Time, Physics, and Freedom: at the Roots of Contemporary Nihilism.

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1. **Introduction**

As far as I know, the term *nihilism* appears in philosophical literature in the second half of the XIX century. The notion of *nihilism* entails a general negative attitude towards all of the traditional values, including the notions of Truth, Being, and Logos; so much more compared to the old historical criticism of the notion of *truth*, prevalently focused on its *logical aspects*.

Two strands can be recognized in the modern *nihilism*: one belonging to the German tradition, from Nietzsche to Heidegger, and one to the French tradition, exemplified, for instance, by “La décadence” of Bourget and subsequently by Deleuze. I believe, furthermore, that we should ascribe to *nihilism* the deflationary minimalism which lies at the ontological roots of — so to speak — the “anti-idealist ineffability” of certain analytic philosophy. Anyway, nowadays in western civilization we have an every-day experience of a widespread sociocultural manifestation of *nihilism* and its *effects*, which includes a deep loss of effectiveness of the sense of truth, meaning, freedom, responsibility, sense of personal and national identity, and which is impressively evident in the common life manifestations of the man of the street: a *world of inauthenticity*.

According to certain critics, Enlightenment carries most of the responsibility for such influential cultural effects, in particular because of the ideas of *causality* and *determinism* stemming from its prevailing philosophy (remember Laplace and Lamettrie). I must say, however, that I see the whole of modern philosophical thinking, at least up to Kant included, as a great *reaction* to the Galilean foundations of physics. Accordingly, in this paper - without being detrimental at all to the achievements of scientific knowledge - I will argue that: i) a robust contribution to contemporary cultural *nihilism* comes as a long-term effect of certain *totalitarian* self-interpretations of these foundations, one of which is already present in the radically mechanistic view of Descartes; and (ii) a contemporary contribution derives from certain prevailing (although often only implicit) philosophical interpretations of the astonishing achievements of physics, including elementary particle theory, relativity theory, certain simplistic interpretations of the remarkable results of neurosciences and, last but not least, the parallel flourishment of the so-called “philosophy of mind” and the “computational” revolution.
Weinberg, for example, has expounded a very clear position about a harsh reductionistic view leading the above mentioned totalitarian interpretations to a climax. He calls this position about the theoretical structure of physics “Grand-Reductionism”, meant however as a general conception of Nature. Since this position – as Weinberg himself admits - is also strictly connected to a deterministic view of the world, I will unify them, for the sake of argument, into a single View of Nature which I call “Deterministic Grand Reductionism” (DGR). I believe that, when properly scrutinized, Weinberg’s view turns out to be a strong, but irrational metaphysical thesis, according to which the facts of the past, in conjunction with the laws of nature, entail every truth about the present and the future. In this paper I will take Weinberg’s stance as an exemplary source of nihilistic thinking. More generally, I will focus on three main issues: namely a crucial logical junction that I would like to call the freedom of meaning, the issue of determinism and free will, and the philosophy of time in conjunction with the mind-body problem. I am aware that in this way I am considering a notion of nihilism which is different from, and more general than, the one introduced by Nietzsche. However, this more general and disruptive brand of nihilism is precisely a specific outcome of certain contemporary self-representation of physics.

The main thesis I will propose is that the nihilism arising from such issues is due to a common aporetic logical source having to do with a basic misunderstanding concerning the nature and the range of the physical description of the world, as shaped by the Galilean foundation. Accordingly, I will start by examining the sophisticated philosophical and methodological process lying at the basis of the Galilean enterprise and some consequent structural limitations inherent to the foundations of physics which, when ignored or too confidently underestimated, become just the basic source of contemporary scientistic nihilism. Overlooking the structural limitations of the physical enterprise is especially relevant to the debate about the alleged determinism (or indeterminism, as well) of the world, and the so-called causal closure of physics, both of which bear upon the mind-body problem and the so-called compatibilist thesis about Free Will.

I will analyze in particular the aporetic nature of some consequences of DGR that bear upon the issue of the freedom of meaning. In a sense, the aporia characterizing this case is exemplary and summarizes the aporetic elements surfacing in all of the issues discussed in this paper. They are all deeply interconnected and play analogous roles as sources of nihilistic influences. Briefly, if we are not able to freely believe and freely think in a meaningful way, we are not even able to freely will and freely act in the world, and viceversa. The conceptions of time also bear upon the same problems. In particular, as is evident from

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history of philosophy – Kant’s thought especially – the issue of freedom and free will is strictly related to the way in which subjectivity is thought to stay in time. Thus, my analysis will be jointly directed to the analytic view expounded in the so-called A and B-theories of time. I will then discuss the consequences of the implicit assumption that the metaphysics of time is dictated by the role played by physical time within the theoretical structure of physics, in particular by a literal interpretation and reification of the spatio-temporal models of the relativity theory. A further instantiation of the same logical junction concerning meaning and freedom of choice is provided by the current reductionist and ideological interpretation of strict Darwinism. This is where I wish to be absolutely clear from the very start. My position has nothing to do with the so-called “creationism”, “intelligent design”, “vitalism” and the like, nor am I willing to put into question the central Darwinist thesis of the common origin of species. Rather I intend to face the philosophical difficulties arising from the conjunction of, on the one hand, the recognition of the reality of subjectivity, which reveals itself in living organisms by various degrees, and, on the other, the extrapolation of the strictly Darwinian theoretical model to the cosmological level. A final section is thus briefly devoted to expound my critique of the aporetic features and nihilistic elements surfacing in standard evolutionary thinking, in parallel with DGR.

In this paper I will argue throughout according to a principle of metaphysic parsimony, so I will not propose any positive metaphysics, if not for the brief analysis given in Section 9. The overall logical structure of my arguments is that of a “reduction ad absurdum”, by which I intend to individuate a perspective with the capacity of avoiding deeply antinomic conclusions. Therefore, I tend to a clarification of the subject which, in a sense, be an incontrovertible conclusion to the extent in which it is implicitly upheld even by those who tend to deny it. Indeed, is this logical circuit not the great discovery of the inner necessity of Reason revealed by the Greeks?

Given the conceptual range of the subject matter and the limited space of this paper, my analysis will necessarily be rather sketchy and simplified. I am well aware that only a few of my readers may be convinced. To most of the readers, my discourse may appear as really provocative. I am saying “appear” deliberately, however, because I am deeply convinced of my view.

2. A philosophical premiss: the ontological-phenomenological aporia

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1 This concept is an extension of what Abner Shimony called “phenomenological principle”. See Shimony (1993).
I call ontological-phenomenological aporia the logical structure of a philosophical argument in which: 1) a basic distinction is deliberately maintained between reality and appearance; 2) ontology does not account consistently for the corresponding phenomenology, in particular, for the distinction between reality and appearances “qua” appearances.

This is the logical tool I am going to exploit for my reduction ad absurdum type argumentation. In this paper will present some instantiations of this aporia.

3. The structural limitations of the physical description of the world

3.1 – A florilegium of quotations – I

3.1.1 - The foundations: Galileo Galilei (Third Letter to Markus Welser, 1633)

<< O noi vogliamo specolando tentar di penetrar l'essenza vera ed intrinseca delle sustanze naturali; o noi vogliamo contentarci di venire in notizia d'alcune loro affezioni. Il tentar l'essenza l'ho per impresa non meno disperata e per fatica non men vana nelle prossime sustanze elementari che nelle remotissime e celesti >>

3.1.2 - The foundations: Galileo Galilei (Il Saggiatore, 1623)

<< La filosofia è scritta in questo grandissimo libro, che continuamente ci sta aperto innanzi agli occhi (io dico l'Universo), ma non si può intendere se prima non s'impara a intender la lingua, e conoscere i caratteri ne’ quali è scritto. Egli è scritto in lingua matematica, e i caratteri son triangoli, cerchi, ed altre figure geometriche, senza i quali mezzi è impossibile a intenderne umanamente parola; senza questi è un aggirarsi vanamente per un oscuro labirinto >>

3.1.3 - The foundations: Ernst Cassirer (Das Erkenntnisproblem in der Philosophie und Wissenschaft der neuren Zeit. Ester Band, 1906)

<< Modern thinking about nature is characterized by a lengthy process of ontological transformation which leads from the classic paradigm of substance to that of function >>

3.2 - The fundamental blockade

Galilei’s intuitions quoted above have been implemented, through a radical philosophical transformation taking place during the Renaissance, by means of a literal blockade of the process of essential individuation of entities. “Accidental” and “essential” properties are no longer taken into account for the understanding of temporal change and transformations of individual entities. This blockade has methodological consequences that match the passage from the notion of object of experience (say “this table”) to idealized abstract classes of entities that allow for mathematization (say “electrons”, but also “Newton’s apple” as concrete instantiation of the class of weighty abstract material objects). The transformation of the world
of experienced objects into a world of abstract mathematizable entities entails the simultaneous and implicit ablation of the experiencing subject from the field of entities that physics is entitled to understand.

This takes place through a set of founding approximations and exclusions. A first founding approximation is the constitution of physical time (see later) which (according to Whitehead) bifurcates Nature. A second founding approximation is the separation of the world into three parts: (i) the object to be defined as a physical system; (ii) the observing and theorizing subject, who often assumes the ambiguous role of “observer” or even “measuring apparatus”; (iii) the remnant of the world. The variability of this last part, initially taken as irrelevant to the immediate scope of defining the physical system, determines the irreducibly contingent component of the physical description in the form of initial or boundary conditions. This partition allows the determination of the forms of possible temporal variations of the physical system in connection to different choices of the relations to the remnant of the world, as physical laws.

The basic passage, however, is the abstraction of the particularities of the object to be interpreted as physical system, as well as of its relations to the remnant of the world, by means of a systematic pre-selection. This sustains the blockade of essential properties that constitutes the physical object as an abstract equivalence class of perceptual things. In this way, the blockade leads to a peculiar new individuation, or better, specification, of entities that constitutes a new reduced and abstract ontology. The important point is that, within the limits of the internal methodological approximations of the physical description, this specification can be considered exaustive or “complete”. This allows maintaining – in the new sense – terms like the ontology of a theory (say, of “material points” [Euler], of “classical fields”, of “elementary particles”, “antimatter”, “identical particles”, “relativistic quantum fields”, and so on). Once the reduced ontology is established, any physical action is described in spacetime as an exchange of 4-momentum among the interacting parts of a whole.

It is just in force of the exhaustiveness or completeness of the reduced ontology (which allows, first of all, the mathematical specification of the concept of “initial conditions”) that one can speak unambiguously of determinism or indeterminism of a theory, while I maintain that

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2 Admittedly, stricto sensu, this picture schematizes the framework of classical physics only. Typical Galilean conditions like the indefinite temporal repeatability of the relevant relations with the remnant of the world, and like the irrelevance of the spatial relations between a suitable region including the physical system and the remnant of the world (spatio-temporal omogeneity), are no longer simply satisfied in the case of general relativity. The situation of astronomy and astrophysics is still recoverable due to the multiplicity of similar physical systems under scrutiny, while the basic conditions are not met in the case of cosmology. Indeed, I believe that “the Universe as a whole cannot be considered as a scientific object in any sense that such words have had in the historical development of physics”, see Pauri (1991) and a related comment in Torretti (2000).
one is not allowed to attribute determinism (or indeterminism either) to the world simpliciter. Aside from the idealized reduction, there is in fact no natural minimality in the concrete multiplicity of the real world upon which to base the dynamical description mathematically (see the following quotation of Nagel and the reference to “des êtres qui la composent” in the quotation of Laplace). Therefore absence of determinism (in the world) is not equivalent to indeterminism in the ordinary sense of chance. Not only does the primary ontological reduction leave out of the picture the experiencing subject with their qualia, but more generally, a whole background of happenings of the world which could not be mathematized in principle. Furthermore, it does not take into account the fact that we have limited access to great part of the world, nor the fact that we cannot say how much of reality lies beyond the reach of the present and future domain of objectivity, or any other form of human understanding. In other words, beyond the typical idealizations of the physical description of the world there is an “open world”. The so called causal closure of physics is only a restriction to the reduced, idealized ontology of a broader general causality of the world which must thereby be admitted. The causal closure of physics is only valid under the condition that the theorizing subject (the agent subject) does not intervene in the dynamic play of the game once the initial conditions are settled. Correspondingly, physical time, related to physical causality, is just a reduction of what I call real time of the world, which is related to the general causality of the world. In the open world a free agent can initiate an emergent causal chain (emergent with respect to the reduced physical causality), that subsequently exploits the quasi macrodeterminism allowed by the physical description under specified conditions. General causality and finality are two aspects of the same fact. The bi-unity of causality and finality is, as I will argue later, the very essence of the future-past relation and of the agents’ freedom. On the one hand, physical laws are entirely silent about the “initial conditions” and, therefore also about the present state of the world. On the other hand, the laws are astonishingly (and “unreasonably”5) effective in describing a great set of empirical data and forecasting the temporal evolution of physical systems. This, however, happens under exceptional circumstances, precisely when all the relevant conditions of the present state are known in terms of the reduced ontology. Finally, this knowledge is possible due to a bundle of actual

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3 This description is of course inadequate for quantum phenomena and requires important adaptations. See Pauri (2000),(2007).

4 I have already discussed elsewhere the notions of real time and general causality of the world. See Pauri (1997a,b),(1998),(1999),(2001. These papers also contain my stance about the mind-body issue and the genetic evolutionary problem that arises from the view that some kind of freedom with respect to strict physical causality be a companion of the subjectivity which is present in various degrees in all living organisms (see also Section 9 of this paper). Free actions of living organisms, giving rise to emergent causal chains, introduce and reveal a new temporal structure of the world, real time, which is reduced within the physical description.
features of Nature which, while guaranteeing its overall stability, allow for a fine-tuned selection of the relations between the physical system and the remnant of the world, discarding great part of such relations. As stressed by Wigner\(^6\), this condition is exemplarily and maximally met artificially in the construction of machines where all determinant conditions are known. The phenomenic appearences have been separated at the beginning from an alleged self-contained “physical world” and transferred within the “minds” of the theorizing subject. The very concept of an objective “physical reality” precisely depends upon this fundamental exclusion of subjective appearances from the “external world” and their attribution to the “mind”. Thus, scientific progress holds in itself the warranty of its essential incompleteness, that is, its inability to explain everything. Overlooking this crucial point is tantamount to implicitly assuming a question begging stance about an alleged physicalistic “resolution” and “explanation” of the mind-body problem. It is then no wonder that the causal closure of physics is typically invoked for denying causal powers to mental properties. Applying reductionism to the field of objectivity is easily understandable since it exploits the simple geometric concept of the relation between the parts and the whole\(^7\). A corresponding direct reduction of subjectivity to “the physical” cannot be really carried through in the form of what we intend to be an “explanation” in science because it would fail anyway to possess the character of a relation between a given level of objective description and another. Therefore, DGR and the so-called “eliminative materialists” base their fundamental philosophical stances on a rather irrational attitude.

I believe that a progressive concealment of the foundational limitations of the physical enterprise has taken place since Galilei’s intuitions. This concealment has been favoured by: i) some initial totalitarian interpretations of physics’ methodology; ii) the astonishing, though “unreasonable”, empirical success of the mathematization of Nature; iii) the patchwork character of the working habits of modern scientists. This concealment has generated the - mainly unconscious - tendency to endorse the philosophical untutored program of a reconstruction of the “world” in terms of the deterministically organized reduced ontology of mathematical physics, as well as the arrogant pretension to reach a complete description of reality.\(^8\) This is exactly the program of DGR and this – I claim - is the main source of all the aporetic manifestations that I shall discuss presently. By

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\(^5\) According to a well-known essay of Eugene Paul Wigner. See Wigner (1960).

\(^6\) See Wigner 1960.

\(^7\) With the important exception of quantum phenomena. See Pauri (2007).

\(^8\) Although, as Richard Feynman remarked, “When you follow any of our physics too far, you find that you always get into some kind of trouble”.
identifying the two different types of causality, DGR excludes any gap in the physical
description, confining the mind-body issue within the rigid alternative options of
determinism and indeterminism and making it philosophically intractable if not by mere
words. In conclusion: beyond the description provided by the reduced ontology there is
certainly something else out there, independent of our representations. Yet, it is an “open
world” and there is no "physical world" simpliciter. We can only talk of a physical
description of the world. It should also be clear, by now, that I am at the same time
against both the compatibilist and the so-called incompatibilist\(^9\) theses about Free Will.

### 3.3  – A florilegium of quotations - II

#### 3.3.1  – E. Schrödinger (about the reduced ontology)

<< Science is founded on a fundamental "objectification", precisely on the "simplification" of the
problem of nature obtained through the preliminary exclusion of the knowing subject from what has
to be understood ... yet the deepest philosophical problems are just those concerning the subject
which has been excluded from the scientific view of the world >>

[E. Schrödinger: *What is Life*, 1947]

#### 3.3.2  – D. Bohm (about the cosmological connection of consciousness)

<< To meet the challenge before us, our notions of cosmology and of the general nature of reality
must have room in them to permit a consistent account of consciousness. Vice versa, our notions
of consciousness must have room in them to understand what it means for its content to be "reality
as a whole" >>


#### 3.3.3 – P. S. Laplace: (about the unwarranted exhaustive minimality of the component beings

Der êtres qui la composes) required by the alleged deterministic view of the “world”)

< Une Intelligence qui, pour un moment donné, connaîtrait, toutes les forces dont la nature est
animée, et la situation respective des êtres qui la composes, si d'ailleurs elle était assez vaste
pour soumettre ces données à l'analyse, embrasserait dans la même formule les mouvements des
plus grands corps de l'univers et ceux du plus léger atome; rien ne serait incertain pur elle, et
l'avenir, comme le passé, serait présent à ses yeux >>.

Pierre Simon de Laplace: *Théorie analytique des probabilités*, 1812].

#### 3.3.4 – T. Nagel: (about the unwarranted attribution of determinism to the “world”)

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\(^9\) The view maintaining that Free Will requires indeterminism. The latter, however, besides being a property of theories and not of the
world, has no capacity for justifying a meaningful finality of the agent's choice, anyway.
<< The ideas of determinism, probability and reduction\textsuperscript{10}... can be significantly discussed only if they are directed to the theories or formulations of a science, and not to its subject matter >>

4. – The aporetic structure of “Deterministic Grand Reductionism”

4.1 - Weinberg’s “Grand Reductionism”
<< We should distinguish between reductionism as a program for scientific research and what I call “Grand Reductionism”, which is a view of nature ... Phenomena like mind and life do emerge. The rules they obey are not independent truths, but follow from scientific principles at a deeper level; apart from initial conditions and historical accidents that by definition cannot be explained (such as the size and the orbit of the earth for meteorology), the nervous systems of George and his friends have evolved to what they are entirely because of the principles of macroscopic physics and chemistry, which in turn are what they are entirely because of principles of standard model of elementary particles...... .....Determinism is logically distinct from grand reductionism, but the two doctrines tend to go together because the reductionist goal of explanation is tied in with the determinist idea of prediction; we test our explanations by their power to make successful predictions...........[Of course, everything is ultimately quantum-mechanical; the question is whether quantum mechanics will appear directly in the theory of mind, and not just in the deeper-level theories like chemistry on which the theory of the mind will be based....... In quantum mechanics isolated systems are governed by an equation (the Schrödinger equation) whose solutions are strictly speaking fully deterministic, never chaotic. The famous uncertainties in the positions and velocities of particles discovered by Heisenberg do not arise in isolation systems but only when we let such a system interact with a measuring apparatus. >>\textsuperscript{11}

Neither I do believe that quantum theory is directly involved in the issue of subjectivity. Accordingly, and for the sake of argument, I will take the two doctrines as a single view of nature renamed as “Deterministic Grand Reductionism” (DGR).

4.2 – Weinberg and his “imaginary friend” George\textsuperscript{12}
I will use Jaegwon Kim’s terminology (*Mind in a physical world*\textsuperscript{13}): mental properties are physically realized as “second order properties” causally generated out of “first order” non-mental properties.

Fig.1 illustrates a realistic happening involving Steven Weinberg and George:

\textsuperscript{10} Of course in the “weak reductionist sense”, see Weinberg later on.
\textsuperscript{11} See Weinberg (1995).
\textsuperscript{12} All of the figures in this and the following Sections are free-hand sketches.
Caption for Fig. 1:

$B_W = \text{physical state of Weinberg's brain};$

$B_G = \text{physical state of George's brain};$

$P_W = \text{Weinberg's brain's "second order properties"};$

$P_G = \text{George's brain's "second order properties"};$

$C_W = \text{causal specification of } P_W;$

$C_G = \text{causal specification of } P_G;$

$E_W = \text{Weinberg's uttering: } \text{<< GRAND REDUCTIONISM IS TRUE! >>}$

$E_G = \text{George's uttering: } \text{<< GRAND REDUCTIONISM IS BULLSHIT >>}$

$\rightarrow$ Weinberg believes that $C_W$ causally determines $P_W$ in such a way that $E_W$ expresses a real truth.

$\rightarrow$ Weinberg must also believe that $C_G$ causally determines $P_G$ in such a way that $E_G$ expresses a real falsity.

Note, on the other hand, that George is not self-contradictory since he can rely in principle upon a notion of truth bypassing DGR.

Let me go on: In fact, I guess that Weinberg, having heard George’s uttering, would add to his first uttering the following specification:

$\text{<< the causal generation of a belief does not, of itself, detract in the least from its truth >>}^{14}$

However, he is de facto also accepting the validity of the specular sentence:

$\text{<< the causal generation of a belief does not, of itself, detract in the least}$

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$^{13}$ See Kim (1998).

$^{14}$ This sentence has been indeed presented to my attention by Adolf Grünbaum in a private discussion taking place in October 1992. At the time I had no occasion to reply with the specular sentence that now I am writing here. Grünbaum’s point of view is also exposed in his compatibilist paper “Free Will and Laws of Human Behavior”. See Grünbaum (1972).
from its falseness >>.

Note that, even if the content of George’s $E_g$ is judged false, it must appear to Weinberg as a meaningful and appropriate response to the meaning expressed by $E_w$. All this means, however, that within the context of DGR, as an (ontological) view of nature, there could be no rational discrimination between Weinberg’s view and his opponent’s view.

Consider, now, the following cosmological evolution\textsuperscript{15}:

According to DGR, suppose that $E_1$ and $E_2$ be two cosmic events, and that $E_1 \equiv E_w$ and $E_2 \equiv E_g$, respectively. We must assume, as already stressed, that $E_2$ is a relatively appropriate and meaningful response to $E_1$. $E_1$ and $E_2$ are end-results of very long causal chains. Now, let $U(0)$ be the physical state of the Universe at $t = t_0$ in cosmic time, say two billion years ago. We then meet the following coordination problem: why should $U(0)$, in conjunction with the standard model, as well as predetermining the occurrence of $E_1$ two billion years later, also predetermine the subsequent occurrence of $E_2$, which expresses a meaningful and appropriate response to the meaning expressed by $E_1$? Note that, barring a pre-established harmony, at $t = 0$ there was no possible “forecast” of the causal consequences of $U(0)$ two billion years later, nor was there, there and then, any cognizance of meaning!

The crucial point is that – within Weinberg’s ontology – no conceptual room exists, or can be added – for any sensible notion of meaning and truth validating Weinberg’s or anyone else’s utterings. This means that, even if not asserted explicitly, the resulting position is equivalent to that of the total nihilist, who denies both truth and falseness.

In conclusion: as soon as Weinberg states – against George - that DGR is the only ontologically admissible view of nature, he falls into the ontological-phenomenological aporia: his ontology cannot justify the phenomenology of meaning he is using against his opponent’s view.

4.3 – A florilegium of quotations - III

4.3.1 - Epicurus (about the aporia of determinism of the world vs. meaning)

<< A man who claims that all things come to pass by necessity cannot resist the argument of a man denying that all things come to pass by necessity, for he must admit that even this negation happens by necessity >>

[Epicurus, Athens, ∼ 300 B.C.]

\textsuperscript{15} Adapted from Watkins: see Watkins (1993).
4.3.2 – Eddington (about the *aporia* of meaning)

<< Assume our brain produces sugar when we say that 7 times 8 equals 56, while it produces chalk if we say - wrongly - that 7 times 8 is 65. We cannot say, however, that sugar is more "true" than chalk ... >>

[A.S.Eddington, Oxford, 1938]

5 – **Time**

5.1. – **Premises: framework and language**

I use throughout the *events* framework, to be distinguished from the *things* framework. The main current terminology concerning the language of time is here summarized for later use. However, I must issue a caveat from the beginning: the following characterization of time determinations follows from the famous McTaggart’s paper “The Unreality of Time” (Mind, 1908), but it has been developed subsequently within the philosophical context of analytic philosophy. I do not share the basic stances of this cultural tradition and I will accordingly distinguish my position from it when the case be. It is important to emphasize, however, that such distinctions are not relevant to my conclusions.

There are **two basic modalities** concerning the determination of events and the general philosophical views on time:

a) The **A-determinations** (A-series of events “E”) are characterized by the singular and *monadic* terms: “E is present, is future, is past”. The truth values of sentences including A-determinations depend on the *temporal perspective* of the utterer (“now it is raining in Cerisy” may be false today and true tomorrow); this modality is called **tensed**. Alternatively, one is used to saying that such sentences contain *token-reflexive* expressions (just like “now” or “here”) that enter the temporal *tensed* discourse essentially. Note the basic difference of time with respect to space: the use of spatially token-reflexive expressions, just like “here”, is *not essential* to the description of things as being in space. That is, we can describe an arrangement of things in space although we do not ourselves have a position in *that* space (even if, of course, we live in space: “externality” of space).

b) The **B-determinations** (B-series of events “E”) are characterized by the *bi-adic relational* terms: “E₁ is before, after, simultaneous to another event E₂”. This series is – so to speak - “static” (“Newton’s death is *forever* before Napoleon’s death”). The truth values of sentences including B-determinations are independent of the *temporal perspective* of the
utterer (“On October 7, 2007 it is raining in Cerisy” may be true or false, but so it is at any
time). This way of presenting temporal determinations is called tenseless. In other words,
to say that an event occurs tenselessly at time t is to say that it is true at any time that the
event occurs at t, so that the truth value of any empirical sentence about it is not a function
of time.

An important remark: from a logical point of view, i.e., with reference to what can be
captured and represented in language, including truth values, tensed and tenseless
sentences are identical (if the former is uttered at the right time). Yet, the tensed sentence
contains additional information of existential nature which is essential, for example, for an
action to be performed “now”: e.g. “to buy an umbrella” if now it is raining in Cerisy.
Moreover, suppose we had a complete narration of a sequence of events: to get complete
information the question would remain, “And which of these events is occurring now?”

5.2. – Premises: ontology
The ontological debate is about the issue of the ontic closure or ontic openness of the
future and/or the past. According to an oversimplified account, the two basic positions are:

1) B-theorists or temporal “realists”: the future (and the past) is ontologically closed
just because it is logically determinate so that, in this sense, it is real. The definition of
ontic closure of the future is allegedly warranted, within analytic philosophy, by the fact that
sentences about contingent future events satisfy the bivalence principle and are time-
independently true or false. Since events are completely individuated by their attributes,
you (unlike things) do not change in either themselves or their relations to other events.
Real events, which either take place or not, are tenselessly ordered by B-series relations
within a universal set W of “all the real events of the world”. (Plato does exist in the sense
that – unlike the hippogryph – he occupies a place in W). Incidentally, note that logical
determination has nothing to do, by itself, with causal determination, even if the two
concepts, as we shall see, often interplay. Finally, I must say that, in spite of a great deal
of logical exercises put forward by temporal realists, I am still at a loss in understanding
how their ontological conception of time could be compatible with Free Will and Action.

The crucial point, however, is another and by far a deeper one. I simply do not share
the view of the analytic philosophers who consider a foregone conclusion that logical
determinateness can be safely equated to ontic determination. This amounts to an
unwarranted inversion of the relation between ontology and logic, i.e., a stance which
expects to deduce metaphysics from formal logic, that is, from language. This tenet of
analytic philosophy appears to me as an instantiation of the deflationary minimalism I alluded to in the Introduction. Within the classical view (and mine), logic reflects ontology and not the other way round. Thus, it could be safely maintained that nothing can be said about the ontic status of the future although sentences about future contingents could satisfy the bivalence principle under certain circumstances: future is ontologically richer than what can be represented by logical structures. This point is not dissimilar from the relation between ontology of the world and reduced ontology pertaining to the representation furnished by the physical description, and could produce analogous aporetic consequences.

2) A-theorists, or temporal “unrealists”: The past is ontologically closed in the sense that past events have happened once and for all, and cannot be altered. Correspondingly, sentences uttered “now” about them satisfy the bivalence principle. On the other hand, the future is ontologically open (“and” logically undeterminate) so that, in a sense, it is unreal. It is usually believed that events change their status concerning futurity, presentness, pastness, even though this is a highly improper assertion. Sentences about future contingents do not satisfy the bivalence principle so that they can be neither true nor false (classic example: sentences about the future happenings of the Aristotle’s “battle of Salamina”). Note, however, the further asymmetry between A and B theories concerning ontology of the future. Instead of saying that the future is unreal, the A-theorist could simply state that ontology of the future is undefined, so that sentences about future contingents cannot satisfy the bivalence principle under any circumstances. The A-series embodies the intuitive view that the value of statements about empirical questions is a function of time in the sense that past and future are separated by a transient present in which things and events attain reality and being.

In other words, while according to B-theorists all real events have a time-independent place in the set W, according to A-theorists future events do not exist yet, i.e. they - as undefined attribute-carrying entities - are merely possible. This means that: i) as seen from now – and unlike past - more than one future is possible, and ii) the very set W is undefined. Then:

1) B-theory: no real demarcation exists between past and future, so that no objective transitory property exists in the world: nowness is therefore unreal or mind-dependent (or

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16 This is where, in my opinion, the very event framework – except of course for its role within the physical description – reveals its limits.
even, in its consequences for actions, illusory\(^{17}\)).

2) A-theory: a real threshold exists between actualized and merely possible events. Nowness shows a real temporal structure of the world. The “now” possesses a specific objective quality in virtue of the fact that events come into being only in the present, and this quality serves to distinguish the possible from the actual. Furthermore, reality of the “now” is an ontological sufficient condition for freedom, because the “now” is when free action makes possible events become actual (reality of the “Becoming”). A-series determinations provide a necessary representation of temporal reality because real transiency cannot be described by means of a tenseless B-series determination. Many B-theorists will not accept this kind of necessity. On the other hand, many A-theorists will not accept the fact that B-theory can describe change, because change comes in only in connection to facts of kind A\(^{18}\). Although I am, obviously, an A-supporter, I believe that B-theory can indeed describe change, of course in a tenseless way, by saying that the same thing possesses tenselessly different properties at different times, or equivalently that the attributes of the distinct relevant events referring to that thing in W are different.

Finally, it should be noted that being unrealist about the future does not license anybody to say that they can “change the future”. This is an ambiguous claim because, if future allegedly possessed some kind of actual reality, it would be analytically true that it is impossible to change it from being what it “is” actually going to be. The point is of course that we cannot change an as yet non-existing entity. On the other hand, we can “shape” or “influence” the immediate future in our spatial neighborhood. The issue of Free Will is strictly interwoven with time, just because the way of shaping this riddle depends upon the way in which subjectivity is thought to be in time. As stressed in Section 3.2, nothing forbids a free action of an agent from bringing some happenings into being and initiating a (physically) emergent causal chain in an open world. By now, the reason why the issue of the reality of nowness is strictly connected with the issue of the freedom of will should be fully clear. Reality of nowness entails reality of actualization of potentialities through action. Moreover, the issue of the reality of nowness is strictly related to the issue of meaning and truth. For, if we are not really free to will and act, we are not even really free to believe and think, in such a way that the essence of rational thought would result as the supreme illusion.

Free choice and free action are fundamental features of the open world and show

\(^{17}\) Note that the illusion at stake here would be a universal and constant illusion.

\(^{18}\) Michael Dummett for one. See Dummett (1960).
the essence of time and subjectivity. I am firmly convinced that if the notion of potentiality is not recovered in its generality at the level of philosophical thinking, there is no way of avoiding the main manifestations of the ontological-phenomenological aporia. The actualization of potentiality (or “becoming”) realizes a change of time, not a change in time. Therefore, any attempt to reduce potentiality to a change in time leads to aporias. Thus becoming is a very special type of change: essentially, it is the only change in reality. This cannot be blurred by the fact that the overwhelming majority of actualizations, once realized, can be described in terms of efficient causes. In particular, any choice can be explained in terms of (non-cogent) motivations. As observed by Richard Gale, “What time enables us to say is exactly what cannot be said about time”.

5.3. – Physical time

A fundamental component of the reduced ontology is physical time. Its constitution is a sort of primary idealization which, abstracting from phenomenological time, introduces a fundamental bifurcation of nature (see Whitehead) and is relational by constitution. I will not enter here the sophisticated theoretical and philosophical steps required for the foundation of physical time. The relational constitution entails from the beginning that all physical time determinations belong to some B-series. Physical laws are intended to be valid for any time and cannot therefore single out a particular instant of time as "the now". Likewise, there can be devised no physical experiment having the capacity of telling whether a particular time shown by the hand of a clock is "the present" or not. Unlike the scientific practice of the experimentalist, there is no “now” in the theoretical structure of physics. Physical time is mathematically represented by an ordered numerical continuum à la Cantor in terms of real numbers. In this way physical time is pointillized, since real numbers are isolated individuals as natural numbers. As with B-determinations, physical events “E” are characterized by time-independent bi-adic relations such as: “E₁ is before, after, simultaneous to another event E₂”. It must be stressed, however, that such determinations are not logically different from the usual ordering relation “smaller than”, “greater than”, “equal to”, of the real line, so they do not possess by themselves the capacity of characterizing such real line as temporal. Such line is not lived through and is presented to us wholly, with all of its distinguishable parts “co-present”. The pointillized mathematical representation, therefore, must be intentionally supplemented by the phenomenological notion of time, which is not included in it.

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19 See Gale (1968).
The level of abstraction of the representation of physical time may be properly appreciated in
the following examples [see Fig.2,3,4].

a) **Change in a physical property “p” of a given physical entity:** (Fig.2)

Here we have an infinite sequence of isolated attributes, one for each real number t*, which
are thought of as representing the values of a property of the same physical entity as time
goes by. However, nothing within the representations tells us anything about the sameness
of the thing whose changes we are describing. The identity (i.e., the substratum of the changes)
of the thing must be intentionally maintained from outside. We are seeing in vitro the effective
working of the blockade of the essential/accidental analysis: the ontological issue is
suspended, without detriment to the efficacy of the representation.

b) **“Genidentity” of world-lines in Minkowski space-time (M⁴):** (see Figs. 3,4)

“Genidentity” is the notion introduced by Hans Reichenbach (The Direction of Time, 1956)
with reference to the world-line of a given massive particle in M⁴, just as a memo for taking
into account the fact that such an identity has no room in the spatio-temporal representation.
Note also that it presupposes that a determination of continuity is epistemically available to us.
Yet, the level of abstraction implicit in the representation of physical time appears even more
surprising, if we consider the spatio-temporal intersection of the world-lines of two different
massive particles. In this case we have the same point-event representing two different
identities, i.e., even a logical contradiction!
In this connection, it is worth recalling that Einstein, in the so-called point-coincidence argument, considered the world–line intersections as the only physically-objective content left in space-time by the requirement of general covariance … We can appreciate here how the Galilean blockade of essences can provide a reduced representation of the phenomenological experience of real things which is effective even at the price of tolerating logical contradictions.

However, in order to avoid misunderstandings, two important caveats must be issued here: (i) we cannot restrict the ontological bearing of the physical description of the world to its theoretical structure: we must take into account the coordinative definitions that link the latter to the practice of the experimentalist; ii) as already stressed, the effectiveness of the mathematical representation of the reduced ontology does not license anybody to operate a reconstruction of the world in terms of such ontology being subject to philosophical aporetic consequences.

6 - A snare of the reduced ontology: are we inhabitants of Minkowski space-time?

<< I conclude that the problem of the reality and the determinateness of future events is now solved. Moreover, it is solved by physics and not by philosophy. We have learned that we live in a four-dimensional, and not a three-dimensional world, and that space and time - or better, space-like separations and time-like separations - are just two aspects of a single four-dimensional continuum with a peculiar metric which sometimes permits distance \((y,x) = 0\), even when \(x \neq y\). Indeed, I do not believe that there are any longer any philosophical problems about time; there is only the physical problem of determining the exact physical geometry of the four-dimensional continuum that we inhabit. >>

First of all, I maintain that we cannot simply “read off” metaphysical conclusions from the theory of relativity. An even greater mistake, however, is to forget the methodological limitations lying at the basis of any physical description and neglect that unavoidably – though implicitly – metaphysical assumptions have entered the formulation of the theory, in the first place. In the end, one can extract only so much metaphysics from a physical theory as one puts in. And it seems rather difficult to maintain that the (necessarily non-transitive !) notion of “reality for (somebody)” linked to simultaneity (which Putnam introduces at the beginning of his paper as a fundamental presupposition) is not a metaphysical one. Also, it is difficult to see how a physical theory, such as relativity, which is

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20 See Putnam (1967).
concerned with spatio-temporal measurements, could inform us as to the manner in which the mind or consciousness is related to the physical world. All these phenomenological issues are not part of the theory of relativity, but are philosophical interpretations of its metaphysical significance.

Minkowski spacetime\(^{21}\) \((M^4)\) is just a physical instantiation of the set \(W\) of all actualized real events considered by B-theorists, with the additional specification that it possesses a fundamental causal structure defined by null-cones. Its events are necessarily actualized in terms of definite physical attributes individuating them, over and above their geometrical meaning: think, e.g., of the values of electromagnetic field. In this connection, I believe that most working physicists (and the philosopher Putnam) may be unaware of the philosophical subtleties hidden under a standard literal interpretation of \(M^4\) as a reification of the real space and time which “we inhabit”. First of all, in order to attribute physical properties to events of \(M^4\), we must think that Maxwell equations have been solved beforehand. Now, solving the equations needs a well-posed Cauchy problem: in this case the allotment of the values of Maxwell fields and their derivatives over a whole infinitely extended instantaneous 3-space, say \(S_3\), at \(t=0\). This knowledge is a synthesis of information accessible only to each one of the infinite many ideal observers sitting on each point of \(S_3\), at \(t=0\). All of such observers – each of whom can only “see”, with little practical utility, their own past light cone - are therefore mutually causally disconnected according to the very causal structure of \(M^4\). This means that gathering the necessary information in order to attribute the physical properties to events is factually impossible in \(M^4\). This operation would require an external super-observer who cannot inhabit Minkowski space-time. Therefore no living observer can be forced within the Minkowski space-time (or any general-relativistic space-time model) to collect in a factually possible (specifically causal) way the infinite amount of information needed. Furthermore, since all events are causally actualized wholly, no living observer can be forced in \(M^4\) who can act to selectively generate a situation in their environment so that this situation, as a cause, will, according to their physical causal knowledge, later give rise with great probability to the effect which is desirable to them. Finally, there can be no living observer with the freedom to check the very empirical truth of the physical theory itself. Any alleged reification of \(M^4\) leads to a notion of the world which includes everything, in particular the object of an action and the agent of the same action. This world, however, is a non-factual world that nobody can "observe", study or control. While the world of science is the object of our action, Putnam’s
imagined world fails to account for the empirical basis that is necessary for its very description while allegedly containing everything. It is just another instantiation of the basic aporia.

We can only look at $M^4$ as a mathematical model for the operational practice of the experimentalist concerning spatio-temporal measures. For example, let us consider the motion of a relativistic object. Of course, given the B-series nature of the temporal description, there is no motion at all in $M^4$ even if there is change. The ordinary sense of the term refers to the observation that there is some object "moving". Since this "moving" always takes place in "the present" of the experimentalist, as all other phenomena "taking place", one could be easily misled to believe that the physical essence of the concept of motion could be captured by the experience of an object as "moving", more or less on the same footing in which it is often asserted that there is a "moving now". Naturally, there are moments of the motion history of the object that are now "past" and characterized as moments of a "remembered present". However, if the motion is no longer taking place "now", we can only describe the former motion as a purely B-series sequence of positions of the object at different times (of a clock), a description which expresses exactly the only objective physical meaning of "motion". Accordingly, since there is no temporal transiency in Minkowski space-time, only tenseless senses of the words "becoming", "now" and even "motion" are admitted in the relativistic idiom of physics. On the other hand, the ordinary sense of "motion" is perfectly legitimate in the practice of physics and, therefore, in the idiom of the experimentalist. This entails that locally and for a limited span of time, the experimentalist can project – so to speak - their practical view of the motion into Minkowski space-time as a mental aid for their intuition of the physical process. The experimentalist can consider, e.g., a world-line of a point-mass endowed with a clock and, as time goes by, mark on the world-line certain times indicated by their own synchronized physical clock in the laboratory, as a running chart. As long as the motion takes place, this can be a useful way of reasoning. It should be clear, however, that as soon as the limited allotted time has expired, the intuitive spatio-temporal representation of the motion given by the experimentalist is concluded and nothing remains in the Minkowski picture which is different by a section of a standard infinite world-line with a B-series finite sequence of marked events.

Then what can we say about the status ofnowness in relation to the mathematical model of $M_4$? Certainly, in Minkowski space-time there is no absolute fact of the matter as

\footnote{A similar discussion could be made concerning general relativity. See Lusanna & Pauri (2007b).}
to which an event is present. Even more, present for different observers. Yet there is no absolute fact of the matter about presentness of events in Newtonian absolute time either, as there is no fact of the matter about presentness in a physical theory whatsoever. It is also certain, however, that acceptance of relativity cannot force one into the acceptance or rejection of any of the traditional metaphysical views about the reality of past and future. In addition, one should not forget, within the foundations of the theory, the distinction between genuinely factual elements and the merely conventional choices which go into the relativistic spacetime picture. One who wishes to stick by a tensed view of time, and is willing to pay the price, is certainly able to do so, all the while accepting the scientific reasonableness of Minkowski spacetime as an operational model\textsuperscript{22} for spacetime physics.

The reality of nowness is a metaphysical issue\textsuperscript{23}. Therefore, at the most we can only try to see whether there is a possible compatibility of such reality with some elements of a (possibly global) spatio-temporal description. As a first example, if one - an external real super-observer - is willing to “force”, whatever the price, a living agent along a time-like world-line of $M^4$, they would have – as it were - to “update” the structure of Minkowski spacetime at the origin\textsuperscript{24} of every emergent causal chain generated by a free action. This “updating” would take place in the “now” – i.e., in the real time - of the external super-observer, but such time convention would not be registered in the updated $M^4$. In correspondence to each updating, $M^4$ would only be tenselessly different from its previous copy. Going further along this line of reasoning, we could correlate the “now” of the living agent - assumed in this case as following the world-line of a “fundamental observer” - to cosmic time of the standard models of relativistic cosmology. This correlated “global now” would resemble the cosmic unison of Whitehead. The identical twins of the standard paradox would share a common “now” at the beginning and the end of the journey, while the same span of cosmic time – defined by the initial and the final events - would be measured differently by the “proper clock” of each of the twins, and the same would be for their “spacious present” time, even if each of them continued to experience their “now” at any point of their world-line.

\textsuperscript{22} Remember, for example, that Poincaré always considered Minkowski spacetime as a mathematical model and not “un modèle véritablement physique”.

\textsuperscript{23} I must say that I cannot share Shimony’s claim that nowness as such can be embarked within Minkowski spacetime: see Shimony (1993).

\textsuperscript{24} To be defined as “acausal” with respect to physical causality.
7 – Time: on DGR thesis of the subjectivity of nowness and becoming

From now on I will consider the consequences of DGR on physical time representation specifically. First of all it is obvious that DGR makes a reification of $M^4$ as a mathematical model of the spacetime we inhabit (I still consider special relativity only, for the sake of simplicity).

According to the tensed view of time, $A$-determinations, reflecting the basic phenomenological structure of our experience of time, have the capacity of singling out a unique instant (or a more complex phenomenal structure) of experienced time, as the real “now”. The issue at stake here is that DGR claims (in analogy with any B-Theory) that there is no real transiency in the world, and $A$-determinations are purely mind-dependent or subjective (or, in this case, even illusory because of the connection between reality of nowness and free will or action: “we – illusorily - feel to be free”).

It can be easily seen that, once a commitment is enforced concerning the ontological status of experience, awareness, and subjectivity in general, the attribution of mind-dependence becomes either a truism or aporetic. In fact, consider two extreme positions:

a) Subjectivity holds an ontological role which is neither included nor derivable from the physical description of the world (as DGR contends. Details are irrelevant here). Then, $A$-determinations possess a real uneliminable status in nature so that they are as subjective as they should be. As already stressed, the crucial philosophical point is the conception of time as actualization of real potentialities.

b) Only physical entities are ontologically fundamental and subjectivity is included or derivable from the reduced ontology of DGR (details would be welcome here !). Then, only a tenseless view of the world is real, including subjective or “mental” events. However, when physicalistic ontology is conjoined with an implicit reification of $M^4$ and the thesis that $A$-determinations are mind-dependent, DGR must claim that nowness is mind-dependent (or even illusory) at least as purely sensory qualia. Besides, it is clear that the B-theory account of nowness, action and Free Will can be maintained only under the condition that an explicit ontological commitment about the mind-body problem is suspended or is questionbeggingly relegated to a future “explanation”.

22.
Consider the temporal career of a human brain B. DGR describes this history tenselessly as a sequence of mental events as characterized on the basis of their neural-physico-chemical properties. According to DGR, the full specification of such properties specifies everything completely. In particular all the attributes, or properties, of the mental events are likewise fully specified in such a way that the attributes of any event E are intrinsic to it, fixed and tenselessly independent of time.

Consider now an event E₀ at time t = 0. We must assume that the experience of nowness of B at t = 0 is one of the properties of E₀ and, as such, part of the complete specification of E₀ that will persist all the time. This entails, however, that at any subsequent time t₁ > 0 the intrinsic attributes of E₀ will still characterize E₀ as taking place “now” (even as “illusion”). Note that we are not allowed to believe that the attributes of, say, E₁ at t₁ will generate the experience of nowness at t₁ together with the remembered nowness at t = 0. This would entail that at least part of the physical specifications attributed to E₀ at t = 0 be time-dependent, so that E₀ itself would be an undefined event.

Fig.5 shows the effect of an alleged tenseless view of the “now”:

\[ \text{includes experience of NOW at } t = 0 \]

\[ \begin{align*}
E₀ \text{ at } t = 0 & \quad E₁ \text{ at } t = t₁ \\
\Rightarrow \quad E₀ \text{ is “NOW” FOREVER!}
\end{align*} \]

In conclusion, according to DGR, A-determinations would fail to fulfil their actual and tensed task of singling out a particular instant as the unique “now”, even as appearance or illusion. Therefore, DGR is unable to justify time phenomenology and falls under the ontological-phenomenological aporia.

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25 Adapted from Shimony: see Shimony 1993.
DGR supporters claim that the experience of *nowness* should be *tenselessly* explained on the same grounds on which sensory *qualia* are explained by the *causal theory of perception*. Nobody, however, has advanced such kind of explanation up to now. The reason is simply that, even assuming that a *truly explicit* causal theory of perception be offered to us (which it is not), this program is unsound in principle due to the fact that, unlike *secondary qualities*, the experience of *nowness* - and the corresponding *A-determinations* that represent it - *are not* sensory data. We do not perceive *nowness* through one or more of our senses. Therefore, a causal theory of the "perception" of *nowness* cannot even leave the grounds, since it should begin with perceived, i.e., *sensible properties*. Of course it is up to DGR/B-theory supporters to offer their explanation of *nowness*. A typical attempt to defend the reductionist B-theory interpretation of the experience of *nowness* as mind-dependent or even "illusory", is to identify *experience of the unique “now”* with immediate *awareness*. This thesis is evidently question begging since, of course, that experience is part of the awareness; yet it remains to be "explained" what exactly *awareness* (or "consciousness") is. This fundamental ontological issue cannot be resolved by a battle of words.

Here, anyway, I propose a simple *causal toy-model*, not directly based on *sensible perceptions*, which should indicate the nature of the difficulties lying beyond the imagined DGR/ B-theory program.

Fig.6 shows a stretch of the temporal career of a perceiving brain B.

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**Fig.6** shows a stretch of the temporal career of a perceiving brain B.

C_E is a clock *external* to the human brain’s owner B; S(t) are *sensible properties* in the B’s environment at time t; P[S(t)] is B’s *perception* of S(t) at time t of C_E; M(t) is the *memory at time* t_1 of the perception P[S(t)] (which is different from P[S(t)]!). Finally, R_I is an *internal recorder* of the brain B which has the function of attributing an internal *temporal index* T to the perception P[S(t)]. Note that the index T by itself – as pure recording of the perception - is a *monadic attribute*: it does not belong to the B-series of C_E and cannot be measured by it.
Adopting a B-series way of thinking, the model consists in describing the experience of nowness of B, at time t of C_E, as the synchronicity of P[S(t)] (at time t) and the index T, as registered by R_i (not a secondary quality!).

Now, the monadic nature of T entails that the internal recorder be a tensed mechanism. Since we want to explain the whole phenomenon tenselessly, T of R_i must be recordable with the same modalities valid for C_E, a fact that would require a second recorder R’ initiating an infinite regress.

It is obvious, therefore, that either a tensed element is introduced at some level, or an infinite regress follows; in other words, the imagined DGR/B-series toy-model fails to reproduce temporal phenomenology: we fall again into the ontological-phenomenological aporia.

8. - Natural Evolution

8.1 – A florilegium of quotations - IV

8.1.1 – T.Nagel (about the cosmological implications of the mind-body issue)
<< We won't have an adequate general conception of the world until we can explain how, when a lot of physical elements are put together in the right way, they form not just a functioning biological organism but a conscious being. If consciousness itself could be identified with some kind of physical state, the way would be open for a unified physical theory of mind and body, and therefore perhaps for a unified physical theory of the universe. But the reasons against a purely physical theory of consciousness are strong enough to make it seem likely that a physical theory of the whole of reality is impossible>>
[Thomas Nagel: What Does It All Mean ?, OUP, 1987]

8.1.2 – T. Nagel (about the appearance or (universal) illusion vs. reality distinction)
<< In physicalism there is no conceptual room for an appearance/reality distinction >>
[Thomas Nagel: “The View from Nowhere”, OUP, 1986]

8.1.3 – W.Pauli (about the eradication of finality from Nature)
<< Dieses Modell der Evolution ist ein Versuch, entsprechend den Ideen der zweiten Hälfte des XIX Jahrhunderts, an der völligen Elimination aller Finalität theoretisch festzuhalten. Diese muss dann in irgend einer Weise durch Einführung des “Zufalls” ersetzt werden >>
[Wolfgang Pauli, Dialectica 1954]

8.2 - On the aporetic character of the conjunction of DGR and the strictly Darwinian theoretical model of Natural Evolution
I will be sketchy. As already stressed in the Introduction, I am not referring here to such ideological counter-moves like the so-called “creationism”, “intelligent design” and the like. Nor am I willing to put into question the methodological Darwinian analyses and techniques that are necessary to the every-day laboratory work of the biologists and paleologists within their piecemail work (which I define LD). Neither do I intend to doubt the central Darwinist thesis of the common origin of species. My aim is mainly to focus on the philosophical difficulties arising from the conjunction of, on the one hand, the recognition of the reality of subjectivity - which shows itself in living organisms by various degrees - and, on the other, the extrapolation of the strict Darwinian theoretical model from laboratory practice to cosmological level, in conjunction with DGR (which I define EDM).

(i) The Darwinian theoretical model is based on a fundamental connection between the essentially random character of mutations and the process of natural selection due to adaptation to the environment. Although, according to LD, single mutations are probabilistic observable events (note that they only resemble pure quantum processes: there are no “quantum events” in spacetime !), the underlying philosophical backdrop of EDM is the same as the DGR view of Nature (“chance and necessity”

Let us consider the issue of chance closely. If this notion must be understood scientifically – i.e., beyond its common sense or vague metaphysical meaning – one should have to define first of all a space of probability for the evolutionary context, and then compare the evolutionary temporal scale, which follows from the model theoretically, with the corresponding empirically observed temporal scale. Thus, within EDM, it should be concretely shown that, corresponding to the theoretical possibility of a given evolutionary stage, the empirical duration necessary for its manifestation is actually verified. I do not believe that a satisfactory account of this foundational theoretical necessity of the model has been given so far. One should not forget, in particular, that while LD exploits statistical methods concerning frequent and reproducible events, the EDM interpretation requires in addition the consideration of infrequent and possibly unique events. All this means, however, that the extrapolation implicit in EDM is first of all very weak empirically.

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26 These considerations parallel those made for relativity theory in Section 6. The fact that the biologists must take into account the phenomenology of probabilistic mutations and adaptive selection at the laboratory scale does not entail that the LD model of evolution could inform them as to the manner in which subjectivity emerged in natural evolution, a fact that has to do with the philosophical interpretation of the possible metaphysical significance of the cosmological extrapolation of LD.

27 Bernard d’Espagnat has ironically remarked that quantum theory seems to play no role for this philosophical chance! See “Une lacune d’importance”, d’Espagnat 1977.
(ii) As Pauli\textsuperscript{28} has remarked, the strict Darwinian model of natural evolution (EDM) is a theoretical attempt to a complete eradication of finality from Nature. We, however, experience ourselves as acting according to finality and free choice, so where is this finality coming from? Clearly we face here the same aporetic junction that pervades DGR throughout. Our experience should be explained in terms of the underlying ontology. Alternatively, one can defend the appearance thesis according to which we deceive ourselves: we erroneously feel to act according to final causes. In this case, however, it is the very role of appearance that should be explained in terms of the underlying ontology. Yet, this is the philosophical crux we have already met for the issue of time, since DGR (like physics itself!) has no room for the reality/appearance distinction. The conclusion is the same: if we are continuously deceiving ourselves concerning finality and free choice, why are we not continuously deceiving ourselves concerning believing and thinking? In conclusion EDM is another typical source of nihilism.

(iii) Consciousness. This is an ambiguous term that is often misinterpreted for self-awareness. I would rather use the term subjectivity, which is common, by various degrees, to all living beings and points essentially to sentience (qualia). EDM claims it can explain the emergence of consciousness (sentience) in the phenotype by means of adaptation and survival of the fittest. Yet, the fundamental point is that adaptation can explain the survival of something given, or at least something whose possibility is already taken for granted\textsuperscript{29}. Subjectivity must be possible before its value in terms of survival can be tested, and this is equivalent to having solved the mind-body issue. The impossibility of this solution within DGR has been argued in Section 3.2. Above all, what is highly unconvincing (and a little grotesque) is the general scenario of the DGR+EDM view: that of a completely senseless Whole that, by pure chance, necessity and adaptation, gives rise to a hyper-complex medium sized object (the human brain) which secretes an intellectual highly convincing, counterfactual supporting, insight of this senseless Whole, including an astonishing and successful physico-mathematical representation of “quantum” phenomena which – by definition – lay outside all the macroscopic adaptive experiences of human evolution!

(iv) The cosmological genetic problem. Summarizing, it is clear that the structure of the Galilean physical description of the world poses anyway a cosmological genetic problem. It is very difficult to imagine a clear-cut demarcation line between life and absence of life. Then, how can an evolutionary process be explained as leading to life, subjectivity and

\textsuperscript{28} See Pauli (1954).  
\textsuperscript{29} Note that this question can be raised even for functions other than consciousness, yet this specific case is emphatically critical for the
real time starting from what we describe as inanimate "matter"?

At this point, I believe I ought to indicate at least what I believe to be a direction of solution of the cosmological genetic issue and to advance a positive metaphysical proposal. My suggestion is that the physical description of the world is not able to capture the whole endowment of potentialities of "matter" either.

In its essence, the issue is simple: we cannot deny the reality of subjectivity. The existence of a causally closed physical world would imply that either subjectivity is one of the properties of this world, or that it is something else. As I have already argued, the first alternative leads to deep antinomies. Then, if we refuse to accept a trascendental solution of Kantian type, which forbids any ontology of subjectivity, and we also refuse to introduce a world of different entities, which raises the awkward and intractable issue of the relations between the two worlds, we must reject the concept of a physical world as a self-contained whole, as if we could put ourselves "from the point of view of matter". Although, in 8.1.1 above, Nagel clearly realizes the connection between mind-body issue and cosmology, in my opinion he misses the crucial point. For – as already stressed in Section 3.2 - in order to avoid aporetic conclusions about subjectivity, we have precisely to give up the idea of a physical world as a causally closed self-contained whole. For the reduced physical ontology only allows us to speak of a physical description of the (open) world.

Then, however, it is the philosophical concept of "matter" that is in need of reformulation, and this points to a direction of solution of the mind-body problem that is more akin to a neo-Aristotelian view. Note that my stance is not a Whiteheadian thesis according to which physics should be reformed. My claim is that the structural limitations of the Galilean methodical foundations inherently forbid an exhaustive description of the world, from "matter", to living organism qua living organisms, let alone of superior conscious and self-conscious organisms. Physics deals with very sophisticated constructions like "physical objects" and "systems", not with "matter".

9. A conclusion?

DGR necessarily implies a reductionist notion of truth, which is nothing else than a merely "pragmatic" notion of truth. This, however, is a basic source of nihilism.

I literally cannot live with a "pragmatic" notion of truth. I do not possess the truth, of course, but I deeply feel that my existential ground would collapse at every instant of time
if I had to give up the *horizon* of real truth and the *inner necessity* of the *circuit of reason* as discovered by the Greeks. Thus, when I used the notion of *truth* in this paper I was not referring to any particular choice among its various well-known different *logical definitions*. I was simply exploiting the common immediate notion of truth which everyone implicitly uses every time they want to defend a thesis whatsoever. Otherwise any human communication about knowledge would be impossible.

Certainly, accepting the strength and the *validity* of the Greek *circuit* is only an *option*, rather than a *mechanical necessity* imposed upon us. On the other hand, were it a *necessity*, the whole articulated edifice of rational thinking would *ipso facto* be annihilated.

In the end, therefore, the conflict shows its real content: in that it arises from a very *deep existential diversity* between the opponents in the debate. Yet the “pragmatic” notion of truth remains a *basic source of nihilism*. That we all live in, today.

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**References**