Journal of Siberian Federal University. Humanities & Social Sciences 9 (2012 5) 1304-1335
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УДК 124.3

Cosmology and Teleology: Purposiveness in the Study of the Universe Through the Reading of Kant's Third *Critique*

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Received 5.06.2012, received in revised form 22.07.2012, accepted 1.08.2012

This paper investigates the delimiters in cosmological research which originate in the structure of the human knower, in particular, how the purposiveness of human actions cascades towards the purposiveness of cosmological research. It is not dealing with a traditional teleology, which would imply the study of the purposiveness of the universe's physical evolution. It rather deals with a "formal" purposiveness of cosmology related to the explicability of the universe. This explicability is linked to the human intentional search for the sense of its own existence in the universe, so that the purpose of explanation in cosmology is related to the explication of the human condition. It is argued, in particular, that the theoretical representations of the "universe as a whole" and "the Big Bang" (as the encapsulated origin of the universe) act as the telos of cosmological explanation and, hence, as well, as the telos of anthropological explanation related to the origin of individual persons at birth. As a historic-philosophical reference, the method of Kant's Critique of Judgment is used, which is quite novel and unexpected in questions related to the philosophy of science.

Keywords: cosmology; teleology; judgement; purposiveness; explicability; humanity.

Introduction

In this paper we continue to investigate the delimiters in cosmological research which originate in the structure of the human knower (See: Nesteruk, 2012). In particular, we concentrate on the issue of how the purposiveness of all human actions cascades towards the purposiveness of cosmological research. Purposiveness of the research is not purposiveness related to the alleged object of this research that is the universe. In this sense we are not dealing with a traditional teleology, which would imply the assertion in the purposiveness of the universe's evolution. We rather deal, as we could say together with Kant, with a "formal" purposiveness of cosmology which, because of the specificity of its subject matter, has to conduct its research under the assumption that there is a goal of research, the motivational purpose, related to the explicability of the universe. However, we argue here that this explicability originates in the human condition, that is in the human intentional search for the sense of its own existence in the universe. Thus the purpose of explanation in cosmology is related to the explication of the human condition. Correspondingly the purposiveness of

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cosmological research acts as a certain delimiter in the explicability of the universe related to the human condition.

In discussing the matters related to teleology, we need to start by noticing that contemporary natural sciences consider any sort of teleological explanations as inacceptable and inappropriate. The objections are perennial and can be reformulated as follows. The first one is that teleology is treated as if it represents the causal operation in the present of future events. If there is a process which is a subject to this teleology it must be purposive, that is progressing towards a goal, so that every event in in this process must be explained by reference to this goal, which determines the course of the whole process. Contemporary physics maintains it is impossible to understand how a future material event (the goal) can causally influence an event that precedes it. Teleology seems to be incompatible with the efficient physical laws which govern the universe of inorganic bodies. Certainly there remains an open question about the facticity of the laws of efficient causality themselves, namely whether these laws, being related to the boundary conditions of the universe (which are beyond space and time), are in place according to the transcendent *goals* of the universe as a whole.

In contradistinction to the physical causality of the processes of non-living matter, the case of human action is understood in terms of consciousness and intention. In the realm of human affairs causality is complemented by intentionality. In scientific research, for example, scientists are aware of their purposes and aim at them consciously, so that their actions are caused not by some future events related to nature, but by their present awareness and the intention to act which they consciously form from within an intellectual intuition. In other words, in all aspects of being where consciousness is involved teleology is permissible as related to the intrinsic teleology of any human activity.

It is teleology related to human purposive action that will be in the center of our interest in this paper. However, being concerned with cosmological research, there is one particular feature of such research activity (as "goal-directed") which will make the case of cosmology special in comparison with other purposive human actions which usually assume that the determining cause of such an action comes at the end. In any conscious purposive action it is assumed that the prevision of this "end-state" is characteristic of the process and is the inspiration to action. It is usually the case that the end-state of a purposive process is the goal at which the action is directed, so that the action is supposed to terminate when the goal is attained and will mark the end of the process in time. Cosmology positions itself aside from this, so to speak generic case, because the goal of its research is related to what is called the "universe as a whole", the concept of which cannot be attained in any finite time. Correspondingly the purposive activity in explicating the universe is an open-ended process (Nesteruk, 2012), an *open-ended teleology*.

Indeed, the open-endedness of purposive activity is obvious since cosmological research goes in phases of success and failure, so that the intermediate "end" of such a process is not necessarily that at which the activity aimed. The fulfillment or "satisfactoriness" of cosmological theory can have only a temporary character, so that the acting *telos* of research (as directed to the universe as a whole) does not cease to function as long as consciousness itself is in existence. In cosmology any research action has a conscious aim, often accompanied by the imagination of the disclosed state of the universe which the researcher is trying to bring about, but this imagined wholeness of the universe is not the state of affairs in which the activity is supposed

actually to terminate even in the case when the activity is successful within the stages of research. In fact, for a cosmologist, it is impossible to imagine what it would be like to attain the end of research at which he is aiming. One may not even know clearly what is that something which a cosmologist tries to bring about because this something is being brought into existence in the course of research in spite of the fact that this same research is driven by the anticipation of that which it wants to articulate.

Whatever awareness a cosmologist may have of the goal which he seeks in his purposive research action, this goal is not just an event or set of events of the ultimate disclosure of the universe, conceived as in the future. This goal is something which, by his own effort and activity, a cosmologist is engaged in bringing about. The achievement of the *telos* of the research and thus the formation of that which this research attempts to disclose and articulate is not conceived as preexisting and thus disclosed in the future without a cosmologist's active participation. In a sense, cosmological research is dealing with its goal in the making, and the goal is what this activity is all the time generating. Cosmological research thus can be described as a process in which the outcome is all along immanent and potential, or through which the "final state" (the universe as a whole) is being generated. The purposiveness of such an action can be seen as a deliberate use of the knowledge of laws of physics in order to bring about desired "effects", that is, in our case, the picture of the universe as a whole.

In order to appreciate the peculiar character of teleological activity in cosmology, if human purposiveness in general is taken as a model, one must consider the relation between the subject of research (the agent) and the intended objective pole, that is the universe as a whole (the end), the properties of the latter, in virtue of which this universe as a whole appeals to the subject as worthy of pursuit, that is, indeed, as that *telos* which drives cosmological research. This issue is closely related to the basic function of the human thought. The idea of the universe through the sense of belonging to it organizes our desires and directs our energies to the pursuit of theoretical models and their alleged physical references in such a manner as to attain what, through its activity, one anticipates as the total satisfaction of the enquiring person because the objects are consciously and persistently pursued only as contributing to the alleviation of the existential anxiety of the person. Elucidating the sense of the universe means to elucidate the sense of one's own existence which is always encapsulated in any form of quest for the universe.

It is because cosmological theories naturally compete and conflict even in a single researcher (one can recall Einstein's blunder over the use of the cosmological constant), and because no single researcher can satisfy the criteria for "objectivity" of their research intentions without the assistance of the scientific community, that the satisfaction of the self of a cosmologist involves a complex process of organization of knowledge, which one usually calls education and training in which some kinds of scientific strategies are given up as incompatible with those accepted and agreed views of the scientific community. Finally, one can speak of the cosmological enquiry as a system of activities, or a way of life, which is found to be the most satisfactory, on the hand for purely scientific and communal reasons and, on the other hand, for the maintenance of personal existential commitments. Being placed in the system which involves the communal aspect of science and which provides for a given researcher the criterion by which one judges the coherence of research strategy and its objectives, the existential anxiety and objective in disclosure of the sense of the universe is subjected to correction and choice. Thus conscious purposive activity in

cosmology is not impelled by any simple force or drive towards an imagined object, nor is it drawn towards some single event (ultimate disclosure) which is supposed to occur in the future, but is the continuous endeavor to maintain, in a self-conscious personality, a dynamic system of research activities and satisfactions which are continuous with a corresponding system of the never-ending human enquiry into the sense of its own existence. One must point out that the "object" (the universe as a whole) which research activities pursue are satisfactory only to the extent that they maintain the system which does not frustrate existence. Correspondingly the pursuit of knowledge of the universe as a whole is chosen for the purpose of maintaining the sense of life and this qualifies as conscious purposive action. It is, therefore, the property of the universe to be a special sort of the whole of life which renders the objects of conscious purposive action, that is cosmological research satisfactory. Then the aims of such action are not "ends" in the temporal sense of finality, *because the real and ultimate aim is the persistent maintenance of the system of enquiry into the sense of existence*. Correspondingly cosmological enquiry is not simply a linear process which aims to terminate in a state of satisfied rest, but a continuous activity, all of which is intrinsic to the satisfactory state of consciousness of those who enquire in the sense of existence. Hence the cosmological quest is at one and the same time both means and end. And thus is our main thesis: there is a *teleology* of explication in cosmology which drives research but which has an existential origin, related to the purposiveness of any human action, in particular, to the desire to explicate the sense of existence. But this teleology, *de facto*, determines the strategy of cosmological research and thus acts as a delimiter relating the extent in the unconcealment of the universe to the parameters of the human existence.

To assign to the thus outlined view of teleology in cosmological research a more rigorous philosophical status, we turn, as a matter of a historical philosophical reference, to some classical writings of Kant on the paradigm of *teleology* as contraposed to that of causal physical explanation. The aim of this reference is to invoke Kant's argument for the demonstration that the prevailing mathematical physics' trend in cosmological research implicitly contains its own teleology so that the teleology of research not only does not contradict the mechanistic-like approach to the study of the universe, on the contrary it is this teleology which ordains physic-mathematical study of the universe. The methodology of research, which implicitly drives cosmologists to the disclosure of the universe, contains teleology as its inevitable component related simply to the purposiveness of any human actions.

It is known that Kant in his investigation of teleology in his *Critique of Judgement* made a shift in emphasis away from metaphysical aspects of the study of nature in the direction of the methodology of this study. It was no longer a question of the way the world is, but of what it is possible for us to know and to understand. The phenomenal world is not given all at once, but unfolds as we investigate it. One particular aspect of scientific methodology which was promoted by Kant and which we want to explicate here, in the context of cosmology, is the *purposiveness* of cosmological research which implies (in spite of all attempts in modern scientific enquiry of the universe to get away from teleology as related to the final causes of the universe) that teleology is intrinsically preserved, not in respect to the material references of cosmological theory, but in respect to the very way the cosmological enquiry works, that is as how teleology pertains to the essence of human enquiry into the nature of the universe, but also into the nature of human beings

themselves. To make the explication aimed at, one needs to relate cosmological ideas not to Kant's views on the scientific systems as they were presented in his first *Critique* and other treatises on the natural sciences, but, and this is novel and unexpected, to his *Critique of Judgement*.[1]

Before Kant published his *Critique of Judgment* in 1790, his writings on science, including the *Critique of Pure Reason* and *Metaphysical Foundations of Natural Science*, were concerned with the logic and structure of scientific systems, as well as their justification. Kant believed that the ideal model of scientific knowledge was the Newtonian physics, so that, in general, the only legitimate explanations of natural phenomena can be provided by mathematical physics. It is in the first *Critique* that Kant formulated the general methodological presuppositions of the possible scientific system of knowledge. However, it is only in the *Critique of Judgment* that he approached science differently, observing it not as an accomplished system, but as a research program and strategy, as a mode of human activity. The motive of Kant's enquiry was the question of the *limits* of scientific investigation which could follow from setting of scientific process in the context of the human historically contingent condition. Prior to this, Kant had already given some responses to this question in his epistemology of science asserting that scientific investigation is limited to study of the phenomenal world, whose objects are to be located in space and time and subjected to the categories of the understanding. Since our interest lies in cosmology and we are concerned with its alleged "object", the universe as a whole, one can easily grasp that cosmology deviates from that pattern of explanation which was prescribed by Kant on the basis of the Newtonian physics. Kant's epistemological prescription, related to space and time, as well as to the exhaustion of the object through categories, cannot work in cosmology and Kant himself placed the enquiry on the wholeness of the world in the context of his cosmological antinomies of reason which explicate the limits of discursive thinking (as well as to cognitive faculties in general). Nevertheless one wonders whether there are any features, related to our structure as human knowers such that, in spite of constraining the ways and scope of our investigation of the universe, they allow the justification of research strategies of present cosmological theories which pretend to understand the universe as a whole. To answer this question it seems reasonable to refer to some ideas of Kant's *Critique of Judgment* dealing with teleology in understanding nature; for we believe that it is the underlying teleological propensity of human subjectivity which allows it to assert the universe as a whole not as a metaphor or as a limiting pole in human understanding, but as that intrinsic existential *telos* which encourages humanity for self-understanding in the background of its ambivalent position in the universe. However, before we turn to a more detailed employment of Kant's ideas, one may, as an example, give a hint of how *teleology of cosmological explanation* revealed itself in a methodological move which, by its historical and methodological essence was *anti-teleological*.

Cosmological principle and explicability of the universe

The universe as space-time continuum is linked, according to general relativity, to the distribution of matter. Since we cannot empirically verify the statistics of distribution of matter from other locations in space, we have to speculate on its overall distribution in the universe appealing to non-physical and non-testable assumptions. The universe seems to be isotropic from what we see in the sky if the scale corresponds to the clusters of galaxies. This isotropy, as an empirical observation, is a

contingent fact linked to the specificity of our location in space.[2] The fact that the universe looks isotropic from our earthly position does not entail that the universe should look isotropic from every possible location in the universe. However, if one assumes that it is only from our position that the universe looks isotropic (but not from others), this assumption carries with itself a suspicion in a kind of *teleology*, namely that our position in the universe is somehow biased, or intentionally adjusted in order for us to observe the universe as isotropic. In order to remove this teleological flavour, cosmology postulates that the observed isotropy of the universe must be extended to all possible locations and this entails that the universe is uniform, that is homogeneous in space. The cosmological principle represents a refined version of the *hypothesis* of a formal interchange of home-places having a counterpart in physical reality related to a particular geometrical aspect of what as a phenomenon is given to human consciousness on Earth. If the cosmological principle is valid all enquiry into our absolute position as observers in space looses any sense because all locations in space become equivalent: the symmetry of space entails the loss of information of the absolute position in it. As sometimes said, humanity's position in the universe becomes indifferent, or mediocre.

The idea of our indifferent position in space, which, as is known, was inaugurated by Copernicus[3] in the context of a solar system and taken by Bruno (through a theological argument[4]) to a sort of extreme, was a prevalent trend after the scientific revolutions of the 17th century, so that modern cosmologists, as inheritors of the same desire to mathematize nature and to subordinate it to the laws of physics, felt obliged to apply the same principle to the large-scale structure of the universe whose elementary constituent – cluster of galaxies – became available to observations only in the 20th century. Thus most contemporary cosmological theories contain, as their basic ingredient, the so called "cosmological principle" (sometimes phrased as the indifference principle) which postulates the uniform distribution of matter in the universe and, as its consequence, the uniformity of space in the universe.[5] Here one note that the principle which advocates the mediocrity or indifference in the position of humanity in the cosmos (that is, historically, incorrectly associated with the name of Copernicus whose intention was not to displace humanity from its centre) must be understood not simply as a cosmographic *ad hoc* statement, but in terms of that which this principle effectively rejects, that is the *teleological* assumptions about the biased, selected position of humanity in being, including its special cosmographic place (See McMullin, 1993, p. 373).

It is not difficult to understand that only under this assumption (namely the cosmological principle), is any scientific methodology of studying the universe as a whole in cosmology (not stars, galaxies etc. in astronomy and astrophysics) possible. Indeed the uniformity of the universe is needed in order to predicate its properties in terms of the same physical laws in locations which are fundamentally inaccessible to our reach (nomological uniformity). The integrity of our intelligence must correspond to the integrity of the cosmos, and this integrity is best expressed in terms of its uniformity. The global picture of the universe would not be possible if in every corner of it physical laws were to be different and the amount of all distinct objects or phenomena infinitely varied. The inexplicability of the universe would follow simply from incommensurability of the universe with our finite rationality. Indeed, astronomers claim that the amount of distinct objects in the sky is finite (Harwit, 1984) and some guess that their finitude is linked to the given "finite" cognitive faculties, whose "finitude" cascades

down to the integrity of the human picture of the universe (McLaughlin, 1985). The cosmological principle, by postulating the uniformity of the universe reduces the number of parameters of its description (related to the large- scale structure) to a minimum which corresponds to the human ability to explicate the universe as a whole. This description is generic, so that all contingencies of objects and aspects of space-time are eliminated from theory in order to avoid a problem with the infinite number of contingent outcomes of the physical laws. The physical law in this case means the postulate of a generic symmetry such that all concrete objects become indistinguishable. But, once again, it is only this description which makes possible any form of speech of the universe as a whole. The contingent facticity of various objects in the universe is replaced by the undifferentiated substance called the "cosmological perfect fluid" (related to clusters of galaxies and characterised by two macroscopic parameters – density and pressure) [6]. The "cosmological principle" implied in the specific form of equations for matter distribution in the universe provides a cosmologist with a necessary physic-mathematic tool, describing the universe in terms of the efficient causality of the laws of general relativity. However, one must remember that this efficient causality is ordained through the anti-teleological cosmological principle of the universe's explicability, the principle which, as such, is related to "another teleology", namely to the purposiveness of cosmological research. To amplify the latter point one must understand that the introduction of the cosmological principle, being de facto a different way of formulating the contingent facticity of what is observed (the contingent facticity of a potentially infinite number of objects is transferred to the contingent facticity of the generic symmetry), does not explain the contingent facticity itself: as such it does not explain *why* the universe is uniform. We need uniformity of the universe as a principle of its explication, but this demand for the uniformity comes from human researchers in cosmology, who realise the purposiveness of their actions in explication of the universe through the postulate of the cosmological principle. Thus, being anti-teleological in its initial intentions, this principle remains teleological, but on a different level, that is on the level of epistemology.

One must notice that the "cosmological principle" changes our perception of the contingency of our spatial position in the universe. If the universe is uniform in terms of matter and space this implies that it looks similar from all possible locations (assuming that there can potentially be observers in these locations). This evidently diminishes any insistence on the special spatial contingency of humanity in the universe: we could be anywhere and observe the same. This means that the fragment of the universe which is visible to us, while being limited in its particular image from our vantage point, makes a fair representation of that which is possible at all. However, one must remember that the actual observability and the possibility of theoretical explication of the universe as a whole requires more than the uniformity of the universe formulated at the level of clusters of galaxies. One expects that the conditions for existence of life in one particular galaxy and particular planetary systems are much more sophisticated and are controlled by cosmology only on the level of necessary conditions. The explication of the actual appearance of life on Earth and human conscious beings requires an appeal to a different type of explanation, not only in the realm of physics. Indeed, since life on our planet is now dependent on and controlled by socio-economical as well as ethical factors, which are secondary with respect to the natural conditions, the continuation of life requires a certain spiritual

commitment (as humanity's *telos*).[7] Then the explication of the universe intrinsically contains the elements of the acting *telos* of explication of life itself: the purpose of understanding the universe lies within the purpose of understanding life, and vice versa.

As we have seen, the cosmological principle was introduced in modern cosmology as an "anti-teleological" move which fights teleology on the level of material poles, *nexus finalis*, in the universe. The universe as such is stripped off of any purposiveness, any intention behind its structure, any design founded in extramundane reasons. However one cannot say that teleology is removed from cosmological research completely. The very treatment of the cosmological principle as a transcendental principle, as a principle of explicability, inserts teleology back as formal purposiveness of research as such. Indeed, the purpose of cosmology is to explicate the sense of the universe. This purpose originates in the innate urges of human beings to understand their place in the universe and, in general, to understand the sense of human existence as such. In this sense the purpose of research is directly implanted into the purposiveness of all human actions. Then the purpose of cosmology, that is to explicate the universe, becomes a particular manifestation of the existential *telos* of humanity. But, to explicate the universe one needs the cosmological principle, which effectively replaces the alleged purposiveness of the material universe by the formal purposiveness of cosmological explanation.

Correspondingly the centrality of human beings in the universe being deprived of its absolute cosmographic sense, is reinstated to the centrality of disclosure and manifestation of the universe through rationality. Human beings are still in the centre of the universe because the universe becomes palpable and self-conscious through human beings who live in a particular period of cosmic evolution when the large-scale structure of the universe is accessible to observation and explication.[8] Claiming the centrality of the universe in this sense does not mean that we imply that the universe was created with the purpose of our coming into being or that it evolved bearing us in mind. What we say is that the universe supports us and this is a fact inherent in physical laws, not in any particular "conscious will" of the universe itself. On purely physical grounds it seems improbable that such physical agencies in the universe as dark matter intentionally organised its forces over billions of years in order to pull atoms together in galaxies, containing stars and ultimately us. The balance of cosmic forces did not cradle our galaxy and the Solar system for the benefit of our arrival through biological evolution. Probably, if physics is right the universe had to be exactly that which it is now according to physical laws. Certainly the facticity of this physics is an even greater mystery related to the boundary conditions which are not controlled by physics itself. In this sense, if one refuses to appeal to the questions of the purposiveness of creation of the universe through special initial (or boundary) conditions, one has to admit that the only efficacious *telos* of the universe is its explicability by human beings for whom the purposiveness is implanted in any practical actions. If then the aim of cosmology is to attempt to understand the contingent facticity of the universe, and through this the contingent facticity of life itself, this aim, referred in cosmological research to the initial (boundary) conditions of the universe, becomes teleological *per se*. Correspondingly the past of the universe as that "grandfather" or "grandmother" of humanity receives a different meaning: it is not only knowledge of this past which matters, but most of all the spiritual leap to this past as respect for that which constitutes an inherent teleology of human life.

Purposiveness in scientific research and cosmology

In general, any strategy of scientific research aspires to have a guarantee that the patterns of its enquiry will provide satisfactory answers to its questions. Applied to the wholeness of the universe, this aspiration is frustrated by recognising that the universe appears as an aggregate of contingent laws which apply across the universe, but the origin of these laws, which is attributed to the boundary conditions in the universe are beyond human comprehension. Even if we grant, along the line of Kant's thinking, that there are synthetic universal and necessary principles that are employed in our enquiry of nature, it does not follow that any particular discovered natural law is also synthetic and a priori, and therefore, universal and necessary: it can be the case that these laws are active only in that part of the universe where we live. For Kant all natural laws, although some of them are in a restricted sense «necessary», are synthetic and a posteriori, which means that although they are indeed the laws *in* the universe, it is logically and conceptually possible that the universe as a whole might have been governed by quite different laws. The framework of scientific cosmology implies that the universe must be coherent with the categories of the understanding, but it does not tell us in advance of how and along which ways this could be discovered. To know in advance that the universe must be exactly that which is actually discovered would involve a human subject in the impossible kind of intuition of the universe as a whole which recalls a mystical communion. Expressed in modern terms, based on the understanding that scientific synthesis rooted in mathematical physics presupposes computational synthesis, this assumption would be tantamount to the possibility of an infinite computational synthesis which is impossible because of the finitude of human embodiment. In Heideggerian language, the foreknowledge of the whole universe would imply the completion of the unconcealment of the universe and removal of all delimiters in its knowledge related to humanity as a measure of this unconcealment (Heidegger 1991, pp. 91-95). In other words, humanity must have been considered in this case as commensurable to the universe as a whole, which is philosophically a weak point. Correspondingly in Kantian terms, the intuition of the universe as a whole would amount to divine foreknowledge; but critical philosophy was rigorously opposed to any claim for the possibility of mimicking this god's-eye view of the universe.

The brute empirical fact is that we continually encounter *items* in experience that cannot be fully understood, and for which no theoretical concepts are at hand. In cosmology this situation is particularly manifest in its assertion that ninety six percent of the material content of the universe is described by the so called dark matter and dark energy; the observations, to fit into theory, demand one to postulate their existence. However, what these dark components of the universe are nobody knows at this stage, for there is no experimentally evidenced carriers of these two types of matter. In this sense, both these components of the universe represent such *particulars* whose theoretical generation and structure cannot be fully understood with reference to mechanical principles based on the patterns of efficient causality simply because this very causality, exercised at the theoretical level, cannot be applied to all things which are in the realm of experience. However, the contemporary model of the universe operates with these notions of dark matter and energy as if they were determinate from their concepts on the level of material causes. Unfortunately this is not the case, and in spite of any realistic commitments with respect to these notions they still remain those particulars for the understanding of

which we require *judgment*. The same is true for the concept of the universe as a whole (in spite of the fact that to think of the universe as a particular seems to be strange). The universe as a whole cannot be a subject of theoretical knowledge restricted to the schematism of the forms of sensibility and the understanding. The notion of the universe as a whole represents such a "particular" which escapes any determination on the grounds of mechanistic-like causality because by its definition the universe is beyond any *relationality* based on worldly causality. In its sheer givenness to us, the universe is an escaping, irregular "particular", which demands from us an exercise of a faculty of *judgement* in order to attempt to understand it. In this sense the exercising of judgment with respect to the universe ultimately vindicates the very enterprise of the physical cosmology: to initiate the process of the study of the universe (based in the faculties of reason) we need to have prior *judgment* of it.

The fact that the universe as a whole falls under the rubric of an irregular "particular" follows from the very definition that the universe as a whole cannot be in the chain of causality which we usually ascribe to its visible part. Here is the essence of Kant's critique of the concept of the world. In this respect the universe is freely generated by escaping all transcendental delimiters, and what it turns out to be could have been otherwise: the universe is presented to us in its contingent facticity.

It is worth making some terminological clarifications in order to elucidate the meaning of that which is meant by the phrase "judgement of the universe." Kant defines the faculty of judgment as "the faculty of thinking the particular as contained under the universal" (CJ, Introduction, IV, p. 15). The faculty of judgement with respect to a given particular which is to be thought as included in a general rule, principle or law can be *determining* or *reflective*. Any judgment that includes an individual or event in the rule, or under a categorical scheme, is determining. This is true of any judgment that subsumes a particular under a given law or concept as principles (CJ, § 69, p. 232). If the universal rule, principle, or law be given, the judgment which includes the particular under it is *determining*.[9] In contradistinction to that latter, the *reflective* judgement is to subsume the particular under a law (the universal) which has to be found (CJ, § 69, p. 232; Introduction, IV, p. 15).

Reflective judgments seek to subsume particulars under laws which are not yet known, and thus can be thought of as principles which are formulated from themselves. It is because this judgement is not objective (as one would say not related through certain rules to empirical reality), it acts as a subjective principle for the purposive employment of our cognitive faculties, that is for reflecting upon objects (CJ, § 69, p. 232). The reflective faculty of judgement attempts to find a concept for the manifold of empirical data by means of which this is not represented in a discursive unity of an *objective concept*, but by means of how it appears in the form of a *systematic unity* of a whole organised according to the representation of a *purpose*. Such systematic unity is characteristic for the notion of the universe as a whole containing objects and laws which are supposed to fit in a logical system. The same can be made more precise by saying that the reflective faculty of judgement subsumes the representation of a particular (empirical aspects of the universe) under the *representation* of the universal, that is the universe as a whole, in spite of the fact that this universal is not given. Correspondingly it is because no universal is given to the reflective faculty of judgement related to the totality of the universe (or the Big Bang as an encapsulated initial condition of such a totality), that the task of this faculty is to reflect on a given representation of the universe (in it pieces and moments) and

to produce a possible concept (FICJ V (211), p.16), that is "to compare and combine given representation either with other representations" (that is to provide a *coherent* picture which unites different empirical representations of the visible cosmos), "or with one's cognitive powers, with respect to a concept which is thereby made possible" (FICJ V, 211, p. 16) (the cognitive faculty of the unity of consciousness which is capable of integrating the variety of empirical data under a conceptual symbol of the totality of all in all). The purposive employment of human cognitive functions is manifested either through achieving systematic unity through the coherence of explanation, or through establishing the relationship of all aspects of the universe to the unity of subjectivity.

Determining judgments are thus objective and are ultimately based upon a priori principles. Reflective judgments apply *maxims* which for Kant are always subjective and are only to be employed regulatively (CPuR, A666-68/B694-96). According to Kant's definition: "I entitle all subjective principles which are derived, not from the constitution of an object but from *the interest of reason in respect of a certain possible perfection of the knowledge of the object*, maxims of reason" (CPuR, A666/B694, p. 547) (emphasis is added). These maxims, in modern terms and in the context of our interest, articulate the *research strategies* deployed in order to understand the universe as expressed in its empirical laws (CJ, § 69, pp. 232-33). Kant's insistence that the maxims are subjective can be nowadays qualified as "intersubjective", or "collective" as related to the community of cosmologists. It is the community of cosmologists which determines what maxim, or methodology, to use in order to fit the variety of data in a reasonable theory, or alternatively adopts the criteria for reality of that which stands behind abstract mathematical theories, in particular, in those cases when the principle of correspondence with empirical reality does not work and one appeals, for example, to coherence arguments.[10] This happens, as an example, in the cosmology of the early universe when cosmologists choose as a maxim (that is a research strategy) the model of the so called inflationary universe on the basis of a possible resolution of some predicaments of classical cosmology.[11] Being a theoretical model of the remote past of the universe, inflationary cosmology cannot be tested empirically, so that its adoption as a strategy of theoretical research has a precarious status deeply based in a belief-motivated commitment supported by the collective opinion.[12] Thus inflationary cosmology functions in the conditions of a reflective judgement imbued with the *purposiveness* of explanation of the variety of astronomical facts as well as resolution of meta-empirical puzzles.[13] In addition one can mention another purposive dimension of inflationary cosmologies, namely the desire to address the issue of generic initial conditions of the universe, whose specialness (according to classical cosmology) points towards a fundamental contingency of the observable universe. It is by means of this "inflationary maxim" that cosmology reflectively seeks a knowledge of the kinds of theoretically expressed laws which can be used for the purpose of conceptual management of those *particulars* (three predicaments mentioned above, which are not part of empirical research) which as such escape the rubrics of efficient causality available to pre-inflationary cosmology. Correspondingly, reflective judgment on the unity and integrity of the visible universe, based on an intersubjective maxim (methodology), is *neither true nor false, not even probable or improbable*. Such a judgement is rather a *rational estimate* of the way the universe operates, and expresses a normative research strategy to render the universe explicable. The purposiveness of the

strategy implied in this judgement is related to the demand for explicability.

If one follows Kant, one must think of two major research strategies or maxims of reflective judgment which can be applied in cosmology:

1] The maxim of mechanism: "All production of material things and their forms must be judged to be possible according to merely mechanical laws" (CJ, § 70, p. 234). In other words, all aspects of the universe, including its alleged wholeness must be described by using physical laws established by earthly physics, so that the comprehension of the universe as a whole can be established by means of ascending through the empirical set of causations in the visible universe;

2] The maxim of teleology: "Some products of material nature [universe, AN] cannot be judged to be possible according to merely mechanical laws (To judge them requires quite a different law of causality, namely, that of final causes)" (Ibid). It is problematic to think of the universe as a whole as being subjected to physical laws, for these laws act across the universe, being perhaps the manifestations of its boundary conditions. In this sense if one enquires into the contingent facticity of the universe as a whole and its laws, one has to appeal to another type of "causality", that is causality as *origination* (not in a temporal sense) from some foundation, which itself is not part of that which is subjected to this alleged causality.

Correspondingly, in accordance with Kant, if we apply these maxims of judgement in respect of knowledge of the universe in cosmology, it becomes quite clear that the maxims cannot be formulated and treated as *constitutive claims* about the universe. The inflationary model remains only a model! The conflict between which is expressed by the propositions "the production of the universe is possible on mere mechanical laws" and "the production of the universe is not possible on mere mechanical laws" is irresolvable because there is no a priori way of determining the possibility of the production of the universe only through the empirical laws of nature: the universe cannot be rerun in the laboratory. Instead, the maxims express two different research strategies, that is the ways of studying the universe, which are, as we argue, not only non-incompatible, but, in fact, are both intrinsically unavoidable in order to sustain the wholeness of research.

Indeed, on the one hand, in view of Kant, unless the principle of mechanistic explanation is applied "…there can be no proper knowledge of nature at all" (CJ, § 70, p. 234). In accordance with this, in cosmology, one must push the investigation of the universe along the lines of mechanistic explanation (that is, the explanation based on causal physical laws) as far as possible. In our empirical investigation of the universe as causally connected, we should proceed in terms of the universe's purely causal physical laws as far as we can, for in these laws lie the true grounds for a physical explanation of the universe, which constitutes that scientific knowledge of the universe which we exercise through reason. According to Kant the efficient causality whose necessity was demonstrated in the Second Analogy of the *Critique of Pure Reason* authorizes every event.

However, the universe as a whole is not an object of possible experience and it cannot be labelled by the term "event" in the sense of an ordinary happening in space and time; one cannot know anything about the ultimate causal features related to the universe as a whole (the antinomies in the *Critique of Pure Reason* accentuate this point). We find that the universe as a whole (in contradistinction with the finite products of nature) represents what Kant would call "genera", in which the efficient causes acting upon the universe and giving it coherence and integrity, are contemplated by us (through study

of the universe's constituents) as based on the concept of a *purpose*, if we want to experience the universe in terms of a principle appropriate to its inner possibility. Suppose that we tried to judge the universe's form and its possibility merely in terms of mechanical laws, where it is not the idea of the effect which is regarded as the basis that makes the possible cause of this effect, but the other way round, that is the cause is regarded as the basis that makes the effect possible. If we tried this, we could not acquire (regarding the specific form of the universe) any empirical concept that would enable us to establish the transition from cause to the effect. For the effect we see in the universe as a whole is caused by its parts not insofar as each part on its own contains a separate basis, but only insofar as all of them together contain a joint basis (related to the whole of the universe) making these parts of the universe possible. But it seems to be quite contrary to the nature of physic-mechanical causality that the whole should be the cause that makes possible the causality of the parts; rather, here the parts must be given first in order for us to grasp from them the possibility of a whole. Further to this one can assert that the presentation of a whole as preceding the possibility of its parts functions as a mere *idea*; and when this idea is regarded as the basis of the causality it is called a *purpose*. Then one can conclude that in the case of the universe as a whole we cannot investigate its character and its cause as given in experience (that is explained by reason) without presenting it, its form and its "causality", as determined according to a principle of *purpose*. But the employment of the maxim of teleology in cosmology does not eliminate or replaces the maxim of mechanistic explanation, it just demonstrates that in some cases the maxim of mechanism cannot be straightforwardly applied. This happens in the case of the universe as a whole whose idea acts as a *telos* of cosmological explanation initiating *de facto* all particular models which are based on the efficient physical causality. The universe itself can only be understood as meaningful in its integrity if it is seen as being "produced" for the purpose of its explicability by human beings.

"The universe as a whole" as *telos* of cosmological explanation

The implementation of the maxim of teleology does not imply that it constitutes an objective pole of that which could correspond to the notion of the universe as a whole. Rather the maxim of teleology outlines the strategy of research as the explicability of the universe. For example, to understand the universe we need to find such a unified description of it in a minimal set of physical laws related to its initial or boundary conditions, so that this ideal description will act as the *telos* of cosmological research. The idea of the Big Bang in this case appears to be exactly the *telos* of explanation, the *telos* which is paradoxically referred to the physical past of the universe, and not its future.

In anticipation of a possible scepticism or objection to this conclusion, which could arise from the camp of cosmologists, one could make a general comment that teleology operates as an a priori presupposition in any scientific enquiry: this teleology is related to the goal of scientific explanation, its objective to disclose nature along the ways humanity is capable of doing so, in order to understand humanity's own "end", a "purpose" of its presence in the universe. In this sense, if teleology is implicitly present in the foundation of any scientific enquiry, it naturally subordinates mechanistic explanation ("ordains" this explanation) as the way to achieving the goal of this explanation, the goal which, as such, transcends all possible particular mechanistic explanations. Hence it is teleology, as the principle of purposiveness of research, that vindicates the usage of the mechanistic trend in cosmology's

attempts to deal with the universe as a whole in spite of clear understanding that this mechanistic trend will never be able to accomplish the goal for which it is used. It is because we must necessarily think of the universe as having purpose to be explicable by us that we are justified in applying the principle of causal efficiency to its visible parts. In a characteristic way teleology of explanation in cosmology functions as a transcendental principle, as a demand for the universe's explicability which cascades down towards some particular theoretical requirements, such as, for example, the cosmological principle, that is the uniformity of the universe in terms of space and matter, which receives its specific incarnation in the mathematical formalism enabling the universe's explication.

Now, it is clear that the concept of a purposiveness of the universe implied by the teleology of cosmological explanation serves us merely *for reflecting* on that which we would like to treat as an object, not for *determining* the object through the concept of a purpose, and that the teleological judgment about the possibility of contingent production of all possible objects in the universe is a merely reflective and not a determinative judgment. What we say is that our thought, in producing a concept of the universe as a whole, includes the thought of the "presentation of a purpose" (that is the universe as a whole as a material pole), because this thought serves us as a principle by which we can guide our investigation of the universe as a physical entity, and also because thinking the presentation of a purpose here might help us devise theoretical and experimental means to further the effect of the anticipation of the universe. However, expressing ourselves this way we do not attribute to the universe a cause that acts in terms of the presentation of purposes, that is in terms of some material pole. If we did so, we would be making a determinative teleological judgment which would be a *transcendent* judgment, since it would suggest a causality that lies beyond the bounds of nature.

Using a *teleological principle of explanation* of inner possibility of the universe as a whole, we leave undetermined whether the purposiveness of the universe implies or does not imply any transcendent *intentionality*. If a judgment asserted either of these alternatives it would no longer be merely reflective but would be determinative; and the concept of a purpose would no longer be a mere *concept of the power of judgment*, but would be connected with a *concept of* reason, that is the concept of a cause that we posit beyond the universe and which acts intentionally, whether we are in this case judging affirmatively or negatively. For example, if we imply this purposiveness as related to the intrinsic property of the universe which we do not experience, so that the purpose becomes, in Kantian parlance, a thing in itself, then this purpose is not a constitutive concept of understanding or of reason, but it can function as a regulative concept for the reflective judgment.

If the universe, as an object of our teleological judgment, is to be thought of as employing *reason*, so that reason produces the concept of a purpose, this would be something more than we could expect from judgment. All that judgment can do, as a separate cognitive faculty, is to consider the relation in which two faculties, that is imagination and the understanding, are related in a representation prior to the emergence of any concept, thereby perceiving the *subjective* purposiveness of the universe relative to its apprehension by the cognitive faculties. Hence, while judgment can indeed have a priori principles for the form of intuition, yet it cannot have a-priori principle for the concepts concerning the production of things, and so the *concept of a real purpose* of the universe, or its end in a physical sense, lies completely beyond the realm of the faculty of judgment. If in dealing with the

teleological purposiveness of the universe, this purposiveness is presented through concepts, judgment will have to put the understanding (applicable to the realm of experience, that is visible universe) in a relation to reason, which, in fact, delimits the understanding, thus making impossible any speculations on the universe as *natural* purpose. If the universe is treated as a concept, that is as a rational idea, it is subject to the Kant's first *Critique*, and thus can function only as a regulative concept for the reflective judgment, to guide our investigation about the universe as a whole by a distant analogy with our own causality according to purposes and in our meditations upon the universe's ultimate ground.

It is true that the concept of purposes and of purposiveness can be a concept of reason in the case we attribute to reason the basis that makes an object possible according to the implied purpose. In *products of art* we can become conscious of reason's causality as giving rise to objects, which are therefore called purposive or purposes. But the analogy with art is very limited, because the concept of the purposiveness of the universe relates reason, as cause, to things (the universe) where no experience informs us that reason is the basis that makes them possible. To attribute purposiveness and purposes to the universe is to use a concept, whose correlate cannot be found in experience. The concept of purpose is employed by judgment only for reflecting with its help upon objects, so that, in the experience of disjoined appearances and objects we are directed to the possibility of uniting them in a system. This is the reason why we talk here about the *teleology of explanation* of the universe, and not teleology of the universe as its natural end.

Indeed, the idea of a *telos* of scientific explanation comes through the reference to our own purposive behaviour in art, poetry and in practical matters: it is there that we can reasonably claim that effects of the activity are also its causes, that is those purpose-based projects which brought the effects into being. For example, if the purpose is to produce a painting of a landscape, correspondingly the effect is a particular reflection of the surrounding nature in a piece of art. This piece of art is an effect caused by the purpose to produce the image of the landscape, but the effect here becomes, through the *telos* set up at the beginning, the *telos* of producing an image of the landscape. In cosmology the situation is similar in that a cosmological theory can be considered as an effect caused by the purpose to produce the "landscape" of the universe, so that the effect becomes through the *telos* of explanation set up at the beginning. The difference is that the desired "landscape" of the universe cannot be accomplished, so that the effect of the cause is an ongoing intertwining with this cause. Correspondingly the *representation* of the universe as a whole[14], being a cause for the unfolding theoretical explication of the universe, according to Kant's definition, forms a purpose: "…the product of a cause whose determining ground is merely the representation of its effect is called a purpose" (CJ, § 77, p. 256). But this purpose is itself being constituted through the fact that it is not something preconceived and is always in the making through the research which is launched by this very purpose. Since it is understood that this purpose cannot be achieved as material knowledge, the question is as to how one can conceptualize "purposes" of cosmological explanation as fundamentally distinct from purposes related to technical, artistic, or practical contexts.

The representation of "the universe as a whole" is fit for judgment as a purpose of explanation because it satisfies the following condition: the representation of its existence and form of its parts must be possible only in relation to the whole. In modern cosmology this is manifested through a perception that the large-

scale structure of the universe effectively controls all physically isolated objects through the sheer fact that necessary conditions are determined by the global cosmological parameters (an example of such a conceptual causation is the famous anthropic principle in cosmology linking the necessary conditions of the biological life on this planet with the large-scale parameters of the universe). This is not empirical material knowledge, but the representation of the wholeness of the universe as related to its parts. As a purpose and hence as a potential end, the "thing" must be understood with reference to an idea determining a priori all that is to be contained in it. With respect to the whole of the universe it is impossible a priori to determine all its contingent components. However, the theoretical hypothesis that all its contingent components originate in the idiosyncratic singular state called "Big Bang" (in conjunction with the various versions of the so called "Theories of Everything") attempts to represent the universe a-priori as the potentiality of everything. Such a definition is usually made in the form of mathematics, which is devoid of any *intuitive* content (for this definition is hardly to be related to the world of experience); it is constructed on the *trans-logical* premise of the universal validity of intuition-free mathematics. This is also true with respect to the theories of multiverse which extend the idea of a unique singular state to the underlying ensemble of universes, similar to the perennial idea of the plurality of worlds. The above mentioned trans-logical premise corresponds to what Kant would describe as an attempt to establish accordance between the contingent things in the universe with our judgement in terms of necessity. To achieve this we must "think of *another understanding*, by reference to which and apart from any purpose ascribed to it, we may represent as *necessary* that accordance of natural laws with our judgement, which for our understanding is only thinkable through the medium of purposes" (CJ, § 77, p. 255) (emphasis added). The "another understanding" is that transcendent "subject" which contains as its intentional correlate the idea of the multiverse. Cosmology wants to assert the multiverse as that necessary foundation of this contingent world, where the contingency is related to the fact that this world is just one among the infinite many others.

Interestingly, the idea of the Big Bang, as an initial state of the universe, that is the non-originary origin of the universe (that is its remote past) effectively contributes to an argument of why the universe as a whole can be attributed the title of the purpose of explanation. If one uses the Kantian phrasing, the universe has parts that "combine in the unity of a whole such that they are reciprocally cause and effect of each other's form" (CJ, § 65, p. 220). Cosmology treats the Big Bang to be the cause of the visible universe, where this visible universe becomes an "effect" of the Big Bang. However, in cosmological knowledge as a process of purposive human action, it is the display in the visible universe that initiates the theoretical ascent to the notion of the Big Bang as the unifying origin of the variety of the visible. In this sense the Big Bang can be treated as an explanatory effect of integration of the visible universe in the whole system. It is then not surprising that the Big Bang, as the purpose of cosmological explanation becomes its efficacious *telos*. In the case where we seek to estimate the universe's causal dependence in such teleological forms, we are *constructing* the nexus of efficient causes productive of the universe's form – that is, the Big Bang – as the concept which is not the constitutive concept of the understanding and reason, but a regulative concept for the reflective judgement in order to guide our investigation of the universe (cf. CJ, § 65, p. 222).[15] A similar situation concerns any knowledge: every empirical cognitive judgement

assumes the objectivity of determining concepts and laws which fit in a logical system. Such cognitive judgements consider their objects hypothetically as purposive, that is, as the purpose of explanation; their objects are products of intentional actions (their intentional correlates), without assuming that they are artefacts (that is material creations).

The explicability of the universe as its *telos*

As we have discussed above, the reflective judgment, unlike the understanding and reason, can conceptualize any "particular" which escapes exhaustion by its discursive signifiers. This can be done either under the principle of mechanistic explanation or under the principle of teleology. Kant stipulates that this point involves a principle of reflection, which in a contemporary language can be qualified as a principle of explicability: "…for all things in nature empirical concepts can be found" (FI, V(211), p. 16). In other words, there is a correspondence between the universe and our understanding of it: there must be in the universe the conditions of its explicability. This means that one can reflect upon any object in the universe as organized in a sense that it is fit for knowledge by human beings. It is this purposiveness of the universe for being known, that is the adoption of a teleology as being hidden in the foundation of any knowledge, that encourages further investigation of the universe along the lines of efficient causality implanted in physical laws. The physical laws are applicable in cosmology only as being ordained by its intrinsic teleology, that is the teleology of explanation: one must apply empirical physical laws in order to understand the foundation of the visible universe. The strategy of cosmological research presupposes that either one of its parts, that is, that which estimates the universe teleologically, as an ultimate goal of explanation, and that part which estimates it, so to speak, "mechanically" (in order to fulfil the intention of having a systematic unity of the universe) are related to each other (Cf. CJ, § 77, p. 258).

If teleology ordains a "mechanical part" of explanation in cosmology, there must be epistemological assurance that the laws will be found, which fulfil the task of mechanistic explanation. Kant's attempt of such an assurance involved viewing nature as a whole on analogy with organisms as self-preserving: the affinities between species and members of species are provided through principles of preservation. One can extend this conjecture by introducing a principle of preservation of self-identity of persons in the course of their life from birth to adulthood and death. And it is this self-identity which is the ultimate purpose in understanding the uniqueness of a person. The explicability of the uniqueness of a person is driven by the desire for explicability of its unique origin, that is birth. This explicability presupposes a form of logic which is preserved in the course of life. Cosmology in turn presupposes that the contingent laws of nature have analogous affinities to their non-originary origin, and this affinity is provided by the logic of mathematical physics. The universe is to be estimated as a system of empirical laws in which the kinship relations are seen as holding between those propositions we produce in order to obtain understanding of the empirical which contains us: by understanding nature we understand ourselves. Kant, by developing the analogy between kinship of properties preserving life and the integrity of properties preserving nature, emphatically states: "Therefore it is a subjectively necessary, transcendental *presupposition* that this dismaying, unlimited diversity of empirical laws and this heterogeneity of natural forms does not belong in nature, that, instead, nature is fitted for experience as an empirical system through the affinity of particular laws under more

general ones. This presupposition is, then, the transcendental principle of the faculty of judgment, which is not simply a capacity of subsuming the particular under the universal whose concepts are given, but also the converse, of finding the universal for the particular." (FI, IV(209), p. 14-15). Continuing this thought, one can add that indeed the explication of the contingent variety of empirical laws and phenomena in the universe implies a transcendental principle of the faculty of judgment of finding the universal (Big Bang) for the particular (aspects of the visible universe extended in space and time) and this is analogous to finding the universal (the event of birth) for the particular (aspects of person's life extended in time) in the context of human personhood.

The latter quote from Kant, in the preceding paragraph, can be translated in the context of this enquiry as a principle which makes research strategies in cosmology intelligible and not as a metaphysical claim about the universe: in cosmology we are not subsuming all particular astrophysical discoveries under the known universal laws (we are not simply describing galaxies, their clusters or the microwave background radiation in terms of the laws of physics established on Earth as if these entities would be disjoint from each other); vice versa the universe as a whole is that universal which is being found for the particulars (all astrophysical objects in the universe are related to each other, for example, through their common evolution). It is this transcendental principle of the faculty of judgement which alone makes possible the explication of the universe as a whole. Whereas Kant employs an idea of affinity of laws for one another by referring to the analogy with the life-preserving properties of organisms which provide stability both for the species and for the individuals, in cosmology one can correspondingly talk of stability of properties of things and of forces that hold astrophysical entities together which are subjectively assured by the principle of affinity (galaxies and clusters of galaxies are held by the affinity to the law of gravitation[16]), which ultimately expresses the unity of the universe.

As a matter of methodological comparison with Kant's example of the inductive generation of the law of universal gravitation (CPuR, A662-63/B690-91) one can point towards a construction of a scenario of the so called inflationary cosmology. As we have mentioned above, historically, the emergence of inflationary cosmology is usually accounted as a response to three meta-empirical problems (puzzles) in the standard hot Big Bang cosmology. They did not appear as a result of formal disagreements on the level of theory and observations and by its origin they are not due to physical causation among the elements of theory and observations but rather represent the influence of the intentional motives originating in the integrating tendencies of human subjectivity to account for the contingent facticity of the initial conditions in the universe. Before the advance of the inflationary model in the 1980s it was believed that the problem of the initial conditions of the universe needed a quantum description. The discovery that one can use classical gravity to address the problem of the initial conditions made the whole theory less speculative and in this sense "realistic". Thus, the three problems (or puzzles) which led to the advance of inflationary cosmology are known as the flatness puzzle, the monopole problem and the horizon problem. Seen at the meta-empirical level these problems (flatness, monopoles and horizon) originate from different angles of view of the universe and thus have a different weight in the inflationary argument which attempts to resolve them. Without going into detail one can state that under the assumption that all these problems exhibit affinity to the same laws of physics, there was made a hypothetical suggestion that all problems

can be resolved if the general law of expansion of the universe were to be exponential in time. Correspondingly the overall substance of the universe is thought as an indefinite field (called "inflaton") which, as we mentioned above, at this stage of research does not have any experimental references. Thus, using the Kantian language, the universals, like the inflaton field, which is responsible for another universal – the exponential geometric expansion – were introduced in order to subsume "recalcitrant particulars" (Cf. Butts 1990) (that is three cosmological puzzles). Exponential expansion of the universe is treated as the "natural kind" that establishes affinities between the kinds of meta-empirical puzzles, thus providing unification of otherwise unrelated sorts of observed phenomena. In analogy with the Kantian appeal to the principle of affinity which discovers "…a unity in the generic forms of the orbits, and thereby a unity in the cause of all the laws of planetary motion, namely, gravitation" the assumption of inductive affinities in the standard cosmological model which conciliates otherwise disparate and unrelated facts (three problems) discovers (predicts) the law of the exponential expansion of the universe. What is important here is that there is a *teleological commitment* implanted in the whole history of construction of inflationary cosmology related to the desire to explicate the unity of otherwise disjoint aspects of the universe. It is this sought unity (as well as desire to construct generic initial condition in the universe which remove the problem of their contingency) which becomes a *telos* of explanation in inflationary cosmology, so that the implicit teleology ordains the usage of the "mechanistic-like" trends (that is causal physical dynamics) for explication of this sought unity thus producing a physic-mathematical model of the inflationary universe.

Another important aspect of Kant's explication of the function of reflective judgment in science is that is requires the presupposition that the universe's empirical laws are related in the form of a deductive system, that is, the laws discovered on the assumption of inductive affinity also form a deductive hierarchy ranging from most to least general propositions (in contemporary usage this would amount to the assertion that empirical laws have their mathematical doubles organised in structures). The unity of natural kinds (empirical objects like galaxies and their clusters) is preserved by inductive affinity; the unity of the truth of the system of laws is preserved by deductive logic (unfolding from the mathematical hierarchy underlying physical laws). It is not a matter of theoretical knowing that entitles us to think that nature forms a set of inductively and deductively interrelated empirical laws; for knowledge itself it is possible because of the underlying correspondence between inductive affinity and deductive hierarchy. Both "mechanistic-like" explanation, or teleological pattern of reasoning do co-exist with no serious contradiction. In both cases, in order for human patterns of judgment to be possible at all, the whole of the universe must be treated as being "designed" in a very special sense (related to what has been said above): the correspondence between inductive affinities of empirical laws and deductive patters of mathematical explanations is the manifestation that the universe can be treated as being produced in order to become explicable. The principle of the universe's explicability, being a transcendental delimiter in knowledge of the universe, thus reveals itself as that hidden *telos* of cosmological explanation, from which all cosmological theories receive their theoretical content. The *telos* of research is to explain the universe.

As a result of our deliberations we can see that the maxims of teleology and of the mechanism initiate different stances with respect to research in cosmology which turn out

ultimately to be intertwined. Our intention was to show that human faculties of judgment cannot operate without teleological commitments, and that, even though mechanistic-like explanations promote the interests of categorical knowing and make possible knowledge of nature "in the true sense", that is knowledge in mathematical physics, the maxim of the mechanism is ordained by the active *telos* of cosmological explanation related to its explicability.

Let us now elucidate the point of constructing the concept of the universe as a purpose of explanation of nature in general. According to Kant those things which are considered to be possible only as purposes of nature provide the "best proof of the contingency of the world-whole" (CJ, § 75, p. 246). The universe as a whole, taken to be the purpose of our quest, and found by us in the given form of the visible universe, could have been otherwise. Modern cosmology understands that this is the problem and attempts to escape the contingency of the universe (and hence the design-like pattern of its explanation) by constructing the most generic *initial* conditions which would follow from the immanent physics (See Albrecht, 2003). Sometimes the initial conditions are replaced by the "boundary" conditions, or, more precise, by a form of the dependency upon "natural" laws enacted *by* or *in* the so called Multiverse – a new version of "intelligent and extramundane" being which operates as a designer of our universe. This move of thought definitely does not mean that we can have cognitive access to such a being. It is conceptually impossible for us as human knowers to conceive of the possibility of an ordered universe (its so called fine tuning) without also conceiving of it as designed (that is ordered or fine-tuned), and, as result where is design there is a designer. However, Kant insists that "we can form absolutely no concept of the possibility" (CJ, § 75, p. 246) of such a designer. Human beings either construe their reflective commitment to a designer of the universe as involving facts about human cognitive capacities, thus upon psychological laws (which manifests the contingency of the intelligibility as such), or they construe on the basis of the tautology that thinking of design is logically also thinking of designers (this corresponds to the natural attitude, when designer is thought as something extraneous to the facticity of the universe and consciousness). When the conceptual item of the ground of the universe's facticity (or an idea of extended reality of that who "orders" the universe) extends human thought beyond the limits of possible experience, theoretical knowledge becomes impossible, and one must look to the special conditions that adjust our thought to fit this idea. The understanding is not precisely suitable for this purpose, for it determines (through application of the categories) only those particulars that are given in the sensible intuition. Judgment, however, requires that all (not only given) particulars are subject to understanding, that they can be kept intelligible and explicable under some law. In respect to the universe, our limited cognitive capacity makes it impossible for us to fulfil the demands of judgment in any theoretical way: knowledge remains apophatic, that is incapable of exhausting the reality of that which it signifies in terms of signifiers alone (See Nesteruk 2012[2]). In spite of this we are able to think (within the demands of mathematics) that the universe is organized so that we will be able to understand it. This presumption, or better, a certain belief-based commitment, establishes the intrinsic *teleology of research*: the research aims towards its *telos*, that is the allegedly objective pole of the concept of the universe as a whole (theoretically explicated, for example, in the idea of the Big Bang as its encapsulated origin). However, in order for this thought to be fully coherent, we must also presuppose (again as a matter of logic), the possibility of an

understanding which is different from our own, an intuitive understanding for which all particulars and all individuals, including the universe as a whole, are given at once. This understanding either proceeds from the theological teaching on the *creatio ex nihilo* (the universe is created by the Logos and through it) or, alternatively, as an infinite compendium of the universes with all possible logically admissible structures which can sustain universes, including that one of ours (the concept of the multiverse is implied here). This understanding (an intelligent designer of the universe or multiverse) then stands as the rational ground of our (God-given) expectation that the universe as a whole (the infinite) can be captured by our (limited, that is, finite) form of understanding (CJ, § 77, p. 255). According to Kant, the metaphysical infinitude of human beings proceeds from the awareness of our practical rationality which inherently transcends all that is available to our senses. We are left with a sense of admiration and awe, focused on our own rational agency and its freely created moral law. This is how we, finite beings, 'feel' about the metaphysical aspect of our infinitude. The question is: how to link the sense of metaphysical infinitude, having a practical character, with our epistemological limitedness related to our finitude in space and time (Moore 1992, 2001).

Here, together with Kant, we need to invoke the representation of the *will.* According to one of his formulations of the moral law: "Act as if the maxim of thy action were to become by thy will a *universal law of nature*" (FPMM, 48, p. 39) (emphasis added). In spite of the fact that the scientific action is not exactly related to the moral one, the urge to conduct research with the aim of disclosing the unity of nature in the concept of the universe as a whole, is something which originates in *human will* (it is not a necessity which is subordinated to the biological order of existence). One can say, it originates in man's desire to imitate in themselves the divine image which aspires to avoid any circumscription of humanity to physical nature and to "create" nature according to the human will exercised in a God-like fashion. And it is this will, realised in posing the *telos* of cosmological explanation – the unity of all in all, or the Big Bang – which ordains reason for exercising all possible mechanistic patters of explanations to asymptotically approach it goal.

To amplify the point discussed above, one must stress that the affinity between human understanding and the unexamined aspects of the universe can only be either an inductive or a logical connection between propositions (laws). But the expectation of a unified systematic nature cannot be realized by means of either induction or deductive logic (indeed we cannot accomplish this synthesis). Instead, it is only on the presupposition either of a designer of the universe or our extended cognitive God-given abilities (divine image) that we can trust induction, and that we can anticipate the application of logic as the form of organization of empirical laws of nature. There is a hidden purposiveness related to the explication of the very possibility of this knowledge. The postulation of understanding that is capable of a God's-eye-view cannot be viewed as any kind of comprehension of a being actually possessing intuitive understanding and the capacity to create an ordered universe. The concept of a designer is in this sense replaceable by the regulative idea of an ordered universe in principle always accessible to human comprehension. The postulation of a designer of the universe thus amounts to nothing more than rational acceptance of an assumption about the systematic order of nature and the affinity between our cognitive capacities and that nature (expressed in the transcendental conditions of knowledge). Finally it is not difficult to comprehend that Kant's argument in § 78 of *Critique of Judgement* that the principle of mechanistic explanation must always be

subordinated to the principle of teleology becomes seen, in the context of cosmology, as something which goes without saying: indeed the judgement of the existence of the universe and its unity initiates the cosmological research which attempts to tackle the object corresponding to this concept discursively, along with the lines of mathematical-physical explanation.

If either teleological or mechanistic-like explanation were to be applied in disjunction with each other, they could be seen to be "competing" explanations each excluding the other. However, understood as principles related to the overall intelligibility and explicability of the universe, they can be employed in harmony when one complements the other. What is meant here is that even the mechanical investigation of the phenomenal world as the only methodology for the production of positive theoretical knowledge *presupposes* the continuing *ability* of human understanding to uncover the secrets of the universe in the form of laws. In other words, the intelligibility of the universe is postulated on the basis of a rationality which in its practical function manifests itself as the transcendental conditions of explicability. By arguing that the methodology of cosmology based in mathematical physics is subordinated to the intrinsic teleology of explanation, we, together with Kant, are not urging that the maxim of teleology is more basic than the maxim of mechanism. That conclusion would be inappropriate because it is impossible to know beforehand whether this particular research strategy is more successful than another: the justification of the rules of investigation is grounded in research practice. Success in generating physical theories in cosmology is the test of those methodological programs which are drawn from the *telos* of explanation, that is the universe as a whole. In addition to this, the maxim of teleology holds only with respect to the process of investigation but not to its result. To think that this maxim is related to the physical referents *per se* would be equivalent to understanding that the entire body of empirical laws is to be judged to be an organism with visible or invisible ends (in the style of Plato); but this has no justification whatsoever. Indeed if the teleology of cosmological explanation were to be wrongly associated with some remote physical reference in the future, that is, as if cosmology is destined to disclose the goal of the universe's evolution in the future, the whole novelty of our claim for the Big Bang as a *telos* of cosmological explanation would be obscured. Teleology is efficacious in the process of investigation of the universe because this teleology originates from within humanity which, being desperate to disclose the sense of its own existence, "humanizes" the universe, becoming not simply microcosm, but rather "macro-anthropos" (the humanisation of the universe is sometimes described as a continuous embodiment of humanity in the universe). Following the *telos* of cosmological explanation in research, humanity does not loose itself in the process of articulation of the universe. This articulated universe does not "swallow" humanity as its infinitesimal part. Humanity remains what it is, being affected by cosmology only in that the wonder and anxiety of its existence in the universe becomes more expressive. The goal in the cosmological explanation proceeds not from the universe as such, but from that humanly inferred aspiration to order the process of knowledge towards the explication of the human condition. In this sense the present teleology of cosmological explanation, in agreement with Kant, does not abandon the crucial epistemological standing of the mechanistic methodology in actual cosmological research, and it is the efficacy of teleology which generates new discoveries and theories of the universe through employment of the formalism of space and time, as well as the categories of the phenomenal world. In this

sense cosmology as such does not manifest any teleological laws of the universe; all particular cosmic phenomena are subject to empirical laws as expressions of causal mechanisms. Correspondingly when Kant writes at the end of $ 78, of *Critique of Judgement* that in spite of the necessity to explain all products and occurrences in nature by the principle of a mechanism, he admits that there are things "which we cannot even state for investigation except under the concept of a purpose of Reason" (CJ, p. 197) and these things "must, in conformity with the essential constitution of our Reason…be subordinated by us finally to causality in accordance with purposes." (Ibid), we must understand this teleological principle in application to cosmology as being, not the maxim of teleology related to the material pole of the universe (as organism), but as the presuppositional principle guaranteeing that human understanding is fit for making the phenomenal world intelligible in order to explicate the sense of humanity's existence. The principle of teleology of explanation in cosmology, which originates in the contemplation of purposiveness in the very fact of human existence, reveals itself as more general than either the maxim of mechanism, or of teleology understood in an old-fashioned matter-referred style. The purposiveness of human actions as related to their underlying condition, which is imbued with will, becomes that decisive tool which makes discoveries and generates the laws of the universe.

Human purposive action (as a living process directed to the future) intends toward discovery of the laws of nature as unified in a single system which includes the "laws" of existence of human beings. In cosmology this single system of laws finds its completion in the idea of the Big Bang as the originary undifferentiated state of matter potentially containing "all in all" which is implied by the explanation. Seemingly paradoxical, however, this alleged "end" of explanation, in fact, lies in the past, that is in the temporal beginning of the universe, not its unknown end. The fact that this alleged "end" of explanation, is, in fact, at the limits of human comprehension, its infinite task, as Husserl would say, makes it quite clear that this "end" is not the universal Law of Nature which would be treated as a work of the transcendent creator. This "end" of explanation is the constituted end, within the transcendental limits related to human embodiment as the network of communicating observers.

Kant criticised the idea of the world, and he would be even more critical of attempts to create a construct of the universe as a whole. In this sense his transition from the *Critique of Pure Reason* to *Critique of Judgment* was a certain redirecting of one's attention away from the universe *per se*, to the ways by means of which one can make some versions of the universe. One can conjecture that in insisting that there is no sense of talking in terms of positive certitudes about the universe as a whole, Kant would encourage us to explicate the underlying motives and methods of thinking of the world. Contemporary cosmology in this sense represents a complex story about what is observed, quantified, measured, calculated and extrapolated. A story which contains in itself the predispositions to its own effectively endless hermeneutics. Since the storytellers are scientists, the question about the truth of this story cannot be answered, by definition, for this story as such is the explication of the question itself. Correspondingly the questions of teleology in cosmology become matters not of any trans-experiential convictions, but matters of trust and confidence in the ability of humanity to understand the meaning of its existence in the universe. Finally, teleology implanted in the very human condition as a predisposition to knowing the universe retains humanity in a state of apprehensiveness and uncertainty stemming from human capabilities not only in trying to know, but in trying to live

(as expressed before in different words, humanity by its mysterious, God-given ability to articulate the whole universe, is still capable of retaining its own transcendence with respect to the universe, to be different from it and thus not "crushed under the number of astronomical facts" (Marcel 1940, p. 32)).

Examples of formal purposiveness in cosmology

At the beginning of § 10 of *Critique of Judgment* Kant describes what he means by 'purpose' and 'purposiveness' in following terms: "If we wish to explain what a purpose is according to its transcendental determinations (. . .), [we say that] the purpose is the object of a concept, in so far as the concept is regarded as the cause of the object (the real ground of its possibility); and the causality of a concept in respect of its object is its purposiveness (*forma finalis*)." (CJ, pp. 54-55). Here the relation of purposiveness is the relation between the concept of an object and this object; this relation occurs when the *concept* is one of the causes of the *object*. An *object* is to be considered as a *purpose* when the concept of this object can be counted as one of the causes of this object, that is, as part of the grounds of its possibility. In the Introduction IV, however, immediately after what is effectively stated above, Kant also uses the term purposiveness in a second sense, namely, for the characterization of the *formal property* of an object which *necessarily* has to be considered as a purpose: "…the agreement of a thing with that constitution of things which is only possible according to purposes [that is concepts as above, AN] is called the *purposiveness* of its form." (CJ, p. 17).

The *concept of an object* is one of the causes of the actual existence of this object when, firstly, a rational person has with intent brought about this object. In cosmology the concept of the Big Bang was brought into existence through the intent of cosmologists to explain the origin of the observed contingent facticity of the cosmological display. It certainly does not entail the existence of the Big Bang in the same sense as physical objects. Still the very existence of the Big Bang as an object of theoretical research is based in its concept which was brought into science through the human intent. Correspondingly the will of a cosmologist acting through using mathematical physics is motivated by the desire to explicate its own origin. This desire is the foundation-stone for the appearance of the concept of the Big Bang as an object of research. A cosmologist's will is determined by the concept of the Big Bang when this person tries to bring this object into existence, moved by a desire to have the object which is conceived under that concept as physically real. In accordance with Kant one can assert that the concept of the Big Bang by means of which the will of a cosmologist is causal (with respect to its possible material pole) is the representation of the purpose. (Cf. CJ, § 10, p. 55). The concept of the Big Bang can then be one of the causes of its constituted existence when it is a representation of a purpose (the purpose to unite the manifold of the astronomical display in the single whole).

One must notice that Kant's use of the term 'purposiveness' diverges from its ordinary use: for in the latter case the term tends to be applied only when the means to the end is a *material object* or *causal event* and not when it is a conceptual representation determining the will of a person. For a rational person the concept of an object can be the representation of a purpose only if this person has a reason to desire the actual existence of this object. For Kant this takes place if the person considers the object to be pleasant, useful or morally good; for us this means that the intended Big Bang is the "object" which unites all appearances and aspects of life in a logical system as its ultimate origin. If we would consider an object of pleasure as existing

in the world of appearances, it could only be considered as an actual purpose if it were to be an *artefact*. This is definitely not the case of the Big Bang in cosmology, for the Big Bang, as an intended object, can not be recognised in virtue of the actual history of its origination, for exactly this history is hidden from us: the history of the Big Bang's origination is unknown – it is not a human artefact. Certainly there is a reason for a cosmologist to desire the actual existence of the Big Bang on the grounds of intended search for the foundations of the facticity of all. But in no way is the production of such an "object", that is its accomplished theoretical construction, at all possible for human beings because not only do they not have a sufficiently exact conceptual representation of it, but they cannot control the ways and means which are appropriate for its "production" once and for all. One can assert with "negative certainty", that the universe is not an artefact but "product" of nature (or whatever transcendent powers), whereas its intended unity (for example in a construct of the Big Bang) can be treated as an intelligible and never accomplished artefact.

According to Kant, judgments in which objects are judged to be actual or possible artefacts are those in which the representation of an object is combined with the representation of an actual or possible conceptual cause of the existence of this object. Kant is concerned not with such judgments, but above all with judgments about relations of purposiveness in which it is maintained that an object in the world of appearances is necessarily to be considered as a purpose or an artefact, because human beings can explain its possibility only by having recourse to a conceptual cause. Such an object is not an artefact, it is not an object that has been or even could be produced by a person according to rules-however paradoxical this might at first appear: "But an object, or state of mind, or even an action is called purposive, although its possibility does not necessarily presuppose the representation of a purpose, merely because its possibility can be explained and conceived by us only so far as we assume for its ground a causality according to *purposes*, i.e. in accordance with a *will* which has regulated it according to the representation of a certain rule" (CJ, § 10, p. 55) (emphasis added). Here one must take note of what Kant meant by the will: in the same paragraph he defines it as "the faculty of desire, so far as it is determinable to act only through concepts." That the possibility of an object can not be explained or conceived (along with the line of efficient causality) means, that the object (Big Bang) can not be an artefact, that it can not be a product of the intentional act of a person, whose will was determined by the representation (for there is no representation of the Big Bang) of the object. For in order to intentionally produce an object a physicist has to be able to explain the possibility of the object according to laws of nature, that is, the physicist must know and be in control of the causes which can bring about the object. It is obvious that this is not possible in the case where the Big Bang is treated as a certain matter-pole of cosmological theory. The Big Bang, or the universe as a whole, cannot be artefacts in any possible sense because their implied definition run against the Kantian conviction that artefacts are the only objects whose possibility one can completely explain, "for we see into a thing completely only so far as we can make it in accordance with our concepts and bring it to completion" (CJ, § 68, p. 231). The universe as a whole, or the Big Bang, whose possibility humans cannot explain by means of laws of nature, but which are nevertheless treated as nature, cannot be considered as artefacts. One can conjecture that they are intelligible artefacts, which are unaccomplished. They are artefacts in the making, that is mental creations forever being constituted. Together with Kant one can judge

"objects" of this type to be purposive because they appear contingent in the light of the laws of nature, or, to be more precise they are contingent for they set up these laws (the universe as a whole as the integrity of its boundary conditions sets up the laws of nature) (Cf. CJ, § 75, p. 246). In the case of the universe as a whole one allows a generalisation, for the contingency of the universe is judged not with respect to the given laws of nature, but with respect to the fact that the laws of nature can be considered themselves to be contingent. The connection between the contingency of an object according to laws of nature and the judging of the object as purposive can be clarified in the following manner: a cosmologist to whom an "object", that is the universe as a whole, appears contingent as transcending the natural laws (more precisely, setting these laws), but who does not want to renounce an explanation of its possibility through these natural laws, can attribute to the universe as a whole a relation to a conceptual cause in a hypothetical explanation (for example, the Big Bang hypotheses realised in different scenarios like those of Hawking, Penrose, or in the concept of the multiverse where the cause of the visible universe is positioned in the realm of intelligible forms similar to that of Plato[17]). This conceptual cause in the hypothetical explanation is that *telos* of cosmological explanation as the universe's explicability.[18] In this way hypothetical judgments about relations of purposiveness arise as hypothetical explanations of objects whose possibility would remain otherwise inexplicable. (The varied contingent facticity of the universe would not be explicable if one would not relate it hypothetically to its conceptual cause.) The purposive ness which is attributed to an object in such judgments Kant calls a "purposiveness without purpose": "There can be, then, purposiveness without purpose, so far as we do not place the causes of this form in a will [that is in the faculty of desire which is determined to act only through concepts, AN], but yet can only make the explanation of its possibility intelligible to ourselves by deriving it from a will. Again, we are not always forced to regard what we observe (in respect of its possibility) from the point of view of reason. Thus we can at least observe a purposiveness according to *form*, without basing it on a purpose (as the material of the *nexus finalis*), and notice it in objects, although only by reflection." (CJ, § 10, pp. 55-56) (emphasis added). "Without purpose" is the purposiveness which is attributed to an object in these judgments because the conceptual representation of the object (theory of the Big Bang) is not claimed to be one of its real causes. Kant emphasises that in these judgments, the cause of the object judged to be a purpose is *not* found in a human will (that is in the faculty of desire which is determined to act only through concepts), thus not in an intentional act of thinking, where intentionality is understood as directedness of consciousness towards a certain material object (Big Bang, for example). We observe in the object (the universe as a whole), whose possibility cannot be explained by natural laws, a purposiveness according to form, without however basing it on a purpose (such as the material of the *nexus finalis*; in our case the universe as a whole understood as an accomplished material object), but this is done not through intentional rational thinking, it is done by reflection.

"Without purpose" is a purposiveness attributed to an object, although this is not an artefact, so that this is purposiveness "without an actual conceptual cause". One can attribute to those "objects" in cosmology whose possibility cannot be explained by natural laws, a "purposiveness without purpose", a hypothetical purposiveness. Kant conceives the judgments about relations of purposiveness in which a hypothetical purposiveness is attributed to objects in analogy with judgements of artefacts. But it should not be

overlooked that in the judgments of artefacts one attributes to an object a relation to a conceptual cause quite different to that which is attributed to an object in hypothetical judgments about relations of purposiveness: in a judgment about an artefact the judged object is connected as an effect with its concept according to the causal law, which is why these judgments are an expression of theoretical knowledge. In a hypothetical judgment about a relation of purposiveness, in contrast, an object whose possibility humans cannot explain by means of natural laws is connected only with a *supposed* conceptual cause (the Big Bang), and this connection does not take place according to the causal law, it does not have the status of objective determination. These judgments, according to Kant, do not belong to the judgments of theoretical knowledge which are concerned with the possibility of the existence of things under the laws of nature. They are, rather, judgments of the reflective faculty of judgment: "purposiveness according to form", that is, hypothetical purposiveness, which can be noticed "in objects, although only by reflection" (CJ, § 10, p. 56).

Cosmology in those theoretical models which pretend to "explain" the origin of the visible universe provides us with the situations which fall under the rubric of formal purposiveness just discussed. For example, there are two typical models which pretend to model a *supposed* conceptual cause of the visible universe either through an appeal to the 4-dimension Euclidian space (Hawking's model), or an ensemble of all possible initial conditions for the universe (Penrose's model). We argued elsewhere (Nesteruk, 2003, pp. 152-59, 167-77) that the connection between these conceptual causes and the visible universe does not take place according to the causal physical law, that is, it does not have the status of objective determination. Indeed, by introducing the conceptual causes its authors rather exercise the reflective faculty of judgement by manifesting the theoretical purposiveness through introducing the intelligible "objects" which aim to explicate the contingent facticity of the visible universe. This purposiveness is formal because there is no physical link between the intelligible and empirical unless in reflection and not through the causal law. Indeed, to "explain" the contingent variety of objects in the universe cosmology imitates an ancient Greek ideal of looking for substance (*ousia*), an undifferentiated and underlying something which contains in itself the potentiality for everything which is observable. Being a formal *telos* of explanation this substance manifests the attributes of the intelligible, hypothetical and "found only in reflection".

Conclusion

In this paper we have investigated the delimiters in the strategies of cosmological research which originate in the fact that all human actions (including scientific research) can be considered as purposive. In spite of a general tendency in science to dispense with teleology, we argued that due to the specificity of the subject matter in cosmology, its research goes on under the assumption that there is a goal of research, the motivational purpose, related to the explicability of the universe. This latter explicability originates in the human condition, that is in the human intentional search for the sense of its own existence in the universe. Thus the purpose of explanation in cosmology is related to the explication of the human condition. Correspondingly the purposiveness of cosmological research as its certain strategy acts as a delimiter in the explicability of the universe related to the human condition. The universe is being explicated in the conditions that the goal of this explication is formulated and followed not on the grounds of concepts of the reason, but on the

grounds of the faculty of reflective judgement. Here cosmology exhibits an example where both principles, namely that of teleology and that of the causal efficiency of the natural laws, work together. The *telos* of cosmological explanation then is that which is constantly constituted through the interplay of "mechanistic" and teleological principles. It is the anticipated purpose of explanation which ultimately ordains the advance of scientific cosmology. It was demonstrated that there are two basic concepts in modern cosmology related to each other, namely the universe as a whole and its encapsulated origin (the Big Bang) that act as the *telos* of cosmological research and explanation. The case of the Big Bang is particularly interesting in this respect for it gives an example of a reversed teleological temporality, for the alleged material pole of the *telos* of explanation is situated not in the future, but in the past of the universe. This result is not surprising in a phenomenological context, where the Big Bang would be treated as a noematic pole towards which intentionality aspires; but being an "object" of the *kosmos noetikos* and thus being to subject of laws of eidetic concatenation, the Big Bang is devo1id of any attributes of the physical temporality. Its functioning as a *telos* of explanation refers to the teleological essence of the cognising subject, its self-elucidation, that light of the reason struggling against self-forgetfulness which is brought by the cosmology in it "mechanistic" application, and in which thought would no longer recognise that it is the centre of the world. As was said once by E. Husserl, the supreme *end* of knowledge is to not forget. This is the meaning of that resistance to the thought of that which G. Marcel characterised as the crushing man under the weight of astronomical facts. To resist dissolution of the *ego* by the universe is the ultimate *telos* of humanity destined to transcend the limited boundaries of the created world.

It is also briefly argued that all contemporary scenarios of the origin of the universe provide a common manifestation of the intrinsic purposiveness in explication of the universe: the appeal for the explanation of the contingent facticity of its visible counterpart to some intelligible entities which allegedly explain away this contingency. The invocation of intelligible entities in explanation of the origin of the universe becomes the manifestation of that maxim of teleology which is active in cosmology: to explain all contingent facticity of the visible universe by referring (allegedly through the natural laws) to the intelligible realm of the immutable and necessary mathematical laws. Summarising, there is an underlying maxim of teleology which is present in cosmological research which makes all strategies of explaining the contingent facticity of the observable universe similar by relating this facticity, through the logic of mathematical physics, to the intelligible models of the universe' foundation, which all manifest the sought *telos* of cosmological explanation.

Acknowledgments

I would like to express my gratitude to George Horton for a careful reading of the manuscript of this paper and making useful suggestion on how to improve its style. My conversations with Grigory Goutner in the summer of 2011 were inspiring for writing this paper at all. To him, I would like to express my deep gratitude.

[1] There are few papers which deal with the purposiveness of research in the context of the Kant's third *Critique*. See, for example, (Butts, 1990), (Fricke, 1992), (Krichivets, 1996).

[2] The asserted isotropy of the universe is not related to the universe at present but represents its non-local in time property because the observed clusters of galaxies are very distant objects so that we see only their past images.

[3] See a paper (Roush, 2003) where Copernicus' position is carefully articulated. One should remember that, Nicolas of Cusa, on different grounds, also argued about the impossibility of asserting the centre of the world either inside the earth

or outside it. See in this respect (Koyré, 1958, 5-23).

[4] See an interesting discussion of this point in (Powell, 1935).

[5] It was E. A. Milne who inaugurated (after Einstein's suggestion) the principle that "all places in the universe are alike" as "the cosmological principle".

[6] The concept of matter of the universe in relativistic cosmology is similar to the concept of ideal gas in which real physical particles are treated as point-like objects, material points. Any set of material points can be taken as prototype, which can be filled in with different meaning. For the ideal gas one can take a prototype of chaotic motion of material points and substitute molecules for these points. In cosmology, by substituting material points by clusters of galaxies one can obtain the notion of "matter of the universe" (See, for example, a classical text (Misner et al. 1973, 711-13)).

[7] See more on the discussion of the sufficient conditions for existence of life in (Nesteruk 2003, 200-208).

[8] Some recent research suggests that in spite of a mediocre position in space, there is a certain selectiveness in our presence in the universe in the present era, not only from the point of view of anthropic arguments related to the necessary temporal span in order to have chemical elements available for our bodies to form, but from the point of view of the dynamical proportions of the large-scale material constituents of the universe (dark energy, dark matter, visible matter) which allow for the large scale-structure to be observable at all. The major claims of this research is that in the future the universe will be so sparse, that its structure would not be seen and we could not make any conclusion of its evolution and origin in the Big Bang. (See, for example, (Krauss, Scherrer, 2008), (Krauss 2009), (Primack, Abrams, 2006, pp. 269-72)).

[9] Kant talks about the determinant faculty of judgment in the *Critique of Pure Reason* (A130/B169ff.) The faculty of judgment is the faculty of subsuming under rules; that is, of distinguishing whether something does or does not stand under a given rule (A132/B171). Thinking of a given particular as contained under a given universal means to subsume the representation of the particular under the representation of the universal.

[10] See on coherence of epistemic justification in cosmology my papers (Nesteruk, 2011), as well as in references given therein.

[11] The bibliography on technical aspects of the inflationary cosmology is vast and I would like to give references only to two books (Penrose 2005) and (Weinberg 2008).

[12] Both Penrose and Weinberg stress a point that the whole inflationary scenario is based on the assumption of the existence of a fundamental field, inflaton, whose quantum, the physical particle known as Higgs boson, has not been yet found experimentally. Penrose while commenting on inflationary cosmology points that the introduction of a new field φ into "menagerie of known (and conjectured) physical particle/fields" was dictated solely by the desire to have an exponential expansion, so that no other physical motivation of relating this field to other known physical was established (Penrose 2005, p. 751). S. Weinberg on his side while commenting on the hypothetical predictions of eternal inflation about existence of many disjoint universes asserts that the validity of this idea "will probably have to come from progress in fundamental physics, which may verify the existence of a suitable inflation field, rather than from astronomical observation" (Weinberg 2008, p. 217).

[13] The fact that these puzzles are not empirical follows from the fact that there is no direct empirical predicament which could invoke these puzzles. They appear on the level of reflection while generalizing different aspects of physics, in particular, cosmology with the physics of elementary particles.

[14] Kant did not discuss, in his reflections on teleology in the *Critique of Judgement*, the universe as "the end of nature", for the universe was treated by him, in his first *Critique*, as a rational idea, but not as an aesthetical or teleological idea. Correspondingly if one approaches the universe from the side of communion with it in an ancient Greek philosophical sense, that is the universe (cosmos) as a category of personal relationship with harmony and beauty, as work of art, then the universe represents an end in itself which demands judgement, rather than reason. In judging the form of the universe aesthetically, we are able to find, without presupposing a concept of the object which corresponds to this universe as a source of beauty and harmony, that certain things which are displayed in the universe are purposive (in the empirical apprehension of them in intuition) merely in relation to the *subjective conditions of the power of judgment*. Thus, when the Greeks judged the universe aesthetically, no concept of this universe as a spatio-temporal object was needed, nor was produced. Correspondingly, in cosmology, by judging the universe aesthetically, for example perceiving the universe as a subject of communion, we do not make an *objective* judgment and do not declare the universe as *natural end* (intentionally created for us to be bedazzled by it), but declare it to be *purposive* only in relation to the subject, namely, for their faculty of representation of the universe as beauty and harmony, as *cosmos*.

[15] If one thinks naturalistically, that is, treats the Big Bang as a material final cause of the universe, then it clashes with Kant's view according to which only organisms satisfy the above mentioned conditions for being the ends of nature. However, despite of his remark that organisms provide "objective reality" to the conception of an end of nature and allow us to distinguish such ends from merely practical ones, he insists that the idea of an end has no constitutive meaning, but only provides us with a rule for guiding investigation of organisms. Here one can point out that the ideas of the Big Bang as a non-originary origin of the universe can be paralleled in an organism-like fashion with the idea of birth of any human being as that phenomenologically hidden non-originary origin of any individual human life which acts as an "end" in itself, because the wholes sense of the human life originating in this event, is ultimately directed to the explication of that mystery of birth. (For more details see (Nesteruk 2008, pp. 247-54) and (Nesteruk 2012[1]).

[16] There are some hypotheses, however, that the stability of galaxies, which is now accounted by reference to the so called dark matter, may be sustained by the laws of gravitation which deviate from the Newtonian one (to which Kant referred in his writings). If this would be true then the hypothesis of dark matter could be abolished.

[17] See the analysis of Hawking's and Penrose's hypotheses in (Nestreuk 2003, pp. 152-59, 167-77).

[18] The universe, being an "object" of cosmology, could not be the lived fact, even if the constancy of a lived experience confers an experiential generality on it. However the universe can become a type of a "lived fact" proceeding from possible idealities in which the laws of eidetic concatenation warrant its rational representation and may be explication.

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Космология и телеология: целесообразность в исследовании Вселенной в свете «Критики способности суждения» Канта

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В этой статье мы продолжаем обсуждать ограничения в космологическом исследовании, проистекающие из природы познающего субъекта. В частности, какова природа ограничений, следующих из целесообразности, присущей человеческой деятельности. Затрагивая телеологическое измерение космологии, мы имеем в виду не традиционное представление о телеологии мира, связанное с его целенаправленным физическим развитием. Мы рассматриваем другую, выражаясь языком Канта, формальную целесообразность космологии, исходящую из представления о цели космологического исследования как экспликации Вселенной для самопрояснения и самоутверждения человека в ней. Телос космологического исследования оказывается соотнесенным с телосом антропологии как экспликации сущности человека. Именно этот телос служит ограничителем в выборе стратегий космологического исследования. Мы прослеживаем активное присутствие такого телоса в двух предельных космологических представлениях: Вселенной как целом и так называемом Большом Взрыве (начальном условии Вселенной), соотнося их с телосом антропологического объяснения начала человеческой личности в акте рождения. Историко-философским источником нашего анализа является «Критика способности суждения Канта», что достаточно ново в плане применения Кантовских идей к вопросам философии науки. В этом смысле наш анализ показывает непреходящую актуальность кантовских идей.

Ключевые слова: космология; телеология; суждение; целесообразность; выразимость; человечество.