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Universalism and Cosmic Harmony:

Principle of Genetic Similarity (PGS) *

Introduction

Modern Cosmology celebrated original anniversary in 2003 - twenty years from the moment of publishing the first work of Russian physicist Andrey Linde, offering "the chaotic scenario " origins of the Universe[1]. The Strangeness of his approach in decision of cosmological problems, maybe, only today can be realized to the full. Despite obvious advantages over the predecessors' scenarios, the chaotic scenario was perceived originally even among cosmologists more as "scientific fantasy", than as the realistic scientific knowledge, which really corresponds to something in a physical world.

Meanwhile, its appearing wasn't caused by aspiration to "originality", but especially innertheoretical requirements - the chaotic scenario was "the natural decision" to the problems which were collected already by the previous versions of inflationary theory of the Origin of the Universe.

Now, let's remind that the first time *the idea to use "inflation" for decision cosmological problems* was claimed by Russian cosmologist Alexei Starobinsky in 1979[2]. But in 1981 the American physicist Alan Guth has used "inflating" for resolving some problems of Friedman's theory[3]. Those decisions required the essential change of the *own* and *epistemological basis* of cosmological theory.

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* This paper was prepared with financial support of Metanexus Institute (USA).Project:"God's Design in Human's Presentations".

[1] Linde A.D. //Phys.Lett.,1983, V. 129B, P 177.

[2] Firs publication was in Russia: Starobinsky A. Letters in JETF, - 1979, V.30, - P. 719. English version was reprinted in: Starobinsky A. Phys.Lett.,1980, V. 91, P. 99.

[3] Guth A.H..// Phys.Rev.- 1981, V. D23,, P.347.

Actually, the matter was about "price" which was necessary to pay for "purchase" of the new *basis*. By measure of this price were dominated representations of local observer over physics-geometrical structure of the Universe. Cosmology at last quote of 20-th century became the quantum theory and physical vacuum becomes a base of theoretical constructions.

So, the inflationary theory has started the mechanism of innovation, which further finds its own life. A set of variants of inflationary theory has appeared: “the first scenario” of A. Guth (1981г)., “new scenario” of A. Albrecht, P.J. Steinhardt and A. Linde (1982г)., scenario of A. Starobinsky (1979г., 1983г.) and, at last, “chaotic scenario” of A. Linde (1983г). The chaotic scenario appears to be most radical, from the point of view of changing the settled scientific representations about the structure the world.

Therefore in this work we undertake a task to show *the possible metaphysical consequences* connected by “realization” of inflationary cosmology, generally, and chaotic scenario, partly. We try to do it *both within the science and beyond its boundaries*.

In previous works we have already undertaken attempts of revealing the epistemological specification of Alexander Friedman’s Theory[4]. Also was shown, that some of modern theories in physics and cosmology are at a stage “ of empirical weightlessness ”, that in these disciplines is observed “ epistemological turn ” from ideals and norms of understanding the nature of scientific knowledge are typical for

[4] *Pavlenko A.N*. The Ideals of Rationality in Contemporary Science // Herald of the Russian Academy of Sciences. M.1994. Vol. 64, N.3; Pavlenko A.N., European Cosmology: foundation of epistemological Turn,- M. INTRADA,- 1997, 256 p.(In Russian);*Pavlenko A.N*. An Epistemological Turnabout // Herald of the Russian Academy of Science, - M. ,1997, Vol. 67, N 3; *Pavlenko A.N*. Epistemological Turn in European Scientific Rationality // XX World Congress of Philosophy, Abstracts, Boston, 1997; *Pavlenko A.N.* Discovery of evolution and inflation in modern cosmology: boundaries of empiricism // Abstracts of International Congress on Discovery and Creativity.- Gent , Belgium,. 1998.; *Pavlenko A.N*. Epistemological Invariants of theoretical Knowledge : N. Copernicus against T. Kuhn // 11th International Congress of Logic, Methodology and Philosophy of Science, -, Volume of Abstracts, - August 20-26 , 1999 - Krakow, Poland, P.325

natural sciences in a New Time, to ideals and norms, which were typical for an Ancient science.

For accomplishing the task formulated above it is necessary to consider the basic features of modern cosmological theories. It will give us a chance to consider the similarity between Universe and Human Being and, finally, to formulate the "Principle of Genetic Similarity (PGS)"

Basic features of Friedman's cosmology

In the early 20th century Alexander Friedman presented his work *On the Curvature of Space*[5], where he showed the picture of the world, not only physical but also epistemological. Underwent qualitative changes that may be reduced to the following:

• All the matter and radiation filling the universe is included in Einstein's field equation. In other words, a cosmological theory properly describing and explaining the universe *as a whole* was produced for the first time.

• The universe as a whole began to be considered *boundless but not infinite* because the question of what lies beyond it's boundaries is meaningless in terms of relativistic cosmology.

• Friedman's paradigm introduced the concept of *the evolution of the universe* as a whole, i.e., of a qualitative change of its characteristics in the course of time, which, in turn, gave rise to the problem *of the beginning of the evolution (birth*) of the universe and *its end (death)* defined physically as a problem of singularity.[6]

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[5] Friedman A.A., On the Curvature of Space //Selected works, Moscow, - 1966.(In Russian)

[6] Such conclusion from Friedman's Cosmology provokes to many religious interpretations of it. Well considered posicion on this question presented by Ernan McMullin: McMullin Ernan "How Should Cosmology Relate to Theology?", in The Sciences and Theology in Twentieth Century, ed. Arthur Peacocke. Notre dame, 1981, P.39-40.

These predictions were absolutely unusual for a science of that time, in which dominated representations of endless material world, the knowledge about which should be verified or falsified. Orientation towards the experience still remains a decisive factor in the assessment of cosmological theories, which prompted even the founder of evolutionary cosmology, Friedman, to evaluate his results very skeptically in terms of their confirmation by observation facilities: "The data at our disposal are quite insufficient for any quantitative calculations and for answering the question as to what type of a world our universe is"[7]. But neither the author's sound skepticism, nor the temporary denying of his discovery by A. Einstein prevented the new system (even in the absence of an empirical foundation) from winning the recognition of most of the researchers in cosmology and physics. This was due to the naturalness of newly discovered solutions (without the λ -term), their simplicity, and elegance.

The above-mentioned paradoxical nature of cosmology as a whole equally applies to Friedman's theory, which was universally recognized before its first empirical verification in 1928. After 1928, Hubble's discovery of a red shift in the spectral lines of galaxies was followed by a stage of empirical stability in Friedman's theory, which was ultimately consolidated by the discovery of background radiation in 1964 – 65, what was predicted by other Russian cosmologist Georgi Gamov[8].

For the subject discussed in this document is rather more significant that Friedman's cosmology, perhaps for the first time since Greek philosophy and science, raised the question *"why* the universe is made this way" and not differently, thus going beyond the traditional question of the previous centuries: "*How* is the universe made"? After posing this question, however, it actually stopped because it was unable to answer itself in a satisfactory manner, i.e., to explain why the universe as a whole has a baryon asymmetry, why space is three-dimensional and time one-dimensional, why locally the universe looks flat, and many other things. This fact, as well as the

[7] Friedman A.A., P.237.
[8] Gamov G.// Phys.Rev .- 1948, - V.74, P. 505.

fact that some problems (for instance, the problem of singularity) cannot be solved satisfactorily within Friedman's paradigm, led to the second innovation of last century of the cosmological views of the universe.

Basic features of inflationary theory

Not claiming for completeness we can point following specific foundations of the inflationary theory.

First of all, the theory enters the scientific employment concept of "inflation", which describes exponential fast increasing of volume of the universe which is taking place in "vaquumsimilary" condition. *The speed of increasing of the size of system (at a stage of inflating) for many degrees exceeds the speed of light in vacuum.* However it does not contradict Special Theory of Relativity, *because the speed of increasing of system's size* (against the speed of transfer signals), can be as much as large. Radius of the universe, at a stage of inflating in Inflationary Theory, approximately for the period 10^{-43} - 10^{-35} sek. is increased from the Plank's size 10^{-33} sm. up to the extremely huge size $10^{10\,(7)}$ - $10^{10\,(14)}$ cm..

Independence of both space and time from the matter and radiation was installed at early stages of evolution. The stage of inflating in common evolution of the Universe is carried out without matter and radiation. In other words, "empty" space and "empty" time are inflating. They are filled only by scalar field. In this case it is necessary to understand "empty" space and time absence of real elementary particles and radiations. The vacuum could contain only virtual particles.

For us it is extremely important to emphasize that after inflating stage the Universe is coming to Friedman's stage, where appeared the observable forms of matter and energy. In other words, we can say that our Universe had "unrepeated" life before birth, so called "prenatal stage" (stage of inflation) and " postnatal

stage"(stage of evolution). This model of the Origin of observable Universe *received its first empirical verification in 2001*.

Now, I would like to consider the basic features of chaotic scenario.

Basic features of chaotic scenario

Chaotic scenario makes a new step towards understanding of the structure of the Universe. The main feature of the chaotic scenario, fixed here, is that the scalar field, which existence is assumed by it, *is distributed chaotically*. This feature of the initial universe also has given an occasion to sign both scenario and the Universe as "chaotic".

Primordial chaotic field derivates new areas filled with the same field. The matter is that in those areas, where fluctuations of vacuum become less then some critical size, the inflation, eventually, stops. But in the areas with not decreasing field there is a generation of new and new inflated areas. *This process will not have the end and, in opinion of author the theory, probably, had no the beginning.*

It follows to three basic consequences:

a) The universe as a whole, if the chaotic scenario is fair, will be never collapsed (will be compressed in "point of singularity" as it takes place in the Friedman's theory of evolutionary Universe). *There will be no death of the universe as a whole.*

b) The universe as a whole consists from a huge number (about 10^5) of domains, similar to the Universe, observable by us.

c) The universe as a whole, probably, at all had no initial cosmological singularity (was not a general origin of the universe as a whole).

According to the chaotic scenario we live in *one* of such inflating domain what filled by matter and radiation. From the chaotic scenario with a logical necessity follows, that there should be other areas. In them can be observers similar to the terrestrial observer, and can not exist or exist, but not similar.

Now, let address to the question whether in history were exclaimed such extraordinary ideas about origin of the Universe or not?

Plato's description of the Cosmos' Genesis

The most complete explanation of the Origin the Cosmos we find in works of Plato. In his dialog "Timaeus" the "cosmological principle" is formulated, in the implicit form, according to which the *Cosmos is alive organism and the Human Being is a connected part of it (an organ)* (Tim. 29 e, 30 c, 89 a). All other history of understanding the structure of Universe till to 20th century was or its denying ("Principle of Copernicus – Bruno"), or Biblical attempt of its assimilation ("Anthropic Cosmological principle ").

According to Plato' doctrine the observable Cosmos is created by Demiurge using a divine plan – First Sample (Tim. 30 c-d) from *non being* (μη ον" *in two basic stages*: "he has brought its from disorder in order (…**εις ταξιν** αυτο ηγαγεν **εκ της αταξιας …**), believing, that the second, certainly, is better than first"(Tim, 30a). Plato says that earth, water, air and fire were ordered by Demiurge "by the help of images and numbers". (Tim, 53 b)

What is possible to conclude from Plato's words? Cosmos was created by Demiurge *in two stages*. At the first stage the god creates *elements of the world*, which while stay disorder, and then from these elements Demiurge creates observable things. "Disorder" (**αταξια)** can be interpreted as "a chaos". The chaos was understood by Plato as "matter", but not as "substance" in modern sense, but rather as "nonbeing of substance" - μη ον (absence of any qualities). Why the matter is not "anything" from Plato's opinion? Really, we can't even sign on the matter, because than we must already ascribe to *its quite certain property*. But it cannot be done! The matter is deprived of any properties. It is impossible to say about the matter even, that "it is a matter" (Tim, 51 a -b).

The doctrine of Cappadocian about origin of the world

According to Plato the Cosmos was created by God from chaos agrees First Sample, i.e. with his plan (Tim, 28 b - 40d). Chaos was understood as a matter, which from the creative point of view is "nonbeing" – μη ον. The matter as dark, inert and evil basis cannot be created by God. Therefore, if it is not created by God, it is as old as He is.

The God of Hebrew tradition has created the world “from nothing” (Θεος εποιησεν ουρανον και γην **εξ ουκ οντων)** (II Mac. YII.28). This biblical statement preserved it's force untouched within first two centuries of Christianity. However in 2- nd century St. Iustin introduces some new elements of understanding the creation. According to St. Iustin, opinion the world was created by God from "a shapeless matter" – εξ αμορφου υλης.[9] Clement Alexandrines told almost the same, when he asserted about reduction of all things from condition “primordial disorder” – *παλαιας αταξιας*.[10] It is completely obvious, that it was Greek influence. But then arises a question: how to reconcile Platonism and Judaism? You see the Christians borrowed Judaic explanation of creation “from nothing " and did not recognize " of an eternal matter " of Plato. In opinion of Russian Theologian Victor Nesmelov: “in the specified places they actually spoke about the creation of the individual forms of being from one matter, which is created by God from nothing".[11]

It also was the conciliatory step between Platonism and Christianity. Thus consequences that Plato's μη ον itself is created "from nothing". However, what does it mean "from nothing"? Nobody has undertaken to explain that. So it is possible to

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[9] See: lustin philosophi et martyris Opera quae feruntur omnia, lenae, 1876,T.l,cap.lO.
[10] See: Klement Alexandrinus. Opera. Berlin-Leipzig, 1909.T.2, Lib.VI, cap. 16.
[11] Nesmelov V.. Dogmatic system of St. Gregory of Nyssa, Khazan,1887, P.328 (In Russian)

say, that the following step in understanding of this capital item of Cappadocian have made, first of all, by St. Gregory of Nyssa. The essence of his view could be reduced to following statements:

1) The question about the way of creation the world from nothing in being remained for the person incomprehensible.

2) In Bible it is said "At the beginning God has created sky and ground". The expression "At the beginning" means not temporal, but ontological correlation" - in a basis ". It is more "spatial" connection, indicating "a place of a source", than temporal. Such explanation is confirmed on St. Gregory of Nyssa by the second sentence: "the Earth was invisible and empty ". It means that" the Earth and sky " should be understood not literally, but as intelligible to the person of that time allegory of the created matter. Now," Invisible and empty " is necessary to understand so, that" at the beginning " by God from nonbeing in being forces of the world (chaos) were brought, and yet in the second act of creation - from connecting of these forces (chaos) in consecutive order the sensible world was made.[12]

We see, that "chaos" of St. Gregory Nyssa, "a shapeless matter" of St. Iustinus and "primordial nonconstruction" of Clement Alexandrines substantially were the same things. Therefore we draw preliminary conclusions:

The necessity was realized to explain described in Bible creation of the world with *two stages:* the first stage - at the beginning "from nothing "God has created matter (chaos). The second stage - from matter (chaos) God creates the specific forms of subjects of the sensible world.

Principle of genetic similarity of Human Being and Universe

[12] Opera St.Gregorii, episcopi Nisseni. Edit.Migne in : Patrologiae cursu completo, series graeca. Paris, 1858, T.I, col.770; col. 72d-73a.

The changes occurring in a modern science today, allows to make a subject of serious discussion such problems which were considered strictly metaphysical[13] earlier. As a preventative example of such problems can be considered Anthropic Cosmological Principle (ACP) in the basis of this lays the most ordinary fact: "the Universe is observable". ACP with all its formulations was a direct consequence of the Friedman's Theory of evolutionary Universe. Let's remind that the role of Observer was for R. Dicke by a locomotive of realization the basis for exact definition of age the Universe[14].

The inflationary theory has made the following step in the attitude to the Friedman's theory. A step from *the description and explanation of structure its general evolution* to concentration of efforts on the description and explanation *of the mechanism of the Origin of the Universe*. The theme, actually, closed for the evolutionary theory of the Universe – basically, because of a singularity's problem - becomes a central theme of the inflationary theory.

In this case it is fair to admit, that inflationary theory should too somehow correlate with the Human Being - observer. Inasmuch as the heuristics of the theory is addressed to an Origin of the Universe, so it is necessary to search correlation in the field of *an origin of the Human Being* also.

Really, from a field of biology is well known phenomenological law, asserting that philogenesis and ontogenesis of the Human Being are similar. The low approves that separate individual in embryonic development passes in " the shortened kind " all those stages, which all fauna has passed in the total development.

In 1994 we have assumed[15], that the achievement of the inflationary theory allows making the following step. Really, the inflationary theory assumes, that the universe in the development passes two basic stages: 1) first is connected with

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[13] See.: Toulmin St., The Return to Cosmology: Postmodern Science and the Theology of Nature, California Press, 1982, P.217.

[14] Dicke R.H. Dirac's Cosmology and Mach's Principle//Nature, Vol. 192, [Nov.4],- 1961.

[15] Pavlenko A.N. Being at its Threshold// Human Being, Moscow, - 1994, - №1.

exponential fast increase of volume of the Universe up to the sizes $10^{10\,(7)}$ cm. for very small time 10^{-43} sek. - 10^{-35} sek. Then there was so-called "a warming up of the Universe" and it literally occurs "on light" ; 2) "after occurrence on light" started second stage which was connected with usual Friedman's mode, when the universe changes too small.

This "two-staging" origin of the Universe strikingly correlates with a "two-staging" origin of the Human Being. 1) At the first stage the Human Being literally "inflates" in his volume from the size 10^{-7} (size of chromosome) up to the size $5 \cdot 10^{-1}$, that is approximately in 10000000 times! 2) On the second stage, after his "appearing on light" the Man is increased scornfully small - in 3-4 times.

Told above allows us to say about fairness of "Principle Genetic Similarity" of Anthropogenesis and Cosmogenesis. On the first sight this principle looks useless both for Cosmology and Anthropology. However, if to look at it more closely, are found out the amazing consequences, following from it.

So, for example, in modern biomedicine very painful is the question about " the moral status " of a fetus (embryo), that is to say *the Human being in prenatal condition*. The supporters of legalization the "artificial extraction of fetus" (the abortions), assert that "mother's fetus" *is not " the subject of the moral attitudes", as deprived consciousnesses, and therefore its "artificial extraction" is not moral, but medical problem*. The principle of "genetic similarity of the Human Being and Universe" unequivocally asserts, that prenatal stage in development is even richer under the contents than postnatal one and, hence, both Human Being and Universe *before* their "appearing on light" in any way do not concede to themselves *after* appearing. Modern Cosmology on behalf of the inflationary theory here is directly entered for the Human Being! The Human Being *is self-identical and self-valuable animated essence at all stages of his development,* both with the shown consciousness and without this display. In what is a source of such "irresponsible" attitude to the Human Being?

As a monstrous argument, as we now in reality see, in protection of the supporters' artificial extraction of fetus, claim the words of Descartes - *cogito ergo sum* - subsequently borrowed by some researchers as a basis of their Philosophy. "The Principle Genetic similarity" finds out not only "limitation" of Descartes approach, but directly demonstrate literal harm caused by him to moral self-consciousness of the Human Being and through him for human existence itself!

This inference arises at the first approach to "the metaphysical" consequences of inflationary theory as a whole.

Conclusion

We see that the main direction of European Thought in explaining of the Cosmos' (Universe') Origin on every its step suggests existing two stages: "prenatal" and "postnatal". In our case it does mean the real "Harmony of Cosmos", In our case it does mean the real "Harmony of Cosmos", of which Plato spoke two and a half thousand years ago. I am too far from attempting to speculate on applying the newest dates of modern Cosmology to Ancient and Middle ages' thinking. So, "The Principle of Genetic Similarity (PGS)" is a real controversy both to the Anthropic Cosmological Principle (ACP) and to the Copernicus - Bruno Principle. In contradistinction to ACP the Principle of Genetic Similarity *doesn't assert the causal dependence the physical properties of the Universe from observer's (Human Being's) existence*. In contradistinction to the Copernicus - Bruno Principle the Principle of Genetic Similarity *doesn't deny connection of the Human Being with properties of the Universe.*

The Principle of Genetic Similarity, following to Plato's "Cosmological Principle", asserts only *correlation (Harmony) between Universe (Cosmos) and Human Being.*