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Section One

INERT MATTER

Philosophy of the Cosmos for a Discursive “Thinking Through” of the Chronology of the Universe

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In the article, we will consider the scientific “Evolving matter” theory and philosophy of the cosmos as the modern “ideal model” of global sustainable development. The answer will be given to the question: “What is the world as Dasein-the-One?” Philosophy of the cosmos has two goals: (1) To resolve the question “How does agathos come into being?” or “How does a thing’s meaningful-presence-as come about?” (2) To use the obtained results for a specific discourse and a way of life creation. The research subject of philosophy of the cosmos is the account of complexity of the movement of Sein in Da, which includes the source of meaningful presence, or the idea tou agathou. Agathos reveals phronesis, the required moulding force of agathos. Philosophy of the cosmos presents Dasein-the-One as the modern intelligibility of the coming into being, the ways of the coming into being, as well as the connection between the coming into being and what is occurring. Dasein-the-One is a continuous and non-linear complication of the structure of matter; the types of interaction and the environments in which agathos are immanently present. The factors and causes of complication determine the coming into being and what is occurring. They develop the chronology of complication or a certain account of complexity of the movement of Sein in Da. The passing and happening of Dasein-the-One define the experience of Dasein being. The latter forms a specific focus of the coming into being, as well as its energy of the meaningful presence in what is occurring.

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Introduction

The 19th – the beginning of the 21st century was the period of several technological revolutions, which not only established and enriched fundamental meanings of Being with new knowledge, but also brought civilization to new levels of development.¹ In the article, we will consider the scientific “Evolving matter” theory and philosophy of the cosmos as the modern “ideal model” of global sustainable development. The answer will be given to the question: “What is the world as Dasein-the-One?”

Cosmology and anthropology in the 21st century: the search for a single source

In the preface to the book “Cosmos and Soul,” Piama Gaidenko noted with regret, “Cosmology and anthropology are rarely used in combination nowadays.”² This fact has an explanation. In the 19th century, thanks to the research of John Herschel, William Whewell, Charles Darwin, John Dalton, and many others, the scientific methods led to industrial and technical revolutions, and the term “scientist” that was coined during this period began to evoke piety and universal admiration.³ However, the absolutization of scientific knowledge and methods, as well as their demonstrative dissociation from philosophy, already occurred in cultural history. The relationships that we have been observing between scientific and philosophical knowledge in the last two centuries, in general terms, repeated the pre-Platonic period in Antiquity. Plato’s merit lies precisely in unifying the disparate knowledge of arithmetic, geometry, music and astronomy by a united idea and presenting it as a philosophy of number, figure, sound and motions of celestial bodies. Plato formulated the idea of philosophy as a new approach in education. He believed that only the transforming force of authentic knowledge and the new transcendental ideal could restore Athens after the defeat in the Peloponnesian War. Therefore, through the education model proposed by Plato, *the art to build and live in an ideal Republic, created on the pattern of the kalos cosmos, was taught.*⁴

The idea of the human as a “small cosmos” and human-built into the cosmos was traced in the teachings of all key thinkers in Antiquity and the Middle Ages: from Socrates, Plato, and Aristotle to Origen, St. Augustine, Maximus the Confessor, Thomas Aquinas, and others. Each of them considered his duty to trace the dependence from the lower level of reality to the higher one. The human was considered the lower level, and the idea tou agathou was the

¹ Industrial revolution in the 19th century; the Scientific-technical revolution about 1950-1960; Information and telecommunications revolution about 1975-present.

² The title of the book: “Cosmos and Soul: Teachings on the Universe and Man in Antiquity and the Middle Ages (Essays and Translations)” (Cosmos and Soul, 2005: 13).

³ In 1833, William Whewell, a theologian and philosopher first used the term “scientist,” by which he designated philosophers specializing in the detailed study of some phenomena of nature, including physical, mathematical and social realms.

⁴ See (Plato, *Timaeus* 29a).

highest one. Piama Gaidenko noted, “In the books “Timaeus” and “Genesis,” the description of man’s creation is similar in that they were deeply cosmic” (Cosmos and Soul, 2005: 14).

Science without philosophy tends to the continuous fragmentation, to the loss of integrity and common development goals. In the 19th century, the absolutization of *scientific* knowledge led to the fragmentation of modern knowledge, to the loss of an *idea, ideal, and values of development*. There is no connection between the evolution of the Universe and man in modern models of global order. The Big Bang theory does not consider humans as a planetary-scale force, and the theories of anthropogenesis (or, according to the author’s terminology – noogenesis⁵) use the axioms that are not related to the Lambda-CDM model.

In our opinion, the inefficiency of the modern theories and the “ideal” models of global sustainable development, which are being developed in the philosophical school, is explained by the lack of unity within the meaning of the highest idea, ideal and values. For millennia, the unity was based on the idea tou agathou, which, on the one hand, was the theoretical and practical basis of the created theories and models, and on the other hand, was the source of the social system transformation. The idea tou agathou allowed philosophy to perform as a “knowing guide and guardian” among the “genuine public.”⁶

Since then, the idea tou agathou underwent a very thorough change and lost its Platonic meanings.⁷ The basics of philosophy were lost, and philosophy began to generate theories, the axiomatic of which constituted the derivative ideas of agathos. The problem of the intelligibility of the source of meaningful presence was worsened by the contradiction that arose within the philosophical school. For millennia, the search for answers to questions “What is there?” and “What is it (that is, whatever it is that there is) like?” was the task of metaphysics.

Andronicus of Rhodes proposed the term “metaphysics” in the first century BC for ease of Aristotle’s works arrangement. Literally, it meant “something after physics.” Aristotle did not use the term. However, some of his works were actually devoted to the “first philosophy” (ἡ πρώτη φιλοσοφία). In the Middle Ages, the term “metaphysics” was used synonymously with the term “philosophy.” Metaphysics was regarded as the central philosophical doctrine.

In 1730 in his book “Philosophia prima, sive Ontologia” Christian von Wolff used the term “ontology” to specify general metaphysics. The new term derived from Greek “ὄντος” (ontos), translated as “that which is.”⁸ Wolff was a heavyweight philosopher of modern history, and one of the originators of a new understanding of the global world order. He created an ontology to the study of the category of being as initial and determinative. Metaphysics played a secondary role in ontology: *knowledge* of soul, world, and God.

In modern philosophy, the questions about the essence of being have acquired a previously uncharacteristic specificity. What is “a thing insofar as it is in being?” “What is a thing in its being?” “What is the being of a thing?” Evidently, metaphysics is presented in these questions as a subject of ontology, as “onto-logy insofar as the operations of questioning and answering (-logy) all bear ultimately on things (onto-).”⁹

⁵ In the future, we shall use the term noogenesis, since in the author’s perspective it conveys the meaning of human evolution much more accurately. Human evolution is, first of all, the development of the structures and functions of the human brain, as well as its manifestations.

⁶ That is exactly how Heidegger expressed the role of philosophy in a letter to Jaspers. (Safranski, 2005: 298).

⁷ See (Plato, *Republic* 6.505a–6.509c; 6.510a–6.511d; 7.518a–7.518d; 7.532a–7.532c; 7.534c; 10.621c–d; *Timaeus* 29a).

⁸ The first definition of the term “ontology” was given in 1613 in “Lexicon philosophicum: quo tanquam clave philosophiae fores aperiuntur” by Rudolph Goclenius.

⁹ See (Sheehan, 2014: 15).

The confrontation between “metaphysics” and “ontology” is still continuing. Considering the etymology of both terms only exacerbates the problem. On the one hand, the history of the development of the meaning of the term “metaphysics” is loaded with outdated and contradictory statements that are no longer correspond to the original Aristotelian meanings. Moreover, among the original senses, the subject of metaphysics research included not only “being as such” and “the first causes of things,” but “things that do not change.” However, on the other hand, the etymology of the term “ontology” and the understanding of the world as a process contradict each other. The term “ontology” derives from the “study of being,” where the being was literally understood as “the study of what there is.” The modern understanding of being is “*the study of what is occurring.*” Thus, both terms are not “ideal” for conveying modern meanings of the *process philosophy*.

In the present context, we will take Heidegger’s advice and make a “genuine retreat into history,”¹⁰ to eliminate all hardened, abstract, and hiding the truth. Seeking the joint basis of the highest idea, ideal, and values, we will appeal to the origins of the idea of philosophy.

The “Evolving matter” theory: the basic provisions

In the “*Timaeus*” Plato wrote, “as ousía (οὐσία) is to génesis (γένεσις), so is alêtheia (ἀλήθεια) to pístis (πίστις).”¹¹ This phrase proves that Plato created the idea of philosophy based on the axiom of an eternal and unchanging world. The meanings of the noun “ousia” meant more for Plato than the meanings of the noun “genesis.” “Ousia” is the present tense of the verb “εἶμι” (eimi, to be, to exist). This is a real being, which is frozen in place and “takes place.” It is significantly present in a certain order, that is *the kalos cosmos*. It is motionless, unchanging, and timeless.

Plato contrasted ousía with genesis. Genesis is a derivative of the verb “gígnomai” (γίγνομαι, to come into being, to be born, to become). It was opposed to “phthoré” (φθορά), as it was “passing out of existence” and “ceasing to be.” Aristotle entitled one of his treatises “Περὶ Γενέσεως καὶ Φθοράς,” literally “On Coming to Be and Passing Away.”

In modern philosophy, that phrase was used to prove the primacy of being (ousía) and to use the knowledge of the essence of being as defining axiomatics during the derivation of theories and “ideal” models of sustainable development. Ontology is considered as a theoretical basis for the unity of the highest idea, ideal and values.

However, Plato regarded agathos as immanent to the eternal. It was present in ousía. The demiurge, created the kalos cosmos, was also agathos.¹² Therefore, Plato’s agathos is at least a defining component of the primacy (ousía), if not the primacy itself. Plato opposed ousia to genesis, while agathos was immanent both to ousía and to genesis. It was agathos that tied together with the eternal cosmos and the cosmos that has come into being.¹³

We shall underline that Plato considered the idea tou agathou strongly rationally. Plato’s perception of the world was based on the teachings of Pythagoras, whose rationalism compares to the rationalism of modern cosmological models. Plato’s understanding of the

¹⁰ Safranski quotes Heidegger: “In genuine retreat into history we gain the distance from the present which alone provides us with the space to run-up that is needed if we wish to leap out beyond our own present, i.e., to take it for what every present deserves to be taken – for being overcome... In the end, only our retreat into history brings us into that which is actually happening today” (Safranski, 2005: 297).

¹¹ “ὅτι περ πρὸς γένεσιν οὐσία, τοῦτο πρὸς πίστιν ἀλήθεια” (Plato, *Timaeus* 29c).

¹² For example, θεὸς ἀγαθός, theós agathá (Plato, *Timaeus* 30a).

¹³ See (Plato, *Timaeus* 29a).

idea tou agathou can be compared to the modern cosmologists’ ideas on initial singularity in the Big Bang theory. The singularity is indirectly predicted, but it is not possible to prove or disprove its existence.

There is only one difference between the understanding of the idea tou agathou and the singularity, and it is critical for the philosophical school. *Plato specified the idea tou agathou as the defining axiom for all the theories and “ideal models” that were created in the philosophical school.* The main feature of the idea tou agathou, which Kant called the transcendental ideal, was the unity between cosmic processes and self-realization.

The defining meaning of agathos in ousía and genesis, i.e., simultaneously in a static and changing world, allowed Plato to argue for the unity between the macrocosm (μακρόκοσμος) and the microcosm (μικρόκοσμος). It allowed Plato to establish political education or *the idea of philosophy* based on Pythagoras’s authoritative teaching. The idea of philosophy was formulated on an axiom, which meanings were indirectly predictable, and could not be disproved.

Plato, Aristotle, and other scholars did not explore the idea tou agathou. Plato used the phrase “εἰκότα μῦθον,” “the likely account,” opposing to “εἰκὶ λόγος,” “the rational account.”¹⁴ He wrote that a person should accept the likely account (εἰκότα μῦθον) of agathos and give up on its exploration.¹⁵ The teaching of agathos was created in late Platonism several centuries later. It was presented as the theory of the One. On the one hand, the theory of the One is the logical end of Plato’s reflection on agathos. However, on the other hand, in the theory of the One, there is no more that strict rationalism, on the basis of which Plato created the idea of philosophy.

Thus, the retreat into the origins of the creation of a philosophical school reveals the main error of philosophical reflection in the period of modern history. *The recognition of being as the fundamental principle of the world as a process is erroneous.* All theories and the “ideal” models of global sustainable development, using the results of the exploration of the essence of being as such as a defining axiom, are developed on a secondary basis. Hence, ontology and/or metaphysics explore derivatives of agathos.

The defining axiom in Plato’s educational theory was the immanent presence of agathos in a static and changing cosmos, as well as in the Creator of both worlds. Since the static nature of the kalos cosmos has been refuted by modern philosophical and scientific theories, and we leave aside the study of the demiurge (the Supreme Deity), who is agathos, following Plato and the authoritative scholars, the subject of our research is obvious. *We are investigating the immanent presence of agathos in genesis.* We will consider the defining issues of process philosophy, namely (a) genesis = the coming into being; (b) the ways of genesis = the ways of the coming into being; and (c) the connection between the coming into being and what is occurring.

Thus, we answer the questions, “What is there?” and “What is it (that is, whatever it is that there is) like?” It is the immanent presence of agathos in genesis.

The subject of our investigation is a new question: “How does agathos come into being?”

Plato answered the questions raised enunciating the cosmos’ chronology, created by the demiurge, who was agathos.¹⁶ It was a consecutive creation of the images (εἰκόν, εἰκόν) from a paradigm (παράδειγμα) or an unchanging and eternal model. Agathos was conveyed through logos and phronesis (τὸ λόγῳ καὶ φρόνησις). Logos (λόγῳ) was a certain account

¹⁴ See (Plato, *Timaeus* 29b-d).

¹⁵ “and you who judge are but human creatures, so that it becomes us to accept the likely account (εἰκότα μῦθον) of these matters and forbear to search beyond it” (Plato, *Timaeus* 29d).

¹⁶ See (Plato, *Timaeus* 29a-b).

of complexity of the coming into being, accessible to intelligible. Phronesis (φρόνησις) represented the sophia qualities used in practice. All images (events of cosmochronology) had been changing. They could be investigated in unity, as a logos-bound Living Creature (ζῷον),¹⁷ or separately.

Plato's answer to the question "*How does agathos come into being*" correlates with the modern notions of the Universe coming into being from a singularity. The fundamental difference lies only in the fact that cosmological models do not investigate *the reason for the cosmochronology intelligibility*. They do not investigate *the reason for the unity* of the axioms of the Big Bang theory, the synthetic theory of evolution and the theory of noogenesis. Accordingly, they do not answer the main question, "*How does a thing's meaningful-presence-as come about?*"

The question "*How does agathos come into being?*" is a question about the source of meaningful presence. Agathos gives meaning and significance to presence. In his quest for an answer, Plato opposed genesis to phthoré. In modern history, Hegel rethought this opposition and presented it as a process of transition of being into nothing.¹⁸

We will consider the genesis of agathos as *Dasein* or *the movement of Sein in Da*. We have to open the full account of the complexity of the movement in order to comprehend the coming into being, the ways of the coming into being, as well as the connection between the coming into being and what is occurring. Only by answering the questions "*What is there?*" and "*What is it (that is, whatever it is that there is) like?*" we can answer the defining question of our research. *The answer to the question "How does agathos come into being?" or "How does a thing's meaningful-presence-as come about?" will reveal the essence of the agathou moulding power.*

A rethinking of Vernadsky's model

The question of the genesis of agathos calls for a rethinking of Vernadsky's model. We are to specify the defining axiomatics, predicted by modern cosmological theories, which cannot be refuted at this development stage.

The main feature of Vernadsky's model was the successful unification of the genesis of the Universe and the biosphere.¹⁹ Through the example of the Earth, Vernadsky considered the ways of the coming into being of Living Matter in certain parts of the Universe, as well as the connection between the coming into being Living Matter and planetary evolution. However, at the end of the 20th century, Vernadsky's model's key disadvantage was identified. *The model did not envisage the genesis of Intelligent Matter in the Universe.*

In 2000, based on Vernadsky's model, the author created the "Evolving Matter" theory.²⁰ The theory envisaged a general understanding of *the coming into being* of Inert Matter, Living Matter and Intelligent Matter, as well as some other states of matter. A uniform basis was proposed for the Big Bang theory, the synthetic theory of evolution and the theory of noogenesis.

¹⁷ οὕτως οὖν δὴ κατὰ λόγον τὸν εἰκότα δεῖ λέγειν τόνδε τὸν κόσμον ζῶον ἔμψυχον ἔννουν τε τῇ ἀληθείᾳ διὰ τὴν τοῦ θεοῦ (Plato, *Timaeus* 30b).

¹⁸ See (Hegel, 2010).

¹⁹ See (Vernadsky, 1975, 1977, 1987; Lovelock, 2010; Bazaluk, 2016).

²⁰ The final version of the theory is in the book "The Theory of Evolution: From a Space Vacuum to Neural Ensembles and Moving Forward," which was published in Russian and English languages (Bazaluk, 2016).

The "Evolving matter" theory was based on two postulates.²¹ First, evolution is the *complication* of the structure of matter, the types of interaction and the environments, though in the unity and struggle of opposites. The complication of the world is the complication of the three components of the physical reality: (a) the structure of matter; (b) the types of interaction (relations) between the structures of matter; (c) the environments, in which complication of these structures and interactions are carried out, and which, to a varying degree, determine environmental characteristics (Bazaluk, 2016: 35).

Second postulate, the complication of any state of matter (the Universe, the biosphere, or the noosphere) is formed by three factors and two causes. The factors of complication are:

- a) Continuity of self-complication of the structure, the types of interaction and the environments of any state of matter, supplemented by blocks of continuous self-complication and the principle of dominance of continuous block self-complication.
- b) Non-linear complication of the structure, the types of interaction and the environments of any state of matter, which is added by the factors: hierarchical non-linear complication and direction of non-linear hierarchical complication.
- c) Isolation of complication (or, Plotinus' setup for "self-assembly").²²

The causes of complication are:

- a) Active principle, which is inherently the basis for the initial elements of any state of matter and forms self-complication.
- b) Natural selection.

Interaction of the active internal principle of any state of matter with natural selection as the impact of the external environment forms a regulatory compromise.

On the basis of the postulates, the author systematized the accumulated knowledge about the evolution of the Universe, biological life, and human and came to the following conclusions (Bazaluk, 2016: 129-130):

1. Complications of the structure of matter, the types of interaction and the environments in our Universe have been carried out by hotbeds, continuously and non-linearly, over proximately 13.7 billion years. The complication of the structure and functions of the Universe happens under the influence of the same (Universal) factors and causes. In due course, there is a complication of universal factors and causes, which leads to the formation and development of the *n* number of *states* of matter.

2. Each state of matter is a new account of complexity of the structure of matter, the types of interaction, and the environments. In consequence of the complication of each new state of matter comes the formation of invariant hierarchies, providing fixation of the state of matter in the structure of the Universe and its co-evolution with other states of matter. Each new state of matter brings new opportunities for the organization of the circulation of substances, energy and information, as well as ways of moving in space.

3. As a result of studying the modern scientific and philosophical theories of global order (the cosmos), the unity of micro and macroevolutionary processes was discovered. The basis of this unity is the variability of factors and causes of the complication. The transition from the microcosm to the macrocosm in Inert Matter, Living Matter, Intelligent Matter and any

²¹ We shall consider only those provisions of the "Evolving matter" theory, which are necessary for building the theory of education. The arguments of these provisions, as well as the theory of evolution itself, can be found in the book (Bazaluk, 2016).

²² See (Plotinus, 1952).

other states of matter is a consequence of the impact of regulatory compromise, as well as the variability of the factors and causes of complication, which determine the complexity of *the coming into being*.

4. During the work on the complication models of Inert Matter, Living Matter and Intelligent Matter, the author discovered and investigated the *transition* states of matter. They were defined by the terms “Bioinert” and “BioIntelligent” matter.²³ Namely, the “transition” states of matter complicate the systematization of knowledge, as, on the one hand, they are structurally and functionally the highest structures of the “mother” state of matter, and on the other hand, they are included in the more perfect blocks of the “daughter” state of matter. “Transition” states of matter are the maximum possible limit of continuous and non-linear complication of the “mother” state of matter. Modern science does not know of any examples when in the “mother” state of matter, a complication of the structure, the types of interactions, and the environments went beyond the hierarchy of a transition state of matter.

5. On the example of the Solar System, only one sequence of the complication of the structure of the Universe can be seen: Inert Matter → Living Matter → Intelligent Matter, or alternatively, taking into account “transition” states of matter: Inert Matter → Bioinert Matter → Living Matter → BioIntelligent Matter → Intelligent Matter. The modern understanding of the complication of these states of matter is considered in the Big Bang theory, the synthetic theory of evolution and the concepts of noogenesis.

6. In the Solar System, the states of matter have been formed sequentially, at intervals of approximately 3 billion years:

- a) Approximately 6 (5.5) billion years ago, in the Milky Way Galaxy, the Solar System was formed – one more hotbed in uneven, continuous and non-linear block complication of the Universe. Vernadsky denoted the structure and functions of our Universe by the term “system of Inert Matter.”²⁴
- b) Approximately 3.5 billion years ago, as a result of geological evolution, on the Earth, the first biological organisms emerged and gained a foothold. Over 3 billion years, they formed the system of Living Matter, which was denoted by the term “biosphere.”
- c) Approximately 6-7 million years ago, as a result of neuroevolution, on the basis of the highly developed biosphere of Earth, the first structures of Intelligent Matter emerged. This started the formation of the noosphere.

Extrapolating the Solar System studies’ results on the structure of the Universe leads to a whole series of conclusions. Let us consider the following:²⁵

1. At the scale of the Universe, five states of matter are evolving as a minimum. One of the unknown states of matter to modern science is the “mother” state for our own Universe. The Universe is developing within it, and probably separate features, ascribed by modern science to the Universe (e.g., gravitation), are actually manifestations of states of Y-Matter. The second state of matter, still unidentified by the scientists, emerged on the basis of highly developed Intelligent Matter. In the model, it is indicated as X_1 -Matter. The model admits X_2 -Matter, where of Y-Matter is probably formed and the so-called “new Universe” emerged. These successive stages of complication of the states of matter can include an n number

²³ See (Bazaluk, 2016).

²⁴ To be precise, Vernadsky used the concept “Inert Substance.” In the works, we gave arguments for the advisability of replacing the term “Inert Substance” with “Inert Matter” (Bazaluk, 2016).

²⁵ See (Bazaluk, 2016).

- of chain links, but the result is the birth of a “new Universe” when saving an “old Universe.”
2. The complication is happening uneven and through “hotbeds.” If we suppose that the Universe perceived by humanity is a fragment of space in which continuous and non-linear complication of the structure of matter, the types of interaction and the environments are happening, then it is possible that “Our Universe” is nothing other than a plurality of Universes which are observed by man in one or other state of complication.
 3. The Earth’s noosphere in the modern state is only the beginning of noogenesis. In future, a minimum of 3 billion years of continuous and non-linear complication are to be expected. Great changes are upon humanity. The scope of changes can be compared using the example of the complication of Inert Matter and Living Matter in the Solar System. Inert Matter had been complicated for 3 billion years from quarks to polymers, Living Matter from RNA molecules to mammals. The complication of the Intelligent Matter of the Earth began with neural-ensembles of subconsciousness that separated out the family of the most progressive primates (hominid) from the animal world. For 6-7 million years, neuroevolution, sociocultural evolution and the evolution of the technologies of the most ancient hominids have brought us to the exploration of near-Earth space. Taking into account that in 1 billion years, the condition of the Earth will be unsuitable for biological life due to physical changes in the sun, a strategy of the evolution of Intelligent Matter becomes evident. It is (a) to obtain utmost liberation from factors of the biological environment; substituting them with more reliable and controlled artificial constructs; (b) the exploration of the near and far space; (c) the complication of the sociocultural environment and technologies to a level, protecting the noosphere from the destructive influence of the cosmos.

In general, the “Evolving matter” theory proves that the evolution of the Universe, the biosphere and the noosphere of the Earth is a single process of complication of the structure of matter, the types of interaction and the environments. The complication of matter in the Universe and the Solar System is subject to common factors and causes. Complications of each state of matter begin with the initial and definite space, last about 3 billion years and have its limits. Having reached the limit of self-complication of the structure, the types of interaction, and the environments, the system of any state of matter creates conditions for the formation of a “daughter” state of matter. The fact of the presence of a “daughter” state of matter changes the existing order (the cosmos). In the new order, the “mother” and “daughter” states of matter are complicated as a single whole.

The “Evolving matter” theory allows the possibility of a simultaneous presence of a certain number of states of matter in the Universe, at different stages of their complication. We can speak of the five states of matter with the greatest probability:

1. Y-Matter is substance, the types of interaction and the environments, which preceded Inert Matter, and at the scale of which Inert Matter arose and continues to become more complicated. Y-Matter is not recognized and is not studied by modern science.
2. Inert Matter is ours and other Universes. At present, the Big Bang theory gives the complete understanding of continuous and non-linear complication of Inert Matter.

3. Living matter is the biosphere, which naturally arises in various parts of the expanding Universes, on space objects with a certain range of physicochemical characteristics. The synthetic theory of evolution provides a complete understanding of the continuous and non-linear complication of the biosphere in an individual cosmic object.
4. Intelligent Matter is noospheres, which naturally arise on the basis of highly developed biospheres. In modern science, the cosmic significance of Intelligent Matter is not recognized. The theory of the complication of Intelligent Matter has not been developed.
5. X_1 -Matter is a state of matter which naturally arise in highly developed noospheres. Modern science does not recognize and research this state of matter.

The states of matter listed above are formed sequentially, through “hotbeds,” with a certain range of physicochemical characteristics, and at intervals of approximately 3 billion years. The totality of states of matter forms continuous and non-linear complication, which is denoted by the term “Universe” in modern science. The “Evolving matter” theory allows the existence of a certain set of Universes and, accordingly, cosmic biospheres, noospheres, etc.

Philosophy of the Cosmos

The “Evolving matter” theory is the scientific theory that, in a certain way, systematizes the knowledge of the last four centuries. The theory gives insight into the modern understanding of the world as a process. It follows from the theory that each state of matter is a part of the whole, which, by its coming into being causes the complication of the whole. Following Plato, we will call the whole by the term “the kalos cosmos.”²⁶ We consider kalos (καλός) as a regulatory compromise. This is agathos. The cosmos (κόσμος) is a world order. In this sense, Pythagoras was the first to use the term.²⁷

The kalos cosmos is a certain account of complexity of the movement of *Sein in Da*. The highest complexity account is agathos, the lowest is what is occurring.

Philosophy of the cosmos explores the kalos cosmos. The term “philosophy of the cosmos” is made up of two terms “philosophy” and “cosmos,” which we take strongly rational and in Plato’s meanings. Philosophy is the practice that Pierre Hadot set as the idea of philosophy.²⁸ It is a transformation of a discourse and a way of life in accordance with the results of the kalos cosmos study. The kalos cosmos is a certain order that is agathos. It is formed by the structure of matter, the types of interaction and the environments, which get continuously and non-linear complicated and self-assembled. Each self-assembly is a certain complexity account, open or closed for intelligibility. This implies the definition of philosophy of the cosmos. *It is the use of the intelligibility results the complexity of the kalos cosmos (the movement of Sein in Da) for a specific discourse and a way of life creation.*

Philosophy of the cosmos does not seek answers to the questions “What is there?” and “What is it (that is, whatever it is that there is) like?” It is the task of metaphysics. However, philosophy of the cosmos addresses these issues. It explores the coming into being, the ways of the coming into being, and the connection between the coming into being and what is occurring, to use the obtained results to create a special practice.

²⁶ See (Plato, *Timaeus* 29a-b).

²⁷ See (Liddell & Scott, 1940).

²⁸ See (Hadot, 1999: 39).

Philosophy of the cosmos has two goals:

1. To resolve the question “How does agathos come into being?” or “How does a thing’s meaningful-presence-as come about?”
2. To use the obtained results for a specific discourse and a way of life creation.

To achieve these goals, philosophy of the cosmos address the following challenges:

1. To formulate the axiomatic systems of the complication theories of Y-Matter, Inert Matter, Living Matter, Intelligent Matter and X_1 -Matter.
2. To creates the “ideal models” of sustainable development of the states of matter, the set of which *forms the kalos cosmos*.
3. To reveal the essence of the agathou moulding force of each state of matter.

The research subject of philosophy of the cosmos is *the account of complexity of the movement of Sein in Da, which includes the source of meaningful presence, or the idea tou agathou*.²⁹ Agathos reveals phronesis, the required moulding force of agathos. The phronesis acquisition is equivalent to cosmic force acquisition.

Thus, philosophy of the cosmos considers the answers to the following questions “What is there?” and “What is it (that is, whatever it is that there is) like?” as an opportunity to present the kalos cosmos through the “ideal model” of the global sustainable development. Its methodology and tools are aimed at the phronesis mastering, as well as the transformation of what is coming into being and what is occurring, in accordance with the kalos cosmos.

The modern possibilities of the intelligibility of the highest account of complexity of the movement of *Sein in Da* reveal two key axioms that define the kalos cosmos. These are the initial and defining axioms of philosophy of the cosmos.

The first axiom: *agathos is immanently present in everything that is coming into being*. Therefore, any theory or an “ideal” model describing *the coming into being* is based on the axiom of the immanent presence of agathos. Plotinus considered agathos as the absolute One. It was the fundamental principle of being, which determined the essence of the static and emerging cosmos.³⁰ We will keep Plotinus’s term “the One,” but clarify its meaning. *Philosophy of the cosmos explores Dasein-the-One*. The use of the term “the One” emphasizes that agathos is not only immanently present in every account of complexity of the movement of *Sein in Da*. *Agathos is the only opportunity to convert any account of complexity from closedness into openness*. The study of *Dasein-the-One*, with the emphasis on the last word, implies that all what is coming into being and what is occurring is rational and intelligible due to the immanent presence of agathos.

The second axiom: the coming into being (*gignomai*) is the movement of *Sein in Da*. It has a certain account of complexity. The highest account is the openness of the source of meaningful presence. The source is agathos. The account of complexity ends up with what is occurring. Hence, *philosophy of the cosmos explores Dasein-the-One*. On the one hand, the term “Dasein” accumulates the methodology and tools of the cognition world as a process, developed in the philosophical school. On the other hand, the term “Dasein” accumulates the entire volume of the multidisciplinary knowledge on the world as a process. Its scientific basis is the “Evolving Matter” theory, which reveals the world as a process as a *complication* of the structure of matter, the types of interaction and the environments. Dasein is defined by three factors and two causes of complication.

²⁹ See (Bazaluk, 2021).

³⁰ See (Plotinus, 1952).

The formulated axioms reveal the kalos cosmos as *Dasein-the-One*. Philosophy of the cosmos presents *Dasein-the-One* as the modern intelligibility of the coming into being, the ways of the coming into being, as well as the connection between the coming into being and what is occurring. *Dasein-the-One* is a continuous and non-linear complication of the structure of matter, the types of interaction and the environments in which agathos are immanently present. The factors and causes of complication determine the coming into being and what is occurring. They develop the chronology of complication or a certain account of complexity of the movement of *Sein* in *Da*. The passing and happening of *Dasein-the-One* define the experience of *Dasein* being. The latter forms a specific focus of the coming into being, as well as its energy of the meaningful presence in what is occurring.

The idea tou agathou

The first axiom of the “Evolving matter” theory is formulated on the result of the intelligibility of the connection between the coming into being and what is occurring. This connection reveals the integrity of *the movement* of *Sein* in *Da* and unity within the meaning of the highest idea, ideal and values. Let us explore it.

According to Plato, the unity between the coming into being and what is occurring was provided by the idea tou agathou (ἡ τοῦ ἀγαθοῦ ἰδέα). It specified the work of the demiurge as the Creator of the kalos cosmos.³¹ Plato considered the idea tou agathou in his dialogues “Timaeus,” “Parmenides” and “Republic.” To reveal the idea, he used the analogy of the sun,³² the analogy of the divided line,³³ and the allegory of the cave.³⁴ It appeared to Plato that the idea tou agathou was “the cause of epistēmēs and of alítheias,”³⁵ and defined ousia and everything that was available and not yet available to knowledge.³⁶ The idea tou agathou was “the beginning of all” (“the origin of all”),³⁷ in the meaning of the principle responsible for everything (παντός, = each, = whole) created. *The idea tou agathou had the moulding power.*

Heidegger explored the connection between the coming into being and what is occurring as the care. In Heidegger’s philosophy, the term “care” has the same significance as the term “Dasein.” Care appeared as the essence of *Dasein*. Koyré described the relation between *Dasein* and care as follows: “Since *Dasein* appears essentially as “care,” its connections with other entities would generally appear as the “taking care” (besorgen); this means that in its needy and caring existence, *Dasein* will take care of a huge number of things “relating to it or to his own being” (Koyré, 1999).

We state that the idea tou agathou provides the connection between the coming into being and what is occurring. We get the idea tou agathou differently from Plato. The openness of the *Dasein-the-One* is a continuous and non-linear *complication* of the structure of matter, the types of interaction and the environments. The complication is determined by the factors and reasons outlined in the “Evolving matter” theory. However, the complication as an idea is studied in philosophy of the cosmos. The idea of complication is the answer to “How does agathos come into being?” or “How does a thing’s meaningful-presence-as come about?”

³¹ See (Plato, *Timaeus* 29a).

³² See (Plato, *Republic* 6.508b–509c).

³³ See (Plato, *Republic* 6.509d–511e).

³⁴ See (Plato, *Republic* 7.514a–520a).

³⁵ αἰτίαν δ’ ἐπιστήμης οὖσαν καὶ ἀληθείας (Plato, *Republic* 6.508e).

³⁶ See (Plato, *Republic* 6.509b).

³⁷ παντὸς ἀρχὴν (Plato, *Republic* 6.511b).

The idea of complication involves transforming the environment in order to achieve complete openness.

It is quite evident that the coming into being is the openness. It is agathos, as it is coming into being in Dasein-the-One. The coming into being is determined by the experience of Dasein's being: it has a certain focus and limits of self-realization. Each coming into being is a potency. It concentrates a certain experience of Dasein's being, which turns the coming into being into the potential of Dasein-the-One. This happens only when the coming into being remains open to what is occurring. The openness is an “ideal” state of the coming into being that ensures its sustainable development and prosperity.

The openness of the coming into being and of what is occurring differ. The disclosedness of what is occurring often appears to be the closedness to the coming into being. Therefore, the coming into being should make some effort to maintain its openness in what is occurring. This effort is the essence of potency realization into the energy of a meaningful presence. It overcomes the veto of what is occurring unilaterally to decide: the coming into being must be open or closed. The coming into being is realized as the Dasein-the-One potential or as the complication only by defending the possibility to be open in what is occurring. A proven right of what is occurring to be open modifies the coming into being into the significant and meaningful presence.

Hence, every new complication of the structure of matter, the types of interaction and the environments is the coming into being that overcame the hiddenness of the outside environment in order to realize the potency concentrated in it into the energy of the meaningful presence. *The coming into being, realized as an energy of the meaningful presence, we call the source of Dasein-the-One.* The openness of the coming into being is that what is occurring is equivalent to the source energy. It is the energy of the regulatory compromise forms the kalos cosmos, which is agathos.

The coming into being goes on continuously, non-linearly, and in different ways. A certain closedness protects what is occurring against the chaos that the coming into being can cause. Therefore, it is agathos. It prevents *all* coming into being from keeping its openness in what is occurring. It controls that only the potency of the coming into being, which corresponds to agathos of what is occurring, is transformed into the energy of the meaningful presence. The correspondence of agathos of the coming into being and agathos of what is occurring is the reason for the new complication. Agathos of the coming into being *transforms* agathos of what is occurring, and outwardly, it is kalos.

Keeping the openness of the coming into being in what is occurring, is nothing more than *the coming into being of agathos in agathos of what is occurring.* And this is not about the addition of agathos of the coming into being and what is occurring. *Agathos of the coming into being transforms agathos of what is occurring.* The transformation of agathos as an action we call phronesis. Phronesis is the coming into being, converting certain closedness of what is occurring into a certain disclosedness. Or it is equivalent to the transformation of the coming into being potency into the energy of the meaningful presence of what is occurring. Phronesis modifies the kalos cosmos, setting a new regulatory compromise.

Therefore, we have discovered the required moulding force of agathos. Agathos of the coming into being, as a certain disclosedness (potency) transforms agathos of a certain closedness of what is occurring. The result of this transformation is a modified disclosedness / closedness of what is occurring, in which agathos of the coming into being is an important actor of the kalos cosmos.

Phronesis as an agathos action generates a new account of complexity of the movement of Sein in Da. We call logos the account of complexity of the Dasein-the-One with an immanent agathos. The presence of agathos in logos guarantees the openness of what is occurring and its connection with the coming into being.

We shall formulate the first axiom of the theory of education, “Those Who Transform the Universe” as follows. *The idea tou agathou is a transformation of the closedness of what is occurring into disclosedness.* It is represented in logos and phronesis. Logos is a certain account of complexity of the movement of Sein in Da, which results from the change of the regulatory compromise (the kalos cosmos) by phronesis. Phronesis is the transformation of the coming into being potency into the energy of the meaningful presence.

The idea tou agathou represents Dasein-the-One as a continuous and non-linear complicated connection between the coming into being and what is occurring. The intelligibility of the connection represents a certain account of complexity of the movement of Sein in Da, which is revealed as Dasein of states of matter. These are images (εἰκόων) that arose in succession from Dasein-Y-matter. Each new Dasein of state of matter is formed by phronesis. The unity of agathos of the coming into being transforms agathos of what is occurring. Logos is a certain account of complexity of the movement of Sein in Da, which results from the change of the regulatory compromise (the kalos cosmos) by phronesis.

Agathos of what is occurring concentrates the experience of Dasein being or the previous account of complexity of Dasein-the-One. It causes the new coming into being. The experience of Dasein’s being sets the focus and limits of Dasein of new state of matter in what is occurring. The copies, or images, are created out of this paradigm.

The coming into being and then the meaningful presence of Dasein of a new state of matter becomes possible due to the compatibility of agathos the coming into being with agathos of what is occurring. This is the compatibility of the image with the paradigm. On the one hand, the agathos of what is occurring (the Dasein’s being experience) determines the basic characteristics of Dasein new state of matter. On the other hand, Dasein of “daughter” state of matter transforms what is occurring (Dasein-the-One) by the fact of its meaningful presence. The energy of the meaningful presence of Dasein “daughter” state of matter determines a new regulatory compromise and further continuous and non-linear complication of Dasein-the-One.

Dasein of the “daughter” state of matter is a new account of complexity of the structure of matter, the types of interactions and the environments. This is a new way of meaningful presence: being-there for oneself and, at the same time, being there for the others. To become what is occurring in the “mother” state of matter and to create its own system in it means to make certain changes in the complication of the “mother” system and, consequently, in the complication of the Universe. Each new state of matter *transforms the Universe by the fact of its coming into being and turning into the energy of the meaningful presence*, i.e., its Dasein.

In order to transform potency into the energy of the meaningful presence of what is occurring, each new state of matter should possess two basic qualities:

1. *The possibilities to make full use* of the material, energy and information resources of the “mother” state of matter.
2. *The possibilities to transform* the “mother” system in order to create conditions for continuous and non-linear complication of its own structure and functions, i.e., to create the “daughter” system.

It follows from the “Evolving matter” theory that each new state of matter turns into the “mother” system, after about 2 billion years of continuous and non-linear complication. It

allows the coming into being of new structures and functions that can be fixed in Dasein-the-One. We called these structures “transitional” states of matter. From a certain set of continuously and non-linearly coming into being transitional states of matter, only one state of matter is fixed, which most effectively use the resources of the “mother” system.

The “daughter” system occupies an “insignificant” place at the scale of the “mother” system. However, despite the fact that the scale of the presence of each new state of matter in an expanding Universe is significantly reduced, its ability *to transform the Universe*, on the contrary, is increasing. The reason lies in Dasein of a new state of matter. It is concentrated the Dasein’s being experience of the previous states of matter, which ensures the openness of the entire account of complexity of Dasein-the-One.

Conclusions

Philosophy of the cosmos actualizes new meanings in the understanding of the evolution of the Universe, which we have designated by a metaphor “Those Who Transform the Universe.” From our point of view, the metaphor fully conveys the meanings of the idea *to agathou* as the idea of transforming closedness of what is occurring into disclosedness. It directs philosophy from the macrocosm to the microcosm and returns true significance to it, that is, *be a way of life*. Philosophy again becomes “the way, the truth and the life.”

It follows from philosophy of the cosmos that Dasein-Intelligent-Matter, which is represented by society on Earth, is one of the five possible states of matter that form the Universe.³⁸ It is an important part of the whole that forms the *kalos* Universe, or a regulatory compromise. Dasein-Intelligent-Matter is a force of the cosmic scale, which causes of the expansion Universe along with other powers. Philosophy of the cosmos opens up a new understanding of man as an idea – a *man who transforms the Universe*. Dasein-Intelligent-Matter come into being in certain physical and chemical conditions of a space object in order to subsequently transform it into a starting point for cosmic expansion.

Modern scientific knowledge makes it possible to compare the complication of Dasein-Living-Matter and Dasein-Intelligent-Matter of the Earth and to reveal the following features in their meaningful presence. The energy of Dasein-Living-Matter is solely aimed at the transformation of a cosmic object. Over the last 3 billion years of continuous and non-linear complication on Earth, Dasein-Living-Matter manifested itself primarily as a planetary power, purposefully turning the Earth into a self-regulating system.³⁹ Dasein-Intelligent-Matter was formed in Dasein-Living-Matter and is its “daughter” state. To manifest itself as a planetary power, it took only a few million years. During this short period of continuous and non-linear complication (in fact, further ahead, 3 billion years!), the Dasein-Intelligent-Matter of the Earth clearly demonstrated its focus on resource development in the Universe. Structurally and functionally, Dasein-Intelligent-Matter was created to intelligible Dasein-the-One. Intelligible the account of complexity of the movement of Sein in Da opens Dasein-Intelligent-Matter the resources of the previous states of matter and turns it into cosmic force.

Philosophy of the cosmos discloses that the Earth’s noosphere is one of the sets of cosmic noospheres that naturally emerged in one of the “hotbeds” of our Universe. The existence of a certain number of “hotbeds” in a single Universe is allowed, which are at different stages of complication: from several million years to billion years. Given the propensity of Dasein-Intelligent-Matter to migration in the Universe, we can allow a certain influence of

³⁸ Another number of states of matter is also allowed.

³⁹ The meanings of this system are sufficiently expounded in the scientific hypotheses of Vladimir Vernadsky and James Lovelock (Vernadsky, 1975, 1977, 1987; Lovelock, 2010).

highly developed cosmic civilizations on less developed ones, as well as competition and cooperation between them.

The study of the stages of the complication of the Solar System find that complication of Dasein-Intelligent-Matter of the Earth occurs through the competitive struggle:

1. With continuously and non-linearly complicating “mother” system of Living Matter. This means competition between the biosphere and the noosphere for the resources of the “mother” system and the domination on planet Earth.
2. With continuously and non-linearly complicating system of Inert Matter. We mean fixation of Dasein-Intelligent-Matter of the Earth at the scale of the Solar System and the Milky Way.
3. With cosmic noospheres, that is, highly developed systems of Intelligent Matter for space resources.

It follows that Dasein-Intelligent-Matter of the Earth is complicated in the competitive environment of cosmic power. The major competition unfolds not on a planetary scale with the force of nature and in conflicts and wars with each other. It will take place in the cosmos for space resources development and the right to the meaningful presence in complicating the Universe. As space activity increases, Dasein-Intelligent-Matter of the Earth will face with a more rigid, uncompromising, not always equal and safe for itself competition in the cosmos. The real danger for Dasein-Intelligent-Matter of the Earth is beyond the Earth and has an extraterrestrial nature. In the near future, humanity will face those who are already transforming the Universe!

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A Philosophical Discourse of the Earth

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The authors examined a philosophical discourse of the Earth in the New History. The purpose of the study is to prove the practical importance of the philosophical discourse of the Earth for advancing human civilization. The nature of philosophy means the transformation of the discourse and the way of human life in accordance with the intelligible complexity of the Earth and the Universe. A holistic view of the Earth and the Universe is used by humans in the proclaimed cultural ideal, with the help of which they achieve the ordering (harmonization) of their way of life with the laws of the Earth and the Universe. The authors identified and considered three stages of a holistic view of the process of transforming the Earth and the Universe: (1) The concept of the biosphere and noosphere by Vladimir Vernadsky; (2) the Gaia hypothesis by James Lovelock; and (3) the “Evolving matter” theory by Oleg Bazaluk. The use of knowledge about the nature of the Earth and the Universe transformation determines human activities and the limits of an individual’s self-actualization. Essentially, a philosophical discourse of the Earth focuses on the practice of human transformation of the Earth and the nearby space.

Keywords: philosophical discourse, Vladimir Vernadsky, James Lovelock, Oleg Bazaluk, biosphere, “Evolving matter” theory, Gaia hypothesis, practice,

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Introduction

In 1676, the book *A philosophical discourse of Earth relating to the culture and improvement of it for vegetation, and the propagation of plants, &c. as it was presented to the Royal Society* was published by John Evelyn in London (Evelyn, 1676). The published study is remarkable due to the fact that it reveals a new human approach to understanding the Earth as a material object. In the New History, researchers have ceased to consider the Earth as an object that reproduces the material and energy resources necessary for human existence. Researchers began to recommend transforming the Earth to meet the human needs. It was not enough for a human that the Earth as a material object reproduced by itself. Therefore, Evelyn, who held a number of responsible administrative positions at the court of Charles II, suggested that the government encouraged landowners to plant special types of trees suitable for building the English fleet. Evelyn's research focused on purposeful transforming the natural landscape to meet the current challenges facing the government of England (Evelyn, 1676).

However, why did a civil servant at the court of King of Scotland, England and Ireland wrote about "philosophical discourse of earth", and not, for example, about "the practice of transforming the Earth?" What is the connection between the ideas of "transforming the Earth" and "philosophical discourse"?

The questions posed turn us to the study of the nature of philosophy. The main goal of the proposed study is to prove the practical significance of a philosophical discourse of the Earth for advancing human civilization.

Philosophy as a way of life

Contemporaries distinguish between philosophy and science, preferring the latter. It is believed that the transformations of the Earth and society are promoted exclusively by scientific disciplines, and the technologies that are transforming the Earth and society are only scientific. Moreover, philosophy was divided into analytic and continental, and the main reason for the division was explained by the attitude of philosophers to scientific methods of knowledge. The style and clarity of presentation of analytic philosophy were declared as "close to science"; therefore, it is promoted as more pragmatic and relevant to society than continental philosophy (Chase & Reynolds, 2011).

However, Maximilian Noichl has proved that the division of philosophy into analytic and continental is not supported by the structure of the philosophical publications (Noichl, 2021). Large scale analysis of the citation-structure of philosophy as a discipline, carried out on the basis of 68,152 records downloaded from the Reuters Web of Science-Database, led to the following findings (Noichl, 2021):

1. "We do not find a cluster for analytic philosophy, which is coherent with claims about its heterogeneous structure..."
2. "...we see that there is indeed such a thing as Continental philosophy." "Continental philosophy emerges as a separable entity in the literature, which nonetheless has multiple links to the rest of philosophy, specifically to the cluster that has been termed Philosophy of Society and Justice (22), and to the large clusters of philosophy of biology (25), which on closer inspection seems to include a lot of general history and philosophy of science."
3. "Seen as a whole, Continental philosophy seems to be well integrated into practical philosophy."

The results obtained by Noichl indicate the stereotypical understanding of philosophy that has developed in modern society. Analysis of statistical results once again confirms that philosophy does not need to prove its “practicality” and “scientific nature.” Philosophy was created by Plato as a special practice, and it has remained the same throughout its history.

At the end of the twentieth century, Gregory Vlastos first used the methods of modern analytical philosophy for the analysis of classical philosophy. The research results allowed Vlastos to argue the following fact: “The ancient Greeks invented the notion of cosmos, which is presupposed by the idea of a science of nature and by its practice. This idea implies that the regularities in nature cannot be challenged by the intervention of divinities either in the world or in humankind” (Vlastos, 2005: xix). The ancient Greeks realized that everything happening on the Earth was determined by the laws of nature and human intervention. This understanding took on a complete form in the dialogue of Plato, who developed philosophy as a special discourse and a way of life (Hadot, 1995; Sellars, 2017; Bazaluk, 2021).

In the chapter that gave rise to the title of the book, Pierre Hadot wrote that in antiquity “philosophy was a way of life,” “mode of existing-in-the-world, which had to be practiced at each instant, and the goal of which was to transform the whole of the individual’s life” (Hadot, 1995: 265). Philosophy “does not merely cause us to know: it makes us ‘be’ in a different way” (Hadot, 1995: 265). During the Middle Ages, theology did temporarily deprive philosophy of practice (Hadot, 1995). However, this temporary and violent act was in no way related to the nature of philosophy.

The nature of philosophy is a discourse and a way of life that causes disclosure (aletheia) of a phenomenon or a process, thanks to which human masters that power that lies at its basis. Phronesis (practical wisdom) allowed an individual to transform their own presence on the Earth in accordance with the intelligible (revealed) laws of the cosmos (Bazaluk, 2021). Plato developed dialectics, or, equivalently, philosophical discourse, as a way of revealing the laws of nature that ordered the existence of outer space, the Earth, a nation-state, and human.

The beginning of a philosophical discourse of the Earth can be definitely dated to the *Timaeus* dialogue, written by Plato around 360 BC (Plato, 2020). *Timaeus* dialogue, first of all, demonstrates the possibilities of philosophical discourse to reveal the nature of the Universe, the Earth, and the human in order to use the results obtained in practice, to order human life in accordance with the intelligible cosmos (Bazaluk, 2021).

Consequently, the attempts to divide philosophy into analytic and continental, guided but its motivation and attitude to practice, are meaningless. They are not in line with the nature of philosophy. The motivation and focus on practice were laid down by Plato at the heart of philosophy. John Sellars, studying this issue came to the following conclusion: “Philosophy as a Way of Life is a model of philosophy that emphasizes its practical, life-changing aspects. It cuts across the division between analytic and continental philosophy, neither aligned with nor opposed to either tradition” (Sellars, 2017: 55).

Therefore, “A philosophical discourse of earth” by John Evelyn is the philosophy of the Earth. Following the traditions laid down by Plato in the Academy, we understand “a philosophical discourse of the Earth” as a way to reveal the complexity of the transformations taking place on the scale of the Earth as a separate space object. Philosophy of the Earth is the comprehension of measuring the complexity of the Earth’s existence and the definition of the laws that cause changes on the scale of the Earth and the Universe.

In the New History, comprehension of the complexity of existence of the Earth as a space object has gone through three stages:

1. The concept of biosphere and noosphere by Vladimir Vernadsky.
2. The Gaia hypothesis by James Lovelock.

3. The “Evolving matter” theory by Oleg Bazaluk.
Consider the highlighted stages.

Vladimir Vernadsky: Philosophical Thoughts of a Naturalist

Vladimir Vernadsky was the first to deepen the idea of the biosphere to the definition widely recognized by the modern scientific community (Vernadsky, 1975; 1977; 1978; 1987) and to initiate the scientific substantiation of the noosphere concept suggested by Pierre Teilhard de Chardin (Vernadsky, 1987; Teilhard de Chardin, 1987). Vernadsky's ideas have been repeatedly interpreted and reinterpreted throughout the rich heritage of his students and followers. The development of Vladimir Vernadsky's ideas about the biosphere and noosphere are worth attention in the studies by Vitaliy Kordjum (1982), Vlail Kaznacheev (1989), Vladimir Levchenko (2003), etc.

Academician Vernadsky was one of the first scholars to realize that oxygen, nitrogen and carbon dioxide in the Earth's atmosphere are the result of biological processes. During the 1920s, Vernadsky published his research showing that living organisms transform the planet just like any physical force. “Living organisms are a function of the biosphere and are closely connected materially and energetically with it; they are a huge geological force that determines it. In order to be convinced of this, living organisms must be manifested as something whole and inseparable.” Thus, the manifested organisms represent the Living Substance, i.e., an aggregate of all living organisms currently existing, numerically expressed in elementary chemical composition, weight, and energy. It is connected with the environment by the biogenic current of atoms: its respiration, nutrition and reproduction. The apparent phenomena of life are studied in biogeochemistry and are manifested as a huge geological process, a geological force of the planetary nature. The main defining principle for them is the astronomical position of the planet – its distance from the Sun and the inclination of its axis to the ecliptic. The indicated astronomical elements of the Earth determine the climate, and the climate determines the life that covers our planet. An annual cycle – a complete revolution of the Earth around the Sun – is not only a measure of our (and geological time), but also a natural measure of the life cycle on the planet. A life cycle is associated with the circulation of chemical elements, creating, as we see it, the Earth's atmosphere (troposphere), continuously and consistently releasing gases created due to life processes – O₂, N₂, CO₂, H₂O, etc.” (Vernadsky, 1987: 45-46).¹

¹ «Живые организмы являются функцией биосферы и теснейшим образом материально и энергетически с ней связаны, являются огромной геологической силой, ее определяющей. Для того чтобы в этом убедиться, мы должны выразить живые организмы как нечто целое и единое. Так выраженные организмы представляют живое вещество, т.е. совокупность всех живых организмов, в данный момент существующих, численно выраженное в элементарном химическом составе, в весе, в энергии. Оно связано с окружающей средой биогенным током атомов: своим дыханием, питанием и размножением. Так выраженные явления жизни изучаются в биогеохимии и выявляются как огромный геологический процесс, геологическая сила планетного характера. Основным определяющим началом для них является астрономическое положение планеты – расстояние ее от Солнца и наклон ее оси к эклиптике... Указанные астрономические элементы Земли определяют климат, а климат определяет жизнь, покрывающую нашу планету. Годовой цикл – полный оборот Земли вокруг Солнца – не только является мерилем нашего (и геологического) времени, но и является естественным мерилем цикла жизни на планете. Цикл жизни связан с круговоротом химических элементов, создающим, как увидим, земную атмосферу (тропосферу), непрерывно закономерно выделяющих в нее жизненными процессами газы – O₂, N₂, CO₂, H₂O и т.д.»

In the works of Vernadsky, life acquires a strictly scientific context – the doctrine of Living Substance. “In geology, life manifests itself only in the form of Living Substance. It is necessary to take this into account in precise scientific geological work. In religious, philosophical, and even in everyday language, the concepts – life and Living Substance – do not coincide, sometimes dramatically. We do not take this into account and in geology, we talk about the Living Substance in the understanding that is given here” (Vernadsky, 1987: 52-53).²

Vernadsky presented the existence of the Earth as the evolution of the geosphere and biosphere. The highest stage of the latter was the noosphere. The emergence of each new sphere of the Earth’s existence (in Vernadsky’s terminology – the state of matter) transforms the previous complexity of being. The Living Substance, as a planetary phenomenon, transforms the Earth’s geosphere and creates a biosphere on its basis: “we can even at present definitely assert that Living Substance in the biosphere plays the main active role and, in terms of its power, cannot even be compared with anything, with any geological force, in its intensity and continuity in time. In fact, it defines all the basic chemical laws in the biosphere” (Vernadsky, 1987: 220).³ The Living Substance as a planetary force was considered by Vernadsky as a “real space-time,” which differs from the inert matter by at least twelve meaningful differences (Vernadsky, 1977). The Living Substance transforms the Earth with the biogeochemical functions: “They are the result of the natural manifestation of billions of living indivisibles, which are revealed taken together in certain chemical processes. Such functions can be divided into five groups: 1) gas functions; 2) concentration functions; 3) redox functions; 4) biochemical functions, and 5) human biogeochemical functions – Homo Sapiens. Taken together, they determine the main chemical manifestations of Living Substance in the biosphere” (Vernadsky, 1987: 222).⁴

According to Vernadsky, the emergence of humans on the Earth and their activities transform the biosphere into the noosphere. “The noosphere is a new geological phenomenon on our planet. In it, for the first time, humans become the largest geological force. They must and can rebuild the area of their life with their work and thought, rebuild it in a radical way in comparison with what was before” (Vernadsky, 1987: 303).⁵ The civilized world forms a thin planetary shell of intelligent organisms and their sphere of activity – the noosphere. The noosphere was a historical epoch in the annals of the Earth’s crust.

² «В геологии жизнь проявляется только в виде живого вещества. Необходимо в точной научной геологической работе с этим считаться. В религиозном, философском и даже в обыденном языке понятия – жизнь и живое вещество – не совпадают, иногда резко. С этим мы не будем считаться и в геологии будем говорить только о живом веществе в том понимании, которое здесь дано».

³ «...мы можем уже в настоящее время определенно утверждать, что живое вещество в биосфере играет основную активную роль и по своей мощности ни с чем, ни с какой геологической силой не может даже быть сравниваемо по своей интенсивности и непрерывности во времени. В сущности, оно определяет все основные химические закономерности в биосфере».

⁴ «Они являются результатом закономерного проявления миллиардов живых неделимых, выявляющихся взятых в совокупности в определенных химических процессах. Такие функции могут быть разделены на пять групп: 1) газовые функции; 2) концентрационные функции; 3) окислительно-восстановительные функции; 4) биохимические функции и 5) биогеохимические функции человека – Homo Sapiens. Вместе взятые они определяют основные химические проявления живого вещества в биосфере»

⁵ «Ноосфера есть новое геологическое явление на нашей планете. В ней впервые человек становится крупнейшей геологической силой. Он должен и может перестраивать своим трудом и мыслью область своей жизни, перестраивать коренным образом по сравнению с тем, что было раньше».

The noosphere closely interacts with the biosphere and geosphere, transforming them with its activity. The emergence of humans and their activities have changed the cycles of matter, energy and information on the Earth's scale. The appearance of Living Substance radically changed the Earth's geosphere. The emergence of human cognition radically changed the biosphere and the appearance of the planet created by it (Vernadsky, 1977; 1978; 1987).

Vernadsky organized research on the nature of the Earth and its laws in two large research teams, at the origins of the organization of which he stood: The Biogeochemical Laboratory (now, V. Vernadsky Institute of Geochemistry and Analytical Chemistry of the Russian Academy of Sciences) and the Radium Institute, the organizer and the director of which Vernadsky was from 1922 to 1939.

Currently, Vernadsky's research is considered pioneering, laying the foundation for environmental sciences. However, at one time, Vernadsky's ideas about the biosphere and noosphere were not widely disseminated outside the Soviet Union.

James Lovelock: The Gaia hypothesis

The Gaia hypothesis was introduced in the 1970s by chemist James Lovelock and the microbiologist Lynn Margulis. The original idea suggested that near-homeostatic conditions on the Earth have been maintained "by and for the biosphere," however, the authors did not provide calculations of the biogeochemical cycles (Visconti, 2021). The Gaia hypothesis reveals the features of the interaction of living organisms with their inorganic environment on the Earth in order to form a synergistic and self-regulating complex system. Lovelock presented the existence of the Earth as a physical and chemical environment including the biosphere, the atmosphere, the hydrospheres, and the pedosphere, which, through a cybernetic feedback system, is unconsciously controlled by the biota. Biota independently regulates the planetary environment in order to achieve stabilization of habitability conditions in full homeostasis. Planetary homeostasis is supported exclusively by living forms, which even determine human development. An important aspect of the hypothesis was the proposal to detect the combinations of chemicals, including oxygen and methane, in the atmospheres of other planets. It was indeed a relatively reliable and cheap way of detecting life on space objects (Lovelock, 2010).

The initial version of the Gaia hypothesis was not completely different from the idea of the biosphere, claimed by Vernadsky almost 50 years earlier. However, at the same time, (a) Lovelock's substantiation was less convincing than that of Vernadsky. (b) The presented hypothesis was focused on the study of the activity of Living Substance only (in Vernadsky's terminology).

The Gaia hypothesis was inconclusive because Lovelock was a Doctor of Medicine and worked in rodent cryonics. While Vernadsky's scientific interests initially covered mineralogy, crystallography, geochemistry, geology, soil science, radiogeology, biology, and biochemistry.

The Gaia hypothesis, in its original form, contradicted the principles of natural selection and proved to be theological (Visconti, 2021). However, Lovelock was an inventor throughout his life, and his work in NASA's planetary exploration programs expanded his circle of interests and acquaintances. Lovelock developed many scientific instruments, including the invention of a family of ionization detectors for gas chromatography, used, among other things, to study the planetary atmospheres. Lovelock's inventions and collaborations with researchers from other fields helped bring the Gaia hypothesis into line with Earth system science, biogeochemistry and systems ecology.

A series of the held Gaia conferences (1st – August 1985 at University of Massachusetts Amherst; 2^d – San Diego, California on March 7, 1988; 3^d – Valencia, Spain, on June 23, 2000; 4th – October 2006 at the George Mason University) contributed to the popularization of the Gaia hypothesis and its refinement. However, the final verdict of the Gaia hypothesis came from a large-scale study by Toby Tyrrell (2013). Summarizing nearly 50 years of pros and cons of the Gaia hypothesis, Tyrrell arguably rejected a homeostatic mechanism, which Lovelock claimed to be his main discovery. Tyrrell confirmed close links between the evolution of life and the environment and the fact that biology affects the physical and chemical environment. However, he pointed out that it was useless to use the term “Gaia” in relation to these phenomena. Both phenomena are already accepted and explained by the processes of natural selection and adaptation (Tyrrell, 2013).

Thus, the Gaia hypothesis is a dead end (Tyrrell, 2013: 209). The complexity of the Earth’s existence was not completely presented in the hypothesis and proved to be contradictory. Nevertheless, the Gaia hypothesis has fulfilled its mission. It revived the interest of researchers in the works of Vernadsky and stimulated many new ideas about the nature of the Earth and the process of its transformation. The holistic approach to the study of the Earth proposed by Vernadsky was established in the academic environment and was implemented in the “Evolving matter” theory.

The “Evolving matter” theory

The “Evolving matter” theory was suggested by Oleg Bazaluk in 2000. The theory substantiation has repeatedly been complicated. The latter line of reasoning was presented by Bazaluk in 2016 in the book *The Theory of Evolution: From a Space Vacuum to Neural Ensembles and Moving Forward* (Bazaluk, 2016). The main difference of the “Evolving matter” theory from the two previous views on the complexity of the Earth’s existence is the use of a new analysis method called Big data (Reca, 2020). In fact, the key mission of the “Evolving matter” theory is, in a certain way, to systematize knowledge from various fields of science, which, to a greater or lesser extent, affects the issues of disclosing and revealing the nature of transformations of the Earth and the Universe. The “Evolving matter” theory is featured by: (1) the amount of data (Volume); (2) data update rate (Velocity); (3) heterogeneous data types (Variety); (4) data compliance with the disclosed nature (Veracity); and (5) the significance of data (Value). Moreover, Bazaluk stipulates that the systematization of knowledge about the complexity of the Earth’s existence suggested by him is nothing more than an improved Vernadsky model (Bazaluk, 2016). As a result, the “Evolving matter” theory is perceived as a rethinking of Vernadsky’s ideas about the biosphere and noosphere using new approaches and methods of working with the global data volume.

Using the predictive analytics methods allowed Bazaluk to obtain the following results. “On the example of the Solar System, only one sequence of the complication of the structure of the Universe can be seen: Inert Matter → Living Matter → Intelligent Matter, or alternatively, taking into account “transition” states of matter: Inert Matter → Bioinert Matter → Living Matter → BioIntelligent Matter → Intelligent Matter. Modern understanding of the complication of these states of matter is considered in the Big Bang theory, the synthetic theory of evolution, and the concepts of noogenesis” (Bazaluk, 2016: 129-130).

A holistic comprehension of the Earth’s nature is presented in the theory as a complexity of interactions between the three states of matter. Each state of matter is studied by scientific disciplines that use appropriate methods and tools of cognition. The novelty of the “Evolving matter” theory is that:

1. The theory allows us to consider the transformation of the Earth as a process. It is built in accordance with the requirements of the process philosophy (Seibt, 2021). Therefore it is not tied to a specific system of views, for example, to the modern understanding of the Big Bang theory or the synthetic theory of evolution. The theory predicts the disclosure of a new complexity of understanding of the Universe, biological life and human, but at the same time, it claims only to systematize the results of this disclosure itself. The disclosure process is carried out within the specialized scientific disciplines that use the predictive potential of the “Evolving matter” theory and improve it with new knowledge in their fields.
2. Bazaluk presented human activity as a new state of matter, which arose on the basis of living matter (in Vernadsky’s terminology). Here are his brief conclusions: “In the Solar System, the states of matter have been formed sequentially, at intervals of approximately 3 billion years: (a) Approximately 6 (5.5) billion years ago, in the Milky Way Galaxy, the Solar System was formed – one more hotbed in uneven, continuous and non-linear block complication of the Universe. (...) (b) Approximately 3.5 billion years ago, as a result of geological evolution, on the Earth, the first biological organisms emerged and gained a foothold. Over 3 billion years, they formed the system of Living Matter, which was denoted by the term “biosphere.” (c) Approximately 6-7 million years ago, as a result of neuroevolution, on the basis of the highly developed biosphere of Earth, the first structures of Intelligent Matter emerged. This started the formation of the noosphere” (Bazaluk, 2016: 130).

Thus, the “Evolving matter” theory offers an improved way to systematize knowledge about the existence of the Earth, based on the ideas of Vernadsky and the development of the process philosophy and Big data.

Conclusions

The results of comprehending the complexity of the Earth as a space object are used in philosophy to create a cultural ideal (Bazaluk, 2019). The cultural ideal is developed and promoted by philosophy as a way of ordering (harmonizing) the laws of organizing human life, the Earth and the Universe. The cultural ideal draws humans to their own nature in order to transform their way of life in accordance with it. The cultural ideal promotes the intelligible unity of human nature, the Earth and the Universe and focuses human attention on the need to transform their being in accordance with the intelligible complexity of the Earth and the Universe. In fact, the cultural ideal sets the focus and limits of human self-actualization.

Thus, it has been found that a philosophical discourse of the Earth performs two main functions:

1. Reveals the complexity of the existence of the Earth as a space object.
2. The obtained results are concentrated in the cultural ideal, and are used to transform the individual and collective way of human life in accordance with the disclosed complexity of the outer space.

The modern philosophical discourse of the Earth allows drawing the following conclusions:

1. The complexity of the Earth's existence is understood by the modern academic community as the co-evolution of three states of matter: Inert Matter, Living Matter and Intelligent Matter (in Bazaluk's terminology). Each state of matter creates its own sphere of existence, the mission of which is to transform in such a way as to resist any transformations from competing spheres. For example, the noosphere is a self-sufficient sphere of human existence. However, it is forced to continuously transform (become more complex) in order to withstand the pressure from the constantly increasing geosphere and biosphere.
2. The revealed complexity of the Earth's existence is concentrated in the cultural ideal. Bazaluk termed it with the metaphor "Earth Transforming" (Bazaluk, 2019). The "Earth Transforming" ideal defines the focus and limits of human self-actualization, namely, it reveals human as a planetary force, about which Vernadsky wrote back in 1944 (Vernadsky, 1987).
3. The processes of natural selection and adaptation explain the features of transforming human activities and continuous complication of the global ecosystem of the Earth and local ecosystems.

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Accessing a Big Bounce Universe with Concealed Mass and Gravitation

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According to Whitehead, nature is disclosed to mind by an ensemble of events characterized by unobservable hidden intrinsic factors (e.g., mass, gravitation) and observable extrinsic factors (e.g., motion, density). Mass is not the substratum of dynamics. It implies spatial extension and temporal duration, which are both necessary conditions of observable natural phenomena. Therefore, an instant, deprived of duration, is immeasurable. Whitehead's claims on mass, space, and time corroborate Verlinde's alternative conception of quantum gravitation. Within the de Sitter space-time, this conception starts from the competition of the short distance degrees of freedom of the Ryn-Takanayagi tensor with long-distance thermalized excitations. This enables the creation of a baryonic mass and a decrease in de Sitter entropy. The memory effect of the original baryon creation leads to gravitation and the production of extensive thermodynamic entropy. However, the baryon production shrinks, and the dissipating space-time transforms into a space-timeless cold sink with an accompanying strong contracting memory effect. This is equivalent to the alternate motion of a giant Carnot engine, where the heat source and sink energy exchange produce the eternal periodic dynamics of the Universe. This suggests that the Universe did not start from Big Bang but oscillated eternally as a Big Bounce Universe.

Keywords: gravity, mass, observability, entanglement entropy, baryonic creation, hysteresis

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1. Database of observable facts according to Whitehead

Celestial body luminosity appears as a discerness of place over a period of time (duration), related to a complex of events such as its velocity and the solar global neutral hydrogen line width, both by two relations of extension and congruence (Tully & Fisher, 1977). How can a database of observable facts be produced, and what are the consequences for scientific claims?

Within an ensemble of events $\mathcal{E}$ a series of congruent events $E_1, E_2, \dots, E_i, \dots, E_n, E_{n+1}$ is given, all making part of the same duration with index i indicating countable extensions (Whitehead, 2007). The event-particle e is the result of converging extrinsic properties connected to surrounding events of the ensemble $\mathcal{E}$. Within the ensemble $\mathcal{E}$, particle-events require a "Moment" as the duration of minimum extension representing all nature at an instant "now" as well as a spatial "Station" at a location "here" (Whitehead, 2007). Given event-particle e as the intersection of a particular moment and station, three possibilities exist:

- i. Other event-particles are all disjunctive to e .
- ii. All events involved with the particular event-particle are inside the Moment containing e .
- iii. All involved events overlap by a duration containing those event-particles which are covered by corresponding bounding moments. The boundary consisted of two 3D spaces. Such a subset $\mathcal{M}$ of events occupies the aggregate of the event particles within. Consequently, all subsets $\mathcal{M}$ of $\mathcal{E}$ ($\mathcal{M} \subseteq \mathcal{E}$) containing the series of a particular event e are closed. The set $\mathcal{E}$ of experimental countable outcomes forms a topological space.

This implies the definition of a Borel algebraic set on Whitehead's set of particle events. If a collection $\mathcal{M}$ of duration subsets of the set $\mathcal{E}$ of event-particles including $\mathcal{E}$ is containing (i) all countable unions of subsets of $\mathcal{E}$, and (ii) all countable subsets of intersections of subsets of $\mathcal{E}$, and (iii) all subsets of event-particles included in the countable union of subsets, then $(\mathcal{M}, \mathcal{E})$ is a Borel Space.

In order to be distinguishable, the ensemble of event-particles must be endowed by a Hausdorff topology so that any extrinsic character (e.g., velocity, position, time, luminosity) can be mapped by a homeomorphism on $\mathcal{F}$. Furthermore, a measurement protocol produces a countable ensemble of experimental data $\mathcal{E}$ as separable final results of a cyclic process starting from and ending within the experimental setting. In addition, there is always a transfer of energy Q and, consequently, a Kelvin-Planck thermodynamic theory is involved. The limiting points of the converging series e_i of $\mathcal{E}$ are mapped on a data base within $\mathcal{F}$. As it contains all limiting points, this database of observable events is a compact set. Within any time-like cone containing the ensemble of events $\mathcal{E}$, the experimental setting detects a physical phenomenon $\mathcal{M}$ (i.e. luminosity) and collects irreversibly the data in an ensemble $\mathcal{E}$. In consequence, a finite regular Borel measure B is defined on the set $\mathcal{E}$ of event-particles in order to connect the event-particles irreversibly to the compact data $\mathcal{F}$. $\mathcal{F}$ presuppose the intervention of the existence of a Kelvin-Planck thermodynamic theory which is a necessary and sufficient condition for the Clausius-Duhem inequality representing the second law of thermodynamics (Truesdell, 1983). The proof is based on the separation theorem of Hahn-Banach that admit a hyperplane within a Hausdorff ensemble, including one closed ensemble $\mathcal{E}$ and one compact $\mathcal{F}$ so that there exist canonical adjoint functionals T and S , called thermodynamic temperature and entropy so that $dQ/T < dS$ is applicable on the closed set of event-particles $\mathcal{E}$. This implies that at the separation hyperplane, the entropy is zero, and in consequence the system has a condition characterized with a low entropy state $dQ/T > dS$ on the compact set $\mathcal{F}$.

2. Verlinde's conception of quantum gravitation within Whitehead's conception of observability

Experimental support for Verlinde's conception of quantum gravitation is provided by the Tully-Fisher relation (Tully & Fisher, 1977). This relationship connects the luminosity of the galaxies to their mass and diameter. Absolute magnitude, global profile, and diameter are functions of the velocity of the relative motion between the galaxy and observer. In Whitehead's concept, observable galaxies are natural events. The corresponding relative velocity and luminosity are extrinsic observable characters, but mass, profile, diameter, and gravitation are intrinsic (Whitehead, 2007). Instrumental observations in a laboratory setting are clearly the result of intelligible discursive processes, thereby not detecting events but entities represented by observable and experimental data, resulting from (mental) thought (Whitehead, 2007). Observable events make room for the set-up of a countable database of experimental facts (Whitehead, 2007). All observed data of events e under consideration form part of the ensemble $\mathcal{E}$ containing series E_i of the observed events. The limit of the above mentioned series with the intrinsic property of e 's is the abstract of the converging series E_i (Whitehead, 2007) and is projected on abstract dimensionless instants of time of a four dimensional (4D) compact space-time manifold $\mathcal{F}$. Instants of time are dimensionless. Instead of a countable ensemble, instants of time make part of space-timelike space; however, they are the ideal of the non-entity and, therefore, neither a database nor entities (Whitehead, 2007), as was explained in section 1.

3. Whitehead's conditions of observability and the Einstein-Friedmann cosmology

What is disclosed to mind by nature, and what is disclosed by nature by the mind (Whitehead, 2007), that is the question. According to Whitehead, the ensemble $\mathcal{E}$ discloses nature to mind, contrary to the Einstein-Friedmann cosmological theory where the formal compact space-time $\mathcal{F}$ discloses nature. Einstein started from the Newtonian conception of space and time as an a priori 4D Minkovski manifold containing matter as a substratum of elementary particles endowed by dynamical characteristics. According to Noether's first theorem (Noether, 1971), the homogeneity of space and time implies the conservation of linear momentum and energy, respectively, while the isotropy of space involves conservation of angular momentum. The symmetry properties are put a priori on the Minkovski container, and the three physical parameters (linear and angular momentum, and energy) are part of the dynamics. However, the dynamic equations are derived from the d'Alembert variation principle of minimum action so that any dynamic event is reduced to a static substratum (Misner et al., 1973).. In the scope of relativity, those patterns governed by dynamical gravitation laws are formally equivalent within any inertial reference system linked by a Lorentz transformation, the so-called equivalence principle (Udwadia & Kalaba, 2002). Constant gravitation is equivalent to a noninertial reference system. The matter is considered as the intrinsic factor of any substratum, while the extensive factor of any substratum is reflected in the curvature of its occupied space-time. Consequently, only geometric deviations of the 4D Minkovski space-time provide experimental support for the action of gravitation. Formally, the Einstein equation connects the substratum of the stress-momentum-energy-pseudo-tensor T_{ij} and G , which represents the new universal gravitation constant, to the curvature R_{ij} of the space-time container as follows:

$$R_{ij} + \frac{1}{2}Rg_{ij} = \frac{8\pi G}{c^4}T_{ij} \quad (\text{Eq. 1})$$

Here, R is the determinant of the R_{ij} curvature tensor, and g_{ij} is the metric tensor. The indices i and j vary between 1 and 4, corresponding to the time and space coordinates, respectively.

According to Whitehead's conceptions, action T and reaction R are completely turned back. Instead of the observability of the extrinsic dynamical factor of any event to provide evidence for its intrinsic gravitation and mass factor, experimental evidence – in the scope of relativity – evolves from the unobservable intrinsic factors within a priori static space-time: the universal gravitation constant G and mass are causes of the varying geometry of its environment. According to Whitehead, however, elements of geometry, that is, space and time, are the a priori conditions of the observable effects of gravitation. Consequently, Whitehead's boundary conditions of observation become the final relativistic results of the experimental observations. Stated otherwise, the cart was placed before the horse. The cosmological consequences of the Einstein-Friedmann model follow directly from the aforementioned a priori symmetry boundary conditions of space-time and from the a priori dual conception of mass. On the one hand, mass is the substratum of any dynamic event as an intrinsic factor; on the other hand, it makes part of dynamic observable extrinsic factors of events such as the conservation of linear momentum and energy. Furthermore, two additional corollaries about the nature of the Universe evolve from the Friedman model. First, the calculated average density of matter of the Universe ($10 \times e^{-29} \text{ g/cm}^3$) is 100% of the estimated matter density ($10 \times e^{-31} \text{ g/cm}^3$) in the environment of a galaxy. Second, the negative open radius curvature provides support for an expanding universe from time zero to infinity with just one singularity, while the positive closed radius curvature implies an oscillating universe with periodic singularities. The first corollary endowed the Universe with unobservable Black Matter, and the second makes room for the Big Bang, provided the Universe has the curvature of the Anti-de Sitter Space (Misner, Thorne & Wheeler, 1973). Both substantial elements of the Universe evolve from mathematical products of mind without disclosure of nature to mind.

4. Whitehead's conditions of observability for Pound-Rebka en Redshift experiments

What are the consequences for basic experiments of relativity, such as the experiment of Pound-Rebka (Pound & Rebka, 1959) and the redshift deviation of electromagnetic rays in the environment of Mercury (Treschman, 2014) given the mentioned controversy? Pound-Rebka's setup was based on the Mossbauer effect measurement of travelling γ -rays produced by a ^{57}Fe source along with a tower with a distance of 22.56 m in order to provide experimental evidence of the above-mentioned equivalence principle of gravitation and inertial reference systems. The gravitational energy shift of massless photons during their downward and upward motion with increasing wavelength demonstrates the gravitational action and, consequently, the length contraction and time dilatation as predicted by the Lorenz-transformation between two inertial reference systems, provided the Sun spectrum is supposed to be standard. At first glance, it concerned a measurement of the extrinsic factor of the gamma-decay shift, while the intrinsic gravitation factor and the equivalence principle were taken for granted. The same remark is valid on classical tests of the deflection of light by the sun and the gravitational redshift in the environment of Mercury. The shift to infrared,

however, is the measurement of acceleration and motion. These are extrinsic characteristics of events; moreover, the equivalence principle is also taken for granted. At face value, these experiments corroborate the formal equivalence of gravitation and inertia; however, both experiments provide evidence for the varying curvature of the 4D Minkowski space-time.

However, this varying curvature of the 4D Minkowski space-time is precisely the *a priori* condition of the observability of any event. Moreover, the ensemble of particle events disclosing the extrinsic energy shift of gamma particles and redshift of light in the Mercury environment is the result of interactions of the involved series of events, but it is not the result of the hidden intrinsic characters of the events. Thus, the data of these experiments only corroborate the geometric *a priori* conditions of their observability. They cannot disclose the deep essence of their intrinsic characters, such as mass and gravitation. Hence, is the interpretation of these experiments from the principle “what is disclosed of nature by mind?” shed more light on the deep nature of gravitation, or are they just obscuring some cosmological phenomena, such as the accelerated expansion of our Universe by presupposing the non-observable dark matter? Evidence for dark matter claims to explain excess gravity is supported by recent references (Brouwer et al., 2021). However, in this study, measurements of hydrogen profiles beyond and within the optical discs of galaxies, dynamics of galaxies in clusters, and other new methods such as weak gravitational lensing, only demonstrate baryon acoustic oscillations and cosmic microwave oscillations. What is more, Brouwer et al. (2021) provided more evidence for Milgrom’s non-general relativistic Modified Newtonian Dynamics (Milgrom, 1983, 2013), although the experimental support discloses the *a priori* conditions of observability rather than shedding light on the essential nature of mass and gravitation. These attempts, based on the equivalence principle of gravitation and inertia, discover the extrinsic characters of the entire Universal Event, but they do not disclose the deep essence of intrinsic characters such as mass and gravitation. As such, they corroborate the varying conditions of observability. We provide answers to the above questions by analysing Verlinde’s claims about the nature of gravitation and apparent dark matter in the scope of Whitehead’s concepts of matter, space, and time.

5. Verlinde’s alternative conception of gravitation

Verlinde suggests the existence of apparent positive dark matter in order to explain the accelerated expansion of our Universe. Contrary to the widely accepted theoretical approach involving dark matter, Verlinde’s conception of matter does not reduce this factor to the substrate of energy and linear momentum. The matter is deeply connected to pressure-less fluid, revealing the emergent nature of gravitation as the intrinsic elastic response of space-time to excitations of the meta-stable micro-ground state of the de Sitter Space. Verlinde’s propositions about the deep origin and the essential nature of gravitation start from the de Sitter space, in which a part of the microscopic degrees of freedom are thermalised. A non-locally stored thermodynamic entropy $S(V)$ emerges besides the Bekenstein-Hawking area law entropy, proportional to the cosmological horizon (Verlinde, 2017). According to the holographic principle, the stored *k*-logic qubits at the surface spread out over *n* physical qubits in bulk. The area law due to the short-distance entanglement of neighbouring degrees of freedom of the Ryu-Takayanagi tensor formulation of emergent space-time generates the entanglement entropy $S(V)$ (Vidal, 2007), which is well-known as the area law for entanglement entropy (Casini, & Huerta, 2009). However, the entanglement entropy is the entropy of the non-observable (Casini & Huerta, 2009) according to the Ryu-Takayanagi conjecture about contributing short-range and long-range areas. Consequently, this entropy

is out of the range of Whitehead's observable ensemble of events. The extensive thermal entropy $S_t(V)$, on the contrary, implies extension and duration, and consequently, $S_t(V)$ implies observability of the involved events. The corresponding entropy decline by mass M gives $S_M = 2\pi M_B / \hbar a_0$. A long-time scale creates eigenstate thermalisation accompanied by a thermal volume law contribution of entropy $S(V)$ that competes with the Bekenstein-Hawking entanglement entropy S_{BH} . This means that the so-called Coulomb branch mass and gravitation branches off from Higg's branch stress-strain response of the pre-baryonic Universe. Furthermore, Verlinde also recovers the equivalent of the scaling Tully-Fisher relation between baryonic and apparent positive dark mass (Verlinde, 2017):

$$\sum_D r = \frac{a_0}{8\pi G} \cdot \frac{\sum_b(r)}{(d-1)} \quad (\text{Eq. 2})$$

G is the Newtonian gravity constant measured by Cavendish in 1798. Furthermore, the thermal entropy decreases because thermal entropy contributes to the de Sitter entanglement entropy. Consequently, the thermal volume entropy transforms the space-time into a reactive elastic medium. Moreover, the gravitation, fed by the created positive dark energy, emerges from the elastic reaction of the de Sitter space within the cosmological horizon in the competition of both long- and short-range entanglements, while the horizon stabilises. Verlinde's claims about gravitation as the memory effect of entanglement entropy producing and competing short- and long-range dynamic tensor energy involve a universe that behaves as a condensed elastic medium.

$$\sigma_{ij} = \lambda \cdot \varepsilon_{kk} \cdot \delta_{ij} + 2 \cdot \mu \cdot \varepsilon_{ij} \quad \text{where} \quad \mu \geq 0, \lambda + 2 \cdot \mu \geq 0 \quad (\text{Eq. 3})$$

Here, σ is the stress, ε is the strain, δ is the Kronecker delta, the indices i and j vary between 1 and 4, corresponding to the time and space coordinates, and k indicates the diagonal terms of the matrix. μ and λ are the Lamé parameters. Stress is followed by entropic elasticity due to adiabatic expansion, and by elastic reaction, adiabatic compression. The reactive action of gravitation to the baryon mass escape minimises the memory effects on external perturbations in condensed matter. Verlinde identifies the latter as the emergence of an apparent positive dark energy. The hysteresis curve describing the stress and strain is a measure of the entropy production in glassy materials identified as positive black matter in the scope of Verlinde's concept of gravitation. The relationship between strain and stress is well established in glassy materials (Radhakrishnan et al., 2017).

6. Whitehead's support for Verlinde's alternative conception of gravitation

Since Verlinde does not put a substratum status on mass, and since he does not make the curvature of space equivalent to gravitation, he reformulates cosmology in Whitehead's concept of nature. Whitehead tacitly implies the creation of an appropriate gravitational environment by mass excitation escape to settle down energy and momentum in the web of space- and time-like events. Consequently, space and time just emerge after the escape of the baryonic mass and the reactive force of gravitation. Verlinde's attempt requires experimental evidence of additional positive energy to explain the border flattering of galaxies. Therefore, he links his results about visible baryonic matter density with positive apparent matter using the Tully-Fisher scaling relation. Given the acceleration g_D due to the apparent positive dark mass with $g_D = G \cdot M_D(r)/r^2$, the baryonic Tully-Fisher relation becomes (Verlinde, 2017):

$$v_f^4 = a_M \cdot G \cdot M_B \quad (\text{Eq. 4a})$$

$$a_M = \frac{a_0}{6} \quad (\text{Eq. 4b})$$

$$g_D = \frac{v_g^2}{r} \quad (\text{Eq. 4c})$$

Here, v_f is the asymptotic velocity of the flattened galaxy (see Papastergis, Adams, & van der Hulst, 2016 for recent experimental support).

However, we emphasise the deep difference between the classical Einstein-Friedmann conclusions from the Tully-Fisher scaling relation and Verlinde's experimental gauge claims for the elastic response of the nature of the essence of gravitation. Within the Einstein-Friedmann concept, luminosity is linked to the intrinsic factor of gravitation, and the conclusion of the k -shift is considered to provide evidence for mass as substratum, notwithstanding the fact that mass as substratum is already tacitly assumed, because the observability conditions of extension and duration are pre-supposed. According to Verlinde, gravitation and mass correspond to the expanding or shrinking space-time, and indirectly, this space-time variation is measured, not the motion of the hypothetical substratum mass. Gravitation, as the memory effect of the mass escape due to the competition of long-distance and short-distance quantum states, can be considered as an intrinsic characteristic of the escape event.

7. The Big Bang as the ideal of the non-entity

Observability and experimental databases start when space and time are created by the mass escape due to competition of short-range and long-range entanglement of degrees of freedom of stress tensors. By baryonic mass creation, the de Sitter entropy decreases, and the measurement of this event implies that the observable creation of baryonic mass makes part of a closed set of event-particles while the observed event is mapped on a compact set of experimental data, provided that on this compact set of data, the Kelvin-Planck thermodynamic theory is valid.

This observed baryonic mass creation matches the branch off within the fact-like thermodynamic reduction of the Arrow of Time by Reichenbach (1956) and Grünbaum (1973). The branch-offs were first mentioned by Reichenbach (1956) and subsequently by Grünbaum (1973). These branch states are nothing more than the emergence of baryonic matter of ensemble E . Consequently, the entropy of a separated galaxy or a solar system increases after gravity and separation starts. The cut-off by hyperplanes explains the apparent paradox of the asymmetric evolution of galaxies and our solar system, while the interactions on the microscale are completely symmetric.

While Reichenbach and Grünbaum define their branch off as a factlike reduction of the Arrow of Time, Verlinde's claims imply a lawlike reduction of the Arrow of Time based on the emergence of baryonic matter. However, there is an important restriction to be added. The arrow of time is not a universal unique time direction but is directly connected to the respective Higg's branch entity from which the baryonic escape creates the respective low-entropy branch off. Consequently, time asymmetry does not reduce to thermodynamic entropy unless it is a relative time within the separated sub-ensemble of the Universe, and there is no evidence for an absolute Arrow of Time. However, this branch cut-off or the creation of the Coulomb branch out of Higg's branch is presented as an instant of time. However, according to Whitehead, an instant is the ideal real of all nature without any temporal extension, so

the ideal of immeasurable non-entity. However, physical theories admit concepts such as dimensionless instants of “now” and “here,” notwithstanding that nature does not allow absolute instants of time “zero” and dimensionless particle events of spatial ‘here’ because they are non-events, and hence immeasurable (Whitehead, 2007).

Whitehead’s conception of matter, space, and time does not imply a unique “first energy-momentum entity” or an absolute beginning of the Universe. However, it has a very remarkable logic corollary: it does not exclude speculations about partial short-range as well as long-range entanglements within the pre-space-time energy-momentum entity that evolves to the above-mentioned excitations of the meta-stable micro-groundstate of the de Sitter Space. Consequently, the origin of baryonic matter escape can be monistic by a unique entanglement or plural by multiple partial entanglements. Obviously, the probability of plural baryonic creation evolving from a unique cause is rather negligible unless a fundamental uncertainty which is a basic property of the space-timeless entity and governs the different baryonic creation.

8. The Giant Carnot Cycle as the Big Bounce Universe

The “space-timeless entity” is not an infinite source of baryonic mass creation. Thermodynamic entropy appears in the dissipating and expanding Universe. The baryon part of the Universe produces space-time from energy taken from the space-timeless entity, and its free energy dissipates into the energy sink of the produced space-time. This mechanism is sustained by the “Heat” source of the space-timeless entity. This space-time, however, shrinks when mass and gravity production is accelerated beyond the cosmological horizon. Indeed, the gravitation response on baryonic creation as a memory effect of the pre-baryonic Universe can exceed the stress factor. In that case, the hysteresis energy is negative, notwithstanding the positive dark matter that provokes the expansion of the Universe. Instead of expansion, contraction is the right response to stress created by baryonic production. The huge memory effects of the original baryon creation appear, and space-time shrinks into a space-timeless cold sink. In addition, entropy as an extensive physical parameter decreases, so that the temperature is raised in the sink. Short and long-distance entanglements arise with thermalised excitations, and the “cold” sink becomes the “heat” source and vice versa; the residue of the former space-timeless heat source becomes the cold sink. It looks like the periodic motion of a giant Carnot engine where the heat source and sink alternately share their functions in order to produce the eternal periodic dynamics of the Universe. The Universe did not start from the Big Bang, but oscillated eternally. The concept that the Universe did not start from the Big Bang but oscillates eternally just like the Big Bounce is corroborated by Popper’s claims about the nonexistence of a central source causing the singularity of the outgoing and contacting waves (Popper, 1956a,b; 1957). According to Popper’s claims, even the singularity of the Big Bang evolving from a central source sounds rather odd.

Thus, the alternative conception of gravitation formulated by Verlinde is supported by Whitehead’s view on the matter, space, and time, and this results in the decline of the Big Bang in favour of the Big Bounce Universe. Within this Giant Carnot Universe, different stages of the expansion of the Universe exist. This implies that the reported values of the Hubble constant, derived from different experiments (Di Valentino et al., 2021), could all be exact acceleration values, although an only representative for different stages of the oscillating Universe.

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Models of the Universe: Ontological and Physical Problems

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The primary target of this paper is a philosophical analysis of modern models of the universe in cosmology. Understanding the existence of being is directly related to understanding both the world and oneself. An important characteristic of ontology is time, matter, space which forms the ontological horizon of presence. Ontology tries to describe the fundamental principles of our universe in a comprehensive and consistent way, but the more the system includes different levels and objects, the more difficult it is to make an ontological description, especially when it comes to the structure of the universe. Cosmology historically develops in the bosom of ontological discourse, as it tries to describe the fundamental structure, nature, and dynamics of the universe. In this paper, we identify the concept of the Bipolar Universe. According to this model, two mirror-symmetric parallel universes were formed during the Big Bang. Within the framework of this concept, the problem of baryogenesis is solved. It is possible to allow some interaction between two parallel universes, for example, the correlation of the motion of matter and solve the monopole problem. The article describes the hypothesis of the existence of mirror matter. The formation of ideas about the structure of our world articulates the ontological question of what reality is and what its metaphysical essence is. Three important ontological categories: time, space, and matter, form the ontological basis of the structure of our universe.

Keywords: ontology, reality structure, cosmology, bipolar universe, parallel worlds, baryogenesis

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Introduction

Ontological questions have a long tradition in the history of philosophy, which begins with the first schools of natural philosophy. The problem of existence, the structure of being are classic philosophical problems. How to explore everything that exists? How to systematize it? How to think about the world as a whole? How to structure and describe it? Martin Heidegger's work "Being and Time" departs from the traditional ontology, because Heidegger tries to answer the question: "What does being?" Its fundamental ontology is fundamental to traditional ontology in the sense that it relates to what necessarily implies any understanding of essences, namely, our understanding of why essences are essences (Heidegger, 2008). Being can be seen as presence, as a special type of existence of man and the world. Heidegger argues that the ability of presence to discover and understand being is that presence itself exists between being involved in the world because one belongs to the world and projecting oneself into that world. That is, the understanding of the being of being is directly related to the understanding of both the world and oneself. Another important characteristic of Heidegger's ontology is time, which forms the ontological horizon of presence. Since people project themselves and reality in time and are doomed to die, time is the catalyst that forces man to raise the question of existence. Heidegger's concept tries to describe the fundamental principles of our universe. Bazaluk takes Heidegger's concept to a new level, considering existence as a discrete-continuous environment ("continuity of matter"), in which essences express themselves. For Martin Heidegger, an important characteristic of ontology is the category of "nothing" – the absence, non-existence of a particular being or being in general. Its initial position is as follows: it is necessary to enter the extremes of existence – to Nothing. Heidegger's Nothing has a contradictory uncertain status: "Nothing" is non-existent, "Nothing" is a fundamental experience. Nothing in itself implies the complete absence of differences, a person must "look into the eyes of its radiant chaos" (Bazaluk, 2005: 50). Why the chaos? Unlike Martin Heidegger, for Oleg Bazaluk the world is a complex universe, space. "There is no emptiness in the universe," says Oleg Bazaluk. But sooner or later, it will reveal its meaning because it is based on quantum processes, the understanding of which has already come close to modern physics" (Bazaluk, 2005: 7).

Modern cosmology, which originated in the depths of philosophical discourse, opens the amazing horizons of our universe against the background of discoveries in modern science. The search for the standard of describing the world as an exhaustive theoretical model of different levels of existence is a research activity that promises unprecedented models of reality. The ultimate goal of ontology is to describe and present all things in the world in a comprehensive and consistent way so that fundamental knowledge will be clearly articulated for different semantic systems and cognitive agents, natural or artificial. This approach to ontology is used as a methodological basis in computer science. There, the ontology acts as a formalized representation of knowledge about a particular subject area. This subject area can be, for example, the environment, the world. This description is made in such a way as to be suitable for automated processing. The more the system includes different levels and objects, the more difficult it is to make an ontological description, the more it is about the structure of the whole. Cosmology historically develops in the bosom of ontological discourse, as it tries to describe the fundamental structure, nature, and dynamics of the universe. How did it form, what is its structure, how will the universe evolve? What is the large-scale structure of the universe?

The universe contains organized structures on various scales, from small systems, planets, planetary systems to galaxies and galaxies. When moving to scales less than 100 Mpc, a clear

cell structure is revealed, with “emptiness” – entrances, followed by clusters of galaxies, local groups of galaxies, the next level (scale 5-200 kpc) – a huge variety of different objects. How and why these organized structures were formed, what is the role of dark matter and energy, and how different objects interact – the answers to these questions are the main areas of research in modern cosmology (Vladlenova & Bazaluk, 2013).

There is a modern cosmological model Λ CDM, which models our universe and is the Standard Model of high-yield cosmology, because it is generally consistent with the observed phenomena and theoretical positions of modern science, although it has several scientific problems that need to be addressed. The cosmological theory of the Big Bang describes the development of the universe from the beginning – the early stage of evolution from an extremely high and hot state 13.8 billion years ago. Observations confirm the presence of relic radiation, which has survived from the earliest times of the universe (Dodelson & Schmidt, 2020).

This cosmological theory is consistent with observational facts, which fits into the general scientific theoretical construction, although it has several unresolved issues.

1. The problem of baryogenesis. The concept of the Bipolar Universe

Baryogenesis is a process that began after the birth of the universe. After birth, the universe contained different parts of matter and antimatter (Vladlenova & Bazaluk, 2013). In our universe, matter prevails over antimatter. We do not know why this is so. The standard model of elementary particle physics describes the microworld. The theory of Einstein describes the macroworld. These theories cannot explain the problem. Antimatter consists of particles that have the same mass as their counterparts in the matter, but electric charge and quantum numbers with the opposite sign (Battiston et al., 2021).

According to the general theory of relativity, any form of matter is combined with space-time to create a geometry that causes gravity. CPT symmetry demonstrates that antimatter obeys the same laws of physics as “ordinary” matter, and therefore responds to gravity as ordinary matter. There are several scientific hypotheses that try to explain the baryon asymmetry of the universe. According to this model, two mirror-symmetric parallel universes were formed during the Big Bang. That is, we have two universes formed during the Big Bang, one of which we live in – consists of matter, and the other world – of antimatter, where time flows in the opposite direction, which does not contradict modern physical ideas about time (Boyle et al., 2018). That is, the Big Bang became a point of symmetry, on different sides of which the universe and the anti-universe catered in time. In principle, the universe of antimatter should be similar to our world. In this model, it is not entirely clear how these two worlds interact through the point of singularity. Do they exist separately, or does some interaction occur? Was the foundation of particles/antiparticles in the days of the early universe through cosmic strings – topological defects in space-time? Difficulties arise due to incomprehensible processes at the point of singularity, which modern science cannot describe due to the extreme phenomena that occurred there. These gaps are trying to close in the quantum theory of gravitation, which is not yet a developed scientific theory. We have quantum physics, which describes the microworld, and general relativity, which describes the macroworld, but at the point of singularity, there are processes related to topological effects that require a theory that describes spatiotemporal and quantum effects simultaneously. There have been attempts to quantify gravity, which has led to even more confusing models of the universe, multidimensional dimensions, and infinite numbers of universes that have no experimental basis (Parikh et al., 2021).

These attempts have given rise to concepts such as supersymmetry and supergravity, superstrings, superbrains, the fifth force, the graviphoton, and so on. Maybe there is no point of singularity at all, but instead, there is a large magnet, where one universe consists of matter and the other – antimatter, and the universes repel each other as opposed to each other by opposite magnetic poles.

No matter how original the cosmological model is, it must explain observational phenomena and solve scientific problems. For example, the essence of dark energy is also the subject of controversy. It is known that it is very evenly distributed in space, has the ability of gravitational repulsion instead of gravitational attraction, low density, and does not interact in any noticeable way with ordinary matter using known fundamental types of interaction, except gravity. In dark energy, the density is the same, almost does not change over time in all reference frames, does not accumulate in space, and is distributed evenly over it (Particle Data Group et al., 2020). In the concept of mirror particles, dark energy is simply understood as the energy of a vacuum leftover from a spontaneous violation of mirror symmetry. There is also a hypothesis that there is no dark energy at all, and the accelerated expansion of the universe is due to unknown properties of gravitational forces, which begin to appear at distances of the order of the visible part of the universe (Boyle et al., 2018; Bian et al., 2018). Dark energy does behave like an antigravity force; its nature and origin remain unknown. It is unclear why dark energy began to dominate the rate of expansion of the universe at some point in time, billions of years after the Big Bang. The existence of dark energy, in any form, is necessary to reconcile the measured geometry of space with the total amount of matter in the universe. Based on astronomical studies of Planck's satellite, 68.3% of dark energy, 26.8% of dark matter, and 4.9% of ordinary matter were detected. Some researchers believe that the accelerated expansion of the universe is an illusion caused by the relative movement of us to the rest of the universe (Dodelson & Schmidt, 2020). As a result, observers in a galaxy like our Milky Way may experience accelerated expansion inside, and this is a local effect that gives the false impression that the entire space has recently entered an acceleration phase. However, the scientific community does not support such ideas. Let us compare the bipolar structure of the universe with a large magnet that has two poles (two universes) between which there is a magnetic-dipole interaction – a dipolar connection. We can allow some interaction between two parallel universes, such as the correlation of motion, flow and mixing particles, etc. It remains to determine the point of the singularity, whether it is needed at all, whether it can be avoided? It is possible that magnetic fields begin to form as a result of processes at the point of singularity in the early universe. Can this model explain the problem of dark energy? Perhaps between two universes, exist force of repulsion act between two magnets with different poles. Researchers led by Federica Govoni have discovered a large area of the magnetic field: 10 million light-years of magnetized space – a large “magnetized filament” in the study of the magnetic field between clusters of galaxies Abell 399 and Abell 401 (Govoni et al., 2019). It is not clear what its existence is connected with; where did these huge magnetic fields come from? We can assume that cosmic magnetism is from the birth of the universe, in which case it must be everywhere, including in voids. If so, magnetism exists along with gravity, can be the force that forms the large-scale structure of space.

2. Monopole problem.

The universe is like a big magnet and relative information

Another cosmological problem is the search for a monopole. Can the model of the Bipolar Universe explain the problem of monopole? It is still unclear why it was not found. The

field of the magnet is created by molecular currents, which are formed under the influence of electric charges, so the poles of the magnet cannot be separated; they are not independent entities, but only the two ends of the magnetic dipole. Theoretically, a monopole should exist. Some mechanism leads to the almost complete disappearance of the monopole. Astronomers are trying to explain this with the theory of inflation. The universe was expanding with acceleration, thereby “diluting the density” of the monopole to an acceptable level. It also solves other mysterious properties of the universe, such as the horizon problem. However, the theory of inflation has shortcomings, which are due to untested forecasts and a lack of serious empirical support. For example, Karsten Jedamzik and Levon Pogosian note that weak magnetic fields in the early universe would have led to faster space expansion than what is observed today (Jedamzik & Pogosian, 2019).

Among the unsolved problems of modern cosmology is the problem of the existence of the “Axis of Evil,” the so-called anomaly in astronomical observations of the cosmic microwave background (Dodelson & Schmidt, 2020). This is a hypothetical long-range area – the “axis” of the world, around which the orientation of the entire structure of the universe. In the work of Lior Shamir, it is assumed that the observation can be explained by the hypothesis that the early universe revolved around its axis (Shamir, 2020). Based on the Bipolar Universe model, this axis can also be the axis of rotation of interconnected universes. Another cosmological problem that may be the result of a correlation with the Anti-Universe is related to the horizon of the universe because it is unclear why our universe is so homogeneous that even some large parts of the sky with cosmic microwave radiation more than 13 billion light-years away, are consistent with both the motion and orientation of the solar system. Is this observation a confirmation of the correlation of the two universes? Is there an interaction between me and my anti-Self in the Anti-Universe? There are also many philosophical questions related to ontological and existential issues. Do I even exist in the Anti-Universe? In addition, does my anti-self in the Anti-Universe write an anti-article about the philosophical problems of cosmology? Fundamental philosophical questions about freedom, determinism, and freedom, which are already emerging at a new level, are also relevant. Are my actions consistent with my anti-self? For example, research in cognitive science confirms the thesis that signals in the brain appear before a person realizes his actions or choices. Maybe we are seeing a subtle correlation of two different people from two universes. Is there a correlation between my actions and my counterpart, the Milky Way galaxy, and its anti-galaxy?

Carlo Rovelli uses the analogy of a magnet to explain the concept of “relative information”: “in any magnet, the two ends have opposite polarity. To know one means to know another (Rovelli, 2015). We can say that each end “has information” about the other. There is nothing strange about it; this is just a way of saying that there is a necessary relationship between the polarities of the two ends. We say that there is “relative information” between two systems when the state of one is limited by the state of the other. “Thus, he deduces, different physical systems have information about each other, and such “relative information” is ubiquitous: “the color of light carries information about the object because the world is a connected tangle of interacting events, it is teeming with relative information”. Thus, when this information is carefully processed by our brain, according to Carlo Rovelli, it is encoded in language and acquires the semantic weight that we usually attribute to the concept of information. However, the foundations of semantics are in the physical sphere, not the mental sphere, because the physical world is a closely connected network of relative information, where the state of each reflects the state of the other. “We understand physical, chemical, biological, social, political, astrophysical and cosmological systems in terms of these networks of relationships, not in

terms of individual behavior. Relative physical information is a powerful basic concept for describing the world. For Rovelli, science is a continuous process of exploring new possible worldviews through “scientific revolt,” which is always based on previous knowledge, but at the same time constantly questions the aspects of this acquired knowledge (Rovelli, 2015).

3. Theory of the Digital Universe

Another hypothesis about the structure of our universe looks even more fantastic. There is an idea that our universe is the result of a large computer – the Theory of the Digital Universe. However, who wrote this computer program? Luciano Floridi develops “information structural realism,” which considers the world as a system consisting of information objects that dynamically interact with each other (Floridi, 2009). Such information objects should be understood as opportunities. The universe is computing. These information models of the universe do not explain the incompatibility with the existence of some continuous properties of physical symmetries, such as rotational and translational symmetry of space, Lorentz symmetry, and electroweak symmetry, which are central to existing physical theory. Proponents of digital physics argue that continuous symmetries are only convenient approximations of discrete reality. For example, although we assume that the Planck length is the minimum possible unit of length, on a smaller scale, the space is quantized (Vladlenova & Bazaluk, 2013). The hypothesis of the existence of mirror matter. There is a hypothesis about the existence of a hypothetical mirror form of matter. As the name implies, mirror matter is mainly a spatial reflection of ordinary matter. Particles of matter can be both left- and right-handed, so if an ordinary particle of matter was “left-handed,” its mirror particle would be “right-handed” but absolutely identical in all other respects. In the theory of mirror matter, every ordinary particle of matter has a mirror particle that doubles the number of particles in the universe. Our universe is mostly “left-handed” because it is dominated by left-wing particles. There are three important symmetries: charge conjugation (C), spatial parity (P), and symmetry with respect to time (T). Charge conjugation (C-invariance) means the replacement of the signs of electric charges of all particles of the physical system by opposite ones. P-symmetry means the symmetry of the equations of motion with respect to the change of the coordinate signs of all particles. In relation to this operation, symmetric electromagnetic, strong, and, according to the general theory of relativity, gravitational interactions. T-symmetry (“symmetry with respect to the circulation of time”) is the symmetry of equations describing the laws of physics with respect to the operation of replacing time t by $-t$. The reversibility of time reflects the nature of changes in physical quantities and physical processes in the formal change of the direction of time to the opposite (Vladlenova & Bazaluk, 2013).

4. The mirror particles

The hypothesis of the existence of mirror matter tries to explain why our universe consists of “left-handed” particles; the presence of mirror particles would restore the symmetry of the universe. Some scientists identify antimatter and mirror particles. Nevertheless, antimatter interacts very strongly with ordinary matter in the process of annihilation, at the same time; mirror matter will interact very weakly with ordinary matter. For this reason, some physicists suggest that mirror particles may be candidates for dark matter (Foot & Mitra, 2003). In this case, it is unclear why there are more mirror particles in our universe than ordinary matter. The usual baryon substance in our universe is a paltry 5%. It is believed that it is very difficult to “see the light” from mirror matter. Mirror particles interact with each other

in the same way as ordinary ones; it is believed that they can be detected by photon-mirror photon mixing, for example, in experiments of direct detection of dark matter. They can also interact with ordinary matter by gravity. Robert Foot believes that planets, comets, and even atmospheric fireballs are made from mirror matter (Foot & Mitra, 2003).

Such fantastic assumptions can be continued: about the mirror – spaces, extraterrestrial civilizations, galaxies, universes. Mirror particles can interact with each other, but with ordinary particles can interact only by gravity because gravity is the only universal force acting between any. What types of matter. There is speculation that dark matter, or perhaps part of it, may be a mirror image. Indeed, it interacts gravitationally with visible matter, but at the same time, we do not see it. However, the concept of mirror matter must explain observational phenomena. The formation of ideas about the structure of our world articulates the ontological question of what reality is and what its metaphysical essence is. Three important ontological categories: time, space, and matter form the ontological basis of the structure of our universe. The most significant example of an ontology is the attempt to form a model of the universe that requires the definition of different categories, the search for an understanding of how they fit together in the broadest possible context: the universe and perhaps even the Multiverse. When we ask deep questions, “What is the nature of the universe? What is existence? What is the structure of the universe? What principles govern the properties of things?” – we ask essentially ontological questions. What is the semantics of the possible and impossible world? The systematic use of the idea of other universes has raised the question of cross-identification; that is, the principles that determine whether a person from this universe will be identical to a person from a parallel world. Can a person exist in several possible situations? In “Two dogmas of Empiricism,” Willard Van Orman Quine argues that the totality of our knowledge or beliefs, from the most important questions from geography and history to the deepest laws of atomic physics or even pure mathematics and logic, is an artificial fabric that “reflects experience only at the edges” (Quine, 1951).

Conclusions

That is, science is a field of research where boundary conditions are studied. Conflict with experience on the periphery causes restructuring in the inner part of the field. Reassessment of some statements entails reassessment of others because of their logical relationships – logical laws, which, in turn, are certain elements of the field. After overestimating one statement, we must overestimate some others in terms of a logical connection. However, the general field is so uncertain of its boundary conditions, of experience, that there is great freedom of choice as to which statements to re-evaluate in the light of any particular opposite experience. Quine emphasizes a pragmatic approach in choosing one or another ontological picture, which is formed on the principles of relativity, our knowledge of objects described in the language of one theory can be considered only in the language of another theory, which should be considered in relation to the language of the next theory, and so on. Thus, the methodological principle emerges, which consists in the absolutization of relativity and conditionality of the content of knowledge. Unlike Quine, Karl Popper advocated critical rationalism and realism (Quine, 1951; Popper, 1963). He postulated that truth is objective, although knowledge is plausible and can be prone to error, so we must constantly review, clarify and verify. The validity of scientific knowledge arises from the fact that we are able to critically examine it.

The structure of reality is quite complex, especially when we try to “comprehend” it on the scale of the universe. There are many different methodological approaches to its study, but the general strategy is built around realism and relativism. According to Hammersley,

the solution is to take an intermediate position between them, which he calls subtle realism (Hammersley, 2004). Ontological issues, or the “study of being,” articulate the existence of what actually exists in the world, about which people can gain knowledge. Ontology helps researchers recognize how confident they can be in the nature and existence of the objects they are exploring. From the standpoint of subtle realism, phenomena are independent, but knowledge about them is always constructed by the researcher and does not follow from sensory impressions. In contrast to relativism, subtle realism argues that there is a single reality, not several realities that correspond to different perspectives, and that one can gain knowledge about the phenomena that make up this reality.

We have no experience of working with other universes, and we have no conclusive evidence that they exist at all. Despite the fascinating models of the structure of cosmological reality, to will win that science that conforms to the principle of simplicity relies on observations, can be tested experimentally, and make accurate predictions.

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Section Two

INTELLIGENT MATTER

From Paradise Lost to Paradise Conceptually Postponed: What Makes Scenarios of the Futures Being Staged

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In the article, the scenario-moulding is evaluated through the linguistic and conceptual accessibility of the future and the moral challenges of doing and allowing harm to the future participants of the practical discourses rooted in the present-centered scenarios. The viability of the scenarios is suggested to be defined by the alienation from the present and past imaginative contexts, as well as by overcoming the projections of humanity exclusiveness through inversive forecasting with the shift from human power to vulnerability as the key issue in scenario-making. The eccentric approach to the future makes it possible to review both intergenerational and intragenerational perspectives of the future through the chronological distance and yet-inexistent subjects' expectations and needs simulation. Taking to account the impact of the past, present and future otherness implies the three-dimensional assessment model involving metaphorical evaluation of the past-rooted patterns as paradise lost, illusions of the accessible futures as paradise found, and refusal of the futurized present expectations for the yet-unknown imaginative future contexts as paradise conceptually postponed. The approach can find its practical application in tailoring and evaluating migration solutions and scenarios.

Keywords: sustainability, futures studies, power, vulnerability, Doctrine of Doing and Allowing (DDE), scenario

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Introduction

The scenario-making in the context of sustainability inevitably implies the issues of caring about the future, responsibility, and outcomes evaluation. At the same time, there should be considered the subjects' connections rooted in the political field and shaping the capabilities for action, within the asymmetrical conceptual pattern of care. As Christopher Groves describes it,

Making sustainability a concrete way of working through the multi-decadal collapse of progress narratives requires the improvisation of shared practices that effectively embody care for the world and solidarity with future people, and the articulation of norms that will help us both locate ourselves as performers of these practices, and trouble us with their insufficiency as ways of expressing our responsibility to whoever comes after us. Responsibility is irresponsible unless it is transformed into an actual response. (Groves, 2019: 923).

The problematic issue on the scenarios of the future is that they seem to have a limitation in reaching further from the present in the dimensions shaped and influenced by otherness, dialogical responsibility, and communication goals for the changes introduced. The futures scenarios evaluation, in terms of sustainability, is focused on the aspects as follows: (1) the markers of the scenarios being potentially instrumental, anthropocentric, or present-centric (Groves, 2019: 916); (2) the markers of the future populations being considered in terms of otherness, in Ours-Other-Alien dimensions; the otherness map including the sense-loaded stereotypes and metaphors of family relations that empower the present populations to guide the choices of the successors using the now-established norms and practices; (3) the correlation between the past, present, and future, as well as the chronological balance between the vectors; (4) the symbolic markers that label the outcomes as either preferable or inappropriate on the scenario-moulding stage, and involve social myths and biases.

The paper aims at outlining the methodological limitations of sustainability through the critique of the positions of the accessibility of the future and dominance of the present-centered patterns. The futures studies methodology and categories have been reviewed in the ritournelle-like contexts of the past, present, and future to formulate and test the inverted approach to the future through some intellectual experiments shifting the focus from nature to humankind as something under the question of being preserved.

The novelty of the paper can be described through the inversion of the future as well the eccentric future means to be included in the scenarios of political regulation. Thus, modeling of the future social-cultural space is bound to include otherness issues concerning the nature and the future populations as hypothetical participants of the actual discourses. The community communication within the eccentric future concept includes dialogical responsibility towards the surrounding space, in terms of making and allowing harm as the problem beyond the anthropocentric perspective.

The further impact of the results can be suggested both in restoring social cohesion in the communities affected by the conflict and migration in the wider scope of adaptation involving context reinterpretation. Another possible application is in an adjustment of legal norms by introducing the eccentric future vision and overcoming the current division between human-centered and nature-centered decisions and norms.

The research question could be formulated as follows: *Would it be sustainable to preserve the current humanity patterns rooted in the sustainability norms and requirements?* The subquestions could be introduced to narrow the scope as follows: *What kinds of eccentric scenarios are possible linguistically? What anthropocentric aspects should be alienated to realize a scenario of the eccentric future, and what are the markers of gains and losses in the eccentric scenarios?*

In the paper, the terms should be understood as follows. *Sustainability* implies an ethical approach beyond the efforts of conservation of the resources for the generations to come, that is, to maintain a normative frame enabling responsible scenario-making based on global interdependence and partnership (Earth Charter, 2000; Transforming, 2015; Speth, 2008). While *future-for-the-present* orientation is described by Groves (2019) through future-discounting models, the *present-for-the-future* includes reflections upon the present through possible changes in values and environments (Groves, 2019: 916). Moreover, Groves mentions “specific ways of enacting a temporal relation between present, past and future (...) [that] tend to rest on implicit misinterpretations of the relation between self and other and, therefore, between human subjects and nature” (Ibidem). Thus, *past-for-the-future* is an added vector of influence applicable when the norms are traditionally accepted without deliberation and shape the present and future decision-making. *Discourse principle (D-principle)* in the context is necessary as a norm validity criterion to consider the possible norm approval by the affected participants of the practical discourses (Habermas, 1974; Thomassen, 2010). To adjust it to the social-cultural and political fields, *inversible forecasting* can be suggested as a preference to human vulnerability rather than power as a basic position for long-term scenario-moulding. From this perspective, *alienation* of the present from past and future in the scenarios can be seen as a constructive chronological distance simulation that makes it possible to evaluate the power/vulnerability ratio of the scenario actors. *Adaptation* in the context of the futures scenarios should be understood wider than “a consequence of acculturation” (Sam & Berry, 2010: 472) as acceptance of the otherness dimension of the future communities with the incomprehensible yet-to-be experience and worldview when the scale between Ours-Other-Alien is regulated based on the norms and values intrinsic to the present scenario-making process (Böhler, 2014), as well as the hazy power and rule-changing metagames (Beck, 2005: 2-3).

The study is based on the set of methods and materials chosen to address both the theoretical challenges of scenario-making and the various markers of the outcomes preferability of the scenarios.

The conceptual modeling has been used to extend the future-for-the-present and present-for-the-future constructs (Groves, 2019) by adding the dimensions of the past in its correlation with present and future, and the criteria of the future accessibility that has an impact on the scenario planning and lifeworld organization. Thus, the extensions are aimed at tracing the chronological balance between past, present, and future, as well as the linguistic possibility of including the latter into scenarios.

At the same time, the understanding of the future populations through otherness orientation requires the comparativist imagology instruments (Świdarska, 2013) be applied to the field of otherness markers beyond literature studies to assess the relevance of the scenario-makers’ position and that of the actors-to-be-affected by the discourse outcome of the future-oriented decision-making. The otherness of the scenarios addressees in the future, as well as a suggestion of a sustainability model beyond the nature-/anthropocentric ones, made it necessary to refer to intellectual experiments as a means of future modeling (Böhler,

2014; Lutz, 2021; Parfit, 1984).

The study contains a theoretical outline of the eccentric approach to the future that is still limited and requires further explication and testing based on the wider range of future-oriented analysis. Further development of the approach could be seen through a study of the actors involved in the process of the scenarios making, evaluation, and realization. Further study can also clarify the possibility of avoiding past and present bias being projected onto the yet-to-be-known gaps in the distribution of the actors' preferences.

Accessibility of the future as a scenarios viability marker

The issues of the future accessibility for scenario-making and the limitations of the future-oriented suppositions based on the heredity idea have been widely discussed in the studies through responsibility and otherness attribution between generations.

Discussing identity, Derek Parfit suggests an imaginary situation of a club with the regular meetings of the members having ceased and then the club with the same name and rules being reconvened (Parfit, 1984: 213). The question of whether the club is the same or similar to the original one could be classified as empty; and before deciding between the variants, after Parfit, "we are merely choosing one of the two descriptions of the very same course of events" (Parfit, 1984: 214). If applied to scenario-making, the claim could remain relevant in a range of "re" contexts. For instance, in the line of social sustainability, territories reintegration and deoccupation scenarios as a part of conflict regulation imply the competitive descriptions of either the preoccupation-like identity restoration or construction of the space oriented at the mostly similar identity but with the conflict-related social-cultural distortions being addressed through the consequent adjustments. The practical application of the approaches can be traced in the suggested reintegration and conflict regulation scenarios for Ukraine, for the future post-conflict period (Haran, 2019).

If the shift from regional to personal identity, the Branch-Line Case suggested by Parfit could be furnished as a way to overcome the present-centricity of the future-oriented scenarios. The situation implies that personal identity could be questioned and correlated with what Parfit calls Relation R, that is, "psychological connectedness or/and continuity, with the right kind of cause (...) In an account of what matters, the right kind of cause could be any cause" (Parfit, 1984: 215). Thus, in the Branch-Line Case, the imaginary Replica of a person could live forty years after the original person's death. The focus on the personal identity makes it possible to classify the situation as death, while the supposition that it is Relation R what matters makes it possible "to regard this way of dying as being as good as ordinary survival" (Ibidem). Moreover, there is to be considered a further fact, after the imaginary case by Parfit, as the transmission of the blueprint to the future persons through the psychological continuity implies that "this continuity will not have its normal cause, since this future person will not be physically continuous with me" (Parfit, 1984: 242). When applied to the sustainability scenarios, the continuity of humankind is to fill in the gap of the yet-unknown future populations' claims towards the issues of power, powerlessness, and vulnerability incorporated into the present-formed sustainability goals.

In his turn, Christopher Groves points out that "whose values matter now is shaped by power inequality" (Groves, 2019: 916). The researcher points out that the future-oriented conceptions are mostly human-centered and reduced to the simplification of *parent-child* and *heredity* concept fields rooted in the parental care-like assumption of the earth being borrowed from one's children (Ibidem). Thus, the questions that arise were articulated by Groves as follows: (1) "If nature is conceived as that which sustains us – or our children and

their children – does this not mean that we will (...) only care for whatever in nature we can currently identify as useful?” (2) “If we translate future-oriented concern into concern for our posterity, are we not reducing the scope of our supposedly cosmopolitan concern to what ‘we’ now consider to be important for ‘our’ children?” (Ibidem).

Another posterity-like connection between the generations can be found in *A Theory of Justice* by John Rawls. The present as the focus makes it possible to bring the responsibility for the future population into the discussion through the *parent-children* concept field as well:

But since we take the present time of entry interpretation of the original position (...), the parties know that they are contemporaries; and so unless we modify our initial assumptions, there is no reason for them to agree to any saving whatever. Earlier generations will have either saved or not; there is nothing the parties can do to affect that. So to achieve the reasonable result we assume first, that the parties represent family lines, say, who care at least about their more immediate descendants; and second, that the principle adopted must be such that they wish all earlier generations to have followed it (...). These constraints together with the veil of ignorance, are to ensure that any one generation looks out for all. (Rawls, 1999 [1971]: 254)

Nevertheless, such inter interconnectedness between present and future generations remains a statement in need of further justification that it is not a quasi one (Toya, 2021).

To compare with the imaginary cases of posterity suggested by Parfit, the parental care-based determining of what is to be useful and valuable for the future populations is justified by the present and past patterns of sustainability. Nevertheless, the Relation R as a psychological continuity of the generations to come might trigger the emerging of the beliefs and values patterns similar but far from being the same as the present ones.

As for the recent studies, Matt Lutz (2021) reviews the Moral Closure Argument through the possibility to rule out the scenario when “our experiences do not discriminate between the case where our beliefs are true and the skeptical scenario where they are not” (Lutz, 2021: 80). The Closure, after Lutz, can be formulated as follows:

If S knows that P, and P entails Q, and S believes that Q on the basis of competently deducing Q from P, while retaining knowledge of P throughout his reasoning, then S knows that Q (Lutz 2021, 80).

In one of the objections, Lutz mentions the problem of Future Outlandishness based on the imaginary case of the claim that in 2050, the Rocky Mountains will spontaneously transform into a giant whale (Lutz, 2021: 103). If considered as a future belief, the claim is problematic to be ruled out and is to be regarded as logically possible because “this experience generator is cashed out in terms of past facts, which is consistent with the claim that the Rockies will become a giant whale in the future” (Ibidem). Nevertheless, Lutz suggests inductive reasoning being applied to the case of the future belief, supported with the “long history of mountains not transforming into whales”. The future can be reviewed by means of defining the unobserved reality through the facts that could be distinguished, even if there is a question-begging in the extending of the past to the future: “But what reason do we have to think that the future will resemble the past?” (Lutz, 2021: 104). Another concern is expressed by Lutz as for the possibility of application of the inductive reasoning to morality, as well as for the evaluation of the future cases less outlandish than the Giant Whale case:

Thus, my arguments here still may direct us toward skepticism about many other future facts. This charge has merit, but it is not an objection. Predictions are hard, especially about the future. I can know that the sun will rise tomorrow and that mountains will not spontaneously transform into whales. About many other things, it is best to suspend judgment. (Lutz, 2021: 104).

The communicative aspect of the inaccessibility of the future generations could be considered through Hiroshi Toya's comment on Greta Thunberg's statement of the future generations watching the present ones and refusing to consider the present decisions acceptable due to the necessity to live with the consequences in the future (Greta Thunberg's Speech, 2019), that is "Responsibility for future generations is the responsibility for what does not exist, and in the most extreme sense, responsibility for others outside our community" (Toya, 2021). The researcher reconsiders the responsibility dimensions suggested by D. Böhler and H. Jonas through the claim that responsibility in itself incorporates the idea of the future bearers of responsibility, regardless of the otherness of the future populations, as "the responsibility to future generations is responsibility to those whom we cannot meet, discuss, or even become acquainted with, which is why future generations are easily forgotten" (Ibidem).

Thus, scenarios being considered, the remaining theory gap includes the issues on the interconnectedness of present and future, limitations of the future beliefs and values acquisition and incorporation into the scenarios, and the possibilities for getting the approval of all hypothetically affected participants in a practical discourse (Habermas, 1987 [1981]) in the situation of the future actors being both inaccessible and unpredictable at the stage of the scenarios being made.

Findings

In the study, the scenario-making and evaluation are suggested to be reviewed in the perspectives as follows: (1) the inversible forecasting as a preference to human vulnerability rather than power as the criteria defining scenarios; (2) alienation of the future from the present and past as a key to a scenario success owing to the possibility of the chronological distance and yet-inexistent subjects simulation.

The eccentric approach to the future involves (1) self-alienation of the present scenario-makers to prevent the scenarios of the future from the biases, values and inequalities engraved in the adopted past and present social imaginative contexts; (2) other-alienation in the view of the imagined future populations and their values, and preferences to avoid the projection of the known onto the linguistically yet-inaccessible future experiences; (3) double alienation of the future and the nature to overcome the present sustainability focus on humanity exclusiveness and nature being preserved as a mere resource and medium for the humankind survival.

Thus, the past systemic patterns defining the lifeworld can be regarded as a *paradise lost* for sustainability, to reflect Ricoeur's description of the Lebenswelt itself as a never-given but presupposed phenomenological paradise lost (Ricoeur, 1986: 27). Nevertheless, the past-ruled present and past-backed future elements in the scenarios, as well as the elements of the futures discounting and future-for-the-present approach, indicate the attempts to colonization and domestication of the inaccessible future through the notions and patterns of the already adopted social imaginative contexts (Figure 1).

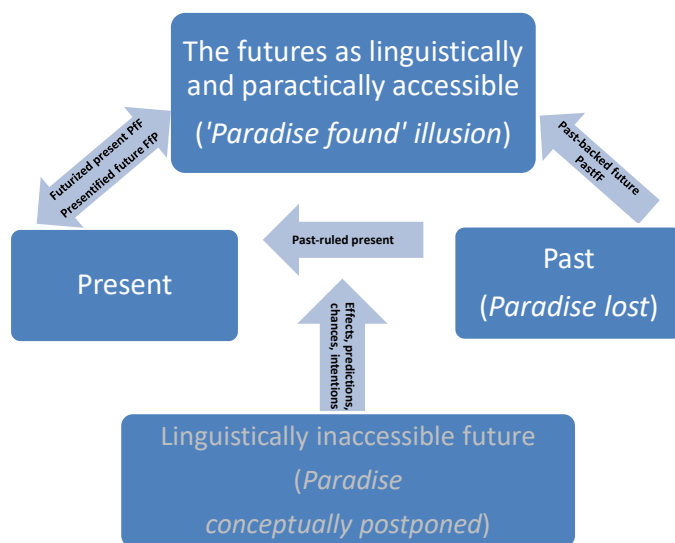


Figure 1. The temporal chart of chronological impacts in the scenarios staging

The colonization of the future by present- or past- means of scenario-making creates an illusion in the practical discourses on the accessible future that could be a *paradise found* for humankind.

Reflecting on Ricoeur's suggestion that the discourse in use generates the imaginary resonance of the things not seen but said with reality (Ricoeur, 1986: 217), it is possible to assume that the inability to derive linguistically the description of the future imaginative contexts yet-hidden from the present observers should be encoded into the futures scenarios as a feasible accuracy of the *paradise conceptually postponed* to counteract the futurized present expectations.

Discussion. Moral and temporal limits of the foreseeing

In the view of the current challenges, the changes in public policy and those in individual and social behavior, after James Speth, "are not the next steps" as "the serious action is long overdue" in the view of the humanity- and nature-related issues (Speth, 2008: 199). Nevertheless, the researcher suggests that transformations in consciousness and politics can be crucial in defining the circumstances for the changes (Ibidem), and refers, in the context of The Earth Charter (2000), to the future-related transition, among other required ones:

from discounting the future, focusing severely on the near term, to empowering future generations economically, politically, and environmentally and recognizing duties to yet unborn human and natural communities well into the future. (Speth, 2008: 207)

The discounting issue also remains influential in the economic scenarios and analyses. For instance, the *EPA Guidelines for Preparing Economic Analyses* (2010) puts the focus on the intragenerational discounting in the time horizon, as opposed to the intergenerational discounting:

Intragenerational, or conventional, discounting applies to contexts that may have decades-long time frames, but do not explicitly confront impacts on unborn generations that may be beyond the private planning horizon of the current ones. Intergenerational discounting, by contrast, addresses extremely long time horizons and the impacts and preferences of generations to come. To some extent, this distinction is a convenience as there is no discrete point at which one moves from one context to another. However, the relative importance of various issues can change as the time horizon lengthens. (Guidelines, 2010: 6-1).

The time horizon is not regarded as arbitrary and can have an impact on policies and benefits estimation (Guidelines, 2010: 6). At the same time, this example illustrates the conceptual rupture between the need in the “intergenerational consciousness and conscience” articulated by the researchers in culture and society studies (Speth, 2008: 201-203), on the one hand, and the intragenerational tendencies in the economic analyses and scenarios, on the other hand.

The fork of the perspectives in the futures evaluation leads to the necessity of assessment of the variations of the future. Speaking of the alternative plausible futures, Metzger et al. (2010) mention that, though it is difficult to assess the alternative narratives objectively, explicit personal judgments of scenario implications form the imaginative context of either high-expectation world (HEW) associated with the positive outcomes or low-expectation world (LEW) with the compromised expectations and values or mismatched trade-offs (Metzger et al., 2010).

In the recent studies on sustainability, the multi-scale participatory approach to scenarios as stories about the future based on the stakeholders’ insights (Kok et al., 2007) becomes a way to overcome human-centeredness in planning. For instance, Zorrilla-Miras et al. (2021) suggest a view of the complex human-environment relationships that are wider than the instrumental land use narratives.

Nevertheless, the benefits of the multi-scale participatory planning process contain the question of whether the scenarios become conceptually-engaged, judgement-related, and present-human-centered. Thus, the key issue of scenarios viability estimation is whether the present expectations of the existing though hypothetical participants of the practical discourses have an impact on future outcomes that might affect the populations beyond participation in the scenarios and solutions moulding.

Making and allowing harm: an intergenerational perspective

The perspective of the present being granted the central position was described by Paul Ricoeur through a series of linguistic paradoxes. Firstly, the present is opposed to the past and the future through the external and internal linguistic indicators of the present as actualizing, yet-to-be, or having actualized. Thus, the present is prone to tear and dehiscence; it is distended and passing; “the present becomes threefold: present of the future, present of the past, present of the present” (Ricoeur, 1986: 262-263). At the same time, the threefold structure involves both experience and expectations of the future, the latter being “inscribed in the present” in the form of the future-rendering-present, *futur-rendu-présent* (Ricoeur, 1986: 273). The *pas-encore* dimension implies that “experience tends towards integration, waiting for the bursting of perspectives” (Ibidem). The futures foreseeing in the scenarios operates the present-centered linguistic means while outstretching them to the limits drawn by the intentions and outcomes of the actions evaluated in terms of harm or good.

Thus, the scenarios of the future imply the harm (or good) as a yet-to-happen outcome of some actions or restrain from them. If considered through the Doctrine of Doing or Allowing (DDA), the evaluation of the possible harm for the future populations fits into the consideration that “the Agent will be allowing herself to have done harm as somewhat morally significant but not as so morally significant that it renders her current behavior morally equivalent to doing harm” (Woollard & Howard-Snyder, 2021).

Shelly Kagan (1989) in *The Limits of Morality* considers four variants of doing or allowing harm, based on whether the harm is “intended as a means or an end” or “merely foreseen as an unintended side-effect” (Kagan, 1989: 86). Thus, countenancing of the harm is dependent on the perspective and is mostly considered separately for the doing-allowing and intended-foreseen cases (Ibidem). However, Jason Hanna (2014) suggests taking into account both moral relevance of actions and temporal proximity, as “our intuitive judgments about some cases seem to indicate that we are especially concerned about the present” (Hanna, 2014: 696). The past and future, thus, could be reviewed through the effects of the past deeds on the moral status of the agent in the present and the future outcomes, even if the harmful behavior does not take part in the present (Hanna, 2014: 689). In the evaluation of the scenarios outcomes probability, the dimension of the DDA involves the subjects’ roles repositioning due to the present-centered perspective, as follows:

we could interpret the DDA as claiming not simply that it is more objectionable for an agent to do harm than it is for an agent to (merely) allow harm, but rather as claiming that it is more objectionable for an agent to now ensure that he will become a harm-doer than it is for an agent to now ensure that he will become a (mere) harm-allower. (Hanna, 2014: 696).

What is to be alienated in the scenarios of the future?

The human-centeredness of the sustainable scenarios of the futures places humankind in the position of power towards the resources evaluation, distribution, and preservation for the future human generations. If viewed eccentrically, through human vulnerability rather than power, the scenarios will have to undergo the inversible forecasting by applying the alienation of the humankind exclusiveness idea, with further eccentric (non-present-human-centered) revision of the sustainability goals and projects.

To discuss human exclusiveness and vulnerability through scenario-making, the imaginative experiment of the evolutionary ritournelle could be constructed based on the ontogenesis models. For instance, it could be imagined that mutations (possibly, unintentional human-made ones) give some species evolutionary preferences like a counterposed thumb and mind-like properties. To make the fanciful example more focused, imagine that birds’ hallux (perching digit) finally turn into thumb not only “allowing the foot to grasp, which evolved from the non-opposable hallux of early theropod dinosaurs” (Botelho et al., 2014), but also presupposing operations with instruments to add to the memory and intellectual abilities of some birds species.

Thus, the question of the nature being preserved as a resource for the future humankind could be shattered with the hypothetical loss of exclusiveness (the birds’ evolution is just an imaginative context stressing the unpredictability of the particular alienation course). Even if keep it far from the radical question on the sustainability of the humankind principles preserving in the perspective of the stochastically adjustable futures, the ritournelle of the present in the future (via future-rendering-present) may turn out the Lorenz attractor-like sensitive dependence on initial conditions (Mackenzie 2015).

Another source of hardly predictable deviations in the scenarios based on human exclusiveness evaluation and alienation could be considered from the perspectives of transhumanism and posthumanism. Thus, the shifts in understanding of the role and values of humankind as well as human beliefs resulting from technological progress require a wide range of the accordingly differentiated legal and ethical regulatory means and imply the cosmological presumption (Dobrodum & Kyvliuk, 2021).

At the same time, the inversible approach to the futures requires further investigations of the alienation limitations in the perspective of the relevance projection of the issues under present discussions for the generations to be influenced by the present expectation-formed worldviews, both HEW and LEW in the wider meaning of the crucial values and beliefs defining the scenarios viability in the conceptually unknown futures, the *paradise conceptually postponed*.

Conclusions. The theoretical and practical applicability of the inversible approach to the future

While past as a form of *paradise lost* and the present as longing for it to be found correspond with the experience, they are being lived through and thus can be described in concepts and relations. The future is not accessible to experience; moreover, it is beyond the linguistic expression of the future itself as a *paradise found* but for intentions, dreams, plans, and expectations. The future is also inaccessible for description, so the prognoses fail to give the outline of the actual events in the future but rather suggest and describe the stochastic range of the possibilities adjacent to the present reality.

Thus, the future being beyond the linguistic experience, it can be evaluated through a combination of results, chances, intentions, responsibilities at the scenario-modeling stage as follows:

- (1) Results as past-rooted projections of the actions;
- (2) Chances as the clusters of the vector change;
- (3) Intentions as direction markers for the changes required in the restructured social space;
- (4) Responsibilities as continuity of norms provoking evaluation of acceptable and unacceptable, as well as limitations of normalcy and the context of the norms adjustment (Figure 1).

Thus, to evaluate scenarios of the future, there should be taken to account the self-alienation of the present scenario-makers from the past patterns and the idea of parental-like continuity of the responsibility between the generations. Another level of the present humankind's exclusiveness alienation involves considering the double otherness of the future populations and the nature that cannot be viewed instrumentally.

The inaccessible future becomes an imaginative trap for the scenarios in the form of *paradise conceptually postponed*. The scenarios implying the needs and preferences of the future populations are utopic, in Ricoeur's perspective on the utopia as "an exercise in the imagination to think about something other than being social" (Ricoeur, 1986: 388).

For instance, the understanding of the future as independent from the projections made onto it from the present angle is important in view of otherness experience in the context of population migrations. The vicious circle of otherness could be outlined as follows: due to the data-gaps, especially on irregular or intersectional migration (Ahmad-Yar & Bircan, 2021), misadapted migrants split the communities and lead to the normalcy scope transformation. In the cases of forced migration, migrants are not only stripped of their past that is attached to

the previous place of residence and corresponding social links but of the future as well. The above-mentioned set of intentions, dreams, plans and expectations require minimal stabilizing of the social and cultural space for the numerous shifts to cause resonance. To transform it into the terms of the inaccessible future, the migrants should get access to planning to be able to create their identity as compatible and not contradictory to that of the host community.

Thus, one of the ways of applicability of the inversible-future-based approach to the scenarios evaluation can be suggested in the context of migration solutions tailoring. If seen through the shift from power to vulnerability, the solutions can be reviewed through stabilized needs and vulnerabilities of migrants as a key for the projected adaption to the changed social space.

Further studies of the scenarios-being-staged evaluation could be suggested in the field of the inversible forecasting and its impact on understanding vulnerabilities: *Could the humankind-and-present-centered perspective of sustainability scenarios be reversible if the future is beyond the actual experience?*

Another aspect to be studied refers to the trial of the communicative resolution of the alienation from the future populations through the vulnerabilities projection instruments different from mirroring the past and present needs and patterns of humankind in the scenarios for the future: *How could the otherness caused by time and experience dividing the future into the mutually incomprehensible clusters be considered in the scenarios?*

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Space Age Grand Narratives in Videogames

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The phenomenon of outer space has become ingrained in the various levels of human culture. A feature of modern views on the phenomenon of outer space is its human-sizedness. It consists in a person's subjective cultural experience of their relationship to outer space and allows the modeling of possible future states of outer space on the basis of comprehending the regularities of its development. With the beginning of the Space Age, the peculiar "accessibility" of space gives rise to new forms of cultural development of this phenomenon, where videogames occupy an important place since they allow a person to freely fulfill their most daring cosmic fantasies. The problem of representing outer space in videogames remains insufficiently studied. The authors' hypothesis is that videogames reflect not only the physical characteristics of space, but also the grand narrative of space exploration and the unity of mankind in the implementation of the global task of space exploration. The authors have concluded that the grand narrative of space exploration is largely legitimized through videogames. The perception of reality, patterns of behavior, and a view on culture and science are formed through videogames. The legitimization of technical and social progress as a way to achieve significant success in space expansion is observed in most videogames where "outer space" is not only the setting, but also a part of the game mechanics. Interactivity as a central feature of the videogame phenomenon allows not only to describe and explain the idea of the physical properties of outer space or the operation of devices and mechanisms in these conditions, but also to participate directly in the development of such devices, as well as to be involved in simulators of real stay in space conditions.

Keywords: cosmos, outer space, videogame, grand narrative, space age, game mechanics, videogame space, interactivity

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Introduction

For thousands of years, people have been thinking about the structure of the Universe, endowing it with various properties and characteristics while looking into the starry sky. In attempts to comprehend the essence of the surrounding space, people have developed astronomical knowledge as the basis for understanding the material structure of outer space.

The concept of outer space appears in the era of the birth of ancient philosophy and culture. For most ancient Greek philosophers, κόσμος is an ordered, harmoniously organized world that originated from disorganized chaos. As a category of ancient philosophy, the cosmos not only embodied the astronomical designation of the Universe, but also possessed ethical, aesthetic, socio-political significance. Based on direct contemplation, the ancient cosmos tended to construct its finiteness in time and space, often perceived as a kind of huge piece of art (Losev, 1993).

The ancient point of view on the phenomenon of outer space dominated in philosophy and culture for a long time, its apogee can be considered the classic work “Cosmos: A Sketch of the Physical Description of the Universe” by Alexander von Humboldt, in which he included the entire natural world around people in this concept.

The concept “cosmos,” “outer space” has acquired the meaning of a space outside Earth’s atmosphere with the beginning of the Space Age in the history of mankind, which started with the moment of the first launch of an artificial Earth satellite, and then, the first human space flight was conducted. These events marked the beginning of the direct study and exploration of outer space.

A feature of modern views on outer space is its human-sizedness. It consists in a person’s subjective cultural experience of their attitude and relationship to the cosmos, based on predictability, which allows the modeling of possible future states of outer space on the basis of comprehending the regularities of its development.

The phenomenon of outer space has become ingrained in the various levels of human culture. Space flights have become a phenomenon that is quite usual today. Conversations about planetary exploration by humanity have become the subject not only of fantastic plots or scientific developments, but also of ordinary small talk. The peculiar “accessibility” of outer space with the beginning of the Space Age gives rise to new forms of cultural exploration of the phenomenon of “outer space.”

We have many different products of a culture that describe these hopes. There are many films about space adventures, such as “Alien” and “Interstellar,” and even more books. Videogames are one of the relatively new cultural products. Interest in them rises with their development and spreads throughout the world, and, in addition, they give new tools of influencing spectators.

Despite its human-sizedness, space continues to attract people with its grandeur and undiscovered territories. Each new generation continues to dream of conquering it. After the first manned spacewalk, humanity immediately began to predict a space future for itself, where everyone would be able to travel the Universe on their own ship, discovering new worlds and spreading human civilization to the most secluded corners of the cosmos. However, despite the fact that more than half a century has passed since mankind entered space, the personal spacecraft and even space exploration in its global understanding are far from being implemented. Today we can only master the Universe in front of a computer screen, playing space videogames. The keyboard serves as a control panel for us, and the worlds that we can master are usually limited by the imagination of videogame developers.

The topic of outer space and its representation in videogames remains insufficiently studied. The main manifestations of outer space are considered as a spatial dimension, but not as a special phenomenon that is of decisive importance for gameplay and game mechanics. We formulated *the hypothesis* that videogames reflect not only the peculiarities of outer space, but also the grand narrative of space exploration. *The purpose* of our study is to analyse videogames and distinguish the main categories of videogames that can disseminate the ideas of the grand narrative of space exploration. In our study, we have used the concept of metanarrative by Jean-François Lyotard to analyse the specifics of the ideas about outer space reflected in videogames.

Methodology

To achieve the stated purpose, it was important to theoretically analyse the phenomenon of grand narrative, its features and impact on society, in particular with regard to the grand narrative of space exploration. It was also important to study the phenomenon of videogames and those of its manifestations that allow the grand narrative of the cosmos to be implemented through this phenomenon. Thus, classification and systematization were used to study the concepts of the grand narrative and its main characteristics. To study videogames and the peculiarities of their use, both the analysis of existing works and practical involvement in the gameplay were used, since such a phenomenon as videogames can be studied only in the combination of theory and practice. According to Espen Aarseth (Aarseth, 2007), we can study videogames in three ways: firstly, considering the design, rules and mechanics; secondly, reading reviews and reports; thirdly, playing by ourselves. All ways of study are valid. However, the third is considered the best method, especially in combination with the other two ways, due to the fact that without personal experience, severe misunderstandings can be committed, even after studying the mechanics and information about the games. Looking at this phenomenon both from “inside” and “outside,” we can stay unbiased and analyse videogame from different positions. Theoretical studying videogames is possible only when we talk about the technical part of games. When it comes to the context, the absence of direct work with the game process or, at least, with the so-called “Let’s Plays” and professional reviews of games can narrow the results to one point of view without consideration of other dimensions of the analysed phenomenon.

Due to their interactive nature, videogames need to be considered in terms of their procedurality, which, in turn, changes the interpretation and perception of information (Horban & Maletska, 2019). Taking this into account is also an important aspect in the exploration of outer space as a phenomenon within the videogame space, as well as in distinguishing the transmission of the grand narrative of space through the videogame plots and mechanics. Thus, we have studied the transmission of a grand narrative of space exploration in videogames through game mechanics and content analysis.

Grand Narrative of Space Exploration

It is often thought that the Postmodern era can be characterized as “incredulous towards metanarratives,” as Jean-François Lyotard stated. Narrative, in general, is a story. Narration is an act of storytelling, which links events into one purposeful system. Using these terms to describe human lives, Lyotard divides existence into “ordinary narratives,” personal, individual narratives, and the so-called metanarratives, grand (master) narratives, which, according to him, are systems or stories that control the individual narratives. While Lyotard

partially distinguishes metanarratives and grand narratives, he also states that both of them have at least one common function – to legitimate ideas and beliefs (Nola & Irzik, 2003). In our study, we will use both terms to mark what Lyotard called grand narratives, because there is an only slight difference between characteristics of these terms in further scientific discourse.

A grand narrative is one that claims to explain various events in history, gives meaning by connecting disperse events and phenomena by appealing to some kind of universal knowledge or schema (Branco, 2014). Sometimes, it is thought that metanarrative is the “narrative about another narrative,” which is indicated by the part “meta” in this term. Grand narratives are fundamental, and they usually become foundational in the history of society and even civilization. Such comprehensive narration limits people’s lives to achieving one specific purpose, which is common for the whole social group (Sim, 1986).

Lyotard shows the difference between ordinary narratives and grand narratives with the use of the following characteristics: 1) they are comprehensive and cover many various issues and areas; 2) there is a greater explanatory ability, in contrast to ordinary narratives, which are usually descriptive; 3) legitimization of claims within the scope of a grand narrative can be traced. Legitimation is the most important here due to the fact that with the help of grand narratives, ideological attitudes and political beliefs change social behavior.

In their analysis of narratives, Kate McLean and Moin Syed (2015) reveal additional principles that describe grand narratives:

The principle of utility means that grand narrative gives people a foundation of how they should understand and define themselves. They provide general information about the goals, values, identities of a group, history and development, etc. With the help of a master narrative, a person can find one’s way in society and construct a personal narrative on its basis.

The principle of ubiquity is about the spread of a grand narrative through the social group, because to work properly, master narratives must be ubiquitously shared by at least group of people with a shared culture. If the master narrative is not shared and is not perceived since early childhood, it will not determine the social group’s life and choices.

The principle of invisibility describes the hidden nature of grand narratives. People usually act unconsciously within such narratives, they do not need to make efforts to be a “good” member of a culture; grand narratives are adopted automatically and unconsciously. However, they may become visible and perceived consciously when a person violates them or negotiates with them.

The compulsory nature of grand narratives is revealed namely after their violation. This principle shows that grand narratives are not value-neutral; they have ideological messages and norms that tell us what we are supposed to do and how we should feel in different situations. In case that we do not correspond to given rules, we may be excluded from a social group or may feel discomfort due to our non-conformism.

The principle of rigidity means that grand narratives have great staying power, and even if they change, it happens slowly, thus making their violation insecure. Their content and structure are not unchangeable. However, it happens very slowly while the grand narrative is in a powerful position.

These principles expand the concept of grand narratives significantly, revealing the specifics of their legitimizing power. It is through invisible impact and compulsory nature that grand narratives substantiate the necessity of generally accepted behavior and views. Different moral norms are inherent in grand narratives, helping to justify one types of activities and blame other ones. A wide range of thoughts which includes Marxism, religious

doctrines, belief in progress, universal reason, and others can be named grand narratives as far as they connect different events into one universal line and ground the modern state of affairs by an appeal to the Reason (Kubsch, 2008), at the same time being based on a myth transmitted through products of culture, sources of knowledge, etc.

Lyotard proposes the idea that such authoritarian universalizing narratives would be no longer viable in postmodernity, which heralds the emergence of “little narratives”: localized representations of restricted domains, none of which has a claim to universal truth status. However, as we can see, this idea has failed to correspond with reality and, in the 20th and at the beginning of the 21st century, new grand narratives have emerged. One of them is the grand narrative of space exploration.

All achievements of humanity in the area of space exploration did not make it less interesting to people. Through the first 50 years of the Space Age, all spacefaring nations have used different rhetorical strategies and invoked specific archetypes to construct a master narrative of the history of space exploration. These archetypes are: the myth of the founding father, the claim of indigenous creation, the connection between spaceflight and national identity, and the essential need to justify space activities (Dick, 2008).

The grand narrative of space exploration is not only a story of human growth from dreams of space to flight and exploration, but also a way to legitimize some norms of behavior.

Studying the grand narrative of space exploration, we can see the same features that are inherent in grand narratives in general, according to Lyotard:

1. The grand narrative of space exploration covers a wide range of human activities, from aspirations and plans to the development of science and technology. Politics and economics of many countries revolve around space exploration and sciences connected with it. The life of a single person has also changed significantly: since childhood, a person is surrounded by knowledge about space, follows space exploration, observes its constant mention in mass culture.
2. The grand narrative of space exploration has an explanatory, not just descriptive ability. It not only brings the entire path of humanity, scientific research, etc., to the single line, and also justifies the vectors of current scientific progress, project financing. Space research tries to globally explain the structure of the Universe, at least in its visible part, and ignore the gaps that become noticeable if we turn to quantum physics and quantum mechanics. This shows that the basis of the grand narrative of space exploration is the same myth about humanity as special “heroes,” capable of realizing everything, who are thinking “masters” of nature.
3. Through the grand narrative of outer space, which strengthens faith in reason and progress, legitimization of individual scientific methods and the scientific paradigm in general, as well as the policies of different states, economic activities, etc., takes place. Research focusing on outer space is popularized, while other research vectors receive minimal attention. At the beginning of the Space Race, the legitimization of the actions of the heads of different states and foreign policy in relation to the rivals of the Race took place in the same way. Even now, actions that justify a hypothetical primacy in the Space Race are much easier to implement. Although ideologies and personalities (such as Bezos and Musk) are competing at the present time, the issue of introducing and legitimizing ideas through their actions is still present.

After the end of the Space Race, the grand narrative of space exploration has not weakened. It transformed into the idea of space conquest, penetration and detailed study of outer space. This contributed to the fact that in the mass consciousness, not only the idea of space flights and the study of nearby planets, but also the idea of a possible cosmic future of mankind, is being affirmed. The spread of mankind in outer space and contacts with extra-terrestrial civilizations are becoming frequent topics in the products of mass culture, which serves as a “repeater” of the way of thinking inherent in humans in the Space Age.

In the context of spreading the grand narrative of space exploration and not just ideas about space and the person in it, videogames are the most interesting phenomenon. Their importance is due to their basic features and the characteristics of outer space formed by the videogame. Despite the presence of these unique features, the issue of transmission and spread of the grand narrative of space exploration in videogames is hardly considered. Before moving on to a detailed look at how the grand narrative of space exploration is implemented in video games, we see it appropriate to reveal the specifics of the phenomenon of videogames and outer space in videogame cyberspace.

Videogames as a New Form of Implementation of Space Exploration Grand narrative

The term “videogame” is usually used as an “umbrella term” for a wide range of digital games, regardless of the platform on which they operate. It is a general term that includes, but is not limited to, the terms “computer game,” “console game,” and “mobile game” (Šisler et al., 2017: 3859). The presence of the term “videogame” that describes a certain phenomenon of social reality allows theorizing and defining this concept. However, despite the existence of a significant number of definitions of the “videogame” concept, in scientific discourse, there is still no single common definition of the videogame phenomenon (Corona, 2020: 462). However, all these definitions have common features, the analysis of which allows us to speak about the existence of a holistic phenomenon, parts of which can be systematized.

The main feature of the videogame, which is usually distinguished by researchers, is its *interactivity*. Despite the fact that the “videogame” concept is often defined through the term “game” and the very notion “videogame” has the word root “game,” it is more correct to say that videogames are specific interactive software that can be used to tell the story, communicate with other players, simulate something, depending on the videogame genre, setting, gameplay mechanics, etc.

A videogame usually unfolds on several different levels, depending on the context and main plot. First of all, each videogame has its internal dichotomy of narrative and ludic part (Frasca, 1999) and, depending on the impact of the narration, the level of interactivity changes. In videogame genre systems, there are examples of genres in which narration or gameplay does not exist at all, and however, as a rule, a videogame harmoniously combines the narrative part and gameplay part. Their combination with the use of mechanics creates a special videogame space in which the player can interact both with the in-game world, acting as a computerized “co-player” and with other players, if the game has a multiplayer mode.

In videogames, “outer space” is a special construct. In addition to the space where the player operates, there are various subspecies of spaces, up to the space of the videogame menu (Schmalzer, 2020).

Unlike for our planet, the outer pace is not “external” but “internal” for the videogame space (Majsova, 2014). Often, in the space inside a videogame, there is no division into “inner” and “outer” worlds, although this is not always true. Such videogames as “No Man’s

Sky” give the player the full experience of the difference between being on a planet/station and in outer space. However, this line between the outside and the inside is rather easily erased, giving a sense of the attainability of outer space.

The specifics of gaming spaces make it possible to make outer space not only a “background” but also a “participant” in a videogame. Space becomes a full-fledged, interactive scene of action, which can either unfold according to predetermined canons and mechanics or be generated randomly, thus differing from the real space. The difference in the videogame structure is usually driven by mechanics.

The concept of “videogame mechanics” (Fabricatore, 2007) is taken from the jargon of game designers and refers to how an action, interaction with objects and the game world is determined by the rules and characteristics of videogames that combine these objects into a single game process. Each of the mechanics has its own “semantics,” which determines the attractiveness of the game for the player and makes the player like or dislike this mechanic and the gameplay of the videogame as a complex process.

The mechanics of exploration and conquest are usually associated with outer space in videogames; moreover, here, we can talk about the imitation of scientific and technological progress, which, in particular, legitimizes investments in technology in the mind of the player. Also, the basis of many games, which do not even demonstrate the attack on other creatures in space, are space travel. Depending on the main genre of the game, they can be implemented conditionally (when the player sees a cut scene with a flight, as, for example, in “Starbound”) or controlled by the player (as in the case of “No Man’s Sky,” where the player also discovers the structure of the ship).

Videogames in which outer space has direct or indirect participation can be conditionally divided into *three categories*. The first is a *category of videogames with the “outer space” as a setting*, or with the use of outer space as part of the story (Lee et al., 2014). An example of such videogames is “Super Mario Galaxy,” where outer space makes the space of videogames brighter and more varied, but the plot and even game mechanics are possible in many other types of setting. Here we can also mention such series as “Prey,” where space is the place of action and the basis of the plot, but almost does not affect the mechanics.

Having identified this category, it is important to show that even though it the implementation of the grand narrative of space exploration in one form or another takes place, however, the space is presented here rather as an archetype, a myth underlying the narrative, than as a scientifically delineated phenomenon, with detailed work to build the space according to the latest research. Also, outer space can be more fantastic in such games, without not only real characteristics, but physical features.

To investigate the implementation of the metanarrative of space exploration, we need to look first of all at those videogames in which outer space is presented as a mechanic or a special type of cyberspace. Games thus focusing on outer space focus on issues such as flight techniques, military and strategic planning, and virtual combat. At the same time, it is games where space is a “participant” that rejects the idea of space as a lonely, dead place, explored and colonized only by mankind. In many of them, space appears as not just a scientific, but fantastic phenomenon and humankind is not the only race in space.

This fantastic component can be seen as a primarily explanatory feature of videogames. The scientific explanation here is replaced with a mythological one. It can be assumed that with the decline in the authority of the Christian grand narrative, in which God was outside of earthly space, and with the change in the vector of this narrative, the narrative of outer space received a similar mythologization. This is an important feature, since in the videogame

space, in contrast to the literary space, there are quite a few plots about a completely empty hostile space. In most cases, it is inhabited or inhabited, and a person there is one of the races, and not a supreme being, as on his home planet.

This situation somehow strengthens the belief in progress, if we are talking about *the second category of videogames*, which consists of videogames about the exploration and conquest of outer space. Among such games are strategies (“Stellaris”), videogame simulators (“No Man’s Sky”), MMO (“EVE Online”). All of them are characterized not only by space exploration, but by the clash of civilizations. Here we see the universalized claims of humanity (or a certain race) to outer space. Such videogames do not contain the specific features of the grand narrative of one state, due to the fact that here space is achieved by humanity (or a certain race), but not by one country or a similar entity. Thus, it can be told about the unification of the grand narrative, an attempt to unite mankind under the leadership of a certain universal leader. If the history of one space traveller can be seen in a videogame, as in the case of “No Man’s Sky,” the central theme is not expansion, but progress and the search for lost and new knowledge.

The characteristics of outer space in strategies can be seen on the example of “Stellaris.” Here, space is a kind of a “map” on which a player can move, and first of all, its visual features, and not physical properties, are preserved. Such a depiction of outer space shows a generalized desire to achieve it. Technological progress in such videogames usually plays a primary role, because it is through it, despite all the incredibility of what is happening, that players can get the necessary resources and seize new territories. It is important to note that in videogames, where “outer space” exists as space between planets, rather than a form of representation of space between realities, space travel is presented as the result of progress in the exploration of outer space. In case when a videogame demonstrates a conflict or a union of races, they all are developed scientifically – that is, even things that are inexplicable from the point of view of science at the moment are the result of some currently fictional achievements, and not “miracle,” “magic,” etc.

The third category consists of videogames about spaceflight, which often belong to the “shooter” genre. It is not outer space itself that is more important here, but the mechanism of space flights, shootings, etc. If, in the first case, outer space acts as a space for exploration, then here its elements are rather obstacles and “participants” of hostilities. However, this space is not “external” to the player either.

Many videogames about outer space have become the ancestors of modern traditions. Space, in particular, was part of the “Shoot ‘em up” genre, where the gameplay in games like “Galaxian” consisted entirely of shooting enemy ships. Later, games of this genre became part of other games, creating the phenomenon of “outer space within another space” in videogame culture (Horban et al., 2020). In fact, not being outer space anymore, such a space retained the originally integrated mechanics, thanks to which it continued to spread the relevant associations.

A videogame that is closely related to the shooter category is “EVE Online,” an MMO with a sci-fi storyline where, in addition to flying a ship and conquering, it is necessary to develop politically and economically. It also represents space exploration through scientific and technological progress, character development through research, and the accumulation of resources. Thanks to numerous players, the game evokes the feeling of a populated space even more, and its mechanics are aimed at interacting with both planets and other ships.

In all the games listed above, we can observe the immersive experience of the player’s interaction with outer space, which is presented not as “external,” as in life, but as a

“continuation of the planetary space.” Thus, space exploration becomes the norm of the player’s perception, being equated to the exploration of the home planet. Development and progress are key elements in achieving the goals in strategies and a means of improving combat power in shooters, arcade games, and others. This echoes the very essence of the grand narrative of space exploration. The norms of behavior are more revealingly demonstrated in those video games, where there are also narratives of individual characters. Everyday life, familiar to a modern person, is transferred to the conditions of space travel, and through the habits transmitted during immersion in the game, videogames introduce interaction with space outside Earth into the range of vision of a modern person, thus making everything that is associated with it legitimate.

Conclusions

Today, ideas about space exploration continue to be more relevant than ever, although their perception in popular culture has become much more fantastic. However, even in such a fantastic, unreal form, the grand narrative of space exploration remains in force. It continues to explain the course of human development in the framework of progressive space exploration and demonstrates all scientific and technological progress as a vector applied to achieve the common goal, which is the conquest of outer space along with some other space races, represented quite fantastically.

The grand narrative of space exploration is largely legitimized through videogames. The perception of reality, patterns of behavior, a view on culture and science are formed today, in particular, through videogames. It is the legitimization of progress as a way to achieve significant success in space expansion in one way or another that is observed in most videogames, where “outer space” is not just a setting, but an important part of the game mechanics, integrated into gameplay.

Like other products of modern popular culture, videogames portray space travel as commonplace, as part of a future life, and not an exception. Their main difference is their explanatory power. The movies, and even more so the books, do not set out in detail the structure of the ships proposed to the player and the schemes with which progress in space expansion can be achieved. Interactivity as a central feature of the videogame phenomenon allows not only describing and explaining at least an approximate idea of how the device works as suggested by the developers, but also participating in the operation of this device. Taking on the role of a spaceship pilot, warlord, and even head of state or alliance of states, the player can get the feeling of a space experience while in an ordinary room.

The genre limitations of videogames in which outer space is part of the game cyberspace should be noted. While videogames where “outer space” is the setting or background can belong to almost any genre, the main focus of videogames that involve space as a part of mechanics are strategy and simulation games with action/shooter elements. These genres propose not only exploration, but also expansion, which fits into the general ideas of the grand narrative of space exploration.

The question of outer space in videogames, like space questions in general, requires further development. Mythologization and fantasy as a part of outer space seem to be especially interesting aspects, because it is they that influence the current ideas of a person about space and the Universe, which, although they do not correlate with reality, express the wildest expectations and dreams, as once fantasies about flying to the sky expressed the dreams of knowing outer space inaccessible at that moment.

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Can Moral Values be Formed without Influencing the Development of an Individual's Worldview?

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The study considers the implementation of one of the top trends in modern society development – defending the role of morality in society and the value paradigm, the centre of which is increased attention to the formation of the value-semantic sphere of personality, which influences their worldview formation. Scientific research focuses on the moral values formation of the growing individual from the perspective of their worldview development, revealed by interaction with the world, specifically in interpersonal relationships and directly with themselves. The essence and features of the moral values formation, in the context of interconnections and interdependence of components in the structure of an individual, are substantiated using the methods of analysis and synthesis, abstraction and concretization

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through the study of the scientific heritage of foreign and Ukrainian scientists. The article specifies moral values as a mechanism of human social behaviour that performs several functions in their life (normative, regulatory, control) and affects the worldview and the formation of a personal worldview.

Based on the generalization of the presented scientific array findings, the author's concept of moral values formation in the worldview of the individual is modelled, it is presented as a diagram of the interdependence of three chain lines: 1) social morality – self-awareness – worldview; 2) values – world perception; 3) moral values – individual's worldview. The algorithm for the studied phenomenon of an individual is seen in the moral education providing, which ensures the moral values formation in the structure of moral self-awareness and the development of the worldview of a growing personality. The individual's worldview is determined by several factors: the system of moral knowledge and beliefs formed resulting from the acceptance of the acknowledged in society moral values that become personal; accumulated moral experience and striving for moral self-improvement. The findings outlined the issues of further scientific research, which will involve clarifying the state of students' moral development in the educational process and the levels of their moral values formation as well.

Keywords: morality, society, moral values, individual, worldview, moral self-awareness, moral education, moral growth, individual's worldview

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Introduction

Current social transformations have a direct impact on all the aspects of an individual's formation, and it impacts both their moral sphere and the state of the entire society. A substantial influence on the individual's worldview formation has the cultivation of value orientations based on moral norms and moral principles of behaviour that give the personal development direction, determining moral motivation, moral choice and ultimately moral self-awareness. It is the individual's adequate perception and awareness of the moral precepts established in society that leads to the production of moral activity based on the existing system of moral values, identified with the moral ideal (Bespalov et al., 2017; Luco, 2019; Nucci, 2016; Saucier, 2018; Severini, 2021; Smyth, 2021).

Considering the above, we underline the *immediacy of the problem* raised in the scientific positions of experts in both philosophy and psychology and pedagogy, which is primarily related to the research of the essence and patterns of the growing personality value system through the lens of social demands. Values form the basis of human life, its real interaction with the outside world (Buchtel, 2020; de Vries, 2019). The value system covers the full range of human existence, as values express significance by acting as internal stimuli produced externally through emotional expressions, judgments, behaviour (Capes, 2019; Kaspar, 2019; Maslova et al., 2020; Severini, 2021). The sphere of values existence is universal and boundless since the infinite universe has long been a philosophical, cognitive, ethical, aesthetic value for humanity (Knobe et al., 2006; Sagiv et al., 2017; Vidal, 2012).

Among the outlined, we focus on ethical/moral values, which essentially cover those properties of objects and subjects of the surrounding reality, explicating the positions of “good – evil” and are manifested in interpersonal relationships (Arrows, 2016; Curry et al., 2019; Martela, 2017; Mills, 2017; Smyth, 2021). According to Frank Martela, morality “aims to make living together possible, and strengthens people's capability to live a good life within a society,” and moral values result from its understanding by humans (Martela, 2017: 58). Moral values as an achievement of a human were considered in terms of formation their moral

culture and ability to accept the Other with their interests, values, beliefs if it is compatible with universal human values established in a particular society (Hartman, 2019; Luco, 2019; Stringer, 2021). Thus, a human's need to interact with others, consider their needs, always has a moral foundation and expresses a good/appropriate or negative/inappropriate attitude. An important question arises as to how the compatibility of the moral values formation in the individual's worldview and how to ensure this process for their harmonious social functioning.

The setting of this scientific problem led to the defining of the purpose of research: A) to carry out the analysis and theoretically substantiate the essence of the moral values formation basing on the study of the leading positions of key foreign and Ukrainian scientists; B) to define the author's theory of moral values formation in the individual's worldview; C) to predict the impact of moral education in the context of the philosophy of education on the formation of moral values system of the growing individual.

The essential *methods* of scientific research were: analysis and synthesis, abstraction and concretization, generalization of the results of the scientific and bibliographic search and the modelling of the author's concept of moral values formation in the individual's worldview.

Theoretical substantiation of the essence of the moral values formation in the individual's worldview

Analytical review of the studied scientific and source base revealed that one of the leading trends in modern society development in the informatization era, according to John Sullins, should be the recognition of the value paradigm, including the observance of moral values in all spheres of life (Stanford Encyclopedia of Philosophy, 2018). It necessitates the clarification of the value-semantic sphere formation of a growing personality since "that every history having a non-zero probability is realized in infinitely many distinct regions of space-time" (Knobe et al., 2006: 47).

The main feature of the value from the perspective of the humanistic worldview is the presence in it, firstly, favourable to the individual qualities, properties, the ability to use this value as their guide and for the benefit of others; and, secondly, their (values) aptness to be combined with positive personal traits, qualities, i.e., psychological characteristics (Parks-Leduc et al., 2015). It is demonstrated by the following pattern: "that more cognitively based traits are more strongly related to values and more emotionally based traits are less strongly related to values" (Parks-Leduc et al., 2015: 3). John H. Evans has stressed that the formation of the value sphere of the individual is not a separate process in human development; on the contrary, it is the end-to-end transformation of value orientations to a higher level, which occurs throughout life and depends on many factors influencing it (Evans, 2019). The moral and value system, reflected in the formation of the individual's worldview, plays a significant role in the success of this process (Evans, 2019). The obtained results have confirmed the applicability of self-control with values relevant to individuals and their correlation concerning their psychological characteristics (qualities, preferences, needs, et cetera).

Such values acquire the personal status of the meanings system and become the uppermost element of the personality structure (Huitt, 2004; Schwartz, 2006, 2012). Thus, William G. Huitt has underlined that it is those values that consciously develop from value constructs accepted by the individual as vital (Huitt, 2004). The values are acknowledged by humans and are characterized as "accepted values" (Huitt, 2004). The scientist noted that "construct of values", formed in the individual (moral values included), serve as the guidelines in solving problems, build their baggage of complex meanings and symbols, reactions and actions that

are the basis of an individual (or group) judgements and deeds on the proper/positive (Huitt, 2004: 630). Hereof we summarize that values play a regulatory and normative meaning in the human's choice of a behaviour model following their inner world (stimuli and beliefs) and towards other people.

Hence, Shalom H. Schwartz singled out the value of "benevolence" from ten universal personal values, the essence of which is "preserving and enhancing the welfare of those with whom one is in frequent personal contact," lying in the plane of "self-transcendence' values" (Schwartz, 2012). Self-transcendence is understood as a personality trait that characterizes an individual as a subject of life created from the perspective of expanding one's boundaries concerning others and awareness of one's place and role in the universe (Frankl, 2014; Reed, 2018). Therefore, this contributes to a human's understanding of their inner world, a deep awareness of the professed values, since the individual's aspirations are related to their self-transcendent values (Bespalov et al., 2017). Such values acquire personal status; they act as a mechanism of self-control as to universally accepted social values and determine the behaviour with others.

Researchers Lilach Sagiv, Sonia Roccas, Jan Ciecuch, and Shalom H. Schwartz hold that values play a decisive role in guiding a human's activities, thus delineating its role in their lives and the lives of others (Sagiv et al., 2017). It is emphasised that personal values are "subjective in nature, and reflect what people think and state about themselves" (Sagiv et al., 2017: 630). In verbal form, personal values indicate that all people have diverse views, which can either coincide or partly differ; and in turn, it affects their preferences and determines environmental behaviour. Each person behaves according to the values formed, which they profess to "attain the goals underlying them" (Sagiv et al., 2017: 630). Accordingly, the perception and understanding of other people's values allow to specify peculiarities of their behaviour, to develop the way to normalize relations based on the principle of humanism.

We find consonance with the specified scientific theses in the researches of Olga V. Maslova, Dmitry A. Shlyakhta, and Mikhail S. Yanitskiy, defining the essence of human differences according to the hierarchy of values – the importance given to core personal values (Maslova et al., 2020). Based on Schwartz's values structure (2006, 2012), researchers have specified "the role of socio-cultural environment in building up personal values" (Maslova et al., 2020). The study states that the personal value system is always based on a set of values inherent in a particular society and established as fundamental in it. The values are reevaluated, which is reflected in the transformation of the personal value orientations due to the change of social values, which is a frequent phenomenon following the dominance of various priority ideologies.

Thus, every person carries out their activities according to the norms and regulations established in society and shared values. For these values to acquire personal meaning, they must, first of all, become those value-based orientations that are consciously formed based on constant reinforcement of their functionality within a particular society (Maslova et al., 2020; Parks-Leduc et al., 2015; Sagiv et al., 2017). If a human is not aware of the content of the values by which the individual is guided, it is impossible to determine the purpose of their activity. The subjective aspect, namely, the goal-setting of human social activity, reflects their value system. The values-based orientations reflect selectivity and individuality through the personal attitude to the objective conditions of their life. The main leverage of the value system is the function of the external behaviour regulator, the development of objective and subjective aspects of moral consciousness (Munzel, 2019). Thus, for the formation of a personal value system, it is important to consider the process of subjective reflection in the

surrounding reality values.

Changes in the personal consciousness regarding the importance of society's values are subject to the paradigm of environment perception. It is done only when there is a process of accumulation of new value-based ideas and knowledge that create the basis of personal beliefs. Setting the value of environmental objects and subjects is associated with the ability to providing them with an appropriate assessment and determines the values formation in the human mind (Osimo et al., 2018). This creates the problem of a culture of values choice, which involves providing freedom and considering personal preferences. The choice is based on the system of established knowledge, implemented through activities, including taking responsibility for its consequences (Capes, 2019). The observance of the chosen values by a human is only arising from the beliefs formed based on the knowledge system (Risberg & Tersman, 2019).

It is only human nature to identify individual differences in behaviour patterns, as their value-based orientations are determined by the community system of social and moral values (Saucier, 2018). "Ethics and moral codes remain critical and universal components of human culture," as they help to establish individual traits and a set of personal values that guide a person and determine their social position (Saucier, 2018).

The analysed array of modern research allows us to make the following intermediate generalizations: the formation of personal values is a complex process caused by various factors, defined by ambiguity and multi-vector development. To cultivate a personal value system, based on gained knowledge and strong beliefs, acquire value, it is necessary to take into account the diversity of human nature manifestations and its features (needs, motives, preferences, et cetera).

Considering one aspect of the psychological patterns of personal growth – cognitive and emotional unity in process, we highlight such a significant component of the values formation as emotions/experiences (Blackman, 2019; Carpendale & Wallbridge, 2019; Haidt, 2006). Jonathan Haidt's research presents the essence of the emotional content of moral values, revealed through the observance of social and moral norms, thus creating a "feeling of happiness" (Haidt, 2006). Human values are the reflection of the emotional sphere and the condition for life purpose fulfilment. Human mood, habits and the urge actively influence the formation of moral values that lie in the socio-cultural plane. Therefore, the emotional and sensory component is determinative for the cognitive and activity-based of the moral values essential sense (Haidt, 2006). Reid Blackman argues this statement by explaining the nature of moral motivation through the influence of emotions and the reasons for them to arise (Blackman, 2019). Their formation successfully ensures the implementation of a "developmental approach to the role of emotions in the social origin of moral norms," the application of which allows taking into account the specifics of the emotional sphere of each individual (Carpendale & Wallbridge, 2019). It confirms the position that the level of moral maturity of the individual is determined by the formation of all moral values components and is based on awareness and adherence to the system of social values.

The study of Alexander Bespalov, Marina Prudnikova, Bavuu Nyamdorj, and Mikhail Vlasov on the correlation between "life aspirations, values and moral foundations" of the younger generation has convincingly shown that the choice of moral values depends on the inner-personal moral values (Bespalov et al., 2017). Scientists have noted that thoroughly understood personal aspirations gain importance and determine their moral basis, which plays a dominant role in life (Bespalov et al., 2017). This phenomenon is called "moral progressivism"; it is realized through the moral development of a growing personality

(Bespalov et al., 2017: 258). This phenomenon (moral growth as progress) is closely related to the social “morally progressive social changes” and is related to the “evolution of moral cognition” (Luco, 2019: 429).

Some research papers (Frisancho & Enrique, 2016; Tripses, 2021) state that the relationship between the moral sphere and the worldview should be considered. Scientists have focused on the relationship interpretation and interdependence between “morality, moral development, moral education,” which determine the formation of human worldview (Frisancho & Enrique, 2016: 239). According to Jenny S. Tripses, “moral purpose expressed through universal values support” provides the acceptance of moral values, directs their development and influences human behaviour (Tripses, 2021: 13). Therefore, this stimulates the formation of human virtues (justice, responsibility, benevolence, and others), which at the same time act as their moral values. It proves and determines the interaction and interdependence between these categories (moral values and virtues) and impacts on personality formation (Tripses, 2021). Thus, the assimilation of (moral) ideas and knowledge, the formation of personal virtues and moral values are the first steps providing the basis for the process of understanding, and importantly, comprehending the essence of moral progress (Severini, 2021).

For moral values formation, the individual’s ability is essential to make a reasonable moral choice and take over moral responsibility (Garcia, 2021; Hartman, 2019; Horowski, 2020). Moral responsibility is the tangible embodiment of moral motivation fulfilled through moral duty (Hartman, 2019). Moral duty fulfilment is always based on strengthening humans’ efforts to themselves (as an individual duty that they set themselves), making a moral choice (Horowski, 2020). The process of moral decision-making is complex as it can destroy both one’s interests and those of others (close people) for the sake “of moral good”, which complicates the relationship between them (Horowski, 2020: 591). According to Avery Kolers, the indicators of individual moral development will increase only if the mechanism of “moral agency” is used (Kolers, 2020: 636). It is the freedom of expression that allows a human to make moral decisions and consciously control their moral actions aimed at achieving the goal of resolving moral conflicts. Moral values formation, in addition to the consistency of moral norms with their moral self-determination, is characterized by a practical act of their approval in relevant moral situations – a moral act (Kaspar, 2019). Therefore, the formation of moral values as the basis of the moral self-awareness of the individual is a multifaceted process conditioned by the causal relationships, which affect their worldview formation (Stringer, 2021).

Many studies provide insight into the search for effective ways to cultivate moral values in a growing personality (Bespalov et al., 2017; Fry & Souillac, 2013; Löfström et al., 2021; Maxwell & Beaulac, 2013; Nucci, 2016; Rashid, 2020). It is significant to organize the integration process of moral education, which provides the formation of critical and reasonable moral considerations in solving real-life moral dilemmas (Nucci, 2016; Löfström et al., 2021). The application of “Moral foundations theory (MFT),” which would take into account the psychological make-ups of personality development, social living conditions, individual traits, et cetera, is convincingly proven (Fry & Souillac, 2013; Maxwell & Beaulac, 2013).

The issue of moral values and their measurement among the younger generation in the educational environment has acquired urgent importance at the current stage of social development and has been studied in recent years at different angles:

- a) “the role of education as a transformative process to develop empathy and compassion among children” (Thapan, 2019: 275);
- b) “the social domain theory approach to moral education” (Ilten-Gee & Nucci, 2019: 58);

- c) the influence of moral education on the personal worldview formation (Tripses, 2021) et cetera.

We shall consider the problem in detail further, according to the purpose of scientific research (implementation of position C) – the philosophy of education on the moral upbringing of the individual.

Thus, the analysis and theoretical substantiation of the essence of the personal moral values formation based on the synthesis of positions of foreign and Ukrainian scientists contributed to the identification of scientific trends in the study of the phenomenon and outline of the following generalizations:

- a) values act for humans as integral markers of the social structure, which the human first perceives as value orientations and is guided by them in various spheres of life;
- b) values formation is based on the recognition of the ideal, perceived by the human and considered as the appropriate/exemplary to which they aspire;
- c) values express the psychological personality characteristics, their needs, motivations, motives, affections, preferences, desires, personal choices, and such like;
- d) during development, values acquire the personal status, the components of values are ideas, knowledge, beliefs (cognitive); emotions and experiences (emotional); choice, action, deeds, behaviour (activity);
- e) moral values are distinguished in the socio-psychological context, they express personal moral and ethical position both concerning themselves and other people, and that is how their worldview is manifested.

These scientific positions allow to build up the author's concept of moral values formation in the personal worldview and to characterize the fundamental principles of its content.

The concept of moral values formation in the personal worldview

In the study, initiated by the authors, presented in the article “Nature of Moral Philosophy in the Human Universe: Retrospective Analysis and Modern Paradigms,” moral values were considered in terms of the human universe, which provides their interaction with others (Lokhvytska et al., 2021). Building on the scientific work of other scientists (de Vries, 2019; Lewis, 2019; Luco, 2019; Narvaez, 2021; Severini, 2021 and others), we underline that the individual is always in a state of continuous change and development. With such dynamic growth, there is an impetus of internal driving forces determining the nature of personality, their view towards the world around them. The personal value system acts as a regulator and mechanism of human growth; values determine human needs, intentions, preferences and so on, ensuring self-realization and self-affirmation in society. This process is aimed at advancing the human to new stages of development, consequently affecting worldview formation. In general, values determine human life and activities, their attitude to others and environmental behaviour. Through the lens of social values, the most significant are the moral ones, based on the observance of moral norms and principles inherent in a particular environment. The complexity of the issue is seen in the fact that moral values are not spelt out (unlike social), but they have a vital mission and act as standards for defining good (proper/moral) and evil (improper/immoral) directing personal activities. Having a stable worldview, a human accepts them as individual values.

Following the target goal, we propose developing the author's concept of moral values formation in the personal worldview (see Figure 1). Concept basis is the modern foreign and domestic scientists ideas on the peculiarities of the human worldview formation (Buchtel, 2020; de Vries, 2019); the role and place of morality in a society considered by philosophical moralists (Hartman, 2019; Luco, 2019; Severini, 2021); the process of self-awareness (Munzel, 2019; Thapan, 2019); essence and values structure (Maslova et al., 2020); the specifics of moral values and the need for their formation in a growing personality (Curry et al., 2019; Narvaez, 2021; Rashid, 2020; Stringer, 2021). These methodological principles, identified as a result of analysis, synthesis and generalization of the scientific base of the research question, have provided the basis for constructing a scheme of the conceptual model of the place of moral values in the personal worldview (see Figure 1), which is described below.

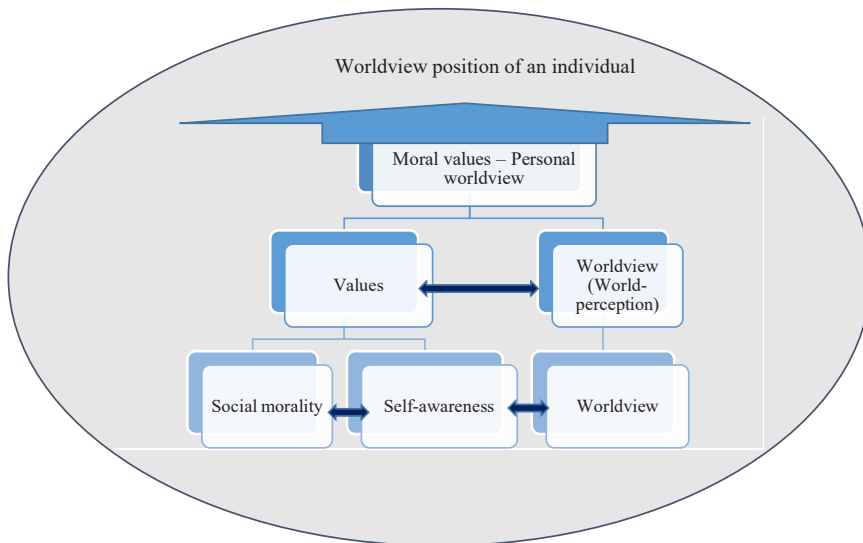


Fig. 1. Conceptual model of the place of moral values in the worldview of the individual

In the schematic image in Fig. 1, the relationships between various components of the complex process of moral values formation that determine the personal worldview in society are conditionally structured. In the author's explication, this process has a chain sequence of the selected components development of and a kind of "road map": from the individual's perception of the social morality – to their generalization by their vitality. The conceptual model contains the following three chain lines:

- a) Social morality – Self-awareness – Worldview;
- b) Values – Worldview (World perception);
- c) Moral values – Personal worldview.

We provide the author's interpretation of the essence of each specified chain line regarding the place of moral values in the personal worldview. *First line: social morality – self-awareness – worldview.* The interpretation of the line components aims at defining the general outline of the phenomenon under study. Every society has corresponding moral

norms, rules and principles that govern human behaviour. Philosophical moralists have been studying *society moral* issues for many centuries. Morality forms the idea of right / proper and wrong / improper (or in other words, good and evil); it is common to all members of society and is entrenched in their minds. The evolution of moral cognition leads to the improvement of social morals since it predetermines progressive social changes. In Andrés Luco study, this process is revealed through the definition of “Naturalist-Realist Hypothesis (NRH)” in elucidating moral facts and their impact on society moral progress (Luco, 2019: 429). According to the teaching of Eleonora Severini, “moral progress occurs when a subsequent state of affairs is better than a preceding one,” requires a person’s awareness and “moral understanding” of the essence of events and phenomena occurring around (Severini, 2021: 87). Conscious assimilation of moral norms contributes to the self-awareness development, directly reflected in their attitude to themselves, to their actions and manifests itself in the development of their *worldview* (Buchtel, 2020; de Vries, 2019). Self-knowledge leaves a significant imprint on them, characterized as progress in personal development, as constant interaction with themselves, without which “we are unable to relate to others in a meaningful and significant manner,” which determines its social factor (Thapan, 2019: 275). Thus, the formation of the personal moral consciousness is determined by the social nature of society.

Value-based orientation is a critical element of *moral consciousness*, as the ability of the human to constantly direct thoughts and actions to achieve the moral goal and obtain the desired result under different circumstances (Munzel, 2019). Value-based orientations are primary in a stable value system formation; they begin to function as internal stimuli that lead to the choice of actions and deeds, developing their moral feelings. Such feelings are directly dependent on the human views system, principles and beliefs, conditioned by worldview. As a form of self-awareness, worldview is the result of a human practical mastering of social morality through the awareness of the need to comply with moral norms and moral principles governing the system of relations with others and attitudes toward themselves. Relationships with other people determine “distinct types of cooperation” in the moral sphere, which depends on the development of moral self-esteem (Curry et al., 2019).

Second line: values – worldview (world perception). This line defines the concretization between *personal values* development and the *world perception* as part of the *worldview*, based on the emotional sphere development. It is through the experience that the moral principle of the individual is awakened. The source of such an experience is the result of cognitive-affective integration of knowledge and sensory response, conditioned by moral appeals that arise from curbing their own needs in favour of the interests of others and are expressed through compassion and empathy (Blackman, 2019; Thapan, 2019). Thus, moral feelings are generated, firstly, by the formation of attitudes toward others, based on the development of human relations and the relationship between them, and secondly, by the accumulation of their own experience of moral behaviour in relevant situations based on moral and ethical norms of society.

Conscious imitation of general social values is quite significant for the personal value system development. That is why values should be considered as a mechanism of human vitality manifestation, as they act as a guideline in establishing human interaction with the environment and, in particular, with other people (Maslova et al., 2020). The values assimilated by a human receive the status of personal ones, ensure the implementation of self-image and self-control towards the observance of generally accepted social values. Being embodied in the activities, these values perform the rule-making function, thus, ensuring the actualization of personal potential.

Thus wise, values in the personality structure arise from the bilateral process: on the one hand, they determine the assimilation of social values, moral norms and moral principles, and on the other hand, they are indicative of the formation of the personal “I,” human self-awareness. Values are indicators of their worldview, expressing the inner world of the human. Personal values reflect in the individual experience, not only their development dynamics but, above all, those invariant aspects of social and universal experience that the subject assumes. It is, therefore, the very process of assimilation of a specific value system that allows them to successfully join the life of a particular society since values express the desired. Due to the formation of such a value system, which should be considered an ethical indicator of human activity (proper/moral behaviour, relationships with others, attitude towards themselves), there is an understanding of the world, which directly affects the formation of the personal worldview.

Third line: moral values – personal worldview. Interpretation of this line is to partially delineate the correlation between *personal moral values* and their *worldview*. Recognition of moral values acting in society, which merge into the internal action plan and become personal ones, is based on their awareness, which forms human moral self-awareness. Humans unquestioningly adhere to them and take responsibility for their moral choice and behaviour. It expresses the ability to regulate their behaviour since moral values become experienced and firmly rooted in the structure of personality (Stringer, 2021). Thus, moral values determine the self-image and self-awareness, which characterize individual position towards other people and affect interpersonal relationships, as well as the choice of priorities in life (principles, ideals, and so on).

The personal worldview reveals the perception on the emotional level of the moral value system of society, which are transformed into personal ones. First, this happens at the level of value-based orientations, that later they become stable moral beliefs (the cognitive component). The formation of a personal moral value system is based on human awareness of their need to meet the moral requirements (norms, traditions, rules, principles, regulations, ideals) established in society. Been integrated into society conditions, social moral values become human internal regulators (the behavioural component) and are manifested in the stability of their moral views, knowledge, evaluations, actions, expressed through relation to the world and themselves. This attitude is characterized by selectivity and distinguishes personal worldview, associated with the formation of their virtues, moral beliefs, attitudes, aspirations, and the like.

Among human virtues, it is worth noting “of prudence, justice, temperance and fortitude,” as they have the utmost influence on the development of consciousness (Horowski, 2020: 591). The cultivation of human virtues occurs in the process of their upbringing, which should correspond to the moral culture and moral values of society. It is the development of “Morality-as-Cooperation (MAC)”, as stated in the study of Oliver Scott Curry, Matthew Jones Chesters, and Caspar J. Van Lissac will ensure the formation of worldview, high level of moral development and personal position regarding their place and mission in society in terms of interaction with other people (Curry et al., 2019). There is a consensus on the need to improve moral education aimed at the moral growth of the younger generation since a decline in their moral development has been recorded recently (Narvaez, 2021; Rashid, 2020). It leaves a significant imprint on the formation of the individual’s worldview, acts as a collective moral characteristic and reflects the interaction of a human with themselves, with other people and society at large, according to the set moral values.

Therefore, the assimilation of the moral values system, their observance and individual’s moral orientation, manifested in their worldview, depends on the effectiveness of moral

education. Such generalizations have determined the need for the following position implementation, aimed at determining the impact of moral upbringing on personal moral growth in the context of forming their worldview.

The influence of moral education on the formation of moral values system of a growing personality

This issue is considered from the perspective of the individual's philosophy of education, as its task is to find out what an individual should be, what characteristics they should meet, what qualities to have, how and in what they should do to ensure their development and the formation of the worldview. Appealing to the philosophy of education allows us to reveal the attitude of the human to the world around them (in particular, to society and its values, to various groups, to other people and themselves) (Horowski, 2020; Westlake et al., 2019). Thus, in the context of the philosophy of education, it is important to determine the influence of moral education on the formation of the moral values system of the growing individual. The essentials are the following scientific positions of philosophers, psychologists, and teachers:

- a) Oliver S. Curry et al. (2019) – on the moral foundations in the formation of relations between the participants of interaction;
- b) Colin J. Lewis (2019) – on the balance between the socialization and moral education;
- c) Renatas Berniūnas et al. (2021) – on the recognition of moral norms at the social level, compliance with which is mandatory in society;
- d) Nicholas Smyth (2021) – on the social moral differences, which create misunderstandings and lead to conflicts;
- e) Darcia Narvaez (2021) – on the relationship between morality, moral development and education of the individual;
- f) David Bakhurst (2019) – on the need for practical application of moral knowledge obtained in the process of purposeful moral education, and their transformation into moral skills;
- g) Hanno Sauer (2021) – on the role of moral judgements and their impact on the formation of moral self-awareness of the individual, which determines its behaviour in society;
- h) Robyn Ilten-Gee and Larry Nucci (2019) – on the importance of moral education in building a psychological portrait of the individual for their later life;
- i) Kristján Kristjánsson (2020) – on the components of the moral education and allocation of Aristotele's dominant virtues;
- j) Marvin W. Berkowitz (2021) – on the need to increase the process of moral values formation in children and youth in educational institutions;
- k) Desheng Gao (2021) – on educational and methodological support of the organized process of moral education of the younger generation in educational institutions;
- l) Jan Löfström et al. (2021) – on taking into account the laws and mechanisms of moral psychology in the assimilation of moral knowledge by students;
- m) Rafi Rashid (2020) – on the dependence of the moral behaviour of the individual on the formed moral considerations;
- n) Jenny S. Tripses (2021) – on the correlation between the set moral goal and the development of moral responsibility in the implementation of the moral education tasks in educational institutions and so on.

The logic of scientific research suggests the following significant perspective: clarifying how a human assimilates the morals of society; identification of determinants and components of moral education that ensure moral development through it; outlining the achievements of moral growth of the individual (cultivation of moral values, formation of moral self-consciousness, production of morality in one's activity, et cetera). It outlines the author's position on the algorithm and the main segments of the studied phenomenon. Since it is distinguished by development continuity, we have ample grounds for conditionally predicting it throughout the process. We present the influence of moral education and the relationship and interdependence of its main components on the formation of a moral values system of the growing personality in a visual (schematic) form Figure 2 (see Figure 2).

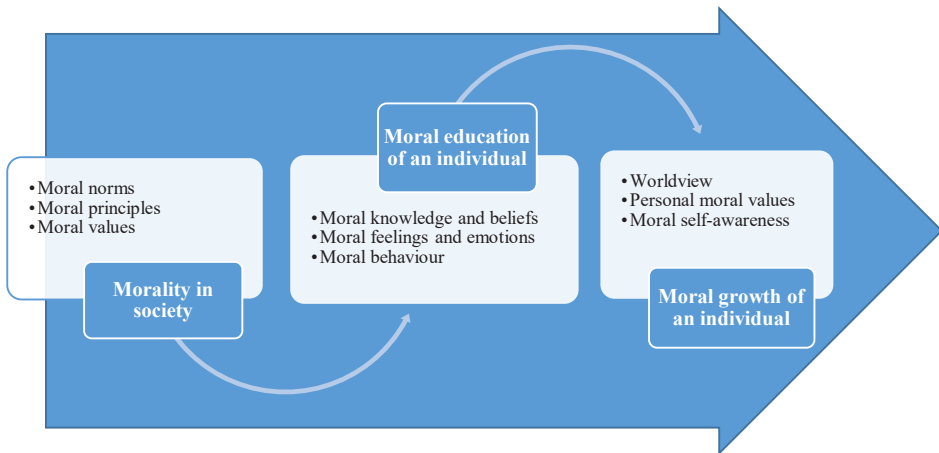


Fig. 2. The scheme of influence of moral education on moral growth of the individual in the context of the worldview formation

In Fig. 2, three segments of the formation of human moral perfection, a continuous individual phenomenon, are identified: from mastering the social morality in which human lives → to a purposeful process of moral education, which ensures the implementation of moral development, increasing its level → to personal moral growth, which is determined by indicators of moral self-awareness with formed moral values, reflected in the worldview.

We shall define each of these segments. Assimilation by the individual of the *social morality* (the first segment) such as moral norms, principles and acceptance as their moral values create the foundations for further moral development. The description of this segment is presented in detail in Fig. 1, where the formation of personal moral values and their production in human life is displayed. The human proactive attitude is based on the conscious moral norms observance by humans and prevention of their violation by others. Among the components are active moral beliefs resulting from the assimilation of moral views, traditions and rules of society. Their integration takes place in several stages: from sense perception that affects the development of the emotional sphere to the formation of sustainable “<moral reasoning>, ... <moral intentions>, ... <and moral behaviour>” (Ilten-Gee & Nucci, 2019: 59).

It leads to the *moral education* content clarification (second segment) – the process that contributes to the formation of moral knowledge and beliefs, moral feelings and emotions and moral behaviour. Therefore, moral education directs personal moral development. Society

creates favourable conditions that open humans to the possibility of a free and conscious combination of social/moral requirements with personal moral beliefs. Considering the indisputable fact that a human cannot be completely independent of the social conditions, a human becomes a subject of moral choice (Lewis, 2019; Westlake et al., 2019). The findings on the impact of the theory of socialization and socio-cultural artifacts on moral education have shown that making moral choices is a complex decision for the individual (Lewis, 2019). At the same time, moral choice is determined by social determinants, and as the moral beliefs of the individual, their moral qualities are formed in the process of education, active participation in the life of society. Within this framework, there is a connection between education and the moral upbringing of the individual “mediated by cognitive ability, self-control and high levels of socialization” (Westlake et al., 2019).

For a growing individual, educational institutions become the centre that, in addition to the educational component in their activity, must implement the tasks of moral development of each subject of this process. Several studies have substantiated the need to clarify moral values and increase the level of moral education, particularly among schoolchildren – Marvin W. Berkowitz (2021), Jenny S. Tripses (2021); in the university education system – Robyn Ilten-Gee & Larry Nucci (2019), Jan Löfström et al. (2021), Rafi Rashid (2020). A comprehensive approach to moral education is critical, taking into account the relationship between its various components (moral knowledge, moral emotions and moral behaviour), acting as multi-vector phenomena and promoting the moral development of the individual and “critical moral orientation towards the norms of society” (Ilten-Gee & Nucci, 2019: 58).

The formation of moral knowledge, moral beliefs and judgements (the cognitive component) in the structure of moral self-awareness has a complex course, as it occurs against the background of the contradiction of conscious and unconscious in the structure of the individual (Sauer, 2021). Olle Risberg and Folke Tersman see “adherence” as the main principle in the knowledge acquiring about moral facts stimulating moral considerations development (Risberg & Tersman, 2019: 189). Functionally, it is associated with such an individual’s psychological properties as stability and instability, which depends on the nature of its moral orientation in moral cognition and is reflected through the implementation of moral reflection (Bakhurst, 2019).

Human stable attitude towards social events, other people, and themselves is revealed due to the influence of the emotional component – moral feelings and emotions (Blackman, 2019; Carpendale & Wallbridge, 2019; Mestvirishvili et al., 2020; Thapan, 2019). Within the context of the study of emotional intelligence, the “integrative linkages” of emotions in the formation of “moral competencies, moral judgement and moral identity” have been proved; it leads to better moral functioning of the individual in society (Mestvirishvili et al., 2020: 307). There is faster assimilation of moral norms on an emotional background, as they are based on friendly relationships formation. The source of such emotional background is the recognition of the same moral values, life together, their relationships, the focus on achieving social goals and responsibility in the moral sphere (the behavioural component) (Capes, 2019; Garcia, 2021; Hartman, 2019; Kolers, 2020; Narvaez, 2021).

To ensure the success of moral education, scientists (Berkowitz, 2021; Gao, 2021; Kristjánsson, 2020; Löfström et al., 2021; Rashid, 2020) focus on finding optimal approaches, methods and means of its organization, namely:

- a) the need to discuss the essential importance of moral values in solving moral dilemmas with students, performing tasks aimed at making moral decisions in the

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- study of disciplines that are “modelled as an interdisciplinary process” to establish their integrity (Rashid, 2020: 1861);
- b) application of the effective model “Aristotelian friendship as a ‘method’ of moral education,” which is expediently “applied in current educational contexts” (Kristjánsson, 2020: 349). A deep awareness of moral obligations by the individual occurs through the implementation of the proposed method in moral education, which the author has identified as a mechanism of moral development, as it creates a basis for “in facilitating moral growth” (Kristjánsson, 2020: 349);
 - c) the introduction of the six-component framework of the implementation of moral education tasks into the PRIMED learning process, where: P – prioritization character education, R – relationships building, I – intrinsic motivation, M – modelling goodness, E – empowerment, D – developmental pedagogy (Berkowitz, 2021). Scientists are presented with a program for a purposeful educational environment to form in young people the essential moral values and virtues, moral relations, et cetera. (Berkowitz, 2021);
 - d) compiling specific Textbooks under the objectives of the moral education program for the growing generation, which would take into account “personal experience and socio-cultural values” (Gao, 2021: 67);
 - e) taking into consideration the “set of stimulus activities” for “expressions of moral reasoning, empathy, sympathy and other moral emotions” (Löfström et al., 2021).

Thus, there is a close relationship between social morality with inherent moral values, moral education and moral development that determines the specifics of personal growth and worldview of each of its citizens (Curry et al., 2019; Horowski, 2020; Ilten-Gee & Nucci, 2019; Narvaez, 2021).

In the sense of the formulated generalization, it is necessary to clarify the essence of the phenomenon of *moral growth of the individual* (third segment). The research findings (Capes, 2019; Munzel, 2019; Risberg & Tersman, 2019; Severini, 2021) have shown that personal values as a component of self-awareness express tendencies of moral choice, criteria for setting goals, and the result of human moral actions. According to the desired moral consequences in a particular life situation, a human can evaluate other people and themselves through the relationships with others, determines what they should strive for, and tries to achieve this using only the means approved by society.

Provided that a human accepts moral responsibility, based on the recognition of the moral values of society, they are included in their internal plan, which raises them to the personal level. They are firmly entrenched in the moral self-awareness of the individual and perform indicative, regulatory, rule-making and guiding functions in human moral behaviour control. Accordingly, the moral growth of the individual is closely related to the worldview and the accumulation of moral experience of joint activities with others (Tripses, 2021).

The development of moral values is carried out in a particular sociomoral situation in society, which inherently differ as fragments of social evolution, which determine both the process of formation and content of these human values (Curry et al., 2019). If a human adheres to the relevant principles of moral behaviour and moral norms in their moral activity, then they become obligatory, transforming into their moral values, which are reflected in their moral actions (Kaspar, 2019). The evidence is the fact that the individual “can resist moral evil, even when this will clearly lead to the experience of loneliness” (Horowski, 2020: 591). It is “the existence of deep and persistent moral disagreement” that provokes conflict

situations in human relations and causes personal imbalance (Smyth, 2021: 1089). Thus, we interpret moral values as the main factor in the orientation of individual behaviour and the formation of the worldview.

The formation of a stable social position of the individual formed based on the worldview, moral beliefs, motives of moral behaviour determine moral orientation in adherence to moral values. A cross-cultural study by Renatas Berniūnas, Vytis Silius, and Vilius Dranseika proved that the lack of “distinction between moral (dao 道德) and conventional cultural norms (wenming 文明)” increases the indicators of development of the personal moral sphere (Berniūnas et al., 2021). Thus, moral values are formed under the influence of a particular social situation and are manifested in human activity.

Based on the scheme (see Figure 2) and its content, we shall make the following generalizations: the worldview of the individual is determined by –

- a) their moral experience;
- b) a system of moral knowledge and beliefs that are formed as a result of the adoption of generally accepted moral values that become personal based on the worldview and develop through the implementation of the moral education tasks;
- c) the set goal and aiming at moral perfection (after the image of the moral ideal) and the means of achieving it, consistent with the moral norms and principles of society, and provide moral activity, which is manifested in relationships with others and themselves.

Conclusions

Modern vectors of social development dictate the need for changes in the formation of human values system, which are the fundamental principle of their life. Moral values hold a specific place due to them. The individual establishes contacts and interacts with the world around them. Growing into personal moral values determines personal worldview relative to themselves and other people. The presented study clarifies the essential importance of the formation of the personal worldview for their harmonious functioning in society.

1. The general review of the scientific and source based on the issue under study has given grounds to substantiate the essence of the formation of moral values. Personal moral values are derived from social (moral) values, and their formation is defined as a continuous process of human awareness of the need to follow them as their own following the content of established norms and rules, as well as changes in society. The development pathway of personal moral values has multidimensional features: from the acceptance of social moral values to their application as their value orientations, which become implicit motives and beliefs. Each person operates their system of established values in their activity and during assessing the events of the real world, other people and ways of their interaction. The formation of human moral values is in a plane of moral self-awareness formation and is explained as one of the components in the personality structure. Thus, moral values are an integral formation of moral self-awareness, directly manifested through the worldview, including moral norms, principles, ideas, concepts, assessments that are closely related to their motives and needs, and ensures the orientation of individual's consciousness to achieve higher moral goals (striving for a moral ideal), which regulate their behaviour based on “good” and “evil.”
2. The synthesis and generalization of research provisions of modern foreign and Ukrainian scientists allowed to design the author's concept of moral values

formation in the individual's worldview. Conventionally, it outlines three chain lines: 1) morality in society – self-awareness – worldview; 2) values – world perception; 3) moral values – personal worldview. The interpretation of each component of the studied phenomenon is given from the perspective of their relationship and interdependence concerning the active human moral position and their life. It is proved that the development of moral values in the personal worldview expresses their ability to predict the consequences of their moral actions and behaviour in general and shows the potential to strike a balance between personal and social needs and interests. It was found that the formation of personal moral values occurs due to the influence of moral education on their moral development, which is reflected in the process of their moral growth and personal worldview.

3. The influence of moral education in the context of the philosophy of education on the formation of the moral values system of the growing personality is revealed through the complex methodological foundations of moral philosophy and moral psychology and pedagogy. Schematically the process is outlined in three segments: (a) assimilation of the social morality, social moral norms, principles and values by a human; (b) purposeful moral education of the individual; (c) personal moral growth of the individual, determined by the formation of their moral self-awareness with the set moral values, which are formed in the worldview of human and social moral behaviour. The moral values formed through the organized purposeful process of moral education not only indicate the type of behaviour of young people but also ensure the implementation of various norms of moral activity, choice of ideals, values, styles, forms and ways of regulating behavioural manifestations that determine moral self-improvement in the worldview.

The prospects for the following research stage are seen in the diagnostic program development to determine the levels of moral values formation in the growing personality (secondary school students).

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Particularities and Nature of Space Projects: Engineering or Social Architecture?¹

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The article raises the issue of the nature of space projects. Some of them were implemented, but most remained on paper. On the one hand, the author discusses specific features of nonconventional social engineering to which he, in particular, refers space projects, and on the other hand – the successful social Donor Project. He demonstrates that the designer cannot rely on existing prototypes in nonconventional design. Therefore, he/she is compelled to constitute the object being designed. To characterize the processes being developed and conditions defining them, he/she has to conduct researches and formulate concepts of these processes, to form the environment and the strategy of implementation of the project. Besides, nonconventional design implies the formation of a number of new kinds of activity (involvement of users in the designing, complex management, expert examination of projects, etc.). The analysis of the Donor Project made it possible to identify such conditions of success of this project as sound financial support, efficient project management, availability of administrative resource, methodological support, and interest of the main social subjects in its implementation. The author used characteristics of nonconventional and social design revealed in the analysis in the second part of the article at the discussion of space projects. He considers conditions under which such projects may be developed and implemented. The Donor Project could be developed and implemented due to creating a number of unique conditions, but in terms of scale, this project is nothing compared to space projects. Though the author shows the problematical character of the development of space projects – as yet there are no necessary conditions required for their implementation – he deems it necessary to continue to work on them, keeping in mind that it is a matter of nonconventional and social design.

Keywords: designing, space, implementation, conditions, environment, schemes, methodology, support, sociality

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Design context of the development of space projects

We have long got used to such expressions like “nuclear project,” “Moon flight project,” “Mars development project,” “interstellar travels projects,” etc. Suppose the first two projects were successfully implemented, meaning that the result obtained was the same as conceived. In that case, the other projects are still at the stage of preparation or, like the latter, in general, are problematic. As Hanna Arendt writes, we are not going to fly anywhere out of the limits of the solar system in the nearest future, and it is hardly possible in general ². If we speak about projects, obviously, it is implied that they can be implemented, or, rather, that they are conceived so that they could be implemented in strict accordance with the design. However, it is not always possible. There are also other questions. Can everything be designed (for instance, can life on Mars or interstellar travel be designed)? What is, in general, “a project”? Is an implementation which allows to create an object matching precisely the project is obligatory for designing or it is enough just to create some object, in particular, one significantly different from ideas and solutions of the project (by the way, currently there are more than a few of such projects and quite large ones)?

Already in the early days of the formation of modern design at the beginning of the last century, architect Vereshchagin wrote, “We perfectly feel that architectural requirements may and must be imposed not only on buildings, but also on any thing, any person and his/her face. Nowadays, not only new plants, but also new culture and a new person are under construction” (Vereshchagin, 1928: 130). Suppose we follow the definition of the project given by methodologist Yuri Gromyko. In that case, a project is without fail a controlled and regulated creation of a new (essentially new quality of life, sociality, and object) for the development of the public activity. “Possibility, Gromyko writes, proceeding from any situational case, to find the best on the basis of thinking and in the thinking itself: the best destiny, the best name, the best state – that is the normalizing and the guiding part of any design thinking (...) The main result of the design thought communication acts of representatives of various mental activity systems is a manifestation of new types of public communication actually maintained by a communicating designer. These new communications arise because the designer introduces a standard vision of the future into the consciousness of communicants (...) Designing is such a peculiar type of mental activity in the context of which ideal structures and idealizations (...) maybe each time redefined on the basis of the situational vision” (Gromyko, 1997: 20, 63, 78).

I refer such understanding of design to social design, and I show that though for the latter, the implementation-oriented *set* is accepted, the object created during the implementation of the project may strongly differ from characteristics of this object specified in the project (Rozin, 2018: 62, 84-87). In this sense, an interstellar travel project may be considered a project even if it is impossible to organize such travel on its basis. So far, it is so. The question is, whether such projects may suit us? After all, it is desirable, probably, that their implementation shall allow creating objects the characteristics of which are close to those specified in the project, for example, such as the Moon flight project.

There are few successful projects like lunar. Therefore, it is difficult to understand what features distinguish them from usual projects or so-called “paper” projects representing designers’ imaginations who consciously ignore the implementation issue. After all, successful

² “Of course, Hanna Arendt notices, in our plans nowadays is no more than the survey of the immediately surrounding part of the Universe, the infinitely-small area that the mankind only can reach, even moving with a speed of light. Considering the duration of human life – the only absolute restriction which remained at the moment – it is very improbable that we will ever reach much further” (Arendt, 2014: 403).

social projects do exist, and the main thing is that scientific reflection of such projects is there. One of them belongs to the author who analysed a big project, “Development of Mass Gratuitous Blood Donorship” (hereinafter referred to as the “Donor Project”) (Rozin et al., 2010). Besides, the solution of our task is facilitated by the design genesis carried out by the author. It makes it possible to understand the difference between space projects and usual ones and their specific features. We will also rely on these two types of research. Let us start with the design genesis.

The design was formed as an independent kind of activity and practice at the beginning of the last century. I called this type of design “conventional” (Rozin, 2018: 16-68). As I show, it has the following specific features.

1. Division of labour between the design and the production (creation of the project and its implementation) and inside the design itself.
2. Development of a product completely in the semiotics plane using schemes, models, designing rules and standards as well as process guides.³
3. Representation of an object being designed in terms of *processes* (natural modality), *material conditions*, which ensure these processes, and *creation* of these conditions (artificial modality).
4. Expansion of the concept “process” on four types of processes: processes of the first nature, aesthetic processes, life-activity processes and technological processes.
5. Description of the *functioning* of the object being designed with simultaneous development of its *design* that implies correlation of functions with the design (action of the principle of compliance⁴), as well as defining stages and particularities of *production*.
6. Rationing of processes and material conditions⁵. Whereas processes and first-level conditions determining them (stability and durability of design, electric, heat,

³ “During the present era, one of the first methodologists of design A.V. Rosenberg writes, of development of technology, a project is developed so “detailed” (and sometimes is accompanied by a model) that the real construction is carried out automatically (i.e., directly according to the project without additional alterations and calculations. – V.R.), including its decorative details. But there was time when the architect previously established only a general plan, applying it in general to paper, and all detailed development of the project was performed along with construction of the building at site” (Rosenberg, 1930: 17).

⁴ Here is how Alexander Rosenberg formulates the principle of compliance, calling it the basic principle of design of architectural structures. “From the theory of organization it is clear what role has the environment for correct progress of the process: it has to match the progress of the process and to create conditions under which basic principles of organization of the process are complied with. Therefore, an architectural structure which is an environment of the process shall match the process organised therein, or, putting it in other way, an architectural structure, its forms, dimensions, its layout in space in general and that of its parts and its materials depend on particularities of the process for which it serves as an environment. This is the basic principle of design of architectural structures” (Rosenberg, 1930: 9).

⁵ “While the organizer provides standards and schematic diagram of the process, the architect provides standards and schematic diagram of the building. Final results of their interaction are in a complex functional dependence upon specific parameters preset” (Rosenberg, 1930: 192). Rosenberg takes the concepts “process” and “organization” from Alexander Bogdanov’s work “Tectology.” The latter defines this discipline as follows, “We shall call general organizational science “tectology.” Translated from Greek, this means “a theory of construction”. “Construction” is a synonym for modern concept “organization” (...) We see that human activity – from its most simple to most complex forms – is reduced to organizing processes” (Bogdanov, 1921: 20, 22). Following Bogdanov, Rosenberg calls development of processes “organization”, the designer acting in this role, “organizer,” and expands the idea of structures upto the concept of “environment” (“facility”). Rosenberg understands an object being designed as a “complex” or a “system” (in “Tectology” this is the main object of studying and organization).

technical conditions, etc.) are defined on the basis of respective technical sciences, such processes as, for example, activity processes, aesthetic, technological processes, etc. are set by means of norms. When developing the latter, the established practices and requirements proceeding from various subjects: state, society, departments, influential people, designers are taken into account.

Almost at once, the expansion of the design ideology (i.e., conscious patterns and principles of design) onto new situations and tasks begins. As a result, two versions of standard design are formed (in the West and in the USSR), and different types of «nonconventional» design (town-planning design, housing design, social, permanent design, etc.) start developing. In this context, as seen from the research, nonconventional design significantly differs from conventional one (Rozin, 2018: 68-109).

In nonconventional design, the designer cannot rely on existing prototypes. He/she is compelled to constitute an object to be designed. To characterize the processes being developed and the conditions defining them, he/she has to conduct researches and formulate concepts of these processes, to form the project implementation environment and strategy. Besides, nonconventional design implies the formation of a number of new kinds of activity (involvement of users in the design process, complex management, expert examination of projects, etc.). I am going to provide one illustration – the development of the Donor Project (Rozin, 2018: 81-109).

Experience of nonconventional social design

This project was launched due to a pressing need to reform the blood banking service realised by all stakeholders (doctors, Ministry of Health, government, NPOs, public). Starting from the 90ies, the number of donors started falling in Russia, having reached by 2007 11 people per 1000 of potential donor population (as compared to 40 people per 1000 in Europe and 60 people in the USA). There are many reasons for that, including outdated equipment of blood transfusion stations, which did not meet modern requirements; donorship lost its high social status, etc. At the same time, it was already impossible, as in the USSR, to force people to donate blood for one compensatory leave and a light breakfast.

The Donor Project had sound financial support; 16 billion roubles were allocated for its implementation. A team of social designers led by two methodologists (Sophia Malyavina and Yulia Gryaznova) was successfully formed. Measures were taken to block attempts of mercenary officials. It was easy to expect that the egoism of Russian officials cannot be blocked by any humanistic reasons (lack of blood in the country is not an argument for officials either). Therefore the team of developers thought over and implemented a number of measures aimed at removing this obstacle (changing the management team, transferring financing to regions, etc.). In general, it is possible to notice that implementation of modern large social projects surely implies thought-over actions blocking the activity of participants of the project or of officials supervising the project attempting to misuse the project. Besides, since Malyavina was an assistant to Tatyana Golikova, Russian Health Minister, from 2007 to 2012, social designers could use an additional resource – an administrative one.

When getting to work on the project, Malyavina and Gryaznova asked a question, what was the major thing that could allow them to work efficiently? The donorship process was most likely only the top of the iceberg. *The taking by a person of the decision to donate blood* was apparently a not less important process. In its turn, this decision depends on many circumstances, both internal and external (understanding donorship, condition of

equipment, etc.). They supposed that there are a lot of donors where donorship exists as a *social institution*. A donor is a social individual and institutional person. He/she solves his/her problems by means of social institutions (which are his/her “social body”). They came to a hypothesis that the object of designing, in this case, is the “institution of donorship,” and as a matter of fact, a new one (since it has to be constructed yet) because the old institution degraded and did not meet its purpose (mission).

Researches of national and western donorship institutions resulted in a mixed model stipulating participation in the donorship of both states and public organizations. Public blood banking service is responsible for the general “blood bank” distributed among medical institutions centrally. The blood banking service is engaged in the collection and preparation of components and attraction of donors. Independent commercial associations help the state at the national and local levels. It is this model that gains development in Russia today. In Europe, a similar system operates in Great Britain.

The next step is the development of the scheme of this institution (*schematic diagram of the institution of donorship*). What does the hypothesis of donorship as a social institution mean? That it is possible to transfer the main characteristics of the institution to the donorship and besides, since it is about the renewal of donorship under new conditions, characteristics of the *formation* of the social institution shall also be taken into account. These characteristics are as follows.

According to Bronisław Malinovsky, it is necessary to distinguish in the institutions the charter (idea), the structure of participants, the standards, the material apparatus, the activity, and the functions. “To represent a sociocultural institution, Anatoly Matiukhin and Vyacheslav Maracha write, i.e., an institution-corporation of the sphere of law, – it is necessary to distinguish the following components of its structure: *the institutional form* (including an institutional **Idea**, a layer of its symbolical attachment and a set of formal sites connected by the procedure(s) – three top elements of the scheme), as well as *the material and spiritual support* (designated on the scheme by letters “**M**” and “**D**” respectively). Institutional supports form a basis of stability of the institution, which enables it to carry out functions of ensuring the stability of society and stabilization of social dynamics. The existence of the spiritual support of the institution means rootedness of the institution in the spirit of the people, traditions, etc., unconditional acceptability of its institutional form from the point of view of “customs” of these people during the given period” (Maracha & Matiukhin, 2006).

The process of formation of the social institution, as the author shows in his book “Formation and specific features of social institutions. Cultural, historical and methodological analysis,” is triggered by “social tension” requesting its discharge, perceived later, at the formation of the social institution, as a challenge, a social problem. This is, if you will, the first structural characteristic of the process of formation of the social institution.

The second characteristic is the *existence of communities or populations interested in the solution of this problem*. These communities create and promote new formations, thereby furthering the emergence of new institutions. As a rule, not one but two-three interested communities take part in forming social institutions.

The next characteristic of the formation process is an *invention of means* (new schemes and procedures), allowing to resolve the problematic situation.

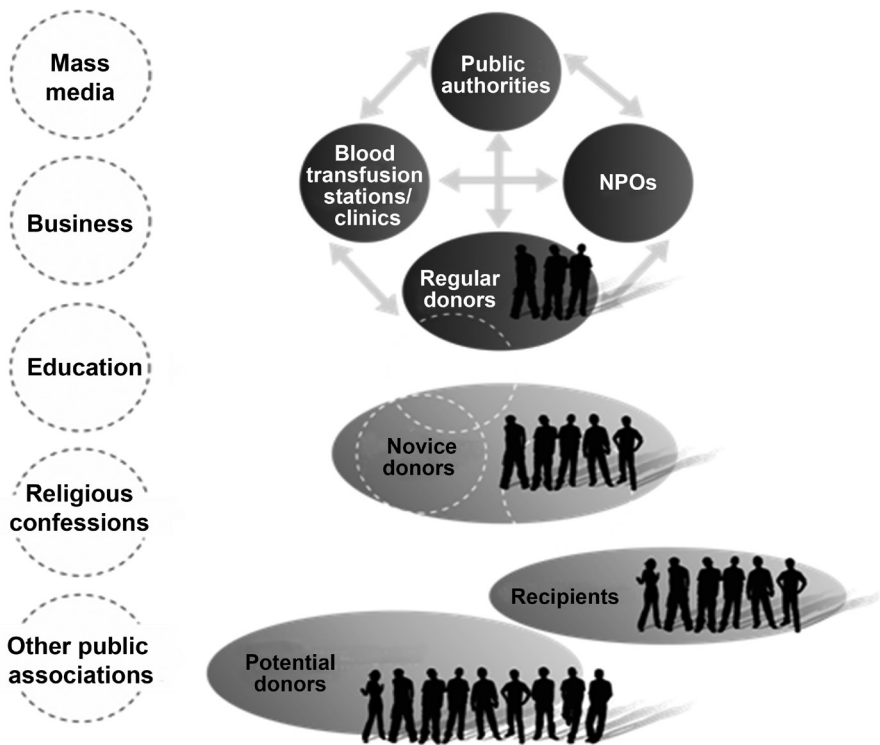
The fourth, and perhaps, the final characteristic of the formation of a new institution is its *understanding and self-description*. It is here that the mission of the new institution is formulated, its characteristic procedures are described, institutional rules are created, and the

interests of institutional communities are discussed in one, or another form.

As an established social entity, an institution carries out certain functions (resolves social problems) and is consistently reproduced. Therefore, an institution is a conscious – to some extent – way of activity, accessible in the sense of development by interested social populations. For this reason, developers emphasized that the decision to donate blood and the real practice of donorship should not be one-time actions.

Actually, the idea of donorship as a social institution was put forward by developers-methodologists (Gryaznova, Malyavina) who were responsible for the content and ideological part of the project. Having come to this hypothesis, they made performed a very important part of the job in terms of defining donorship as *a social design object*. The second part, which they also formulated, is the statement that donorship as a social institution was yet to be created. The question was: by what ideal of the social institution shall we be guided – the one that had been accepted in the USSR or the modern, western one?

Projecting on the donorship the ideas of a social institution and its formation, the developers included the following components in the *schematic diagram of the institution of donorship*: *authorities, blood transfusion stations, public organizations, regular donors*, as well as potential participants of the institution – *novice donors* and *future potential donors*. To understand, what factors can influence the decision-making to donate blood, as well as to include the institution of donorship in the culture (society), *other institutions* were also presented in the schematic diagram, namely, Mass Media, Business, Education, Religious Confessions, various Public (other than the donor) Associations.



Scheme 1.

In fact, this scheme (Scheme 1) set one more concept of a social institution – *an institution within the system of other institutions and within the culture*. So, the three main concepts and schemes of an institution are an institution as an established entity (concepts of Bronislav Malinovsky, Maurice Hauriou, Anatoly Matiukhin and Vyacheslav Marach), an institution as a becoming social entity (Vadim Rozin) and an institution within the system of other institutions and within the culture.

Creation of schemes passes into the “construction” stage, i.e., the stage of creation and detailed design of the social project, including, on the one part, the development of contents of items set in the donorship institution schematic diagram, on the other part, the definition of conditions for the processes of formation of these contents, and on the third part, practical formation of these processes. Previously, it was necessary to conduct a number of researches of these contents and processes.

In theoretical terms, it was necessary to understand, first of all, what real links can exist between basic elements of an institution as a system and what is the contents of these elements, i.e., how a designed scheme may be turned into a real model⁶. For this purpose, two models (prototypes) of the social institution of donorship – the mobilization one and the public one- were compared.

For the first model, the following specific features are characteristic. The whole process from public awareness campaign and recruitment to distribution among recipients is carried out completely by the state represented by ministries and departments. The institution of donorship is regulated legislatively and financed from the budget. The state carries out federal and regional promotion campaigns, plans the activity of all participants, and monitors performance of targets. Such a model has a mobilization character and often is based on ideological or political rationales. Donor activity is maintained by periodic campaigns. The mobilization model existed in the Soviet Union prior to the beginning of the 90ies. Today it is used in China, the United Arab Emirates and some other countries.

Let us now consider the characteristics of the public model. The main donor engagement activity is carried out by public organizations. That forms of such organizations may be the most diverse. However, they are guided by general rules and closely interact among themselves. Such organizations or associations are formed, as a rule, on a territorial basis, or around large medical institutions consuming a lot of donor blood and its components. The state sets the “rules of the game” for public organizations, renders them the necessary assistance at the legislative level. Needs for donor blood and its components are formed “at sites” by clinics and local blood services serving this clinic or several clinics. Procurement plans are agreed upon with local offices of public organizations, which, in turn, provide the required quantity and quality of “donations” (blood donation procedures). The “donor network” is well developed. Donor NPOs understand that they are part of the health system and therefore have to provide this system with blood and its components “when, and in quantities, required.” The NPOs realize their duties with respect to donors, blood services, and the whole social system of the state. Donors realize their obligations towards patients and society. Donors consider blood donation regularity as a guarantee of quality and safety.

The motto of NPOs is to work in partnership with the state, with its support, but independently and without restrictions on the part of the state. The main functions of NPOs include engagement of donors, their training and providing them with information, donorship promotion, organization of blood collection, donor management, information support,

⁶ George Schedrovitsky and one of the authors show that building schemes is only the first step of both knowledge and design. The next steps are aimed at transformation of built schemes into models and projects (Rozin, 2018: 38-48).

cooperation with the blood service in programming (planning) requirements and supporting donors, cooperation with clinics in planning requirements, recruitment and organization of activities of volunteers, development of the system of encouragement and incentivation of donors and volunteers, fundraising. This model is widespread in Europe and successfully functions, for example, in Italy.

The analysis of the existing situation in Russia carried out by the developers of the project showed that currently, the donorship reality is described best of all by the “mixed model” with the participation of both the state and public organizations. The blood service is responsible for the common “blood bank” distributed among medical institutions centrally and without reference to local clinics. The blood service is responsible for collecting and preparing components, as well as for the engagement of donors. NPOs help the state both on the national and the local level. In Europe, a similar system operates in Great Britain. It was a mixed model that was presented in the schematic diagram of the institution of donorship.

The creation of the schematic diagram of the institution of donorship was an achievement of methodologists. They devised, set, as designers would say, *the initial sketch of the social object being designed* (donorship as an institution within the system of other institutions and within the culture), *in which values and ideals of developers, as well as the first characteristics of the future object (donorship system) were embodied*. It was the time of its *construction*, i.e., development and refining⁷. It is worth paying attention that the sketch of the donorship system described characteristics not of an existing earlier and improved system, but of an essentially new system.

The real situation in Russia with donorship was very far from desirable, and the institution existing in the USSR degraded. Therefore, the purpose of both design and management was the *creation of a new donorship institution*, combining the best features of the national and western experience. The analysis of the situation in 2008 showed that basic structural elements of this new donorship institution were either absent or did not fully meet the design requirements. Therefore, creating a new donorship institution was set, and the first steps in this direction were taken. As experience showed, the *process of institutionalization* (formation of a new institution) included two major links: on the one hand, the *institutionalization of a social institution*, and on the other, *self-organization* processes.

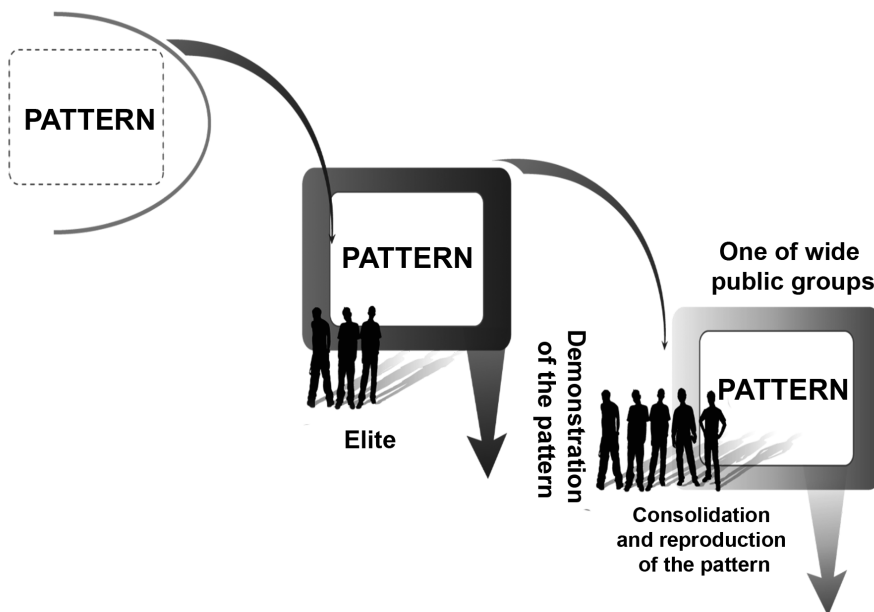
What does the institutionalization of the donorship institution mean? Identification in the process of research and practical formation of the main units of a new institution and relations between them. The matter is that the scheme of the institution of donorship given above is only a scheme and somewhat empty. It should be filled with the contents, real contents, that could be embodied materially. Filling of the scheme begins with the task of defining the contents of its “sites.”⁸ For example, filling of the schematic diagram “site” “Blood Transfusion Station” was elaborated as follows: “*Studying the experience of blood transfusion station works with donors. Integration with blood transfusion stations at the regional level*”; filling of the “site” “regular donors” – as “*Studying motivation of regular donors, meetings. Formalization of motivation*”; filling of “site” “Authorities” – as “*Methodical recommendations: interaction with authorities, a database of contact persons in the regions.*”

⁷ These stages (sketching, development, refining, and at last, implementation) are characteristic especially of conventional design, in nonconventional design the stage of implementation can be only implied.

⁸ Differentiation of “sites” of the structure and their “contents”, as well as other categories of the system-and-structural analysis are discussed in detail in works of Schedrovitsky (Schedrovitsky, 1995: 57-115, 474-481).

The following step is the analysis of contents of the “sites,” which, in its turn, consists of two parts: *research of pre-set phenomena* (studying *experience, motivation*, etc.; often when research has not been mentioned, in fact, it was there) and *assignment of certain actions* (integration, meetings, etc.). It is clear that research makes it possible to gain the knowledge necessary for correct actions, creating new elements and relations of the donorship system.

For example, according to the statistics of the Russian Public Opinion Research Center VCIOM youth expresses the greatest readiness to become donors (16-17 years: 45%; 18-24 years: 43%; 25-34 years: 33%; 35-44 years: 27%; 45-54 years: 22%), and on the basis of this knowledge, the respective recommendations were developed. Another example is a research of one of the mechanisms of social influence making it possible to take decisions (in this case, the decision to donate blood): 1) identification of an institutional pattern; 2) acceptance of this pattern by a narrow, elite group of society which knows what should be done and assumes responsibility for transformations in the face of the rest of the society; 3) transfer of this pattern to another, less elite, but more mass group which consolidates the results of transformations started and ensures self-reproduction of the institution.



Scheme 2. One of the institutionalization mechanisms

On the basis of this research developed, the program and the plan of work with significant social persons (famous statesmen, politicians, artists, TV presenters, etc.) who promoted donorship and often donated blood.

In general, conducted methodological and theoretical applied researches enabled to develop and perform the following measures (actions) in 2008-2009:

- a) detailed informing of the population of Russia about basic social needs satisfied by the donorship institution, its scale, and consequences in case if the donorship institution fails to perform its functions;
- b) formulation and formation of values of the donorship institution (donorship is a norm of life, donorship is useful, a donor is a healthy person, etc.);

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- c) identification of main participants of the donorship institution of, stimulation of their activity;
 - d) creation of communication, interaction, and behaviour standards and rules both within individual social organizations and functions and between them;
 - e) creation of the blood service symbolics and corporate style with which the donorship institution, in general, is associated, holding emblematic actions (All-Russian videoconference, blood service forum, ad hoc actions in the regions);
 - f) formation of communication and interaction of service of blood with other social institutions specified on the donorship schematic diagram;
 - g) organizing conventional actions for the donorship institution. It is worth paying attention to the fact that all these actions were implemented only in those regions where the infrastructure was ready to change (the respective re-equipment of blood transfusion stations had been carried out).

As the development of a social project implies social management, the implementation of the Donor Project included such technologies as *organization, training and adjustment of consciousness*. As it is known, management is an activity connected not only with the organization of the working process (productions broadly defined), but also with people. In the latter case, it is substantially reduced to the *organization, training, and adjustment of consciousness* of specialists and users necessary to the manager. After respective research, all three types of administrative influence were used within the Donor Project. For example, employees of blood transfusion stations and clinics passed training and retraining, and important work was carried out with officials of authorities to create with them a correct attitude to the donorship, organizational work was carried out virtually with all participants of the project.

Self-organization is the second link and side of the process of the creation of a new institution. These are various changes (processes), including reciprocal activity occurring in response to the creation of the social institution (initiated by it). In this case, it is possible to emphasise two important processes: *involvement in the process of formation of donorship of other institutions*, which started to supply actively new donors or to support the initiative, and *expansion of activity of donor groups and communities*. Usually, the formation of a new social institution entails a fight of other institutions against it – a fight for power and “social territory” (expansion of influence upon potential users). But the donorship institution did not compete with other institutions; on the contrary, it turned out to be attractive for them since it enabled them to increase their own social value. In fact, for businesses, mass media, schools, churches, some public associations, participation in the donor activity is considered to be a social and humanitarian service strengthening their own mission. The formation of a new institution also created grounds for the independent activity of donors: they began establishing associations, promoting donorship, communicating in matters relating to donor practice.

And donors themselves turned out to be very active: they created associations, promoted donorship, communicated on issues relating to donor practice. The organizers of the project developed traditional events, such as, for example, “The Day of Donor’s Majority Age”: this day in September second-year students (almost all of them by this time reach the age of 18, and, according to the legislation, they have the right to donate blood) all over the country organized donor campaigns in their higher education institutions. Based on the results of such actions, students became initiators of donorship promotion. Donorship for them became a common good deed with respect to which it was possible to develop real useful and productive activity (not imitating). It appeared to be that many Russians seek

for meaningful social activity, are ready for social service. This, for example, may explain the extensive participation of volunteers in the formation of donorship. Many of them for various reasons, could not become donors, but, nevertheless, volunteers helped to promote and organize blood donation.

The Donor Project may be considered successful; Russians streamed actively into donorship (Rozin, 2018: 104-105). It should be noted that the success of the project was in no small part determined by the participation of methodologists in the social design team. They offered the strategy of solution of the problem and carried out ideological and methodological support of the social project. Therefore it makes sense to characterize the basic principles of their work.

1. Methodological design, research and support made an organic part of the transformation of the current situation and formation of the phenomenon interesting the society.
2. For the purposes of transformation management, two interconnected horizons shall be distinguished: actually *transformations as an artificial plan* and *formation of the phenomenon as a natural plan*. In this context, *transformations and methodological work participate in the formation of this phenomenon*. In this way methodological work and various actions aimed at the creation of the donorship institution made a contribution in the formation of this institution.
3. Specific features and characteristics of the becoming phenomenon (as a whole) are revealed and defined on methodological schemes and subsequently refined and enhanced in the course of implementation of the methodological project.
4. The study of subsystems, units, and relations of the becoming phenomenon revealed on methodological schemes is a prerequisite of refinement and the necessary modification of the methodological project. Another condition is the *formation* of subsystems, units and relations set by methodological schemes, since “natural components” of the becoming phenomenon are constituted in purposeful transformations (training, retraining, communication campaigns, etc.).
5. The efficiency of methodological schemes and the project is conditioned not least by how correctly the social problem is revealed, whether there is a need in the society for the offered changes, and whether methodological management and support are provided.
6. Methodological schemes and knowledge cannot be considered as strict models; their efficiency and conformity to models become clear in the course of implementation of the methodological project. This implementation represents an iterative process during which both the concept, the schemes, and the project are refined and, if required, modified.

In general, the logic of actions within this social technology is governed by the principle which may be called “the principle of change of realities and modalities.” Thus, methodological design and the setting of the whole (in this case, donorship as a social institution) imply “an artificial modality” and a movement within the “project reality.” In their turn, the design and methodological work rely, as it was said above, on researches that means a change of modality (from artificial to the natural one) and a transition to the reality of scientific thinking (more widely, to the reality of knowledge as knowledge can be not only scientific, but also empirical). Formation of missing units and relations of the whole is again a modality of artificial, but the reality this time is different, namely, the reality of

“practical action.” However, since formation – the same as methodological management of the donorship institution formation process in general – make part of this formation and therefore can be studied, in particular, for the purpose of correction of initial schemes, settings and targets so far as the modality of natural and the reality of the becoming whole (donorship institution) exist simultaneously.

It is also worth discussing the axiological side of the whole setting. In this specific case, positive values of restoration of the donorship institution were obvious to all. For patients, it is a hope for saving life and recovering. For doctors, donors’ blood is an absolutely necessary means and resource of their professional activity. For donors, blood donation is one of the conditions of realization of their personality and social identification (I help a fellow-being, donate blood for a good cause. Therefore, I feel unity with other people and compatriots, etc.). Finally, donorship as a mass movement is evidence of its consolidation and unification for society.

But much more often, an absolute positive value of envisaged social changes is not evident, but there are various reasons testifying to eventual negative consequences. For example, the same methodological group (Gryaznova and Malyavina) developed in the Ministry of Health and Social Development of the Russian Federation another project, “Healthy Lifestyle.” What may be considered as the whole in this case? Only such behaviour of a person when he/she does not drink, smoke, and take drugs? Obviously, no. Perhaps, then, such behaviour when a person treats the values and the way of life of a technogenic civilization critically, preferring bicycle and rest in a tent to cars and villas? However, how is it possible to live in a society focused on equipment and consumption, ignoring the latter? Or another consideration: things that are good for one, do not fit others, a correct, healthy life for one does not mean the same for another.

Can a methodologist, in this case, decide for others how they should live and what a healthy lifestyle means? We think that no. not only experts but also the main persons concerned shall participate in the setting of the whole within their competence. These are, first, an individual person, secondly, the society in general, thirdly, departments and spheres specializing in health (health system, physical culture and sport, education, etc.). The problem, however, is that all these subjects do not have a coordinated, and often, in general, comprehended (from the point of view of modern challenges and knowledge) understanding of what is “healthy, correct life.”

Health is a supercomplex phenomenon, a contribution made by various social practices, social environment, activity, attitude to the life and health of a person. A new understanding of health is just being established nowadays. Obviously, it cannot be created and built as a building. It can only develop, sprout, but not without our efforts. Components of these efforts include an extensive discussion in the society of health issues, and not only health, but also correct life, as well as sociality, its sense; creation of concepts and on their basis, of disciplines allowing to see health in a new way and to work practically; development of cultural policy promoting formation of a new reality of health consolidating all interesting subjects; training of experts and assistants who would initiate, start and support transformations of the main health practices and conceptualizations.

The solution of all these tasks implies social management and design, individual characteristics we considered here using as an example the successful Donor Project.

Some conditions of development and implementation of space projects

Judging by materials of the mass media and obviously insufficient researches, approximately the same logic of social design was used during the development and

implementation of the American Moon Flight Project (Krichevsky & Bagrov, 2019). It was also necessary to constitute an object of the design, start research processes, and form the implementation environment. This social project was rather difficult, including adopting the political decision, consolidating public forces, concentrating various resources, reforming the rocket industry, and other areas.⁹

Suppose one thinks about why the Russian Moon flight project has not been implemented. In that case, the answer will be the following: first of all, because the USSR as a type of sociality, as a social organism, did not possess sufficient resources (not only material, but also spiritual ones) for the solution of this task. In other words, I want to say that large social projects are not only nonconventional design, but also *sociocultural functioning*. Therefore, the American society and culture developed and implemented the Moon flight project, while the Soviets did not. Realising this, for implementation of major social projects, certain countries combine their efforts as illustrated by examples of projects of creation of planes, rockets, and other big technical systems, and today, development of vaccines against coronavirus.

As a sociocultural functioning, perhaps, it is better to call nonconventional design “social architecture”, understanding that here design launches and involves very different types of activity and spheres (research, various technologies, political decisions, organization and management processes, etc.), which have to be not only co-organised and configured, but which – and that is very important – are conditioned by various sociocultural factors.

Let us think now about what conditions are there to develop and implement space projects. First of all, currently, mankind is not ready to decide seriously to go ahead with the development of such projects, both due to limitation of funds and huge risks for life in space, and reasons of general character (Glenn, 2018; Miller, 2020). Hardly an understanding comes that, without having solved on Earth a number of urgent problems, we may not only fail to master the space, but simply lose our civilization.

Sergey Krichevsky continues general reasons and correctly lists risks that will face a person after leaving our planet (Krichevsky & Bagrov, 2019; Krichevsky & Levchenko, 2021). To transfer the space exploration issue from a fading process into an active and creative one, we probably need a social project within which it shall be necessary to develop at various levels and in various communities a discussion on destinies of our civilization and to convince participants of the discussion that without the development of the space the mankind is doomed. However, it is clear, that even the development of such a project is a difficult task, not to mention its implementation.

Now, what can represent an object of a social space project, or, more exactly, space projects, since space exploration, meaning outlooks of interstellar and intergalactic flights, implies the creation of a system of social projects. Even a person who is not an expert can realise that it is necessary to move cardinally in two to three areas. First, to solve the most complex engineering and technological problems, conducting in parallel most various researches. They shall include the solution of a set of biological and psychological issues, which would allow a man to live in space without, prejudice to his/her health. Secondly, to develop for this purpose on Earth and in space production facilities for manufacturing spacecraft for flights and everything necessary for life on other planets and in space.

⁹ Works under the Apollo Program acquired a nation-wide scale and in terms of mobilization of scientific, industrial and financial resources overpassed the “Manhattan Project” of creations of the atomic bomb. Unlike the latter, the lunar program was not secret that significantly simplified and accelerated performance of works as all participants could exchange freely technical information both in vertical and horizontal plane. Openness of works allowed to exercise their efficient public control, in particular through mass media (Apollo, 2020).

Sacramental question: can these problems be solved in the nearest and even in a more distant future? Are they solvable in general? Would not such social projects be utopian? The Donor Project could be implemented successfully due to creation of a number of unique conditions, and in terms of scale, this project is nothing as compared to space projects. It is asked, what unique conditions need to be provided for the development and implementation of the latter? Would not the solution of such tasks undermine world economy? Any projects, including space projects, may be developed within the framework of nonconventional design, but it is still impossible to think about their implementation suitable for a man.

However, the prospect of the death of mankind either as a result of technogenic accidents or pandemics, or from a casual asteroid or a comet, or due to disappearance of the magnetic field (the number of such forecasts has been multiplied lately) forces to think nevertheless about space exploration.¹⁰ And it is better to think of space projects and work for their promotion, understanding that it is a matter of nonconventional design and social architecture.

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¹⁰ The Universe is a huge place where hidden dangers may be concealed virtually everywhere. Even if you consider just only our solar system, there are threats of asteroids and comets which can destroy our planet in case of a collision. Studying space enables us to determine in advance the location of these dangers to be prepared for the meeting and to save our race.

Noohumanism as a New Worldview Paradigm of the 21st century

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The article discloses the prerequisites of the Noohumanism, which incorporates the noospheric-environmental as well as the humanistic components. Studied is the role of the principle of harmony as a basic cornerstone element of the Noohumanism. The metaprinciple, being projected through each level of the “human-society-nature” system, generates the axiological array of the noohumanism and plays the regulatory role in forming the noohumanistic senses and values.

The aim hereof is to provide a rationale for the author’s development of the worldview potential of the noohumanism as the homonymous worldview concept based on the synthesis of the noospheric-environmental and humanistic worldview matrices. The noohumanistic worldview focused on the harmonization of the socio-natural systems shall be formed applying adequate approach, in this particular case, the noohumanistic approach, which plays the methodological role within the scope of the handled problem.

The noohumanistic approach, as elaborated by the author, is the complex research method that helps to argue and approves the conceptual bases lying under the formation of the noohumanistic worldview and to structurize the framework of the determinant noohumanistic categories and concepts. The noohumanistic approach incorporates: (a) the mixed-level analysis and the subset of approaches (axiological, interdisciplinary, regional, psycho-didactic, musicological et al.), exposing the philosophical-anthropological, culturological, psychological-pedagogical and other requisites that predetermine the socio-cultural, worldview-wise and moral significance of the noohumanism; (b) the noohumanistic ideas tracing their origins back to the philosophic, naturalistic, interdisciplinary areas of knowledge. The noohumanistic approach reflects the relevancy of the introduced worldview system as a social demand of the present.

The scientific finding that resulted from the noohumanistic approach is the developed theoretical-methodological and methodical framework of the noohumanistic worldview within the scope of the philosophy of education to provide blueprint principles for the incipient noohumanistic pedagogy – one of the most prospective areas of contemporary education.

The practical implication hereof is that the study materials may be put into scholarly circulation and used in developing the strategies of the educational modernization, the youth policy and within the teaching and learning activities.

Keywords: noohumanism, metaprinciple of harmony, axiology of noohumanism

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The current world situation reveals all sorts of multiple global threats, e.g., military-terroristic, political, social-economical, environmental, denominational-extremist, etc. The socio-economical, physical and psycho-emotional health of people all over the world has worsened even more because of the recent outbreak of the Covid pandemic, which confronted humanity to find a newer policy of global collaboration between the countries in solving existing threats and the related crisis events within multiple strata of economy and society. The worldwide community is concerned about the aftereffects of the pandemic, which might lead to the total impoverishment of the masses and the global economic crisis. Economic stagnation, closed borders, unemployment, and restrictions over the producers might become the factors that could trigger the “hunger crisis.”

In such conditions, one shall have along with the clear mind and strong nerves, the positive-constructive world outlook – the worldview focused on the harmonization of the socio-natural systems, on the productive cooperation of people, which will rely upon the humanistic guiding (orienting) points, and seek for consensus, as well as the development of the planetary intelligence. In this regard, a very viable direction is the noohumanization of the society, i.e., by introducing humanity to the noohumanistic values.

The worldview foundations are laid and shaped not only by the family, educational institutions, or by the scientific-technological and cultural progress, yet they already stem out of the exquisite, subtle spirit of the society. Developing inside the public energy and information space, these worldview germs steadily propagate into the collective consciousness. Certainly, as we have noted, those processes are conditioned by the complexity of the factors listed above.

The scholarly objective shall be capturing and studying any newborn worldview trends ever so manifested in society, assessing their overall efficiency and productivity, and specifically for the youth as far as they are the conductors of those ideas-trends into their future professional daily activities.

In our view, one of the promising departments of the contemporary philosophy of education is the *Noohumanism* as a worldview construct that reflects the most critical aspects – i.e., environmental, humanistic, spiritual-moral aspects of social development.

This paper attempts to disclose author’s vision of fundamental grounds of the noohumanism in terms of the worldview paradigm – the triunity of components of the “human-society-nature” system based on the socio-natural homeostasis or harmonization of the socio-natural systems.

We pose as prospective – especially, in the context of the philosophy of education – the accumulation of humanistic, noospheric, environmental worldview reference (orientation) points under the general noohumanistic matrix, which is intended to form in an individual of the: intelligent and careful attitude toward the nature; communicative skills and empathy toward a neighbour; and to master and exploit the health-saving technologies to maintain one’s own psycho-physical balance.

The concept of “the noohumanism” consists of two components: the humanistic and the noospheric, essentially, it comprises the *noospheric humanism*.

It is known that humanism recognizes “the value of a human as a person, his or her right to free development and the manifestation of his or her capabilities, the postulation of the human welfare as a criterion for assessing social relations” and the humanity – as the ideal of humanism – is “the love, attention to a person, respect for a human person; a kind attitude to all living things” (Sarybekov & Sydyknazarov, 2007: 59).

The noospheric concept of the noohumanism is associated with the idea of the noosphere by Pierre Teilhard de Chardin (2008) and Édouard Le Roy (1928), the doctrine of the noosphere

by Vladimir Vernadsky (1944), whereunder the main meaning of the noosphere “lies in the principle of co-evolution – the correlation of cosmo- and anthropogenesis” (Birich, 2010: 18). Indeed, in terms of the Universe evolution, the “geological force” is represented by the Man, since it is him, who is “the main instrument of the Universe awareness,” life and can see beyond the actual opportunities, create new forms of existence, evolve from nature imitation and adaptation thereto towards the creativeness and perfection of self spiritual dimension” (Birich, 2010: 18). Pioneers have diversely interpreted the definition of the “noosphere”: Vladimir Vernadsky, as a natural scientist, believed that mankind, “while mastering the laws of nature and developing technology, ever more transforms the nature up to its needs, and therefore the noosphere tends to continuously expand, which is facilitated by the Man’s spaceflight and penetration into the depths of the planet” (Philosophic Encyclopaedic Dictionary, 2005: 65).

Pierre Teilhard de Chardin viewed the noosphere in an abstract and esoteric way. In Teilhard de Chardin’s understanding, the noosphere is a qualitatively new state of the concentration of consciousness, which forms a specific envelope or a sphere of the spirit, a “thinking layer” covering the Earth. He defines the noosphere as the “harmonized collectivity of consciousnesses equivalent to a sort of super-consciousness” (Teilhard de Chardin, 2008: 247).

Instantly, shall we point out that the notion of “the noosphere” and, respectively, the doctrine of noosphere bear intricate character: they have both many proponents and opponents alike. For example, Vladimir Kaganov sharply criticized the said notion and the noospheric humanism in general, emphasizing their utopianism and inconsistency. He wrote: “Vladimir Vernadsky believes that Man faces “an issue of restructuring the biosphere for the benefit of free-thinking humanity.” One shall note that the biosphere has been restructuring since the domestication of plants and animals, which ensured a significantly better food supply of the Man. Since then, the restructuring has gone with varying success, producing not only benefits for the Man, but also affecting big and irreparable damage to the entire nature. Yet, there is no “free-thinking humanity” in the world, and nobody knows when it will appear. Likewise, nobody knows what would remain behind the biosphere by that time. Moreover, there are other forces out there in the world, uncontrollable by the Man, the forces of the nature itself. As for now, protection and salvation of the biosphere against Man’s vandal destruction stand as the essential task before humanity. In principle, nobody is going to restructurize it into the noosphere. That would be impossible. The biosphere will never become intellectual and thinking and will never transgress into the noosphere. Evolution creates a hierarchy of life forms, and the biosphere is lying in its basis. A reasonable symbiosis of Man and biosphere is needed, without which the very existence of the Man is impossible. It is not by coincidence that the problem of environmental safety and protection in our time has become the focus of attention of public organizations and international forums” (Kaganov, 2018).

The quote we cited to objectively display multipolarity of opinions about the issue under consideration does not only diminish, but rather emphasizes the potential of the noohumanism and the prospects of its research. It (the quote) expresses the author’s concern about the biosphere protection issues and the survival of *Homo sapiens* as a species, on the one hand, as well as highlights the ecological principle as an organic part of the noospheric whole, on the other. That is understandable since Man (society) – Nature, Cosmos are the links of a single chain and interaction of humans with socio-natural systems in terms of harmonization, more broadly – of their survival – is the top priority task that requires a relative consensus of the human community in solving modern global challenges of the era.

Clearly, the environmental part of the noospheric component could not fail to be impregnated with the ideas of sustainable development (Meadows et al., 1972; Kuznetsov et al., 2001). However, not only the ecological orientation of this problem brings it to the planetary level. The absence of inter-cultural dialogue and tolerance, inter-ethnic strifes, civil wars, terrorism, etc. – all this highlights the civilizational crisis, the need to switch to a qualitatively new level of consciousness and develop a concerted strategy of survival in this complicated world. If the intelligent human activity, at the time when Édouard Le Roy, Pierre Teilhard de Chardin and Vladimir Vernadsky were building foundations of the noosphere doctrine (the first stage), did not pose any threat and was viewed positively in essence, then the present predatory attitude of people toward the bioresources, the expansion and technogenic load on nature push the biosphere to irreversible catastrophic consequences as a result of such consumer egoism. Therefore, in the modern reading of the noosphere concept, considering the threatening state of the biosphere, its semantic dominant has shifted towards the ideas of the sustainable development concept, i.e., intelligently managed sustainable evolution.

In other words, we are talking about the formation of *the harmonious noosphere* (the second stage) – a new human habitat, which, based on the systemic scientific knowledge, provides the possibility for harmonious coexistence of the biosphere, the technosphere, and the Man. The most important conditions for creating the harmonious noosphere are the education and maintenance of the desired level of culture, morality and human conscience, as well as the development of creative abilities.

The harmonious noosphere shall be understood as “such an interaction between Man and nature, which will promote resolution of the conflict between limited resources of the biosphere and growing needs of the society for energy and substances. The fight against environmental pollution, curing damages caused to nature by uncontrolled industrial activities, and the conscious management of evolutionary processes in biological systems are particularly important today. Therefore, formation of the harmonious noosphere is the main problem of the 21st century, the solution of which has already begun, as evidenced by the formulation and attempt to solve environmental problems” (Sarybekov & Sydyknazarov, 2007: 234).

Apropos the above critical assertions concerning the noosphere doctrine, it should be noted that the scientific community pays tribute to the academicism and productivity of the said doctrine. The modern scientific paradigm exhibits a steady trend to actualize the statements of the noospherism and sustainable development concepts, focused on the formation of a worldview model having co-evolutionary, humanistic, and eco-philic directionality. Considerable amount of research papers have been published in connection with the development of typological diversity of the worldviews: the noospheric (Kuznetsov, 2001; Ivanov & Voroshilova, 2010), environmental (Moiseev, 2001; Glazachev, 2005), environmentally-oriented (Ivaschenko et al., 2008), humanistic (Batalova, 2004; Kaznacheeva, 2000), ecohumanistic (Seliverstova, 2009; Zulkarnaeva & Vinokurova, 2016). To that effect, following the logic of progressive development, the conceptual foundations of the noohumanistic worldview shall undoubtedly be elaborated.

Substantially, the noospheric component of the noohumanism gained its reflection in Russian science. It is stated that the noospheric concept is represented in the noohumanism as a “humanized integral organism, which is to solve not only environmental, but entire global and universal problems. It calls to love not only one individual person but also the entire humanity regardless of race and nation, love nature as a habitat, all living on Earth (...) Imperative of the noohumanism is to humanize existence of the human being as a guarantee of its survival” (Drobzhev, 2013: 198). Besides, Igor Borzenko points out that,

“The noospheric humanists urge to account all the global trends of our time and realize that a dignified living of every person, peaceful existence, environmental safety, social and moral justice, the meaningfulness of existence, universal human solidarity in the process of humanization of life and the planet-wise transformation of inner and outer nature are the only imperatives for Man’s survival. The central theses of the noospheric humanism are as follows (Borzenko, 1999: 60):

- a) the interpretation of the Man as a biosocial cosmic being;
- b) acknowledgment of the universal science as far as it concerns “the unity of the Man, the life and the Universe as well as the global laws of their systemic-organizational structure, functioning and development”;
- c) the philosophic credo in that the human mind plays a decisive role in the cosmo-evolutionary process.

Alexander Subetto, tracing the origins of the noospheric humanism, refers to it along with “the new scientific directions such as the noospherology, the noospherism, the anthropocosmic ecology, the noospheric ethics, and all of them represent the noospheric scientific school – the school of paradigmatic typology, carrying the revolutionary changes in the system of scientific worldview, the ideology of the 21st century, and in the scientific picture of the world” (Subetto, 2012: 7).

Prominent scholar Oleg Bazaluk considers that the philosophy of education in the light of the new cosmological conception forms the “image” of the future human, thus, orienting and meaningfully enriching the pedagogy with the new knowledge, methods, modi, goals, which eventually by means of education will underlay the immanent system of views of a certain generation (Bazaluk, 2010: 9).

The noohumanism we are considering as a worldview concept is based on the idea of socio-natural homeostasis (Subetto, 2003), which originates in antiquity and is brilliantly developed by the modern scientific community. This idea is associated with the harmonization of the socio-environmental systems and is founded on the *principle of harmony* (Mukaeva, 2003), which corresponds to the *principle of harmonization* – the key principle of the noospheric education (Maslova, 1999), etc. Plotnikova Larisa notes that, “At the United Nations Conference on Environment and Development held in Rio de Janeiro (1992), and later at the World Summit in Johannesburg (2002) it was recognized that the comprehensive harmonization of the socio-natural interaction is an urgent goal of our time, the prerequisite for the transition of mankind to a new phase of sustainable and safe development (...) Now, at the beginning of the 21st century, the common human idea of the noosphere can (should) become an ideal project of the future socio-natural harmony governed by the collective human mind” (Plotnikova, 2004).

So, what meaning do we put into the concept of noohumanism, why do we think that, in terms of the socio-natural homeostasis, it is legitimate of the idea of socio-natural consonance regulated by the metaprinciple of harmony to be substantial therefore?

The principle of harmony between Man and nature is the key principle in the noohumanism and has fundamental methodological significance. The principle of harmony is interpreted as generic in an array of correlates: “sustainable development,” “tolerance,” “the co-evolution,” and “homeostasis.” It denotes the whole’s unsteady (non-equilibrium) balance and has a universal meaning.

Indeed, the term “harmony” means “the accordance, the consonance” (Philosophic Encyclopaedic Dictionary, 2005: 87) and is associated with its generic temporal being.

What relates harmony to the concept of “sustainable development” is that people should live “in *harmony* with nature,” “recognize that the environmental protection shall become an integral component of the development process” (Sikorskaya, 1999: 3). Semantic similarity of “the harmony” and “the homeostasis” is obvious, because the latter within common scientific discourse is interpreted as “the dynamic equilibrium state of a system, maintained by its resilience against external and internal disbalancing factors” (Dictionary of Practical Psychologist, 1997: 107). The concept of the “tolerance” shares the same semantic space along with the listed meanings; it is defined as a value and social norm of the civil society and manifested in “the right of all individuals of the civil society to be different; the sustained harmony between various religious denominations, political, ethnic and other social groups (...) the willingness to understand and cooperate with people having different appearance, language, beliefs, customs and faiths.” Declaration of the Principles on Tolerance was adopted by the UNESCO resolution dated November 16, 1995” (Sarybekov & Sydyknazarov, 2007: 368).

As per the Noohumanism concept proposed hereinabove, the principle of the socio-natural harmonization regulated by the metaprinciple of harmony is viewed in the light of the “human-society-nature” system. Notably, projections of this principle are capable to generate the noohumanistic values and set the vectoriality of the *raison d’être*, the meaningful and purposeful foundations of an individual’s life, its motivation and activity.

However, from the synonymic chain of: “the socio-natural homeostasis,” “the socio-natural harmonization,” as based on the harmony metaprinciple, we derive the principle of the socio-natural consonance, since it means the unanimity and concordance of the views. It is for this reason that the “group agreement” (“the group consensus”) was coined as the psychology term, which expresses “the similarity of outlooks, positions, and attitudes” (Dictionary of Practical Psychologist, 1997: 620).

Moreover, the reason to count on the given term is that it reflects the human factor. Here the most important is an individual’s intention, his or her attitude, willingness to establish a dialogue, constructive and mutually beneficial cooperation. Therefore, within the category of socio-natural consonance, the harmonizing impetus is not exerted statically, but in the intention of its initiators, in the desire to strengthen and maintain the relative balance of the socio-natural systems.

Manifesting the idea of socio-natural harmony, the aforementioned metaprinciple of harmony plays a regulatory role and acts as a noohumanistic gradient, which projects the whole range of noohumanistic values within the “human-society-nature” system (in terms of variable combinations of its components). In other words, projections of the metaprinciple of harmony, at each level of the said system, generate the axiological array of the noohumanism.

So, let us investigate what noohumanistic scale of values is structured through the projection of the harmony metaprinciple at each level of the “human-society-nature” system.

On the personal level (the “human” level within the “human-society-nature” system), the harmony metaprinciple projects as an individual’s formation (self-upbringing) of the stable subconscious mental set, balanced composure, health, distress tolerance and commitment to positive relations with the society that prospers into congruity (Rogers, 1994), i.e., the higher cohesiveness of one’s internal world with the ambience, on the one hand, and internal self-acceptance, on the other. An individual’s willingness to cultivate the internal psychological stability within the frame of the noohumanistic worldview paradigm corresponds to the principle of the potential intellectual safety of a child, of a teacher and is marked in the noospheric education as the health-preserving technology (Maslova, 1999). The individual’s

personal committedness to build harmonious relationships with the world, society, him or herself results in the development of self-awareness and self-knowledge (Rubinstein, 1989; Rogers, 1994). Realizing the objective reality and endowing it with personal noohumanistically-oriented meanings and values, one turns it, thereby, into the content of its own subjectivity, the resultant of which (ideally) is the formed desired noohumanistic worldview.

Oleg Bazaluk fairly notes that the “System of values forms part of the nucleus of personality and acts as the worldview basis of all vital spheres and aspects thereof. The main function of the educational system exactly is to form the said component, which reflects in the very term of *education* itself (Bazaluk, 2010: 330).

– Further, let us consider how the harmony metaprinciple is manifested at the society level within the “human-society-nature” system.

It has been found that the projection of the harmony metaprinciple on an interpersonal level is most prominently materialized, as demanded by the present-day realities, in such communicative quality as the tolerance, i.e., the patience towards the Other (Maikovskaya, 2009), the people’s capacity to establish intercultural, interpersonal dialogue and build mutual understanding on denominational, interethnic, interstate and other levels, as well as capacity to show mercy, humanity and kindness. As per the Declaration of the Principles on Tolerance adopted by the UNESCO in 1995 and recognized by 185 countries, the tolerance is the “harmony in difference.” Novelty of usage of this term arises out of its contextuality, i.e., in terms of the noohumanism, tolerance also stands as the noohumanistic value (attitudes, beliefs) – a spiritual and moral quality that is urgently needed by humanity nowadays. Moreover, tolerance initiates derivative meanings associated with empathy and sociologically – mastering communication skills, teamwork (Vorobyova, 2008; Andreeva, 2010), and conflict resistance (Tsoi, 2015; Khasan & Sergomanov, 2004) that regulates the conflict discrepancies.

Hence, implementation of the harmony metaprinciple at the “society” level within the “human-society-nature” system has great prospects. A tolerant person would judiciously build his or her relationships with the society and would try to comprehend the inner logic of Others, avoiding any aggression, thus, contributing to thwart any conflict. Alternatively, an individual, who has conceived and adopted the noohumanistic value of forging harmonious communicative skills in the society, would gain benefits for his or her professional activities and competencies of the noohumanistically-oriented personality;

– On the “nature” level of the “human-society-nature” system, i.e., the people-nature interaction, the harmony metaprinciple is exhibited through environmental component of the noohumanism – as the Man’s willingness to preserve the environment for the sake of future generations, as an individual’s cultivation (self-cultivation) of the responsible environmental attitude towards the biosphere, ecological culture, which contextually serve as the noohumanistic values.

Analyzing the current scientific content of the Ukrainian scholars on this topic, we would like to mention a relevant article by Tamara Kirik, the Candidate of Pedagogic Sciences of the Kyiv Medical University, called “On the Tendency of Introduction of New Terms in the Courses of Philosophy and Other Disciplines” (“Про тенденцію упровадження нових термінів у курси з філософії та інших дисциплін”), wherein the author figures some moments (Kirik, 2017). Kirik remarks the author upon that using the term – “the noohumanism”: “Shindaulova did not set herself a task to study in details the history of usage by other modern scientists of the scientific terms that would begin with ‘noo-’, in

particular, ‘the noohumanism,’ being satisfied with one single case – the doctoral dissertation of a Russian citizen Galina Sikorskaya, whom she considers the inventor of this term” (Kirik, 2017: 165).¹

Tamara Kirik rightfully remarked that we did not set ourself the specific task to study minutely who was the first to coin out the term – “noohumanism.” This absolutely was beyond the scope of our research study.

The primary objective was to investigate the applications of the noohumanism as widely as possible and impregnate this very concept with our own vision.

However, in the late 90s, at that time when we started the project of our dissertation study for the degree of the Doctor of Philosophy, it was the doctoral dissertation of Galina Sikorskaya available in open media sources that was the most noteworthy and which provided the clearest definition of the noohumanism (Sikorskaya, 1999).

In none of our papers did we emphasized that it is Galina Sikorskaya and only she who is the original inventor of the term “noohumanism.”

Revisiting the above remark by Tamara Kirik that we have not set ourself the task to study in detail the history of usage by other modern scientists of the scientific terms that would begin with the “noo-” prefix, we would like to furnish two considerations to that effect.

Firstly. While creating an intellectual product, a scholar cannot sidestep the analysis of earlier accomplishments in the field of his or her interest. Objectively, what is meant here is the paradigm – “the achievements, which are acknowledged by all scientists and which provide the academic community with the problem statement and solution model for a specific historic period” (Concise Philosophic Dictionary, 2016: 279). No new strata of the knowledge could ever be discovered without “standing on the shoulders of giants.” This well-known metaphor that conveys the sense of the knowledge continuity is the ultimate and unconditioned reference standard for our study of the noohumanistic concepts. Based on the multidisciplinary approach that integrates the systems approach, the noospheric-environmental, the quantum, the musicological and other approaches, we have drawn into the orbit of our research not only the treatises by Sikorskaya, but also the works of other scholars, who have studied the scientific phenomena, concepts with the “noo-” particle such as: “the noospherism,” “the noogenesis,” “the noospherogenesis,” “the noosphere-oriented synthesis of sciences” (Moiseev, 2001; Subetto, 2003). For instance, Nikita Moiseev considered the formulation of the sustainable development strategy as a particular step toward the noosphere, in other words the step on the way toward the noospherogenesis” (Moiseev, 1997).

By and large, a scholar has to somehow find out approaches to elaborate such a fundamental research project as, in our case, – the development of a cosmo-planetary individual, a one who would think globally and person-wise would own profound moral principles, responsibility, leadership skills, etc. (Bazaluk, 2021). In this regard, it is notable that the academic ideas, concepts, dwelling in the surrounding info-space (in the noosphere), instantaneously resonate with the contemporary scholars, since “the noosphere” is the single organized whole, of which the all parts are harmoniously interconnected at various levels and act in concert with each other. A precondition for that must be a connection that is quick, reliable, covering long-distance range between those parts, as well as permanent material flow between them, the comprehensive information exchange” (Ivanov & Voroshilova, 2010).

¹ “Шиндаулова Р.Б. не ставила перед собою завдання детального вивчення історії використання іншими сучасними науковцями наукових термінів, які б різночинилися с “ноо-,” зокрема, і поняття “ноогуманізм,” задовольнившись одним-єдинним випадком – докторською дисертацією громадянки з Росії Г.П. Сикорської, яку вона вважає вінахідником цього терміну”

Secondly. Meaning of the noohumanism is construed differently in our studies (Shindaulova, 2016) and in the papers by Galina Sikorskaya. If Sikorskaya in understanding the “noohumanism” concept accentuates its environmental component, then we define its meaning more widely.

That is, first of all, the idea of the homeostasis (the dynamic equilibrium) of the socio-natural systems, at each of three levels of the “Human-Society-Nature” system, and, accordingly, the formulated value-based orientations. In other words, achieving the harmony at all three levels of the said system – be it either the psycho-emotional balance, human resistance qualities (“the human” level) or the social skills, tolerant relations with people (“the society” level) or the prudent and careful human-and-environment interaction (“the nature” level) – in all cases means the requirement for the human being to keep within limits, to pay respect to oneself, to the surrounding people and to the nature. While the moral-ethical qualities (such as humanity, respect, responsibility, tolerance, love, etc.) as well as the imperatives (the moral, the environmental, the survivability imperatives), forming at that point, constitute the axiological basis of the noohumanism.

One shall note that the followers of diverse scholastic and academic traditions are enriching, in this case, the term “noohumanism” with various senses.

Thus, in addition to the above reviewed “environmentally-oriented” meaning of the “noohumanism” as for one is proposed by Galina Sikorskaya or to the extensive interpretation of the noohumanism in terms of the socio-natural homeostasis as suggested by Raushan Shindaulova, the exponents of the Ukrainian school of thought – Konstantin and Yuri Korsaks – in their nooglossary define the noohumanism as “the realisation of principle for the relation to the person as to the highest value in conditions of noosociety and adoption of the world convention ‘On Duties of the Person’” (Korsak & Korsak, 2014: 46).

As we see the multiple understandings of the meaning of “the noohumanism” take place. That is normal since scholarly knowledge can gradually grow because of the legitimate criticism of the hypotheses proposed for a problem’s solution. Here one may recall Sir Karl Popper, and his principle of falsification as one of the scientific criteria (Popper, 1935).

With all that said, the contemporary geopolitical situation and various civilization threats require well-reasoned and balanced approaches. Herein the proposed worldview concept of the noohumanism, which is to form the value orientations as per the central idea of the homeostasis (the metaprinciple of harmony) under the “human-society-nature” system, gains paradigmatic tendency within contemporary philosophy, philosophy of education, and while still undergoing its evolutionary development, offers tremendous prospects, creative productivity, and is capable of solving the topical issues of today.

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Legal Issues and Risks of the Artificial Intelligence Use in Space Activity

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Ever since the use of artificial intelligence (AI) in the space sector, there have been progressive changes that brought both benefits and risks. AI technologies have started to influence human rights and freedoms, relationships with public authorities and the private sector. Therefore, the use of AI involves legal obligations caused by the influence and consequences of the dependency on the specified technologies. This indicates the need to investigate the issue of the legal problems and risks of using AI in space activity to identify, describe and explain legal issues and dilemmas in general and in the space sector in particular. The author has formulated theoretical definitions in the defined area through the logical-semantic approach. The comparative method has allowed us to carry out a comparative analysis of the AI legal regulation in the space sector in the USA, China and the EU. The authors have gone into rethinking the issue of action, cause-effect relationship, legal personality in matters of prosecution for damage caused by autonomous space objects. As well as combining the existing space law and its state-oriented responsibility with the space activity of private players using autonomous objects.

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Introduction

While AI is still in its infancy, it is already doing the most improbable things that will forever change our interaction with the space sector. This applies, first of all, to the application of autonomous robots in space missions. Since 1997, when Sojourner Rover was involved in the (Mars, 2020) mission, they have been used in space expeditions for various purposes. For example, today, the European Space Agency (ESA) has announced that they are working on a project that will use AI to send robotic elements into space. This project is still in its initial phase, but it could be used for anything from exploring new planets to studying the effect of microgravity on humans (Artificial, 2021a).

Automation of many processes in space has always been relevant. Since the space factors impede the constant supervision of all functions performed during a space mission. Increasing the level of autonomy and automation using AI technologies allows a wider range of space exploration. Increasing the level of autonomy and automation using AI technologies allows a wider range of space exploration. In some cases, autonomy and automation are critical to the mission success. For example, deep space exploration may require greater autonomy of the spacecraft, since communications with ground operators will be carried out with significant delays, or there could be no connection.

As well, with the help of AI, huge amounts of data obtained during Earth observation or telemetry data from spaceships are processed (Gal et al., 2020). AI determines the information required for further analysis, saving time and money. Another application of AI is geospatial intelligence, which extracts and analyzes images, information about objects and events on and around Earth (Walker, 2018). For example, AI has successfully captured and analyzed the first image of a black hole that was recorded using CHIRP technology (Bouman et al., 2016). An algorithm that uses AI to reconstruct low-resolution input data into high-resolution images (The Role, 2021). Data from some rovers, which has even been taught to navigate on their own, are also transmitted using AI (Artificial, 2021b). Thus, AI development, coupled with space data, can improve the production, storage, access and dissemination of data in space and on Earth.

The German Aerospace Center (DLR) has been developing AI techniques for space and terrestrial applications for many years. In 2018, DLR created an AI-powered robotic assistant, CIMON, intended to support astronauts in their daily tasks aboard the International Space Station (ISS). Fully voice-controlled CIMON can see, speak, hear, understand, and even fly (Artificial, 2021b).

The use of AI in space activities can be conveniently classified into three types of operations: predictable, unpredictable, and real-time response (Jonsson et al., 2007). Complex situations can arise even during conditionally predictable operations, where the application of AI in automatic mode allows people to handle the situation and helps to make decisions. Not to mention unpredictable situations or those carried out in real-time (Chien & Morris, 2014). There can also be distinguished the following types of autonomy – autonomy for unmanned missions and autonomy in support of human space missions (Jonsson et al., 2007).

However, currently, there are several unresolved issues concerning the use of AI. If they are not solved on Earth, they will be implemented in space. It is highly weighted towards ethical and legal problems. AI has been given the ability to learn and to act autonomously to some extent. These abilities have led to situations where it has become possible to challenge traditional legal postulates. First of all, this concerns the legal personality of AI, for example, in copyright (Guadamuz, 2017) or legal liability grounds for harm caused by autonomous systems (Pepito et al., 2019).

There are already a sufficient number of recorded examples where issues of AI legal regulation have arisen. From scandals over the misuse of users' personal data of Facebook and Cambridge Analytica (Facebook, 2019) (privacy issues) to accidents involving cars (Boudette, 2021; Bateman, 2021) and aircraft (Coeckelbergh, 2020) (legal liability issues) operated in autonomous mode. Since AI, to a greater extent, controls the work of mechanisms, devices, robots, the ability to determine responsible one for possible harm is a necessary issue when considering disputes in courts.

These benefits and risks become even more acute in the use of AI in space activity. First, commercial space activities, which account for about 70% of space-related activities (Inter-Agency, 2018), have increased ubiquitous impact on Earth and the benefits that space products and technologies provide in solving the problems and needs of humankind (Soroka, 2020; Gal et al., 2020). Second, new actors, together with emerging new technologies such as AI, develop new global business models driven by demand, such as satellite constellations, tourism, asteroid and lunar mining, in-situ resource utilization (ISRU), 5G, in-orbit servicing (IoS), 3D printing of satellite parts (e.g., solar panels, etc.), and commercial space station (Gal et al., 2020). Third, the use of AI is realized without a global regulator and global rules. So, how can a legal framework be established if AI technologies are distinguished by spontaneity, constant development and transformation, and the space conditions where this technology will be used are generally difficult to predict. Some authors have noted that the regulatory framework governing this sphere should be universal. After all, constant amending of legislation in response to changes in the field of technology can be a difficult procedure (Čerka et al., 2015). Legal regulations must ensure a regulatory balance in the interaction of robotic and virtual technologies with humans in space missions. AI capabilities should not go beyond their intended purpose. It is essential that AI meets human needs and values and be incapable of adapting to them (Del Castillo, 2017).

All of the above determines the relevance and prospects of the legal aspects and risks research of AI use in the space industry.

Theoretical approaches and directions in the Artificial Intelligence legal definition

The ambitious short- and long-term goals set by various national space agencies require groundbreaking advancement in new space technologies, including the development of space AI agents. Recently there has been an upsurge in interest in AI across the aerospace community (Soroka & Kurkova, 2019). Therefore, such an interest determines the need for adequate and timely development of appropriate legislative regulation in this area. Industry, government, academics and civil society advocates suggest using ethical or technical approaches when discussing the establishment of the necessary regulatory framework. However, the specified framework setting will be challenging without genuine understanding and adequate interpretation of the term "Artificial Intelligence" (Morhat, 2017). Accordingly, within the framework of this study, the concept of Artificial Intelligence analysis is of great importance.

It is believed that the term “Artificial Intelligence” has been put into professional and scientific practice by John McCarthy in 1956 at the Dartmouth Artificial Intelligence (AI) conference (Newell et al., 1959; Smith et al., 2006). John McCarthy pointed out that one of the AI defining characteristics is the ability to replicate human intelligence (Wienrich & Latoschik, 2021). The majority of the figures from academia have perceived this formulation as a postulate and begun to state in their works that AI is an imitation of human intelligence by machines or computer systems (The Role, 2021).

Nils Nilsson has provided an interesting historical overview of the definition of AI. He gives an example of the use of autonomous systems by NASA (Remote Agent project, 1999) in “The Quest for Artificial Intelligence a History of Ideas and Achievements” while researching the use of AI in space missions (Nayak et al., 1999). Nilsson specifies that one of the unique RA characteristics and the key difference from traditional spacecraft control is that ground operators can use the RA by targeting it; rather than by issuing detailed sequential synchronized commands. The RA itself sets the strategy to achieve these goals and implements this plan by issuing commands to the spacecraft (Nilsson, 2010).

Nils Nilsson specified that AI technology “is that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment” (Nilsson, 2010). Thus if we interpret Nielson’s definition, AI is the activity of machines that are endowed with intelligence, i.e., intelligent machines; it brings us back to Turing’s theory (Turing, 1950) and his statement about the possibility of intelligence mechanization. Or to more ancient artifacts, such as in Proverbs 6:6–8, King Solomon says “Go to the ant, thou sluggard; consider her ways and be wise” (King, 2021). While his advice was intended to warn against laziness; it may also motivate us to look in biology for clues on how to create or improve something based on the knowledge gained while observing nature (Nilsson, 2010).

The Russian researcher Petr Morkhat followed a different course in his monograph “Artificial Intelligence: Legal View” while defining Artificial Intelligence; the author does not focus on intelligence, and at the same time, considers the possible options for the technology application and properties. By artificial intelligence, the author understands fully or partially autonomous self-organizing computer-software virtual or cyber-physical (also bio-cybernetic), system (unit) with the following preset capabilities: 1) anthropomorphic-cognitive thinking and actions, such as image recognition, symbolic systems and languages, reflection, reasoning, modelling, imaginative (meaning-generating and sense-perceiving) thinking, analysis and evaluation; 2) self-reference, self-regulation, self-adaptation to changing conditions, self-restraint; 3) self-maintenance in homeostasis; 4) genetic algorithm (a heuristic search algorithm that preserves important aspects of “parental information” for “subsequent generations” of information), accumulation of information and experience; 5) learning and self-learning (based on their own mistakes and experience); self-development and self-application of self-homologation algorithms; 6) independent development of tests for their own testing, independent self-testing and testing of computer and, if possible, physical reality; 7) anthropomorphic-intelligent independent (including creative) decision-making and problem-solving” (Morhat, 2017: 69-70).

However, in our opinion, the use of such a complex terminological construction in a regulatory legal act will be quite problematic. AI is changing every day, new processes and technologies are being created; therefore, when forming a legal definition of Artificial Intelligence, it is not necessary to list all the types and areas of its application. Besides, the author does not state that the system (unit) is endowed with intelligence; he bypasses

the controversies in the formulation and indicates that it is endowed/possessed of abilities and capabilities. Further, Morkhat describes various types and forms of intelligence, using phrases “intelligent thinking and cognitive actions”; “reasonable independent creative decision-making,” which are the signs of intelligence. Since it is generally believed that intelligence is a reason, human ability to think and cogitate (Large, 2001). By “artificial” we shall mean something that is created by humans and imitates natural phenomena, processes, etc., including intelligence. And in this context, Matthew Scherer pointed out that the difficulty in defining AI lies not in the concept of artificiality but rather in the conceptual ambiguity of intelligence. As humans are the only entities that are universally recognized (at least among humans) as possessing intelligence, it is hardly surprising that definitions of intelligence tend to be tied to human characteristics (Scherer, 2016).

Some researchers consider incorrect the emphasis on the machines exclusivity, imitating human intelligence, right from the beginning. For example, Stuart Russell and Peter Norvig distinguish AI as a separate area of research, without associating it with human intelligence (Russell & Norvig, 2020). These authors defined AI as artificial agents that receive percepts from the environment and perform actions. Each agent implements a function that maps percept sequences to actions. The authors referred to such agents: reactive agents, real-time planners, decision-theoretic systems and deep learning systems (Russell & Norvig, 2020). Therefore, we support the position of the authors of the study “RoboLaw: Towards a European framework for robotics regulation” (Palmerini et al., 2014), which focus on applications rather than single technologies in forming the concept of artificial intelligence. The authors specify two reasons for such an approach: the impossibility to isolate a technology or system from its context of use, including the operative environment and its users, and the impossibility to focus on a single technology since the majority of technologies do not work in isolation but rather as components of technological systems (Palmerini et al., 2014).

In 2018, a group of high-level European AI-experts released a document, “A definition of AI: Main capabilities and scientific disciplines,” which described and defined the capabilities of AI, as well as outlined ethical guidelines for the policy of AI use. According to the document: “Artificial intelligence (AI) refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals. AI-based systems can be purely software-based, acting in the virtual world (e.g., voice assistants, image analysis software, search engines, speech and face recognition systems), or AI can be embedded in hardware devices (e.g., advanced robots, autonomous cars, drones, or Internet of Things applications)” (A Definition, 2018). In this document, the authors interpreted the definition they suggested that AI should be understood not only as a computer program but as a technology and a scientific discipline. As a technology, AI refers to the systems created by humans to act in the physical or digital world to find an efficient solution to complex problems. As a scientific discipline, AI includes several approaches and techniques, such as (1) machine learning; (2) machine reasoning; (3) robotics.

In a more recent variant, the above definition was expanded and updated as follows: “Artificial intelligence (AI) refers to systems designed by humans that, given a complex goal, act in the physical or digital world by perceiving their environment, interpreting the collected structured or unstructured data, reasoning on the knowledge derived from this data and deciding the best action(s) to take (according to pre-defined parameters) to achieve the given goal. AI systems can also be designed to learn to adapt their behaviour by analysing how the environment is affected by their previous actions. As a scientific discipline, AI includes several approaches and techniques, such as machine learning (of which deep learning and

reinforcement learning are specific examples), machine reasoning (which includes planning, scheduling, knowledge representation and reasoning, search, and optimization), and robotics (which includes control, perception, sensors and actuators, as well as the integration of all other techniques into cyber-physical systems)” (A Definition, 2019).

Thus, in our research, by artificial intelligence, we understand a system designed by humans (computer program, algorithm), which, by analyzing the environment, is capable of acting (without active control or supervision from an individual) or being idle autonomously to achieve a specific goal.

And, although there are many scientific developments in the analysed area, researchers note that there is still no agreed (generally recognized, conventionally recognized by all theorists and practitioners) universal, comprehensive, clear and unambiguous definition of artificial intelligence concept (Nilsson, 2010; Gal et al., 2020). Therefore, we shall consider current legal definitions of the analysed concept.

Legal regulation of Artificial Intelligence

Until recently, artificial intelligence development in general and in the space sector, in particular, took place in a kind of regulatory vacuum (though not absolute). Except for the present national regulations of some countries, regarding basically autonomous vehicles and drones. There exist very few legal provisions that specifically address unique challenges raised by AI. There is practically no case law on this issue (Scherer, 2016).

On this issue, the position of Doctor of Law, Professor Mykola Karchevsky is quite interesting, in “The main problems of legal regulation of socialization of artificial intelligence” (Karchevsky, 2017), he identified three key issues of legal regulation of AI use and gave the following answers to them:

1. Should the development of artificial intelligence be banned or regulated? Despite the risks, an absolute ban on the development of artificial intelligence systems is impossible; legal regulation in this sector should provide incentives for socially efficient use of technologies and minimize the risks of technology abuse.
2. What will be the legal regulation in the field of robotics? The classic “developer-owner-user” scheme is relevant and necessary for the current level of technology. The complexity of technology will require the transition to a new, more complex scheme of legal regulation. Most likely, the legal regulation of AI socialization will go from considering the robot as an object of relations to endowing it with rights and responsibilities.
3. If robots get rights and responsibilities, how will the justice system change? Complementary to traditional justice, we can discuss the emergence of two new types, notionally named “hybrid justice” and “AI justice.” The operation of the latter will provide counteraction to robots that pose risk to social development and stability. Most likely, AI justice will be developed based on robots. The establishment of such a system involves the generalization of clear algorithms of experience gained through the traditional justice existence (Karchevsky, 2017).

The first attempt to develop universal law to regulate autonomous systems, namely the robotics sector, was made by science fiction writer Isaac Asimov. Thus, the author proposed Three Laws of Robotics: “1) A robot may not injure a human being or, through inaction, allow a human being to come to harm. 2) A robot must obey orders given it by human beings except where such orders would conflict with the First Law. 3) A robot must protect its

own existence as long as such protection does not conflict with the First or Second Law” (Anderson, 2017). Eventually, Isaac Asimov added the Zeroth Law “A robot may not harm humanity, or, by inaction, allow humanity to come to harm.”

Alternative laws have been suggested to update Asimov’s laws which follows: 1) a human may not deploy a robot without the human-robot work system meeting the highest legal and professional standards of safety and ethics; 2) a robot must respond to humans as appropriate for their roles; and 3) a robot must be endowed with sufficient situated autonomy to protect its own existence as long as such protection provides smooth transfer of control to other agents consistent the first and second laws (Pepito et al., 2019).

However, still among the relevant sources are legislative acts and subordinate legislation, as well as official documents. At the moment, it’s difficult to provide many examples of using AI definition at the legislative level; for now, such cases are rare. Nonetheless, we can cite some examples.

In 2011, the UN adopted a landmark document – the Guiding Principles on Business and Human Rights, which calls on industry to respect and protect human rights (Guiding, 2011). These principles set out general rules for technology companies for designing AI-based products to ensure that they do not violate fundamental human rights. Although the UN Guiding Principles are an important milestone in business and human rights, they are only a starting point for human rights respect in the technology sector. And this regulation does not define what AI is; it states that the production and use of technology should be under state control, and digital institutions should not restrict natural rights and human rights (Soroka, 2020).

According to the “TES analysis of AI Worldwide Ecosystem in 2009-2018” (Samoili et al., 2020), the EU, China, and the USA are the leading players in AI. Therefore, the analysis of the legal and regulatory framework in our study will focus on the following countries.

The USA

An analysis of the US legislative framework makes it possible to state that as of June 2021, there is no national federal law on AI. Most of the legal provisions are based on the cross-application of rules and regulations governing traditional areas such as product liability, data confidentiality, intellectual property, discrimination and rights in the workplace. The first federal document regulating legal relationships in the AI field is Executive Order 13859-Maintaining American Leadership in Artificial Intelligence (DCPD-201900073, 2019). The document determined that “the policy of the United States Government [is] to sustain and enhance the scientific, technological, and economic leadership position of the United States in AI” (DCPD-201900073, 2019).

Following the adoption of the Order, the American Artificial Intelligence Initiative was launched at the federal level. It is guided by five principles: (1) driving technological breakthroughs; (2) driving the development of appropriate technical standards; (3) training workers with the skills to develop and apply AI technologies; (4) protecting American values, including civil liberties and privacy, and fostering public trust and confidence in AI technologies; and; (5) Protecting US technological advantage in AI, while promoting an international environment that supports innovation (Chae, 2020).

Then in early 2020, the Office of Management and Budget released the Memorandum for the Heads of Executive Departments and Agencies (Russell, 2020). This is the Guidance for Regulation of Artificial Intelligence Applications, which guided on developing normative and non-normative approaches to AI technology. It has also identified potential ways to reduce

barriers to the use of AI in promoting innovation in the private sector. The Memorandum contains a set of principles that should be considered when formulating normative and non-normative approaches. It also states that if existing regulations are sufficient, or if the costs of the new regulations outweigh the benefits, then the agencies concerned may find alternative approaches (Russell, 2020). It is believed that the new guidance for the regulation of AI is or will become the actual set of US regulatory principles (Zhu & Lehot, 2021).

In April 2020, the Federal Trade Commission published further guidance on the commercial use of AI technology, recognizing that while AI technology has significant positive potential, it also presents negative risks, such as the risk of unfair or discriminatory outcomes or entrenchment of existing disparities (Zhu & Lehot, 2021). The FTC has emphasized that the use of AI tools should be: (1) transparent; (2) explainable; (3) fair; (4) empirically sound; (5) and at the same time accountable. Besides, commercial companies were encouraged to take responsibility for compliance, ethics, fairness and non-discrimination (Smith, 2020). Thus, the USA, being a leader in AI, has not yet passed a national law on AI at the federal level and has not standardized the rules in the AI sector. At the same time, at the executive level, certain aspects of AI are regulated mainly in the field of technical standards through the adoption of directives and rules.

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The People's Republic of China

China ranks second after the USA in terms of the number of AI players (Samoili et al., 2020). However, in the USA, AI is represented by commercial enterprises and start-ups, and in China by government agencies and research institutes. The legal and regulatory framework is based on strategic policy documents aimed at stimulating the AI industry development. These include: "Made in China in 2025" (Explanation, 2020), the Action Plan for Promoting the Development of Big Data (Circular, 2015), the New Generation of Artificial Intelligence Development Plan (Notice, 2017).

As for the last-mentioned document, it refers to AI as a revolutionary technology that can affect governance, economic security and social stability, and even global governance. However, all of this can lead to problems associated with changes in employment structure, impact law and social ethics, violate personal privacy and challenge international relations. While vigorously developing AI, the Chinese government attaches great importance to potential threats to flight safety (Notice, 2017). The recommendations are being developed to prevent, limit and minimize risks to ensure safe, reliable and controlled AI development. According to the New Generation of Artificial Intelligence Development Plan, China's legal and regulatory framework should start to be created from 2025, through the adoption of laws and regulations. While the Plan lacks specific details, its ambitious agenda and selected policy targets indicate soon important sectoral, legal and regulatory changes (Karch, 2021).

Based on national plans, there also began to adopt plans for the development of AI at the local level. For example, the leadership of the city of Shenzhen (known as Silicon Valley of China) on 28 June 2021 announced Shenzhen Special Economic Zone Artificial Intelligence Industry Promotion Regulations (Draft) (Announcement, 2021). The project was submitted to the National People's Congress, and its main goal is to regulate and support the development of its AI industry. This made it the first local government in China to establish

targeted policies for the sector (Koty, 2021). Concerning governing principles and measures, the draft regulation provides that the AI industry of the city follows the principles of harmony, fairness and justice, tolerance and sharing, and respect for privacy as well. Besides, the draft regulation stipulates that AI enterprises must incorporate compliance with ethical norms into their professional norms requirements and incorporate ethical safety risk education into the content of their induction and on-the-job training (Shenzhen, 2021). It also defines artificial intelligence. Article 2 indicates that the term “artificial intelligence” referred to in these Regulations refers to the use of AI methods and technologies using computers or equipment controlled by them, to study and analyze the collected external data, the perception of the environment, through the knowledge and deduction, research and development of theories, methods, techniques and applications for modelling and expanding human intelligence (Announcement, 2021).

Thus, through political decisions at the national level and administrative documents at the local level, the Chinese government develops regulations and national standards that promote the implementation of innovation policy in China.

The EU

The first European project, which brought together different countries and research institutes to address the legal issues of AI use, was launched in March 2012 and was called RoboLaw. It was focused on the issues facing the legal “status” of robotics, nanotechnologies, neuroprostheses, brain-computer interfaces, areas in which very little work has been done so far (RoboLaw, 2019). The radical novelty of these technological applications and tools required an original and more complex study, characterized by an interdisciplinary method and a comparative analysis of the diverse approaches adopted in different legal systems. Several research institutes worldwide have studied aspects of the regulatory and legal consequences of developments in robotics. Researchers took for analyses North American and Eastern approaches as examples. The outcome of this project is the development of a set of regulatory guidelines (D6.2 “Guidelines on Regulating Robotics”) addressed to the European policymakers (RoboLaw, 2019). The Guidelines were to become an ethically and legally sound basis for future robotics developments and the use of AI. However, the settlement of this issue (both in Europe and abroad) are still sketchy.

Without global regulation of the stated issues, the technological countries have independently begun to establish the legal framework for the AI technologies establishment.

In 2018, the European Commission established the High-Level Experts Group on AI with the general objective to support the implementation of the European Strategy on AI, including the elaboration of recommendations on future-related policy development and ethical, legal and societal issues (Neri et al., 2020).

In April 2021, the European Commission published its final Regulatory framework proposal on artificial intelligence (hereinafter the EU Proposal) (Regulatory, 2021) to promote robust AI in Europe. A classification of AI into systems with “high risk” and “low risk” has been proposed. Risk and its level were determined by a set of AI characteristics concerning the quality of the datasets used, technical documentation and record-keeping, transparency and information delivery to users, human oversight and reliability, accuracy and cybersecurity. High-risk AI systems will have to go through testing for compliance in national AI certification bodies to ensure compliance with the new EU regime. This will entail the publication of algorithms and datasets for certification bodies. High-risk AI systems that pose potential harm to health and safety or negatively affect fundamental rights necessarily

undergo certification. The EU Proposal does not contain similar detailed requirements for low-risk AI systems, but there are codes of conduct and transparency rules that will be applied.

Thus, following the EU Proposal, users will need to be notified about: (1) AI systems designed to interact with individuals (such as chatbots), (2) emotion recognition systems or biometric categorization, (3) some machine-generated content such as images or videos that resemble real people or objects (deepfakes). The proposed AI regulation, or rather the legal requirements for AI systems, is the result of two years of preparation based on the ethical principles of HLEG (Regulatory, 2021).

Proposing new rules and actions to turn Europe into a global hub for robust AI, the following documents have been adopted: (1) a Communication Fostering a European Approach to Artificial Intelligence; (2) the Coordinated Plan with the Member States: 2021 update; (3) a proposal for an AI Regulation laying down harmonized rules for the EU (Artificial Intelligence Act) (A European, 2021).

For the first time, the Artificial Intelligence Act at the legislative level determined that: “artificial intelligence system (AI system) means software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with” (Part I Article 3) (Proposal, 2021).

The specified framework European law paved the way for the legal regulation of the use of AI, if not at the global level, but at least at the European level.

As for the legal regulation of AI in the space sector, we have not found such specialized regulatory legal acts. Space treaties do not address the use of AI, nor any international treaty governs the use of AI in space. This means that domestic legislation should serve as the main source of substantive law regarding the use of AI in space (Gal et al., 2020). As for the issues of responsibility for damage caused by space activities with the use of AI, in our work, we will consider the existing regulatory legal acts on space law; we will attempt to compare current norms of space law with the realities of the normative vacuum in the AI sector.

Legal and ethical problems require solutions, which cannot be defined and implemented with the current national laws and declarations. Therefore, it is essential to develop legal procedures that will link AI and AI-based services with the applicable rules system. Existing legal AI regulatory tools do not fully allow making space law effective and compatible with the specified technology, as well as the risks that this technology can bring.

Issues of legal responsibility and legal personality of Artificial Intelligence

Before answering the question: “when and how can legal liability arise for causing harm by AI technologies in space activities?” it is necessary to determine what is a legal responsibility and what should be the conditions under which it occurs.

There is still no consensus in legal science on the definition of “legal responsibility.” Some authors associate it with the punishment (Hart, 2000), others – associate legal responsibility with stigmatization public condemnation (Khachaturov & Lipinsky, 2007).

Regarding the conditions under which legal liability is possible, it should be noted that even Aristotle in the *Nicomachean Ethics* (1984, 1109b30-1111b5) (Complete, 1984), argued, that an action should come from an individual and that what they do cannot be ignored. Thus, responsibility arises if (1) there is an action or inaction (if there was a need to act), i.e., there is an action agent who has a sufficient degree of control over the action (inaction) and (2) if the action (inaction) agent knows what he is doing and understands the nature of his action

(Fischer & Ravizza, 1998; Rudy-Hiller, 2018; Neri et al., 2020; Prus, 2015). That is, since Aristotle's time, there are two generally accepted conditions, upon the occurrence of which it is possible to apply for liability for action (inaction) – it must be volitional (free) and conscious (intentional).

Thus, the entire history of the legal responsibility institution, starting with the works of ancient Greek philosophers, revolved and revolved around the postulate of a causal relationship between an action that must be volitional, conscious, and harmful.

After all, when people act and make decisions, freedom of action is usually associated with responsibility. One influences the world and others, so they are responsible for their deeds and decisions. However, it is not always obvious who should be held liable. It may be confusing who exactly caused the corresponding consequences (for example, harm, but it can also be a benefit), and even if it is clear who did it, possibly, that person did not act voluntarily or did not know what he was doing. So how, to whom, and when can people and society meaningfully attribute responsibility? And what does this mean for establishing accountability for AI? (Coeckelbergh, 2020).

As for legal liability for harm caused by AI, in the current law systems, which are specially designed and created for human beings, liability applies only to cases where the reason for the actions or being idle of AI can be associated with a specific individual, such as an operator, manufacturer, owner or user. And where this human agent could foresee and, therefore, avoid negative consequences (Asaro, 2015). It is essential to understand that when AI makes autonomous decisions, traditional rules will not be enough to create legal liability for the damage caused. Since it is impossible to determine the liable party and demand from this party compensation for the damage caused by the autonomous AI (Kingston, 2018). It remains difficult to determine who is liable when an AI capable of making autonomous decisions causes harm to human beings or damages property, as such decisions disturb the chain of causation (Pepito, 2019).

Some autonomous robots can be unpredictable in theory and many in practice. A critical approach to current legal approaches to liability is predictability. Within traditional product liability, the manufacturer is responsible for the product working as designed and anticipates likely problems or harms it may cause. Determinating what is “foreseeable” is often up to the courts, but the used legal standards are whether the manufacturer knew of the potential hazards, whether a reasonable person should have foreseen it, or whether there is an industry standard of practice that to reveal this (Palmerini et al., 2014).

In any case, no matter how events unfold with the use of AI, it will be necessary to revise the concept of legal personality, which in itself is quite controversial, in any case, it is very difficult. Therefore, politicians are most likely faced with the task of adopting a law to establish regulatory rules for the AI design and use, as well as procedures for bringing to legal responsibility for the damage caused.

Liability under the space law treaty regime is based on Article VII of the Outer Space Treaty, which states: “Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage by such objects” (United, 2008). Article VIII of the same treaty obliges the State Party on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such an object.

The use of AI in space activities raises the following questions: how can a state retain control over a space object it launches or on whose registry an object is; how to balance the

use of artificial intelligence in space activities with its obligations under the Outer Space Treaty (Long, 2018).

Article II of the Convention on International Liability for Damage Caused by Space Objects (1971) specifies that for damage caused by a space object on the surface of the Earth or to an aircraft in flight, a launching State shall be absolutely liable to pay compensation to the victims. In the event of damage being caused elsewhere than on the surface of the Earth, then a launching State is liable only if the damage is due to its fault or the fault of the persons for whom it is responsible (Article III) (United, 2008). These liability rules can also apply to spacecraft that have used AI technology. As is evident from the above norms, space law establishes state-oriented responsibility.

However, when creating AI, as we have already indicated, a large number of people take part, and it is extremely problematic to prove the guilt of a particular person (persons) for causing damage to bring the launching state to justice. Sometimes this situation is referred to as “the problem of many hands.”

Dennis Thompson, who was probably the first to use the concept of “the problem of many hands” in an article on the responsibility of public officials, describes it as follows: “Because many different officials contribute in many ways to decisions and policies of the government, it is difficult in principle to identify who is morally responsibility for political outcomes” (Thompson, 1980: 905). In a more recent article, Helen Nissenbaum discusses the problem of many hands as one of the barriers for attributing accountability in what she calls a “computerized society.” She characterizes the problem of many hands as follows: “Where a mishap is a work of “many hands,” it may not be obvious who is to blame... The conditions for blame, therefore, are not satisfied in a way normally satisfied when a single individual is held blameworthy for a harm” (Nissenbaum, 1996; Ibo van de Poel et al., 2012).

Since fault liability under Liability Convention Article III is premised on the fault of a State or the faults of persons, a decision by an intelligent space object will, in all likelihood, not be the fault of persons (Gal et al., 2020). Therefore, it is difficult to trace the cause and effect relationship between the action of a particular person in the chain of AI creation, maintenance, use, et cetera, and the harm caused by an autonomous spacecraft.

Therefore, some authors suggest using the so-called joint tort liability when causing harm by autonomous machines (Scherer, 2016). Essentially, all activities on designing AI systems should be certified by an appropriate government body, such as an agency. This will create a liability system under which the designers, manufacturers, and sellers of agency-certified AI programs would be subject to limited liability, while uncertified programs offered for commercial sale or use would be subject to strict joint and severe liability (Scherer, 2016).

Likewise, Liability Convention Article XVIII provides that the “Claims Commission shall decide the merits of the claim for compensation and determine the amount of compensation payable, if any” (United, 2008). However, neither Article XVIII nor any other provision of the Liability Convention specifies what substantive law is used to decide on the merits and determine the compensation issue.

An analysis of the Space Liability Convention suggests that the relevant substantive law is domestic (national) law of 1) the launching State of the space object causing the damage, 2) the Registry State of the space object causing the damage, 3) the State that owned or whose national owned the damaged space object, 4) the Registry State of the damaged space object, 5) the home State of the software developer for the AI used by the space object that caused the damage (Gal et al., 2020).

Thus, the lack of (1) the conventional legal regime at the international level; (2) a single global administrative body; (3) pluralism of liability, state-oriented only, limits the ability of the space law treaty regime to establish a harmonious or uniform legal standard for making decisions on claims relating to damage related to space activities using AI.

Conclusions

1. AI is a future technology, which even nowadays expands the boundaries of human perception and enhances their capabilities where a few years ago, there seemed no prospects for a full and comprehensive study. Moreover, one can hardly imagine the development of the space industry without AI, although there are still some issues from the point of view of legal problems and risks.

2. Increasing the level of autonomy and automation using AI technologies in space activities has significant benefits, from simplifying the implementation of space missions to the production, storage, access and data dissemination in space and on Earth. However, the unpredictability of AI decisions in a specific situation sets on thinking on the issues of legal personality, precautions, and global postulates of protecting human rights. These issues have gained relevance as AI to a greater extent controls the mechanisms, devices, robots, and therefore the main concern is to determine responsible for its actions. At the same time, it should be understood that the solution of these issues is directly related to both the accuracy of the legal definition of the concept of Artificial Intelligence and the establishment of a clear legal framework for its functioning at the global level.

3. Analyzing numerous opinions of researchers, including European experts, it is prudent to consider that AI should be understood as a system designed by humans, which, by analyzing the environment, is capable of acting (without active control or supervision from an individual) or being idle autonomously to achieve a specific goal. From the point of view of AI legal regulation, the main concern is that currently the definition of AI cannot be specified at the global level, and its normative definition is rare. Still, there are some examples, like the Artificial Intelligence Act, which laid the foundation for the legal regulation of AI use, if not at the global level, but at least at the European one. Still, there are some examples, like the Artificial Intelligence Act, which laid the foundation for the legal regulation of AI use, if not at the global level, but at least at the European one. This issue is indirectly raised in the Guiding Principles on Business and Human Rights, but mostly it has a national background.

4. At the moment, the use of AI in space is in the plane of a legal vacuum. The existing outer space law can no longer satisfy the needs of the space sphere. It is essential to develop legal procedures that will link AI and AI-based services with the system of applicable rules. Modern legal AI regulatory tools do not fully allow making space law effective and compatible with the specified technology, as well as the risks that this technology can bring.

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Balancing European Security Governance: Policy Networks and Correlates of Deliberate Harm

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The proposed study reveals the features of the pressure from policy networks on the safety and security governance of states and intergovernmental organizations. The authors explore the current definitions of “policy networks,” which assert them as important actors in global, regional and national security, as well as correlates of deliberate harm, which are a consequence of policy networks activities. The authors developed and suggested a method for evaluating the pressure from policy networks on safety and security governance based on the dichotomy of non-malicious versus malicious intent. A rigorous model of accountability and evaluation of policy network actors is proposed, which aims to balance the governance of European security and strengthen civil society control over the regulatory and executive actions of formal and informal policy networks actors.

Keywords: policy networks, risk and safety studies, deliberate harm, EU security governance, threat assessment

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Introduction

Terrorism, espionage, migration, cyberattacks on government institutions, etc., are the harbingers of changes that redraw the state borders and redistribute the influence spheres of intergovernmental organizations. Geophilosophy is one of the scientific disciplines that shapes fundamental discourse on the nature of changes in the boundaries between civilizations and nations and, accordingly, determines the axiomatic of theories of war and peace (Bazaluk, 2017). Academic studies of the “stresses” created on the Earth’s surface between the loci of different civilizations reveal many reasons for their occurrence. Science makes use of different approaches, methods, and tools to explain the nature of aggression, interethnic and interstate conflicts, and causes of threats. Knowledge of the nature of motives to inflict harm helps to develop the security concepts that protect states and intergovernmental organizations from a wide range of issues: terrorism, interstate conflicts, environmental issues, organized crime, etc.

The development of safety systems and security governance depends on the historical and political context. It is worth noting that over the past 50 years, the concepts of safety and security governance have undergone several stages of development (Contemporary, 2018). Initially, they were designed for the security of individual human. After the Second World War, security governance came to be understood as a defense of the nation-state’s interests and its independence. During the Cold War, the first concepts of security of intergovernmental organizations were developed. After the collapse of the Soviet Union, security governance expanded to the Earth’s entire surface. Theories of war and peace began to be created focusing their attention on peace, human rights and sustainable development of the entire space civilization (Bazaluk, 2017).

The emphasis on global sustainable development and prosperity of society has expanded the meanings of the concept of “security.” The concepts of safety and security governance have expanded to cover more sectors of society. It was understood that global security governance is possible only on the basis of effective management of regional security, international security, security of separate countries, macro and micro social groups, as well as individual security. At present, security is understood as a shared responsibility that spans different levels and sectors of society. National security is no longer limited to the duties of the police and army (Jore, 2019).

The proposed study examines the features of the pressure from policy networks on the safety and security governance of states and intergovernmental organizations. The authors investigate the modern meanings of “policy networks,” which assert them as important actors in global, regional and national security and correlates of deliberate harm, which are a consequence of the policy networks activities. The authors reveal the role of policy networks and a causal relationship between policy networks and security using the example of E.U. security governance, i.e., at the supranational level.

Policy networks and issue networks

The development of the meanings of the term “policy network” began at the end of the twentieth century and was carried out in two directions. The first direction explored policy networks as kinship ties between bureaucrats, politicians, and interest groups. In this context, a policy network had definable and stable boundaries, and its analysis helped to predict the development of specific segments of the national and international policy. The second direction studied policy issues such as issue networks. Issue networks are less stable policy

networks with a large number of stakeholders. In most cases, issue networks are composed of: (a) governmental actors: bureaucrats, politicians and their interest groups, and (b) non-governmental actors: professional and/or academic experts and their interest groups. An important characteristic of issue networks is that membership in the network is constantly changing, the interdependence between network members is often asymmetric, so it is almost impossible to identify the dominant network participants and assess their motivation (Compston, 2017).

However, over the last decade, the typology of policy networks has become more diverse (Compston, 2017; Bossong, 2020). We use the term “policy network” to refer to a group of governmental (formal) and non-governmental (informal) political actors whose activities allow for constitutional and institutional changes at the state and interstate levels. A policy network in the context of our study is a group of actors whose political pressure leads to redrawing the boundaries of influence between civilizations on the Earth’s surface, i.e., has a direct impact on safety and security governance at the global and regional level.

A policy network of this format consists of a relatively small number of participants who are granted authority. The actors in the policy network are linked by close personal and work relationship, as well as general agreements on scope, goals and general institutional processes aimed at achieving policy outcomes. Policy networks causing constitutional and institutional changes in states and intergovernmental organizations cannot consist of a large number of participants. The large number of actors in a policy network increases the likelihood of internal conflicts and, accordingly, reduces the effectiveness of political pressure. The research of policy networks of this format helps to explain the similarity of political decisions between nations with different political systems and disagreements in decisions between the nations that adhere to the same policy.

The most illustrative example of effective pressure from a policy network of this format is the network that we call “Berlin–Moscow–Paris.” The policy network was created by Vladimir Putin, Gerhard Schroeder and Jacques Chirac in the early 2000s and determined close cooperation between Russia, Germany and France until 2014. The Berlin–Moscow–Paris policy network has brought about constitutional and institutional changes in three influential states in Europe, European and world politics, as well as influenced the revision of the concepts of safety and security governance at the national and international level. However, until now, the existing approaches and assessment methods have not allowed assessing the threats that this network has caused to the European security system over the years of its existence and, accordingly, giving a legal assessment of the actions of policy network actors.

The Berlin–Moscow–Paris policy network has gone through two key stages in its development. Initially, the presidents of three nations with different political systems established formal relations, directly fulfilling their constitutional duties as state leaders. However, subsequently, after leaving the posts of the Chancellor of Germany and the President of France, Gerhard Schroeder and Jacques Chirac continued to exert informal political pressure in resolving issues of combining the security concepts and security governance of Germany, France and their allies, on the one hand, and the security strategy of Russia, on the other hand. The Berlin–Moscow–Paris network actors determined the unity of political decisions and E.U. security governance, guided by trust-based relationships.

According to the studies of Carsten Daugbjerg, Bert Fraussen, and Darren Halpin, common values and interests of the network actors are an important condition for the creation of a policy network and the effectiveness of its political decisions (Daugbjerg et al., 2018). When applying the study results by Daugbjerg et al. to the analysis of the policy network

“Berlin–Moscow–Paris,” we found the following. The formal reason for the creation of a new political spectrum Berlin–Moscow–Paris was the unity of the position of Germany, Russia and France concerning the American invasion of Iraq (March 20, 2003). The political leaders of the three aforementioned states initiated categorical condemnation of the war in Iraq unleashed by the Americans. The actors of the newly created policy network based their argumentation on European security and E.U. security governance.

However, in reality, the creation of the Berlin–Moscow–Paris policy network, directed primarily against the U.S. hegemony in the world political arena, is due to informal reasons. The values and interests of German Federal Chancellor Gerhard Schroeder and French President Jacques Chirac focused their political activity on rapprochement with the political elite of Russia headed by President Putin. The actions of the United States as a world political leader were disapproved of by many European political leaders. However, the two leaders with a personal predisposition to an alliance with Russia decided to openly enter into an alliance with Russia and oppose the U.S. policy.

Here are the following facts that reveal the informal side of the relationship between Gerhard Schroeder and Jacques Chirac towards Russia. In 2004 (at the age of 60), Gerhard Schroeder adopted a three-year-old orphan girl Victoria, taken from an orphanage in St. Petersburg. In 2006, the Schroeder family adopted an orphan boy, Gregor, from the same orphanage. Gerhard Schroeder did not have children of his own; therefore, the two children adopted in Russia revealed the values of the Federal Chancellor of Germany. His political activity at that time (September 2005) was manifested in the signing of the agreement between Russia and Germany on the construction of the North European Gas Pipeline (NEGP) on the bottom of the Baltic Sea. Key partners of Germany in the European Union opposed the signing of this agreement. However, Schroeder signed the agreement, for the first time openly opposing the interests of Germany and Russia to the interests of key strategic partners in the European Union. Moreover, in December 2005, after leaving the post of the Federal Chancellor of Germany, Schroeder headed the committee of shareholders of North European Gas Pipeline Company, the operator of North European Gas Pipeline. The committee headed by Schroeder made all strategic decisions related to the production and transportation of gas between Russia and Germany. To this day, Schroeder continues to advance Russia’s interests, including lifting sanctions on Russia and recognizing Crimea to be Russian territory.

In his youth, French President Jacques Chirac shared communist ideas, knew Russian well and, at the age of 18, translated *Eugene Onegin* into French. Vladimir Putin sincerely admired Chirac and called the President of France “our” Chirac.

Thus, initially, in the early 2000s, the Berlin–Moscow–Paris political triangle was created as a formal (governmental) policy network aimed at redistributing spheres of influence on the Earth’s surface. By 2007, Gerhard Schroeder and Jacques Chirac did not hold public office, so the status of the political network changed to informal. However, the new status of the policy network did not reduce its activity and the degree of influence on E.U. security governance. The Berlin–Moscow–Paris policy network continued to exert political pressure on safety and security governance in Europe and the world. Gerhard Schroeder became a lobbyist for Russian interests in Germany and the European Union, and Jacques Chirac, due to health problems, limited himself to lobbying for Russian interests in France.

Policy networks, causing constitutional and institutional changes in states and intergovernmental organizations, perform three main tasks: 1. exchange of information; 2. regulatory tasks; and 3. executive tasks. Their main difference from numerous policy networks of a different format is the predominance of regulatory and executive tasks over

the exchange of information. In fact, such policy networks are created for effective policy and exist until the effectiveness of political pressure satisfies the interests of policy network actors.

According to Raphael Bossong, approximately 75–85% of all currently registered policy networks established under E.U. security governance are limited to the exchange of information in their activities (Bossong, 2020). These networks specialize in sharing the “best practices” and using “soft” coordination. The networks of this kind do not fulfill regulatory and executive tasks and, accordingly, do not exert real political pressure on the national security policy and security governance of intergovernmental organizations.

Bossong’s research proves the need to study the policy networks that cause constitutional and institutional changes in states and intergovernmental organizations. “(...) public actors, whether they are representatives of security authorities, ministries or government agencies, remain central to European governance networks” (Bossong, 2020). In fact, safety and security governance at the global, regional and national level are determined by a small number of policy networks (25-15%), whose activities are isolated from civil society and its governance (control). These networks are created and controlled by political actors: representatives of security agencies, ministries or government agencies, representatives of large financial and industrial groups.

The conceptual distinction between security and safety

The study of policy networks causing constitutional and institutional changes in states and intergovernmental organizations is faced with the problem of assessing the results of their political pressure on global and regional safety and security governance. Many academic analysts have expressed a distrust of informal internal security governance in the European Union (Bossong, 2020). The main reason for this distrust is the lack of legal frameworks and publicly available administrative acts that regulate and allow assessing the performance of such networks. The models for accountability of political pressure from such networks are imperfect that gives rise to impunity for the actors of the policy network for civil society. For example, Gerhard Schroeder and Jacques Chirac, despite criticism and criminal prosecutions, continued to promote the interests of the Berlin–Russia–France policy network in national and interstate security concepts.

From our point of view, the assessment of the outcomes of policy networks activities at the supranational level should be based on a clear understanding of the meanings of the conceptual distinction between security and safety. The definition “security is a means to achieve safety” across civilization must achieve a clear interpretation that can be used as a baseline assessment of the pressures of policy networks on global and regional safety and security governance.

There are numerous studies that reveal the nature and relationship between the concept of security and the concept of safety. For example, Sissel Haugdal Jore suggested the following systematization (Jore, 2019):

Safety:

- a) Protection against human and technical failure.
- b) Harm to people caused by arbitrary or non-intentional events.
- c) Natural disasters, human error or system, or process errors.

Security:

- a) Protection against deliberate acts of people.

- b) Loss caused by intentional acts of people.
- c) Intentional human action errors.

The concept of security implies a sense of safety, absence of threats and management of future risks. In fact, the concept of security concentrates in itself the ability to combine being safe and the absence of danger under the presence of army and weapons, as well as the ability to use war technologies to maintain peace and safety in the region. The concept of security achieves this result by using the concept of threat as a base model.

The concept of threat, in contrast to the concept of security, has a developed methodology for assessing (a) expected opportunities to inflict harm, and (b) possible intentions of attackers to inflict harm. The approaches and assessments developed in the threat concept are used in the concept of safety and security governance as initial and defining.

The second edition of the *International Handbook of Threat Assessment* offers modern approaches to and best practices in threat assessment (International Handbook, 2021). The central place in identifying threats is occupied by the possible intentions of an attacker. The intention is the motivation or desire to inflict harm and the expected results. Threat assessment takes into account the attacker's capabilities in terms of resources and knowledge. Distinguishing malicious intent from non-malicious intent of an intruder helps to delineate the circle of criminals that fall under the security category.

From the point of view of possible security threats, the following types of criminal activities are distinguished (Jore, 2019):

1. Theft.
2. Vandalism.
3. Organized crime.
4. Sabotage.
5. Kidnapping.
6. Hackers.
7. Terrorism.
8. Espionage.
9. Political crises that disrupt safety and security governance.

All of the above threats are defined as the forms of criminal activity. Forms of criminal activity can be carried out on one's own (suicide bombers, hackers, spies, etc.) or by organized groups, including policy networks operating at the national and international levels.

The developed threat assessment approaches and methods help to develop and promote the concepts of safety and security governance as the ways to mitigate threats and risks. The concepts of safety and security governance are being developed as ways to overcome uncertainty about possible scenarios for infliction of harm on the state and international cooperation. The nature of threat often lies outside the state, is mostly of a dramatic nature for society. For example, Oleg Bazaluk and Svitlana Balinchenko examined the threats of migration and its impact on the safety and security governance of the state (Bazaluk & Balinchenko, 2020). Therefore, both states and intergovernmental organizations should create and develop institutions (strategies) specializing in assessing threats and preventing them.

Practice shows that static security measures and rules are not enough to create a reliable safety regime at the national and international levels. The threat and risk mitigation measures that are envisioned by the security concept must focus on proactive threat elimination and awareness of impending threats, not just assessing the likelihood of threats. An effective safety

and security governance model is the one that creates a system that can adapt to and cope with changing conditions and various threats. The models of safety and security governance at the national and international levels should be built in such a way as to “see what one sees” and provide political institutions with remarkable resilience. Igor Linkov proved the need to distinguish between the concepts of “risk” and “resilience” and, accordingly, the construction of the organization security models and safety models (Linkov et al., 2018). Managing security threats (risks) involves assessing and reducing the likelihood and consequences of potential attacks by applying various types of threat mitigation measures. Such measures include protecting critical infrastructure and enhancing organizational and social resilience at the national and international levels.

The difference between security and safety is manifested in the tools, standards, and risk management in these two areas (Jore, 2019). The scientific literature contains several international and national standards, guidelines and recommendations on how to assess security threats (Contemporary security studies, 2018; International Handbook, 2021). Security threat analysis practices, security governance concepts and tools vary depending on the country or region. However, they are all usually based on one of three areas:

1. Normal Accident Theory.
2. The Theory of High-Reliability Organizations.
3. Resilience Engineering.

Security threats are different from safety risk assessment. Sissel Haugdal Jore argues that most of the literature in the field of security is based on the perspectives from safety science. Jore explains it with three reasons (Jore, 2019):

1. Security has historically been outside the scope of organizational responsibility.
2. Organizations that have a tradition of dealing with security risks were mainly the military and police. i.e., organizations whose activities are hidden from research and critical views.
3. Safety science was a broad research area encompassing many disciplines. However, at the same time, until recently, it has not belonged to the security area, which has been mainly the subject of research in criminology or international relations, i.e., the disciplines focused on national and international governance.

In modern academic literature, security is understood as a process that reduces threats and protects (increases) the stability of the system (state, intergovernmental organizations) against possible scenarios of inflicting harm. An example or “exemplary” model of safety and security governance in the U.S. National Security (Shiffrinson, 2020). The National Security Council System is built on the consolidated work of the National Security Council, a Principals Committee, a Deputies Committee and interagency policy coordination committees.

The prerogative of national security over all other national strategies and programs is proved by the following fact. In the first two weeks of his work, U.S. President Joe Biden signed 4 documents defining the U.S. National Security:

1. United States Global Leadership to Strengthen the International COVID-19 Response and to Advance Global Health Security and Biological Preparedness (NSM 1) 01/21/21.
2. Renewing the National Security Council System (NSM 2) 02/04/21.
3. Revitalizing America’s Foreign Policy and National Security Workforce, Institutions, and Partnerships (NSM 3) 02/04/21.

4. Advancing the Human Rights of Lesbian, Gay, Bisexual, Transgender, Queer, and Intersex Persons Around the World (NSM 4) 02/04/21.

The overall structure of the Biden National Security Council system is similar to that of its predecessors. However, the title “Renewing the National Security System” indicates the political aspiration of the new administration of the President of the United States to change the national security system of previous President Trump. President Biden added to the National Security Council the ambassador to the United Nations, the director of the Office of Science and Technology Policy (OSTP) and the administrator of the U.S. Agency for International Development (USAID). New and notable changes to the National Security Council System reveal the focus of the Biden administration on science, global engagement, cybersecurity and rule of law (Bellinger, 2021).

Thus, security is a risk-reducing process carried out through political, technological and physical protection. According to Jore, security is “the perceived or actual ability to prepare for, adapt to, withstand, and recover from dangers and crises caused by people’s deliberate, intentional, malicious acts, such as terrorism, sabotage, organized crime, or hacking” (Jore, 2019). Security risk management provides preparation, adaptation, counteraction and recovery from threats and crises.

The results of the author’s research completely coincide with the conclusion of Jore that “it is the malicious intent that separates safety from security. As a result, the demarcation between security and safety should be drawn in terms of the dichotomy of non-malicious versus malicious intent, not between intentional and unintentional” (Jore, 2019).

Therefore, assessment of policy networks causing constitutional and institutional changes in states and intergovernmental organizations should be based on the dichotomy of non-malicious versus malicious intent. However, how possible and objective will such an assessment be?

Correlates of Deliberate Harm

According to Bossong, up to a quarter of all policy networks and groups (182) operating in the European Union have a minimum legal or formal administrative basis (Bossong, 2020). These are mainly policy networks associated with E.U. institutions such as the Commission or agencies such as EUROPOL or FRONTEX. The rest of the policy networks operate outside the legal field or within the framework of formal decision-making processes, the documents of which, by themselves, cannot provide adequate legitimation of informal policy networks.

The authors’ assessment of formal and informal policy networks, based on the dichotomy of non-malicious versus malicious intent, aims to enhance the accountability of policy networks. The policy network accountability model, based on the dichotomy of non-malicious versus malicious intent, allows for threat assessment approaches and methods to assess the pressure from the policy network within safety and security governance. For example, the basic agreement signed by the Federal Chancellor of Germany Gerhard Schroeder on the construction of the North European Gas Pipeline (NEGP) between Russia and Germany under the Baltic Sea (September 8, 2005) can be assessed as a form of criminal activity carried out by an organized group, i.e., policy network, conventionally designated by us as “Berlin–Moscow–Paris.” This assessment is based on the damage to the safety and security governance of the European Union. The assessment of the threat from Nord Stream construction to the security of the European Union is evident.

An assessment of the Berlin–Moscow–Paris policy network pressure, based on the dichotomy of non-malicious versus malicious intent, reveals the Correlates of Deliberate Harm caused by signing the basic agreement for the construction of Nord Stream. Namely,

1. Nord Stream bypasses the traditional transit countries of the European Union: Slovakia, the Czech Republic, and Poland, as well as Ukraine, whose interests are defended by the United States. The national security concepts of these states view Nord Stream as political pressure on national and European security from Russia.
2. On August 20, 2009, Russia officially refused to ratify the European Energy Charter, thereby retaining the right to make decisions on the transportation of energy resources to Europe.
3. Gas disputes between Russia and Ukraine over gas prices, as well as Russia's foreign policy towards Eastern Europe, have proven that gas supplies are used by Russia as an instrument of political pressure.
4. In a study by the Swedish Defense Research Agency, more than 55 incidents (threats) between Russia and European nations were registered, most of which were “both politically and economically motivated” (Solum Whist, 2008).
5. In April 2006, Radoslaw Sikorski, Polish Minister of Defense at that time, compared the construction of the North European Gas Pipeline (NEGP) between Russia and Germany to the infamous 1939 Nazi-Soviet Molotov-Ribbentrop Pact (Gustafson, 2020).

Thus, the current assessment of the activities of the “Berlin–Moscow–Paris” policy network proves the malicious intent inflicted by Federal Chancellor of Germany Gerhard Schroeder by the fact that he signed the agreement on the construction of the North European Gas Pipeline (NEGP) between Russia and Germany. The threat assessment of the signed agreement testifies to the violation of the safety and security governance of a number of European countries and the European Union. In 2006, like his colleagues from Poland and the Baltic states, the Swedish Minister of Defense expressed concern that Russia would use the pipeline to spy and build up its military presence in the region (Bakst, 2006). Time has confirmed his fears (Gustafson, 2020).

Conclusions

An example of the policy network, designated by us as “Berlin–Moscow–Paris,” made it possible to study the features of the pressure from policy networks on safety and security governance at the national and international levels, as well as to develop the criteria for assessing this pressure.

Various models of policy networks accountability are suggested within the framework of safety and security governance concepts. Their goal is to ensure civil society control over the activities of policy networks. Researchers are trying to develop approaches and methods for assessing safety threats and security governance by policy networks. For example, Bossong offered mandatory publication of annual work programs for influential formal and informal policy networks. According to Bossong, publishing programs and reports will make it easier to summarize different theoretical perspectives and practices. Mandatory printed reports will reveal the causes and sources of pressure from policy networks, which will ultimately balance the governance of European security (Bossong, 2020).

The authors complement Bossong's findings with the need to use the concept of threat assessment in evaluating the pressure from policy networks on the safety and security

governance of states and intergovernmental organizations. The authors proposed an assessment method based on the dichotomy of non-malicious versus malicious intent. A more rigorous model of accountability and evaluation of policy networks will strengthen civil society control over policy networks and balance the governance of European security.

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Section Three

COSMOS AND HISTORY

Sergei Vsekhsvyatskii's Studies on Philosophical Issues of Cosmology and Cosmogony

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*This paper analyses the methodological ideas of Sergei Vsekhsvyatskii's Studies on Philosophical
Issues of Cosmology and Cosmogony. The article examines the background and history of the
development of astronomy and cosmology in Ukraine and its gradual transition from a descriptive
method to mathematical analysis. The authors have studied the influence of Ukrainian scholars
and philosophers on studies in cosmology, astronomy, philosophical issues in cosmology, and
computational cosmology. The philosophical understanding of cosmology and cosmogony is always*

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a search for alternative views on generally accepted ideas, not intending to deny the merits of other sciences but to critically analyse the conclusions of the natural sciences, made based on empirical data and mathematical calculations. The contribution to global knowledge by Ukrainian astronomers, astrophysicists, cosmologists, and other scientists who work on questions about the Universe has been studied. It is indicated in which modern research areas the main contributions were made (dark matter; dark energy; gravitational lensing). These contemporary problems of cosmology go beyond the usual field of understanding of the natural sciences, which actualises the possibility of an interdisciplinary dialogue between physicists and philosophers on the problems of cosmology and cosmogony. Using the example of Sergei Vsekhsvyatskii's works, the authors showed how philosophical analysis can reveal the weaknesses of the methodology and ask key questions to understand the essence of the processes of space. In the 1960s, he investigated the density of space objects to find new ways to solve the cosmogonic processes of the past. However, even today, the density of the Universe raises major questions. Even though science has made a huge leap in half a century, the essence of scientific and philosophical search remains the same.

Keywords: Sergei Vsekhsvyatskii, cosmogony of the solar system, philosophical issues of cosmogony, history of cosmology, philosophy of cosmology

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Introduction

The history of philosophical cosmology in Ukraine is closely connected with the history of astronomy and physics. Since astronomical observations are among the oldest in the history of science in the territory of modern Ukraine, the facts from observation of celestial bodies have been known since prehistoric times. The inquisitive human mind seeks to answer eternal questions about the structure of the cosmos. In the Middle Ages and modern times, many unique Ukrainian scholars were interested in natural philosophy and cosmology. They wanted to understand the rules and laws of the Universe, for, throughout its long history, humanity developed naïve experiments of observation and natural-philosophical speculation in complex methodological sciences. The history of modern cosmology in Ukraine is determined by a constellation of outstanding physicists, mathematicians, and philosophers who, in an interdisciplinary dialogue, often use methods and theories of other sciences.

This study aims to describe mathematical and computational cosmology in Ukraine in its historical development to indicate the theoretical basis for the emergence of this science and its philosophical understanding. The importance of this research allows not only cosmologists and philosophers but also historians of science to reconsider the contribution of Ukrainian researchers to the development of science, regardless of historical realities. With growing interdisciplinary research, this topic will expand our understanding of the philosophy of science. The conclusions we reached in this article allow us to assert the independent achievements of Ukrainian science, not only in the field of mathematical and computational cosmology, but also in philosophical cosmology as a whole.

Sources and Cultural Background

The history of astronomical observations and cosmological ideas in Ukraine is an interesting topic. Researchers of the leading astronomical observatory of the National Academy of Sciences of Ukraine, Iryna Vavilova and Tetyana Artemenko, in the article “The oldest evidence of astronomical observations in the territory of Ukraine,” described some archaeological finds

made on the territory of modern Ukraine. They believe that this is evidence of the interest of our ancestors in astronomy. These findings are dated from the Upper and Middle Paleolithic (100–12,000 years BCE) (Petruk, 2014). The emergence of rational astronomical knowledge and the creation of a system of cosmological notions about the starry sky are the consequences of centuries of practical activity of our ancestors. Interest in astronomical phenomena in the territory of Ukraine was manifested in everyday life. For example, in the Middle Ages, ceilings in buildings were often decorated with starry sky images. In Ukrainian ritual songs, the cosmic act of creation sometimes appears as the process of building a church, and the Universe, space like a temple. The worldview of the Slavs was profoundly religious and was defined by Greek Orthodoxy. One of the first Christian descriptions of the world belongs to Cosmas Indicopleustes (Κοσμάς Ἰνδικοπλεῦστης). In his book *Christian Topography*, he reinforced the idea of a flat Earth. The cosmos was divine, inhabited by angels, and therefore had a meaning hidden from humans. Only an inquisitive mind could unravel it.

In the second half of the 15th century, Kyiv became a scientific centre, producing many translated works on astronomy, medicine, physics, and logic. One of the first to disseminate humanistic ideas in Ukraine was Yurii Drohobych or Yurii Kotermak (1450–1494). Exploring the cosmos, he wrote the first book published by a Ukrainian, and this book was about astronomy. Professor and Rector of Kyiv-Mohyla Academy Innokenty Gizel (1600–1683) taught students the geocentric model of the solar system as well as the heliocentric model, authored by Nicola Copernicus. In the 18th century, one of the earliest books on astronomy was published in Kyiv, Ukraine. Written in Latin and titled *Theses of General Philosophy*, it contained studies in honour of Ivan Mazepa (1639–1709). It was written by Ukrainian philosophers, theologian Theophanes Prokopovich (1675–1736), and his disciples (Petruk, 2014).

Astronomical research in Ukraine began in the 18th century. It is known that the first observatory on the territory of modern Ukraine opened in Lviv in 1771. After some years, other observatories were opened in Kyiv, Kharkiv, Odesa. In 1845, the astronomical observatory of Kyiv University was opened in Kyiv; the first director was Vasyl Fedorovich Fedorov. The observatory of the Lviv Polytechnic Institute was opened at the end of the 19th century, during the Austro-Hungarian Empire, officially called in German *Observatorium der k.k. Technischen Hochschule in Lemberg*. In 1944, at the time of the Soviet Union in Kyiv, the principal astronomical observatory of the National Academy of Sciences of Ukraine opened, after construction was initiated by Alexander Orlov. Listed discovery dates and cities indicate the constancy of interest in astronomical science. Interest in space exploration has been strengthened by a common interest among scientists in the natural sciences. In Ukrainian, the concept of “space” comes from the Greek word “κόσμος,” which means both “world” and “Universe.” The etymology of the word enables us to understand this concept in Ukrainian philosophy and science. Whereas in English-language philosophy, space is viewed as an empty opportunity, as a length, as a container of objects, for Ukrainian-language philosophy, the cosmos is understood as harmonious, endowed with meaning and unity.

Modern cosmology is a physical science based on the general theory of relativity, astrophysics, elementary particle physics, fields and fundamental interactions. The task of modern cosmology is to explain all the information about the Universe. If this problem belonged to natural philosophy in the past, today cosmology is trying to describe the evolution of space from the Big Bang to the present state. An essential task of philosophical cosmology is to demonstrate the possibility of contemporary philosophy interpreting physical answers to questions about the Universe. Physical cosmology is currently interested in the topic of

cosmological models of a homogeneous isotropic Universe, dark matter and dark energy, relic radiation and models of the early Universe, and the structure of the Universe and its elements. Students traditionally study topics such as the Einstein equation for a homogeneous isotropic Universe, the Friedman cosmological model, the cosmological constant, and the de Sitter model. In addition, they are studying alternatives to the Big Bang theory, indicating a retrospective review and the importance of alternative views. Alternatives to traditional theories do not indicate profanation, but the interdisciplinary nature of research.

Vira Sharomova published the book *Ukrainian Physicists and Astronomers* in 2007, in which she collected and systematised information about more than 500 Ukrainian physicists and 100 Ukrainian astronomers. Evaluating the contribution of Ukrainian scientists to world science, the author focuses on both Ukrainian researchers born in Ukraine and researchers of Ukrainian origin. In chronological order, the book presents the discoveries and inventions of Ukrainian scientists. This information can serve as a basis for analysis from a philosophical point of view, the contribution of physicists to physical and philosophical cosmology. A considerable contribution to Ukrainian astronomy was made by such scientists as Ivan Kortazzi (1837–1903), Boris Ostashchenko-Kudryavtsev (1877–1956), Leonid Semenov (1878–1965), Mykhailo Dichenko (1863–1932), Mykola Zimmerman (1890–1942), Hryhorii Levytskyi (1852–1917), Mykola Evdokimov (1868–1941), Pavlo Romanchuk (1921–2008) (Sharomova, 2007).

Ukrainian scientist and astronomer, Doctor of Physical and Mathematical Sciences, Pavlo Romanchuk, developed a method for predicting solar activity. Since 1967, he has been an associate professor in the department of experimental physics, and since 1972, he has been an associate professor in the department of astronomy and director of the astronomical observatory of Taras Shevchenko National University of Kyiv. The Ukrainian scientist researched the activity of the Sun; he developed a method for predicting the essential characteristics of solar activity. The research findings were used for the needs of basic science and the economy.

It is necessary to mention the current educational materials developed by Ukrainian scientists: Yurii Alexandrov, *Basics of relativistic cosmology* and Iryna Vavilova, *The Universe's large-scale structure*. In his book, Yurii Aleksandrov states: “In the last two decades, cosmology began to study processes of the early Universe – with such great values of energy, when it required the application of a theory that describes the Universe as a quantum object and, at the same time, a gravitating object. At the intersection of the cosmology of the early Universe and the physics of ultrahigh energies, we managed to approach the creation of a unified field theory.” (Alexandrov, 2001: 20).

Significant contribution in the field of astrophysics did Volodymyr Tsesevich (1907–1983), who studied variable stars for decades, Mikola Barabashov (1894–1971), Ukrainian astronomer, rector of the V. N. Karazin Kharkiv National University, and he made observations of the Moon and planets of the Solar System. In particular, he made a series of observations of Mars in various spectral ranges; based on the data, a map of the planet's surface was compiled, the albedo was calculated, the colour of various sections, the law of reflection and other observations. Together with the Kharkiv Observatory, he took part in processing data from the Luna-3 space program and became one of the authors and editors of the first Atlas of the Far Side of the Moon. “In the second half of the 1920s, the scientific interests of M. P. Barabashov completely focused on the study of physical conditions on the Moon and planets. He became convinced that the Moon and planets as bright objects are quite accessible for research with relatively modest observational means” (Shkuratov, 2008: 85).

The first professional Ukrainian astrophysicist was Alexander Kononovich (1850–1910), who worked as head of the department of astronomy and director of the observatory of Odesa State University. He introduced a course of astrophysics for students and acquired advanced instruments from Europe for the observatory. He studied binary stars, performed photometric studies of planets, the Sun and its activity, and the spots on the surface of the Sun, and devoted his dissertation to the problem of prominences. He graduated many scientists as astronomers, physicists, mathematicians, and cosmologists: Alexander Vasilyev (1868–1947) studied the rotation of Venus, Alexei Gansky (1870–1908) discovered the dependence of the shape of the solar corona on the number of spots, Artemii Orbinsky (1869–1928), and many others (Kolchinsky, 1977). The case of Alexander Kononovich was continued by Alexander Yakovlevich Orlov (1880–1954), who developed astronomy and cosmology. He, in turn, trained a whole generation of astronomers including computer observer, director of the Poltava Observatory, Zinaida Aksentieva (1900–1969), Ivan Dyukov (1888–1961), a researcher of celestial mechanics, Vencheslav Zhardetsky (1896–1962), a native of Odesa, and professor at Harvard University Dmitry Pyaskovsky (1891–1970). Alexander Orlov's interest in questions of the history of science found expression in teaching astronomy and researching the history of the Astronomical Observatory at the University of Kyiv.

Dmitry Pyaskovsky was the first to compile a comprehensive outline of the history of the Kyiv Observatory from its foundation until 1954. In 1834, Kyiv University was founded in Kyiv; it consisted of one faculty, philosophical, but with two departments: humanities and natural sciences (including astronomy). A year later, in 1835, the department of astronomy was founded, the activity of which is connected with the name of the scientist Vasyl Fedorov (1802–1855), professor and rector of the Imperial University of St. Volodymyr. From 1945 until his death, Ukrainian astrophysicist Alexander Bogorodsky (1907–1984) taught astronomy at Kyiv University. He wrote works in the field of the general theory of relativity, astrophysics, and the history of astronomy. The famous scientist Klim Churyumov (1937–2016), a specialist in comet astronomy, the discoverer of two comets, worked at the Kyiv Observatory. He was the corresponding member of the National Academy of Sciences of Ukraine, a full member of the New York Academy of Sciences, and director of the Kyiv Planetarium. One of the comets discovered by him (comet Churyumov-Gerasimenko) was visited by the space probe of the European Space Agency Rosetta. He received higher education at Kyiv University and worked at the Arsenal factory. In 1972, he defended his thesis *Research on the comets of Ikea-Seki (1967n), Honda (1968c), Tahoe-Sato-Kosaka (1969IX) and the new short-period comet Churyumov-Gerasimenko based on photographic observations*. In 1993, at the Space Research Institute of the Russian Academy of Sciences, he defended his doctoral dissertation on the topic of *Evolutionary physical processes in comets*. At the initiative of Klim Churyumov, one small planet was named after the famous Ukrainian philosopher Gregory Skovoroda (Melnik & Churyumova, 2012).

Klim Churyumov's students and colleagues continue his work. Doctor of Physical and Mathematical Sciences, Professor Valerii Zhdanov, wrote his dissertation *Research on the equations of motion in the relativistic dynamics of interacting particles* (1974), *Methods of approximation and qualitative analysis in relativistic dynamics* (1992), *Introduction to the relativistic theory of attraction* (2004). His research interests include relativistic astrophysics, relativistic astrometry, cosmology, the theory of relativity, and relativistic dynamics. He prepared specialised courses on the general theory of relativity, cosmology, and synergetics in astronomy at the physics department of the Taras Shevchenko National University of Kyiv. Doctor of Physical and Mathematical Sciences, Sergii Parnovskiy, Senior Researcher,

Professor, Taras Shevchenko National University of Kyiv, in 1981 he defended his thesis on *Investigation of solutions of gravitational equations with features on temporal hypersurfaces*. In 1993, he defended his doctoral thesis *The behaviour of space-time and non-gravitational fields near clock-like singularities* in the speciality “theoretical physics.” His scientific interests embraced the general theory of relativity, relativistic cosmology, astrophysics, and extragalactic astronomy. Ukrainian astrophysicist Bogdan Hnatyk is a doctor of physical and mathematical sciences, professor, director of the astronomical observatory of Taras Shevchenko National University of Kyiv (2001–2004). In 1983, he defended his thesis, *Physics of shock waves and regularities of their motion in the shells of stars*, and his 1997 doctoral thesis, *Non-stationary high-temperature processes and shock waves in space plasma*. Bogdan Hnatyk’s field of research is high-energy astrophysics, mechanisms for accelerating ultra-high-energy cosmic rays. He has developed hydrodynamic methods for modelling non-stationary high-temperature processes and dynamics of shock waves in space plasma.

The Ukrainian Astronomical Association (UAA) was founded on January 24, 1991, in Kyiv. In 1992, UAA was admitted to the European Astronomical Society, and since 1993, it has acted as the Ukrainian National Committee of the International Astronomical Union. Today, Ukraine continues to cooperate with foreign companies and research centres in the field of rocket science, the manufacture of spacecraft, and in 1997, by agreement with the US government and NASA, the first and so far the only astronaut of independent Ukraine, Leonid Kadeniuk (1951–2018), flew into space. Astronautics, astronomy, astrophysics, computational, and mathematical cosmology continues to interest Ukrainian scientists, calling for international and interdisciplinary cooperation.

At the end of the last century, revolutionary changes took place in astronomy, the result of which was the introduction to the widespread use of such concepts that until recently could have been considered not physical but metaphysical. It is difficult to imagine how non-baryonic “dark matter” and “dark energy,” about the nature of which so little is known, are possible. The name itself does not refer to their black colour, but to our ignorance. The Universe consists of types of matter that practically do not manifest themselves in any way, but for which there are indirect pieces of evidence. We know only a small part of the cosmological density. However, cosmology is now entering a new stage of development associated with close interaction with other branches of knowledge, requiring both high accuracies of observations and the accuracy of theoretical predictions, both the tools of the natural sciences and the ability to work with the paradoxical knowledge of the humanities. It is worth recalling the classic example with the complementarity principle proposed by Danish physicist Niels Bohr and his interpretation of quantum mechanics. It is known that, for a complete description of quantum mechanical objects, two mutually exclusive or complementary classes of concepts are needed, each of which is applicable in special conditions. Their combination is necessary to reproduce the integrity of these objects. The physical meaning of the principle of complementarity is that quantum theory is associated with recognising the limitations of classical physical concepts in relation to atomic and subatomic phenomena. Dark energy (DE) is usually called the reason for accelerated cosmological expansion. The DE mass density is more than 70% of the average mass density of the Universe.

According to modern concepts, DE is evenly distributed in the Universe. From the data on the chemical composition of the Universe, it was found that baryonic matter can be no more than 5% of the total cosmological density. The remaining 25% is unknown non-baryonic invisible dark matter (TM); it does not react with ordinary matter, which makes it elusive. The spatial distribution of dark matter (DM) is concentrated in the vicinity of the galaxies and

their clusters. At the beginning of the 21st century, an international programme was carried out in which the Special Astrophysical Observatory in Russia took part, along with the Max Planck Institute, Germany; Hubble Space Telescope Institute, USA; and Astronomical Observatory of the Taras Shevchenko National University of Kyiv, Ukraine. As a result of this cooperation, a thorough analysis of previous observations was carried out, 97% of the entire sky was examined, and a detailed three-dimensional picture of the distribution of local galaxies was built for the first time. Measuring the velocities and distances to galaxies made it possible to determine the content of dark matter in groups of neighbouring galaxies (175 years of the Astronomical Observatory of Kyiv University, 2020).

Cosmologists around the world face the daunting task of trying to uncover mystery and predict the evolution of the Universe from early times to the emergence of galaxies. This is a difficult task for mathematicians since we are discussing calculating the trajectories of billions of interacting DM “particles” together with the distribution of gaseous baryonic matter. This problem is complicated because DM practically does not interact with ordinary baryonic matter and it can be registered only, as stated above, by indirect signs—gravitational action. The force of gravity in DM clots is so great that it affects the movement of stars and entire galaxies, and scientists are already able to track the movement of such large objects through the effects of the gravitational deflection of light. This new direction in astrophysics has received the name gravitational lensing since the essence of the phenomenon is that the action of the gravitational field resembles the action of a conventional optical lens, but only with a very large focal length. The gravitational field, like a lens, deflects light from its path, which allows an observer on Earth to see this distortion. Because astronomical scales are huge, gravitational lenses can amplify the light of distant objects several times, and today, this is one of the most promising methods for studying the spatial distribution of mass in space. Even if TM is invisible, it creates a gravitational field that distorts the image of distant objects and, therefore, in some way, becomes visible. After all, what is essentially vision, is a feeling that also receives information about the external world indirectly through the reflection of light from external bodies. We assert the visibility of an object based on receiving a light signal, while the object itself remains incomprehensible to us. Likewise, when we receive information about TM, we analyse light, not reflected, but distorted, which is not very different. The contribution of Ukrainian astronomers to the development of research methods for gravitational lensing is significant. The world’s first monograph on this effect was published by scientists from Kharkiv Pavlo Blioh, Anatolii Minakov. *Gravitational lenses* (1989), theoretical models, and their interpretations were created, which significantly improve the accuracy of the light curves in gravitational lenses (Zhdanov, 2008).

Philosophical Issues on Cosmogony of Solar Systems

Scientific progress does not stand still. This is a well-known fact, but whether this process is a process of neglecting previous achievements is a key question in the philosophy of natural science. The natural sciences are characterised by emergent leaps in the process of obtaining new empirical knowledge, based on which, new theories are built. Thus, the history of science becomes a complementary analysis of the achievements of previous generations of scientists. However, if we approach the study of the heritage of the natural sciences from the point of view of philosophy, then each era acquires a unique, independent meaning, and each research acquires an end in itself, like an artefact of the past. Just as the philosophy of science studies the ideas of the representatives of natural philosophy of the 18th and 19th centuries, such practices are possible and necessary in the 20th century. The legacy of the

past carries with it a unique meaning that is relevant to the present. Nataliia Yarmolitska and Katherine Gan, in their article 'Odesa's research school in Ukrainian philosophy of the Soviet period: historiography and future perspectives' (2020), agree with such ideas: "Studies of the philosophical heritage of the Soviet era, determining its impact on modern domestic cultural practices, are becoming increasingly important. Systematic study and holistic theoretical reconstruction of the scientific view of functioning in the system of science and education of philosophical research of the Soviet period, due to the need to develop new ideological and theoretical foundations for the development of philosophical knowledge, increase the professional level and practical significance of scientific research" (Yarmolitska & Gan, 2020, p. 109)

In Moscow, the famous astronomer Sergei Konstantinovich Vsekhsvyatskii was born on June 7, 1905. In 1925, he graduated from Moscow University and worked for the next ten years at the Astrophysical Institute. From 1935 to 1939, he was an employee and deputy director of the famous Pulkovo Observatory. In 1939, he moved to Kyiv, where until 1981, he worked as a professor, head of the Department of Astronomy at Kyiv University.

He studied the physics of comets, the Sun, and solar activity and was interested in the problems of cosmology and cosmogony. He wrote the book *Physical Characteristics of Comets* (Vsekhsvyatskii, 1958), examined the history of observing comets, mathematically calculated their orbits, and presented the results in the world's first catalogue of the absolute magnitude of comets. In 1932, on a new basis, he developed the hypothesis of J. L. Lagrange about the ejections of comets from the surface of planets and their satellites. In a number of works, he pointed to the influence of planets in the development of solar activity. He was one of the first to suggest the existence of a ring around Jupiter, which was later discovered by the American spacecraft Voyager 1 (1979). He also wrote the book *The Nature and Origin of Comets and Meteoric Substances* (Vsekhsvyatskii, 1967) and co-authored the collective book *Problems of Modern Cosmogony* (Ambartsumyan et al., 1969).

In 1964, in the first issue of the interdepartmental scientific journal "Philosophical Problems of Contemporary Natural Science," published in the Kyiv Order of Lenin State University, named after T. G. Shevchenko, the article 'Philosophical problems of the modern cosmogony of the solar system' was published. This collection contains articles that are original research. In several articles, methodological issues related to natural science, in general, are developed. It was characteristic of Soviet science to seek the interconnection of the most important categories of dialectics in the process of studying natural phenomena and the development of the natural sciences. The aim was to express some questions of the Marxist-Leninist theory in matrix form and to analyse the epistemological principles of planning the development of natural sciences. During the period of Marxism–Leninism, scientists paid great attention to the philosophical and sociological issues of natural science. All this is because K. Marx, F. Engels, and V. I. Lenin, in many of their works, emphasised the importance of this idea; they were convinced that scientific philosophy helps to solve the most important methodological and theoretical problems of natural science. It makes it possible to consistently explain all the achievements of the natural sciences and refute the antiscientific metaphysical and idealistic interpretation of these achievements. Obviously, under the conditions of the dominance of the materialist worldview, there could be no talk of any idealistic concepts.

In his article, Sergei Vsekhsvyatskii claims that the ideas of the first cosmogonic theories were important for Marxists. He compliments F. Engels and his attitude to the nebular hypothesis. Philosophers I. Kant and P. Laplace assumed that the formation of the Sun and

planets is a long-term mechanical evolution that essentially excluded dialectics and did not provide for the implementation of dialectical contradictory paths of development. At one time, in science, the task arose to explain only the most general, well-known features of the formation of the solar system; cosmologists were interested in the size and nature of planetary orbits, the ratio of the masses of the Sun and planets, the distribution of the angular momentum, etc.

“The cosmogonic hypothesis was considered by the authors themselves only as a possible, but not obligatory explanation, as purely speculative knowledge, to a certain extent – a fantasy. In this regard, cosmogonic constructions differ in terms of methodology from other astronomical studies (...) In contrast to the much younger stellar cosmogony, even now the cosmogony of planets remains the cosmogony of the classical direction, the cosmogony of speculative hypotheses, mostly purely mechanistic. The methodology of classical cosmogony corresponded to the period of formation of mechanistic materialism and it turned out to be untenable in the face of many facts, later clarified by the astronomy of the solar system, in front of the dialectical essence of the processes of cosmic nature. Only with the emergence of dialectical materialism did it become possible to really penetrate the essence of the processes of development in the Cosmos” (Vsekhsvyatskii, 1964: 115–116).

The thinker intends to briefly characterise the general methodological features of the classical cosmogonies of Carl Friedrich Freiherr von Weizsäcker (1912–2007), Dirk ter Haar (1919–2002), Gerard Peter Kuiper (1905–1973), John Jamieson Carswell Smart (1920–2012) and Harlow Shapley (1885–1972).

He argues that all the theories that explain cosmogonic processes have one feature that can be noticed if you think about the problem philosophically:

“In all cases, instead of searching for and revealing the dialectical aspects of development, the processes of formation and evolution are considered from the standpoint of mechanism as the accumulation of unchanging elements, as a simple addition, excluding the dialectical laws of self-development as a result of the struggle of opposite tendencies. But it is precisely this dialectic of self-development that we observe in cosmic processes, where the struggle between attraction and repulsion is clearly manifested and, as a result, a change in qualitative states occurs (...) Only a mechanical perception of the cosmogonic problem – ‘antiphysicality’ – emphasises the discrepancy between classical cosmogony and real processes. It is with these main shortcomings of the methodology of cosmogonic research that the current stagnation in the study of the past and development processes in the solar system is associated” (Vsekhsvyatskii, 1964: 116–117).

Quite an original statement, which, however, requires philosophical reflection and mathematical justification.

Such attempts to rethink cosmological and cosmogonic research methodologies are not unique. Their number is large, but this does not diminish the importance of various methodologies. On the contrary, it indicates strong scientific interest. So, for example, in the article ‘The transcendental method and physical cosmology: an interdisciplinary approach in the research of Ukrainian and Anglo-American philosophers’ (Rudenko & Sobolievskiy,

2019), the question of the possibility of applying the transcendental methodology to cosmology was actualised:

“The philosophers of science have a desire to apply such a philosophical method to the natural sciences, and especially to cosmology. The fact is that space objects are not as they are observed from the Earth, but they represent peculiar phenomena of consciousness. The ‘transcendental shift’ changed the interest from empirical research to transcendental research, which in turn does not diminish the importance of empirical sciences, but complements the understanding of the results of their research” (Rudenko & Sobolievskiy, 2019: 160).

According to Sergei Vsekhsvyatskii, classical cosmogonies are not able to explain important features of the solar system, particularly the distribution of the density of planetary matter depending on the Sun and geology of the planets. Cosmologists do not use, according to the thinker, the basic principles of the methodology of cosmogonic studies of stars and galaxies, namely, to study not the general but the singular in the phenomena. The point is to pay attention to the rapid transition processes from quantity to quality, which is precisely the essence of the dialectical process. These concepts are very different, but they coexist with one another. This situation is more characteristic of philosophy, as, for example, the researcher Vadym Tytarenko aptly said about German idealism: “The difference in research positions does not allow reducing or ‘sublating’ (Hegelian term) the theoretical achievements of one thinker by the positions and achievements of another, as it has been deliberately done, for example, in Soviet Marxism” (Tytarenko, 2019: 186). Paying attention to dialectical processes, the author nevertheless does not delve into metaphysics; on the contrary, his views are purely materialistic. A philosophical understanding of the problems of natural science can be based on materialism. Although Marxism is rooted in the religious philosophy of German idealism, it can give a result comparable to the results of research in modern natural sciences, avoiding supernatural concepts. Researcher Liubov Sobolievskaya rightly argues about the paradigm shift: this is the “reason for penetrating the secrets of nature, which became not the scene of the Biblical story, but the workshop of the scientist” (Sobolievskiy & Sobolievskaya, 2021: 173).

In terms of the relevance of the astronomical knowledge of Sergei Vsekhsvyatskii today, it is clearly inferior to modern knowledge. Not surprisingly, science has made a big leap in almost 60 years. For example, the author raises the topic of volcanic activity on the planets of the solar system, which corresponds to scientists’ ideas of the 1960s. Today, we know that volcanic processes on the Moon are long past, as evidenced by basalt rocks. As for Venus, there is much indirect evidence of volcanic activity, as evidenced by surface radar data. The most interesting evidence for extraterrestrial volcanism comes from Jupiter’s Moon Io. The volcanic activity of the planets, according to the author, should have depended on the primary mass of the planets. He suggested that the emissions of light substances increased the density of the planets, and the closer the planet is to the Sun, the faster this process should have progressed.

“This should explain the modern density distribution for planets and high densities for Earth-type planets (Mercury-5.6–6.1; Venus-5.2; Earth-5.5; Mars-4.1; Moon-3.3)” (Vsekhsvyatskii, 1964: 125). Based on these data, the scientist assumes that the original planets of different masses and sizes had almost the same average density as primary stellar matter. In this scenario, the rate of further evolution and loss of matter should have

been inversely proportional to the degree of mass. Assuming the initial average density of protoplanets is the same, the scientist represents the distribution of the generalising density by Roche's expression:

$$\varrho = \varrho_0 \left[1 - \xi \left(\frac{r}{r_1} \right)^\lambda \right],$$

Where ξ and λ are the parameters of the planets, and r_1 is the primary radius of the protoplanet. With a value of $\xi = 0.96$, according to the scientist, this expression may well satisfy the data (mass, radius, density) for Jupiter; the value $\xi = 0.76$ at $\lambda = 2$ corresponds well to the conditions of Earth (Vsekhsyatskii, 1964: 125–126). If the protoplanets had the same mass order as the initial configuration set, the central densities should have been close.

He believes that the present conditions of Earth reflect its protoplanetary state, and that the central density is preserved, just as you can check these conditions for other large planets. It should be said that Sergei Vsekhsyatskii uses the term “protoplanet” in a different sense than Gerard Kuiper or other supporters of the nebular theory. In the understanding of the Soviet scientist, a “protoplanet” is a body that was formed from stellar matter and went through a stage of chemical transformations.

According to this equation:

$$\mathfrak{M} = 4\pi\varrho_0 \int_0^{r_1} \left[1 - \xi \left(\frac{r}{r_1} \right)^\lambda \right] r^2 dr = 4\pi\varrho_0 r_1^3 \left(\frac{\lambda}{3} - \xi \frac{1}{\lambda + 3} \right),$$

“We have configurations for $\xi = 0.96$ and $\xi = 0.80$, with value λ , variable from 0 to 5. In this case, ϱ_0 is taken equal to 12.2, as for the Earth. Planetary data show that Mercury, Mars, Venus, Earth fit the curve very well at $\xi = 0.80$ ” (Vsekhsyatskii, 1964: 126). Nevertheless, the author does not strive to create a model of the planets or to find out the peculiarities of their evolution; he is trying to prove the same density of “protoplanets” for his cosmogonic studies.

Discussion and Conclusions

The purpose of this article is not to provide a detailed and precise historical analysis of astronomical research in Ukraine. It aims to demonstrate the deep integration of natural science in Ukraine and the legacy of computational and mathematical cosmology in a review of astrophysical research by Ukrainian scientists. On the other hand, cosmology, as a natural science, originated from philosophy, and in cosmology, in addition to mathematical methods, philosophical methods can also be present. Modern philosophy and natural sciences in Ukraine have an interest in interdisciplinary research. “The cooperation between physicists, mathematicians and philosophers in order to identify and explore fundamental issues in cosmology (in the framework of the philosophy of cosmology) resulted in the image of the Universe evolution model” (Bazaluk, 2021). Ludwig von Struve agrees with this thesis, once eccentrically speaking about the connection between cosmology and philosophy: “great philosophical interest. I believe that science has reached the point where it is necessary to take into account the actions of intelligent beings, in addition to the classical laws of physics (Sullivan, 1994). Exploring outer space raises the question about the appropriateness of the

Universe: Are humans the only intelligent species in the Universe? Astronomers seek the answer to this question, as well as physicists and philosophers. However, within the framework of this interdisciplinary study, future research could focus on answering the question about the contribution of Ukrainian scientists to world science against the background of violent and political events.

The article by the Soviet cosmologist argues that in cosmology, there is an unsatisfactory situation in the field of planetary cosmogony. This is primarily due to the application of the classical methodology of the speculative mechanistic hypothesis at that time. According to scientists, this hypothesis cannot reflect the dialectical process of self-development of cosmic bodies. After analysing the article by Sergei Vsekhsvyatskii, we can draw conclusions about his philosophical views on cosmology and cosmogony. He is convinced that contemporary cosmogonic theories are untenable from the point of view of methodology. To demonstrate the inconsistency of this mechanism, which was considered a passed stage in the middle of the 20th century, as a worldview for explaining cosmogonic processes, in his opinion, natural science has stepped forward in the study of the physics of planets and stars; an unprecedented amount of empirical data about space has been obtained, but at the same time, it has weakened its methodological apparatus. If we analyse his views as philosophical, then it becomes obvious that natural science, which is built on natural philosophy in attempts to transform its knowledge into scientific, has lost an important component of a philosophical view of reality, namely critical analysis and the production of alternative opinions. For example, based on the astronomical data of small bodies, a scientist calculated the amount of matter lost by the planets during their evolution. These calculations are important for the cosmologist since mathematics is the scientific community's fundamental science with the true one. In addition, by citing new data, the scientist tries to substantiate the starting points for judging the past of the planets and the planetary system.

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Truth and Falsity: Whether they Overlap or Possess Distinct Borders

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The boundaries between truth and falsity are being assessed in the context of Plato's theory of recollection. The nature of knowledge is seen as quite elusive, and this is why it evokes a need for questioning the notion of truth. Most important theories of truth are analyzed and taken to consideration in order to assess the boundaries of truth and falsity. The question of truth and falsity is being discussed in the context of broader topic of perception of the Universe. This is why the place of language and sensations is analyzed in the frame of cognizance. Theories of modern and post-modern thinkers are seen as a continuation of some statements made by Plato. Some approaches to cognizance of the Universe are evaluated in the diachronic aspect in order to develop a suitable theory of boundaries between truth and falsity. Approaches to paradoxes related to knowledge and deception are assessed in order to specify the distinction between truth and falsity. Machine assistance in the process of decision making is analyzed.

Keywords: truth, knowledge, cognizance, reminiscence, deception

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1. Introduction. Universe and Paradox

This is the third article in the series of essays aimed at interpreting Plato's dialogues "Cratylus," "Meno," and "Alcibiades-1" in terms of language learning (versus acquisition), the nature of knowledge (versus cognizance), and, finally, or thirdly, on the borders of truth and falsity. The first article in the series discussed primarily the problem of language acquisition in comparison to language learning. As a result, it has been defined that Plato's theory of reminiscence appeared to be significantly profound in terms of modern theories of language (Sodomora & Yerchenko, 2021) despite the fact that the theory of reminiscence itself at the first glimpse seems to be pretty vague to some extent, as well as it can be neither proved nor supported by any experiment. Furthermore, this theory, as a continuation to the aforementioned problem discussed in the article, can be extrapolated to the question on the nature of knowledge, e.g., when we know something but are not quite sure whether the known fact is true or false, since belief can be false as well, as it was shown in the second article (Sodomora & Yahelo, 2021). These statements settle the third question, which consequently is being assessed in this article, namely the question on truth and falsity, as well as on the borders between these two opposites, since they are believed to be such.

These questions have been asked since time began, insofar as the answers to who we are and where we are going are still pending. This article, being far from providing sufficient answers to these eternal questions, is aimed, taking into account Plato's theory of reminiscence, to shed some light on clarification of the boundaries between truth and falsity we deal with in our daily life. Quite possibly, there is always some paradox being relied upon, at least implicitly, as we form conclusions, which makes the latter to some extent illogical. This is why, as it was said in the two previous articles on the basis of language and knowledge, consideration of borders between truth and falsity might require discussing several paradoxes. Since the nature of knowledge appears to be quite elusive, this provides us with the need for questioning the notion of truth. Consequently, if truth's being truth is to depend on the total absence of falsity, their borders are to be taken as clearly distinct. However, this requires more precise insight into broader problems, linked to the issue.

The problem of perception of the Universe is being discussed widely by scholars (Bazaluk, 2021), but apparently there is a distinction between so-called "our Universe," or the one we observe, and the one which is outside of us. Again, while assessing the correctness of names as images of things, Plato in the "Cratylus" (432c) asserts that an image cannot represent a thing in its full perfectness, as well as in the opposite case, as he says, there would be "two Cratyluses" instead of the only one. The assertion concludes that correctness does not presuppose identical likeness of a thing and an image. Plato continues as it follows: "Do you not perceive how far images are from possessing the same qualities as the originals which they imitate?" (Plato, *Cratylus* 432d). Presumably, this is what much later Immanuel Kant meant by distinguishing between noumena and phenomena, and this is why he claimed that cognizance of a thing was impossible, but this topic is to be discussed elsewhere.

This is how the third question, of truth and falsity, can be settled on the basis of the two previous discussions, which analyzed the paradoxical nature of language and knowledge. In fact, basic principles of cognizance of the Universe due to their elusiveness cannot steer clear of paradoxes. It was shown that a series of aporia developed by Zeno puzzled not only Aristotle, but all upcoming generations of thinkers and contributed significantly to the development of a variety of theories and approaches to different issues. The further development of the problem of knowledge to some extent involves so-called "twofold ignorance", which questions what exactly can be called "knowledge," and what does not

belong to it by definition. However, despite this fact, it leads to a positive result. This question was discussed in the aforementioned articles and it seems logical to continue the topic with a discussion of truth and falsity as well as assessing their boundaries.

2. Truth and Knowledge

One fundamental problem linked to the process of learning is truth. Language, being a means of cognizance of the Universe, resembles the progress from less to more perfect, although Zeno's paradoxes reveal to us the paradoxical nature of language and point at inherent inconsistencies in the process of understanding of reality. It is highly arguable that the phenomenon of language possesses clear and explainable nature, since it seems not to be unambiguously explained by behavioristic theories (Skinner, 1992). The standard epistemological objection to it is that it possesses to some extent paradoxical nature we are unable to explain by any of methods available (Chomsky, 2002). As a result, this view adds significantly to the development and improvement of newer approaches to the process of learning in general and obtaining reliable knowledge in particular, and epistemologists have been working for a quite long time towards what they hope is going to be a non-skeptical conception of knowledge (Lehrer, 1965), but this approach is to be addressed later.

There is no proof that gives us the right to assert that we possess any reliable knowledge, and this is why aiming at investigating the notion and foundation of the concept of knowledge is directed at clarifying what exactly the knowledge consists of. First, according to Plato, it is impossible to learn anything if we lack knowledge about ourselves. In this article, an attempt has been made to assess the boundaries between truth and falsity in terms of their application to reality. Again, the reality can be seen differently, as it was shown in the previous article, and this is why the relation between truth and falsity is to be assessed more precisely.

In general, knowledge is usually identified as justified true belief, or JTB. This is what can be inferred from Plato's "Meno" as well as from other dialogues (Pritchard et al., 2018). As a rule, JTB is the departing point for scholars to start investigating the concept of knowledge, which was primarily initiated by Plato. The majority of modern theories differentiate between knowledge and belief (Unger, 1968: 157-170), and this is the riddle posed by Socrates at the end of his "Meno." As usually, Socrates provides a somewhat enigmatic and elusive distinction between knowledge and true belief, as well as Plato never provides the explicit answer in his dialogues. It is convenient for a distinction to be generalized into a more wide-ranging concept of truth in general.

It seems that the difficulty in defining the notion cannot be confined to Plato's theory exclusively, as well as it still remains problematic (Meadows, 2013: 221-240). The elusiveness of the definition of knowledge generates challenges to the philosophical tradition. This is why the definition of knowledge of a proposition as justified true belief in some contexts is not considered as a sufficient one. The problems arise in cases of either actual or possible situations in which someone has a belief that is both true and well supported by evidence. Still, as is believed by many epistemologists, it fails to be knowledge. The extensive debate was initiated with a single two-and-a-half-page article (Gettier, 1963). Gettier's article triggered a period of pronounced and renovated epistemological debates and innovations that, to some extent, can be applied to the definition of truth.

As a rule, while talking of knowledge in general, the majority of epistemologists are referring to propositional knowledge (Ichikawa, 2018), which is knowledge of a truth or known fact, or knowledge of how the world is constructed in any respect, which is described by a given occurrence. Following the words of Plato, if we do not fully understand ourselves,

we will not be able to fully understand what it is either. That is a possibility, as philosophers have long realized, and these in their own way were settled by Plato, not solved though. In case if JTB is false as it has been shown by the riddle, it is evident that it should be replaced with something newer. Unfortunately, Gettier himself made no suggestions about any replacement, which resembles Plato's style of dialogues. But philosophy always settles questions, while other sciences aim to look for answers (Deely, 2001: 238). There has been an attempt to provide answers for defining boundaries between truth and falsity by machine assistance, which is to be discussed in the last chapter of the article.

As well as it can be seen, JTB form of analysis of knowledge presupposes three individually necessary and sufficient conditions for certain knowledge. For instance, to obtain knowledge that you are a living being, three prerequisites are required, namely: 1) you have to believe in this; 2) the belief is supposed to be true; 3) it is supposed to be based on good or sufficient evidence. The biggest problem, as it can be inferred from previous articles in this series, can be encountered in the last statement, since Zeno would not consider experience-based evidence of Achilles being faster than the tortoise as a valid rejection to his aporia. Consequently, this way of thinking questions the truth of the primary proposition.

There are other weak sides of JTB analysis as well which are disclosed by Gettier's paradox. Imagine that someone, who is looking at the farm, sees something that seems to be a horse. Consequently, the only belief which instantly occurs to someone, who is looking at the farm, is that there is a horse at the farm. Coincidentally, he is right, because there is a horse in the far end of the field behind the hill, but it cannot be seen, and the only animal, which can be seen, is a bull that looks like a horse. There is no direct evidence of presence of the horse in this very field, although the statement has been made correctly, and belief is true and justified, since someone, who is looking at the farm, trusts his eyes. However, such JTB cannot be considered valid knowledge (Hetherington, 2001). With this quite simplified example, it would be interesting to consider what astronomers are able to see while looking into the telescope. Their beliefs, while being true, are supposed to be supported by something else in order to become valid knowledge.

On the other hand, experiments, which are aimed at proving similar beliefs as well as at avoiding justifications that are present within each and every case to be false, can go wrong due to infinite series of unpredictable circumstances and hindrances. As a result, it can be inferred from this that the justification indicates only the fact that the belief is true to some extent, but it does not prove conclusively that it is true absolutely. This is how justification still stays open at least the possibility that the belief is false. This is what Plato speaks about in his "Meno," providing us with an example of Dedalus' effigies (*Meno* 97e). Plato questions whether such knowledge possesses the required validity to be compared to the higher type in order to be called valid knowledge.

On the other hand, such cases can contain a good portion of luck which makes it impossible to prove that they cannot be called knowledge. In fact, this is the most distinctive of Gettier cases. Consider, for example, the case with Columbus' enterprise. Despite the fact that he was ignorant of the existence of two Americas, he was to some extent knowledgeable of the spherical shape of the Earth. However, not only this: he appeared to be extremely lucky to complete his four round-trips. Consequently, despite of Columbus' ignorance, the outcome was immense and it is highly questionable whether the falsity his ignorance comprised can be equated to the falsity of flat shape of Earth or not. It can be concluded that there exists certain degree of falsity, which contributes to falsity's being either less false, or more inclined to truth. It appears that when certain abnormal or favorable circumstance is present in this or that case, this circumstance can make quite fortuitous the existence of justified and true

belief despite the fact that it is not supported by strong evidence. This, in its own turn, blurs the boundaries between the two opposites, i.e., truth and falsity.

3. Truth by the Means of Language

Since we communicate mostly via the means of language, the relation between truth and meaning is to be assessed as the place where truth and language relate closely. Insofar as the theory of meaning is notoriously broad (Higginbotham, 1989: 153-174), some scholars use the theory of truth as part of the theory of meaning (Glanzberg, 2013). The first sort of theory of meaning, or semantic theory, is a theory that assigns semantic contents to expressions of a language. The second sort of theory of meaning, a foundational theory, is a theory which states the facts in virtue of which expressions have the semantic contents that they have (Speaks, 2021). Some expressions might be context-sensitive or indexical. Within a propositional semantics, we can say that certain expressions possess different contents relative to distinct contexts. However, the phenomenon of context-sensitivity is one that any semantic theory recognizes. This is why many philosophers and linguists think that one or more of these categories of expressions are indexicals (Johnston, 1988: 28-42). As it can be observed, virtually every natural language expression is context-sensitive, which gives a good soil for deception.

This is why any theory of truth conditions can be applied to the theory of meaning. This category of research is pretty broad and there are different approaches to it. It would be expedient to look at what Plato says in this context in “Cratylus” (436 b): “Do you not see that he who in his inquiry after things follows names and examines into the meaning of each one runs great risks of being deceived?” More than twenty centuries later, L. Wittgenstein expressed the idea that humans do not communicate via words, but via images (Sutton, 2015: 409-443). This view was widely accepted and lively discussed in broad academic circles and contributed significantly to the development of science. Not actually being a follower of Plato, Wittgenstein initiated the process of studying language through the perspective of other disciplines (Kripke, 1982), and this subject was discussed earlier (Sodomora & Yerchenko, 2021). However, images can be distorted due to differences in perception, and this poses a significant threat to their truthfulness or correctness, as it is said in the aforementioned quotation of Plato’s “Cratylus.” Again, Bertrand Russel claimed that false propositions pose a problem, but he was far from the first one who pointed at this controversy. Consequently, there has been an extensive debate among epistemologists on the definition of truth (Glanzberg, 2021).

One of the most significant approaches to the definition of truth is so-called correspondence theory which is concerned with the relation between propositions and the world. It presupposes that a proposition is true when the world contains a fact that is structurally similar to the proposition (David, 2018). Again, this has not been noticed for the first time, since Aristotle had spoken about it a quite long time ago in his “*Metaphysics*” (Γ 7.27): “to say of what is that it is, or of what is not that it is not, is true” (Aristotle, 2009). The basic idea of correspondence was captured in this quotation, as some scholars suggest (Tarski, 1944: 341-375). This Aristotle’s saying was refined and clarified more extensively later, and correspondence relation is explicated as a representation relation, since a truth bearer is called true if it represents a fact (Ross, 1928). However, this theory only exacerbated further discussions on the subject, since there is an ambiguity on what can be called a fact. Reliance of truth on belief is a key point of Joachim’s theory, which claims that any belief is true if and only if it is part of a coherent system of beliefs (Joachim, 1906).

However, any system which seems to be coherent today, can be questioned some time later. More pragmatic point is expressed by Peirce, as well as he is usually understood as holding the view that truth is the end of inquiry, or truth is something which is satisfactory to believe (Glanzberg, 2021).

As it can be inferred, it is not entirely clear what scholars mean by suggested definitions, partially due to the complicity of the subject as well as due to its elusiveness. Probably due to this elusiveness Tarski's definition of "semantic conception of truth" (Tarski, 1944) lacks precise explanation, following to a certain degree Plato's approach. It is not entirely clear what exactly Tarski had in mind by defining this conception, but it can be assumed that Tarski's theory defines truth for sentences in terms of concepts like reference and satisfaction. They are intimately related to the basic semantic functions of names and predicates. Primarily, Tarski was concerned with so-called "liar paradox" (Beall & Glanzberg 2020) that it would make theories in languages containing a truth predicate inconsistent (Ray, 2018: 695-717). This was especially important to his own correspondence theory, but whether it provides any substantial philosophical account of truth at all or not, is still a matter of controversy.

The liar paradox, which is also called "Epimenides paradox," since Epimenides from Crete, according to tradition, is known for saying that all Cretans are liars, has created an enormous number of debates, discussions and articles since it was introduced. Some scholars argue that this paradox shows, among other issues, essential "incompleteness" of the world (Grim, 1991), at least to some, though uncertain, degree. Some assert that the paradox shows the importance of context in language (Glanzberg, 2018), and this assertion seems to resemble Aristotle's principle of noncontradiction. Nevertheless, what is the most intriguing; it is that liar paradox shows that the notion of truth is a vague notion (McGee, 1991). This can be taken as evidence (of which has been said earlier) that truth is far from being a fully objective matter. It is not independent of us, of our thoughts, or of context. It can be argued instead, that truth is rather constrained by our abilities to verify it. This is why it is constrained by our epistemic stance since it is to some degree an epistemic matter, and far from being an objective matter. This is why Tarski in previously cited work, expressed the opinion that the ordinary notion of truth is incoherent and far from being scientific.

Consequently, if images we communicate via can become distorted, if words do not represent the essence of things, if the truth is difficult to determine, it seems that falsity cannot be fleshed out in order to avoid being trapped by it. This is what so-called redundancy theory is concerned with. It holds that there is no property of truth at all, and appearances of the expression "true" in our sentences are redundant, which means they have no effect on what we express (Forbes, 1986: 27-54). This is why the truth, exactly as knowledge, is difficult to identify.

4. Conclusions: Boundaries Between Opposites

Since it is highly questionable if a proposition can be absolutely true, the question arises to what extent some propositions are true or false, as it has been shown in Columbus' example. This is why there has been a variety of attempts to solve the difficulties posed by the aforementioned series of paradoxes. One of them is so-called "infallibilist" approach, which claims that only fallible support can be provided for any belief. However, this is what Descartes wrote about in his "Meditations," i.e., overreliance on external senses, which can fail to provide us with reliable knowledge. This is why we rarely obtain infallible justificatory support for any belief, and this is why we are not infallible knowers of truth, and we are fallible instead, which means that we are not knowers at all. However, this reaction to

paradoxes is regarded as not appropriate one since epistemologists strive to understand how we obtain at least some knowledge.

Plato never provides clear answers to questions he settles, and he gives only cues “that guide rightly,” as Socrates says in “Meno” (99a), on what exactly true opinion and knowledge this case can be. As a result, ignorance (either simple or twofold) is a cause for mistakes, and wrong opinions or beliefs which turn to be a “twofold ignorance” cause false beliefs, as Socrates says in “Alcibiades” (118a), as it was discussed earlier (Sodomora & Yahelo, 2021). Still, the puzzle remains that, in spite of the fact that we might opine that each of us produces sentences which express true propositions, we clearly disagree with each other (Lasersohn, 2005: 643-686). What can be suggested here as an answer is a resemblance of St. Thomas’ “negative theology,” which claims that the only knowledge that can be obtained about God is “what he is not” (Deely, 2001: 290-297). It seems that these words can be applied to knowledge in general, although this view can be seen as rather skeptical.

Therefore, since the total absence of falsity is required for belief’s being knowledge, most beliefs can cease to be knowledge at all. On the other hand, so-called “negative” approach places us well too far from obtaining any sufficient answers. This is where some epistemologists suggest applying “no false evidence proposal” in order to develop a non-skeptical approach, as it has already been mentioned in another context (Lehrer, 1965: 168-75). According to the suggestion, the only thing which is required for belief to be knowledge is the absence of significant element of falsity only. It means that wrong beliefs that are being used as evidence in obtaining reliable knowledge are eliminable. This is why this kind of justification is adequate for belief’s being knowledge. Therefore, since false evidence sometimes plays a significant role in knowledge, such belief is far from being knowledge. This approach appears to be quite weak as well, since false evidence is to be eliminated to some unknown extent. Therefore, this still has yet to make significant inroads among scholars, and answers from epistemologists are still being awaited.

There were other approaches to the problem of identification of falsity and eliminating false evidences. Since the beginning of the Industrial Era, humanity’s overreliance on machines and computers has become expressively overwhelming. This is why there has been wide range of attempts to involve computers into the process of distinguishing of truth from falsity. However, they proved to be of little help, since, for example, lie-detection techniques developed in the 20th century are notoriously inaccurate. Partially it is so because there is a need to look for some answers behind the science. Scholars and scientists became excessively obsessed with computers and calculations, but identifying falsities appears to be more elusive and subtle to be performed by artificial intelligence, which is still far from being perfect. Neither computer, nor any other machine can identify elusive and blurred boundaries between truth and falsity.

According to statistics, commonly applied academic standards of scientific evidence are usually misleading and fail to meet necessary standards to be at least slightly above chance (McKelvey, 2021). It has been shown that humans are no better than chance at detecting deception (Mann et al., 2004: 137-149). And, as well as Plato’s theory of reminiscence can be proved neither by experience, nor by five basic senses, the boundaries between truth and falsity are elusive and cannot be distinctly set by any scientific method available today. It is difficult to do this, since being humans, we are highly biased.

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World Kaleidoscope

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The article focuses on the concept of synchronicity, which C.G. Jung developed in the late period of his creative work. Scrupulous attention is confined to the organic connection between the concept of synchronicity and the theory of archetypes. Since synchronicity is an acausal semantic coincidence of events, the article reveals the metaphysical meaning of such concepts as "coincidence," "concordance," and "correspondence." It is reasoned that synchronicity is a particularly strong case of coincidence; the decisive factor of synchronicity is the presence of a single meaning in events belonging to different causal chains. The connection between the concept of synchronicity and G.W. Leibniz's concept of world harmony is shown. Three hypotheses that complement each other are put forward to explain synchronicity: 1) synchronicity as a manifestation of the eventheme nature of events; 2) synchronicity as a manifestation of the hidden plotline of the Universe; 3) synchronicity and kaleidoscopcity. An eventheme is a kind of virtual cell filled with real events in history. If events that are similar in meaning and belong to different events occur with the same actors, then such events prove to be synchronic. If we use the metaphor "world is a literary text," widespread in culture, then synchronic coincidences prove to be a kind of author's signs scattered in this text. The image of a kaleidoscope is used to substantiate the hypothesis of world development as a change in holistic gestalts. In such a picture of the world, individual causal chains lose their relevance against the background of true causality, which is a change in holistic gestalt.

Keywords: C.G. Jung, G.W. Leibniz, synchronicity, coincidence, concordance, contingency, world harmony, gestalt

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“... a vague but delightful intuitive sense of the causeless locations and combinations of events...”
C.G. Jung, *Synchronicity: a causal unifying principle*

1. Introduction: a story about a one-horned ram

In the biography of Pericles, Plutarch describes an interesting, most likely legendary, but possibly a true-life episode. One day, they brought a skull of a one-horned ram to Pericles. Lampon, the soothsayer, who was present at the time, said that the skull signified the individual rule in Athens. Whoever kept that skull at home would be the political leader of Athens.

At this time, Anaxagoras was also a guest of Pericles. He asked for an ax and cut through the skull. Then he showed those who were present that the ram's brain was collected in the frontal part, which formed a horn-like outgrowth. And then everyone admired Anaxagoras' insight. Then, when Pericles ostracized his main political rival Thucydides, the son of Melesius, and secured almost autocratic power in Athens for the next fourteen years, everyone admired Lampon's perspicacity. (Plutarch, 2006: 215).

Most interesting is Plutarch's commentary on the conflict between philosophical (natural science, essentially) and prophetic explanation: “In my opinion, both the physicist and the soothsayer could achieve their goal; one clearly understood the cause, the other – the effect; one had to consider why and how it had been done; the other had to predict what this phenomenon meant and what it was intended for. Those who regard the discovery of a cause as the destruction of a sign do not understand that by this reasoning, together with divine signs, they destroy artificial signs, what the essence of the sound of disks is, the light of lighthouses, the shadow of a sun clock, each of which, for a known reason and by its constitution, serves as a sign of something.” (Plutarch, 2006: 215).

Modern science undoubtedly shares Anaxagoras' point of view. However, it does not accept Plutarch's worldview pluralism. We will try to revive this pluralism and show that the natural causality of a particular phenomenon does not at all exclude the possibility that this phenomenon is a sign of some deep essence or event.

2. The phenomenon of synchronicity

In the late period of his creative work, C.G. Jung became interested in the phenomenon of synchronicity. An extensive lecture (Jung, 1997: 180-194) and a far more extensive monograph (Jung, 1997: 194-307) are devoted to the analysis of this phenomenon. C. Jung distinguishes between synchronism and synchronicity. The main criterion for synchronicity is the simultaneous occurrence of two or more events, connected not causally, but within the meaning. It should not be confused with synchronism, which means the simple simultaneity of two or more events (Jung, 1997: 217-218). “Therefore, synchronicity means the simultaneous flow of a certain mental state containing one or several external events, which look like semantic analogs of the momentary subjective state ...” (Jung, 1997: 218).

C. Jung gives many examples of synchronicity, the most known of which are likely to be the case of the scarab and the case of the birds. In the first case, the patient tells Jung about her dream in which she is given a golden scarab. At this very moment, they hear a light knock at the window of the room. Jung opens the window and catches a common chafer, which is a close analogue of the scarab. It should be noted that the chafer striving to get into the poorly lit room is by no means a rare insect for Europe (Jung, 1997: 214). In the second case, the wife of a patient tells Jung that at the time of the death of her mother and grandmother many

birds gathered outside the window of their room. C. Jung discovers that the patient had heart disease symptoms and tells him to go to the cardiologist. On his way back home from the cardiologist, the patient loses consciousness and falls down. When he is brought home, his wife is in a state of anxiety as far as a flock of birds is landing on the roof of their house. Being in his own home, the patient dies. (Jung, 1997: 214-215).

Evidently, there are causal explanations in all these cases. Theoretically, it is possible to trace the causal chains that determine the patient's dream, the arrival of the scarab-like beetle, the death of the patient, and the arrival of the flock of birds. The coincidence of these events is unlikely and almost incredible.

According to C.G. Jung, synchronicity indicates the parallelism of time and sense between mental and psychophysical events. Some "meaningful coincidences" are so incredible that they cannot trace any mutual causal relationship between the parallel events in which these coincidences are manifested. Therefore, we have to recognize the commonality of sense as the only noticeable connection between them (Jung, 1997: 192). Jung's brief formulation of the essence of synchronicity is as follows: "The principle of synchronicity states that 'semantic coincidence' is caused by 'simultaneity' and 'sense'" (Jung 1997: 268). C. Jung believes that in addition to the causal relationship in nature, there is a certain factor of ordering events, and sense is this factor. For Jung, this is not an incredible hypothesis. He throws down a bold challenge to the stereotypes of modern rationalistic consciousness: "We must remember that the rationalist Western approach is not the only possible and all-encompassing one, but it is characterized by a bias that requires correction" (Jung 1997: 268).

C. Jung makes bold to question the effectiveness of one of the "idols" of modern natural science – the statistical approach. In his opinion, if the connection between cause and effect is only statistical, then the principle of causality presupposes the existence of several factors necessary for explanation. The connection between events under certain circumstances is different from the causal nature and requires a different principle of explanation. In the macrophysical world, we cannot imagine the existence between events to be different from a causal relationship. But this does not mean that events between which there is such a connection do not exist. (Jung 1997: 198).

According to C.G. Jung, the "inexplicability" of synchronic events "stems not from the fact that their cause is unknown, but from the fact that the mind simply cannot imagine such a cause" (Jung, 1997: 305). This reason is a semantic coincidence. In such coincidences, space and time lose their sense and become relative, and the causality associated with them becomes unthinkable. Synchronic phenomena presuppose randomness as "an eternally existing universal factor, and in part, as the sum of countless individual acts of creation taking place in time" (Jung, 1997: 305).

These propositions seem to us theoretically profound and methodologically productive. We will return to them in the final part of our work when considering one of the options for our explanation of the phenomenon of synchronicity.

One of the keywords for describing the phenomenon of synchronicity is the word "coincidence." The metaphysical meaning of this concept should be analyzed.

3. The metaphysical meaning of the concept of "coincidence"

If we consider the inner form of the word "coincide," we can realize that it means "to fall together and agree in position." But "to fall," in this respect, should be understood not as a movement downward in space. Here, "to fall" rather means "to fall out," i.e., to "coincide" is "to fall out together," "to happen", "to turn out."

But “to fall out” is a polysemantic word as, incidentally, almost all words of a natural language. On the one hand, “to fall out” is a synonym for “stand out for,” “differ from,” “be special in a number of similar ones.” “NN’s creativity falls out of the poetics of symbolism.” “The point of view of NN falls out of classical rationalism,” etc. The second basic meaning of the word “fall out” is “to happen,” “to occur regardless of the will of the subject.” However, these connotations should be distinguished. “To fall out” is “to come about by chance”; “to take place independently of the will of the subject” does not have to happen by chance (although this can also occur). Here, one can be aware of the sense of objectivity, implacability, and, partly, undesirability. “it fell out that he had such destiny,” “it fell out that he got into all troubles.” It is doubtful whether it is possible to say: “it fell out that he had a good luck” – although if you use the seme of contingency, then you can express your idea in this manner. It would seem that destiny and contingency are incompatible. But this is not true. There can be no contingencies in an already realized, predetermined, present destiny. But let us consider the following picture of the world: initially, a subject can choose destiny (for example, as in the vision of Er in Plato’s “*Res publica*”). There is another option: initially, destiny falls out like a lot, but after it has fallen out, it becomes given once and forever, irrevocable.

We can see that the meaning of contingency is strongest in the semantic field of the word “fall out.” That is, ultimately, “to fall out” means “to happen by chance.” Thus, the world in which events, fates, destinies, lots, etc., fall out is a world in which contingency either exists or (most likely) reigns.

Possibly, the most visible way of falling out is the roll of the dice. The world in which coincidences happen is, as it were, the world of a dice game: one gets 2, the other – 12. It resembles the famous fragment of Heraclitus.

Let us go back to coincidence. There is a seme of place in this word. That is, “coincide” means “to happen at the same place.” But here, certain difficulties await us. First of all, it is obvious that although the seme of time is not expressed in the morphological structure of the word “coincidentally” it is extremely important in its semantics. At first glance, there is no doubt that “to coincide” means “to happen at the same time.” That is, to put it simply, we have before us a chronotope of an event: “to coincide” means “to happen at the same place and at the same time.”

This meaning will likely be the main one in the word “coincide.” And yet, it will not be the only one. First, there are some connotations that should be taken into consideration. Is chronotopicity a required attribute of coincident events? At first glance, yes, it is so, but looking closely, we can see that no, it is not. In particular, for Jung, chronotopicity of synchronicity is not necessary. He considers a number of events that occur at different times, but in his opinion, they fit into the phenomenon of synchronicity. Let us give two examples that are, in our opinion, the most striking. The first example is taken from the work of W. von Stolz on strange coincidences. A woman took a picture of her son and left the film in a photo studio in Strasbourg for development. The First World War began, and the woman, for various reasons, could not collect the film. In 1917, she bought a film in Frankfurt to take pictures of her daughter. When the film was developed, under her daughter’s photograph, there was a photograph of her son taken three years before. The old film had not been developed and returned to the market (Jung, 1997: 208).

The second example comes from Flammarion’s work, also devoted to strange coincidences. A certain Monsieur Fortibou treated a certain boy Deschamps to a piece of plum pie. It happened in Orleans. Ten years later, the young man Deschamps lived in Paris. In one of the restaurants, he saw there was plum cake on the menu and decided to order it. But it

turned out that a certain Fortibou had just ordered the last piece of plum pie. The mature man Deschamps was invited to an evening where the plum pie was served. Deschamps noticed that only Monsieur Fortibu was missing. At that moment, a very old man entered the room. He turned out to be de Fortibou, who came there by mistake (Jung, 1997: 235).

What makes the described events synchronic? It is obviously not a chronotope, since they occurred at different times and at different places. The unity of the subject (subjects) makes them synchronic. We see unlikely coincidences of events occurring with actors that are either close or in some way related to each other. Thus, the unity (integrity) of the actors of events is an essential factor in determining synchronicity. The unity of the actors turns out to be a more significant factor than the unity of place and time.

Secondly, if we remember the meaning of compatibility, we will see that at least two phenomena are necessary for coincidence: something must coincide with something. But that's not all. Let us suppose that it is proved that events A and B, which occur at the same time at the same place, or events C and D, which occur at different times and at different places, but with the same actors, are links of the same causal chain. In the first case, at some point, a single causal chain, so to speak, bifurcates and causes the simultaneous occurrence of events A and B. In the second case, a single causal chain seems to be "hidden" in the stream of events, but it exercises its deterministic force even in this state. Are the first and second events the same in the strict sense of the word? No. they are not. To be congruent, it is necessary to be heterogeneous and come from different sources. Therefore, we have the following: *a coincidence is two or more events in which the same actors participate, while these events originate from different causal chains. These events can occur both at the same time, at the same place, and at different times at different places.*

But even in this case, coincidence still eludes us, and synchronicity eludes even more. In order for a match to take place, there must be a single semantic field. When Deschamps walked into a Parisian restaurant, there could be many visitors. The presence of these visitors is not a coincidence. A coincidence is the presence of Monsieur de Fortibou, a long-time and, most likely, an episodic acquaintance of Deschamps. There is nothing surprising in coincidences as such – they obey the laws of probability.

But synchronicity is not only surprising – it amazes us. Why? What exactly surprises us in cases with a photo of a son, the plum cake, and all other coincidences? It is their strangeness, bordering on improbability. If the film, which was re-bought by the woman, had captured someone else's son or, say, a giraffe from a zoo, this would surprise us to a lesser extent or not at all. If Monsieur Fortibou had ordered a roast in a Parisian restaurant, and pineapples in champagne were the highlight of the program at the party, Deschamps would have been somewhat surprised by chance encounters with an old acquaintance. Still, his surprise would not have been so strong. Synchronicity is a special case of coincidence. We can say that coincidence is, as it were, weak synchronicity, while *synchronicity is an extremely strong coincidence, almost incredible*. In this coincidence, there must be two or more independent causal chains, as well as the presence of some single sense. Thus, with all the other conditions listed above, it is *the single sense that ultimately makes the events synchronistic*.

Are all synchronistic events, so to speak, cases of the one-horned ram? Or only some of them? Or none of them? In other words, are all synchronistic events loaded with semiotics? Do they indicate something, signify or forebode something? If we take into account the decisive factor of meaning, then we will have to agree that *all synchronistic events are "cases of one-horned ram,"* but we do not always understand it.

4. Synchronicity and pre-established harmony

4.1. G. Leibniz's doctrine on pre-established harmony.

When presenting his doctrine on synchronicity, C. Jung repeatedly refers to G. Leibniz's doctrine on pre-established harmony. Indeed, these theories have much in common. Pre-established harmony is the universal coherence of the monads, originally established by God. Since God created the best world, then in it, "all things are in perfect harmony with each other and breathe in complete harmony" (Leibniz, 1989: 475). Harmony is a kind of "conformity" due to which the connection of the future with the past and the present with the absent is realized (Leibniz, 1989: 69).

The ideal influence of one monad on another occurs through the agency of God. Each monad, as it were, "requires that God, establishing the order between other monads at the beginning of things, should also take it into consideration" (Leibniz, 1982: 422). Thus, each monad depends on all others, and all others depend on it (Leibniz, 1982: 422). If we accept this picture of the world, then the indicated universal interdependence of monads can be thought of as the basis of synchronicity.

To specify the picture of the interaction of monads, Leibniz depicts a space in which, so to speak, everything is "filled up." In this filled space, every movement affects distant bodies, so that each body, to some degree, feels everything that happens; such a message occurs at any distance. Consequently, each body senses everything that takes place in the Universe (Leibniz, 1982: 424). Here, in essence, there is an anticipation of the mechanism for realizing synchronicity.

Pre-established harmony finds its expression in the "general economy of the world" (Leibniz, 1982: 146). Since God is the perfect being, he chose the best plan when creating the world. "He disposed of place, space, time in the most economical way; using the simplest means, he performed the greatest actions – the greatest power, the greatest knowledge, the greatest happiness and the greatest goodness in creations, which are only available to the universe" (Leibniz, 1982: 409). We will return to the principle of economy of the world when considering our key hypothesis, with the help of which we will try to explain the phenomenon of synchronicity.

An essential aspect of pre-established harmony is the presence of *metaphysical* communication between the soul and the body, thanks to which the soul is capable of spontaneous actions (Leibniz, 1989: 165-166). The soul is essentially related to all things in the world; due to the variety of its modifications, "the soul (...) must be likened to the universe" (Leibniz, 1982: 334). As a result, so to speak, of the entire filling of the Universe, there is a universal interaction of all things. Harmony should be understood not only as the physical interaction of bodies but also as a correspondence between the perceptions of the monad and the movements of bodies (Leibniz, 1982: 405). This implies an unexpected but profound comparison of a monad with a mirror: "(...) every monad is a living mirror, endowed with internal action, reproducing the universe from its point of view and ordered in the same way as the universe itself" (Leibniz, 1982: 405). The world is, so to speak, a repeated reproduction of itself "in numerous mirrors, each of which reflects it in its own way" (Leibniz, 1982: 541). The reflective powers of the monad determine the potentially infinite cognitive faculties of the soul. "Every soul knows the infinite, knows everything, but knows it vaguely" (Leibniz, 1982: 410). These vague perceptions are the consequences of the impressions that the entire Universe as a whole produces on the soul (Leibniz, 1982: 410).

From this point of view, cases of synchronicity are phenomena that allow us to even vaguely realize the pre-established harmony. These are, as it were, indications of pre-

established harmony. When C. Jung insists on the psychic nature of synchronicity, when he tries to explain synchronicity by referring to the theory of archetypes (see below), he, in essence, implicitly relies on Leibniz' metaphor of the mirror monad.

Describing the pre-established harmony, G. Leibniz resorts to a variety of explicit and implicit metaphors. In the context of the connection between the phenomenon of synchronicity and the theory of pre-established harmony, the metaphor of "collusion" is of particular interest. "What is so wonderful about everything going as it should, everything is done with strict precision?" – Leibniz exclaims. – "As long as we assume that this 'everything' is the realization of a perfect design, all things are, as it were, in collusion with each other and they are led by one hand" (Leibniz, 1982: 332-333).

So, things "collude" with each other, and the events of such collusion are acts of synchronicity. Above, we analyzed the concept of coincidence. The collusion metaphor prompts us to analyze the metaphysical implications of the concepts of "concordance" and "correspondence."

4.2. *Concordance and correspondence*¹

Along with "coincidence," important semantic shades of synchronicity are "concordance" and "correspondence." Describing the pre-established harmony, G. Leibniz often uses these and synonymous words. Collusion is a special case of agreement with implicit negative connotations. As a rule, they agree about something reprehensible, often about a crime.

"Concordance" (its Russian approximate equivalent "Со-глас-ованность") means the unity of voices, the joint voting on any issue. "Correspond" (its Russian approximate equivalent "Со-ответ-ствовать") means answering together, responding in unison, responding in a similar way. This is so if you take the internal form of the word. In a broader sense, to correspond means to be similar, to be convenient for solving a given problem, to be, as it were, "fitted" to each other. Correspondence is a necessary sign of truth (truth as the correspondence of a statement to the current circumstances).

In the concepts of concordance and correspondence, there is a dialogical picture of the world and not only of the social one. It is implicitly assumed that a person and the world seem to communicate with each other: a person asks – the world answers, the world asks – a person answers. If a person and the world answer, so to speak, "in the wrong," then they correspond to each other; there is a consistency of their answers.

Pre-established harmony is the initial concordance of the soul and body, the concordance of all monads with each other, their correspondence to each other, and to the Creator's plan. Concordance is the coincidence of the "voices" of the subject and the object during their interaction; conformity – the coincidence of their "answers." Synchronicity is a special case of concordance and correspondence, and, therefore, a special case of pre-established harmony. Ultimately, synchronicity is a clear manifestation of a usually hidden harmony; these are cases of a vivid, visible, obvious correspondence-agreement of a single, so to speak, "friendly" nature of various phenomena, the pile-up of which seems chaotic to a flat-rationalistic consciousness.

¹ It should be clarified that it is hardly possible to match the Russian words "согласованность" and "соответствие" with their English equivalents. In the Russian word "согласованность," co- is the prefix and глас is the root. Co- has the meaning of compatibility, глас is an archaic form of the word "голос." Thus, "согласованность" means "joint voices." In the Russian word "соответствие," there is the same prefix co- and the root ответ, which denotes "answer." Thus, "соответствие" means "joint responses." The internal form of the corresponding English words turns out to be different.

5. C.G. Jung's explanation of synchronicity under the effect of the theory of archetypes

C. Jung tries to explain the phenomenon of synchronicity by means of his theory of archetypes. In his opinion, synchronicity consists of two factors: 1) an unconscious image penetrates into consciousness either directly or indirectly (in the form of dreams, premonitions, etc.); 2) the objective situation coincides with this content (Jung, 1997: 224). Thus, in the final analysis, synchronicity is the coincidence of the external with the internal, the phenomena of the physical world with the phenomena of the psychic world. In this case, the psychic world has priority: it is the objective situation that coincides with the psychic image, but not vice versa.

C. Jung emphasizes that “there can be no question of a causal explanation of synchronicity” (Jung, 1997: 301). Synchronicity rests on archetypes as psychoid factors. In this case, archetypes are found not only in the mental sphere but also in equivalent physical processes. Moreover, this is exactly equivalence, but not causality. “In the categories of causality, archetypal equivalences are random; that is, there is no regular connection between them and causal processes” (Jung, 1997: 301).

According to C. Jung, it follows from synchronicity that the soul (psyche) is located outside space, or that space is related to the psyche (Jung, 1997: 192).

On the one hand, Jung categorically rejects the causal explanation of synchronicity; on the other hand, he sometimes admits something like Freudian slips. In the subconscious, there are psychic images that are, as it were, inexplicable knowledge. This knowledge either does not have any cognizable basis, or there are causal relationships between it and the archetypal content of the unconscious. These images are in a semantic connection with objective events without having a cognizable causal connection with them (Jung, 1997: 223). So, causal relationships of objective occurrences with archetypal content are unknowable, but do they exist, anyway? In the philosophy of I. Kant, things in themselves are unknowable, but they still exist. One can see inconsistency in this, or one can see the balanced thinking of the German classic. So, what is the essence of synchronicity: in coincidence as such, or in our, albeit inexplicable, knowledge? The question is complicated by the fact that psychic content must be present in the phenomenon of synchronicity. Synchronicity is the coincidence of a physical event with a certain psychic content; without a conscious subject, there will be no synchronicity.

C. Jung examines the famous case that allegedly occurred on July 19, 1759, when the Swedish scientist and mystic E. Swedenborg, while in Gothenburg, “saw” a fire that was taking place in Stockholm at the same time. “In a sense, the Stockholm fire was also blazing in Swedenborg. For the unconscious psyche, space and time are relative; that is, knowledge finds itself in the space-time continuum, in which space is no longer space, and time is no longer time. Therefore, if the unconscious can develop its potential in the direction of consciousness, then the possibility of perception (or ‘knowledge’) of parallel events arises” (Jung, 1997: 261).

Far from denying the archetypal aspect of synchronicity, we still do not consider an explanation through the theory of archetypes to be entirely satisfactory. The essence of synchronicity is not in our knowledge of parallel events but in the very coincidence of parallel events. Let us emphasize again that the psychic element, undoubtedly, must be present. Without it, the phenomenon of synchronicity will not take place. When we say that the essence of synchronicity is coincidence itself, we mean the following. The scarab beetle flies into Jung's office while the patient tells the psychiatrist about the gold scarab she had

dreamed of. The golden scarab is a psychic image. Thus, the real event coincides with the psychic image.

Moreover, Jung is aware of this image because the patient had told him about it. That is, the real event coincides with the fixed, known, spoken psychic image. Without this articulation, synchronicity would not have taken place. At least it would not have happened for Jung. But even for the patient, it most likely would not have taken place since it is unlikely that the patient was so well-read in entomology that she had information about the scarabaeoid beetle. And yet, ultimately, synchronicity is the mere fact of coincidence. It is the fact of this coincidence that is the most surprising aspect of this situation. It is definitely a coincidence as such that is the essence of synchronicity.

The same is true for all other cases. For example, in the cases of Deschamps and Monsieur de Fortibou, synchronicity exists only for Deschamps, since he knows about the plum cake from his childhood. It would seem that this is a clear argument regarding the psychic essence of synchronicity. Without this knowledge, synchronicity will not take place. But it is not the knowledge that turns out to be surprising and significant, but the coincidence itself: during Deschamps's life (or at least several times), the plum pie turns out to be associated with Fortibou. *The decisive factor in synchronicity is not the physical event or the mental image, but the coincidence of the event and the image.*

Opposing any causal explanation of synchronicity, C.G. Jung seeks to understand it as a manifestation of some kind of world order. Synchronicity is a special example of acausal ordering, "... synchronicity in the narrow sense is just a separate example of general acausal ordering, namely, the equivalence of mental and physical processes" (Jung, 1997: 303). Jung believes that the archetype explanation is the best, "since only the archetype is an introspectively recognizable form of a priori psychic ordering" (Jung, 1997: 303). "This form of ordering differs from the ordering of natural numbers or discontinuities in physics in that the latter exists eternally and regularly recurs, while the forms of psychic ordering are acts of creation in time" (Jung, 1997: 303). Although I am somewhat skeptical about explaining synchronicity through the archetype theory, the explanation through order seems to me theoretically deep and methodologically effective. I find it especially fruitful to distinguish between eternal orderliness and orderliness as a consequence of creative acts in time. I use this idea in my hypotheses about the nature of synchronicity.

6. The explanations for synchronicity

Below I will offer my three hypotheses to explain the phenomenon of synchronicity. Although these are different hypotheses, they are complementary. In my opinion, the third of the proposed hypotheses has the greatest explanatory power.

6.1. *Eventhemes as storage of virtual events.*

I introduced the concept of "eventheme" into scientific usage in a number of articles and developed it in sufficient detail in the monograph "History as Eventfulness" (Yeremenko, 2005). An eventheme is an abstract possibility of sporadic events. An eventheme is a virtual cell filled with real events in history. An eventheme is a timeless eidos of events that allows single events to unfold in historical time. An eventheme is the unity of emptiness and fullness. On the one hand, it is a kind of emptiness filled with isolated events. On the other hand, the events that have already taken place fill this void, so it is a partly filled void, and it becomes more and more filled in the course of world history. After the historical event is laid down in the eventheme, it becomes irreversible.

An event is, for example, the first speech of Cicero against Catilina, the Battle of Waterloo, and the invention of the steam engine. An eventheme is, for example, a public speech, a battle, an invention.

Is an event necessarily a certain “point” act of the historical process? Not necessarily. There may be long-term events. The line between an event and a process is conditional. Can the conspiracy of Catilina as a whole or the Napoleonic Wars, in general, be considered a single event? Yes, they can. But these are chains of events. The wholeness is given to the event by a kind of historical entelechy. If a chain of events leads to a single result, then in this sense, it can be considered a single event. Also, the qualification of a given happening as an event or as a process (chain of events) partly depends on the steadiness of our gaze. If so to speak, we cast a steady glance at the era, and then the Napoleonic Wars will turn out to be a single event for us. If we look more closely at these wars, they will turn out to be a multi-branched chain of events, consisting of elements like the Battle of Waterloo. By the way, with sufficient intentness of the gaze, even a point event reveals, so to speak, a “loose” structure. For example, in the Battle of Waterloo, we find a struggle for the farms of Hougoumont and La Haye Sainte, the appearance of Blucher’s army, an attack by the Imperial Guard, and other elements.

Similar questions may arise regarding eventhemes. For example, what exactly should be considered an eventheme: a public speech, or a speech of the prosecution, or a speech before the legislative body, or a speech before the Roman Senate? The degree of abstractness can be different, and a hierarchy of eventhemes is possible. But the speech against Catilina delivered by Cicero on November 8, 63 B.C., in no case can be considered an eventheme.

It seems that it has been said enough about the difference between an event and an eventheme. It is important to emphasize that an eventheme is a kind of “space” (in the sense of “container”) of both already occurred and possible virtual events. Here, doubleness is especially important.

First, when a single event occurs, does it, so to speak, “flow into” the emptiness of the eventheme or “fall out” of this emptiness? It flows into and falls out. It flows into the eventheme, since it is carried out by the efforts of the actors. But it falls out of the eventheme, since it turns out to be possible in principle. If a certain event is impossible in principle, then no efforts of any actors will bring it to fruition in real history. Sometimes, at the same time at the same place, events of different eventhemes may occur, having some semantic similarity. This will be synchronicity here and now.

Secondly, is it possible to assume that future single events exist in a virtual form in the structure of the eventheme? Generally speaking, with enough imagination, one can assume anything. Initially, my theory of the eventheme did not contain such an assumption. Moreover, it was rejected. But if we accept this assumption, we can, in turn, assume the following: some people can see virtual future events in the structure of the eventheme. Such a vision would be a synchronic coincidence facing the future.

Sometimes in C. Jung’s interpretation of synchronicity, one can see a kind of anticipation of the eventheme approach. Considering cases of synchronicity of mental images with future events, Jung notes: “They are clearly not synchronous, but synchronistic, since they are felt as mental images in the present as if an objective event already exists” (Jung, 1997: 221). These cases quite organically fit into the theory of the eventheme: in the eventheme, future events are, as it were, “packed.” They exist there in a virtual modus, and their implementation is, as it were, “crystallization” of the real from the virtual due to the activity of actors. But some subjects are able to “crystallize” these events in advance in the form of mental images.

According to C. Jung, “we are not able to imagine any space where future events are objectively present...” (Jung, 1997: 222). If we still manage to imagine such a space, then it will be eventhemes.

Thus, at the same time or at different times with the same actors, events that have semantic similarities but belong to different eventhemes can occur. Since they are the consequences of different event chains, the connection between these events is acausal. These are synchronistic events.

6.2. The world as a plot. Synchronistic events as copyright marks.

If we resort to one of the most famous metaphors of world culture – “the world is a work of art” to explain the phenomenon of synchronicity, then everything fits together.

When Shakespeare, out of the mouth of Jacques in the comedy *As You Like It*, says: “All the world’s a stage, and all the men and women merely players” – he expresses a maxim that is quite banal for his contemporaries. The identification of the world with a literary work has various options: “the world is a play,” “the world is a novel,” “the world is a poem,” “the world is a book,” “the world is a text,” etc. In this case, the world can become a metaphor, not necessarily through comparisons with a literary work. In the medieval worldview or in the philosophy of H. Skovoroda, the Bible is a “symbolic world,” i.e., the World is, in a sense, the Bible.

If we refer to the reflections of G. Leibniz, we will find the following interesting illustration of pre-established harmony. It sometimes happens in life that a very gifted person succeeds less than a mediocre one. Why does it happen so? “It can therefore be said that people are also chosen and distributed not so much because of their superiority, but because of the conformity in which they are with the plan of God, just as they use the worst stone in building or sorting because they find that it is precisely such a stone that can fill that or another emptiness” (Leibniz, 1989: 193). Like the worst stone, which, so to speak, completely fits into the structure of the building, and that is why the builder is selected, the worst person is chosen who fits into the structure of the historical situation, and the best is rejected because he does not fit. The metaphor of “being inscribed” again draws us to the metaphor of the world as a literary text.

One of the hallmarks of the writer’s skill is the ability to scatter the original author’s signs over the plot: various coincidences, correspondences, omens. In *The Master and Margarita*, Annushka spills butter at the right time in the right place. In *The Idiot*, at the first meeting with Nastasya Filippovna, Myshkin thought that he had earlier seen her in a dream; and Nastasya Filippovna had a similar feeling. In *Anna Karenina*, in an episode of Vronsky’s acquaintance with Anna, a railway watchman is accidentally crushed by a steam locomotive. One of the most striking scenes in the novel is the declaration of love when Levin and Kitty guess the meaning of the phrases from the first letters of the words.

William Shakespeare’s plays are full of diverse, often fatal coincidences / non-coincidences. Let us consider *Romeo and Juliet*. Lorenzo promises to inform Romeo of the situation in Verona through his servant. When Lorenzo arranges the imaginary death of Juliet, he sends his brother Giovanni to Mantua. Balthazar, Romeo’s servant, sees Juliet’s funeral. Since he does not know anything about Lorenzo’s plan, he arbitrarily decides to notify Romeo about this event. At the same time, Giovanni is not released from Verona under the pretext of quarantine because of the imaginary plague. Thus, Romeo receives false news of Juliet’s death and decides to commit suicide at her grave. When Lorenzo finds out that Giovanni failed to inform Romeo of the essence of what is happening, he hurries to the crypt where Juliet is buried.

On the same night, Paris appears to the crypt to shower the deceased bride with flowers. Soon Romeo appears. In the duel, Romeo kills Paris. Romeo is convinced that Juliet is dead – and he takes poison. Then Lorenzo appears and sees: Paris and Romeo are dead. Juliet awakens. The monk tries to take her out of the crypt, but this does not work, and Lorenzo leaves. Juliet sees her dead husband and stabs herself with a dagger.

At this point, firstly, the sequence of events that could be different is important. First, Paris comes to the crypt, then Romeo, then Romeo kills Paris, then he kills himself, then Lorenzo comes, then Juliet awakens, then she kills herself. Lorenzo could have appeared before Paris and Romeo, Juliet could have woken up during a duel between Paris and Romeo, she could have woken up before the duel, Paris could have killed Romeo, etc., etc. – there are many options.

Secondly, the chain of unfortunate inconsistencies, mistakes, misunderstandings of the meaning of events is important. Balthazar might not have seen Juliet's funeral. The pharmacist might not have sold the poison to Romeo or fooled him by giving him some harmless powder. Friar Giovanni might not have been detained in Verona, and he would have given Romeo a letter from Lorenzo in time, etc. We can say that it is not coincidences, but discrepancies, that lead to a tragic outcome. That is right. But at this point, one should correctly understand the nature of literary and artistic reality. *In everyday life events, coincidence is a special case of non-coincidence; in the events of a work of art, non-coincidence is a special case of coincidence.*

Trying to convince Juliet to leave the crypt, Lorenzo says, "Another force, greater than mine, Warned us." Ultimately, everything is God's will. The demiurge of Romeo and Juliet is Shakespeare – it is his will that creates a chain of inconsistencies and brings the heroes to their fateful place in just such a sequence.

We see a very diverse and sophisticated system of coincidences in Doctor Zhivago. With all the undoubted merits of the style, ideological and figurative wealth, deep and subtle psychologism of Boris Pasternak's novel, I was most struck by its plot. Pasternak constructed the plot of Doctor Zhivago as a complex aesthetically adjusted system of coincidences, correspondences, anticipations and premonitions (Polivanov, 2021).

The candle that Yuri Zhivago sees in the window of a house in Kamergersky Lane; a candle burns in the room where Lara is meeting with Pasha Antipov. The train, from which Yuri's father threw himself out, stopped in the wrong place. Misha Gordon is on the train. At the same time, Yuri wanders around the outskirts of the Kologrivov estate and descends into a ravine. He prays for the repose of his deceased mother. It occurs to him that he should also pray for his father, but he decides to postpone the prayer until next time. "Not yet. There's no need to hurry, he would think" (Pasternak, 2016: 15). At this time, his father dies on the railroad embankment.

During the war, Yuri Zhivago takes Mikhail Gordon with him to the field hospital. They watch a scene in which an officer has an argument with a doctor. The nurse is also watching this scene. This is Lara Antipova. At this time, a seriously wounded man is brought in and dies on a stretcher. The deceased is a Tatar Gimazetdin, who was a janitor in the courtyard of the house where the teenager Pasha Antipov lived. The swearing officer is his son Galiullin, who served in the same unit with Antipov and watched as Pavel came under shelling during the attack. Subsequently, Galiullin takes part in hostilities in the Yuryatin area as an officer in Kolchak's army (Pasternak, 2016: 105-109).

Yuri cannot decide whose vaguely familiar female voice he hears in his dream. Subsequently, when Yuri sees Lara in the reading room of Yuryatin's library, he realizes that the voice from his winter dream was the voice of Antipova (Pasternak, 2016: 261).

Yuri Zhivago is on a tram. He sees an old gray-haired lady in a hat made of light straw, in an old-fashioned dress, pulled into a corset, walking parallel along the street. The tram moves slowly, constantly stops to fix faults, and then overtakes the woman, then she overtakes it. This is Mademoiselle Fleury, the governess of Countess Zhabrinskaya, in whose house in Meliuzeevo there was the hospital, in which both Lara Antipova and Yuri Zhivago find themselves. She is sure that there is a love affair between Lara and Yuri. Now, many years later, Mademoiselle Fleury is on her way to the Swiss embassy to get her exit visa.

Yuri Andreevich recalls school problems about trains, then: “He thought about several beings developing side by side, moving at different speeds one next to the other, and about when someone’s fate overtakes the fate of another in life, and who is worried about whom. Something like the principle of relativity presented itself to him on the ranks of life, but finally getting confused, he abandoned these associations as well” (Pasternak, 2016: 435-436).

On a crowded tram, Yuri Zhivago has a heart attack. He barely gets out of the tram, falls to the sidewalk and dies. Mademoiselle Fleury approaches, looks at the deceased, and moves on. “And she went ahead, overtaking the tram for the tenth time, and without knowing it, she overtook Zhivago and outlived him” (Pasternak, 2016: 437).

A visible symbol of synchronicity in Doctor Zhivago is a faulty clock that suddenly, inexplicably, “wakes up” and starts running. Yuri Zhivago visits a patient in a house near Tverskaya Zastava. The patient’s husband tells Yuri about a strange case: the old chimes, which they bought as antiques, had not been in use for several years. And suddenly they started by themselves, rang the minuet and stopped. The wife took this as a sign of her last hour. On examination, the wife is found to have typhus.

Tonya informs her husband about an amazing incident at home: yesterday, the alarm clock broke. Yuri’s father-in-law tried to fix it but failed. And suddenly, an hour ago (Yuri was examining the patient at about this time), the alarm clock rang by itself. “This is my typhoid hour has struck,” Yuri Andreevich joked and told his family about the patient with the chimes” (Pasternak, 2016: 184). After a while, Yuri falls ill with typhus.

Lara arrives in Moscow and accidentally comes to be in Kamergersky Lane. She enters the apartment she once rented and sees the coffin with Yuri’s body. From Evgraf Zhivago, she learns that Antipov-Strelnikov had a long conversation with Yuri before his suicide. “What an amazing coincidence!” – Lara exclaims (Pasternak, 2016: 441).

She also remembers the conversation with Pasha in this very room and cannot remember anything except the candle on the windowsill. She does not know that driving along Kamergersky, Yuri saw this candle, and it was then that the first lines of his first poem sounded in his mind: “A candle was burning on the table, a candle was burning” (Pasternak, 2016: 443).

Lara reflects on her love with Yuri: “They loved each other because everyone around them wanted so: the earth below them, the sky above their heads, the clouds and trees. (...) Never, never, even in moments of the most granted, unconscious happiness the highest and most exciting did not leave them: the enjoyment of the general modeling of the world, the feeling of their belonging to the whole picture, the feeling of belonging to the beauty of the whole spectacle, to the entire universe” (Pasternak, 2016: 445).

Yuri Zhivago writes in his diary: “Perhaps the contents of each biography, along with the characters encountered in it, also requires the participation of a secret unknown force, an almost symbolic person who comes to help without being called upon” (Pasternak, 2016: 258). Yuri thinks that this is his half-brother Evgraf. But we know that Boris Pasternak is the real secret helper.

B. Pasternak ends the scene in the field hospital in a forest glade with the following comment: "... they were all together, they were all nearby, and some did not recognize each other, others never knew, and one remained unidentified forever, the other began to wait for detection until the next chance to come, until the next meeting" (Pasternak, 2016: 109).

Here we have a picture of implicit, latent synchronicity. The fact that the characters, partly familiar, partly unfamiliar with each other, found themselves at the same time in a forest glade is accidental. Moreover, even the characters that had come across (Yuri and Lara) do not recognize each other. They do not know that their thoughts and actions will influence each other's destinies.

The question arises: can there be unconscious synchronicity? Or does synchronicity only take place when it is realized? In accepting the first picture of the world, we will have a much broader and, so to speak, frequent synchronicity. Many events that happen to us, which seem to us so small and insignificant that we either do not notice them or immediately commit them to oblivion, may turn out to be full of deep, but unknown to us, meaning. Moreover, this is the meaning that directly concerns us, influences the subsequent course of our life, and possibly determines our destiny. In the strongest version of this hypothesis, all events may turn out to be synchronic. I do not insist on this hypothesis, but I do not reject it either.

Acceptance of the second hypothesis destroys the first one. Suppose a necessary condition for the synchronicity of events is the realization of their acausal coincidence filled with meaning, then in the meeting of the characters in a forest glade, where the field hospital is located. In that case, it is impossible to find a grain of synchronicity. A synchronic meaning to these events is given only by the fact that the author knows about the role of these coincidences in the whole plot of the novel. Moreover, he communicates this knowledge to the reader.

Everyday consciousness is hostile to synchronicity: it interprets even its obvious availability as "simple" coincidences that have no semantic meaning. Sometimes it seems that cases of synchronicity are deliberately thrown into the world in order to discourage ordinary consciousness.

The best explanation of the phenomenon of synchronicity will be the recognition of the fact that the World was created and realized in all its detailed integrity by a certain Author. Of course, they will point me out that the hypothesis of "author's intention" goes beyond what is acceptable in modern rationalistic-scientific discourse. I proceeded from the metaphor "the world is a work of art." But the metaphorical explanation is not scientific. The metaphor does not explain anything, and it can only illustrate.

Someone might argue: "If you explain synchronicity in the real world by comparing it to the plot of a work of art, then someone also wrote the real world?" I have to give a positive answer to this question. The real world should be understood as a plot, not in a figurative, but in a literal sense. Synchronous coincidences are possible if and only if the real world is a plot composed by a certain Author. Synchronic coincidences are the author's signs scattered in the text called "The Universe."

The framework of what is permissible in scientific discourse is flexible, and what is unacceptable in one period of the development of science may turn out to be acceptable in another period. Moreover, my discourse is not scientific, but philosophical, although, in any case, it remains rationalistic. Science does not have a monopoly on rationalism.

6.3. Synchronicity and kaleidoscopicity. Genuine and Illusory Causation.

Some metaphors permeate world culture, like knitting needles on which the yarn of meaning is strung. The world tree, the world as a human organism, the wheel of fortune,

the world as a theater, the world clock, etc. The impressive inventions of modern science and technology can also be used as a metaphorical encompassing of the world whole. For example, the world is like a computer.

I propose the metaphor “the world is like a kaleidoscope” to use for another explanation of the phenomenon of synchronicity.

Let us imagine that the process of world development is not a sequential and gradual change of events within various causal chains, sometimes diverging and then intersecting, but a change of integral “pictures.” These pictures are, as it were, integral states of the world – a kind of world gestalt. Pictures are separated by emptiness, nothingness, non-existence. There is no causal relationship between two pictures, one of which directly replaces the other. And in general, no picture has a causal relationship with any other picture. It resembles a variety of figures made of colored glass or other multi-colored objects when turning a kaleidoscope. These figures, impressive in their beauty and brightness, in fact, represent an optical illusion formed due to the arrangement of multi-colored glasses, reflected several times by mirrors, of which, in fact, the body of the kaleidoscope consists. The number of figures seems to be infinite, but in reality, their number is limited, since, although extremely large, the number of combinations of glass is not infinite. When a kaleidoscope containing 20 glasses rotates at a speed of 10 times per minute, it will take about 500 billion years to view all the figures (Perelman, 1986: 142).

At first glance, it seems that this or another figure is caused by the interaction of the glasses. Of course, this interaction takes place. Glass 1 hits against glass 2, glass 2 hits against glass 3 (...) glass n – against glass $n + 1$ – and as a result, a holistic figure is created, pleasing our eyes with intricate combinations of bright-colored fragments. Each piece of glass takes its place, being hit by other pieces of glass and being squeezed by neighboring pieces of glass.

Interestingly, in fact, the glasses collected in the patterned chamber are a chaotic heap. The pattern appears due to their reflection in the longitudinal mirrors of the kaleidoscope tube, and this pattern can only be seen by a child looking through the eyepiece of the kaleidoscope. An adult is also capable if he knows how to play like a child.

Let us get back to our causality. The real reason is not at all the collision of the glasses – *the real single reason for the figure is the Player’s hand, which turns the kaleidoscope. Collisions are illusory causation.*

Despite the seeming arbitrariness and, so to speak, “frivolity,” the picture we have sketched has considerable explanatory power. It explains not only the existence of synchronicity. It explains very well the phenomenon of luck, for instance. Why are some people incredibly lucky, but others are not? Moreover, both luck and bad luck have nothing to do with either the actors’ moral or intellectual properties or their talent or mediocrity. It is just because of the location of the glasses. It is for you that they are located like that.

Cases like Swedenborg’s vision of the fire in Stockholm fit nicely into the kaleidoscopic explanation of synchronicity. Some people may have the ability to see a complete picture of a kaleidoscopic figure. When the world kaleidoscope turns, such a person instantly sees all the details of an integral figure. And he instantly sees all the coincidences, correspondences, concordance, etc.

The image of a kaleidoscope has not yet been in demand in culture for metaphorization of the Universe, unlike, e.g., the images of a theater, a book, or a clock. The explanation for this is quite simple: the kaleidoscope was invented relatively recently – in 1816 by the Scottish physicist D. Brewster.

The metaphor of the world kaleidoscope smoothes away C. Jung’s rough indeterminism. Jung believes that “synchronic phenomena, in principle, cannot be associated with any concept

of causality” (Jung, 1997: 222). The archetypal explanation assumes that synchronicity is made up of random equivalences, so “a causal explanation for synchronicity is out of the question” (Jung, 1997: 301). I believe that denying the possibility of a causal explanation for synchronicity is too categorical. The hypothesis of the world kaleidoscope brings causality into synchronicity, although this causality is transcendental. If the chains of cause and effect within the world gestalt are, in some way, “inauthentic” causality, then the true and only cause is the will of God, which changes the gestalts.

I have already cited C.G. Jung’s opinion on the combination of mental and physical arrangement in synchronicity. The arrangement of natural numbers or certain physical phenomena has existed for eternity, and the forms of mental arrangement turn out to be acts of creation in time (Jung, 1997: 303). This concept fits perfectly into both the eventheme theory and the kaleidoscopic hypothesis. There is a set of eventhemes or a set of “pictures.” This set is timeless; it represents an unchanging aspect of the Universe. The acts of turning the World Kaleidoscope that is, the acts of changing the world gestalts, unfold in time. These are creative acts of the transcendental Superintelligent Power. According to C. Jung, we should consider causeless synchronistic events “as creative acts, as a continuous creation of a scheme that exists forever, sporadically repeating and does not have any visible sources” (Jung, 1997: 304).

In such a picture of the world, not only the unity of necessity and contingency is realized, but also the unity of necessity and freedom. At first glance, contingency is an essential characteristic of synchronistic events. This is repeatedly emphasized by C. G. Jung; this follows from our analysis of the concept of “coincidence.” Here is the final idea of the work “Synchronicity: the acausal unifying principle”: “For these reasons, I believe, it is necessary to introduce, along with time, space and causality, a category that gives us not only the opportunity to understand synchronistic phenomena as a special class of natural events, but also a certain contingency as an eternally existing universal factor and, in part, as the sum of the countless individual acts of creation taking place in time” (Jung, 1997: 305).

This is especially for lovers of dialectics: the hypothesis of the world kaleidoscope assumes the unity of true causality, necessity, and freedom, as well as the unity of illusory causality, contingency and non-freedom. The change of world gestalts occurs thanks to the free creative acts of God. These acts are the real cause of all events. At the same time, these acts are necessary: on the one hand, for the actors within the gestalt, on the other hand, in God, necessity and freedom coincide. The glasses of the kaleidoscope are positioned randomly every time. In any case, the superficial consciousness of many actors perceives the events that happen to them as accidental. But each actor is a piece of glass, squeezed by adjacent pieces of glass and, therefore, not free. The lack of freedom of individual actors is the general restraint of glass.

We return to the Stoics and Spinoza: freedom is reconciliation with the world by seeing its whole picture.

7. Conclusion.

I proposed three hypotheses to explain synchronicity: the eventhemes hypothesis, the world plot hypothesis, and the world kaleidoscope hypothesis. Let me remind you: in my opinion, these hypotheses are complementary. Ultimately, they can all be combined into one. For me personally, the hypothesis of the world kaleidoscope is preferable. Firstly, it is preferable due to its visible aestheticism: we, as it were, contemplate with our own eyes the change of beautiful pictures that capture the integral states of the Universe. Secondly,

the kaleidoscope hypothesis fits in best with the fragmented worldview of a modern person. However, nothing prevents us from inscribing the theory of the eventhemes and the metaphor of the world plot into the general kaleidoscopicity.

They brought us the skull of a one-horned ram. Ultimately, both Anaxagoras and Lampon are right.

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