scientific and technological achievements — those that existed, those that exist, and those that are in the conceptual stage. Regenerative medicine, nanotechnology, life extension techniques, mind-shifting, and freezing the body are just a few examples of the possibilities offered by modern science and technological development (Ferrando, 2014: 221-223). The *Declaration of Transhumanism* was adopted in 1998 to codify these aspirations, which contains the basic postulates of the transhumanist trend.

It was extending the epistemological framework of the concept of “human” sparked a need in the search for a new existential space. The assumptions of posthumanism and transhumanism result in an anthropocentric model, which in the postmodern world is redefined with the appearance of new beings or the behavior of the existing ones taking on a new form and nature. The aforementioned *Declaration of Transhumanism* contains postulates that set the direction for the development of transhumanist thought, which results in their actual implementation. In this context, it is worth referring to the question of freezing people. One example of such practice is the work of Fred and Linda Chamberlain, who founded the ALCOR non-profit organization in Scottsdale (Arizona) — the *Alcor Life Extension Foundation* — dealing with cryotherapy of the bodies and brains of people who have been diagnosed with death. The purpose of ALCOR is to revive frozen people when science reaches an appropriate level to heal the causes of death and repair the damage caused by freezing (ALCOR, 2020). The implementation of such practices would have a significant impact on the modern world, raising numerous questions. So, what if the technology to bring people to life is invented? Won't it overpopulate the planet and exhaust the natural resources that are the source of the existential energy of human beings?

There is no doubt that man has always strived for perfection and wanted to get to know the world around him. Reasonable attempts in this regard were made, among others, by nineteenth and twentieth-century philosophers and scientists, whose aim was to create a “superman.” Fyodor Dostoyevsky or Friedrich Nietzsche, in their literary works, undertook the task of creating the idea of this “superman.” However, the question that raised considerable controversy in this context was the question of extending the existential space. This approach was a direct call to space exploration. Nevertheless, it is worth remembering, as has already been emphasized in the previous part of this article, that the colonization of space does not correlate with the assumptions of the posthumanist idea. It is legitimate to emphasize the pragmatic approach in this matter because by expanding the concept of “human,” one should also be open to expanding the existential space of a human being.

The cosmos has always been the object of particular human interest. Already at the turn of the 6th and 5th centuries B.C., the Pythagoreans made their first philosophical reflections on the structure of the cosmic order. In their investigations, they relied on numbers as the fundamental principle shaping reality. The actual content of these scientific considerations was the search for evidence of order by indicating number and harmony as factors determining the properties of things (Ghyka, 2014: 23-25). Nevertheless, such a distant historical perspective only emphasizes the importance of the cosmos in the scientific discourse of man. Johannes Kepler, the author of the famous novel *Somnium*, described the planet Earth from the perspective of the moon, describing it as *Levania* (Rosen, 2003: 32-35). Kepler's work can be considered the world's first science fiction novel. Metaphorically, it can be assumed that it is precisely from the level of literary works in the 20th century that, thanks to the Soviet Sputnik, the first artificial satellite sent into space, a man was able to get to know

cosmic space, but above all the planet Earth from the perspective of space. Nevertheless, it is worth remembering that Sputnik was not the first human-made object to reach extra-terrestrial space, because it was the “infamous” German V-2 rocket launched in 1944. It became the basis of the rockets built by the Soviet Union and the USA, leading the famous arms race, also covering outer space (Filiciak et al., 2015).

The cosmos as an object of scientific discourse is a multifaceted issue. Therefore, the author of this article implements a cosmological perspective in the considerations of posthumanism and transhumanism. The central reflection in this context comes down to the search for human existential space in the future. Nevertheless, the Universe for many researchers for centuries was limited only to the Solar System. Then, until the beginning of the 20th century, our Galaxy — the Milky Way, was the object of study. Knowledge of the existence of other galaxies was unavailable. Reflection on the cosmos was still, in most cases, the domain of philosophical and theological speculation. Discoveries both in the field of the theory of physics — the theory of relativity and nuclear physics — as well as observations mediated by the latest technological achievements, allowed to conclude that there are other galaxies besides the Milky Way, thus broadening the image of the Universe. Thus, modern cosmological theory dates back to the 1960s with the discovery of microwave background radiation, the residual light from the hot Big Bang. A systematic description of this process was presented in his book *The First Three Minutes* by the outstanding American physicist Steven Weinberg (Bajtlik et al., 2013).

In the context of the contemporary scientific discourse on the trends of posthumanism and transhumanism, the discovery of a new space creates a potentially new chance to expand the existential area. The question remains, however, to what extent did the man know the Universe? Is it possible to cosmically colonize other planets with the present advancement of scientific and technological achievements? In 2016, the discovery of a planetary system on the star Proxima Centauri was announced, which, apart from the Sun, is the closest star to our planet. It is located four light-years from Earth, and Proxima Centauri is a system of three stars — Alpha Centauri A, Proxima Centauri, and Alpha Centauri B — orbiting each other. It is important in the context of these considerations that Proxima Centauri has a planetary system (Worth & Sigurdsson, 2016: 4-5). Besides, in 2017, the results of research conducted since 2015 were published, indicating the existence of a planetary system around the TRAPPIST-1 star (Transiting Planets and Planetesimals Small Telescope) located 39 light-years from Earth in the constellation Aquarius. All the planets in the TRAPPIST-1 system orbit very close to their star due to its size, which is much smaller than the Sun. The closest of these planets — TRAPPIST — 1b — orbits only 1.65 million km from the star, which translates into the time equivalent of 36 hours. From the perspective of these considerations, this planetary system is interesting because 3 out of 6 planets have temperature values close to the rates of the planet Earth. This fact means that the physical conditions, taking into account only the temperature, as the rest of the indicators are not precisely defined, allow to state the presence of water there (Turbet et al., 2020: 100). Nevertheless, the distance of this planetary system of 39 light-years indicates that at today’s speeds, it would take about 1.5 million years to travel from Earth to this place. Therefore, it requires new technological and scientific solutions, enabling, among other things, the perspective of overcoming certain distances faster.

Thus, the pragmatic approach to the issue of extending the existential space of man is now preferably at the stage of theoretical calculations. Getting to know the Universe from a philosophical and cosmological perspective is still, as well as hundreds of years ago, the priority goal of all humankind.

Conclusions

The premise of this article was to analyze the process of redefining the concept of “human” from the perspective of posthumanism and transhumanism. This reflection has been implemented in the area of philosophical and cosmological discourse. The need for this resulted primarily from the correlation between the process of expanding the concept of “human” and the search for new existential spaces in the form of cosmic regions. Three main conclusions can be drawn from the above considerations.

First, posthumanism and transhumanism introduce more questions than answers through their narrative in academic discourse. It comes down to the hypothetical assumptions and ideas propagated by these trends. The scope of knowledge about human nature, despite many achievements in this field, is still insufficient. There are often situations that are not amenable to rational explanation. So, what are we dealing with, a miracle? Should we, therefore, revert to the theocentric model? Questions of this kind are present in modern science, which undoubtedly points to a long process that man, as a rational being, must overcome to find answers to such problems.

Secondly, posthumanist and transhumanist reflection often “run” counter to the ideological or religious assumptions of individual states/nations. The implication of this state of affairs is ethical and moral antagonisms between different environments. The question remains, however, to what extent is it possible to interfere with human nature? Where is the limit beyond which it would mean being able to speak of a non-human being? Questions of this kind are currently a sphere of discussion among representatives of the scientific community, especially those representing posthumanist and transhumanist trends. Nevertheless, the anthropocentric model remains the determinant of these considerations because it is the man as an object that is the primary determinant of this border.

And finally, thirdly, posthumanism and transhumanism, which aims at the one hand to implement new phenomena and solutions, and on the other — to improve the existential improvement of human beings, causes some problems primarily related to the issues of overpopulation of the planet and the depletion of natural resources. In this context, recalling the migration processes to space, which constitute an alternative and the possibility of extending the space to live, it is also worth asking about the time perspective and technological possibilities responsible for this kind of phenomenon. Space exploration requires a lot of money, and today more than half of the world’s population lives in extreme poverty. Therefore, can we talk about scientific and technological development, which is related to the economic potential of individual entities/states, as a process that is rational from the development of the entire humanity? The question of the rationality of technological development in the context of the whole of humankind also boils down to the issue of resources at the disposal of individual entities/countries. First of all, it is about economic resources that allow the involvement of the best specialists in the process of developing new technologies. Hence, there is also a disproportion between various actors/states in the international arena. How, then, would the inhabitants of Nigeria or Bolivia, or one of the Oceania islands, perceive the current of posthumanism and transhumanism? And are they not the same people as the Americans, French or Japanese who invest considerable sums in technological development and research? This question is where the essence of the anthropocentric model in science manifests itself, because man is the central object of discourse, and it is a man who should be taken into account as the main priority.

Nevertheless, the economic stratification of the world is one of the many reasons why it is worth discussing this issue with a broader level of engagement with policymakers from

different countries. Therefore, initiatives such as international conferences and meetings of scientists, mentioned in the introduction to this article, play a significant role in this process. It should be remembered that the greater the interference of science and technology with human nature, the newer questions and problems arise, the solution of which is not always a useful development aspect.

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In-Depth Time Compaction in Fundamental Measurement of Consciousness by Husserl-Heidegger-Badiou (According to the Recipe of Einstein's General Relativity Theory)

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In this study, we wanted to show that plunging into the depths of modern (including altered and generic) consciousness (according to the phenomenological recipe of Edmund Husserl, Martin Heidegger, Alen Badiou and others and Albert Einstein's cosmological recipe) allows us to discover a new fundamental measurement of consciousness associated with compaction of time. More precisely, we seek to identify the possibility of compaction of time in the consciousness under certain (high-energy) conditions, by analogy with how time is fundamentally transformed in space (in the black hole zone). We are trying to understand how, through modern existential and phenomenological as well as natural science methods, primarily on the way of interpreting Heidegger's destruction, one can rethink the essence of the fundamental dimension of consciousness related to institutionalization of time. In other words, the analysis results offer an opportunity to state that the new dimension reveals another fundamental property of consciousness. In this dimension, not only time is split (into the past, present and future; retention, now-point and protention, in Husserlian terminology), which had an objective effect on the classic understanding of the world view. The intention of time is also split, which manifests itself in transretention (destruction, in Heidegger's existential coordinates), transcendence and transprotention (in our understanding).

Keywords: consciousness, thinking, time, anthropology, destruction, transcendence, fundamentality, Alen Badiou, Edmund Husserl, Martin Heidegger

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The urgency of research

The subject of searching for the origins of the European thinking (or the origins of being) was constantly referred to by the European thinkers of the 20th century. One can mention Edmund Husserl (with his Cartesian Meditations (Husserl, 2001a)), Martin Heidegger (with his destruction and primordially projects (Heidegger, 2009, 2010, 2011, 2013)), Alen Badiou (with thematic analysis of generic procedures (Badiou, 2003, 2013; Badiou, 1988, 2006, 2009)). It is these thinkers who appeared to be the key figures of non-classic European culture. Their excursion into the historical domain, under the sign of modern anthropological culture, proved to be so deep and somewhat similar that one can speak of a certain synonymy of the 20th-century anthropological row: factuality — meditation — life world — destruction — generic procedure, primordially, etc. This row can be extended with the problems of Carl Gustav Jung's archetypes, Albert Einstein's general relativity theory, Stanislav Grof's altered state of consciousness, etc. This reveals a complete picture of the general mood of the leading, rather outstanding thinkers of the 20th century, whose sensitive thought heads for the distant past, for the origins of the existence of the European culture, for generic mythologemes and philosophemes. Structural linguists, such as Max Müller, Ferdinand de Saussure, Claude Lévi-Strauss, in terms of the same anthropological and historical paradigm, also diachronised the past, and, more precisely, turned it into the structured history of consciousness. Emile Durkheim, Sigmund Freud, Claude Lévi-Strauss, Lucien Levy Bruhl, Bronisław Malinowski, Paul-Michel Foucault (with their ideas of tabooing of consciousness, the archaeology of consciousness, the mythology of consciousness, etc.) developed their mythologemes of consciousness and turned the flow of mythological thought into the past — into the topos where the primary thinking differed little from the natural ideas of space. And religious systems, such as Christianity, Buddhism or Hinduism, actually send our thought to the distant past (to the time of Jesus Christ, Buddha or Vedas), to formulate the main religious problem: the origins of religions and myths, philosophy and science, in a word, the origins of all our culturogemes are in the remote (not to say prehistoric) past. In particular, the modern Chinese thought constantly goes back to the distant past — to Confucius and Lao Tzu. We can not help mentioning that in his general relativity theory, Albert Einstein actually turns our consciousness to the origins of the European natural and metaphysical thought — to Pythagoras and Anaximander. And this row of recurrent anthropological mechanisms can be extended.

Here arises a logical question: what are the modern 20th-century thinkers looking for in the distant past? Why can't the spiritual and philosophical thought of our contemporaries find a solution to problems in the modern culture and goes back to the past — to the origins of existence of the European tradition — to find answers and salvation? This question is simply answered by Martin Heidegger: trying to interpret the essence of existence of the modern culture, we are heading for its origins. According to Heidegger, this means we are heading for the primordially of thought. And it does not matter what thought it is — naturalistic, philosophical or mythological, as, at the onset of consciousness existence, cosmological, logos and thinking processes actually coincide. In the period of deep crisis of modern culture, it is apparently high time to turn to its origins, to find understanding there — at the onset of its existence. Having found no answer, the atheistic and idealistic thought (from Plato and Aristotle to Kant and Hegel) referred the all-logos concept of reality to atheism and idealism, due to certain reasons, what brought the modern European philosophy to the logos-based analysis of history or to the use of reconstruction, destruction and deconstruction.

However, this context clarifies the complexity of the problem. A modern man's thought cannot grasp the origin of his being, as it is covered with the veil of not only time (history), but the

veil (obscurity) of the logos-based spirituality that came from the past — the spirituality called Maia according to the Indian tradition. The whole culture is under a hidden anthropological curse. The anthropological code of history appears to be closed. And there can be seen an internal ban on primordiality in human existence.

Naturally, in historical consciousness, there arose a question — is there any other, not anthropological, but say mythological, naturalistic, scientific or religious code (access) to the distant past of the human being? But the human consciousness also gives, by its own recipes, a logos (conceptual) shape to all the material and spiritual. In this sense, even religion and cosmological mythology appears to be a frozen thought of the past, a reflection over the distant past. No doubt, we can speak of logic (logos), mathematics (geometry and topology), physics (the science of the changing world), linguistics, epistemes (sciences) as forms of consciousness built into the discursive space (expression) of thought. The question is whether they are revealed in the same way as the sciences of frozen thought, per se, metaphysically, that is according to the same scenario where the destructive rules of returning to the past form a belief in existence (presence of space) of absolute thought. And there is a one-step from here to the world of ideas (Plato), mathematical ideal structures and numbers (Pythagoras), and religious, mythological narratives (Gospel). The “big” (long) history idealizes the primordial naturalistic consciousness of an ancient Greek or Hindu who viewed water, air, fire, etc. as primary sources (reality). The history brings to the fact that the reality of thought is viewed as an ideal (distracted from natural origins) or religious (already spiritual) space. History and mythology turn consciousness into spirit or, rather consciousness starts singling out spirituality in the man himself.

Such being the case, it is high time to gain insight into these strange features of thinking itself, which is able to, on the one hand, subjectify (ontologise) space, and to objectify (cosmologies) consciousness, on the other hand. It may be about time to understand what our thinking wants: to reach perfect techniques of its ideas (techne) or upbuild a strict rationally-thought logical world, where all the facts would be built into the logic of thought. And the formula of Albert Einstein’s general relativity theory, which shaped our thinking of the world, factually connects (equals) the world of strict thinking (mathematics) and the world of stable events (energy impulse of the material world). So, we are evidently on the brink of unveiling a great secret of the essence of thinking as a universal form of life existence (in other words, unveiling the formula of Cartesian substantiality). Not without reason, Spinoza built up even the ethical world according to the geometry recipe. The examples are numerous, and the “mass” of ideas of primordial thinking grows. This process cannot be evidently stopped until we grasp a new formula of primordiality that is not connected with the world of ideas or the world of concepts and categories. But will it lead us to new discoveries or new spirituality? This is a rhetorical question.

The purpose of research

The goal of our research is to gain a certain insight into this culturally new process and bring closer the inevitable moment (believing that it is not the Bible Armageddon) when the historical thought becomes clear. We undertake or, rather, continue our investigation of the problem of primordiality of the European thought in creative work of possibly most extreme modern European thinkers whose research into the European thought was the deepest — Martin Heidegger and Alen Badiou. According to Plato, the true thinking means walking along things (or say events), without taking them over and passing ahead. Both Cosmos and consciousness are the results of such a walk.

For this, we shall try to build up Alen Badiou’s diachronic row by analogy with the row built in our articles on Martin Heidegger.

Presentation of basic materials

Taking into account that in our previous works we analyzed the main ideas aimed at understanding the consciousness and time in creative work of Edmund Husserl and Martin Heidegger (Okorokov, 2017), we shall undertake a research into Alen Badiou's destructive and mathematical ideas to reveal the peculiarities of consciousness plunged into the distant past.

Alen Badiou's works translated into many world languages prove the importance and urgency of his ideas. Only in the last several years, there were published a number of Alen Badiou's works: "Century" (2014), "Praise to Politics" (2019) and others.

Alen Badiou's thought, broadly expressed in his key works "Manifest of Philosophy" (2003), "Being and Event" (Badiou, 1988) and "Logics of Worlds" (Badiou, 2006, 2009), has aroused much debate both in France and all over the world. We shall only refer to several discussable and critical articles and works devoted to Alen Badiou's creative work. The subjective theory of truth was analyzed and criticized in, for example, the works by James Griffith, where he investigated truth creation by a negative and reactive subjects in different worlds (Griffith, 2019), as well as in the works by Joseph Spencer, in relation to the ideas of Jacques Rancière (Spencer, 2015). The generic procedure of love can be viewed, for example, in the article by Jeremy De Chavez (Chavez, 2015). Alen Badiou's plurality Platonism was investigated in a number of works, in particular by J.Spencer (Spencer, 2015) who considered an active discussion on the problem of truth plurality between Jacques Rancière and Alen Badiou, in his lecture on Alen Badiou's ontology as a mathematician (Chernyakov, 2010).

Alen Badiou's main goal was to save the European culture from common sliding towards modern fake philosophy that resembles Ancient Greek sophism and actually repeats the way from Cosmos to consciousness. First of all, the French philosopher tried to figure out the true state of affairs in philosophical (see modern) thinking (see, for example, work (Badiou, 2018)).

For Badiou, philosophy is what is going on in human consciousness. Philosophy is a way of existence by thinking and in thinking on the base of generic procedures. The French philosopher states that there are four ways of existence for a human as a subject empowered with co-knowledge and being involved in thought, or a human co-participating in philosophy. Badiou's anthropology is oriented to a thinking human, and a human absorbed information (event) of truth. It is clear for a contemporary thinker that anthropology can be both destructive and progressive, such that forms both good and evil. In this sense, modern (post-modern) philosophy is oriented at thought flows that reveal the truth of existence (history) of culture. In other words, there is an attempt to connect the existence of these truths with destructive thought. The post-modern strove to destroy the area of stability of classical existence of truths (the system of natural sciences, metaphysics and classical philosophy), to reveal the essence of existence of destructuring (self-differentiating) consciousness, to show the end of the epoch of existence of the reason as a stiffly articulated way of existence of truths (ideas and concepts), the end of the epoch of existence of the language as a form of existence of truths (Cosmos and consciousness).

But does the change of epochs mean the end of thinking, what is so much discussed by modern philosophers? In Badiou's view, classical philosophy constantly strove for sewing to certain cognitive zones of human existence — mathematics, politics, art, or poetry. Even Heidegger considered that only poets are empowered with primary access to existence. But philosophy emerges in a point where the four conditions of its existence appear at the same time — the four generic procedures (matheme, poem, political invention and love) (Badiou, 2013). In other words, philosophy sews to all these sutures at the same time. Philosophy is realized where the procedural conditions of thought formation emerge. There is no other variant

of philosophy existence. In other situations, philosophy dies. After Nietzsche and Heidegger, philosophy, instead of looking for the sense of being, started looking for the sense of its own existence. In this meaning, the post-modern started revealing the sense of philosophy end. Leaving the zone of truth existence, philosophy itself started seeking for salvation in alternative ways of human beings. This was the way Zeno, following Parmenides, led philosophy — Zeno, who showed that consciousness, when contacting motion, starts diverging and disintegrating.

To save philosophy, Alen Badiou suggested tying the philosophy to the basic coordinates of the existence of a human being himself (the four generic procedures). He also proposed to save the truth by its renormalizing (according to the physicists' recipe), that is, to place it in the area of formation of event plurality (and make necessary corrections, for example, in the zone of emptiness). The human path in such a topos is stiffly attached to the way of truth (co-existence) formation. And co-existence, in Badiou's view (Badiou, 2013: 17), is the possible creation of the truth procedure in the world. In general, such Platonism of plurality works well both in modern culture and on the way of interpreting the existence of truth as an infinite set. And here, according to Badiou, there are only two mistakes that take philosophy beyond the visibility range. The first mistake is a religious interpretation that understands infinity as God. The second mistake considers infinity as chaos (Deleuze's mistake) (Badiou, 2013: 167).

Based on the above, Badiou states that the philosophy of today is paralyzed, in relation to its own history. This causes a certain "internal disease" that he calls delocalization: philosophy no longer knows if it has its own place (Badiou, 2003: 143), as, beyond the nationhood, truth deterritorializes and disappears (Badiou, 2002). In this case, philosophy has to distract from its ordinary classical form, which is rigidly marked with ideas, concepts and categories, and seek relief in mathematics, turning to plurality procedures that could help find its unity. According to Abdullah Azad, one of the attentive investigators of Badiou's creative work (Azad, 2009: 50), generic procedures are turned into truth only in a situation where any truth is a generic subset. Truth is co-diachronic to the historical co-location of points in the generic subset of society's existence that characterize a situation and make a generic procedure. Following Plato, Alen Badiou (Badiou, 2003: 67) forms a conception of plurality Platonism.

Such an approach reveals Alen Badiou's first formula related to the origin of the European thinking: truth is where a subset of points is closed in an event by means of generic procedures. In other words, a centre of truth emergence is eventually the human consciousness that absorbed all possible historical situations (or truths). Truth does not mean knowledge and does not depend on us. It assumes a non-limited application of two-valuedness (Azad, 2009: 87). Badiou actually washes away the historical frame of truths (ideas) of Plato, by placing them in a turbulent zone of human thinking, which accompanies, sometimes reinforces, but more often washes away any tradition. Tradition is kept with strong ideas, truths, and fundamental concepts (categories). In this context, Badiou only puts into life the idea of Socrates, Plato and Aristotle, meaning that conceptual thinking is always washed away and two-valued (it always exists in coordinates of polarities: good-evil, logos-chaos, being-non-being (nothing), God-devil, etc.), and is sometimes multiple-valued. And an important factor of truth existence is two-valuedness (even multi-valuedness, as viewed by Badiou). Such is the sacral essence of thinking: it sees truth only through a dialogue event (Socrates and Plato) or a plurality event (Badiou's discovery). There is no truth in loneliness, there is no truth of emptiness, but the emptiness of truth is possible, by Badiou, as the event unfolds around emptiness — the turbulence zone (instability and uncertainty) of consciousness (see, for example, work (Kolshek, 2014)).

This formula of Badiou allows us to draw the following conclusion. What bears the burden of uniting all these polarities can be truths as converging flows of procedurally ordered thought

(generic subset), which tries to bring all opposites to a single beginning (even origin), and which cannot be reached by means of logos thinking. Here consciousness itself starts diverging and gets into the zone of contradictions, aporias and antinomies.

Note that this formula of Badiou's based on the mathematical theory of sets, in its functionality, reminds an action taking place in the black hole where all events are rolled into uncertainty (cavitation), which is in its (conventional) centre. In other words, these events disappear beyond the horizon of visibility (clarity and definiteness), where space and time change, and the topos method of event localization no longer works. In this zone, all existing sciences stop functioning, and conceptual and spatial definiteness disappear.

That is why Badiou introduces into the zone of primordality (emptiness) of thinking turbulence (singularity, like a black hole in physics), around which an event unfolds (literally tightens), and identifies the truth (origin of event) with emptiness as a place which gathers the consciousness flows, but this place cannot be reached by the flows. Consciousness in the topos where it faces pointness or infinities (absoluteness), then diverges and becomes indefinite.

One can note that Alen Badiou's search of truth very much reminds the search (analysis) by the 19th-century mathematicians of point existence (theorems of convergence of series and Cantor's actual set). Therefore exact characteristics of such location of truth are actual mathematical sets and subsets. Human thinking, in its search of truth or essence of existence, slides down to its origins. Badiou only reveals the very fundamental essence (truth of existence) of consciousness (the way of its functioning). Its nature is not only in transcending (which was discussed by Husserl and Heidegger after Kant), but in eternal wandering around the origin, in return to primordality, one can say, in retranscendence, in movement to what is closed by the history of culture and traditions. The search for the origins of consciousness (for example, European consciousness) is a cultural breakdown.

The new formulation of truth makes Badiou carefully analyze the essence of convergent mathematical sets, which are, in his view, analogs of both truth and co-existence. Truth is reached only in the process. This process, as a convergent set, leads to co-existence. And until the truth disappears, dissolves in other events, it generates the corresponding thought (or way of thinking). Truth is a break of thought, its sliding down to the point of primordality (its origination). In this sense, any concept is singular, as it captures a certain number of semantic lines of language and thought. Any concept is discursive, as it is directed to a variety of language utterances. And language itself is not a uniform and linear system of concepts united by a system of formulas or laws. It is rather a non-linear area (topos) of connectivity of the system of concepts that have energy and force of thought attraction. Language is identical to thinking in such a sense that it is synchronized (connected) according to the principles similar to the principles of thought. Language existence is rigidly connected to the space of thinking (language is a home of being, according to Heidegger). Language cannot exist where there is no thought. And truths, categories and concepts are only forms of existence of thought, which is rigidly connected to certain situations. Language is merely a frozen form of thinking that is able to start again and again mechanisms of new thinking and generate the subsequent thought. That is why Badiou wrote about devotion to the event of truth. The existence of thought is rigidly oriented to its markup. Consciousness is the work of energies, energy centres, but it is not quite embedding into language and culture. And the more complicated the energy action of consciousness is, the stronger the energy of a man is. For example, meditation in emptiness consumes much energy. That is why it is one of the highest stages of relaxation of consciousness in oriental religious practices. Religious processes are exclusively important for the human mind as they touch upon the most energy-consuming areas of mind (and consciousness).

The underlying concept of Badiou's all creative work is as follows: truth is always a certain collective co-existence that reflects on the history map the whole spectrum of thinking of supporters of this truth. Truth, at least political, is only collective efforts of all its followers that are plunged into a situation of trust in this truth. That is why it can be neither single-valued, nor individual. Truth is a collective event (not to say collective unconscious) as an act of faith that builds up an energy field of all followers within one (spiritual and religious) direction. Something similar is in other forms of collective ideas (fanaticism in football, art, poetry, etc.).

However, according to Badiou, the way to the truth is the truth itself, and a measure of truth is its pointness. Truth, like a point, is fiction, it's nothing. And at the same time, it is a topos where an event of truth slides down to. Therefore, knowing the truth always means approaching the truth, movement on the way to the truth. Any fragment of this movement is already involved in the very truth event. There is no truth without a way to it, without its history. An event always takes place in a breakpoint (Azad, 2009:173), that is where this break activates events similar to movement (sliding down) to a point. Truth is always a process breaking the relation with both the conceptual world of consciousness and the reality. This is the process occurring in consciousness, where the pointness and fundamentality of a truth event draw it out from the measured flow of time or ordinary, normal arrangement in space and place it in a certain trans space resembling the mathematical screwing into a point (where only changes dominate and there are no quiet things). The being of an event is a breakdown, a fold, and while they are in progress, an event of truth goes on. A place of stay of a truth event is human consciousness with its fundamental abilities. Therefore, Badiou takes pains looking for the words to describe an event of truth in consciousness: exclusiveness, emptiness, indefiniteness, being unnamed, non-objectness, uncertainty, commonness — in other words, language exorbitance, transcending as a throw-in of consciousness into an event, where it is impossible to stop. Any stop or embedding in a conceptual frame causes the death of an event and terminates the being of truth. According to Badiou, truth exists until there exists its pointness, emptiness, explosion, breakdown, that is trans-being (co-being), where classical thought does not work.

As viewed by Badiou, it is this topos that evil starts working in — it is an attempt to name what cannot be named. Evil exists until truth exists — the truth as a name of what cannot be named, the slight opening of the hidden, when a man subordinate to the truth is able for a deed that breaks sociality. Evil is a social, human deed. The destructive force of truth is an integral part of the truth (Azad, 2009:132). Evil can be done only by a creature with consciousness able to distort the truth. Evil, like truth, is an explosion (breakdown). Those who are inside it are blissful, while to the others, this explosion brings destruction. Truth only synchronizes the being of the event (for those who are taken up by the flow of truth). Emptiness in the centre of a truth situation explodes the time, breaks the balanced order of quiet weighted peering at the being. Truth is so aggressive that it absorbs everyone into its existence, or throws them far beyond its limits — where one can quietly understand what is going on by way of regular speculative peering at an event (for example, there is a category — Aristotelian peering at existence). Badiou's truth is much more aggressive than Aristotle's truth. And it is not just a slight opening of the hidden. It is rather a fabrication of an instant change of a situation of openness. Badiou's mechanics is very aggressive — it seizes all the thinking space, like a black hole. There is a feeling that truth is trying to integrate us into another world, another reality.

But if Badiou links truth with the subject, one can also link truth with the activity of consciousness. According to the conception of the French philosopher, truth can only be a special production of a certain plurality. A central place in his philosophy is occupied with a category of generic plurality (Badiou, 2003: 67). Badiou points at four possibilities of unfolding

the truth: revolution, passion, invention and creative work. They correspond to four areas of existence of our subjectivity — politics, love, science and art (Badiou, 2003: 71). If, as viewed by Badiou, philosophy is a thinking situation of co-possibility of its four generic conditions (poem, matheme, politics, love) in the event form, a failure in philosophy can be caused by the fact that philosophy passes its functions to one of these conditions (commits all thinking to one generic procedure). And Badiou calls this situation a suture. The 19th century, from Hegel to Nietzsche, was mostly powered by sutures (Badiou, 2003: 33–34). Today, one must remove the sutures from philosophy and announce its revival. But this revival is possible only in case one finds necessary conditions for activating all the four procedures. Therefore, according to Badiou (2003: 55), our duty is to make a conceptual configuration that is able to gather together all the generic procedures. For this analysis, Badiou, following Heidegger, performs an operation of destruction and brings the modern thought back to the ancient culture, in which, in his view, the four generic procedures united for the first time, and together they gave birth to philosophy. Our consciousness makes fundamental compaction of all historical space of the European culture (in other words, compaction of time) and in-depth peering at its origins.

Another vivid example of Badiou's destructive position is an event of resurrection from the dead, which was articulated and exposed for the trial of consciousness by Paul the Apostle. Having plunged into the distant past, to the origins of the formation of the Christian thought, Badiou shows that death is such a construction of an event place that means resurrection. This event can be explained by only peering at the names of death and the names of life. And one of the death names is Law (Badiou, 1999: 61). Thus, Badiou, based on the destructiveness of thought (in Heidegger's sense), is looking for origins (primordially) of the European thought in another (Christian) aspect. On the one hand, he turns to Ancient Greeks (Badiou, 2003), on the other hand — to the origins of Christianity (Badiou, 1999).

Now we see that in Heidegger's and Badiou's destructive systems, there is another vitally important event (feature) of consciousness — this is an event of time (and history) and even, say, trans-temporality. Consciousness can compress the historical time. Let's try to reveal its essence.

In Badiou's opinion, truth blows uptime, and we think that time disappears in truth. One can interpret this reversely: there are times when truth disappears (the epoch of sophism domination in Ancient Greece and, seemingly, the modern epoch of post- and meta-modern). In this case, truth either disappears (beyond the horizon of other events), or it seems eternal, as it extends simultaneously with its being. We destructively follow the being of truth, and beyond the boundaries of its history, there disappears the visibility of its temporality. And beyond this particular truth, there starts another reality and another story.

Alen Badiou only demonstrates to us the destructive phenomenological (or even psychological) experience, in which generic procedures are formed. But in this, the French philosopher goes further than Socrates and Plato: in the ideal case, it only shows that the state of affairs in modern thinking very much resembles what was going on with the Greek thought in the epoch of sophism. Though Heidegger had developed his anthropological and phenomenological destruction much earlier than Badiou, he came across its boundaries (origins) and showed that the destructing thought leads us to an earlier, than it is commonly believed, primordially of the existence of the European thought (in his view, primordially dates back not to Plato and Aristotle but to Anaximander, Heraclitus, and Parmenides, that is to Presocratics). We find out that the two destructing branches of the European culture (Heidegger's and Badiou's) lead us away to the distant past (to the Ancient Greeks), but they both break at their primordially. However, there may be more powerful instruments of consciousness experience (destruction

elements) that would lead us to say Homer and Hesiod or even deeper into Egyptian, Sumerian or Vedic thought (and this depends on the aim of consciousness only). So far, our conceptual, etymological, biographical, and historical data are not enough to reveal clear origins of the European culture, whose logic is logos-based and hardly primordial — the creation of logic must be preceded by a meta-language necessary for its formation. One can look for a meta-language of any logic, the European as well. And then, there may appear that such an origin is religious or mythological thought, which opens the door to another world. European thinkers have been knocking at the same door for two thousand years, trying to see what they want, to see that beyond logic (and reason), there is illogical (say, other, visual) thinking. But here the European thought stops, as, in this, other fields, logic, with its conceptual and categorial framework no longer works. It is necessary to understand the limits of logical thinking. The European thought constantly comes across the boundaries of logic and makes corrections, more often related to interpretation errors or translations of earlier texts. It is there, at the dawn of tradition, that phenomenological thought plunges into the zone of non-balanced, instable and controversial thinking. It is this effect of consciousness that is often called *Maia* in the oriental tradition. However, the European consciousness, from the peak of its eminence, does not allow to draw such radical conclusions (as in the Indian culture). And the European thought does not dare to go to another, possibly, higher level of consciousness existence. According to Wittgenstein, we, literally, close our thinking with the limits of our language and link the presence of the world with the total number of facts in logical space. Our thought and our language are burdened with tradition.

In other words, the past-oriented European thought, actually stops hearing the future (in the ideal case, it deals with fragments of present experience). Distant history (primordially) and distant future are closed with the horizon of logic, language and tradition. The European thought is totally based on reconstruction and corrections to ancient texts (often false interpretations and translations of ancient Greeks (in particular, Plato and Aristotle) or the Old Testament (Septuagint)). Therefore, the final point of formation of its being, as viewed by Heidegger, is *techne* (technology). The life in the world of technology freezes according to the recipe of logic (in the way it is known to European thought).

Conclusion

Thus, with regard to the discovery of anthropological destruction (which can be understood as a variant of phenomenological reduction), we can draw several important conclusions. First of all, E.Husserl discovers, an original phenomenological way, the modern phenomenological row. He reduces the row to searching for mechanisms of consciousness work. And though his phenomenology school is based on mainly classical European thought, in its functionality, it surprisingly resembles the oriental (first of all, Indian) schools, as the oriental thought was originally meditational. And E.Husserl introduces elements of thought construction that are very similar to the meditation space of consciousness. It uses the meditation mechanisms (construction of thought (Husserl, 1999), Cartesian meditations (Husserl, 2001a)), appresentation, projection (Husserl, 1999), life world (Husserl, 2004), etc.).

Husserl actually rests on mechanisms of phenomenological destruction (epoch, reduction, construction and institutionalization of thought, retention, transcending (Husserl, 2004)), which are much older than those presented in his phenomenological conception. Such an approach of his notices a historical and philosophical puzzle (Husserl nowhere refers to oriental philosophy but his phenomenological thought surprisingly resembles the Hindu thought at its Vedic origins, and, by the way, the ideas of Shankara and especially Ramanuja). Husserl himself sees the

origins of modern humanity and crisis of scientificity in the ideas of Galileo Galilei and René Descartes (Husserl, 2004), while in the destructive and phenomenological sense, these origins can be traced back to older sources (such a plan of consciousness work is noticeable even with stoics and much earlier — with ancient Indians).

The outlines of phenomenological destruction are seen in the magic coordinates of the Renaissance period as well. In these coordinates, traditional scholastic thinking was destructed and pushed out by the magic ideas of Hermetism (Hermes Trismegistus). And in still earlier Arabic thought, destruction brought Arabic philosophers and later scholastics to Aristotle. This is why, Martin Heidegger's historic move to the creation of anthropological destruction related to Edmund Husserl's criticism, could be borrowed even from the scholastic thought.

In general, the use of phenomenological destruction in the studies of late scholastics, Arabic thinkers and Renaissance philosophers was rediscovered in creative work of modern scientists (Edmund Husserl, Martin Heidegger, Michel Foucault, Gilles Deleuze, Alen Badiou and others),

A direct consequence of such rediscovery in the 19th-20th centuries became a detection of fundamental (in-depth) existential and phenomenological measurement of consciousness that was presented by Husserl (as pure logic), Heidegger (by means of fundamental ontology) and interpreted by Badiou (as a system of generic procedures). By the names of its discoverers, this fundamental field can be called a Husserl-Heidegger-Badiou fundamental (in-depth) field of consciousness. Though, Heidegger generally applied his fundamental (in-depth) ontology only to the being. But even in Heidegger's works, there is a complex boundary between Husserl's consciousness and Heidegger's interpretation of the being of consciousness.

In this measurement, one can view another fundamental feature of consciousness, which can be, on the one hand, called transcendence (it is an established term in the 20th-century philosophical culture that points to transcending). On the other hand, this more global measurement reveals what is related to destruction — retranscendence (by analogy with Husserl's retention). If we consider this fundamental measurement of consciousness according to the scheme of the phenomenology of consciousness developed at Husserl's time (1994), then (by analogy with retention, intention (now-point) and protention) one can speak of a new fundamental (deeper) field of consciousness. Such Husserl-Heidegger-Badiou fundamental measurement of consciousness clarifies that consciousness, on the one hand, is classically split into the modi of the past, present and future, split on the horizon of time (Husserl introduces other splitting coordinates: retention, now-point and protention). On the other hand, in the fundamental (high-energy) measurement (for example, Dasein or altered state), consciousness splits its functional possibilities, for instance, intention and time. Husserl and Heidegger discovered the first parameter of fundamental splitting of consciousness, having revealed the transcendence features (the transcending effect).

Along with that, Heidegger found out the second component of this split — destruction (transretention in our understanding). And finally, there can be seen the third component of fundamental measurement — transprotention (related to a little-studied feature of consciousness running ahead into the distant future). This deeper fundamental measurement of consciousness allows us to see not only Heidegger's destruction, not only transcending but also transretentioning and transprotentioning. In such fundamental measurement, the internal time of consciousness starts subordinating to the mechanisms of consciousness itself and can be fundamentally compacted or extended to most remote moments of the past or future. The consciousness of time in its internal measurement has not only mechanisms of retention, intention and protention. It has deeper fundamental mechanisms of transretention, transcendence and transprotention.

We can say that, in the fundamental measurement, consciousness can radically compact (compress or extend) time, in the field of internal energies, similar to the black hole processes (in accordance with Einstein's general relativity theory). By a surprisingly strange coincidence (and similar behavior), in full analogy with the way the ordered (structured) Cosmos flows down to the "emptiness" of the black hole that radically changes space and time, consciousness included in (high-energy) psychic mechanisms (in its relation to the unconscious) resembles "cosmos" with cavitations (black holes) — truths, according to Badiou, and ideas, according to Plato. In these truths, space and time can be also radically compacted or transformed. In the same way, the cosmic space (with the matter) flows down beyond the time horizon of the black hole, in which the time itself is transformed, the ordered consciousness (with its concepts) flows down to the time horizon of the unconscious that behaves like a black hole and can critically compact the internal time of consciousness.

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Worldview Essence and Cosmic Connotations of Religious Feelings

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The purpose of this study is to identify the essence and features of the cosmic nature of religious feelings, their various meanings, which are unfolded in the system of the "Person-Absolute" relationship. The authors reveal the essence of cosmic religious feeling as the experience of unity, the harmony of a person with nature, with the Universe, in which the experience of beauty (aesthetic feelings), sacred (religious feelings), moral (moral feelings), and intellectual (scientific feelings) are combined. In the trinity of religious feelings — immediate experience, manifestation, and comprehension — certain spiritual existential meanings are fixed, which reflect the unity of the human and the Divine, the finite and the infinite. The authors compare such phenomena as "cosmic religious feeling," "transpersonal experiences," and "peak experiences" and describes their similarities and differences. Religious feeling is immanently inherent in life-meaning orientation, which is associated with the experience of infinity, immortality, and that is due to socio-cultural realities. Religious feeling "expresses" the desire to go beyond the finite, to establish itself in the infinite, and thereby contribute to the integrity of the personality. It should be noted that these experiences are of great importance for the person, differing in generalization, originality, and relate mainly to the emotional states. The authors conclude that the infinity is inherent in religious feelings, which leads to the presentation of them as a cosmic religious feeling that combines religious, intellectual, and aesthetic features resulting in the formation of cosmic consciousness as a certain worldview strategy.

Keywords: religious feelings, cosmic religious feeling, transpersonal experiences, peak experiences, cosmism, William James, Albert Einstein, Stanislav Grof, Abraham Maslow

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Introduction

The modern globalized world, diversifying all spheres of human life, harbors a number of dangers associated, on the one hand, with environmental disasters, nuclear wars, resource depletion, overpopulation of the planet, economic inequality, etc., and on the other, with depreciation of traditional system of values, with loss of the mental and spiritual wealth of humanity. Moreover, the dramatic events of the present affect not only the content of ideals, values, life-meaning attitudes of religious processes but also form new imperatives in the understanding of a religious phenomenon, in particular, the sphere of feelings. The problem of understanding religious feelings is one of the key issues in both theological and scientific discourse. After all, religious feelings are the components of religion and form a religious identity. They become an important factor in the construction of a person's meaning of life and value orientations, and, therefore, are able to influence the attitude and worldview of the person.

It is important to note that in Modern Philosophical and Religious Discourse, there is virtually no deep research on the phenomenon of "religious feelings." In a few studies on this issue, attention is mainly drawn to individual manifestations of religious feelings, their structure, functional aspects, and role in the creation of the human world. However, the problem of the essential features of religious feelings, their different types of manifestation, including their cosmic dimension, requires a detailed scientific investigation.

Methodology for the study of the phenomenon of "religious feeling"

First of all, we should note that the whole range of meanings of the concept of "religious feeling" turns around the concept of "experience." To get closer to the understanding of the process of "experiencing," let us turn first to the analysis of definitions existing in literature, that is, we will look at it through the prism of certain interpretative fields, to clarify the features and traditions of its usage. Usually, in everyday speech, the term "experience" is used as a certain personal state, its reaction to a certain object, event, etc.

German philosopher Hans-Georg Gadamer, exploring the origin of the word "Erlebnis," concludes that in the 18th century, there was no such word in the German texts. The philosopher emphasizes: "Schleiermacher's appeal to living feeling against the cold rationalism of the Enlightenment, Schiller's call for aesthetic freedom against mechanistic society, Hegel's contrast between life (later, spirit) and "positivity," were the forerunners of the protest against modern industrial society, which at the beginning of our century made the words Erlebnis and Erleben become almost sacred clarion calls" (Gadamer, 2006: 55). Gadamer noted that the concept of "Erlebnis" arises on the wave of Romanticism, which swept through philosophy, literature with its cult of feelings, the rejection of normativity, and the rise of the artist's creative activity. The philosopher emphasizes that the word "Erleben" means primarily "to be still alive when something happens" (Gadamer, 2006: 53). Later its meaning "consists precisely in mediating between the two meanings and in seeing these meanings as a productive union: something becomes an "experience" not only insofar as it is experienced, but insofar as its being experienced makes a special impression that gives it lasting importance" (Gadamer, 2006: 53). This thorough study of the history of the concept and the analysis of the thoughts of various scholars enabled Gadamer to determine the proximity of the structure of "experience" as the way of being aesthetic and to formulate the concept of "aesthetic experience," which contains the experience of an infinite as a whole. In this aspect of consideration, it "demonstrates" the semantic coincidence with "religious experience."

Methodologically significant for our research are the ideas about the experiences in the works of the Georgian philosopher Merab Mamardashvili, in which he indicates that the limits of the possible and the impossible are presented in the experience: "...this undoubted experience we always feel as a boundary experience, with the help of which we face the impossibility of the possible or the possible impossibility" (Mamardashvili, 2002: 287-288). The philosopher calls such experiences "tying up acts," staying in which we carry out certain spiritual acts, which reflect the process of correlating of the world of human life with its value-semantic formations. As a result, it represents what is subjectively meaningful for the person. Especially, this can be vividly manifested in tense situations, life crises.

In our opinion, it was the American philosopher, psychologist William James who, for the first time, tried to conceptualize the phenomenon of religious feeling by defining its features that lay in the intentionality (are directed at the object) and the role they play in human life. He noted: "Religion shall mean for us the feelings, acts, and experiences of individual men in their solitude, so far as they apprehend themselves to stand in relation to whatever they may consider the divine" (James, 1902: 32). James stressed that religious feelings are the deepest source of religion. As the content of visual senses is light, the content of auditory senses is sound, the content of religious feeling is the existence of the Supreme Being, God, which makes it possible to distinguish that common, inherent in all religions (James, 1902).

Referring to James's "The Variety of Religious Experience," Stephanie Gripentrog draws attention to the fact that religious experience is a purely personal phenomenon — a person cannot receive it from another person as ordinary information. It is always perceived personally, and, most importantly, experienced personally. In this sense, it is impossible to "get" it, but it needs to be experienced. Therefore, it is quite clear that it is precisely due to the intensification of religious feelings, the personal experience, "the subjective power of the persuasion of such experiences seems to be overwhelming and can scarcely be questioned anymore" (Gripentrog, 2018: 246).

Consequently, religious feelings are, firstly, an immediate experience, which reflects the feeling of a certain mental state receiving experience in the "man-Absolute" system, secondly, a manifestation in which various forms of explication of internal states and processes are realized, thirdly, comprehension, in which the inner work of self-awareness takes place according to the awareness of mental states and the whole existential situation. The Ukrainian philosopher, psychologist Denys Predko, revealing the dynamic, life-meaning nature of religious feelings, draws attention to the fact that "the concept of infinity, eternity, immortality is closely connected with religious feelings since the attraction to eternity is a person's awareness of both his mortality and personal higher purpose" (Predko, 2018: 46). Therefore, the religious feelings are characterized by the ability to go beyond the limits of "Self" and thereby overcome the finality, including a person and all the uniqueness of his being in the context of infinity.

Cosmic nature of religious feelings

In this study, we will be interested, first of all, in that aspect of religious feelings, in which the unity of the personal and the Divine, finite and the infinite is revealed. Thus the cosmic character of religious feelings is manifested.

Let us turn to the reflections of Albert Einstein, who drew attention to the relationship between the nature of feelings and the form of human religiosity. He noted that quite diverse feelings, which have a certain structure in the historical genesis, are involved in the formation of religious experiences. In this case, the scientist considers them as certain "stages," where each has a functional specification.

Therefore, in primitive societies, religions arise from the experience of fear. This feeling can be identified as a psychological response to danger. Later, as Einstein notes, social impulses become a source of religiosity: the religion of fear is transformed into a moral religion. In this case, religious feeling acquires an axiological dimension. Its emergence is correlated with an awareness that someone's actions may be incompatible with various religious precepts. Einstein stated that both of the above-mentioned historical "stages" of religious feelings are characterized by an anthropomorphic conception of God.

The highest stage of the development of religious feeling is a cosmic religious feeling, where the anthropomorphic character of God conception is overcome. Such a feeling is inherent in developed societies and especially in talented people. What is the essence of this feeling? Einstein explains it this way: "The individual feels the futility of human desires and aims and the sublimity and marvelous order which reveal themselves both in nature and in the world of thought. Individual existence impresses him as a sort of prison, and he wants to experience the Universe as a single significant whole" (Einstein, 1930). In this sense, religious feeling becomes a powerful and most noble factor of scientific research. "If we recall that, for him, music was an expression of religious feeling and that often, while playing music, he "suddenly" found the solution to a scientific problem that had intrigued him for some time" (Jammer, 2002: 56).

Speaking about the tendencies towards the rapprochement of religious and scientific worldviews observed in modern science, it is necessary to note the attitude to the religion of many famous scientists, including Albert Einstein, Max Planck, Vladimir Vernadsky. The following things unite them: awareness of the unity of a person with nature, the feeling of the presence of the Universal Mind, and perception of the Harmony of the World, which Albert Einstein called "cosmic religious feeling."

The expressions "cosmic religious feeling" probably first appeared in Albert Einstein's article "Religion and Science" (1930). Such a religious feeling, according to Einstein, is the only creative religious activity. This conviction he kept until the end of his life. According to Einstein, "the religious geniuses of all ages have been distinguished by this kind of religious feeling, which knows no dogma and no God conceived in man's image" (Einstein, 1930). He believed that the cosmic religious feeling is transferred to people and is cultivated in people through art and science. Scientist emphasized: "... I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research. Only those who realize the immense efforts and, above all, the devotion without which pioneer work in theoretical science cannot be achieved are able to grasp the strength of the emotion out of which alone such work, remote as it is from the immediate realities of life, can issue" (Einstein, 1930). Albert Einstein linked his understanding of the perfect structure of all that is incomprehensible, which is hidden behind the immediate experience of the rational structure of the world, with the "mathematical construction," with those forms that the human mind must freely build before their real existence is confirmed and thus, with the phenomenon of pre-established harmony and the inconceivable effectiveness of mathematics in the natural sciences. In this case, Einstein's "cosmic religious feeling" consonant with the "pre-established harmony" of David Hilbert and Platonic-Pythagorean divinity of the mathematics of the world. It is about such feelings that are mentioned in Ryan Gillespie's work "Cosmic Meaning, Awe, and Absurdity in the Secular Age: A Critique of Religious Non-Theism" (Gillespie, 2018), which considers the understanding of religion by Albert Einstein. Ryan Gillespie states that aesthetic feeling coincides with religious feelings: "It is wisdom and beauty, and it is knowledge, and it is feeling, and this knot is what he means by religion" (Gillespie, 2018: 473).

By the way, Einstein's ideas about cosmic religious feeling somewhat overlap with the phenomenon of cosmism (a number of religious-philosophical, aesthetic and natural science trends, which are based on the idea of cosmos as a structurally organized world and man as a "citizen of the world," as well as a microcosm similar to the macrocosm). The ideal of cosmism is the unity of humanity in a planetary community. It is consonant with globalist concepts. Thus, cosmic participation in eternal being is born when the unity of man and the Universe is revealed, where the experiences of religious, aesthetic, moral, intellectual phenomena coincide. The representatives of cosmism (Nikolai Fedorov, Konstantin Tsiolkovsky, Vladimir Vernadsky, and others) have developed worldview strategy as a semantic unity of cultural dialogue with the past and future of man and humanity, combined with the ideas of cosmic universalism and human freedom. The main idea of cosmism is the awareness of the unity of the objective world in all its manifestations, including the unity of the Universe and Person.

We will consider in greater detail the issue of finding out the essence of cosmic religious feeling, since it contains a considerable heuristic potential. Such feelings are inherent to many scientists. Philosopher Inar Mochalov (Mochalov, 1988) notes that the religious experiences of the famous scientist Vladimir Vernadsky embraced space, life, on the one hand, and creative intentions of scientific search on the other. Indeed, sometimes it happens that a scientist, fascinated by a scientific search, experiences a "cosmic religious feeling." Such a feeling was inherent to Vernadsky. However, this feeling, as Mochalov notes, is significantly different from religious feeling: "1. Religious emotions of believers in their masses usually have a sensual character. They are distinguished by their imagery, visual representation and are associated with very specific sensations — visual, auditory, etc. However, Vernadsky's emotional-religious mood has the abstract sensual character of such a generalized emotional experience, that literally all specific attributes of a religious feeling evaporate. 2. Religious feelings of believers are aimed at objects that really do not exist (God, angels, saints, etc.). Instead, Vernadsky believed that the content of religious experiences was quite real objects — Cosmos, life, person, mind, science, and scientific creativity. 3. Religious feelings of believers are accompanied by a so-called "prayerful," in essence, an irrational state of personality. On the other hand, they were accompanied by a very rational state of spirit in Vernadsky, expressed in the experiences of the process of his scientific search, and philosophical reflections" (Mochalov, 1988). Consequently, in this case, religious feelings coincide with intellectual feelings — their essence includes a rational component.

In order to find out more deeply the essence of cosmic religious feeling, let us turn to transpersonal psychology ("the fourth force in psychology," which is designed to complement the one-sidedness of the previous three projects in psychology: Psychoanalysis, Behaviorism, and Humanistic Psychology). It emerged in the USA in the late '60s of the twentieth century on the basis of a transpersonal project in culture. By the way, transpersonal psychology made a significant contribution to the reassessment of the role of the brain in the process of human mental activity, especially in such important aspects as religious feelings. The American psychologist Abraham H. Maslow rated the transpersonal movement rather highly. "For Maslow, this implied an explicit reference to transcendence, which was also to be part of his new psychological anthropology and its corresponding therapy. He wrote: "Without the transpersonal, we get sick, violent and nihilistic, or else hopeless and apathetic"" (Gripentrog, 2018: 249).

The famous researcher and psychologist Stanislav Grof introduces such a construct as transpersonal experiences (the term transpersonal is used in the sense of what is superior

to personal). According to Grof, transpersonal experiences of various types are the basis of both religious experience and religion. Most importantly, in any developed religious system, except for transpersonal experience and religious experience, there is a religious doctrine (dogma), theology, cult, church etc. However, the basis of religious faith and religious life is, precisely, the transpersonal experience. Grof identified four types of experiences: 1. Abstract and aesthetic experiences, explained by the language of the physiology and anatomy of the senses. 2. Psychodynamic experiences include our bibliographical memory, unsolved conflicts, emotions, and can be interpreted within the theory of Sigmund Freud. 3. Perinatal experiences are based on the fact that the human unconscious contains repositories or matrices, the activation of which leads to the re-experiencing painful processes of birth, death, and rebirth. 4. Considering Transpersonal experiences, Grof notes: "The common denominator of this otherwise rich and ramified group of phenomena is the subject's feeling that his or her consciousness has expanded beyond the usual ego boundaries and has transcended the limitations of time and space" (Grof, 1985: 159). Moreover, the transpersonal experiences of "mystical" varieties are quite diverse. In particular: unity with life and all of creation, both at the macro (Universe) and at the micro (world of atoms and elementary particles) level; various parapsychic (extrasensory) abilities, described by people as being in the other world, meeting with various archetypal and divine characters; intuitive understanding of universal symbols; similar to the descriptions of the experiences of adepts of the Indian psychological techniques (activation of the chakras, kundalini energy, etc.), identification with cosmic consciousness or void, etc. Mystical experiences, having a beyond-senses origin, are the immanent experience of transcendental reality. Therefore, transpersonal psychology has opened new aspects of beingness, has made a penetration in the field of transcendental. "Not only does this type of psychology represent a clear rejection of the materialistic paradigm in science, it also claims to open up a path for the connection of the individual psyche with the anima mundi and the process of man becoming one with the cosmos" (Gripentrog, 2018: 264).

According to Stanislav Grof, the identification with "undifferentiated consciousness of the Universal Mind or the Void" (Grof, 1985: 36) belongs to the peak levels of transpersonal experiences. In such a dimension, transpersonal experiences acquire the status of an event in which a person becomes united not only with humanity but also with the Universe as a whole. This new transpersonal dimension of a person is compatible with the cosmic religious feeling as a unity with the Absolute, Supernatural. Grof believed that such archetypal patterns as "The sense of cosmic unity, identification with the Universal Mind, or experience of the Supracosmic and Metacosmic Void ... have an enormous therapeutic potential" (Grof, 1985: 354).

In addition, there is a term that somewhat corresponds to the phenomenon of "cosmic religious feeling" in the writings of Sigmund Freud. It is "oceanic feeling", with which origins of religion are associated. In his work "Civilization and Its Discontents," Freud made an attempt to comprehend the essence of the oceanic feeling. The psychoanalyst does not agree with the interpretation that this feeling is the source of religion. Without denying on this basis the fact of the presence of similar feelings in other people, he raised at the same time the question of how correctly it is interpreted and can be considered a source of religious beliefs. Scientists believed that feeling could serve as a source of energy only when it is motivated by a strong need. In this respect, a religious need was derived by Freud not from the oceanic feeling, but from a child's helplessness and the adoration of the father associated with it. At the same time, Freud admitted that later this feeling turned out to be connected with religion. Freud noted: "I can imagine that the oceanic feeling became connected: with religion later on. The 'oneness with the universe' which constitutes its ideational content sounds like a first

attempt at a religious consolation, as though it were another way of disclaiming the danger which the ego recognizes as threatening it from the external world” (Freud, 1962: 7).

Paying attention to the formation of the Ukrainian religious worldview, the ideologist of Ukrainian Orthodoxy Arsen Richynsky, along with such characteristic features as the absence of any mediators between man and deity, a feeling of intimacy between a person and God, natural optimism, based on the idea of God as the human Goodness, the just Master of the world, distinguishes the cosmic feeling as the phenomenon by which the boundary between the real world and the otherworld is overcome “into the intuitive anticipation of the internal unity of the World” (Richynsky, 2002: 109).

Therefore, the cosmic religious feeling refers to beyond personal experiences. It is a feeling of the greatness of the world and personal involvement in this greatness. In this regard, the cosmic religious feeling comes closer to a mystical phenomenon, which is formed of both faith and religious beliefs.

Religious beliefs are changing with the development of social realities. When a particular religion is in crisis, a gradual process of “recoding” existing religious beliefs and ideas takes place: they become subject to critical rethinking. However, in this continuous, moving stream of religious beliefs, their driving force is still religious feelings, which, by intensifying religious faith and consolidating themselves in religious experience, nourish and intensify religion.

Consequently, the cosmic religious feeling is a kind of worldview strategy. However, the philosopher Vyacheslav Skosar notes: “Einstein’s cosmic religious feeling is not the highest type of religiosity, as the famous theoretical physicist thought, but an elegant form of natural religiosity. This form of religiosity is inherent to some people with subtle mental strings and an increased ability of abstract thinking” (Skosar, 2007). We believe that it is hardly possible to agree with this opinion. Indeed, there is a moment of unity of the human and Universal in the cosmic religious feeling, where there are no clear boundaries of the object of reflection, where the experiences of the beauty (aesthetic feelings), sacred (religious feelings), moral (moral feelings), intellectual (scientific feelings) are combined. In the latter case, we are talking about a matter of thought, which by its specification, is more philosophical than scientific.

Philosopher Mikhail Epstein in his article “About philosophical feelings and actions,” notes that since philosophy is a love of wisdom, so it is marked by some “feeling” nuances. “After all, love is a feeling, and wisdom is not only a thought, but it’s a fusion of both: the ability of emotional filling of thought and intellectual filling of feeling” (Epstein, 2014: 168). In such an intellectual and emotional union, the presence of the Divine is experienced as a factor of order and harmony of the Universe.

The American psychologist Abraham H. Maslow shares similar ideas on the essence of religious feelings. He identifies the heightened experiences of happiness, ecstasy, fulfillment as peak experiences. Moreover, “perception in the peak-experiences can be relatively ego-transcending, self-forgetful, egoless, unselfish” (Maslow, 1964: 68). During peak experiences, a person feels a sense of awe, admiration, and moments of relaxation, bliss, and peace. Maslow emphasizes: “It (peak experiences — O. Predko, D. Predko) is felt to be a highly valuable-even uniquely valuable experience, so-great an experience sometimes that even to attempt to justify it takes away from its dignity and worth” (Maslow, 1964: 68). These experiences are an ecstatic state that is experienced at the culmination moments of love and intimacy in the gusts of creativity, insight, discovery, and unity with nature.

Peak experiences, as Maslow believes, are characterized by a sense of discovery of limitless horizons, a sense of being both more powerful and more helpless than ever before, a

sense of delight and awe, a loss of space and time sense. Sometimes religious feelings cause sudden experiences. That is why the American psychologist Abraham Maslow calls such experiences “peak experiences,” the summit ones, which open up the unlimited possibilities of the person. These experiences include the feeling of God. “Peak experiences” are caused by strong feelings, works of art, music, impressions caused by an exceptional beauty of nature. Such peaks of the upswing of the emotional sphere may take from several minutes to hours. It’s very difficult to talk about them, and this is what makes such kind of experience related to each other. They are not necessarily linked to the rationally tangible presence of God. Such feelings relate specifically to beyond personal experiences. It turns out that such experiences are almost always, on the one hand, empty, have no specific content, but on the other — they are comprehensive.

The concept of Maslow emphasizes the uniqueness of a person, affirms an optimistic view of humanity. After all, a person’s life cannot be understood if one does not take into account its high aspirations — growth, self-actualization, striving for health, the search for identity and autonomy, the thirst for beauty. Maslow noted: “because of such an experience, were totally, immediately, and permanently cured of (in one case) chronic anxiety neurosis and (in the other case) of strong obsessional thoughts of suicide” (Maslow, 1964:68). Thus, peak experiences have a psychotherapeutic effect. At the same time, they require healthy, developed, socialized, free, critically-thinking, mature personality who, recognizing the limits of his own capabilities, could integrate such experience into his own structure of personality, avoiding the dangers of dependence, irrationalism, escape from reality and selfishness in relation to other people. Hence, peak experiences are the highest degree of the experience of feeling and are characterized by a high degree of intensity, go beyond person’s subjectivity, loss of self, ecstatic involvement with the Universe. At the same time, Abraham Maslow warns that such experience requires a high level of personal development and social inclusion.

The phenomena of “cosmic religious feeling,” “transpersonal experiences,” and “peak experiences” are semantically related.

The cosmic religious feeling manifests the moment of unity of human and Universal, where there are no clear boundaries of the object of reflection, which combines the features of religious, intellectual, and aesthetic feelings resulting in the formation of cosmic consciousness.

Transpersonal experiences acquire the status of an event in which a person becomes united not only with humanity but also with the Universe as a whole.

“Peak experiences” are heightened experiences in which the way of expressing, preserving, and transmitting the relationship of a person with the Absolute at the level of a mystical phenomenon as a personal form of a transcendental manifestation is presented.

Conclusion

The cosmic religious feeling is based on the perception of the beauty and harmony of the Universe and on selflessness (it does not depend on the fear of punishment and the desire to receive a reward), the human need to move towards perfection. This sense of mystery is the experience of the presence of the Divine in the foundations of the Universe, but not in an anthropomorphic form, but in the form of the principle of the ordering of phenomena. Thus, in the existential space, through the process of the unfolding of religious feelings, a new meaning is constituted — qualitatively different, rethought and experienced. Moreover, meaning is born as a result of experiencing a relationship, on the one hand, between the “Self-

concept” and sacred objects, and on the other — between us, between subjects, who constitute the meaning. Therefore, in the cosmic religious feeling, there is a moment of unity between the human and Universal, where there are no clear boundaries of the object of reflection, where the experiences of the beauty, sacred, moral, and intellectual, combine to form the cosmic worldview paradigm. Such a paradigm is able to unite and consolidate humanity on the basis of Beauty, Sacral, Morality and Truth. In this context, promising opportunities are opening up to comprehend the cosmic nature of religious feelings — their axiological and praxeological potential as a criterion of humanity.

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World Economic Order: Evolution of the Cooperative Sector

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The purpose of the development of a multifunctional cooperative sector is to realize the opportunities of cooperation and effective use of its potential for economic growth and the social orientation of Ukraine's diversified economy. The authors prove in the article that the scale and pace of the cooperative sector's formation of the economy depend on the development of the system of cooperatives, mainly: agricultural, consumer, credit and social services. In the future, the regional sector of the cooperative economy will be formed on the basis of different types of cooperatives. Integration into the cooperative sector should take place in two ways: the intra-system integration of cooperatives and the creation of a national cooperative sector of the economy.

It was found that globalization, as an irreversible phenomenon in the development of the world economy, makes it possible to learn that in most Western countries, the cooperative sector occupies a leading position in the economy and is characterized by a variety of forms and types of cooperative activities. The processes of globalization, which are the basis for the formation of a non-economic system, pose a real threat to the very existence of the cooperative movement. Adequate response on the part of cooperatives and their unions should be to overcome competition between cooperatives of different types and kinds and to integrate the cooperative movement not only within national economies but also outside them.

Keywords: globalization, cooperation, cooperative sector, cooperative philosophy, strategic development

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Introduction

In the late twentieth century, the market economy has dramatically increased its influence around the world due to the strengthening of the post-industrial era and its transformation into a non-economic system. The globalization of the world economy has significantly changed traditional trade barriers, increased free trade zones, weakened state support for agriculture, and transformed the world financial system. Using the advantages of modern forms of communication, capital has become faster, without delay, to move around the world in search of the most profitable areas of its application. From an economic point of view, this means that many cooperatives have encountered large multinational companies with financial and legislative advantages that cooperatives do not have. They faced much greater competition than that which took place in the late nineteenth and early twentieth centuries, even that which existed in the second half of the twentieth century.

Cooperative forms of organization, on the one hand, are losing their positions in economically developed countries due to the rapid growth of living standards, and on the other – trust in cooperatives undermines the prosperity of capitalist enterprises. Cooperatives faced an unprecedented pressure of capital on the economic interests of people who sought to solve their own socio-economic problems without succumbing to new living standards formed by transnational companies for different groups of the planet. All this poses a real threat to the functioning of cooperatives. For prosperity, and in many cases simply for survival, cooperatives must respond adequately to the changed situation.

One of the most important directions is the unification of cooperatives, the opposition to the globalization of cooperative integration. Instead of conflict, cooperatives of different types and kinds need to identify common prospects and opportunities for the development of mutual assistance within the cooperative sector of the national and world economy. Globalization is considered as the highest degree of development of the system of the international division of labor, as a system that allows active implementation in the economy of scientific and technological progress. Given these positions, the cooperative movement is interpreted by them as an anachronism, which is a brake on progress (Balaban, 2015). However, the history of the cooperative movement development shows the ability of cooperatives to solve not only economic but also social problems of cooperative members. Thus, cooperatives in agriculture should be considered not only as one of the organizational and legal forms of entrepreneurship. Their social significance for the village must also be taken into account.

The cooperative model is widespread around the world, and many countries have account for companies that operate as cooperatives. However, there are regions in which the presence of cooperative companies is more embedded within the cultural and historical settings of society. Europe accounts for hundreds of thousands of cooperative companies and represents the continent with the most relevant presence of this type of organization, also due to the tradition in European countries. In Italy, England, Germany, France, and Spain, a relevant part of the economy is represented by cooperatives (Quintana, 2016).

The historical and philosophical concept of cooperation

Cooperatives are organizations whose origin is extremely remote. It is believed that already at the early days of prehistoric human societies, there were forms of organized associationism in the form of cooperatives whose task was to distribute resources and tasks among the members of the tribes so as to preserve the survival of the entire community (International, 2015) over time. The ancient origins of cooperative forms were designed

to serve the needs of members, even if difficult to date back to their origins indicate the importance of cooperative action in human societies.

Owen Robert is considered to be the universally recognized ancestor of the cooperative philosophy. In his speeches, the word “cooperation” was first used in the sense in which it is used now. He based his philosophy of cooperation on educating people. He was convinced that the workers of his well-performing cotton trade company could have better worked if they had had the opportunity to participate actively in the governance of the company and if they could have received benefits such as education for their children (Cooperation, 2013).

Although his ideas were not destined to be put into practice, the cooperative theory has since developed and is developing quite rapidly, sometimes experiencing ups and downs. Despite the fact that Owen’s ideas remained the ideas of utopian socialism, they reflected the germ of modern cooperation and its basic principles: voluntary membership, equality, the election of leadership, self-government (Babenko, 1995; Bilan et al., 2017).

In reality, the theory of modern cooperation began to be developed by his students and followers. In particular, the system of views of Charles Fourier laid the fundamental foundations of collective farming. They are more reasoned. Of particular relevance were his ideas about the superiority of cooperative work over employment, the need to make cooperation accessible to all segments of the population, the possibility of rapprochement of producers and consumers, and as a consequence, the elimination of unnecessary intermediaries.

Charles Gide, French researcher and organizer of the cooperative movement, played an important role in the development of cooperative theory in the 19th century. He can be called a theorist and even an apologist not for cooperation at all, but only one of its areas – consumer cooperation. The economic system of modern society seemed to the French scientist extremely imperfect. He saw this imperfection primarily in the antagonism between production and consumption, producer and consumer, and the manifestations of this antagonism Charles Gide considered counterfeiting of goods, commercial untruth, advertising, as expensive as deception, contracts, brazen speculation, fierce competition, struggle for life, ruthless war. The French professor saw the way out of this sad situation in the fact that production serves consumption “on the same grounds as the hands serve the stomach” (Cooperation, 2013). In other words, when social production is in the hands of consumers, the antagonism described above will disappear by itself, because “consumers ... cannot have interests hostile to themselves: they have only one interest for all: to obtain as many vital benefits as possible. lower costs: and this interest is nothing but the interest of society as a whole, of all mankind” (Cooperation, 2013).

The theory of agricultural cooperation occupies one of the important places in the works of modern scientists. Vitaly Zinovchuk defines cooperation as “...a process of voluntary pooling of efforts and resources of entities interested in achieving certain socio-economic results, which can be obtained only or faster – through group action” (Zinovchuk, 2010). It follows from his research that only purposeful actions of a group of subjects united by a common economic interest constitute the essence of the process of cooperation. The researcher believes that the definition of cooperation reflects its dual nature, and cooperation is too broad a concept to cover a huge range of group actions. Referring to the fact that there is labor cooperation, industrial cooperation, inter-economic, intersectoral, interregional and even international, Zinovchuk recognizes that not every interaction will be considered cooperation, but only that which implies the existence of regular, organized and purposeful group actions of an economic character (Zinovchuk, 2010). We should agree with his opinion that there is still a problem of finding such a definition of cooperation, which would allow any cooperative organization to identify differences from other types of companies.

The British Dictionary defines cooperation as the process of working with another company, organization, or country in order to achieve something: economic/international/global cooperation (Cambridge dictionary, 2020).

After analyzing the definitions of many scientists, we can conclude that the issues of cooperative theory and practice remain debatable and require further study, which is natural, given the diversity of this economic form. Therefore, we offer our definition of cooperation: “Cooperation is a system of cooperatives, their unions, associations, associations, as well as other economic organizations created by them and acts as a form of joint economic activity of producers in one or different but interconnected processes of labor or production, or in order to achieve economic results or to satisfy their social and economic interests, which are difficult or impossible to achieve in individual activities” (Ushkarenko, 2009). This definition sufficiently reveals the essence of cooperation and can find application in the scientific field.

The place and development of the cooperative sector of the economy

The developed market economy includes three interconnected and interacting sectors: private, represented by enterprises that are individually or jointly owned, cooperative and state. The relative share of each sector in the total economic activity is determined by the characteristics of the country or region. According to the Canadian cooperator Alex Laidlaw, who owns the idea of “three sectors,” none of them alone so far could solve all economic problems and ensure a perfect economic system (International, 2015). Only three sectors working together and complementing each other can achieve better results.

The cooperative sector of the economy, which is defined as a set of real organizations and enterprises created by them, having common features of cooperative ownership, principles and values of the international cooperative movement, which carry out commercial activities in accordance with the cooperative business model in the interests of its members. and private. Like the state (in a democratic, civilized state), it focuses not on a single independent individual. Still, proceeds from the common interests of certain strata and social groups prioritize not profit but the creation of normal working conditions, life, and activities of its members by providing them services. On the other hand, the cooperative sector differs from the public and closer to the private in that it is, firstly, less centralized, secondly, takes into account not so much public as group interests, and thirdly, has, in addition to social, commercial orientation.

The situation of cooperation between the public and private sectors is twofold and rather unstable. In a democracy, cooperatives can find opportunities for agreements and joint action with the government. However, under authoritarian rule, the state can subordinate cooperatives to the point of nationalizing the cooperative. But even in democracies with a highly developed private enterprise sector, cooperation is also in a difficult position. As noted by Alex Laidlaw, the ideology of cooperation is threatened, on the one hand, by extreme statehood, and on the other – by superpower capitalism (International, 2015).

To reasonably determine the significance, place and role of cooperatives in modern national economies and the global economy, the research committee of the International Cooperative Alliance since 2006 publishes annual data on the 300 best cooperatives in the world (“Global-300”) (Sakharova, 2009). Some of these cooperatives are leaders both in certain market segments and in their own countries. Analysis of the activities of the leaders of the world cooperative movement allows us to conclude about the most preferred areas of use of cooperative forms of management: in agriculture and industries that process the products

of cooperative farmers (more than 33%), trade – 28%, lending and insurance – 27% (World Cooperative Monitor, 2019). However, none of the cooperatives in the post-Soviet space is included in this number.

A cooperative, according to the International Co-operative Alliance, is defined as “an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly-owned and democratically-controlled enterprise” (International, 2015).

Cooperatives are created as organizations aimed at satisfying the common needs of a group of individuals. The group of individuals who give rise to and participate in the cooperative is individuals who can be very heterogeneous in economic/social extraction but share a need that cannot be addressed individually (Diaz-Foncea & Marcuello, 2013; Yatsenko et al., 2019). People do not found a cooperative either to maximize profit or for regulatory compliance. Instead, the aim is to help each other in a particular task or service.

Today, many sectors experience companies organized in the form of cooperatives. Among the 300 largest cooperatives, 117 operate as insurance companies, 95 are in agriculture, 53 are cooperative supermarket, 21 are banks, and the others operate in 5 other (World Cooperative Monitor, 2019). It is estimated that cooperatives employ over 100 million workers and support the daily life needs of 3 billion people around the world. Internationally, the 300 worlds largest cooperatives have a turnover of between \$600 million and \$65 billion, and, altogether, they generate a total turnover of \$2,034 billion (World Cooperative Monitor, 2019). They operate in many sectors, such as agriculture, banking, insurance, supermarkets, etc.

Following the European tradition, even the Americas see many companies operating as cooperatives specially in the agriculture sector. A more contained number of cooperatives are currently operating in Asia (with an exception for India), Africa, and Australia.

The cooperative sector performs a number of functions specific to it, regulating market relations, smoothing the negative effects of market forces, activates the bureaucratic state machine to solve socio-economic problems (Sakharova, 2009; Bilan et al., 2017a). The main goal of the development of a multifunctional cooperative sector is to realize the opportunities of cooperation and effective use of its potential for economic growth and the social orientation of Ukraine’s diversified economy. The strategic development of the cooperative sector in Ukraine should promote the transformation of existing cooperative systems and the creation of new, more efficient, and promising ones in order to maximize the potential of cooperation to accelerate the socio-economic development of the country. Given the scale and complexity of the strategic goals of the cooperative sector, its development should be divided into several stages (Table 1).

The allocation of individual stages is due to the different levels of organizational and economic tasks that will face the national cooperative sector in the future. The starting point for the formation of a promising model of the cooperative sector is a rethinking of the socio-economic content of cooperation, taking into account modern cooperative theories and concepts. This means that cooperation should be considered as a socio-economic phenomenon. Accordingly, cooperation must have a socio-economic nature: it is based on economic activity and the social idea. Thus, social and economic principles are organically connected, and social are primary. Giving priority to the economic rather than social basis will inevitably lead to a deformation of the nature of cooperation and, accordingly, the cooperative sector as a whole (Babenko, 2003).

Table 1

The main stages of strategic development of the cooperative sector

The essence and quality of the stages	Stages		
	I	II	III
Creation	Primary cooperatives	Territorial and branch associations of cooperatives	Formation of the cooperative sector at the national level and its organizational design
Duration	Will be determined by the ability of members of cooperatives to see the benefits of their interaction, to show initiative and to take responsibility and risks associated with membership in the cooperative	Will determine the access of cooperatives to markets, credit resources, focus on coevolutionary development and effective interaction of all types of cooperation, the effectiveness of state support for the cooperative sector	
Priority	Formation of cooperatives in accordance with international principles of cooperation and the concept of the National Cooperative Movement	Development of vertical integration and formation of vertical systems in the cooperative sector	The formation of a nationwide corporate system has been completed

Source: own research.

The socio-economic context of cooperation within the cooperative sector can be successfully implemented only on the basis of cooperative principles and values. In addition to generally accepted international principles of cooperation, the long-term model of the cooperative sector should be based on national principles that reflect its specifics. This is organizational and functional unity, planning, justice, interaction with the state.

The relocation of the cooperative sector to basic international and national cooperative principles is extremely relevant because the market orientation of the national economy has created unprecedented conditions for the spread of cooperation.

However, the cooperative structures that are often based on principles and values that do not reflect the cooperative essence, so they are cooperative only conditionally. Also, historically existing cooperatives question some traditional notions of cooperation in finding ways to adapt to new conditions. They offer a new interpretation and ways to solve modern problems on a cooperative basis.

Therefore, there is a threat of losing the cooperative idea and cooperative essence, its transition to an environment of the diversity of organizational forms and methods of management that appear in the cooperative sector of Ukraine.

The need for the development of cooperation that meets the interests of agricultural producers of the legal form of organization of production in the agro-industrial sphere is not

denied by anyone and is a generally accepted truth. However, cooperative forms of agro-industrial enterprises face certain difficulties.

In addition to unfavorable macroeconomic conditions in which both agriculture and related sectors of the economy are located (disorder and high level of taxation, extremely unsatisfactory state of financing of production, the high disparity in prices for agricultural products and means of agricultural production, non-payment crisis, etc.) strongly restraining influence on the development of all types of cooperation also have: low level of legal and economic knowledge of agricultural producers; ignorance of many of them of the essence, principles and mechanisms of cooperative activity; the almost complete absence of a cooperative education system; lack of skills of economic independence and entrepreneurship in most agricultural producers; weak state, regional support for the formation of cooperative forms of activity; the imperfection of cooperative legislation.

Results and prospects of development of the cooperative sector of the economy

Socio-economic conditions, political climate allow developing different types of cooperation as the basis of the cooperative sector in Ukraine (Ma & Soroka, 2020; Drozd, 2020). It is only important to correctly determine the priorities of such development. There are different types of cooperative: consumer, retail, housing, worker, banking, insurance, agriculture, and utility cooperatives.

The dominant position belongs to cooperatives in the agricultural sector, which is due to the following points: 1) the presence of small producers willing to voluntarily unite in both production and service cooperatives; 2) the ability of cooperatives to ensure the optimality of organizational, economic and technological parameters of agricultural production and other aspects of economic activity; 3) the possibility of the cooperative to develop economic ties, the way of rural life, to provide guarantees of social protection and social support of peasants. This idea is being successfully implemented in many countries.

Another priority area for the development of the cooperative sector should be consumer cooperation. This is explained by the fact that: 1) in consumer cooperation, as in any other field, the economic and social interests of people are closely intertwined; 2) consumer cooperation is not so much an institution sanctioned by the state, as an institution that arose from the direct will of the people; 3) consumer cooperation solves not only narrowly cooperative problems of consumption, but also performs a number of state functions on social protection. A significant role among cooperatives (10%) belongs to consumer cooperatives, and in some countries, it is higher: 33% in Denmark, 25% in Norway. The main goal of consumer cooperation is the permanence of relations in the system of distribution of goods and services. However, cooperative activities are aimed not only at meeting the material needs of the population but also at the social restructuring of the village, economic stabilization. In addition to rural areas, consumer cooperatives serve a significant part of the urban population, mainly district centers. The share of trade in cities is 42% of total cooperative turnover.

Cooperative banks play a crucial role in the financial and economic world system (Migliorelli, 2018). They operate in many countries around the world, and, in Europe, they represent 20% of the banking sector market share (in 2019). They can be in the form of a retail or commercial bank. The main aim of a cooperative bank is to provide deposit and loan services to its members. They have nonmember clients, and they can be traded on public stock markets even if they still are ruled by members (Balaban, 2015).

An important strategic direction in the development of the cooperative sector of the economy is the expansion and organizational design of credit cooperation (Karafolas, 2016). With the emergence of diversity and the development of private property and small-scale production in rural areas, the problem of forming an adequate credit and financial system adequate to the new conditions has become more acute. Prospects for the development of farms, agricultural production cooperatives, personal farms are increasingly determined by the availability of credit resources. The existing banking system is aimed primarily at lending to large agricultural entities. Small and medium agribusiness are not of interest to banks due to the insignificance of the requested amounts and high transaction costs of lending. This led to the involvement in the production process of savings of legal entities and individuals in the form of a system of agricultural credit cooperation as an organization of financial assistance and mutual lending. This is one of the few elements originally focused on serving the small-scale rural economy, remote from major financial markets.

The development of credit cooperation will provide the village with credit resources, increase the financial stability and solvency of farmers, provide primary capital for small rural businesses, increase employment in rural areas and the attractiveness of the agricultural sector as an object of investment. Carrying out financial flows through a credit cooperative will help revive business activity in the countryside will allow funds to work more for the socio-economic development of the territory where the cooperative is located. Therefore, it is important to fully promote the development of credit cooperation, as is done in most countries.

For example, in the system of “Credit Agricole” (France), there are about 3 thousand local credit unions, organized in the form of cooperatives. The owners of their shares are farmers, villagers and locals. In Germany, 3,223 credit unions with a total book value of more than 514 billion marks have more than 10 million shareholders. In Sweden – 390 similar local credit unions, which have 650 branches; in Austria — 1,754 credit unions. In the Netherlands, credit cooperatives account for 90% of lending to the agricultural sector, in France – 70%, in Japan – up to 50%, in the United States – 26%. In the 1990s, the revival of credit cooperatives began in the former socialist countries. Thus, in Poland, the share of cooperatives in the credit market is 10%, in Hungary – 15%.

In Ukraine, the development of credit cooperatives in general and in rural areas, in particular, is at an early stage. However, the number of credit cooperatives is increasing, and they demonstrate the high efficiency of credit and financial activities. At the present stage of structural restructuring of the agricultural sector and in connection with the commercialization of the credit and financial system, one of the directions of cooperation in Ukraine should be the formation of agricultural credit cooperatives that provide uninterrupted and necessary lending to shareholders. Credit cooperation is widespread in countries with developed economies. Thus, US farmers receive through credit unions annually up to 40% of long-term and up to 20% of short-term loans, in Germany, respectively, 45% and 24%, and in Finland, only short-term loans are 50%. The attractiveness of this form of organizational credit is that in cooperative credit institutions, loan interest rates are much lower than in commercial ones. The advantage of cooperative credit is that the proximity of credit cooperatives to their shareholders allows the latter to easily use the services regardless of the size of the farm. In turn, cooperatives easily control the purposefulness and efficiency of their loans and the timeliness of their repayment. Conceptually, this form of cooperation development should have a multilevel structure from rural (grassroots) credit cooperatives to regional cooperative banks and the central cooperative union with a clear division of functions.

Cooperatives in the field of social, household, and cultural services have significant prospects in Ukraine. They carry a mixed social and capitalistic mission. They play a pivotal role in many social sectors such as healthcare, education and many others. In order to operate, they also need to manage financing and budgeting; however, these activities shall be functional to the performance of social actions.

The priority development of cooperation in the field of services is due to the fact that in the market environment, this area is significantly expanding, the demand for services is growing. Also, the creation of cooperatives is not associated with high costs. They are available to the general population. The experience of other countries – Scandinavia, Spain, Italy, Greece, Portugal, indicates the possibility and feasibility of the cooperation of many types of services. In these countries, the reality has become cooperative social clinics, nursing homes, home pharmacies, cooperatives in education, tourism, culture. Thus, based on the above, we can identify strategic directions for the development of cooperation in Ukraine (Table 2).

Thus, the scale and pace of the formation of the cooperative sector of the economy depend on the development of the system of cooperatives, mainly of four types: agricultural, consumer, credit and social services. The strategic development of the cooperative sector of the national economy should be based on scientifically sound approaches and be implemented evolutionarily, comprehensively, and in coordination with other sectors of the diversified economy.

Table 2

Strategic directions of development of different types of cooperation in Ukraine

Types of cooperation	Characteristic
Agricultural cooperation	- development of cooperation of individual producers of agricultural products of farms, individual owners, public farms, i.e., the creation of agricultural production cooperatives; - modification of production cooperatives in the direction of creation of production-processing, production-sales other types of multifunctional cooperatives; - creation of service cooperatives — procurement and marketing, supply, agricultural, and other; - development of inter-farm horizontal and vertical cooperation based on the step-by-step technological specialization of participating farms.
Consumer cooperation	- restructure of the multidimensional structure (organizational, functional, social, territorial) and create a modern market-adapted model of cooperation; - introduction of market mechanisms and forms of management; - development of major industries (trade, procurement, processing) and the development of new economic activities, modernization of material and technical base;

	- strengthen of the social mission, social support and social protection of members — shareholders, expanding the scope of social services and intensifying its role in socio-cultural transformations in rural areas; - development of the rural consumer market, the formation of the agricultural market, an increase of efficiency of interaction with agrarian and industrial complex; - expand international cooperative cooperation and foreign economic activity.
Credit cooperation	- creation of new credit unions, intensification of their activity on the financial market, improvement of organizational structure, the formation of regional (regional) associations of credit unions; - creation of systems of cooperative banks, the direction of their activity on credit services of small subjects of economy, various types of cooperatives; - formation of the necessary infrastructure of credit unions — stabilization and guarantee funds, mutual credit systems and others; - creation of a legal basis for state and regulatory regulation of cooperative unions; - strengthening state support for the development of credit cooperation and legal protection of credit unions and their associations. - life, property, any risks of its members and depositors
Cooperation in the field of services	intensive development of cooperatives in the field of consumer services, especially in rural areas, where the contingent of consumers of services is scattered; - creation of cooperatives of social profile — educational, socio-cultural services, social assistance; - development of cooperatives for the provision of tourist, hotel, recreational services; - organizational, scientific and personnel, financial, legal support for the development and operation of these cooperatives; - introduction of new forms of service taking into account the peculiarities of the population, in particular the widespread use of visual and mobile forms of providing and selling services, home services, as well as leisure and entertainment services (computer clubs, billiards, etc.).

Source: own research.

All the diversity of cooperatives is united by one feature – the recognition and implementation in practice of cooperative principles, among which the 6th principle stands out: cooperation between cooperatives (Lappo, 2014). Any cooperative is recognized as a cooperative only when it recognizes the cooperative values and all the principles of the cooperative movement and follows them in practice (Piliaiev, 2019; Nitsenko et al., 2018). The importance of this principle is especially growing in the 21st century, in connection with the formation of a non-economic system characterized by the globalization of all aspects of society. If cooperatives intend to reach their full potential, to remain attractive

in a fundamentally changing world, they can achieve this through constant and practical cooperation. The problem of cooperation of cooperatives is relevant not only for Ukrainian cooperation, but also for the world cooperative movement.

An important direction in the development of cooperative processes in Ukraine should be a mutually beneficial association of agricultural producers, food industry enterprises, trade and service enterprises. Associations for the production of grain, its processing and the production of bakery products, the production of milk and meat products, semi-finished products ready for consumption, etc. should be developed. The main requirements for optimizing the system of economic relations of participants in cooperative processes are a rational combination of interests of agricultural producers, processors, trade structures and market participants that serve these processes.

Cooperatives should more often use the opportunity to conduct joint business projects and strive for this in practical ways, pursuing the interests of their members (Tytarenko, 2019). More often than not, consider joint activities. At the same time, cooperatives have a unique opportunity to directly protect and expand the interests of ordinary people.

An example of such business cooperation can be the joint activities of grain processing agricultural cooperatives and consumer societies that have bakery enterprises and a trade network at their disposal. The flour produced by the first cooperatives can be used by consumer cooperatives for the production of bakery products and their sale.

An important problem of cooperative organizations is the formation of financial resources for economic activity. Most consumer cooperatives seek capital within their organization. This is symptomatic of the traditional cooperative approach, as cooperatives have always focused on membership capital and capital as a result of economic activity. Another source of financial resources is loans from commercial banks or commercial loans. At the same time, insufficient attention is paid to other sources that have emerged in recent years, capital formation, and general financial management at the levels of the cooperative sector. To solve this problem, cooperatives can attract free cooperative financial resources. On the other hand, many potential cooperative financial resources are not properly coordinated, and most of them go beyond the cooperative sector, often supporting cooperative competitors. In other words, there is a need to develop effective models of cooperation between cooperatives in the field of financial resources. There are various examples of such models.

1. Establishment of cooperative banks in the regions. A cooperative bank can act as a multi-purpose regulator of existing savings and production needs, like any bank, but it also has an active and highly professional unit, whose staff is called to advise cooperatives on the use of resources, taking into account the perspective and management.

2. Establishment of credit unions of cooperatives or entry of cooperatives into existing cooperative credit unions as their member. Without these structures, cooperation is significantly dependent on commercial banks. In addition, participation in credit cooperatives of agricultural production and service cooperatives, consumer cooperatives will simplify the calculations for the products produced, improve the organization of economic relations.

3. Establishment of insurance cooperatives and the attraction of their financial resources for the development of new cooperatives. Of course, new cooperatives face the problem of obtaining the necessary funds in the initial period of activity. Insurance cooperatives can invest part of their funds in the development of the cooperative movement.

Comprehensive development of all types of cooperation is needed. Different types of cooperatives have different, sometimes directly opposite, economic objectives. The members of these cooperatives have their own specific needs and priorities. Entrepreneurial

cooperatives, acting in the market as sellers, are created, as a rule, for profit at the expense of other market participants. Social cooperatives, on the other hand, act as collective buyers in the market, and their main goal is either to solve the social problems of their members or to save members the costs associated with meeting their living needs. Conflict in stock: business and cooperative social organizations serve the material interests of two directly opposite groups of people. The former want to get a return on investment and / or labor, and consumers want to get good quality goods and services as cheaply as possible. Cooperatives of the same type also often compete with each other in the market, realizing their economic functions. Competition between cooperatives weakens the cooperative movement, exacerbating the adverse effects of the economic environment.

The success of economic reforms in modern conditions must be assessed primarily by overcoming the recession and increasing production, improving the work of producers, who are the main actors in the functioning of a market economy. The solution to this problem should be based on those forms that can ensure the normalization of the food market and the conditions of self-financing. Agricultural cooperation is one of the effective forms of economic progress, which helps to combine resources and efforts with responsibility for the end result. The proposed methodological approaches allow to increase the level of scientific substantiation of the problem and can serve as a starting point for further development and improvement of models and systems of sustainable development of agricultural cooperation at the regional level.

Conclusions

As a result of the study, it was found that the effectiveness of cooperatives depends on the general socio-economic situation in the region, the decisions of administrative bodies, the company's capabilities, investment, and other conditions. On the other hand, the influence of the formations themselves on these processes is important. First of all, it is market regulation, coordination of business activities of enterprises and organizations in the district, region, or interregional level. This is especially important in modern conditions when public authorities do not have the right to interfere in the economic activities of market participants. The interaction of state authorities with enterprises and organizations of the agro-industrial complex on the basis of branch unions, associations, and non-profit partnerships is very important.

To date, there are all the necessary favorable conditions for the development of international economic cooperation. As foreign experience convincingly shows, an essential factor for the successful operation of cooperative systems in the context of globalization is the use of the existing unity of the international cooperative movement and its economic and social potential. Therefore, the effective development of cooperation in Ukraine will depend on the level of implementation of measures aimed at adapting to the current economic situation in the country, intensification of international cooperative cooperation, and the established system of state support and stimulation of cooperative enterprises and organizations. In modern conditions, the strategic goal of cooperation should be the maximum use of all available resources, benefits and potential opportunities by increasing the organizational and economic efficiency of operations in domestic and foreign markets.

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Section Three

COSMOS AND HISTORY

Theoretical Sources of Theological Interpretation of Contemporary Cosmology by Alexei Nesteruk

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The article proves that the widespread use of philosophical ideas is characteristic of liberal Orthodox theological comprehension of modern cosmology, carried out by Alexei Nesteruk. Among these ideas, the most influential was Kant's doctrine of things in themselves and his teleology, the metaphysical doctrine of analogies, the doctrine of contemplation of the mind, borrowed from Schelling teaching and Russian religious philosophy. The theological understanding of these philosophical concepts allows formulating a new interpretation of the anthropic principle, the initial conditions for the existence of the Universe, and its eschatological future. The form of ideas of Alexei Nesteruk was influenced by the phenomenology of Jean-Luc Marion, the post-metaphysical theology of Sergiy

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Khoruzhy and Christos Yannaras. As postmodern ideas do not define the content of theology of Alexei Nesteruk, the theory of Volodymyr Hritsyshyn about the postmodern nature of Nesteruk's speculation about cosmology is under discussion. Specifically, these speculations have only a postmodern form of expression but are a controversial combination of theologically redefined metaphysical and Kantian concepts by themselves.

Keywords: liberal Orthodox, phenomenology, Alexei Nesteruk, modern theology, post-metaphysical theology

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Introduction

Orthodox theological interpretations of the history of the development of the Universe, a living being and a human is formed following two opposing strategies: liberal and conservative. The first takes into consideration the contemporary scientific picture of the world. This strategy is forwarded by those priests who were naturalists in the past. Alexei Nesteruk, a deacon of the Patriarchate of Constantinople, the former theoretical physicist, has primarily distinguished himself in the last decades. The liberal strategy is an original phenomenon, since naturalists who became theologians (Kaleda, Tspini, Nesteruk, etc.) do not borrow Western theological concepts, but create their own ideological systems, in which philosophical theories play the leading role. The latter fact, unfortunately, has not attracted the attention of the researchers up to this time. Theological reflections of Alexei Nesteruk on the topics of cosmology, the anthropic principle, and the beauty of the Universe as an “intense phenomenon” are usually evaluated as fundamentally new to Orthodox thought. In this case, the work of this theologian attracted the attention of only a few researchers. Hennadii Khrystokin and Yuri Chornomorets drew attention to the “mystical empiricism” of Nesteruk, his desire to focus on the apophatic theology, and the importance of the experience of ecstatic knowledge of God (Khrystokin & Chernomorets, 2009). The researchers also critically evaluated the attempts of Nesteruk to prove the existence of God through reference to the existence of mystical experience and the availability of rational laws of nature. Volodymyr Hritsyshyn points out that Nesteruk puts theology as a universal philosophical discourse in the place of philosophy, sees in the human consciousness, especially a religious one, the manifestation of self-knowledge of the Universe (Hritsyshyn, 2017).

Oleg Mumrikov approves Nesteruk's idea that if there existed an ideal time (or the other ideal reality) that preceded the visible world, they would have been created anyway. In our opinion, these thinkers simplify the positions of Alexei Nesteruk in their way (Mumrikov, 2013). Theological works of this physical scientist interested researchers as the first attempt of the Orthodox theological application of Jean-Luc Marion phenomenology, as well as the first Orthodox interpretation of modern cosmological theories, especially of Stephen Hocking and Ilya Prigogine. We agree with Volodymyr Hritsyshyn's opinion that one can trace the transition from attempts to adapt theology to the norms of modern thinking (“mystical empiricism” of the book *Logos and Space* (Nesteruk, 2006)) to thinking within the postmodern theological paradigm (“existential phenomenology” of the book *The Sense of the Universe* (Nesteruk, 2017) in Alexei Nesteruk's theology (Hritsyshyn, 2017: 155).

It seems that the combination of Orthodox and Western theological and philosophical principles allows Nesteruk to create a kind of “theology of science,” which provides new principles for understanding the role of religion in the modern personalistic worldview. In

our opinion, the theological system of Alexei Nesteruk is not so original, as its author and the mentioned researchers of his works consider. The issues of the theoretical sources of theological cosmology of Alexei Nesteruk in philosophy, especially metaphysical one, seem to be particularly relevant for the objective assessment of the works of this theologian. In our opinion, Nesteruk's reflections are a vivid example of the philosophizing of Orthodox theology at the beginning of the 21st century.

Statement of basic materials

Our investigation aims to make a systematic analysis of theoretical sources of theological cosmology of Nesteruk as a part of the Orthodox theology of the postmodern age.

Nesteruk began his professional activity as a theoretical physicist who worked at Leningrad research institutes and in the group of Ilia Prigogine and then as a theologian, who devoted his life to the problems of religion and science dialogue. In the book *Logos and Space*, Nesteruk admits that the discussion was usually carried out with the help of philosophy, which summed up the "scientific picture of the world" and correlated it with theological concepts. Instead, today's theology itself claims to have the status of a universal philosophical discipline that does not require mediation for dialogue and science. Paradoxically, but theology is conceived not as a certain number of theoretical concepts, but as an experience of theoretical contemplation, similar to the phenomenological one (Nesteruk, 2006: 49-54, 60-68, 76-79). Thus, the emphasis is placed on a philosophical interpretation of theology in order for theology to replace the philosophy in the mediation between religion and science, i.e., the reinterpretation of theological thinking in the spirit of phenomenology. However, "theological contemplation of the world" did not ensure the specific results, which could be verified. And therefore, Nesteruk combines philosophy and theology without eliminating the philosophical component in the book *The Sense of the Universe* (Nesteruk, 2017). According to our estimations, the basis for Nesteruk's theological reflections was mainly a variety of philosophical theories that we will try to prove.

The first source of Nesteruk's theology was Kant's doctrine of "things in themselves." Namely, God, a human, and the world as a whole were evaluated in the book *Logos and Space* as an apophatic (unknowable) reality (Nesteruk, 2006). The inability of consciousness to perceive these realities was conceived both quantitatively and qualitatively. For example, it is impossible to perceive the "dark matter" in the Universe; the past of the Universe is conditionally perceivable, especially its initial moments of existence. The personalization of God and a human make them unreflective for consciousness. These elements ("dark matter" in the Universe, "personalization" of God and a human) determine the infinity of the process of getting to know these "things in themselves." Indeed, modern physics in relation to the Universe, and contemporary psychology and philosophy in relation to personality, which is more and more open, but realizes the infinity of such cognition. According to Nesteruk, qualitative unperceivability of God, a human and the world is connected with the spontaneity of creativity. The free impulse of the creativity of God and a human is fundamentally apophatic reality. In his opinion, it does not matter to what extent science and theology open the harmonious beauty of the world created by reason and freedom; this beauty will still be incomprehensible. Paradoxically, but this beauty is incomprehensible because of the excess of its manifestation, but not because of its concealment. To legitimize this theory in his book *The Sense of the Universe* Jean-Luc Marion uses the doctrine of "saturated phenomenon." However, the only inspiration for Nesteruk's theory of quantitative and qualitative unperceivability was exclusively the doctrine of Immanuel Kant about "things in

themselves.” Indeed, the theologian constantly refers to the texts of Kant and interprets the phenomenology of Marion, through the prism of Kantianism, and not vice versa.

The second source of Nesteruk’s theological reflections was the combination of the postulates of the theories of the anthropic principle and the provisions of the Orthodox mystical theology on the similarity of a human not only with God but also with the world. According to the theologian, the existing Universe is adapted to the appearance of a reasonable human subjectivity that will perceive it. Thus, the anthropic principle turns into the principle of openness of the Universe to the consciousness of the subject that contemplates and understands. The availability of conditions for life is a definite prior degree of readiness of the Universe for the appearance of rational existence. Instead of anthropocentricity in the sense of adaptability to human life, Nesteruk postulates subjective centricity in the sense of adaptability of the Universe to the functioning of consciousness in it. In this case, human embodiment contributes to the cognition and plays a specific symbolic role, since it represents the matter of the Universe, collected in the specific “synopsis.” According to Nesteruk, a person is not a special living being, in relation to which the Universe is only an “environment” of his existence. He is “coessential” with the Universe, introducing it as a whole in his subjective integrity. Nesteruk tries to prove that the Universe has a certain orientation not only to the appearance of life but to the emergence of consciousness, inherent to the Universe. And the bigger mystery is the actual existence of the Universe and consciousness, rather than their mutual coherence between themselves: “It is known that the so-called anthropic cosmological principle tries to express the connection between the conditions of human physical existence and the fundamental physical parameters that determine the possibility of the existence of stable systems in the Universe, including the embodied consciousness itself. The anthropic principle gives, in fact, a trivial statement. However, it gives it a quantitative form, about the consubstantiality of the Universe and its observers (this is expressed, for example, through the so-called exact adjustment of physical constants numerical values of which are critical turn out to be critically agreed with the fact of the existence of terrestrial forms of life). However, even in this case, the very fact of the presence of this consubstantiality in its noetic and noematic givenness, i.e., the fact of its presence of this in its reflexive consciousness, is not subject to discussion and attempts to explain, since, perhaps, it cannot be explained at all. But it is this facticity of the Universe capable of containing life, as well as the facticity of the life itself, that is responsible for the necessary conditions for the possibility of individuals, i.e., the multitude of conscious subjects uniqueness of which cannot be reduced to something natural” (Nesteruk, 2017: 370). In these reflections, Nesteruk tries to move from scientific and ideological explanations of the harmony of the world to the theological explanations of its existence. God is conceived to be the source of actual givenness of the world, life, consciousness, personalism (Nesteruk, 2017: 371). It seems that the dependence of Nesteruk’s theology on the phenomenology of the givenness and the bestowing of Marion is manifested in this transition from thinking about “what” of the world to the way of its givenness. However, the schematic understanding of the phenomenological concept of the French thinker is that it is more likely to speak about the similarity of Nesteruk’s thoughts to the Medieval theories of the delineation of the essence and existence of the world, with the proofs of the existence of God from the analysis of the phenomenon of the existence of the world. The central confrontation between science and theology manifests itself in the fact that science attempts to explain the existence of the Universe with the help of natural reasons. The theology of Nesteruk abstracts the very existence of the world and proposes to interpret this existence as a consequence of

supernatural givenness or bestowing: “Cosmology cannot accept the conclusion about the unperceivability of the actual randomness of the Universe and persistently tries to eliminate this problem, appealing to the original conditions in the Universe, assuming that they contain” information “about its present and future states” (Ibid.). The scientific explanation of the basic properties of the material state of the Universe from the moment of a Big Bang up to today is a reliable basis for science. In contrast, the appeal to the “actual randomness of the Universe” is philosophical theorizing, since it is quite possible that the emergence of the Universe was due to the necessity, but not by chance.

At least science must do everything to identify the necessary causal links to the genesis of the Universe, and should not refuse this intention in favor of the thought about the randomness of the existence of the Universe until there are sufficient grounds for such a turn of thought. The investigation of the initial state of the Universe is still largely explained both at the present stage of its development and its very genesis, and it would be rather strange to leave these investigations in favor of philosophical and theological speculation. It turns out that Nesteruk suggests finding a harmony between the theological and scientific world outlook, at least at the expense of refusing from scientificity, which will lead exclusively to illusory reconciliation in a certain philosophical and theological perspective. The transition from speculation about essential features of the Universe as adapted to the existence of a human and explained by the supernatural causality to speculation about the existence and actual givenness of the world is significant in the sense that it confirms the weakness of the theoretical foundations for modern theology in its dialogue with science.

The third source for Nesteruk’s theology was the metaphysical theory of analogies. As we have seen from the previous analysis, the researcher makes an analogy between human creativity and God’s creativity. This central metaphysical concept is supplemented by speculation about the similarity between freedom, wisdom, unperceivability, personalism of God, and a human. It should be mentioned that Nesteruk does not speak only about God a lot. In general, he admits that modern theology has made a transition from anthropocentric to theocentric thinking. At the beginning of the 21st century, theologians contemplated God not in terms of subjective experience. Still, on the contrary, God as Trinity in his activity becomes the starting point for the reflection on the world, society, which should reflect life in the Trinity. Surprisingly, but Nesteruk says almost nothing about God as Trinity. According to him, God remains an apophatic creator whose common features are perceived by analogy with the features of the human subject. Contemplations that were not confirmed can provide the credibility of the reflections. Thus, metaphysical judgments by analogy are masked by phenomenological contemplations. Still, it is done without any proof since there is no description of contemplations in the texts of the theologian, there are only reflections. At the same time, Nesteruk honestly admits that all contemplative and mystical experience I relation to God can only confirm the existence of God, but does not provide any reliable knowledge of God. The situation seems paradoxical when Nesteruk systematically contemplates about the laws of nature as a reflection of the divine Logos. Still, almost nothing says about the rationality of God as such. It is more than strange for a theologian to refuse completely to describe God. Therefore, the reader can only imagine God by analogy with the human intelligent and free creative subject.

The fourth source for Nesteruk was the methodology of theological reflections by Sergey Khoruzhy in his work *On the Phenomenology of Ascesis* (Khoruzhy, 1998). The experience of “boundary states” is the source of universal knowledge in this work. Based on the phenomenological and hermeneutical analysis of this kind of experience, a human is

described as open to the transcendent, as being dynamic, rather “energetic” than substantive. However, it is necessary to point to a significant difference between the theological projects of Nesteruk and Khoruzhy. The latter considers “boundary experience” as the experience of “synergistic states,” in which human energies interact with the energies of God and the world. The Orthodox theology of the beginning of the 21st century does not accept neopalamism, and speculations on “energy” and “synergy” are no longer of interest to such theologians as Nesteruk, Hart, Manoussakis, etc. The search of ontology that would be free from the naturalistic understanding of the activities of the subjects as “energies” leads to the development of personalism, according to which the person is open to perception and the reality, is fundamentally recognizable, even with the preservation of some apophatic “core” of individualism.

The fifth source for Nesteruk was the contemporary philosophy of science in its comprehension with the help of anthropology of culture. The central position in the book *The Sense of the Universe* sounds like this: “Cosmological theorizing, as the permanent encoding of the Universe with the help of symbols, uses logic and connections that are not directly related to the object of cosmology, but rather to the sense and purposes of a human” (Nesteruk, 2017: 165). Thus, the study of cosmology should give Nesteruk the truth about a human who perceives, but not about the Universe. According to Nesteruk’s conception, it is the analysis of cosmology as the highest embodiment of the scientific consciousness of a human that will allow perceiving a human as a place of revelation about God, which created him in his image and likeness. The attempts of cosmology to know the Universe reveal the impossibility of his knowledge, a person feels that he faces the prospect of an infinite process. In Nesteruk’s opinion, this allows a person to realize one’s own finality and the fact of his creation entirely and, therefore, is open to the recognition of the existence of an absolutely infinite God (Nesteruk, 2017: 164-165).

Consequently, based on the postmodernist position that cosmology speaks about a human, but not about the Universe, Nesteruk develops this position metaphysically in the spirit of modern liberal theology of Protestantism. A similar contradiction occurs in the assessment of the Big Bang theory. On the one hand, Nesteruk acknowledges the cosmology of the Big Bang as a substantiated scientific theory. On the other hand, he sees a narrative in it, which allows organizing the existing knowledge through the theory of the creation of the world through the product of the supernatural cause of the singularity point. Nesteruk criticizes alternative explanations of the emergence of a singularity point. He believes that the theory of multiversity, the theory of the pre-existence of the ideal time, or the whole ideal space are not justified by metaphysical theorizing. Special attention is paid to criticizing the corresponding theories of Hoking and Prigogine, with the help of which these well-known scholars try to avoid the need in the hypothesis about God. In the case of accepting the theory of the Big Bang, the hypothesis of God is the easiest explanation. There is no reason to consider this explanation to be more likely than others, except that other hypotheses look far-fetched and complicated. However, in the history of science, the most straightforward explanations were not always valid. Also, the argument regarding the simplicity of explanation would seem natural if Nesteruk accepted the discourse of analytic philosophy and theology.

Meanwhile, he categorically refuses to think within the limits of the analytical tradition, giving the exclusive advantage to phenomenology. Of course, phenomenology cannot contemplate anything not only concerning the moment of the Big Bang but also about the significant period of development of the Universe in a state of singularity and after it. According to Nesteruk, the combination of some of the provisions of the contemporary

philosophy of science and phenomenology is possible due to anthropology. This idea is typical of modern Orthodox theology: it is expressed by Khoruzhy (Khoruzhy, 1998: 204) and Filonenko (Filonenko, 2017: 84). It is based solely on making analogies between procedures of falsification and the apophatic method of theology, verification and cataphacy, hypothetical thinking, and poetics.

However, the main pre-condition of theology — the experience of bestowing of the existence of the Universe and human — remains inaccessible to the scientific worldview, and is only limitedly verified in phenomenology. The sixth source of Nesteruk's theology was the religious philosophy of Christos Yannaras, namely, the "Orthodox" interpretation of Heidegger's understanding of existence, its openness to the world, truth as the unconcealedness of being, language as the home of existence, etc. Using the philosophical ideas of Yannaras and Heidegger does not clarify, but only makes the combination of apophatics and phenomenology complicated in the concept of Nesteruk, although helping the theologian more confidently describe the world as the one that involves the existence of a human, and a human as a contemplator of the world. The paradox lies in the fact that the post-metaphysical language of Yannaras's philosophy is used to express the contradictory combination of metaphysical concepts about the world and God with a completely traditional for existentialist ideas about a human.

The seventh source for Nesteruk's theology was the combination of Kantian teleology and the Chardinian mysticism of humankind and Universe deification. According to the logic of the theologian, the adaptability of terrestrial conditions to human existence indicates that space was supposed to be "inhabited by humans." But this goal has only an intermediate nature, since wisdom in the Universe should be maximal, and the Universe must exist as incorporated in the person of the God-man. According to Nesteruk, the perfection of existence means to be personalized, and the Universe as a whole must have such an accomplishment. In general, Orthodox theology is characterized by a restrained attitude to the legacy of Teilhard de Chardin (Strugovtschikov, 2004). It is believed that the doctrine of the theological aspiration of the Universe to humanization and the theanthropomorphism has the features of hidden pantheism and contradicts the doctrine of the creation of the Universe. Nesteruk offers a similar to the Chardinian doctrine, but without deepening into the theory of evolution, solely on the basis of a combination of cosmogenesis and theology.

"Life" and its development to consciousness are understood not in the paradigm of evolutionary ascension, but within the phenomenological understanding of living and consciousness as a consequence of affection from the point of view of the supernatural. According to Nesteruk, such phenomenology of life and consciousness is quite developed by Michel Henry and should only be theologically interpreted. The theologian does not want to notice that the French phenomenology, actively developing the doctrine of living and consciousness as a consequence of affectation, passive synthesis, etc., undergoes a crisis. There is a transition to post-phenomenology (Sholokhov & Yampolskaya, 2014), or at least expressing demonstrable doubts in the validity of the entire path of French phenomenology after Emmanuel Levinas (Yampolskaya, 2013). Regarding the danger of falling into pantheism, Nesteruk believes that this problem is far-fetched. Everything that arises as a result of a Big Bang — matter, energy, space, time, life, consciousness — everything is created and infinitely different from God, who is solely the creator. At the same time, everything created exists due to the total presence of the uncreated, supporting its existence. The laws of nature are the rationality that points to such a presence. The harmony and beauty of the Universe are also a manifestation of this kind of presence. Considering all the autonomy created, it

exists and develops in the fold of the uncreated, as its symbolic embodiment. According to Nesteruk, the more the world is the embodiment of the “laws of nature,” the more it represents God, and even more — the more it is open to the fullness of the eschatological presence of God in the world, to the existence in eternity. Typically, all these speculations are romantic and metaphysical ways of theology development. It is impossible to substantiate such reflections phenomenologically or scientifically in the same way as Schelling’s speculation in “Philosophy of Art.”

Discussion

Thus, Nesteruk’s theology is characterized by a significant influence of philosophical ideas, since the theologian paradoxically combines the ideas of Kantianism and metaphysics. At the same time, there are such post-modernistic features of Nesteruk’s thinking as an arbitrary transfer of philosophical theories into the theological context and the rejection of consistent argumentation as a way of constructing the text. In this case, cosmology in its proved theories refers to the field of reasoning, and unproved cosmological constructions regarding the beginning of the Universe are interpreted as the embodiment of the aspirations of reason and its theology and free synthesis of ideas. In our opinion, if we take into account the Kantian distinctions, modern physics and cosmology continuously go beyond the scope of intelligence, applying reason in all its manifestations. At the same time, the mind of a cosmologist or physicist is clearly deprived of the theological contemplation or mystical experiences regarding the integrity of the Universe, which Nesteruk attributes to reason, unlike understanding. In opposition to limited Western rationalism, the Orthodox theology of Nesteruk repeats the old methodological method of Russian religious philosophy, introducing the intermediate gap of metaphysical meta-rationalism between the scientific rationalism and religious fideism (mysticism). At the same time, the reader should have the impression that the sources of the doctrine of contemplation of the mind are phenomenology and patristics, and not the Russian religious philosophy and Shelling’s teaching. However, Nesteruk does not refrain from referring to Semen Frank and Petr Florensky, and, therefore, reveals true theoretical sources of his ideas.

Nesteruk himself considers the goals of his theological project to be accomplished. Namely, in his opinion, there can be no contradictions between theology and cosmology, since they are the product of one consciousness, and only reflect two different experiences of it (Nesteruk, 2017: 470). To make such a conclusion, the theologian recognizes the presence of the transition from reason to mind in the whole cosmology. And it is precisely at the level of reason in Kant’s sense and Shelling’s contemplation; there is no contradiction between cosmology and theology (Nesteruk, 2017: 470-471). At the same time, Nesteruk forgets that he limited scientific cosmology to discretion, and attributed to it only the desire for cleverness in the sense of Kant and Shelling teaching. Now, only the ideologues of modern secularism, which makes cosmology primitive, are accused of limitations of cosmology by the spheres of discretion (Nesteruk, 2017: 470). Nesteruk’s conclusions are quite metaphysical and strange even for theology that the Universe implies the constant presence of an observer, and the material must exist only as a world of life for individuals who are called to perceive the Universe (Ibid.). Such postulates could be born only as a result of a tendentious interpretation of the modern philosophy of science (the first) and phenomenology (the second).

Conclusions

This analysis does not allow considering the modern Orthodox theological comprehension of cosmology to be successful. However, the discourse of contemporary cosmology and physics presented in the works of the leading Orthodox theologian, Alexei Nesteruk, is significant regarding the fact that his analysis reveals a considerable dependence of Orthodox phenomenology on metaphysics. Thus, regarding all the attempts to think “after Martin Heidegger” and “after Jean-Luc Marion,” the Orthodox theology of Alexei Nesteruk remains within the theory of analogies, as well as primitive variants of Plato and Shelling teaching, which was characteristic of Russian religious philosophy in the past. Nesteruk’s theology, being postmodernist by the form, remains, in fact, within the paradigm of liberal theological thinking and religious and philosophical metaphysics of the modern age.

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Pan Maoming's Philosophy and Cosmology: a Historiographical Research on the Sources and Cultural Background

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This paper presents the results of the authors' study of the philosophical heritage of the Ancient Chinese philosopher Pan Maoming, who played an essential role in the development of spiritual culture, as well as Philosophy and Science of Ancient Southern China (nowadays, Guangdong Province). The authors carried out historiographical research of currently available ancient and modern sources, which contain data on the life and philosophical ideas of Pan Maoming; reconstructed the Pan Maoming's intellectual biography; revealed the main features of his worldview. The authors reconstructed the

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social, cultural, and philosophical context of the historical epoch in which Pan Maoming's philosophical and scientific views arose and developed; clarified the philosopher's historical role in the development of local culture in the Southern region of Ancient China.

The article contains the author's description and interpretation of the main philosophical ideas of Pan Maoming, the main amid which the authors consider the ethical concept of "peace and emptiness," the concept of "clumsiness"; the idea of "monasticism for the happiness of the people." The authors compared Pan Maoming's philosophical ideas with Lao-tzu's philosophical doctrine and came to the conclusion that Pan Maoming formed his own unique and original elaboration of Taoist philosophy, significantly developed its linguistic (conceptual) apparatus and worldview.

The authors paid particular attention to the description and analysis of Pan Maoming's cosmological views, which include the doctrine of "Inner alchemy" (Neidan), the doctrine of "chaos, order and causality." The authors concluded that Pan Maoming's cosmological ideas significantly developed a way of understanding the Universe, the relationship between "inert" and "living" matter, the "world of nature" and the "world of human" in the Taoist philosophical culture.

The authors also presented and substantiated their point of view that some philosophical and cosmological ideas of Pan Maoming have not only of historical value but can also be used for developing and enriching the local spiritual culture of Guangdong Province (an intrinsic part of which is the so-called "Pan Maoming's culture") in the form of ethical and educational practices, as well as practices of strengthening cultural unity and identity.

Keywords: Pan Maoming, philosophy, cosmology, Ancient China, "Inner Alchemy" (Neidan), "Pan Maoming's culture"

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Introduction

The person of Pan Maoming is not part of the traditional canon of key intellectuals, through which Western historiography of philosophy and culture presents and interprets the philosophy, science, and culture of Ancient China to English-speaking readers. The name of Pan Maoming is not mentioned as in solid, time-tested multi-volume editions, for example, *The Cambridge History of China* (Twitchett & Loewe 1986; Dien & Knapp 2019), as well as in small articles or essays from Chinese studios written in English (Li Rui, 2019). On the one hand, this state seems quite justified, because, no doubts, the figure and theoretical legacy of Pan Maoming is minor compared to such well-known philosophers, scholars, religious, political and cultural actors as Lao-tzu, Confucius, Mo-Tzu, Sun-Tzu, Ming-Tzu, and many others. On the other hand, we believe that local studies in Chinese philosophy and culture should not be ignored for at least a few reasons.

First, most studies of major figures, philosophical schools and cultural currents of ancient China tend to generalise the results and systematically present them. In other words, studies of this type, at least methodologically (sometimes theoretically), are aimed at *generalisation* the results obtained. Of course, generalisation and systematisation cannot be interpreted as shortcomings of a study. However, when we resort to techniques that present the results of research holistically and systematically, we inevitably throw out of our attention small details and nuances. To paraphrase the famous words of Immanuel Kant, we can say that there is a "necessary dialectic" that inevitably leads any generalising study to a lack of detail and nuance. At the same time, a certain lack of systematicity, logic, coherence and scale is an inevitable characteristic of research that methodologically aimed at studying individual figures, facts, works, ideas of a particular culture and its history.

Secondly, the study of the philosophical and cultural heritage of local Chinese thinkers and actors allows us to supplement and expand generalising research significantly. Moreover, this type of local studies can play an essential role in constructive criticism, which points to the limitations and, at the same time, the advantages of generalising research. We have revealed a more detailed argumentation on this issue in previous publications (Rudenko, 2014: 24-28).

Thirdly, local studies of Chinese philosophy and culture avoid another dangerous theoretical and methodological bias, which in modern literature is denoted by the terms *Eurocentrism* and *Westernism*. Scientists in the 1950s, such as Ukrainian Soviet scholars Volodymyr Dmytrychenko and Volodymyr Shynkaruk (Dmytrychenko & Shynkaruk, 1958), emphasised the theoretical and methodological inability and unfoundedness of Western-centric guidelines in studying the history of Chinese philosophy and culture in the 1950s.

The history of the spiritual culture of the Chinese people, in particular, the history of Chinese philosophy, is clear, indisputable evidence of the absolute groundlessness of the ideas of "Eurocentrism" or "West-centrism" in the development of science and philosophy. Reactionary bourgeois historians have made considerable efforts to prove that all the development of science and philosophy was concentrated in the West only, that the peoples of the East did not create any original philosophical teachings, that the philosophical thought of the East trailed behind Western philosophy, or regurgitated old religions... The peoples of the East, including the Chinese people, have made a massive contribution to the development of the material and spiritual culture of humankind... modern science and philosophy are the product of the creativity of particular people and not "chosen peoples," but all the peoples of the West and East."

A similar point of view (though not in such a blatant polemical form) is held by the authors of modern research on the comparative analysis of the ideas of Western European and Chinese philosophy. For example, the modern researcher of cross-cultural communication K. Hwang in his article "Escape from Kantian Eurocentric bias in cross-cultural psychology" (Hwang, 2020: 2-5) on the example of comparing views on the nature of the moral act by Immanuel Kant and Confucius, finds and substantiates the "Eurocentric bias" in Immanuel Kant's position on the nature of moral duties. Using this example, K. Hwang demonstrates the existence of many Eurocentric biases in modern research in the social sciences, in particular, the relationship between the study of the relationship between individual and collective in cross-cultural psychology.

These considerations have determined the features of the goals and main objectives of our study of the figure of Pan Maoming, his philosophical, scientific and cultural heritage.

First of all, the authors of this article deliberately sought to construct the study in such a way as to avoid generalising, classifying, and systematising judgments about Pan Maoming's philosophical and cosmological views. Undoubtedly, some aspects of generalisation and systematicity are present in this study. However, the authors sought to avoid setting such goals as "defining the place and significance of Pan Maoming's ideas in Taoism," "analysing Pan Maoming's contribution to China's general philosophy and culture," on the scale of "Western European cosmology," "definition of originality and novelty." Instead, the authors aimed to conduct a rigorous empirical study of sources that contain data on the life and scientific heritage of Pan Maoming; to analyse in detail his worldview, the content of the main philosophical and cosmological ideas without trying to fit them into the "general context" and "general logic"

of the development of ancient Chinese philosophy. In setting such tasks, we do not deny the value of generalising research and consider them possible, but only after careful study of sources and historiography through local studies. The authors of this article do not in any way believe that Pan Maoming's philosophical, scientific and cultural views developed in isolation from the general culture of China; however, we seek to avoid unreasonable exaggerations about the existence of "global processes" in ancient Chinese philosophy (by analogy with the current time) and intrinsic Pan Maoming's inclusion to them.

An essential task of this study is also to analyse the influence and significance of Pan Maoming's philosophical, scientific and cultural heritage on the local, regional culture formation (currently, the culture of Guangdong Province) both during the life of the philosopher and at the current time. The authors aimed to identify and describe those components of Pan Maoming's philosophical, cosmological and cultural views that, despite their historical distance, continue to be valuable and can be practically applied to the development of the modern local culture of Guangdong Province.

The third objective of this study was to develop and improve the methodology of local studies of Chinese philosophy, science and culture, which could be applied to further studies of the history of spiritual culture in Guangdong Province and would be a useful tool to prevent Eurocentrism and West-centrism in understanding Chinese philosophy and culture.

Methodology

To study Pan Maoming's worldview, cultural heritage, philosophical and cosmological views, the authors used modern methods and approaches to the history of philosophy, social and cultural anthropology, as well as the history of science. The methodology of this study was developed and formed by the authors based on modern works on the history of local philosophy and culture, as well as their developments in the methodology of research of local philosophy and culture, presented in previous publications by one of the authors (Rudenko, 2012, 2018).

One of the critical tasks of this study is the historiographical description of sources that contain data on the Pan Maoming's biography, main stages of creativity, philosophical and cosmological views, as well as a description and reconstruction of the social and cultural context in which they arose and developed. The peculiarity of the historiographical study of the Pan Maoming's cultural heritage is that he did not present his philosophical and cosmological views in a systematic form. That is why the authors of this article have chosen several descriptive methods and approaches that have been developed in the concept of interpretive anthropology by the American researcher of local cultures, Clifford Geertz. The authors modified according to the characteristics of the material of this study and applied the approach "*Thick Description*," the main points of which is presented in detail in the work of Clifford Geertz the *Interpretation of Cultures* (Geertz 1973: 3-32). The authors of this article used and interpreted the Clifford Geertz's idea of "Thick Description" in the following way. The description of any cultural message (action, event, state) (in this case — the texts were written by Pan Maoming) should not be purely external, phenomenal, but should take into account (1) the intention, (2) the addressee, (3) the specific historical meaning and (4) social code, which is specific to a certain point in time, a particular local culture and social group (Geertz, 1973: 6)

The authors also used the Clifford Geertz's ideas presented in his work *Local knowledge: Further essays in interpretative anthropology* (Geertz, 1983). We used and applied in this study the following idea of Clifford Geertz about the "inevitability" of local knowledge:

“As frameworks are the very stuff of cultural anthropology, which is mostly engaged in trying to determine what these people or that take to be the point of what they are doing, all this is very congenial to it. Even in its most universalist moods — evolutionary, diffusionist, functionalist, most recently structuralist or sociobiological — it has always had a keen sense of the dependence of what is seen upon where it is seen from and what it is seen with. To an ethnographer, sorting through the machinery of distant ideas, the forms of knowledge are always ineluctably local, indivisible from their instruments and their encasements. One may veil this fact with ecumenical rhetoric or blur it with strenuous theory, but one cannot really make it go away” (Geertz, 1983: 4).

In our opinion, Clifford Geertz's doubts about the possibility of a “general theory” of a particular culture are an essential tool in eliminating the Eurocentrism and Westcentrism we have mentioned in interpreting Pan Maoming's philosophical and cosmological views, as well as the background culture of South China.

In addition to the methods of social and cultural anthropology, the authors used several methods and methodological approaches that function in the history of local (national) philosophy. Among them, (1) the idea of reconstructive reflection (developed by one of the authors of this article), the essence of which lies in the fundamental impossibility of a complete rational reconstruction of the history of philosophy (Rudenko, 2012: 119-177); (2) the “reception studies in the history of philosophy” approach, developed by the contemporary Polish philosopher of philosophy Tomasz Mróz (Mróz, 2016: 46-61).

The authors of this article also used the idea of Tomasz Mróz on the feasibility and prospects of studying local philosophy and culture, which is presented in the form of three recommendations:

“1. consider minor authors, though; naturally, those in the top international philosophical league seem to be the most attractive; 2. search for material outside the works traditionally considered to be philosophical; study literature and poetry, for example; 3. consider the following: is it more fruitful to write another study on Hegel or Kant, or to do pioneering work on a little known author?” (Mróz, 2016: 37).

To describe and analyse the Pan Maoming's cosmological ideas, the authors of this paper used and applied as a methodological approach the ideas and experience of such scientists in the field of philosophy and cosmology as Oleg Bazaluk (Bazaluk 2019), Denys Svyrydenko (Svyrydenko & Fatkhutdinov, 2020), etc.

The sources

Pan Maoming's 潘茂名 historical records were first seen in the Beihulu 北户录 by Duan Gonglu 段公路 in the Tang Dynasty (Qian & Liu, 2019). The book was completed in 871 and recorded the animals, plants, and local customs in the Lingnan region (now Guangdong area). The authors travelled through the area of Maoming in present-day Gaozhou and discovered that the local market was named “Xianxu 仙虚” (the immortal market) because it was next to the remains of Pan Maoming's alchemy furnace (Li, 2003). Also, the fragment of Ling Biao Lu Yi 岭表录异 written by Liu Xun 刘恂 of the Tang Dynasty was retained in Taiping Huan Yu Ji 太平寰宇记. Ling Biao Lu Yi is a book that records the social life and customs of the Lingnan area, which mentions that Pan Zhou (approximately in Maoming City and Dianbai County, Gaozhou City, Wuchuan City, and other places in Guangdong Province today) was named after Pan Maoming. After the Ming and Qing Dynasties, the

stories of “Pan Maoming” are often found in local chronicles, such as *Guangdong tongzhi* 广东通志 (Guangdong General History) and *Gaozhou Fuzhi* 高州府志, but their content mostly contains the information on the social life and customs of the area (Liang, 2006b).

Pan Maoming himself has no published works. The most relevant information about him comes from the *Pan Xian Quan Shu* 潘仙全书 (Complete Writings of Immortal Pan) edited by Tan Yingxiang 谭应祥 in the late Qing Dynasty, which systematically introduces Pan Maoming’s life and philosophy (Liang, 2006b). The book was discovered by Zhang Junshao 张均绍 and was the only remaining copy in the world at that time. Zhang studied the book in-depth and referred to other related documents on Pan Maoming before publishing *Pan Maoming, the Pioneer of Lingnan Taoism* 岭南道教先驱潘茂名 in 2006 (Liang, 2006b). It is the most systematic documentation of Pan Maoming’s deeds and philosophy. It also provides an appendix to Lao-tzu’s *Tao Te Jing* and two books included in the *Daozang* 道藏 The Daoist Canon: *Tai Shang Lao Jun Shuo Chang Qing Jing Miao Jing* 太上老君说常清静妙经 and *Gaoshang Yuhuang Xinyin Miao Jing* 高上玉皇心印妙经. In addition to the books mentioned above, Pan Maoming’s deeds, and descriptions of them, are also found in literary works. The most famous is Kong Yong’s poem “Stone-boat and Alchemical furnace.” Kong Yong 孔镛 was the prefect of Gaozhou at that time. He wrote this poem besides the Pan Maoming site, and after that, local officials, literati, and gentry produced similar creations (Li, 2003).

We have not obtained *Pan Xian Quan Shu* or *Lingnan Taoist Pioneer Pan Maoming*. The primary references for this research come from *Modern Maoming Daily*, *Southern Journal*, and *Origin and Theory of Chinese Historical Geography*, all of which use secondary data analysis. Among them, Zhang Junshao’s article “On the theoretical core of Pan Maoming’s Taoist thought (2011)” is used as the primary basis for the analysis of Pan Maoming’s thoughts.

Li Juexun 李爵勋, Liang Jiye 梁基毅, and others have studied relevant legends, the origin of place names, and Taoism. Li Juexun’s article cites many local chronicles and literary works and compares them with existing ruins, showing that Pan Maoming was a real person in history (Li, 2003). Liang Jiye has a special article on the authenticity of Pan Mao’s famous characters and the relevance of place naming and people (Liang, 2006b). In contrast to Li Juexun, Liang’s articles consider Pan Maoming to be a “doctor/healer” and explain that his medical knowledge and technology belong to Chinese alchemy. Liang believes that Pan Maoming’s words and deeds practice the ideas of Lao-tzu’s *Tao Te Ching* (Liang, 2006a, 2010).

In 2019, Qian Yuanchu 钱源初 and Liu Zhenggang 刘正刚 studied the origin of Maoming’s place names and concluded that they should originate from the name of the river “Maoming Water,” not from Pan Maoming. The so-called Pan Xian (Immortal Pan) was originally named Pan Mao, not Pan Maoming. Qian and Liu believe that the current misunderstanding may have originated from the Song Dynasty, that intellectuals during the Song Dynasty tend to associate local legends with celebrity names as the name of cities. The explanation that Maoming is named after local celebrities has been passed down to this day. In the same year, Liao Jun 廖君, an expert on Lingnan culture, was the editor-in-chief of the documentary *Pan Maoming*. From 2016 to 2019, Liao Jun collected and investigated documents related to Pan Maoming. After discussing it with a number of scholars and experts, they concluded that Maoming city was named after Pan Maoming (Jun, 2020). The local government-connected Pan Maoming’s good deeds with the early promotion of Lady Xian’s “Haixin Gaoliang (now Gaozhou, Guangdong Province) 好心

高凉 (Good heart/will Gaoliang)” culture, and believed that Maoming’s “Haixin Maoming 好心茂名 (Good heart/will Maoming)” and Haixin Gaoliang culture originated from the story of Pan Maoming’s practice of medicine. They believe that Pan Maoming’s medical knowledge and techniques have been passed on by later generations and have contributed to the development of Chinese medicine.

Pan Maoming’s intellectual biography

Pan Maoming (290-371), a Taoist and medical scientist in the Jin Dynasty, was born in Panpo, Genzi Town, Gaozhou (now in Maoming City, Guangdong Province) in the first year of Taixi in the Jin Dynasty (290). According to historical records, the young Pan Maoming once travelled to the northeast during the Yongjia period of the Western Jin Dynasty. One day, Pan met two Taoist priests playing chess in Xindu 新都 (now Chun’an County, Zhejiang Province) and watched them for a long time (Li, 2003; Liang, 2006a). One of the Taoists asked him if he could understand chess, and the Taoists appreciated his clever answers. The Taoists taught him the “Huang Jing 黄精 (Polygonatum sibiricum)” prescription for longevity, after which he began to learn the techniques of alchemy and health preservation (internal and external alchemy) (Li, 2003).

During his second grand tour, Pan came to Jiankang 建康 (now in Nanjing, Jiangsu Province). Pan admired Zhang Xuanbin 张玄宾, a famous Maoshan Taoist, and learned Taoist nihilism and metaphysics from him (People’s government of Gaozhou, 2020). After bidding farewell to Zhang Xuanbin, Pan returned to his hometown of Gaozhou to live in seclusion. At that time, Gaozhou was hit by floods and plague, and Pan Maoming practiced medicine and made pills to save the people. The imperial court repeatedly recruited Pan Maoming to be an official, but he refused. Pan Maoming expressed his willingness to do his utmost, as a civilian, to treat the suffering of the people throughout his life. Pan ultimately died during a plague because he was actively trying to help the sick and doing his best to save them. Later generations were grateful for his good deeds, and they deified his story, saying that he finally became immortal (Liang, 2006b). Currently, it is generally believed that the Sui Dynasty is named Pan Maoming’s hometown, “Maoming County.” Later, in the Tang Dynasty, “Panzhou 潘州” was established, which was then named for his merits. However, some scholars found evidence that the city was named after the river “Maoming River” rather than being named after a person (Qian & Liu, 2019).

According to historical data, Pan Maoming was already a local hermit when he was young, and he could read the Book of Changes and the Book of Songs, both of which are related to Confucianism and Taoism (Madame Xian Culture Research Network, 2018). When young Pan Maoming was travelling, he encountered Taoist priests who taught Huang Jing, the immortal prescription (Li Jue Xun, 2003). Huang Jing (Polygonatum sibiricum) is an essential plant in the art of bigu 辟谷 (lit. “to avoid grains”) (Arthur, 2009). It is also evidence that he began to learn alchemy and acquire medical skills. He then went to Nanjing to continue to study metaphysics and medicine, especially the Taoist belief in “nothingness” as the origin of the Universe. In his later years, he continued to develop his knowledge of Lao Tzu and Taoist philosophy and to practice them personally. He refused to be an official, and instead, he lived like a hermit. Scholars generally believe that Pan practised the Lao-tzu’s principles of “purification” and “inaction” throughout his life. These descriptions of self-cultivation and immortality are also common in literary works related to Pan (Liang, 2006a).

Scholars often suggest that Pan Maoming was a Taoist figure who valued practice. Such practice is mainly manifested in continuous self-cultivation, free treatment of the poor,

seclusion, and few desires (Liang, 2010; Zhang, 2011). Liang (2006a, 2010) regards him as a “doctor/healer” and believes that Pan’s Taoist thought can be traced to the two Taoist books *Tai Shang Lao Jun Shuo Chang Qing Jing Miao Jing* and *Gaoshang Yuhuang Xinyin Miao Jing* and that his health regimen originated from the theory of internal and external alchemy. Pan freely healed the poor and lived in seclusion in the practice of Lao Tzu’s principles of “Bu-zheng 不争 (do not fight; not striving for),” “Qing-jing 清静 (purity and stillness),” and “Wu-Wei 无为 (do nothing/inaction).” Pan Maoming did not have any works. Only the *Pan Xian Lingqian Yibai Shu* 潘仙灵签一百数 (Immortal Pan’s One Hundred Divination Poems), compiled by his disciples, was believed that represents his thoughts. Zhang Junshao is an authority on contemporary research on Pan Maoming.

In order to analyse Pan Maoming’s poems, Zhang Junshao categorised them, according to content, into four types: 1. “Persuade others to practice Daoism,” 2. “Persuade others to practice morality,” 3. “Inaction,” and 4. “Purity and stillness.” He then selected 38 poems that were representative of the four categories (Zhang, 2011). In the poems, Taoism mainly emphasises “returning to the simple and true,” morality is mainly expressed as the principle to “practice to help others,” “doing nothing” means not to force anything or fight, but to conform to nature whereas “Purity and stillness” mean to be pure in heart. Most of the poems do not, however, express only a single category. For example, there is a poem that Zhang Junshao categorised in both the “Inaction” and the “Purity and stillness” categories. It reads: 入深山中, 自行搭建茅屋, 不理俗事, 专心练丹药. Go into the deep mountains, build your own huts, ignore mundane matters, and concentrate on practicing medicine.” This sentence is also the most frequently cited by the mass media as evidence that Pan Maoming was “indifferent to fame and wealth” and “unwilling to be an official.” (According to the result of a google search on the poem in 2020.8.24) According to our classification, this sentence also includes the need to “persuade others to cultivate,” “Wu-Wei,” and “alchemy.”

We used the superficial meaning of words or sentences to classify the 38 divination poems selected by Zhang Junshao. After removing incomplete and vague sentences, we identified five main words and phrases: “inaction,” “morality,” “persuade others to cultivate the way,” “natural,” and “alchemy.” Among the 38 poems, six poems contained more than two critical elements in our analysis. The key elements that appeared the most were “persuade others to practice Taoism,” followed by “inaction” and “morality.” Comparing our analysis with Zhang Junshao’s classification, we found that “wuwei” has the highest consistency with our classification, followed by the classification of “cultivation,” whereas the “Purity and stillness” in Zhang Junshao’s classification mostly has the word “alchemy” (seems the alchemy practice need to be away from people).

One of Pan Maoming’s 100 poems expresses the following: “济世有奇诀, 救人需用心. 三天曾记录, 四海尽知名. There is a special way to help others, that is, you need to use your heart. It will be recorded over time and will be widely known in the future.” This poem was used by the local authorities to represent the cultural movement of “Good Heart/Will Maoming.” Both Zhang Junshao’s classification and our classification place this poem in the category of “self-cultivating (morality).” On the whole, scholars generally agree that Pan Maoming’s behaviour reflects his principles, that is, it demonstrates his commitment to “doing nothing” and “not fighting” as well as his belief in the need to “help others” when it is morally called for. “Doing nothing” and “not fighting” are the main ideas of Lao-tzu. The “helping others” aspect is more like the values of Confucianism in the philosophy of Rushi 入世 (lit. Into world; an opposite word for hermit).

In addition, it is essential to note that Pan Maoming's 100 divination poems have similarities with other common temple divination poems, especially in that the "ambiguity" element contributes to the "plausible" interpretation of divination. During our research, we found that the 38 fortune-telling poems selected by Zhang Junshao are similar to 16 of the 384 fortune-telling poems of the Zhuge Miben Shenshu 诸葛密本神数 (the Secret Book of Zhuge's Divine Numbers) and that 42.1% of Pan's 38 poems are duplicated in other divination poems (Baptandier, 2016). The sentences were more than 90% similar, and the overall meaning of the verses was basically the same. The book Zhuge Miben Shenshu combines the hexagrams of the Yijing and the corresponding 384 poems as the result of divination. The fortuneteller calculates the strokes of Chinese characters or grabs the rice three times to get three numbers, then uses a specific calculation method to calculate a number between 1 and 384 and find the corresponding poem. Du Jiangshui 杜江水 (2000) found that Zhuge Miben Shenshu should have been written by literati after the Northern Song Dynasty based on textual research. He argued that Zhuge Miben Shenshu was a folk work for divination and that 80% of the 384 poems in the book were ambiguous so that it could be used to explain any topic ingeniously. Due to limited data and time, this study only analysed Zhang Junshao's 38 poems. If Pan's original divination poems can be obtained in the future, we should be able to analyse further and compare them for a more precise understanding.

Pan Maoming's philosophical views

Pan Maoming's philosophical views were formed mainly under the influence of the philosophical culture of Taoism. The philosophy of Lao-tzu, presented in the book Tao-te-Ching, can be considered the core of Pan Maoming's worldview. However, at a certain stage of life and work, Confucianism and Buddhism also influenced the worldview and philosophical views of Pan Maoming. Undoubtedly, this influence was secondary and did not change the general domain of the development of Pan Maoming's philosophical views.

As already mentioned, the primary sources for studying the of Pan Maoming's philosophical views are the texts of his contemporaries and followers. Although the philosopher himself did not systematically present his philosophical views, we tend to believe that they have an internal systematicity and consistency, and therefore can be described and presented systematically.

Generally, Pan Maoming's philosophical views are pronounced *practical* nature. According to researchers of the life and cultural heritage of Pan Maoming, the philosopher attached great importance to "practice throughout life."

In our opinion, the following Pan Maoming's statement also testifies to this quite clearly:

"If you do not study and make progress throughout your life, your time in this world will have been spent in vain. Progression afterlife cannot be avoided; you might fall into a deep pitted moat forever" (He & McNulty, 2011: 2).

On the one hand, Pan Maoming meant monastic practice, and on the other hand, he emphasised the importance of social and ethical practice. That is why the main Pan Maoming's philosophical ideas have, above all, *ethical* and *social* character and, in our opinion, are represented in three main domains: the doctrine of "peace and emptiness," the idea of "clumsiness" and the idea of "monasticism for the happiness of the people." It is important to note that we use the term "ethics" in the sense that was inherent in the era of Pan

Maoming's life. However, we believe that the differences between the use of this term in the European philosophical tradition are insignificant.

The calmness and emptiness. Pan-Maoming's teaching on peace and emptiness refers to the general concept of "inaction" (Wu-Wei), which was developed in Taoism. Pan Maoming's interpretation of Wu-Wei, on the one hand, coincides with Lao-tzu's position, and on the other hand, is its extension and concretisation in ethical, practical and social relations. According to available sources, Pan Maoming interprets Wu-Wei as a person's essential attitude to society and life. According to Taoism, the world must exist in harmony with society and the people. People must follow the path of Heaven; that is, he must renounce his will and become free from opposition. Because the Tao is the source of things in the Universe, it does not act arbitrarily, so it is called "inaction." In this interpretation of the teachings of Lao-tzu, Pan Maoming emphasises that Wu-Wei does not mean the absence of activity, but the absence of arbitrariness. That is, the practical, ethical, and social dimension of Wu-Wei is to avoid arbitrariness and related errors, not to refrain from any action in the literal sense.

Pan Maoming reveals the meaning of Wu-Wei in the form of practical maxims that have ethical and social meaning:

"Catch beasts in the water while looking for fish within the mountains. From morning till the evening, you are wasting your strength and getting negative results. Change the way and road, and you can get accomplishments" (He & McNulty, 2011: 2).

This allegorical statement, in our opinion, could be interpreted as follows. "If you're on the wrong path or using the wrong method, then it's hard to succeed. It is time to reassess your methods and possibly change your course of action; it may be required to achieve your goal."

Also, these features of Pan Maoming's understanding of Wu-Wei can be seen in another of his statements, which, in our opinion, has the character of an ethical and managerial maxim:

"Pay no attention to verbal attacks and slander; eventually, the truth will be on display. It is better to be satisfied with what you have and be law-abiding" (He & McNulty, 2011: 2).

In other words, this statement means "do not pay attention to nonsense or minor mischief because everything has its own destiny."

Based on the concept of Wu-Wei that Pan Maoming formulates his understanding of calmness and emptiness.

Following the opinion of Lao-tzu, Pan Maoming speaks of calmness as one of the chief virtues that allow a person to become like the nature of the Tao, and thus successfully govern the people and society. However, Pan Maoming emphasises the need not only for a proper understanding of what peace is but also for the practical implementation of this understanding. In other words, Pan Maoming emphasises the need not only for a "theoretical" understanding of the concept of "peace" on the model of Lao Tzu and Taoism in general but also for their *practical* understanding, which is expressed in the application of this idea in personal life and practice of governing society.

Here is an example of Pan Maoming's interpretation of "calmness":

"Do not blindly go-ahead to become a leader. You will realise that it is better to pull on the reins and stop the horse. There are thousands of roads, it's better to look for the right one" (He & McNulty, 2011: 2).

"Rushing about all of your life will be in vain, and you won't find any achievements. It's better to go back home and be happy" (He & McNulty, 2011: 2).

As we can see, all these definitions, on the one hand, do not contradict Lao-tzu's position, and on the other hand, they significantly expand and develop it in practical terms.

According to Pan Maoming, "calmness" creates a productive "emptiness," which, again, is interpreted by the philosopher in the form of an ethical maxim and the rules of governing the people:

"You are at a crossroads, whether you can be successful depends on whether you are stubborn or open to change. You may need to adjust your course of action" (He & McNulty, 2011: 2).

This statement suggests we believe that emptiness in the Pan Maoming's interpretation means the openness of man and society to change, while its stubborn absence leads to trouble.

The concept of clumsiness. The core of Pan Maoming's ethical views is the doctrine of *clumsiness*. According to Pan Maoming's position, the practical implementation of Wu-Wei, calmness and emptiness is clumsiness. Accordingly, the concept of clumsiness also has an ethical meaning. Clumsiness could be interpreted as a form by which calmness and emptiness are expressed in a specific (individual) personality. The authors believe that according to Pan Maoming's position, clumsiness can be defined as a way of manifesting the Tao in the life of a particular person. However, this detection is carried out not in a passive but also in an active form, therefore, in the form of a moral act.

Another feature of clumsiness is immediateness. In other words, clumsiness means, according to Pan Maoming, direct knowledge of the Tao, which is realised in the active unmediated practice of helping others. Pan Maoming describes clumsiness with the word "heart":

"There is a special way to help others, that is, you need to use your heart. It will be recorded over time and will be widely known in the future" (Zhang, 2011:101).

As we can see from the above quote, clumsiness, according to Pan Maoming, appears as a way of expressing not mind-mediated knowledge, but direct experience, which combines the general law of nature (Tao) and the personal will of a human.

Clumsiness, says Pan Maoming, is a manifestation of a person's personal life. In the practical aspect, clumsiness allows a person to implement the law of nature, even with limited "immediate," "external" resources.

Pan Maoming notes, *"There is one acre of the field; you can feel free to farm on it. If you do, there will be an endless harvest. This achievement will be accomplished in the West"* (He & McNulty, 2011: 2).

In other words, we tend to think that this statement means, *"You may not have vast resources, but if you manage what you have, you will surely succeed. It seems that you should not move in the near future or seek another occupation"* (He & McNulty, 2011: 2).

As an intermediate conclusion, it must be noted that the concept of clumsiness indicates some influence of the ideas of Confucianism and Buddhism on the worldview of Pan Maoming. However, this influence did not change the holistic worldview of the philosopher but emphasised the practical, ethical, and social orientation of his philosophical views.

Monasticism for people's happiness. As is well known, Pan Maoming was a practising monk. However, according to the analysis of various sources, Pan Maoming made significant changes in the understanding of the monastic practise, which could be described as “monasticism for the people’s happiness.” A notable difference between Pan Maoming’s monastic practice is that he to some extent rejects the idea of asceticism, which presupposes the monk’s departure from the secular world, contrasting it with the idea of “helping people” as the monk’s primary purpose. Undoubtedly, the idea of using the Tao way to govern the people and provide them with various benefits justly belongs to Lao-tzu. However, without denying Lao-tzu’s position, Pan Maoming gives it a pronounced practical and social character.

The idea of the monk’s openness to people and society can already be seen in how Pan Maoming characterises the practice of Taoism: “*When the world was at peace, the general put away his armour and weapons. Practising Taoism in the mountains is so beautiful, it makes people know who you really are.*” Even the practice of Taoism high in the mountains must be open and understandable to the people, just as the monk himself must be open and understandable.

Pan Maoming sees the true purpose of a monk in the usefulness of his knowledge for people and society, the criterion of which is nothing but how happy people and society are.

According to Pan Maoming, a monk should not hide and hide his knowledge from people. Applying his knowledge to people and society, even to solve practical and everyday problems, the monk realises his purpose and brings people closer to happiness.

This position, in our opinion, is presented in the following statement of Pan Maoming:

“Use your skills to help others, and you can get good results. If you are a doctor, you will be a famous doctor; if you are a teacher, you will be a famous teacher. Follow your heart and do what is right” (He & McNulty, 2011: 2).

The monk’s knowledge and skills become more developed through the practice of helping people, so this activity is related, able to combine the general and the individual.

From the above description and brief analysis of Pan Maoming’s philosophical views, it can be concluded that Pan Maoming, without entering into a discussion with the teachings of Lao-tzu, significantly develops them and forms his own unique view of Taoism. It is one of the fundamental features of Pan Maoming’s style of thinking, which distinguishes him from philosophers who develop their views by means *criticism* of their contemporaries and predecessors. Pan Maoming developed his own unique view of Lao-tzu’s philosophy and elaborated its main ideas without resorting to *criticism*. The experience of the development of Pan Maoming’s philosophical views once again confirms the limitations of the attitudes of Eurocentrism and West-centrism in the interpretation of the historical development of philosophy. After all, it is well known that the vast majority of the tradition of Western European philosophy is based on *criticism* (denial, refutation, falsification, verification) of a philosopher to his predecessors and contemporaries.

Pan Maoming’s cosmological views

Before proceeding the description and analysis of the Pan Maoming’s cosmological views, we consider it necessary to give an important, in our view, clarification of the peculiarities of the development of cosmological studies in the intellectual culture of China at the turn of the Ancient and Early Middle Ages. This salinity lies in the fact that cosmological studies have been inextricably linked with the development *Alchemy* and *Medicine*. Such a strong

interconnectedness of cosmology, astronomy, cosmogony, natural philosophy with alchemy, and medicine is not inherent in Western European intellectual culture, so we consider it necessary to focus on this feature of cosmological studies in China at the turn of the Ancient and Early Middle Ages.

The connection between Chinese cosmology, astronomy, cosmogony, alchemy and medicine has been described in many fundamental studies. From our standpoint, the most representative in this aspect are the works *The Theoretical Background of Laboratory Alchemy* by Nathan Sivin (Sivin, 1980), *science and civilisation in China* by Joseph Needham (Needham, 1983), *Great clarity: Daoism and alchemy in early medieval China* by Fabrizio Pregadio (Pregadio, 2006), *Two Ancient Chinese Antinomies: The Hengxian and Early Cosmology* by Li Rui (Li Rui, 2019), *History of Chinese Philosophy* by Bo Mou (Mou, 2009), *Encyclopedia of Chinese Philosophy* edited by Antonio Cua (Cua, 2013) and others.

Based on the works mentioned earlier, we would like to briefly describe the points of contact between cosmology, astronomy, alchemy and medicine in the intellectual culture of China at the turn of the Ancient and Early Middle Ages.

First, ancient Chinese cosmology, astronomy, alchemy, and medicine are united by the philosophical and religious principles of Taoism.

Secondly, common to ancient Chinese cosmology, astronomy, alchemy and medicine is the problem *time*. According to Nathan Sivin (Sivin, 1980), the role of time is key to ancient Chinese cosmology, alchemy and medicine, as cosmological and astronomical ideas about time, stages of the Universe, its harmony are extrapolated to alchemy and medicine in the form of a practical solution. *Immortality (immortality)* in the form of creation *elixir*, which would reflect the harmony of the Universe. Solving the problem of immortality directly refers to the sphere *medicine* and her idea of *health*, the idea of which is the achievement of *immortality*.

Also, according to Nathan Sivin, *Alchemist* in the intellectual culture of ancient China is understood as an “accelerator of space processes” (Sivin, 1980). In other words, the art of alchemy and medicine is the practical ability to direct the development of the Universe in time.

As it is known, Pan Maoming is mentioned in various sources as a famous alchemist and physician. That is why his teaching on alchemy, which is interpreted as the art of creating pills and elixirs for *treatment* and improvement people's *health*, is the basis for the description and analysis of his cosmological views. Pan Maoming's cosmological views can be divided into the doctrine of *Inner Alchemy*; ideas about Chaos and Order; interpretation of causality.

Inner Alchemy (Neidan). Pan Maoming's cosmological views based on the doctrine of inner alchemy and the interpretation of the relationship between inner and outer alchemy.

According to the scholar sources, Pan Maoming as an alchemist and physician practised external and internal alchemy. In the art of external alchemy, Pan Maoming was known as a master of tablet making. However, according to Pan Maoming, the practice of external alchemy is inextricably linked with internal alchemy. Internal alchemy, from Pan Maoming's standpoint, is a practice that involves treating the human body as a “cauldron” that is a projection of space. Accordingly, the art of inner alchemy is the body's use of its own essence and Qi energy as medicine. The essence of this practice is to bring the human body in the same order with which the Universe exists. The human body must become the point of intersection of divine energy. It is precisely the state Pan Maoming characterises as health and the path to immortality.

“With one exhalation, the heart and fire fall, one inhalation, the kidney water rises, one exhalation and one inhalation, the heart and kidney intersect, and the fire and water are all together, completing an energy cycle. The qi and blood in the meridians also prosper and decline at different times, and our work and rest should conform to the law of qi and blood. In this way, the inner alchemy can be achieved, and we can gain the way to Heaven” (Zhang, 2011: 101).

It should be noted that Pan Maoming does not interpret inner alchemy as a self-sufficient practice. It must be supplemented by external alchemy.

However, we can say that Pan Maoming prefers internal alchemy in terms of the need for more considerable efforts to master it than external alchemy. In our opinion, this thesis is confirmed by the following statement of Pan Maoming: “Dan Ding’s practice is extraordinary. The cultivation of inner alchemy requires powerful means (Zhang, 2011: 101).

At the same time, Pan Maoming emphasises that internal and external alchemy, as well as medicine, are not separate practices. They are all part of Taoist practice: “I don’t know what is thirsty for three days, and what is fullness for seven days. No matter how the four seasons change, I hope to achieve longevity through continuous practice of Taoism” (Zhang, 2011: 101).

In other words, according to Pan Maoming, internal alchemy and external alchemy (tablet alchemy) are closely related to the philosophical principles of calmness and emptiness. The art of medicine is to understand that “God can enter a stone, God can take shape, enter water and not drown, enter fire and not burn.” Alchemy and medicine guide a single being (such as the human body) in the pattern of the harmony of the Universe. Pan Maoming notes that alchemy and medicine are the art of combining spiritual essence and *Qi*, because “essence is heaven, *Qi* is earth, and god is their relationship and combination.” If the mind and spirit are unbalanced, the body will be dispersed and, as a result, will perish. Achieving longevity and health is the result of “acceleration” and control of cosmic processes within the body of a particular person. In this aspect, the condition of human salvation, his attainment of immortality is the activity of the “heart.”

As an intermediate conclusion, we note that Pan Maoming, in his concept of internal alchemy, presents his point of view, according to which “inert” matter and “living” matter, the “world of nature” and the “world of human” cannot be thought of as opposites, but as moments of the integral existence of the world. However, the unity of these regional ontologies is not achieved speculatively but through the practice of alchemy and medicine. In other words, alchemy and medicine are not only a separate craft with utilitarian goals but the practice and combination of the Universe and man, the practice of “accelerating” space and social change. However, this “acceleration” is possible only in a state of “calm” and “open heart.”

Pan Maoming interprets the categories of *Chaos*, *Order* and *Causality* in an ethical context. Chaos is interpreted as an undifferentiated form of simplicity, order as the achievement of “calmness,” and causality as a manifestation of the unity of the Universe, and therefore the basis and criterion of virtue.

Obviously, Pan Maoming’s cosmological views differ significantly from the methodological framework of the Western European tradition. However, even in the context of the development of the cosmology of ancient China, we believe that Pan Maoming’s cosmological ideas significantly developed a way of understanding the Universe, the relationship between “inert” and “living” matter, the “world of nature” and the “world of human” in the Taoist philosophical culture.

Discussion and conclusions

The results of the study of the historiography and cultural background of the Pan Maoming's Philosophy and Cosmological views provoke, in the authors' opinion, a fertile field for discussion.

The first debatable issue, in our opinion, is about a general methodological nature and concerns not only the philosophical and cultural heritage of Pan Maoming but rather the tools of studying the philosophy and culture of China at different stages of its historical development. It can be formulated as follows: "Is it possible to avoid Eurocentrism and West-centrism in the study of Chinese philosophy and culture?" In our opinion, one more thing is closely connected with this question: "Is it possible to compare the philosophical, religious, scientific culture of Western Europe and China and is it possible to have scientifically substantiated comparative studies in this field?"

On the one hand, the limitations, one-sidedness, and to some extent the "harmfulness" of the Westcentric (as well as the Eurocentric) guidelines are apparent, as pointed out by both current researchers of Chinese philosophy and culture and researchers of the 20th century. On the other hand, avoiding West-centrism, especially for researchers educated in the Western education system, is quite a challenge in that the results of studying Chinese philosophy and culture must still be presented in English in order to be accessible to a wide range of intellectuals, which immanently and inevitably (due to the history of its development) contains a Westcentric intention. Apparently, by resolving this conflict may be, paraphrasing the idea of Immanuel Kant, the presence of a constant *criticism* methodological tools and results obtained, which is possible only through the formation of international research groups that include scientists from the "western" and "eastern" cultural worlds.

Given the above, on the one hand, the status of comparative studies in European and Chinese philosophy is questionable. However, in our opinion, only an external, abstract comparison of European and Chinese philosophy and culture is unproductive. Promising prospects, from our point of view, have research in the format of reception studies, i.e. such explorations, the subject of which is the study of the way of perception of Chinese philosophy and culture in the European (Western) philosophical traditions and vice versa.

Another interesting debatable issue is the value of studying minor figures and, accordingly, local cultures of China. Undoubtedly, minor figures (such as Pan Maoming) will always "lose" to major figures (such as Lao-tzu and Confucius) in terms of impact, dissemination and originality. However, the authors of this article are convinced that the study of the intellectual and cultural heritage of local figures emphasises the richness of culture as a whole, its simultaneous unity and diversity. Also, local studies could significantly harmonise the processes of globalisation of culture (which have a positive impact on the development of the country and society) while preserving the identity and achievements of local communities.

Finally, the last controversial issue concerns the importance of the figure of Pan Maoming himself and the local culture of southern China (now Guangdong Province). This question might be formulated as follows: "Does the philosophical, scientific and cultural heritage of Pan Maoming have any value for the development of modern local culture of Guangdong Province, other than historical?" Despite the danger of being accused of unwarranted emotionality, the authors of this paper tend to answer in the affirmative. Undoubtedly, the achievements of Pan Maoming in philosophy, alchemy and medicine due to its historical distance can not be called modern. However, their philosophical, scientific and cultural heritage of Pan Maoming, in our opinion, is essential for the current stage of development of

Guangdong Province as a component of educational practices and local ethical practices. In this aspect, the philosophical and scientific achievements of Pan Maoming function in modern society. In this aspect, the “Pan Maoming’s Culture” is meaningfully and functionally an essential and valuable part of the culture of Guangdong Province.

As a result of the study, we came to the following conclusions. Pan Maoming is an essential figure for the development of the local culture of Southern China at the turn of the Ancient and Early Middle Ages. Pan Maoming developed his own unique view on the philosophy of Taoism and developed it significantly, focusing on personal, ethical and social practices, which aim at the happiness and well-being of the people. Pan Maoming’s cosmological views are presented in his practice of internal alchemy and medicine, which is also focused on personal and social practice, the benefits for individuals and society. In this regard, Pan Maoming’s cosmological ideas significantly developed a way of understanding the Universe, the relationship between “inert” and “living” matter, the “world of nature” and the “world of human” in the Taoist philosophical culture.

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The Basics of Neo-Realist Cosmology: Bertrand Russell against Alfred North Whitehead

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The article presents a comparative analysis of neo-realist views of Russell and Whitehead on cosmology in the first decades of the 20th century. It is noted that despite the similarity of the basic theoretical and methodological principles of their philosophizing, these thinkers formulated philosophico-cosmological conceptions that differed significantly from each other. The reason for this was that Russell, at the epistemological level, used the theory of degrees of certainty, and on the logical one he developed the theory of descriptions, but Whitehead, in contrast, was a supporter of the theory of critical realism in epistemology and the method of extensive abstraction in logic. All this influenced the former to pay more attention to the questions of analysis and, accordingly, to use the basic concepts of facts, logical atoms, and propositions, and the latter to focus on the question of synthesis and to consider the structure of being through the prism of concepts of actual entities, eternal objects and prehension. Hence the world for Russell is a static formation (set of events), and we only need to define its laws, and for the Whitehead world is a dynamic formation (set of processes), the laws of which still need to be understood. It is emphasized that as a result, Russell's cosmology rejected the previous metaphysics, but Whitehead's cosmology aimed at finding the origins of modern cosmology in the writings of early thinkers. Nevertheless, it is argued that the cosmological teachings of both had a significant influence on the development of analytic philosophy.

Keywords: neo-realist cosmology, fact, logical atom, actual entities, eternal objects, law, reality

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Introduction

Influenced by the rapid development of science in the early twentieth century, a number of British thinkers — firstly George Edward Moore and later Bertrand Russell and Alfred North Whitehead, made a sharp critique of the prevailing neo-Hegelian methodology of absolute

idealism. In general, the main points of idealism Moore reduced to the following two: “(1) ... the Universe is very different indeed from what it seems, and (2)... it has quite a large number of properties which it does not seem to have” (Moore, 1903: 433). Such theses were counterproductive. Notwithstanding the limitations of science in its expressive possibilities, it was already demonstrating progress and remarkable empirical and theoretical results, while philosophy in its metaphysical interpretations continued to multiplying concepts, each with a claim to truth, but without the possibility of verification. That is why the philosophical theory of neo-realism was offered as an alternative to idealism. It is based on simple principles: 1) material objects actually exist and can be perceived by subject; 2) they exist even if no one perceives them; 3) space and time are real; 4) sufficient evidence to prove the presence of other minds can be given; 5) the process of analyzing objects of knowledge is a reliable means of obtaining adequate knowledge of the external world. It is clear that in neo-realism, much attention is paid to the issues of epistemology, as well as logic and ethics.

However, despite the precision in definitions, argumentation, and appeal to empirical facts, the very first neo-realist conceptions differ significantly from one another. This is especially noticeable in the process of studying the cosmologies of Whitehead and his student Russell. At the same time, they had a lot in common: both began as mathematicians, together in the fundamental work “*Principia Mathematica*” (1910-1913) formulated the foundations of a program of logicism, and made considerable efforts for the ideas of scientific philosophy and methodology of neo-realism. But when asked the question of what reality is, what principles are at its heart and how to know them, they diverge in their own cosmological interpretations. This issue has not yet been adequately explored in the scientific literature, despite the growing interest in Whitehead’s cosmology today (Bansal, 2018; Berve & Maassen, 2016; Kling, 2019; etc.) and some attention to Russell’s one (Pribram-Day, 2018). Therefore, the purpose of the proposed article is to make a comparative analysis of the cosmologies of Russell and Whitehead, which is extremely important, given the contribution both of them have made to the development of analytic philosophy and philosophy of science. To achieve this goal, I will study the basic categories of their cosmological conceptions, as well as how they interpreted the essence of laws, the nature of the Universe and the metaphysical foundations of cosmologies.

Facts against actual entities

The difference in Russell’s and Whitehead’s views in cosmology arose primarily from the development of different theories of correlation between sense-data and physical objects. Thus, Whitehead adhered to the theory of critical realism, according to which the full coincidence of sense data and physical objects is impossible, since every time we have to interpret our own perceptions. He wrote: “There is no world corresponding to the world of our common experience” (Whitehead, 1926: 48). But Russell was a supporter of the theory of degrees of certainty, according to which there are different types of sense data, which are generally heterogeneous in nature, and therefore in the process of epistemological analysis, this must be taken into account. That is why he distinguished “hard” data and “soft” data, stating the following: “I mean by ‘hard’ data those which resist the solvent influence of critical reflection, and by ‘soft’ data those which, under the operation of this process, become to our minds more or less doubtful” (Russell, 1969: 78). The difference between these types of data determines the validity of our experience. However, Russell himself prefers to use the term *fact* that is the content of sense data and can be clearly defined. Also, this concept enables the transition from empirical research to more abstract one in ontological and epistemological terms.

The concept of fact is the basic construct by which Russell defined our relation to the objective world. He wrote: "... the world contains facts, which are what they are whatever we may choose to think about them, and that there are also beliefs, which have reference to facts, and by reference to facts are either true or false..." (Russell 1972: 6). So facts are a kind of mediator between language and reality. They are part of the objective world, not the result of human thought. However, since there are many facts and there are always some exceptions, Russell did not give a clear definition of them. He only distinguished such facts as particular ("This is white") and general ("All men are mortal"), positive ("Socrates was alive") and negative ("Socrates is not alive"), and abstract facts, that relate to all sorts of mathematical and logical truths, and accordingly state a certain type of correlation between abstract concepts (Russell, 1992: 33). Such a variety of facts can be described in language.

If Russell interpreted the world more as a static set of facts, Whitehead sought to comprehend it as a dynamic formation. To do this, he built a one-tier ontology. It does not contain any mysterious truths that have nothing to do with sense data. However, we still need to understand what we perceive. In his cosmological metaphysics, experience is generalized to such an extent that there is no longer a need for physical–mental distinction and for the consideration of mental properties that are not inherent in inanimate nature. All that exists is *actual entities* (basic elements of analysis). Hence the simple basic principle of ontology: " 'Actual entities' — also termed 'actual occasions' — are the final real things of which the world is made up. There is no going behind actual entities to find anything more real... But, though there are gradation of importance, and diversities of function, yet in the principles which actually exemplifies all are on the same level. The final facts are, all alike, actual entities; and these actual entities are drops of experience, complex and interdependent" (Whitehead, 1978: 18). So reality is multiple, made up of different actual entities.

The being of actual entities is a constant becoming. They are so interconnected that it is inappropriate to build a hierarchy of their levels of existence. Each of them definitely is essentially unique. It is fundamentally important that we can develop unified methods for understanding them. Like Ludwig Wittgenstein, he wrote: "the actual world is a process, and that the process is the becoming of actual entities. Thus actual entities are creatures; they are also termed 'actual occasions' " (Whitehead, 1978: 22). Thus, the process becomes synonymous with reality, which consists of physical objects, ideas, feelings, subjects of cognition and so on. A characteristic feature of the existence of actual entities is creativity. It is the phenomenon that determines the nature of all processes occurring in the Universe, when, as a result of the interaction of different entities, something is formed, or vice versa. This one breaks into many different entities. When there is a transition from multiple to single, it is also a process of self-creation. As some actual entities are formed from others, the former are passed for the latter, and the latter are future for the former, and the process of creation is the present for both of them. It is unique to every actual entity. However, it must be understood that as soon as something arises, another disappears. Therefore, these two processes occur simultaneously.

Logical atoms against eternal objects

Both analytic philosophers were convinced that knowledge of reality comes through the prism of language. This is why Russell gave a classification of facts based on the expressive language capabilities. This allows them to be clearly stated in the propositions. The precision of such fixation depends on the scrupulousness of the analysis. Of course, language does not determine the logical structure of the world. Real things do not depend on language.

But in the process of research, it is important to reach the level of linguistic analysis and to investigate logical analogs of facts. In this way, Russell, largely influenced by the works of early Wittgenstein (Stern, 2018; Wahl, 2018), came to the concept of atomic elements of knowledge. He immediately stated the following: "... the atoms that I wish to arrive at as the sort of the last residue in analysis are logical atoms and not physical atoms" (Russell, 1972: 3). Therefore, logical atoms are facts of the philosopher's analysis. They are logical constructs of sense data and serve the ultimate purpose of analysis, since they are basic elements of reality that can be operated by the researcher. He explores the external, that is, logical, correlations between these atoms, not the correlations between things. This, in turn, means that the world can be decomposed into individual objects, the correlations between which can be analyzed. Each of these objects, like the facts, is a complex entity.

In general, facts are what turns a proposition into true or false. Their simplest form is atomic facts. In such facts, a certain property is attributed to a particular object. In more complex atomic facts, there are already two or more objects, between which a certain relation is established. This property can be an action (it is expressed by a verb). The atomic fact is fixed by the atomic proposition, that is, "... which does mention actual particulars, not merely describe them but actually name them, and you can only name them by means of names" (Russell, 1972: 28). Such a proposition is true if it corresponds to the adequate fact. The truth of more complex propositions — molecular ones (formed by the logical connectives "or," "if," "unless") — depends on the truth of atomic (kind of logical variables). They are used for symbolical designation of empirical facts. Logical constants are those specific logical terms used to combine logical variables that denote facts. Perception is the source of determining the correspondence of facts and propositions.

For his part, Whitehead paid much less attention to the linguistic analysis of language. He was more interested in the deep, theoretical and metaphysical foundations of language. In addition to specific actual entities, he also distinguished such abstractions (universals) as eternal objects. Their presence at first glance is not entirely correct in the context of the one-tier ontology. As Whitehead noted: "An eternal object, considered as an abstract entity, cannot be divorced from its reference to other eternal objects, and from its reference to actuality generally; though it is disconnected from its actual modes of ingression into definite actual occasions" (Whitehead, 1929: 198). Therefore, there is some uncertainty about the correlation of eternal objects to real phenomena, which is not present at the level of correlations between abstractions. Eternal objects allow the researcher to relate actual entities to one another. These include theoretical objects of science, expressions of natural or artificial language that we use to call something, and ideas that we actualize in the process of cognition. At the same time, propositions are not pure types of eternal objects because they combine actual entities and eternal objects (predicates). The presence of eternal objects is evidenced by the possibility of repeating processes of the physical world that can be detected empirically every time. Under these conditions, the event repeats its form. It follows that it possesses a set of structural characteristics by which it is self-realized. Eternal objects are pure potential and have an ideal status in thinking. They are unique and necessary for nature, although they are outside it. These abstractions can be regarded apart from any entity and attributed to other entities. They are a component of different events, but do not change their own properties. In addition, some of them may have a higher degree of abstraction than others.

It should also be noted that in order to know the structure of actual entities and eternal objects, the prehension ability is required. Explaining its specifics, Whitehead wrote: "A

prehension reproduces in itself the general characteristics of an actual entity: it is referent to an external world, and in this sense will be said to have a 'vector character'; it involves emotion, and purpose, and valuation, and causation" (Whitehead, 1978: 19). It allows us to capture in our minds the things that we perceive, and to some extent, resembles an analysis whereby a perceived object is decomposed into many individual objects. In the process of prehension (at the physical and conceptual levels), the internal structure of actual entities is built. The main way of perceiving things (feeling) is the so-called *positive prehension*. On the contrary, there is a negative prehension that allows us to do eliminate from feeling. In the case of conceptual prehension, it must be borne in mind that its subjective form is valuation.

Prehension involves a *subject* that prehends the actual entity; *datum* (i.e., what is prehended), and the *subjective form* in which the subject prehends some datum, especially emotions, valuations, purposes, aversions, aversions, consciousness. Prehension is somewhat fragmentary and does not allow us to know the thing in a holistic way. But this is the only way we can know the world around us; it makes part of the characteristics of actual entities our characteristics. The process of prehension by itself is so fast that many of its phases we simply do not notice. However, this does not prevent us from knowing the world.

Theory of descriptions against the method of extensive abstraction

To explain the syntactic and semantic structure of language, Russell investigated the peculiarities of the use of symbols that perform the function of the subject of expression. He drew attention to such a specific type of language expressions as descriptions, which differ significantly from proper names. His theory of descriptions was a means of solving the problems of singular propositions and propositions with empty names. He wrote: "By a 'description' I mean a phrase such as 'The present President of the United States,' in which a person or thing is designated, not by name, but by some property which is supposed or known to be peculiar to him or it" (Russell, 1967: 831). The meaningfulness of a name depends on whether there is an object that it denotes, but descriptive can be meaningful even when it does not really denote anything. For example, the description "the present King of France" is meaningful, though, in reality, it does not mean anything (is false). Of course, the meaning of proposition in ordinary language is determined by objective facts, not by means of formal logic. However, it should be borne in mind that the meaningfulness of expression is also defined by such a psychological criterion as the ability to act. Without understanding the meaning of words and rules of grammar, one can hardly act correctly. This approach is known to be opposed by the early Wittgenstein. He determined the meaning of the proposition by verifying it on the basis of the conditions under which it was true, and specified: "In the proposition, the form of its sense is contained, but not its content" (Wittgenstein, 1922: 31). However, it should be noted that he later became increasingly aware of the pragmatic aspect of language use and did not regard it as the equivalent of reality.

As we can see, in the theory of descriptions, Russell gradually replaced formal logic with the theory of knowledge. But even more logic was epistemologized by Whitehead. His method of extensive abstraction appeals not only to analysis (as it is in theory of descriptions) but also to synthesis. Whitehead analyzed a particular phenomenon to get as simple as possible concepts in order to find correlations between them, because the more elementary the concepts are, the easier it will be to find appropriate connections. To his mind, every event is only a part of a whole. Russell would not agree with this, because he wrote: "I do not contend that the holistic world is logically impossible, but I do contend that it could not give rise to science or to any empirical knowledge" (Russell, 1939: 142). In other

words, science in Russell's understanding aims at obtaining elementary logical atoms that are entirely self-sufficient and can be investigated. The elementary basic events (actual entities) that Whitehead identified as the basic elements of reality are always components of holistic reality. And the more complete our knowledge is, the closer to the truth we are.

It is important for us to study individual parts of events as specific abstractions solely for convenience, not to construct any ontology. Logic does not construct the world, but only describes actual connections. Each concept is related to the other at the abstract level. The logical equivalent of the world reflects the integrity of reality. In order to describe everything that is there, the logical theory must appear in a symbolic form, not an atomistic form, and pay attention not only to quantitative (formal) differences, but also to qualitative differences in content.

The status of laws in cosmology

The concept of law is certainly one of the basic for Russell's and Whitehead's cosmologies. However, if the former sought to understand how the laws were manifested, the latter considered what they were. So Russell was skeptical of the possibility of expressing the laws correctly. He wrote: "All that we can know empirically is approximate and liable to exceptions; the exact laws that are assumed in physics are known to be somewhere near the truth, but are not known to be true just as they stand. The laws that we actually know empirically have the form of the traditional causal laws, except that they are not to be regarded as universal or necessary" (Russell, 1922: 95). This indicates that our knowledge is vague. Even if we consider abstract things (the result of logical inference), we still need to keep in mind that logical analysis itself is the result of the continuous improvement of simpler ways of waiting for a certain event to occur (that is characteristic of intelligent beings). Therefore, such inaccuracy is characteristic of both knowledge by acquaintance (knowledge of things) and knowledge by description (knowledge of truths). However, this does not prevent us from finding causation in the physical world and understanding that after some events have taken place in space-time, other ones will also happen. At the same time, the influence of additional factors that influence the course of events should be taken into account. Clarifying the meaning of *causal laws*, Russell wrote: "When I speak of 'causal laws,' I mean any laws which connect events at different times, or even, as a limiting case, events at the same time provided the connection is not logically demonstrable" (Russell, 1969: 115). We can talk about certain laws, even when predicting the occurrence of an event is only with a chance. Causation is when such a probability is more than a half. But discovering a particular law will not explain to us the cause of an event.

Moreover, the ascertaining of the law will not explain its nature. Although, as Whitehead suggested, the concept of law, that is, "... of measure of regularity or of persistence or of recurrence..." (Whitehead, 1933: 139), informs a lot about reality, because no laws could be spoken of if nature were heterogeneous. In this case, the development of science and technology would simply be impossible. Whitehead pointed out that the concept of law was defined differently within the frameworks of different scientifico-philosophical systems. The complexity of defining such concepts lies in their abstractness and, consequently, the impossibility of empirical perception as such. But one thing is, how we understand the concept of law, and another one — what it really is. Whitehead has distinguished four types of historically formed conceptions of the laws: 1) laws as immanent; 2) laws as imposed; 3) laws as observed order of succession (mere description); 4) laws as the conventional interpretation. It can be noted that under each interpretation, we are dealing with the personality of the interpreter.

For example, in the first case, the researcher looks for things in common in different objects to find out the identity of their relationships, which should be kept no matter what tokens he or she operates. The scientist constructs a certain abstract model, which reality only approximates to (hence the possibility of exclusion from the rules). In addition, correlating laws with the essence of constantly evolving objects, we must also assume the variability of the laws themselves, for which, to my mind, we will need new laws to describe them. This is a potential infinite recursion. The interpretation of the laws as a system of external relations is not better, since the question arises as to whether this system (which actually duplicates the real-world correlation system) can really be used as a means of knowing the internal nature of objects? The world of laws appears to us as a certain system of metaphysics. Because it is external to nature, it is unclear how it originated. Under such conditions, research ceases to be empirical and becomes transcendental. Such an understanding of the law is more prescriptive rather than descriptive. But when a scientist simply understands the law as the observed order of succession, they do not need metaphysics. In this case, the conclusions are made on the basis of observations and experiments: "The laws of nature are nothing else than the observed identities of pattern persisting throughout the series of comparative observations" (Whitehead, 1933: 147). The law, in this case, becomes a kind of relation between the quantities. However, a scientist who adopts such a positivist doctrine states what are laws in nature but does not explain them. On the other hand, any interpretation of the fundamental principles of being as real entities will be conventional and cannot be empirically proven. Conventional principles are formulated in the theoretical sciences, regardless of whether they can be interpreted from the standpoint of the actual world. The interpretation of such systems still needs to be created. However, the sciences that appeal to this kind of abstract systems are simply necessary: "In fact, the abstract sciences tend to correct the evil effects of the inadequacy of language, and the consequent dangers of a logic which presupposes linguistic adequacy" (Whitehead, 1933: 178). They provide a deeper explanation of the nature of reality.

How to interpret reality correctly?

Since laws are always about changing something, the question arises as to what is the real world that surrounds us. Both thinkers emphasize the importance of the concept of an event for the correct interpretation of reality. Although Russell offered an analytical approach rather than a synthetic one, as Whitehead had. So, according to Russell, the Universe is a set of interconnected events that take place in space and time; that is, such entities that are characterized by length and duration. In modern science, these events are characterized by the physical and mental levels. The physical world is traditionally defined by the notion of matter (a set of elementary particles). Although Russell regarded matter as a system of events. He wrote: "A piece of matter, like a space-time point, is to be constructed out of events, but the construction is considerably more complicated, and in the end is only an approximation to what the physicist supposes to be really taking place" (Russell, 1970: 289). Therefore, it is not accidental that at the level of quantum mechanics, what is happening can be described both by the notion of particles (Heisenberg's approach) and waves (Schrödinger's approach). Events just happen by themselves, not as something material.

It is even more complicated to deal with mental events. To explain them, one must study the brain. However, the terms we possess are extremely inadequate to accurately describe what is happening in it. One can certainly define consciousness as "the essence of mental events" (Russell, 1970: 297). However, such a definition will only be a convention. Through the analysis of sense data, it will not be possible to determine what is called consciousness

(Synytsia, 2017: 211-212). The distinction between the material and the mental is also inappropriate, because what happens in the brain can be explained by events that can be interpreted both as mental and physical, based on the causal laws that describe them. We describe events with sense data that is neutral to the physical and the mental. This Russell's position is known in philosophical literature as a neutral monism (Jin, 2020). According to it, the nature of reality cannot be described without a combination of our conceptions of objective and subjective, since "all our knowledge of matter is derived from perceptions, which are themselves causally dependent upon effects on our body" (Russell, 1927: 27). To my mind, another thing is how to do it properly and whether it is enough to investigate events only without resorting to the analysis of particles of the material world.

The importance of overcoming the distinction between objective and subjective was also emphasized by Whitehead. It poses a certain threat to the normal progress of modern science and philosophy, which are closely interconnected. The difference between them was formed on the basis of the distinction between objective and subjective. As Whitehead remarked: "The objective world of science was confined to mere spatial material with simple location in space and time, and subjected to definite rules as to its locomotion. The subjective world of philosophy annexed the colors, sounds, scents, tastes, touches, bodily feelings, as forming the subjective content of the cogitations of the individual minds" (Whitehead, 1929: 181). Philosophy should clarify how true our subjective experience is to reflect the objective world and review the specifics of such a distinction between science and philosophy. Nowadays, the scientific world-picture must necessarily include a statement of aesthetic and ethical experience, otherwise it will not fully reflect the current state of affairs.

It was important for Whitehead to understand not what nature is for the various sciences, but what it is as such; as a certain entity not yet shared by the various sciences. At the same time, he understood nature — all that is given to us in perception — as a process consisting of processes, not just as inanimate matter, but as a living organism. On such considerations, he was encouraged by new discoveries in physics, especially relativity and quantum mechanics (Epperson, 2018). However, his interpretations differed significantly from scientific ones, in particular, he interpreted relativity as the definition of certain physical concepts in relation to a system of other concepts that characterize events in the structure of reality, not the relativity of events in the structure of space-time, as explained by Einstein's theory of relativity (Whitehead, 1922). In addition, Whitehead sought to replace materialism with the organism and to interpret any phenomena of the macro- and microcosm on the basis of the principle of organicism. Explaining the meaning of the term "organism," Whitehead specified: "The organism is a unit of emergent value, a real fusion of the characters of eternal objects, emerging for its own sake" (Whitehead, 1929: 135). Each organism is in the process of its formation. To explore its internal nature, it is impractical to contrast the physical and biological parameters of the system. The difference between physics and biology is only quantitative. From the standpoint of biology, you can also consider small objects of the microcosm. The basic organisms are electrons and atomic nuclei. They consist of organisms of a higher type — atoms and molecules. They have their own story, which is very difficult to follow — so scientists are paying attention to larger organisms. Most of the events we can perceive occur at the macro level. Every organism (including the Universe) is in the process of constant change, and at the same time, it is "the realisation of a definite shape of value" (Whitehead, 1929: 241). In this way, there is a transition from the physical to the social, so that each event can be interpreted as "a matter of fact which by reason of its limitation is a value for itself" (Whitehead, 1929: 241). Thus, the possibility of the emergence of social

features is generally characteristic of all its systems, but it can be manifested only at the level of organisms with high intelligence.

Metaphysical bases of cosmology

Both thinkers did not deny metaphysics, but differently defined its role in modern science. Thus, for Russell, it was important to demonstrate the inappropriateness of all previous metaphysics for the solution of contemporary philosophical and cosmological issues. But Whitehead, on the contrary, sought to prove that modern cosmologies contain many thoughts of ancient thinkers.

In Russell, logic became a new ontology, and to some extent, the core of philosophy (yet not traditional logic, but a symbolic one, like Frege's logical calculus). Applying the full potential of modern logic, you can better understand the nature of reality. To do this, we need to clarify the content of the propositions and reduce our knowledge of the objects to more basic entities. In each science, minimum vocabulary sets can be used to express all other terms. Specifically, in geography, to set coordinates, one can use the term "Greenwich," in astronomy — two terms, for example, "Sun" and "Sirius," in physics — elementary particles, in logic and mathematics — three vague terms for the designation of individual objects, qualities and relationships. However, Russell was firmly convinced that the most fundamental terms of science should still be based on experience. He remarked: "every empirical science, however abstract, must contain in any minimum vocabulary words descriptive of our experiences" (Russell, 1951: 265). It should be noted that under such conditions, the transition from empirical data to abstractions, such as universal algebra, is far from obvious. Moreover, how to apply them in the process of exploring the Universe is also unclear, especially if we consider Russell's belief that: "... the Universe is all spots and jumps, without unity, without continuity, without coherence or orderliness or any of the other properties that governesses love" (Russell, 2001: 72). This is clearly contrary to the Whitehead's approach. In addition, it follows that any universality of science is a futile affair.

According to Whitehead, the very concept of law shapes our conception of what cosmology (speculative or scientific) should be. The task of the philosopher of science is to demonstrate how the theoretical and conceptual framework reflects the empirical nature of the objective world. Whitehead designed his philosophy as a cosmological metaphysics — a coherent and logically consistent system of general concepts for characterizing any items of experience — the result of our perceptions, feelings, thoughts, intentions, desires, or value representations. This approach was developed in analytic philosophy (Hedrick, 2019). It can be described as a philosophical theory of everything that could unite phenomena of different natures into one whole within the same conceptual scheme and can be characterized in different aspects — ethical, social, cosmological, etc.

Exploring the history of philosophy, Whitehead identified two main types of cosmologies — Plato's and Epicurus'. Every modern cosmology only modifies the principles of their cosmological systems. The first of them, following Plato, was developed by Aristotle, Alexandrians, Scholastics. They were somewhat mixing the doctrines of Imposition and Immanence because interpreted being as simply power, and at the same time, allowing the possibility to impose laws on objects as external correlations between them. But the atomic cosmology of Epicurus (also developed by B. Russell) in some way mixed the doctrines of Imposition and of Description (Whitehead, 1933: 155). Therefore, according to it, the internal nature of bodies no longer causes their movement. However, in the case of an external force

(Newton's version) or a chance as a source of motion (positivists' version), the difficulties in interpreting the particle trajectory in space-time do not disappear.

After all, today's idea of atoms is more like Hume's than Epicurus's. Therefore, it is more appropriate to speak not of finite particles as elements of the physical Universe, but of these "ultimate elements, subjectively given in the activity of knowing, are the impressions of sensation, showering through the stream of experience, associated as memories, provocative of emotions and reflections, and expectations" (Whitehead, 1933: 159-160). Such an interpretation admits of some subjectivity and contradicts the positivists' view of the exceptional appeal to the facts. In addition, positivist principles are poorly aligned with the possibilities of prediction — a convention that goes beyond descriptive science. However, the possibility of rational, well-founded prediction makes it possible to discover in science, to understand the nature of things, to search for relationships between them, that is, to go beyond the empirical description of single facts and to make theoretical generalizations. And this already opens the possibility for metaphysics, because in our predictions, we interpret our feelings on the basis of a certain conceptual scheme. We can combine facts of different nature into a single picture of the world. Whitehead remarked: "Our metaphysical knowledge is slight, superficial, incomplete. Thus errors creep in. But, such as it is, metaphysical understanding guides imagination and justifies purpose. Apart from metaphysical presupposition, there can be no civilization" (Whitehead, 1933: 164). Metaphysics is necessary because it enables us not only to describe observations, but also to understand their nature — objectively (like Newton) or from the subject's position (like Leibniz).

Conclusions

Thus, Russell and Whitehead, constructing neo-realistic cosmologies, sought to answer a number of important questions — to establish the basic elements of reality, through the prism of which we can explain its nature, to determine the status of abstract objects, to interpret the concept of law, to outline features of the correlations between individuals, to determine what place a person occupies in this system, that is, the interpreter of any knowledge of the outside world. Both philosophers adhered to the methodology of analytic philosophy, together developing ideas of logicism; however, they offered neo-realist theories, which largely differed. So Russell was a supporter of the theory of degrees of certainty, and Whitehead was a supporter of critical realism. Both thinkers epistemic logic, but if Russell paid more attention to the issues of analysis (facts, logical atoms, propositions), Whitehead paid much attention to synthesis (actual entities, eternal objects, prehension) and viewed the world not as static formation, but as a dynamic process. The former was more interested in the logical analysis of language, while the latter was more interested in its theoretical and metaphysical foundations. In order to construct neo-realist cosmology, Russell sought to determine how laws were manifested, and Whitehead sought to understand what they were. In addition, Russell formulated an exceptionally new metaphysical approach in cosmology, based on the latest data, rejecting the previous ones, and Whitehead intended to explore the previous cosmologies and find a rational grain in them. As a result, the ideas of the former found greater resonance in the field of philosophy of science in the beginning, and the considerations of the latter were rethought in the second half of the twentieth century when a more clear awareness of the need for the study of metaphysical knowledge was formulated in analytic philosophy. All this testified to the importance of cosmologies of both thinkers for the progress of analytic philosophy and the prospect of the philosophical investigations in the context of the latest theoretical and practical developments in natural science.

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International Society of Philosophy and Cosmology (ISPC)

ISPC is an organization formed at the suggestion of members of the First International Seminar “The Universe — structure, stages of formation and development” (Pereyaslav- Khmelnytsky, Ukraine, 5–7 October 2004). The mission of the project ISPC — to merge into a single information space academic scientific and philosophical researches on space matters.

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