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A model–independent method to analyze the logic of world models

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The fundamental aim of science and philosophy is
to obtain impartial and unprejudiced knowledge.

ABSTRACT:

In this paper we consider whether it is possible to agree on the basic questions of scientific method and philosophy, in a way that has a most suitable, universally reliable basis, free from awkward commitments and presuppositions. The biggest obstacle on the road to develop philosophy into a universally acceptable science is that different systems of philosophy attribute, somewhat awkwardly, different weights to different basic concepts. These attributions generally contain implicit metaphysical presuppositions about what exists, or what exists "really". Such presuppositions play a crucial role in obtaining the main structure of the world models corresponding to different philosophical schools, primarily determining the whole system of relations between their central and secondary concepts. We formulate these relations in a mathematical form expressing the logical inclinations of the world models. It is timely to consider the presuppositions in order to obtain a general, model–independent, universally acceptable and reliable approach. We extend the requirement of universal acceptability and reliability to the most basic presuppositions of science and philosophy and determine which of them are model–independent. We present a short picture about some world models (of Materialism, Idealism, Theism, Physicalism, Naturalism, Dualism and Phenomenology) in the light of their central concepts and their conceptual weights. The obtained results indicate that phenomenology has a scientific attitude considering the utmost basis of knowledge in the immediate experience. Exploring the consequences of this recognition we found that phenomenology has a deeper concept about the nature of the Universe than natural sciences have at present, and it is suitable to explore how can the subject play a central role in the new scientific world picture. Finally, we consider how our results can contribute to optimize the world models for mankind's future.

Introduction. Some basic concepts

Is it possible to agree with each other? In our postmodern world it may seem that there are no question in which universal agreement could be achieved. Let us consider an example. The question is: how many chairs are present in this room in which I am sitting now? The well–equipped philosopher can remark that first of all the concepts of the "chair", "room", "present in" are necessary to be defined, as well as the method of verification. He can add that the concept of the "chair" can be different in different cultures. Moreover, if we define the concept of a chair wide enough to include most culture's concept, e.g. as something to which one can sit, than, strictly speaking, it can become an indefinite concept, since it is possible to sit on the floor, on the computer, on each other. Moreover, it may seem to be necessary to accept some metaphysical premises about existence as such, about the criteria of existence of a chair, and the hypothesis that there can be universal truths acceptable on the basis of universally reliable facts, which is a postulate that is already challenged drastically. Based on such mental exercises, universal agreement can be postponed indefinitely, even in the case of such a simple problem like the problem of how many chairs are in the room. If so, than it is no wonder that there is no universal agreement in the deep questions of philosophy. The message of this exercise is that, once we leave the context of everyday experience and navigate to the field of professional philosophy, it is easy to disagree in the answers to any question.

Therefore, an approach attempting to find basis for agreements should be restricted. Our attempt is not to work out the methodology of disagreement, but the opposite one: is it possible to find universal agreement in our practical everyday life as well as in the basic problems of philosophy, within some suitable conditions to be determined? We think that if the aim to understand each other can be universal, than we can achieve — at least in some basic respects — universal agreement, and, within certain limits or contexts, given some universally acceptable rules, norms or principles, we can understand each other. In our everyday life, as well as in science, we are able to agree, and not only by making compromises, but on the basis of universally acceptable and reliable methods. We can define the chair as the tool made for sitting, and can explain to anybody that the chairs

in our room are made (in our culture) for sitting, while the floor is made for walk on it. Therefore, it is possible to agree that in the room there are two chairs, even in case of people coming from different cultures. Moreover, we can agree that fire can burn our skin and make harm to our body, that the car can kill us within the break distance, that we are living on the planet Earth, and that the Sun shines. We can agree in an apparently unlimited number of questions, in facts of everyday life as well as of science, which can confirm each other. In cases of doubt, we can test it, and science has a strict method on the basis of which one can decide about the validity of an uncountable number of facts. Indeed, scientific facts have a universal validity, and such facts seem to populate our Universe.

A similar ability for universal agreement seems to be lacking among different systems of philosophy. It has become usual to select *ad hoc* philosophical "positions" or "commitments", preceding the systematic work itself. For example, Materialism and idealism seem to miss to understand each other, each is working on the basis of its own commitments. Preference of prejudices and commitments over finding the common basis of universally acceptable truth is an *ad hoc* method being inconsistent with humanity's imperishable demand for pure and absolute knowledge. The *ad hoc* method makes philosophical systems vulnerable since if their premises are wrong, their conclusions will be mistaken. Awkward inclinations may be present even in the most rigorous sciences, as the doubts raised concerning the objective status of science indicate, see e.g. Tomas Kuhn[1]. The ability of human beings to disagree with each other seems to be more and more pronounced, and, apparently, more powerful than our common basis of existence: the Universe. On the other hand, we are able to develop universal agreement in our everyday life as well as in science — due to the remains of common sense and, promisingly, the core of the scientific method. If so, it is reasonable to transplant the universal reliable method of science into philosophy.

One can claim that universal method for obtaining knowledge is not possible, since every system of knowledge relies necessarily on presuppositions and prior commitments that inevitably distort kno-

1. T. Kuhn, *The function of measurement in modern physical science*, «Isis», 52 (1961), pp. 161–193.

wledge. As a matter of fact, mankind suffers from a whole legion of prior commitments, most of which are usually unconscious and deeply ingrained. We are involved in a theory–laden culture, bond by a myriad of tiny threads to the ground, like Gulliver in Lilliput. Moreover, we also know that cutting away too much of our previous bonds may lead to the loss of our ground of reliable knowledge. Indeed, strict avoidance of values like commitment for truth, or for the scientific method can make our mind impotent to form reliable judgments. Therefore, if we want to live with the power of our intellect, we have to make at least some commitments preceding all our judgments. Our task to find a basis for universal agreement translates to the task to find the minimal set of universally acceptable commitments. The question arises: can any universally acceptable commitment exist?

We can observe that the aim to obtain universally acceptable agreement expresses already some commitments. Such commitments can be expressed as the requirement of "universal agreement". We are committed to universal agreement, we regard universal agreement as a value for us — for example, because it is the basis of our co–operation, and mankind can live only if we remain able to co–operate with each other. Here we make explicit the prior commitment for universal reliability, and give a reason for selecting it. This commitment is by its very nature a communal commitment, that can be shared by anybody who is interested in co–operating with each other. And since all of us are inevitably and naturally bond to co–operate, therefore this commitment can itself be universally acceptable. It is a commitment that opens the widest perspective before mankind, because it corresponds to the co–operation of mankind. Since the existence of mankind is in a certain sense a universal value for all members of the *Homo Sapiens*, and *Homo Sapiens* as a member of the biosphere, and a product of the Universe, it is natural and arguable to regard universal agreement as a universal and acceptable value.

How can we avoid all awkward, unreliable commitments? On the one hand, our attempt to avoid awkward, implicit presuppositions, to build up impartial, universally reliable knowledge seems to be related to objectivity. On the other hand, the qualification "objective" in the expression "objective fact" is frequently meant the property of the fact being completely independent of any mind. But the claim "there are objective facts" with this absolute mind–independent meaning is

certainly not true, since the factual status of any experience is a result of consideration, and each consideration has some motivations or aims. Although Western culture seeks for some Archimedean vantage point, allegedly unmovable, from which an observer can objectively perceive the subject of inquiry, with a view of totality, "removing himself" from the object of study so that one can see it in its allegedly "true" nature, but remain independent of them. In contrast, we note that obtaining knowledge always relies on personal experiences, and mind plays an important role in it, as the fundamental role of the observer is indicated in quantum physics. Elementary phenomena are impossible without a distinction between observing equipment and observed system[2]. Indeed, the observer has such a fundamental role in the process generating all phenomena, that the whole Universe can be created in a process of observation by observers, as it is shown e.g. in the idea of the observer–participatory Universe[3].

We point out that the observing the same physical object by different persons not necessarily involve that the object exists in the absence of any mind, since all confirmation of the object is due to another observer's mind. This means that at the confirmation of an observation mind is always present. Ultimately, from the aspect of the Universe, mind and matter are interconnected at the most fundamental level of Nature. Experiences are selected, classified and evaluated by minds, on the basis of a method in which the cooperating observers (and their minds) can agree. Valid experiences are distinguished from invalid on the basis of the interplay of experience and thought, which has its rigid logical laws followed by disciplined minds. Therefore, we consider the term "objective" not only as theory–laden, but also as based on dubious assumptions. In order to avoid undue connotations, we use the term "publicly reliable" instead.

How can a universal agreement be based on a reliable basis? It is, if we commit ourselves in favor of a knowledge that is consistent with the world in which we are living in. Our commitment becomes reliable if is consistent with all our confirmed knowledge, including

2. J.A.Wheeler, *Beyond the black hole*, in H Woolf (ed. by), *Some strangeness in the proportion*, Addison–Wesley, Reading–Mass 1981, pp. 341–375; see also in J.A.Wheeler, *At home in the Universe*, The American Institute of Physics, Woodbury 1994, p. 292.

3. *Ibidem*, pp. 290–294; see also Id., *It from bit*, in *At home in the Universe*, cit., pp. 295–311.

empirical experience and theoretical knowledge. Such a universally acceptable, reliable knowledge must be universally accessible (public) and controllable (empirically and logically testable) for us. Apparently inevitably, we become committed to reliable(empirically and theoretically sound) and public (accessible for all of us) knowledge. In order to avoid any awkwardness, we become also committed in simplicity, when accepting only the minimal number of natural commitments. The minimal set of inevitable commitments that arise by the very nature of the commitment to our aim of universal agreement, due to the common natural basis of being committed to our very human nature.

Philosophy can be conceived a systematic approach to understand each other, life and the whole world in which we are living. Therefore, apparently, philosophy is by its very nature committed to the natural commitments of universal agreement. If so, philosophy must be able to free itself from the straitjacket of working in different treadmills contradicting to each other.

Science is frequently meant nowadays in a narrow sense, in which it is a systematic method to understand the world of phenomena directly observable by our outer senses. Yet it is clear that scientific method itself is not directly observable by our outer senses, therefore the task to find the most suitable scientific method cannot be realized within the framework of this popular, narrowly conceived science which considers only observable phenomena. The founders of modern science were faced with the problem to find a suitable method to obtain confirmed, reliable knowledge. Today the situation is somewhat different, science already applies a certain scientific method, and now our problem is to find the most suitable scientific method beyond a merely empirical one. Such a problem can be solved only within the framework of a more general system of knowledge. If one would prefer to expand the limits of science in order to make it able confirming or rejecting its own findings, we can redefine science as the unified system of all empirical and theoretical knowledge, confirmed by both. Recognizing the significance of empirical facts for science was an achievement of Medieval philosophy of science. The founders of modern science, among them Nicolai Copernicus, Francis Bacon, Johannes Kepler, and Galileo Galilei were scientists and philosophers at the same time, and so they all were well equipped to become able

working out the Medievial scientific method that is since then called as "modern", which is based not on speculation, like its predecessor, but on two legs: empirical and theoretical knowledge. We can use both of these tools in our task exploring how to obtain universally acceptable and reliable knowledge. Such a task corresponds to another one, namely, how to generalize the modern scientific method based on medieval achievements, to assign science a power to obtain universally acceptable and reliable knowledge.

As Hempel[4] remarked, the concepts of science are the knots in a network of systematic interrelationships in which laws and theoretical principles form the threads. Therefore in the task of reconsidering the scientific method we have to consider first the basic concepts of science and philosophy. In order to assist our attempt to abstract ourselves from *ad hoc* commitments, let us refer to the basic concepts by a mathematical notation. Let us denote the concept of phenomena as P, material object as MO, matter as M, the Universe as U, life as LI, and mind as MD. Perhaps the most economic and agreeable way is to use these basic concepts in their most conventional meaning reflected in basic encyclopedias and dictionaries, which we indicate here in case of necessity. Let us introduce the following concepts as given below:

a) P, phenomena: in general, phenomena are the objects of the senses (e.g., sights and sounds) as contrasted with what is apprehended by the intellect/mind[5];
b) MO, material object: material objects are quasi–invariant systems, obtained from phenomena with the help of already accustomed, already unconscious and automatic operations of mind. Despite of their abstracted nature, MOs are usually regarded as directly observable, since the method of abstraction became automatic;
c) M, matter: all material objects together forms the matter of the observable universe, consisting from elementary particles, atoms, molecules, macroscopic objects, planets, and galaxies;
d) U, universe, nature, world: the Universe involves not only the

4. C.G. Hempel, *Philosophy of natural science*, Prentice–Hall, Englewood Cliffs–N.J. 1966, p. 94.

5. Cf. the entry "phenomenon" in *Encyclopaedia Britannica*, 2010.

observable universe[6], but also all the laws and principles[7] governing it. The Universe is the reliable basis of the complete, self–consistent system of all what is not only theoretically conceivable but also empirically testable;

e) LI, life: in general, self–initiating activity. Physically realized life is the coherent and self–sustaining system of persistent self–initiated activities against physical equilibration;

f) MD, mind, intellect: the mind is what apprehends, i.e. what obtains empirical and theoretical knowledge. The apprehension involves logic (L) and intuition. Logical conclusions and intuitions can be tested objectively when comparing it with empirical observations and a wider system of already established theoretical knowledge;

g) SC, self–consciousness is the self–reflective mind apprehending with the constraint of persistent self–reflection: the only known example of SC is human self–consciousness.

We are looking after a model–independent comparison of some already existing and some yet not invented but possible world–models. In this paper we denote the laws of nature with the denotation LN. These are to be distinguished from the scientific laws, which are their corresponding and possibly incomplete idea existing in our present knowledge. While scientific laws are tools of our mind, laws of nature act in nature. These two are not to be confused. The difference is that of map and reality.

Two types of evidences: empirical and theoretical

Due to the successes of materialistic science, it is a general belief nowadays that scientific evidence must be empirical (E). Acknowledging the basic role of empirical evidence in scientific argumentation, we point out that the other pillar of scientific argumentation is logic (L), the system of principles obtaining reliable inferences. Logic is the

6. Observe the intended difference in notation: <universe> refers to the observable, material universe, while <Universe> involves laws and principles that govern material objects, too.

7. We consider here only such first principles as the least action principle of physics, and the Bauer–principle of biology.

tool of our mind in distinguishing between facts and non–facts[8]. It is logic that makes any empirical evidence acceptable[9]. Direct empirical evidences in themselves are not enough to establish a law of Nature. Indeed, there is often a strong disinclination to call a universal conditional a "law of nature", despite the fact that it satisfies the various conditions already discussed, if the only available evidence for that law is direct evidence[10]. For example, gravitation was not accepted as a scientific fact until Newton worked out the numerical formulation of that specific law, making it possible to predict specific events like the return of the comet Halley[11]. The empirical confirmation of Newton's law made it acceptable, despite the fact that gravitation contradicted some basic contemporary hypothesis, like the non–existence of action in distance, or the non–existence of nonmaterial entities. Despite such kind of scientific achievements, the hypothesis of non–existence of non–material entities is still a widely held dogma. Therefore, on the road to explore the power of a general scientific method, we have to consider first this problem.

On the existence of nonmaterial laws of nature

We point out that the laws of logic as well as the laws of Nature are *par excellence* nonmaterial entities[12]. Since the dogma of non–existence of non–material entities is still widely held, laws of Nature are frequently regarded as equivalents with quantum fields having a kind of materiality. In quantum field theories fields and forces are represented by exchanges of virtual particles[13]. We point out that the distinct non–physical nature of physical laws becomes clear when we realize that they determine, delimit and govern when, where and what

8. Á. Pauler, *Bevezetés a filozófiába* [*Introduction to philosophy*], Áron Kiadó, Budapest 2001.

9. E. Nagel, *The structure of science. Problems in the logic of scientific explanation*, Routledge, London 1974, pp. viii, 4, 66.

10. *Ibidem*, p. 66.

11. Cf. C.G. Hempel, *Philosophy of natural science*, Prentice–Hall, Englewood Cliffs–N.J. 1966, p. 72.

12. J.W. Yolton, *Thinking matter. Materialism in eighteenth–century Britain*, University of Minnesota Press, Minneapolis 1983, pp. 149, 179.

13. Cf. B. Setterfield, *Exploring the vacuum*, «Journal of theoretics», 26 (2002); see also http://www.journaloftheoretics.com/Links/Papers/Setterfield.pdf

kind of virtual particles are generated, in which direction and in what number. The physical laws, being the determining factors, are to be distinguished from their results, the virtual particles themselves. Realizing this basic difference between physical laws on the one hand and interactions, particles, and observable matter on the other, the nonmaterial nature of laws of Nature becomes evident. Laws of Nature do not consist from elementary or virtual particles; they do not have spatial extension; they do not move and do not change, they are not observable, yet they are invariant, universal and reliable.

Admittedly, recognizing the nonmaterial nature of physical laws requires the solution of the profound problem how can a nonphysical cause act on physical objects. We can only indicate here that it happens through virtual particles which represent the interface between non–physical and physical existence. Recently, D. Papineau noted:

> Sometimes it is suggested that the indeterminism of modern quantum mechanics creates room for *sui generis* non–physical causes to influence the physical world. However, even if quantum mechanics implies that some physical effects are themselves undetermined, it provides no reason to doubt a quantum version of the causal closure thesis, to the effect that the chances of those effects are fully fixed by prior physical circumstances. And this alone is enough to rule out *sui generis* non–physical causes.[14]

This argument is helpful in shedding light to the circularity of many similar arguments. The hidden thesis of Papineau (applied implicitly) is that only physical laws (and so, only physical causes) can exist. We point out that this implicit thesis is not necessarily true. If there are biological and psychological laws too[15], they can determine how and when virtual particles are generated. Certainly, this can fit smoothly to quantum physics within the limits of uncertainty relation for vacuum fluctuations[16].

14. D. Papineau, entry: "Naturalism", *Stanford Encyclopedia of Philosophy*, 2007; http://www.science.uva.nl/ seop/archives/fall2007/entries/Naturalism/ Accessed 05 August 2011.

15. This problem seems to be not yet solved; on the existence of biological and psychological laws, see E. Bauer, *Elméleti biológia* [*Theoretical biology*], Akadémiai Kiadó, Budapest 1967, p. 51; T. Crane, D.H. Mellor, *There is no question of physicalism*, «Mind», 99 (1990), pp. 185–206; A. Silverberg, *Psychological Laws*, «Erkenntnis», 58/3 (2003), pp. 275–302; R.L. Gregory, *Perception beyond physics?*, «Perception», 33 (2004), pp. 895–896.

16. A. Lambrecht, *The Casimir effect: a force from nothing*, «Physics World», September

Both vitalism and the theory of gravitation invoke "nonmaterial agencies, which cannot be seen or felt"; one of them is the vital principle; the other is gravitation[17]. Indeed, Hempel[18] also points out that if e.g. neovitalism would be able to obtain an exact mathematical formula and confirmed by all empirical observations, scientists should accept the vital principle in the same way as Newton's law of gravitation was accepted in his time. Despite of this challenging possibility, neovitalism is not only ignored but generally regarded as dead and unscientific. If it were possible to find a specific, mathematically formulated law that determines the behavior of a living organism within specific conditions, and if it would turn out to be true on the basis of extensive experimental tests, than that law should be accepted. In the apparent absence of such a detailed and exact theory all the corresponding empirical facts have no real significance. This means that not only empirical observations (E), but also theoretical knowledge (denoted here by L, since logic is a basic factor in the development of theoretical knowledge) has a crucial role in determining what counts as scientific evidence.

On the relation between theoretical and empirical evidences

Today's dominant view, physicalist Materialism or physicalism is based on the positivist claim that «all genuine knowledge is based on sense experience and can only be advanced by means of observation and experiment»[19]. In contrast, the entry "Physics: General survey" of the 1970 edition of the *Encyclopaedia Britannica* notes that physics may be called as «a method based upon certain general principles and disciplined by the close interplay between experiment and theory». Actually, the role of theory is fundamental for observations, since theory tells what to observe, and observations depend on instruments that are planned on the basis of a theory. Moreover, theory and empirical

2002, pp. 29–32.

17. Cf. C.G. Hempel, *Philosophy of natural science*, cit., p. 72; see also I. Newton, *The general scholium*, in *The mathematical principles of natural philosophy*, transl. by A. Motte, London 1729, pp. 387–393; J.W. Yolton, *Thinking matter*, cit., p. 177.

18. C.G. Hempel, *Philosophy of natural science*, cit., pp. 71–72.

19. Cf. "Positivism", entry in *The Concise Encyclopedia of Western Philosophy and Psychology*, 1960, p. 322.

observations are inseparable. «All observation sentences depend on some sort of minimal theory (even "the needle points to around 5 on the scale" presupposes that the needle and the scale exist independently of the observer and that the observer's perception of them is not systematically deluded by a Cartesian demon)» writes J. Worrall[20].

We point out that the development of knowledge is a co–operative process between the development of theoretical understanding and empirical observations. This process may start from e.g. empirical observations (E1), continues with a deeper theoretical understanding (L1), which can be checked in a wider empirical context (E2), which can lead to a deeper theoretical understanding (L2) etc. This process will be called as the development of knowledge, and will be referred in the followings as the ELEL.... In short, instead of the usual empiricist claim that the development of science is due to the increase of the number of empirical facts, and so can be represented symbolically as EEE..., we think that the logic and development of science is better approximated by the cooperation of theory and observation, and so can be represented as ELELEL... The longer is this chain of evidences, the stronger is the argument.

During this process, explanation[21] (L) extends towards broader and broader range of phenomena, and, in parallel to this broadening, towards deeper and deeper laws. This extension of explanation is what is regarded as the increase of scientific understanding. Indeed, this is the gross outline of the development of science[22]. In the followings, we extend the chain of arguments to it limits and explore the presuppositions of science.

Although the empirical plus theoretical elements (EL) together can establish the model–independent validity of any claim, all the available empirical plus theoretical evidences can be partial, since experimental evidences without suitable theoretical formulation do not count

20. J. Worrall, *Science, philosophy of*, in E. Craig (ed. by), *Routledge Encyclopedia of Philosophy*, Routledge, London 1998. Retrieved November 09, 2010, from http://www.rep.routledge.com/ article/ Q120SECT2

21. Scientific explanation, prediction and postdiction all have the same logical character: they show that the fact under consideration can be inferred from certain other facts by means of specified general laws. Cf. C.G. Hempel, *Scientific explanation. Essays in the philosophy of science*, The Free Press, New York 1965, p. 174.

22. C.G. Hempel, *Philosophy of natural science*, cit., p. 2.

as evidences, and since theoretical arguments without experimental confirmation are also not regarded as evidences. More fundamentally, presuppositions (P) have a fundamental role in the scientific method, and so the scientific method, instead of E, or its improved version, EL, can be better formulated as PEL[23]. Presuppositions are necessary and they can constrain the development of knowledge. Since presuppositions P are necessary as the primary elements of the scientific method, the development of knowledge, instead of E–L–E–L. . . , is, in reality, P–E–L–E–L. . . Presuppositions are the key elements responsible to the incommensurability of different world models, like that of Materialism and idealism. It seems that all popular world–models claim that they represent essentially complete knowledge about the world. Incommensurability arises mainly because these presuppositions remain implicit. Therefore, an explicit consideration of presuppositions may help to find model–independent, and so, more universally acceptable approaches. In principle, it is possible that some presuppositions are universally acceptable and reliable, as in the case of universally acceptable commitments to universal and reliable knowledge.

On the presuppositions of science and the scientific world picture

Among the model–independent presuppositions of science we found two as basic:

1st presupposition

(1) The world persists.

We use this term "persists" with a definite meaning: something persists if it is a member of the system unifying all our empirical and theoretical knowledge EL. In more details, it has the following content: there are phenomena (P) observable through our outer senses, which are observable not only by one of our senses, but, since they can be confirmed by all our senses, and not only once, but repeatedly (persistence) and publicly (reliability). Moreover, observable phenomena can be analyzed and inverted into quasi–invariant mate-

23. H.G. Gauch, *Scientific method in practice*, Cambridge University Press, Cambridge 2003, p. 113.

rial "objects" (MO). All the observable phenomena and objects (M) together with the invariant laws and principles beyond them (LN) form a unified system, which we regard as the "world" (M+LN=U). Not only material objects, but the invariant laws beyond them persist, i.e. accessible for the theoretical and empirical system of knowledge EL and testable by it. In this sense, such a systematic EL persistence receives a model–independent, well–established meaning. We regard this formulation (1) as a significant improvement over the thesis "the external world exists" since the term "exists" can have many different meanings (even the term "physical existence" is notoriously unclear, according to Nagel)[24]. Moreover, since the invariant laws of Nature also persists, and we can conceive them by our intellect, and confirm them empirically, their persistence is not necessarily delimited to the external world. We can observe that since the unified system of all available, empirical and theoretical evidences of mankind confirm presupposition (1), and since this body of knowledge is robust, including a cosmic number of observational, experiential and theoretical confirmations extending from our everyday experiences until the systematic and deeply penetrating analysis of science, therefore the "presupposition" status of the thesis (1) can be regarded as robustly confirmed, by careful and systematic investigation of all available evidences.

The skeptic can say that any perception can be an illusion, and so he can deduce, on that basis, that the world may not persist[25]. In contrast, we point out that although the skeptic may be right in any concrete case corresponding to a certain object, he is certainly not correct in his argumentation about the long–term persistence of the world. The persistence of the world is confirmed not only by all present empirical and theoretical knowledge (EL) of mankind, including not only one of the instants of "now", but all the instants involved in mankind's history. This means that the persistence of the world is confirmed on a long timescale repeatedly, and the confirmation is reliable (confirmed by EL) and public (confirmed by all people). That makes a difference. Due to the enormous number of different types of evidences, the persistence of the world cannot be an illusion.

24. E. Nagel, *The structure of science,* cit., pp. 145–146.
25. N. Warburton, *A filozófia világa*, Kossuth Könyvkiadó, Budapest 1992, pp. 94–95.

2nd presupposition

(2) The world is comprehensible.

Since all the material objects together: M and the laws of Nature: LN together M+LN=U are the world, the knowledge of which arises from the process of developing knowledge ELEL...; therefore the world is naturally conceivable. The persistence and the comprehensiveness of the world (in other words, Nature or Universe), in the light of all available evidences and their robust weight can be regarded not only as a valid, model–independent presupposition, but as an established fact.

Additional, possibly model–dependent presuppositions of science

Science has a basic methodological presupposition, trying to find only natural causes; supernatural causes are excluded. This idea led to the philosophy of Naturalism, «a view of the world, and of man's relation to it, in which only the operation of natural (as opposed to supernatural or spiritual) laws and forces is admitted or assumed»[26]. Regarding that natural forces arise from interactions governed by natural laws, and that natural laws describe the changes of things, we can reformulate the basic claim of Naturalism in the following thesis, representing a general presupposition of science:

3rd presupposition (the thesis of Naturalism)

(3) Every observable changes of the world are determined by laws of nature, at least basically.

The problem of determinism and autonomy in respect to the laws of nature

If the world (or nature) is consistent with the unified, self–consistent body of all our empirical and theoretical knowledge EL regarding all material objects and laws of nature (M+LN), than all changes of the world must be consistent with these laws. Therefore, if we mean by the expression "determined by laws of nature, at least basically"

26. Cf. "Naturalism" entry in *Oxford English Dictionary*.

the same meaning as by the term "consistent with laws of nature", than (3) arises automatically. We can give a more definite meaning to the term "consistent", namely, "determined by or allowed by". Indeed, spontaneous processes like radioactive decay of individual atoms, spontaneous emission of single photons are not determined completely by the laws of nature, since only their probabilities are prescribed. For example, there is no law of nature telling exactly which atom will decay in the next istant (time step) in the process of radioactive decay. Spontaneous processes are called "spontaneous" because the physical laws do not determine them completely; instead, only their probabilities are determined. Laws of nature can determine the rate of radioactive decay only statistically. The timing of single quantum processes is not determined completely by physical laws. This means there is room for biological or psychological determinations.

In thermodynamics, there is no systematic coupling between the behavior of subsystems, therefore the possible spontaneous processes do not lead to significant differences from the one given by physical laws. In the absence of systematic coupling between the subsystems, the arising observable behavior of macroscopic objects is the one given by the laws of thermodynamics. The question whether there can be a systematic coupling between the subsystems of macroscopic systems in case of biological organisms leads too far from the scope of the present paper. In principle, it is possible that such systematic couplings exist. If so, their natural source can be laws of nature: biological or psychological laws. In cases when the observable changes of biological organisms and psychological beings are due to such laws of nature, presupposition (3) fulfils. Yet, in contrast to physical systems, biological organisms and psychological beings like humans can manifest a certain autonomy from all laws of nature. Here we define a living organism as biologically autonomous if it can make decisions (selecting from different options) spontaneously (by decisions not completely determined physically and biologically) about its macroscopic states and changes. Autonomous decisions of the organism (physically and biologically not completely determined organismal decisions) are possible only if physical (and biological) determinism is not complete. We propose a plausible scientific background for biological autonomy smoothly fitting to physics. Namely, we suggest that spontaneous decisions correspond to single, biologically useful

vacuum fluctuations occurring within living organisms. Cells demonstrate the capability of collecting and integrating a variety of physically different and unforeseeable signals as the basis of problem–solving decisions[27]. They can respond and make biologically useful, efficient decisions[28]. Decision–making is a central feature of the cell[29]. Any successful 21st century description of biological functions will include control models that incorporate cellular decisions based on symbolic representations[30]. Regarding that all organisms are cells or build up from cells, the ability of the cells for spontaneous decision–making means that all living organisms are autonomous.

We point out that a certain degree of autonomy of living organisms, mind (MD), and "free will" cannot be excluded in a model–independent manner. For example, For example, a fish thrown back to the river has an uncountable number of different options to follow the command of Nature: survive. The fish itself must decide about how to behave, what to do, which direction to swim, how to look, how to move its mouth. A thirsty deer in a forest itself must decide about to go or not to go to the spring for drink water; and if it goes, it must decide about details like how to select its steps, and while doing so, how to move its tongue. The ultimate biological aim of survival cannot determine all details of biological processes, since the biological organization extends to the molecular level, and the number of biologically equivalent but microscopically different realization of the same biological aim is astronomical. Evolution cannot fix how the thirsty deer must move its tongue while walking towards the spring, since it is, from the aspect of survival, completely indifferent.

Yet in physicalism physical laws plus historical accidents of evolu-

27. G. Albrecht–Buehler, *Cell intelligence*, http://www.basic.northwestern.edu/g\Ti\textendashbuehler/FRAME.HTM.

28. Cf. M.E. Linder, A.G. Gilman, *G proteins*, «Scientific American», July 1992, pp. 36–43; B.J. Ford, *Are cells ingenious?*, «Microscope» 52 (2004), pp. 135–144; Id., *Revealing the ingenuity of the living cell*, «Biologist» 53 (2006), pp. 221–224; Id., *Single cell intelligence*, «Mensa Magazine», February 2010, pp. 6–7.

29. Cf. J.A. Shapiro, *Revisiting the central dogma in the 21st century*, in G. Witzany (ed. by), *Natural genetic engineering and natural genome*, «Annals of the New York Academy of Sciences», 1178 (2009), pp. 6–28; Id., *Evolution. A View from the 21st Century*, FT Press Science, Upper Saddle River–N.J. 2011.

30. *Ibidem*.

tion must determine all these details[31]. This example illustrates that different philosophical systems usually postulate different positions regarding this question. Nowadays it seems that the problem whether biological or psychological laws of Nature exists or not has no universally acceptable solution. At the same time, the existence of biological autonomy is consistent with the 3rd presupposition only if the term "basically" means only that biological behavior has some physical limitations, basically, by the uncertainty relation giving an upper limit for the energy and lifetime of virtual particles which mediate between biological aims and their physical realizations. Yet we can observe that although quantum limits set extremely small range for single biological interventions, living organisms are built in a way that their activity is, in many respects, unconstrained by physical laws and conditions. Therefore, we think that in the light of the existence of biological autonomy the model–independent status of presupposition (3) cannot be regarded as well substantiated.

4th presupposition. The thesis of the "causal closure of the physical"

(4) All phenomena can have nothing but physical causes.

Regarding the considerations given at the discussion of the 3rd presupposition, as well as a short review of the relevant literature, the indication is that the model–independent status of presupposition (4) cannot be granted. An example may be helpful. When we decide to jump into the air, the result is observable: our body "flies up" into the air. The jump must have an immediate physical cause, namely, the physical force exerted by its legs on the ground. This physical cause itself is caused by preceding physical causes, primarily, by microscopic changes in our brain corresponding to the decision. Papineau argues that unless we want to say that physical effects are overdetermined by two separate causes, which we clearly don't, we need somehow to view the biological aim (in our example: our decision to jump) and the physical cause (the related microscopic change(s) in the brain) as the same cause[32]. In contrast, we point out that the decision is related to single vacuum fluctuations occurring in living organisms.

31. M. Gell–Mann, *Nature comfortable to herself*, «Complexity», 1 (1995), p. 1126.
32. D. Papineau, *Why supervenience?*, «Analysis», 50 (1990), pp. 66–71.

Within living organisms, single vacuum "fluctuations" can be generated (triggered, selected, modified, channeled, rectified) by biological aims. The primary processes in the physicist's picture are the physically observable processes elicited by single vacuum fluctuations. The biologist's picture is deeper; it is able to grasp also the existence of teleological, and so extra–physical biological aims as causally effective entities. This means that biology can grasp natural causality more fully, in a context logically preceding physically determined processes. Moreover, it is clear that in the quantum context of this problem, where decision–making and single vacuum fluctuations occur, physical determinations are incomplete and offer room for biological determinations. Therefore, causal overdetermination is not present. At the same time, we can successfully predict when will we jump into the air, and our predictions are observable testable. In our everyday life, all these "predictions" are successful. We use similar "predictions" when we wake up in the morning, get up from the bed, have a breakfast, and go to work. All the related movements are practically well predicted in advance. We can successfully predict any time, when will our little finger be bended. It is highly improbable that such decisions could be programmed genetically due to natural selection, or determined by our social environment. Yet our common–sense theory works fine and well, all the time, and its predictions are testable by science, and all these tests would be confirmative. If the claim for the causal closure of the physical would be true, we were completely unable to predict when will our little fingers be bended. This means that an uncountable large number of empirical evidences reject the causal closure of the physical. Such considerations tell us not to accept the 4^{th} presupposition as an reliable, model–independent assumption.

We can obtain an important inference about the nature of mind (MD). We defined it as the entity what apprehends, i.e. what obtains empirical and theoretical knowledge. Definitely, the process of apprehending anything must be a self–initiated process, initiated by the mind itself, not determined fully by physical or biological determinations. This means that the mind works as an autonomous entity. If biological autonomy can be causally effective, this means that the mind can have a causal power. We note that the so–defined mind must not be necessarily self–reflective, and so it can be different from human self–consciousness.

In the followings, keeping in mind our aim to avoid model–dependent "positions", commitments and assumptions, we try to learn from all the philosophical systems considered below. First, we present a formal review of these systems, and try to formulate their central these in abstract, neutral formulas. We point out that awkward claims about basic concepts of our everyday life and science have the risk not only to conflict with other such claims, but also to conflict with universally accepted or acceptable, model–independent, robustly established facts. We will consider such cases only if it is necessary for the main purpose of our present article.

1. The logic of Materialism

As "Materialism" entry of the *Encyclopaedia Britannica* (2011) writes: «Materialism, also called physicalism, in philosophy, is the view that all facts of the world (including facts about the human mind and will and the course of human history) are causally dependent upon physical processes, or even reducible to them». The word Materialism has been used in modern times to refer to a family of metaphysical theories (i.e., theories on the nature of reality) that can best be defined by saying that a theory tends to be called Materialism if it is felt sufficiently to resemble a paradigmatic theory that will here be called mechanical Materialism. Materialism is «the opinion that nothing exists except matter and its movements and modifications; also, in a more limited sense, the opinion that the phenomena of consciousness and will are wholly due to the operation of material agencies»[33]. Based on these formulations of Materialism, we can observe that in the conceptual framework of Materialism, the central concept is "matter"; all the other concepts play a subsidiary role. The conceptual extension or relative weight of the concept "matter" has a hundred percent range in determining the world model. Indeed, matter exerted a determinative impression on mankind. Not only our body consists of matter, but also our environment, involving also the Earth, the stars and the galaxies, the whole observable universe. It is natural to become impressed about the observable universe in such a rate to

33. "Materialism", entry in *Oxford English Dictionary*.

find the idea plausible that everything else is secondary. We regard this hundred–percent–Materialism as the standard version of Materialism. Materialism regards that the Universe can be fully grasped in terms of its observable matter, U=M. Therefore, life and mind as causally relevant entities in Materialism do not really exist, MD=0. If nothing else can exist besides or beyond matter, than even the laws of Nature (LN) had no causal power, since the behavior of matter must be basically determined also by the observable material properties.

In Materialism, observation is the base of everything. Matter exists because it is observable "directly". We note that this is a naïve belief, since in actual reality we do not observe material objects directly, since after our birth we learn to observe objects, and the process of learning to perceive is a long, social process requiring years) by our outer senses (e.g. sights and sounds). Not only material objects are observable directly, but also their behavior (their spatio–temporal changes). Moreover, if matter (M) is regarded as all material objects (MOs) of the observable universe together, then (M) is itself the observable universe (U). Observations tell us that a fundamental characteristic of matter is its long–time evolution in its natural, cosmic context, i.e. cosmic evolution.

1.1. *Materialism and cosmic evolution*

While material objects represent the static aspect of the observable universe, cosmic evolution represents the dynamic aspect of the observable universe, corresponding to the overall scheme of things. «Cosmic evolution comprises the sum total of all the manyvaried changes in the assembly and composition of radiation, matter,and life throughout the history of the Universe»[34]. Regarding the fact that in Materialism observations are the source of all evidence, it is interesting to see what picture arises about the observable universe on cosmic timescales, in terms of M, LI and MD. Empirical observations that are central in Materialism tell us that on the cosmic timescale, matter evolves towards life, and life towards mind, at least by our best

34. E. Chaisson, *Cosmic evolution. The rise of complexity in nature*, Harvard University Press, Cambridge–Mass. 2001, p. 2.

present understanding[35]. For example, the overall increase of such objective measure like the genetic complexity on the Earth on the four billion years timescale[36] illustrates the cosmic timescale, and so, the robustness of directed evolution of matter. Chaisson[37] suggested free energy density as the measure of complexity in the Cosmos. Neither of these complexity measures makes it necessary to regard human mind as the "pinnacle or the end product" of cosmic evolution. Nevertheless, both measures indicate that cosmic evolution is directed towards life and something like human mind.

We can sum up the most basic message of Materialism, which will be referred to below as "the logic of Materialism", explicitly expressed by the following formulas:

$$U = M, \quad LI = 0, \quad MD = 0 \quad and \quad SC = 0 \tag{1}$$

On the basis of equations (1) one can hardly expect cosmic evolution. Everything would be determined by material properties, and these properties (the mass of the electron, or the speed of light) are static by their nature. But even if matter could change somehow, equation (1) is in direct conflict with the observed cosmic evolution, of cosmic evolution, indicated by (2):

$$M \quad \rightarrow \quad LI \quad \rightarrow \quad SC \tag{2}$$

In the static aspect of the logic of Materialism, indicated by equation (1) SC is an insignificant epiphenomenon, a "side effect" of the cosmic evolution of matter. It is not only that the mass of the human brain carrying SC is relatively small in comparison to the mass of the earth, or that SC is a rare phenomenon in the universe; more importantly,

35. Cf. L.J. Henderson, *The fitness of the environment*, Macmillan, New York 1913; E. Jantsch, *Self–organizing universe. Scientific and human implications of the emerging paradigm of evolution*, Pergamon Press, New Yok 1980; E. Chaisson, *Cosmic evolution*, cit.; H.J. Morowitz, *The emergence of rverything. How the world became complex*, Oxford University Press, Oxford 2004; J.D. Barrow, S.C. Morris, S.J. Freeland, C.L. Harper (eds.), *Fitness of the cosmos for life*, Cambridge University Press, Cambridge 2007; S.J. Dick, *Introduction and bringing culture to cosmos. The postbiological universe*, in S.J. Dick, M.L. Lupisella (eds.), *Cosmos and culture. Cultural evolution in a cosmic context*, National Aeronautics and Space Administration, Washington 2009.

36. J. Maynard Smith, E. Szatmáry, *The major transitions in evolution*, W.H. Freeman–Spektrum, Oxford 1995, p. 5, Table 1.1.

37. E. Chaisson, *Cosmic evolution*, cit.

the logic of Materialism tells that SC does not have a significant role in the universe, since it is an „epiphenomenon", the causal role of which, if any, is basically determined by matter, M.

Now let us have a look to these claims from the perspective of science. We know from empirical observations that SC plays a significant role on the earth, transforming the whole biosphere in an increasing rate. We also know that mankind has the potential for transforming even more radically our whole planet. It seems for an increasing number of scientists that mankind has a significant potential to transform the universe in a significant manner[38], with the help of mind, SC. Cosmic evolution, the idea that the universe and its constituent parts are constantly evolving, has become widely accepted only in the last 50 years[39]. In the last decades, it became increasingly clear that biological and cultural evolution has been an important part of cosmic evolution on earth, and perhaps on many other planets[40]. In these new perspectives, it is not clear how it can arise that the antipode of matter (M), namely, mind (MD) or self–consciousness (SC), postulated in Materialism as being nothing but an insignificant epiphenomenon of matter (SC, MD$\ll$M), may actually have a central significance in the cosmos:

$$U \approx M \quad \rightarrow \quad LI \quad \rightarrow \quad MD \tag{3}$$

Indeed, Davies presents arguments showing that the long–time prevailing view claiming that living systems had no particular significance in the cosmic scheme of things, is "profoundly wrong". In contrast, «life [...] and mind is a key part of the evolution of the universe»[41]. The materialist opinion that LI and SC$\ll$M, in the light of (3), seems to contradicted by the 50 years facts of science.

We note that all philosophical systems, among which Materialism is only one, implicitly assumes that the world is comprehensible, there-

38. F.J. Dyson, *Time without end. Physics and biology in an open universe*, «Reviews of Modern Physics», 51 (1979), pp. 447–460; J.D. Barrow, F. Tipler, *The anthropic cosmological principle*, Oxford University Press, Oxford 1986; F. Tipler, *The physics of immortality*, Doubleday, New York 1994.

39. Cf. S.J. Dick, *Introduction and bringing culture to cosmos*, cit..

40. S.J. Dick, M.L. Lupisella (eds.), *Cosmos and culture*, cit.; P. Davies, *The quantum life,* «Physics World», July 2009, pp. 24–29.

41. P. Davies, *The quantum life,* cit., p. 383.

fore, at least in some respects, SC≈U. Accepting the basic assumption of Materialism that mind and self–consciousness are completely or at least basically material and are a side–effect of matter, MD, SC≪M, determined by the properties of matter. If the role of self–conscious mind and matter in the universe is negligible, it is not easy to see how the two can be comparable empirically on the earth and theoretically in the universe[42]. It is not easy to see any meaningful materialistic context in which human mind and the Universe are co–extensive, SC≈U.

1.2. *The problem of the nonmaterial nature of physical laws*

The laws of nature[43] are not only universally and reliably persistent entities, but also invariantly exerting the same influence by determining the time evolution of interactions. Materialism claims that "nothing exist but matter", therefore, nonmaterial things cannot exist. Yet it is a model–independent fact, substantiated by the system of all our empirical and theoretical knowledge, that physical laws play a central role in physics, which is the science of matter. We are faced with the problem of the ontological status of the physical laws. One of the most popular school of philosophy, realism, considers the laws of Nature as existing in reality: «Unlike conventionalism, a philosophy of science that regards scientific laws and theories as freely chosen constructs that are simply devised by the scientist for the purpose of describing reality, Realism holds that laws and theories have determined and real counterparts in things»[44]. Yet laws are not "movements and modifications of matter", and so, they are nonmaterial[45], and, if the materialist claim were true, they cannot exist; Materialism shows up in respect to the central concept of science, the laws of nature, as irrealism. In contrast, we point out that if material objects exist in reality, than the laws that determine their "motions and modifications" must act in the same reality where the material objects exist. Keeping in mind that laws of nature act in nature, it is hard to escape the conclusion that

42. Cf. S.J. Dick, M.L. Lupisella (eds.), *Cosmos and culture*, cit.; P. Davies, *The quantum life,* cit..

43. See section 1.3.1 above.

44. Cf. "Realism and the problem of knowledge" entry in *Encyclopaedia Britannica*, 2007.

45. See our note in section 1.1.

laws of nature exist in nature. If so, nonmaterial objects, namely, the laws of physics have a real existence.

1.3. *On the model–independent core of Materialism*

Searching for the model–independent part of Materialism, we found it suitable to reformulate the basic claim of Materialism U=M in a novel version. This version of Materialism consists in the non–modest claim that observable matter occurs universally. This claim is consistent with all our empirical and theoretical knowledge (EL), therefore it can be regarded as being universally acceptable, and so, as model–independent.

We note that the materialistic world model is very fruitful. Modern science is in many respects materialistic, and science is one of the most successful branches of activity of mankind. Without doubt, the material, observational aspects of science are of basic importance, since the impression of the observable universe on us is enormous. Moreover, modern science outperforms its medieval predecessor just because realizing the importance of empirical facts.

1.4. *On the model–dependent part of Materialism*

It is easy to see that the standard materialist claim that U=M, is a model–dependent postulate. It can be regarded as a "naive" thesis, ignoring basic empirical and theoretical evidences. For example, gravitation, inertia, magnetism cannot be observed directly with our outer senses. The observations of our thoughts, feelings, and instinctive initiations cannot be denied; they are inevitable and fundamental aspects of our vital experiences, and they argue that there are such things which are not observable directly by our outer senses, contradicting to the thesis of Materialism on an empirical ground.

The second thesis of Materialism M≫LI is also a "naive" thesis, at least from the aspect of science. First of all, one do not know what life is, and until this will be known, one cannot say any definite thing about it. The more radical a thesis is, the more compelling arguments it requires in science, but this second materialist thesis misses concrete evidence. This thesis reflects a widespread view of the last century. For example, Caws wrote that physics is the most basic of the empirical

sciences, because every object in the universe has physical properties, while most objects in the universe has no biological properties[46]. In contrast, recent results of astrobiology[47] indicate that cosmic life forms populate not only the whole of universe but even the vacuum can be regarded as having a biological nature. If so, instead of the claim of Materialism LI≪M, LI≈M can be the case. Life can be co–extensive with matter.

The third thesis of Materialism LI≫MD is also untenable in the light of new scientific discoveries concerning cellular intelligence[48].

In the light of these evidences, the scientific counter–arguments telling that MD has a central importance in the Universe, obtain a confirmation.

1.5. *Physicalism*

Physicalism differs from materialism in that it allows not only directly observable entities, but also so–called scientific unobservables[49].We point out that physicalism can be considered in a fundamentally extended context. If unobservables can be regarded as existents, just because we have the well–established theoretical and indirect empirical evidences for their existence, then physical laws may be also regarded as existent entities. The existence of fundamental physical laws is observationally confirmed, and their existence is also based on empirical and theoretical evidences. We propose to consider that the existence of physical laws is a fact.

46. P. Caws, *Philosophy of physics*, entry in R.G. Lerrer, G.F.L. Trigg (eds.), *The Encyclopedia of Physics*, Addison–Wesley, London 1981, p. 740.

47. A. Grandpierre, *Cosmic life forms*, published as a chapter in J. Seckbach, M. Walsh (eds.), *From fossils to astrobiology*, Springer, Berlin 2008, pp. 369–385.

48. E. Ben–Jacob, I. Becker, Y. Shapiro, H. Levine, *Bacterial linguistic communication and social intelligence*, «Trends in microbiology», 12 (2004), n. 8, pp. 366–372; K.J. Hellingwerf, *Bacterial observations. A rudimentary form of intelligence?*, «Trends in microbiology», 13 (2005), n. 4, pp. 152–158; B.J. Ford, *Revealing the ingenuity of the living cell*, «Biologist», 53 (2006), pp. 221–224; J.A. Shapiro, *Bacteria are small but not stupid: cognition, natural genetic engineering and socio–bacteriology*, «Studies in History and Philosophy of Biology & Biomedical Sciences», 38 (2007), pp. 807–809; Y.V. Pershin, S. La Fontaine, M. Di Ventra, *Memristive model of amoeba's learning*, «Physical Review E», 80/2 (2009), p. 021926.

49. A. Chakravartty, "Scientific Realism" entry in *Stanford Encyclopedia of Philosophy*, 2011; http://plato.stanford.edu/entries/scientific–realism/ Accessed at Sept. 1, 2011.

2. Idealism

Idealism, in philosophy, any view that stresses the central role of the ideal or the spiritual in the interpretation of experience[50]. In Idealism, it is mind or consciousness (MD) or self–consciousness (SC) that is the all–important and fundamental concept. At the first sight, it might seem that Idealism is the opposite of Materialism, but follows the same logic excluding all the rest of the world, exiling life and matter to a secondary role. We note that although in Materialism there is a usual notion that matter determines everything, claiming the causal closure of the physical, exiling mental causation, in Idealism, although different versions are known, a similar thesis of causal closure of the mental, and exiling physical causation, by our best knowledge, is not developed. This means that there is no such a kind of logical symmetry between Physicalism and Idealism. The reason is that in Idealism, besides MD or SC, causation by matter (M) or life (LI) is not strictly prohibited. This is not surprising, since in our everyday life as well as in science the causal role of physical objects and laws are well known and frequently experienced.

Even if in idealism mind and/or self–consciousness (MD/SC) are much more important or fundamental than matter (M), M can have a non–epiphenomenal causative efficiency. In practice, especially when we experience or approach only some surface layer of Nature, in a physical or material context, it can be enough to rely on materialism, even if in deeper levels, the role of mind/self–consciousness is not negligible.

2.1. *Cosmic evolution in Idealism*

Regarding the fact that the nature of the Universe is strongly determined by its initial or primordial state, Idealism is inclined to consider that initial or primordial state as being ideal or having a high spiritual level. Regarding the other fact that the future or final state of the Universe should offer us a perspective to spiritual evolution, this future of final state must also have a high spiritual level. There it seems inevitable that after the primordial state a spiritual devolution

50. "Idealism" entry in *Encyclopaedia Britannica*, 2010.

or descent should occur. Indeed, similar outlines of cosmic evolution are indicated by F.W.J. Schelling, G.F.W. Hegel, Pierre Teilhard de Chardin, and more recently by J.D. Barrow and F.J. Tipler[51].

3. Theism

The theist considers the world to be quite distinct from its Author or Creator[52]. The Universe is divided into observable matter (M) and unobservable supernatural (SN) that creates and governs the evolution of the Universe. The supernatural (SN) is primary; nature is "naturalized" and considered as material (M) and as secondary not only in a logical but also in a temporal sense. Theism seems to be based on an Idealism of the supernatural, and a Materialism of the nature. Now if the two basic ingredients of the Universe (U) are the natural — in Theism, material (M) — and the supernatural (SN), forming a complementary pair, the Universe as a whole, than we obtain the following equation:

$$SN = U - M \tag{4}$$

SN is the Creator, the source of all material existence; it maintains the existence of all matter. Remarkably, life (LI), mind (MD) and self–consciousness (SC) are tertiary not only in a logical, but also in a temporal sense:

$$SN \gg M, LI, MD, SC, SN \quad \rightarrow \quad M \quad \rightarrow \quad LI, MD, SC \tag{5}$$

We point out that the basic problem of theism is that it did not specify its central concept, the supernatural, as an exact concept that could be specific enough to be suitable in a scientific, explanatory context.

51. J.D. Barrow, F.J. Tipler, *The anthropic cosmological principle*, Oxford University Press, Oxford 1986.

52. "Theism" entry in *Encyclopaedia Britannica*, 2010.

3.1. *A scientific interpretation of the so–called "supernatural"*

We note that it is plausible to attribute a definite meaning to SN. Based on our concept of the Universe (U), telling that the Universe involves the observable universe (M) as well as all the laws of nature (LN) and principles of nature (PN) governing it, we obtain the following formula:

$$U = M + LN + PN \tag{6}$$

Therefore, if SN=U–M, then we obtain the suitable meaning of SN:

$$SN = LN + PN \tag{7}$$

Regarding the fact that the laws of Nature, as well as the principles of Nature, are scientific concepts, we obtained, surprisingly, a scientific interpretation of the "supernatural", namely: super–material. This super–material part of Nature can be regarded as nonmaterial, as we argued in section 2.2. In order to appreciate the role of the nonmaterial laws in the observable universe, we add that in the context of the Big Bang theory it is a popular idea in modern physics that all the material of the Universe has been created by the physical laws[53]. This view fits well with the description of theism given by the *Encyclopedia Britannica*, namely, that all limited or finite things are dependent in some way on one supreme or ultimate reality, namely, on the physical laws.

This new, scientific understanding of "supernatural" (i.e. super–material) makes it immediately plausible that Rationalism is not necessarily limited by the supernatural. Instead, in our interpretation obtained here, it is this supernatural, with it laws and principles, with which all the phenomena of the natural world will become explainable, since SN consists from LN and PN, both of which are regarded as comprehensible. The scientific meaning of the "supernatural" has a consequence also regarding rationality: the realm of "irrational" (or at least, the

53. Cf. S. Hawking, *A brief history of time*, Bantam Books, New York 1988, p. 142; P. Davies, *The mind of God. The scientific basis for a rational world*, Touchstone, New York 1992, p. 73.

realm of the presently unexplained) retreats from its "supernatural" positions into the realm of autonomy (see section 1.3.1).

Regarding our results indicating the existence of biological autonomy, we can complete the nature of the supernatural by autonomy (A):

$$SN = LN + PN + A \tag{8}$$

Biological autonomy is defined as the ability of the living organism to make decisions (selecting from different options) spontaneously (by decisions not completely determined physically and biologically) about its own macroscopic states and changes. If a living being has its own sphere of decisions in physical, biological and social questions, all of which are manifested already at bacteria, it can be regarded as having a personality. This additional element plays a crucial role in determining the nature of the supernatural. While by (7) SN seems to have an impersonal nature, (8) already assign a personality to the supernatural. And if the whole Universe can be regarded as a kind of living organism[54], than the Universe may have a personality. This means that it is possible to work out a scientific description of God, and identify God with the living Universe having a personality and its own sphere of decisions:

$$G = LN + PN + A \tag{9}$$

Remarkably, this scientific version of "super–material" reality offers a new, scientific meaning for the apparently paradox claim of theism that the supernatural is simultaneously immanent and transcendent. On the one hand, physically, the laws of nature can be regarded as being "within" material objects, and so, as being "immanent". On the other hand, astronomically, the laws of Nature can be conceived as being beyond the observable universe, and so, as being "transcendent".

We note that pantheism can be characterized by the thesis that God (G) is the whole material universe:

$$G = M \tag{10}$$

54. A. Grandpierre, *Cosmic life forms*, cit.

The difference to panentheism is that in this latter:

$$G = M + LN + PN \tag{11}$$

3.2. *Cosmic evolution in theism*

From our relation (5), it is possible that the cosmic evolution is directed towards the development of life, mind and self–consciousness, as it is suggested by Russian cosmism, Teilhard Chardin, and the anthropic principle[55]. Moreover, the idea that self–consciousness has a natural task to explore the Universe and the nature of the super–natural also fits smoothly to this picture:

$$SN \rightarrow M \rightarrow LI, \quad MD \rightarrow SC \rightarrow U, \quad SN$$

4. Dualism

Dualism is a philosophy that is defined by the *Encyclopaedia Britannica* as the use of two irreducible, heterogeneous principles (sometimes in conflict, sometimes complementary) to explain all of reality or some broad aspect of it (metaphysical dualism). Examples of metaphysical Dualism are God and the world, spirit and matter, mind and body, and immaterial and material substance[56].

In Descartes's Dualism, the priority is attributed to mind (rationalism). If human self–consciousness (frequently referred to as "mind", which we identify with consciousness and distinguish from self–consciousness) can be regarded as a sparkle from the eternal fire of the supernatural (as it was a frequent thought in Descartes' time), cosmic evolution can be thought as driven by the cosmic mind, (SN).

The logic of Dualism tells that, ontologically:

$$SN \approx M,\ SN + M = U,\ SN \rightarrow M,\ LI,\ MD,\ SC$$

55. J. D. Barrow, F.J. Tipler, *The anthropic cosmological principle*, cit.
56. Cf. "Dualism" entry in *Encyclopaedia Britannica*, 2010.

Dualism can be described in terms of SN (non–material aspects of the Universe) and M (observable matter). Dualism expresses a Materialism of Nature and theism of self–consciousness.

5. Naturalism

Naturalism is, in philosophy, a theory that relates scientific method to philosophy by affirming that all beings and events in the universe (whatever their inherent character may be) are natural. Consequently, all knowledge of the universe falls within the pale of scientific investigation. Although Naturalism denies the existence of truly supernatural realities, it makes allowance for the supernatural, provided that knowledge of it can be had indirectly — that is, that natural objects be influenced by the so–called supernatural entities in a detectable way. Naturalism presumes that nature is in principle completely knowable. There is in nature a regularity, unity, and wholeness that implies reliable laws, without which the pursuit of scientific knowledge would be absurd[57].

We point out that the existence of laws of Nature not necessarily means that everything is completely determined by these laws. Actually, as we had seen in Sect. 1.3.1 that biological autonomy exists. Therefore, determination by laws of nature is not complete, and so, Naturalism misses to grasp a fundamental aspect of its name–giving subject, nature.

5.1. *Naturalism and its relation to the "first philosophy"*

There are views[58] claiming that Naturalism is the empirical method of inquiry, while there are other, philosophical, non–empirical methods of inquiry, the importance of which are denied my some naturalists. We already pointed out that even the so–called "empirical method" is actually and empirico–theoretical method (EL). Moreover, while physics in solving practical tasks does not necessarily involves philosophy, the working out of the scientific method is not a task of practical

57. Cf. "Naturalism" entry in *Enciclopaedia Britannica*, 2010.

58. P. Moser, D. Yandell, *Farewell to philosophical Naturalism*, in W.L. Craig, J.P. Moreland (eds), *Naturalism. A critical analysis*, Routledge, London 2001, pp. 3–23.

science; therefore, it necessarily requires a kind of "first philosophy". Realizing the importance of logic, the general consensus is that the method of science is a balance of logical construction and empirical observation, these components standing in a roughly dialectical relation[59]. The clarification of the possibilities of knowledge does not follow the ways of objective science[60]. Therefore, the opinion of some naturalists claiming that "first philosophy" is unnecessary cannot have general validity.

6. Phenomenology

Let us conceive here phenomenology as based on the idea that all that is given for us are our immediate phenomenological experiences in our mind, preceding any interpretation, and all the rest is transcendent; therefore Husserl said: «go back to the things themselves»[61]. According to this concept, everything in our mind is based on our immanent, personal experiences, it is called as "phenomena". Moreover, the so–called "observable universe" is the result of objectification from our percepts. The idea of observable things arises from experiences by the intervention of our mind that analyses the giant flow of experienced event flows and finds invariant units in it that are regarded as reliable if they are confirmed by all our empirical experiences and knowledge, including public, socially confirmed knowledge. Certainly, these public, intersubjectively confirmed, transcendent experiences must correspond to relatively stable, long timescale units in order to become confirmable and consistent with experiences of all other people. A part of our subjective experiences becomes socially confirmed, other people reporting about experiencing the same objects at the same place. Moreover, the domain of our experiences that is related to the concepts of apparently inanimate things is found to be consistent with the empirical and theoretical knowledge yielded by physics. This

59. P. Caws, "Philosophy of physics", entry in R.G. Lerrer, GF.L. Trigg (eds.), *The Encyclopedia of Physics*, Addison–Wesley, London 1981, p. 343.

60. E. Husserl, *The idea of phenomenology*, transl. by L. Hardy, Kluwer Academic Publishers, Dordrecht 1999, p. 64.

61. Id., *Investigations into phenomenology and the theory of knowledge*, in *Logical investigations*, transl. by I. Findlay, Routledge, London–New York 2001, p. 168.

"public domain" is the same not only for us, human beings, but, apparently, also for all living organisms and inanimate things, since they seem to experience the same physical objects than ourselves. Certainly, the idea of observable, material universe (M) can be related to that aspect of experiences. This material, observable, publicly accessible universe is based on a certain domain of our experiences accessed from the first–person point of view. We point out that experiences may have non–public, non–repeatable, not–confirmable aspects, too. Indeed, it is plausible to admit that all experiences are in themselves rich, and their invariant aspects represent only special aspects of them that do not exhaust the full richness of the genuine experiential realm. Experiences may have a rich "subjective", non–stable, non–public, non–repeatable content, contributing to a subjective, private realm, what we can call as the subjective universe (SU). The subjective universe can be conceived as the realm of all immanent experiences, together with their principles generating and governing them.

Our immanent, empirically experienced phenomena can be tested directly with the help of logic, and, indirectly, when related to all our other immanent as well as transcendent empirical experiences. Therefore, the same empirical plus logical (EL) confirmation can work in the internal world than in the external world, with the difference that, instead of observing by our outer senses, the empirical observations of the internal world are observations by our self–conscious and unconscious attention. Remarkably, from the aspect of Materialism and physicalism, the concept of the subject seems to be incommensurable with that of the object. The object consists of physical ingredients; the subject does not consist from ingredients at all, it is an elementary unit of subjectivity. Moreover, while the object is related to other objects and to outer bodily senses, the subject is related to immanent experiences, feelings and thoughts. We propose that the personal relations of the subject to its natural, immanent experiences are conveyed by feelings. More concretely, from an almost unlimited variety of rich, fresh, first–hand experiences, our emotions select and amplify the ones that are considered as important for us. In this way, it is possible that the almost infinitely rich set of immanent experiences practically no important ones are left out. At least, the subject has the capacity to optimize its value–system to perceive and utilize its immanent experiences. If so, we can speak about an emotional autonomy, as a

basic form of the subject's autonomy.

While the subject cannot be derived from the object, the case is different from the viewpoint of the subject: the object is a part of the subjects' experiences, namely, that of corresponding to the public domain, observable "directly" by the outer senses. We add that the conceptual extension of the subject is larger than that of the object. Moreover, while objects are governed by laws of Nature of the empirical sciences, the universe of the subject consists from thoughts and feelings (experiences contribute to the formation of empirical concepts that are constituents of thoughts) are governed by the laws of Nature corresponding to the non–empirical sciences. Namely, self–conscious thoughts are, naturally, governed by classic logic; we propose that the natural, immanent feelings are governed by a more fundamental law of Nature: natural logic[62]. We can argue that natural logic is the fundamental law, classic logic can be regarded as a special case of it, and the mathematical logic can be regarded as a special case of classic logic, applied to quantitative aspects. Hempel found that sciences are determined by their fundamental concepts and laws[63]. Now if the internal universe of personal experiences is related to concepts fundamentally different from physical concepts, and if they have fundamentally different kind of logical relations, than it requires a fundamentally new kind of science. One can argue that since the concepts and laws of the internal universe are broader, therefore the science of the internal universe can be regarded as the fundamental science, in comparison to empirical sciences. This means that the subject is the basis of the object. In case if this proposal will be confirmed, the subject can have a certain control over the subject, within some suitable conditions. Moreover, phenomenology can be regarded as opening a road towards the natural science of the subject. The subject becomes a fundamental basis of natural sciences.

Our proposal seems to be underpinned by scientific evidences. For example, it is well known that in quantum physics «no phenomenon

62. A. Grandpierre, *The biological principle of natural sciences and the logos of life of natural philosophy. A comparison and the perspectives of unifying the science and philosophy of life*, «Analecta Husserliana», cx (2011), "Phenomenology / ontopoiesis retrieving geo–cosmic horizons of antiquity", pp. 711–728.

63. C.G. Hempel, *Philosophy of natural science*, cit., p. 102.

is a phenomenon until it is an observed phenomenon»[64]. If so, the physically undetermined observer–observed, i.e. subject–object relation has a fundamental, cosmic significance (leading to e.g. the idea of the participatory Universe in which the subject participates in creating the observable Universe)[65]. For Husserl, the primary basis of all knowledge, phenomena, are pre–reflective experiences. Self–consciousness developed from pre–reflective consciousness. This means that in the cosmogenesis pre–reflective consciousness could play the primary role. An open question is whether direct subject–subject interactions are possible or not.

In this phenomenological approach, the fundamental basis of reality is given by the universe of subjects (SU), and everything else, including the public universe U, is formed from the events in the subjects (feelings and thoughts). Therefore, the logic of phenomenology tells that:

$$SU \quad \rightarrow \quad SU + U \tag{12}$$

Phenomenology has such a deep approach to Nature that we have to re–define the concept of the Universe given in the Introduction. The more complete concept of the Universe (UN) includes also the subject, the internal world: UN=SU+U. Nowadays, at the same time, for adults living in modern societies, we are accustomed to think that our most direct experiences are physical objects. Phenomenology argues that our most immediate experiences are not physical objects, but our immanent experiences that are the manifestations of our natural beingness and our natural interactions with the Universe. We can note that man is the only living being on Earth which is not specialized. The natural destination of mankind is to preserve and develop the universality of *Homo Sapiens*. Becoming accustomed to Materialism can be a prison for mankind, a kind of specialization that would lead to the loss of our genuine human capacities.

We can observe that phenomenology offers a richer conceptual framework to understand ourselves and the Universe than all the other approaches mentioned above.

64. J.A.Wheeler, *Beyond the black hole*, cit.

65. J.A.Wheeler, *At home in the Universe*, cit.; H. Stapp, *The mindful Universe. Quantum mechanics and the participating observer*, Springer, Berlin 2007.

Conclusions

Working out a model–independent conceptual formalism, it became transparent that Materialism is a philosophical approach to understand the Universe at its observational level, securing it an important role in science and philosophy. Moreover, it became clearer that beyond the immediate observations nature has deeper layers, where we found the laws of nature. Following the pursuit of obtaining an essentially full picture about the Universe, we found the first principles and autonomy at the ultimate level of the Universe. It became clear that not only physics, but biology and psychology may have also their first principles. Therefore, the attitude of Materialism to consider only one of these ultimate ingredients of nature as "real" expresses an inclination to focus attention always to one of them. Instead of such an autocratic world–model, we proposed to revise the presuppositions of all world models, and work out a model–independent scheme of world–models.

We presented explicit arguments showing that science itself is a result of a first philosophy, which worked out the scientific method. Science in practice is a more restricted discipline, concerning concrete scientific tasks on the basis of the already established scientific method. Antique science is based largely on the Aristotelian concept of science, in which logic and "first philosophy" played a founding role. Modern science is largely due to the invention of the modern scientific method, in which Francis Bacon's philosophical insights[66] had a significant role. Bacon emphasized the role of empirical observations in the development of science. Following him, Empiricism become dominant in modern science (see section 1.1). The invention of the scientific method and its development into the EL and PEL model[67] indicates the role of logic and philosophy in offering suitable scientific method for the development of science.

An unexplored consequence of the fundamental role of the subject in the Universe is that all cosmic life forms can interact with their environment and with each other, at the level of the subject, too. The co–operation of cosmic life forms can open new vistas before the

66. F. Bacon, *Novum Organum* (1620), § xix.
67. H.G. Gauch, *Scientific method in practice*, cit.

evolution of science. Life and matter can interact in the cosmic scene, at the fundamental level of the Universe, beyond the material level, and due to this collective activity, new forms of matter can develop. Life can shape matter more and more suitable to realize and express the nature of life.

A question arises: what kind of world model can be optimal for the future of mankind? We presented a list of observational and theoretical arguments (see sect. 2.1) indicating that the Universe evolves towards life and mind; LI and MD are central in cosmic evolution[68]. Our result that not only physics, but biology and psychology also are autonomous natural sciences, having their own, independent first principles that is not derivable from physics, offers a natural explanation for the fine–tuning of the Universe, and for the life–and mind–centered evolution of the Universe. If the Universe develops really towards life and mind, it can not only utilize the physical resources of the Universe, but can also renew them, modifying the direction of cosmic evolution from the one towards physical equilibration towards life and mind.

Since cosmic life forms populate the entire observable universe[69], the co–operation of cosmic life forms presents new, dynamic degrees of freedom before the evolution of the Universe. The interaction of cosmic life forms can follow the exponential laws so frequently met in the history of Western civilization. A new cosmic perspective opens up before us: all life forms can be conceived as organic parts of a vast, living Universe. Therefore, the natural function of all life forms is to contribute to the richest and most complete evolution of the whole Cosmos.

In Rationalism or Dualism the thesis that mind (MD) and matter (M) are in a sense comparable is true only in the mental context, but untrue in the material context if mind (MD) refers to the mind of an individual. Actually, human mind can transform the earth or the Universe only as a result of a collective effort. Therefore, mind can be comparable with life and matter not only in the mental but also actually within suitable collective context. If mind turns out to live

68. Cf. L.J. Henderson, *The fitness of the environment*, Macmillan, New York 1913; J.D. Barrow, S.C. Morris, S.J. Freeland, C.L. Harper (eds.), *Fitness of the cosmos for life*, cit.; S.J. Dick, M.L. Lupisella (eds.), *Cosmos and culture: cultural evolution in a cosmic context*, cit.; P. Davies, *The quantum life*, cit.

69. A. Grandpierre, *Cosmic life forms*, cit.

with its genuine potential, it can form a "collective mind" (science is cultivated collectively, too). Our individual minds (iMD) can develop towards this collective mind (collMD). Moreover, even the collective mind of mankind can develop towards a harmonic union with all cosmic life and mind, (cosmMD):

$$iMD \quad \rightarrow \quad collMD \quad \rightarrow \quad cosmMD$$

And if our co–operating collective mind can be effective in the cosmic scene, then mind can lead us towards a Universe which enfolds its whole collective potential for the sake of life and mind:

$$U\,(present) \rightarrow U\,(future) \approx cosmLI \approx cosmMD$$

A new conclusion obtains from this new perspective: all knowledge of mankind should serve the best cooperation of all cosmic life forms for the sake of the cosmic life which maintains us and supplies us with new and new sources of vitality, enthusiasm and energy in searching the secrets of nature. A new social perspective arises from the new cosmic perspective for the world's future: all nations should serve mankind's best abilities in unfolding our human potential for the sake of cosmic evolution. All our mental efforts, our learning, our consciousness, our spiritual and emotional life can be recharged in this new cosmic perspectives with the galvanizing potentials arising from peaceful cooperation of human minds with each other, with the terrestrial and the cosmic biosphere.

Our model–independent considerations indicate that it is not necessary to cultivate philosophy in a way to start with model–dependent "positions". Instead, it is advisable to keep in mind the immense system of empirical and theoretical knowledge obtained by mankind during its whole lifetime. While in Materialism or Physicalism the evolution of the observable universe and the future of mankind were not intimately coupled, in these new perspectives the two becomes coupled in a number of different ways. Besides obtaining the logic of some important world models, we obtained a new, essentially complete world model that can be suitable for optimizing the future of mankind in harmony with the future of the Universe. In this future, not only the static elements of the world model play a significant role, but, as we pointed out here, their dynamic interactions. The

cooperation of all the factors of the essentially complete world–model opens up new, collective perspectives before the evolution of science and mankind.