

Why Relativity needs Phenomenology ?
Eidetic-Relativistic Kinesthetics and Temporality in Husserl, Weyl and Einstein.

Perché la relatività ha bisogno della fenomenologia?
Cinestesia eidetico-relativistica e temporalità in Husserl, Weyl e Einstein

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ABSTRACT

This paper aims to explain how the insights Weyl gleaned from Husserl played an important role in his scientific work, and then how Einstein's major work exhibit important parallels to Weyl's work, thereby establishing phenomenology both as an indirect historical influence and a systematic underpinning for Einstein's work in theoretical physics. In so doing, this paper seeks to show how some of the most basic problems that Einstein addresses have a kinship not just to problems addressed in a completely different context by Edmund Husserl's phenomenology and his circle, but also to perennial problems in ontology and epistemology that go back to Kant, Hume and Leibniz. The conclusion seems to suggest that it not only shows how phenomenology both historically and systematically provides a backdrop for Einstein's work; my thesis actually situates issues in twentieth-century scientific thought against the backdrop of a philosophical development, and perhaps the most original idea of this study consists not just in showing how phenomenology influenced Einstein,

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but also how Einstein's work on relativity had an important influence on the work of Edmund Husserl in *Crisis of European Sciences* and in his later works.

KEYWORDS

Phenomenology; Husserl; Relativity; Einstein; Hermann Weyl

RIASSUNTO

Questo articolo cerca di dimostrare non solo come il lavoro scientifico di Hermann Weyl si sia ispirato alla Fenomenologia husserliana, ma anche come quest'ultima abbia costituito il retroterra teoretico comune su cui si basarono sia le teorie di Weyl che quelle di Einstein. Infatti, molti dei temi discussi da quest'ultimo, non solo negli scritti di carattere epistemologico ma soprattutto in quelli scientifici inediti, evidenziano una certa familiarità con le problematiche di cui si faceva carico, proprio negli stessi anni, la filosofia fenomenologica husserliana e che non fanno altro che riproporre le antiche questioni dell'ontologia e della metafisica classica da Leibnitz e Hume fino a Kant. Tuttavia, questo studio non si limita a fornire una semplice ricognizione storico-critica di temi epistemologici che sono alla base della Teoria della Relatività einsteiniana, bensì si propone di mettere in luce come non solo la Fenomenologia husserliana abbia influenzato l'attività scientifica di Einstein ma anche come la stessa Teoria della Relatività abbia esercitato la sua profonda influenza sulla Fenomenologia husserliana, che risulta cogente soprattutto in "Crisi delle scienze europee" e negli ultimi scritti ad essa collegati.

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PAROLE CHIAVE

Fenomenologia; Husserl; Relatività; Einstein; Hermann Weyl

INTRODUCTION: THE QUEST FOR A NEW CONCEPT OF ESSENCE

When Hermann Weyl claimed that the formulation of Einstein's theory of Relativity represents «a method which combines *Wesenanalyse* (analysis of essence) with *mathematische Konstruktion* (mathematical construction)» (Weyl, 1956: 26), many physicists did not grasp the meaning and sense of this statement. Yet, Einstein himself, in a popular work dealing with the developments of his theory, "warmly recommended" Weyl's book *Raum-Zeit-Materie* as "an excellent and detailed manual on the general theory of Relativity". (EINSTEIN, 1920, p. vi).

Seizing upon this conception, we should deal with Husserl's early studies about mathematics and geometry and his fundamental work, *Logical Investigations*², such as

² "When I spoke above of theories of manifolds which arose out of generalizations of geometric theory, I was of course referring to the theory of n-dimensional manifolds, whether Euclidean or non-Euclidean, to Grassmann's theory of extensions, and, among others, to the related theories of a W. R. Hamilton, which can

Riemann's formulation of an *n-dimensional* multiplicity theory. (HUSSERL, 1970a; 1973b; 1983; 1991, p. 232-243). Nevertheless, Husserl describes the essential nature of mathematical work:

The mathematician is not really the pure theoretician, but only the ingenious technician, the constructor, as it were, who, looking merely to formal interconnections, builds up his theory like a technical work of art. As the practical mechanic constructs machines without needing to have ultimate insight into the *essence* of nature and its laws, so the mathematician constructs theories of numbers, quantities, syllogism, manifold, without ultimate insights into the *essence* of theory in general, and that of the concepts and laws which are its conditions. (HUSSERL, 1970b, p. 159).

On the contrary, the work of the philosopher is "[...] to clarify the *essence* of a thing, an event, a cause, an effect, of space, of time, as well as that wonderful affinity which this essence has with the essence of thought, which enables it to be thought, with the essence of knowledge, which makes it knowable, with meanings which make it capable of being meant". (HUSSERL, 1970b, p. 159).

In this respect, science as an actually developing enterprise may have been very imperfect, but this radical demand guided a corresponding theoretical striving towards perfection, and accordingly, the great function of exploring was assigned to logic, by displaying in detail the essence of genuine science as such – and therefore its pure possibility, giving to actual science its norm and guidance. (HUSSERL, 1974, p. 4). Yet since science made itself independent, without being able to satisfy completely the spirit of critical self-justification, it fashioned extremely differentiated methods, whose fruitfulness was practically certain, but whose productivity was not clarified by ultimate insights³.

However, as human beings engaged in the ordinary activities of our daily lives, we are, in our acts of perception, directed towards material things. For Weyl, we ascribe a *real* existence to them, and we accept them as constituted, shaped, and colored in such and such a way, and so forth, as they appear to us in our perception

be readily purged of anything geometric. Lie's theory of transformation-groups and G. Cantor's investigations into numbers and manifolds also belong here". (HUSSERL, 1970b, p. 157).

³ «They fashioned these methods, not indeed with the everyday man's naïveté but still with a naïveté of a higher level, which abandoned the appeal to the pure idea, the justifying of method by pure principles, according to ultimate a priori possibilities and necessities. In other words: logic, which was originally the torchbearer for method and claimed to be the theory of the pure principles of possible cognition and science, lost this historical vocation and lagged far behind in its development». (HUSSERL, 1974, p. 3).

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in general, which is ruling out possible illusions, mirages, dreams, and hallucinations. These material things are immersed in, and transfused by, a manifold of analogous realities which are indefinite in outline and which unite to form *a single ever-present world of space* to which I, with my own body, belong.

Philosophical reflection probably begins in everyone who is endowed with an abstract turn of mind when one first becomes sceptical about the world-view of *naïve* realism to which I have briefly alluded. (WEYL, 1952, p. 4-5).

He continues:

I "have" the perception, but it is only when I make this perception in turn the intentional object of a new inner perception (a free act of reflection enables me to do this) that I "know" something regarding it (and not the chair alone), and ascertain precisely what I remarked just above. In this second act the intentional object is immanent, i.e. like the act itself, it is a real component of my stream of experiences, whereas in the primary act of perception the object is transcendental, i.e. it is given in an experience of consciousness, but is not a real component of it. What is immanent is absolute, i.e. it is exactly what it is in the form in which I have it, and I can reduce this, its essence, to the axiomatic by acts of reflection. On the other hand, transcendental objects have only a phenomenal existence; they are appearances presenting themselves in manifold ways and in manifold "gradations". (WEYL, 1952, p. 4-5).

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In the same way, in logic a judgment affirms a certain set of circumstances and it takes them as true. Here again, the philosophical question of the meaning of, and the justification for, this thesis of truth arises; here again, the idea of objective truth is not denied, but becomes a problem which has to be grasped from what is given absolutely. "Pure consciousness" is the seat of that which is philosophically a priori. On the other hand, a philosophical examination of the thesis of truth must and will lead to the conclusion that none of these acts of perception, memory, etc., which present experiences from which I seize reality, gives us a conclusive right to ascribe to the perceived object an existence and a constitution as perceived. This right can always, in its turn, be over-ridden by rights founded on other perceptions, and so on. It is the nature of a real thing to be inexhaustible in content; we can get an ever deeper insight into this content by the continual addition of new experiences, partly in apparent contradiction, by bringing them into harmony with one another. In this interpretation, things of the real world are approximate ideas. From this arises the empirical character of all our knowledge of reality. (WEYL, 1952, p. 6-7).

According to Weyl's phenomenological interpretation, to the essence of a thing there belong ideal possibilities (ZHOK, 2012, p. 99-130) of unlimited development of concordant intuitions that follow, moreover, prescribed directions of determinate type. But in the constitution of empirical reality, discrepancies will occur which will force us to make corrections. Owing to its empirical character, cognition of reality must pass through errors. What is given never implies material existence as certain and necessary but merely as presumptive reality; this means that the further course of experience will force one to abandon what, with good empirical justification, had earlier been posited, as Husserl said in *Ideas*. (HUSSERL, 1982, p. 86). For the same reason, it might well be within the range of possibility that in the unfolding of our perceptions every beginning of concordance would irreparably explode. (WEYL, 1949, p. 121).

In analyzing this conception, we also necessarily grapple with the Kantian idea of essence: "[...] the first inner principle which concerns the *possibility* of the existence of something in general". (KANT, 1973, p. 467). However, according to Kant, "[...] the determination of something in general in preparation for its essence is transcendental" (KANT, 1995, p. 340). In this sense the sphere of the transcendental comes into view and plays a fundamental role in redefining the same possibilities for describing an objective reality.

Therefore, Husserl's method is based upon the old intention «to investigate the ultimate sense of the validity of knowledge through a return to the transcendental-phenomenological origins, the origins of objectivity in transcendental subjectivity, the origin of the *relative being* of objects in the *absolute being* of consciousness» (HUSSERL, 2003). According to Husserl, "transcendence" is an immanent constitutive mode of being within the ego itself: in fact, he claims that: "every thinkable meaning, every thinkable being, regardless of whether it is immanent or transcendent, falls within the realm of transcendental subjectivity. Thus, transcendental subjectivity is the universe of possible meanings; anything external to it is meaningless". (HUSSERL, 1973b, p.32-33).

For these reasons, we can consider time as the primitive form of the stream of consciousness. (WEYL, 1952, p. 7)⁴. It is a fact that the contents of consciousness do not present themselves simply as being (such as conceptions and numbers), but as

⁴ "It is a fact, however obscure and perplexing to our minds, that the contents of consciousness do not present themselves simply as being (such as conceptions, numbers, etc.), but as being now filling the form of the enduring present with a varying content. So that one does not say this is but this is now, yet now no more. If we project ourselves outside the stream of consciousness and represent its content as an object, it becomes an event happening in time, the separate stages of which stand to one another in the relations of earlier and later". (WEYL, 1952, p. 7).

being now filling the form of the enduring present with a varying content. If we consider time as the form of the stream of consciousness, therefore, one may justifiably assert that space is the form of external material reality⁵.

Since Physics directly treats only sense experiences and the *understanding* of their connection (EINSTEIN, 1936, p. 349)⁶, yet the *real external world* of everyday thinking rests exclusively on sense impressions (EINSTEIN, 1936: 350). However, actual reality (*Wirklichkeit*) is not a *being-in-itself* (*Sein an sich*), but rather is constituted *for* a consciousness. (WEYL, 1931, p. 49).

The Theory of General Relativity, in the intentions of its author, was to be based on the effort to comprehend *inertia* and *gravitation* as an *essential unit* (*Wesens-Einheit*) (EINSTEIN, 1923b, p. 660), and Einstein tried to apply the same theoretical scheme even to the gravitational and electromagnetic field.

In the wake of these considerations, we might consider the actual world with all its pieces and determinations as intentional objects of conscious acts. In the phenomenological sense, Weyl claims that the “absolutely given” are the conscious experiences that I have, just as I have them, and so the immanent is *absolute*, that is, it is exactly what it is as I have it and I can eventually bring this, its essence (*Wesen*) to givenness before me in acts of reflection. What is given to consciousness (*das Bewußtseins-Gegebene*) “[...] is the point of departure at which we must place ourselves in order to grasp the meaning and justification of the posit of actuality (*Wirklichkeitssetzung*) in an absolute way”. (WEYL, 1952, p. 3-4).

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1. EINSTEIN’S UNAVOIDABLE QUEST FOR THE PHENOMENOLOGICAL ESSENCE

⁵ “All characteristics of material things as they are presented to us in the acts of external perception (e.g. colour) are endowed with the separateness of spatial extension, but it is only when we build up a single connected real world out of all our experiences that the spatial extension, which is a constituent of every perception, becomes a part of one and the same all-inclusive space. Thus space is the form of the external world”. (WEYL, 1952, p. 7).

⁶ “The experiences of an individual appear to us arranged in a series of events; in this series the single events which we remember appear to be ordered according to the criterion of “earlier” and “later,” which cannot be analyzed further. There exists, therefore, for the individual, an I-time, or subjective time. This in itself is not measurable. I can, indeed, associate numbers with the events, in such a way that a greater number is associated with the later event than with an earlier one; but the nature of this association may be quite arbitrary. This association I can define by means of a clock by comparing the order of events furnished by the clock with the order of the given series of events. We understand by a clock something which provides a series of events which can be counted, and which has other properties of which we shall speak later” (EINSTEIN, 1936, p. 349). See also Einstein (1956), p. 1⁵.

In a letter dated October 30 1929, to Dr. Hermann Vollmer, a Jewish physician living in Heidelberg, Einstein stated that he had tried in some way to become familiar with Husserl's work ("*Ich habe versucht kurz nach Empfang des Husserl'schen Werkes mich in dasselbe einzuleben*"); but his task was not so easy, as he hastened to point out: «the vision of essence (*Wesenschau*) is like an *accessory*, something that is completely unknown to me» ("*Wesenschau ist mir nebst Zubehör der ein spanisches Dorf geblieben*")⁷.

Although, on the one hand, this surely proves the fact that Einstein strove to read Husserl's major work, *Ideas*, on the other hand, this proves that he did not brush aside the important role of Husserl's conception about the *essence* of a logical and philosophical foundation of the physical objects which he, as a scientist, dealt with.

What appears to the physicist as matter, the sensuously appearing thing, actual thingly reality with its characterizations, is thus anything but a *sign* for all such things in the association and connection of series of causal properties belonging to that thing. The physical thing which the physicist observes, with which he experiments, which he continually sees, takes in his hand, puts on the scale, introduces into the melting furnace, becomes the subject of physical predicates such as weight, mass, temperature, electrical resistance, and so forth. (HUSSERL, 1977, p. 120-121). At the same time, it is the perceived events and connections which are determined by means of concepts such as *force*, *acceleration*, *energy*, *atom*, *ion*, and so on.

In the same way, Einstein endorsed this conception of the world, as it appears to physicists, which is closely related to *naïve realism*, since they looked upon the objects in space as directly given by our sense perceptions. The introduction of *immutable mass points*, however, represented a step in the direction of a more sophisticated realism. For this reason, it was obvious from the beginning that the introduction of these atomistic elements was not induced by direct observation. With the Faraday-Maxwell theory of the electromagnetic field, for instance, a deepest refinement of the realistic conception was unavoidable. It was necessary to ascribe the same reality to the electromagnetic field, continually distributed in space, even if sense experiences certainly do not lead inevitably to the field concept. There was even a trend to represent physical reality entirely by the continuous field, without introducing mass points as independent entities into the theory. (EINSTEIN, 2005, p. 46).

By replacing the original field theory by a new probabilistic field theory, a

⁷ Purportedly Einstein means the most important Husserl's work, that is *Ideas* (HUSSERL, 1982): See Einstein, 1929.

method has been obtained, according to Einstein, which furnishes the most useful theory of the behavior of ponderable matter. But the price which had to be paid for the extraordinary success of the theory has been that the conception of causality, which cannot be tested in the atomistic domain, had to be given up, and the endeavor to describe the reality of physical objects *in space and time* had to be abandoned. Furthermore, in its place, an indirect description is used, from which the probability of the result of any conceivable measurement can be computed (EINSTEIN, 2005, p. 47-48).

Is there nothing at all that has remained stable in all this change? Einstein answers: Sense perception is the beginning of all research, and the truth of theoretical thought is given exclusively by its relation to the sum total of those experiences. (EINSTEIN, 2005, p. 48).

Yet Husserl considers it self-contradictory to connect causally the things of the senses and those of physics: pure consciousness replaces the robust laws of the causal legality, rather consciousness grounds the latter, as it represents the transcendence of Physics in immanence, as *essence*.

Precisely because of this, according to Husserl, there arises the huge problem of a *naïve realism*: “[...] one confuses the external sensuous appearances (i.e, the *appearing objects*) by virtue of their mere subjectivity with the absolute *Erlebnisse* (*mental processes* of any appearing) of any experiencing consciousness whatever, which is constituting them”. (HUSSERL, 1982, p. 122). Allegedly it comes to confuse the *subjective* with the *objective*, but rather, through such a confused passage between the subjective being and the consciousness that constitutes it: even a connection between the physical being and absolute consciousness, along with all pure *Erlebnisse* of experiencing comes into play. One speaks as though objective physics were engaged not in explaining the physical thing-appearances in the sense of the physical things appearing, but in the sense of the constituting mental processes of experiencing consciousness. In so doing, one assigns a mythical absolute reality to the beings determined by physics, missing the consideration that the correlates of pure consciousness account for the true being.

Husserl claims that:

A not insignificant influence exercised in these misinterpretations by circumstance that one misinterprets the lack of sensuous intuitability which is a property of all categorical unities produced by thinking as well as the useful inclination in the practice of cognition to attach sensuous images, models, to these unities: that which is not intuitable sensuously is understood to be a symbolic representative of

something hidden, which could become an object of simple sensuous intuition if there were a better intellectual organization; and the models are understood to serve as intuited schematic pictures in place of this hidden reality having, accordingly, a function similar to that belonging to the hypothetical drawings of extinct living beings which the paleontologist makes on the basis of meagre data. (HUSSERL, 1982: 123).

The really known facticity, the visible world, becomes an unknown reality: in other words, it can be never grasped with the external natural and transcendent determinations to which it might assign the task of representing the first reason and the inner meaning of the subjective appearances and *Erlebnisse* that constitute it.

In Einstein's rendering there is a hint of Husserl's conception: "On the stage of our subconscious mind appear in colorful succession *sense experiences (Erlebnisse)*, memory pictures of them, representations and feelings. In contrast to psychology, physics treats directly only of *sense experiences* and of the understanding of their connection". (EINSTEIN, 1936, p. 349)⁸.

Presumably we may figure out a real external world if we refer to the concept of bodily objects and of bodily objects of various kinds. In the multitude of our sense experiences we have certain repeatedly occurring complexes of sense impression, as *signs* (like in Husserl) for sense experiences, and we attribute to them the meaning of the bodily object. Logically speaking, this concept is not identical with the totality of sense impressions referred to; but it is an arbitrary creation of the human mind. On the other hand, the concept owes its meaning and its justification exclusively to the totality of the sense impressions which we associate with it. (EINSTEIN, 1936, p. 350).

In our consciousness, we attribute to this concept of the bodily object a determined meaning, which is independent of those sense impressions which originally give rise to it.

This is what we mean when we attribute to the bodily object *a real existence*. The justification of such a setting rests exclusively on that fact that, by means of such concepts and mental relations between them, we are able to orient ourselves in the labyrinth of sense impressions. These notions and relations, although free statements of our thoughts, appear to us as stronger and more unalterable than the

⁸ Then in the following page Einstein claims: "With the discussion of this problem, which affects also the notion of reality, we will not concern ourselves but we shall take the existence of sense experiences as given, that is to say as psychic experiences of special kind". (EINSTEIN, 1936, p. 350).

individual sense experience itself, the character of which as anything other than the result of an illusion or hallucination is never completely guaranteed. On the other hand, these concepts and relations, and indeed the setting of real objects and, generally speaking, the existence of the real world, have justification only in so far as they are connected with sense impressions between which they form a mental connection. (EINSTEIN, 1936, p. 351).

For Einstein, this unsuspected relation among sense impressions and our consciousness, constitutes *the eternal mystery of the world*, so to say, *its comprehensibility*. (EINSTEIN, 1936, p. 351).

Still, it implies that the aim of science is, according to Einstein, “[...] a comprehension, as complete as possible, of the connection between the sense experiences in their totality, and the accomplishment of this aim by the use of a minimum of primary concepts and relations”. (GRELLAND, 2008).

The production of some sort of order among sense impressions, this order being produced by the creation of general concepts, relations between these concepts, and by relations between the concepts and sense experience, are the logical-theoretical structures of science, its *essences*: “It is in this sense that the world of our sense experiences is comprehensible” (EINSTEIN, 1936, p. 352). The connection of the elementary concepts of everyday thinking with complexes of sense experiences is the only thing which differentiates scientific thought from a logical but empty scheme of concepts. By means of these connections, the scientific theorems become statements about complexes of sense experiences. These primary concepts are directly and intuitively connected with typical complexes of sense experiences. From a physical point of view, these “*Erlebnisse*” possess a meaning, only insofar as they are connected, by theorems, with the primary notions; and yet these theorems are partially definitions of the concepts or statements derived logically from them, and partially theorems not derivable from those definitions, which express at least indirect relations between the primary concepts, and in this way between sense experiences. Einstein, in a real phenomenological sense, steadily repeats that: «theorems of the latter kind are *statements about reality* or laws of nature, i.e., theorems which have to show their usefulness when applied to sense experiences comprehended by primary concepts. The question as to which of the theorems shall be considered as definitions and which as natural laws will depend largely upon the chosen representation. It really becomes absolutely necessary to make this differentiation only when one examines the degree to which the whole system of concepts considered is not empty from the physical point of view» (EINSTEIN, 1936,

p. 352).

However, in Einstein's opinion, the totality of concepts and relations obtained in this manner is utterly lacking in logical unity. "The essential thing is the aim to represent the multitude of concepts and theorems, close to experience, as theorems, logically deduced and belonging to a basis, as narrow as possible, of fundamental concepts and fundamental relations which themselves can be chosen freely". (EINSTEIN, 1936, p. 353).

In the wake of *Ideen I*, Husserl warns against tacitly accepting models or symbolic forms of physical and mathematical theories of nature as absolute categories, which underly it and would serve to better organize it. Thus, he claims that every thingly perception has collaterally background-intuitions or background-seeings, but everything in the original instrument of visual perception or "[...] of all that which in fact lies in the objective *background* seen along with it". (HUSSERL, 1982, p. 68). Obviously, in saying this we are not speaking of that which is to be found *objectively* in the objective space; and at the same time, we are not speaking of all the physical things and physical occurrences which valid and processing experience may ascertain there. We are speaking exclusively of the "[...] halo of consciousness which belongs to the essence of a perception effected in the mode of the advertence to the object and, furthermore, of what is inherent in the essence proper of this halo". (HUSSERL, 1982, p. 69). Nevertheless, it is evident that such a material physical thing given in such a way in the mental process of perception is by essential necessity not a mental process but a being of a wholly different mode of being. The objective something may appear to us not only in perception but also in memory or in phantasy; at the one time the mental process is, so to speak, *explicit* consciousness of its objective something, at the other time it is *implicit*, merely potential. (HUSSERL, 1982, p. 70-72).

In this sense they are said to be *intentionally referred* to this something, rather it should be very clear that here we are not speaking of a relation between some psychological occurrence (considered as mental process) and another real factual existence (an object) nor of a psychological connection taking place in objective actuality between the one and the other. The same things that are given to us in perception, are similar to those given in our consciousness, in memory or in presentifications or primary retentions, as they are present to consciousness in the free phantasy.

Although nature understood in this way is not real, correlatively it is not a subject of current experience, hence for Husserl, it is a quasi-experienced nature. But all these possibilities are still bound by eidetic laws, regional formal ontologies, concerning the epistemological and ontological status of a particular sphere of

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objective knowledge.

Moreover, *Object* is a name for various formations which, nonetheless, belong together, for example: *physical thing, property, relationship, predicatively formed affair-complex, aggregate, ordered set*. Obviously, it is sufficient to point out that it is essentially impossible for even the spatial shape of the physical thing to be given otherwise than in mere one-sided adumbrations and that each physical property draws us into infinities of experience. (HUSSERL, 1982, p. 9).

Pure essence, the *eidōs*, can be exemplified for intuition in experimental data, data of perception, memory and so forth, but it can equally well be exemplified in data of mere phantasy. Consequently, to seize upon an essence itself, and to seize upon it originally we can start from corresponding experiencing intuitions, but equally well from intuitions which are non-experiencing, which do not seize upon factual existence but are instead *merely imaginative*. (HUSSERL, 1982, p.13).

Positing of and, to being with, intuitive seizing upon, essences implies not the slightest positing of any individual factual existence: in fact, pure eidetic truths do not contain the slightest assertion about matters of fact. Thus not even the most insignificant matter of fact truth can be deduced from pure eidetic truths alone. So thinking about pure essences needs the seeing of essences as its legitimating foundation. Thus in pure geometry we do not judge, as a rule, about the *eidōs* straight line, angle, triangle, conic section, or the like, but rather about any straight line whatever, any angle whatever, or about a straight line, an angle, or a straight line, as an angle, about any individual triangles whatever, any conic sections whatever.

Such statements need for their noetic grounding a certain seeing of essences as a seizing upon essences, and this seeing, like the eidetic intuition which makes essences objects, is based on sighting but not on experiencing individual single particulars *subsumed under* the essences. For such judgments, too, more phantasy objectifications or rather individuals sighted in phantasy, are sufficient. (HUSSERL, 1982, p. 14). Every application of geometrical truths to cases in nature (nature posited as actual) belongs here.

Husserl points out the proposition: "All bodies are heavy," which posits no definite physical affair as factuality existing within the totality of nature. Yet it does not have the unconditional universality of eidetically universal propositions because, according to its sense as a law of nature, it carries with it a positing of factual existence, that is to say, of nature itself, of spatio-temporal actuality: all bodies in nature, all actual bodies are heavy. On the other hand, the proposition: "all material things are extended" has eidetic validity and can be understood as a purely eidetic proposition provided that the positing of factual existence, carried out on the side of the subject, is suspended. It states something that is grounded purely in the essence

of a material thing and in essence of a material thing and in the essence of extension and that we can make evident as having *unconditional* universal validity. We do this by making the essence of the material thing something given originally (perhaps on the basis of a free phantasying of material thing) in order, then, in this presentive consciousness, to perform the steps of thinking which the *insight*, the originary givenness of the predicatively formed eidetic affair-complex explicitly sets down by that proposition, requires. That something actual in space corresponds to truths of that sort is not a mere fact; instead, it is an eidetic necessity as a particularization of eidetic laws. Only the actual thing itself, to which the application is made, is a matter of fact here. The principle for the corresponding interrelation between sciences of matters of fact and eidetic sciences is the connection (itself eidetic) obtained between individual object and essence, according to which an essential composition belongs to each individual object as its essence, just as, conversely, each essence contains possible *individua* which would be its factual singularization. (HUSSERL, 1982, p. 15-16).

Pure eidetic sciences, such as pure logic, pure mathematics, and the pure theories of time, space, motion and so forth, are pure matters of fact: in them no experience, as experience, that is, as consciousness that seizes upon or posits actuality, factual existence, can assume the function of grounding. Where experience functions in them it does not function as experience. The geometer who draws his figures on the board produces thereby factually existing lines on the factually existing board. But his experiencing of the product, qua experiencing, no more grounds his geometrical seeing of essences and eidetic thinking then does his physical producing. This is why it does not matter whether his experiencing is hallucination or whether, instead of actuality drawing his lines and constructions, he imagines them in a world of phantasy. It is quite otherwise in the case of the scientific investigator of nature: he observes and experiments; that is, he ascertains factual existence according to experience; for him experiencing is a grounding act which can never be substituted by a mere imagining.

In precisely the same way, as pure geometry desists from binding itself to the shapes observed in actual experience and rather pursues possible shapes and transformations of shape in free, constructive, geometrical phantasy determining the eidetic laws (*Wesensgesetze*) of those shapes; precisely in this way, pure phenomenology wished to explore the realm of pure consciousness and its phenomena, in accordance not with factual existence but *with pure possibilities and forms*. Nevertheless, the scientific cognition of *empirical actuality* can be exact, partaking of genuine rationality, only insofar as it refers this actuality to its eidetic possibilities. (HUSSERL, 1995).

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Previous experience pre-delineates horizons of possible experiences, as Husserl writes, the free play (*Spielraum*) of possibilities is to be tracked back to the universe of actual sedimented experiences. In order to suggest that a layer of experience is a settled acquisition and that it also defines a range of possibilities, Husserl introduces the term "*Vermöglichkeit*", which is both an inherited asset (*Vermögen*) and a room of possibility (*Möglichkeit*): the horizon of open indeterminacy that circumscribes the realm of actual experience (*Erfahrung*) is a realm of possibilities tied to what is already experientially acquired. "*Vermöglichkeiten*" are not just formal possibilities, but experiencing possibilities, primarily embodied by *Kinesthesia*, which pre-delineate certain configurations of experiences rather than others. (HUSSERL, 1973c, p. 191).

For the physicist who wants to explore not actualities but *ideal possibilities*, not predicatively formed actuality-complexes but predicatively formed eidetic affair-complexes, the ultimate grounding act is not experience but rather the *seeing of essences*. Grounded on the predicatively formed eidetic affair-complexes (or the eidetic axioms), seized upon in immediate insight, are the mediate, predicatively formed eidetic affair-complexes which become given in a thinking with mediated insight, a thinking according to principles, all of which are objects of immediate insight.

If, on the one hand, transcendence is a borderline concept signaling what is given to consciousness as subsistent independently of consciousness, on the other hand, essences are what we grasp in the sphere of transcendence as endowed with stable identity. Hence, we could define essences as the 'graspable contents' that emerge from our confrontation with the irreducible 'untamed' sphere of transcendence. (ZHOK, 2012, p. 120).

The essence of purely eidetic science thus consists of proceeding in an exclusively eidetic way; from the start and subsequently, the only predicatively formed affair-complexes are those that have eidetic validity and can, therefore, be either made originally given immediately (as grounded immediately in essences originally seen) or else can become *inferred* from such *axiomatic* predicatively formed affair-complexes by pure deduction. (HUSSERL, 1982, p. 16-17). Connected with this is the practical ideal of exact science which, strictly speaking, only recent mathematics has shown how to actualize: it has shown how to bestow on any eidetic science the highest degree of rationality by reducing all of its mediate steps of thinking to mere subsumptions under the axioms of particular eidetic province, these axioms having been assembled once and for all and reinforced with the whole set of

axioms belonging to the formal pure logic or *mathesis universalis*. (HUSSERL, 1984)⁹.

2. HUSSERL QUEST FOR A RELATIVISTIC KINESTHETICS

The body is the bearer of the zero point of orientation, the bearer of the here and now, out of which the pure Ego intuits space and the whole world of the senses. Thus each thing that appears has *eo ipso* an orienting relation to the body, and this refers not only to what actually appears but to each thing that is supposed to be able to appear. (HUSSERL, 1989, p. 61). The constitution of nature by subject must, of course, be accomplished in such a way that at first is constituted normally with body, within an open horizon of possible experience of further properties of things and of the body. (HUSSERL, 1989, p. 62). For the same reason, Husserl points out that the processes of kinesthetic sensations are free process and this freedom in the consciousness of their unfolding is an essential part of the constitution of spatiality. In fact,

in all constitution of spatial thinghood, two kinds of sensations, with totally different constituting functions, are involved, and necessarily so, if representations of the spatial are to be possible. The first kind are the sensations which constitute, by means of the apprehensions allotted to them, corresponding features of the thing as such by way of adumbration [...]. The second kind are the *sensations* which do not undergo such apprehensions but which, on the other hand, are necessarily involved in all those apprehensions of the sensations of the first kind, insofar as, in a certain way, they motivate those apprehensions and thereby themselves undergo an apprehension of a completely different type, an apprehension which thus belongs correlatively every constituting apprehension. (HUSSERL, 1989, p. 62).

This does not mean that the same unchanged objects appear only one-sidedly and, according to their position in relation to my body, the same unchanged form has a changing appearance. (HUSSERL, 1989, p. 64). According to Husserl things are experienced as *intuitively given* to the subject, and are necessarily unities of a *spatio-temporal-causal* nexus, and necessarily pertaining to this nexus is a prominent thing, my Body, as a system of subjective conditionality which accounts for a system of causality. Furthermore, in the transition from natural attitude to the subjective

⁹The “highest task of pure logic” is to be a “theory of possible forms of theory” or “the pure theory of manifolds”. (HUSSERL, 1975).

attitude, according to Husserl, real existence and all real changes connected with it as well, are given as “in conditional connection with subjective being”. Therefore, relations of dependency of the apperceived state of the thing emerge from the sphere of sensation and from the rest of the subjective sphere: here we have the primordial state of psychophysical conditionality, including *somatological causality*, which pertains to the relations of the *irreal*, of an event in the subjective sphere, with something real, the Body, then mediately, the relations with an external real thing which is in a real, hence causal, connection with the body. (HUSSERL, 1989, p. 70). In fact, anomalies emerge in this context when real-causal changes of the body bear on the normal activity of individual organs as perceptual organs. In this conception, what is fundamental is that the body is co-experienced as functioning in the perception process. As the normal world remains constitutively preserved by the rest of the perceptual organs, the ones which, functioning reciprocally for each other as organs, continue to give us experiences in the normal way. The material world remains an experienced world: it presents itself as it is, if the corporeality is normal; but if the corporeality is abnormal, then it is given in anomalous appearances or *phantoms*. (HUSSERL, 1989, p. 77).

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The phenomenological constitution of thingly reality relies on a *substratum* which is common to all things in experience, since all sense-things are what they are as unities in a manifold of levels of perceptions and kinesthetic constellations of subjectivity. A sense-thing, in its givenness, is made conditionality dependent on subjective corporeality, “[...] on my opening my eyes to look, on my eye movements, on my running my hands, hands moved by subjectivity, over things in order to feel them, etc.” (HUSSERL, 1989, p. 71). What we have here are simply *causalities* of a typical kind: the body, as a thing like any other, admits an infinity of causalities, namely every kind of causalities whatsoever which belong to things with such physical qualities. (HUSSERL, 1989, p. 79).

The thing is what it is in its thingly nexus and *in reference* to the experiencing subject, but it remains the same in all changes of state and appearance that it undergoes as a consequence of the altering circumstances. (HUSSERL, 1989, p. 86).

In the wake of these considerations, the “*Ich-Beziehung*” (“Ego-Relation”)¹⁰ is the meaning-bestowing ego kinesthetically constituted or shaped, the bearer of the

¹⁰For an example of Phenomenological Relativity see also the important but untended Husserl’s manuscript written between May 7th and 9th, 1934 entitled: “*Umsturz der kopernikanischen Lehre in der gewöhnlichen weltanschaulichen Interpretation. Die Ur-Arche Erde bewegt sich nicht. Grundlegende Untersuchungen zum phänomenologischen Ursprung der Körperlichkeit der Räumlichkeit der Natur im ersten naturwissenschaftlichen Sinne. Alles notwendige Anfangsuntersuchungen*”. (FARBER, 1940, p. 307-325; HUSSERL, 1940). See also the next paragraph.

physical existence as zero point and origin of all experiencing possibilities of thingly reality. (HUSSERL, 1973d, p. 10). At the same time, we might consider intentionality as the formal essence of this “Ego-Relation” and consciousness as its internal and physical counterpart of all its sense-perceptions. (HUSSERL, 1973d, p. 14). At this level, however, the transcendental Ego-Pole makes the world “everything that is ever true to us”, and is somewhat revealed to us as truth, intentionally given, “conscious of consciousness, and it moves itself in the form of our imagination and our representation, actual and potential”. (HUSSERL, 1988, p. 149).

Herein lies what we intend as “Phenomenological Relativity”, which is nothing but the phenomenological intentionality which entails the intrinsic and unchangeable *relationality* which determines every possible experiencing process. More precisely Husserl claims that: “This relativity remains concealed in the normal course of life” (HUSSERL, 1988, p. 231): this means that it is an inner dimension of our everyday life and everybody experiences things in his/her own spatio-temporal horizon in such a different way in reference to such a different positioning in space. Facing this bodily relativity, Husserl also dwells a great deal on the problem of “objectivity” which this everyday relativity entails. Furthermore, Husserl’s conception makes room for a new explanation of subjectivity in terms of being “annexed” to Nature (HUSSERL, 1988, p. 114); in fact, the clarity of mathematical grounding in Physics (in a special way, Einstein’s Relativity Theory) and the objective foundation of exact sciences, in a broad sense, relies on the discussion about this *subjective-relative* dimension of knowledge. (HUSSERL, 1988, p. 115). Since this element is firstly denied in formulating physical laws, it will be secondly grasped in grounding physical concepts. For that reason, Husserl says: “Here everything is merely relative. The new absolute *being-in-itself*, by means of all the relativities of experience, is readily presupposed as recognizable by the higher powers of the *epistème*”. (HUSSERL, 1988, p. 190). Since subjective direct experience is always merely sensuous for every concrete real, showing itself merely in the relativities of being. This appearance, which lies in every experience and every experience-knowledge of life, leads to the empirical being of the world-of-life, and thus turns into *infinitum*, according to the unavoidable endlessness of relativity. (HUSSERL, 1988, p. 191).

In a theoretical attitude, by penetrating into the openly endless horizons of the empirical world, one is subjected to objective infinities of relativities and discovers the inner and outer infinities of the world in itself as kinesthetic possibilities, rapidly gaining position in the mathematical idealization of the infinite objective forms of space and time. This does not mean neutralizing any knowledge, but rather reducing it to the empirical world-of-life, this world of relativity which is given to us only

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directly. (BOWER, 2015, p. 111; ZAHAVI, 2005).

For Husserl: "Die Erkenntnis bloßer Erfahrung in ihrer Relativität ist beiderseits nicht wissenschaftliche Erkenntnis, die auf die objektive Wahrheit, auf das letzte wahre Sein geht [...]: The knowledge of pure experience in its relativity is, on the other hand, non-scientific knowledge, in so far as it is concerned with objective truth, with the ultimate true being". (HUSSERL, 1988, p. 150).

It has to be emphasized here that experience does not exclude the possibility that it will be annulled by future experience or even that it may not be real at all, even though it was given in a concordant way. The danger, that under the assumed conditions the constitution of objective nature could not be attained, is removed as soon as we lift the abstraction we have maintained up to now and take into account the conditions under which constitution takes place: namely that the experiencing subject is, in truth, not a solipsistic subject but is instead one among many. (HUSSERL, 1989, p. 94). The true thing is then the object that maintains its identity within the manifolds of appearances belonging to a multiplicity of subjects, and specifically, again, it is the intuited object, related to a community of normal subjects, or, abstraction made from this relativity, it is the physicalistic thing, determined logico-mathematically. This thing is obviously the same, whether it is constituted solipsistically or intersubjectively. What a cognizing subject comes to know in logical objectivity can be similarly known by any cognizing subject as long as he fulfills the conditions any subject must satisfy to know such objects. That is, he must experience the things and the very same things, and he must, if he is also to know this identity, stand in a relation of empathy to the other cognizing subjects, and for that, he must have corporeality and belong to the same world. (HUSSERL, 1989, p. 92-93). Thus we come to an understanding of the physicalistic world-view or world-structure, i.e., to an understanding of the method of physics as a method which pursues the sense of an intersubjectively-objectively determinable sensible world. (HUSSERL, 1989, p. 94).

In reciprocal understanding, my experiences and experiential acquisitions enter into contact with those of others, which is similar to the contact between individual series of experiences within one's own experiential life; and here again, for the most part, *intersubjective harmony* of validity occurs, and thus an intersubjective unity also comes about in the multiplicity of validities and of what is valid through them. (HUSSERL, 1976, p. 163).

In this *life-world* each individual has experienced things, that is, what is seen by that individual and, through the seeing, is experienced as straightforwardly existing and being-such. Each individual knows that he or she, in his or her actual contact, is related to the same experienced things in such a way that each individual has

different aspects, different sides, perspectives, etc., but that in each case these are taken from the same total system of multiplicities of which each individual is constantly conscious as the horizon of possible experience of this thing. (ZHOK, 2016, p. 213-235).

In fact, to use the *Lebenswelt*, life-world, in this way is not to understand it scientifically in its own manner of being. Husserl responds to Einstein, who uses the Michelson experiments and their corroboration by other researchers without carefully examining pertaining factors: the persons, the apparatus, the room in the institute, etc. But Einstein could make no use whatsoever of a theoretical psychological-psychophysical construction of the objective being of Mr. Michelson; rather, he made use of the human being who was accessible to him, as to everyone else in the pre-scientific world, as an object of straightforward experience, the human being whose existence, with this vitality, in these activities and creations within the common life-world, is always the presupposition for all of Einstein's objective-scientific lines of inquiry, projects, and accomplishments pertaining to Michelson's experiments. It is, according to Husserl, the one world of experience, common to all, that Einstein and every other researcher knows, in which he lives as a human being, even throughout all his research activities. (HUSSERL, 1976, p. 125-126). But while natural scientists are involved in their activities, the subjective-relative is on the other hand still functioning for that scientist, not as something irrelevant that must be passed over, but as that which ultimately grounds the theoretical-logical, *ontic* validity for all objective verification, as the source of self-evidence, the source of verification. The visible measuring scales, scale-markings, the Euclidean space, the rigid bodies and clocks, the homogeneity and congruence in space, and so on, are used as actually existing things, not as illusions; but that which actually exists in the life-world, as something valid, is only a *premise*.

The knowledge of the objective-scientific world is *grounded* in the self-evidence of the life-world. If we cease to be immersed in our scientific thinking, we become aware that we as scientists are, after all, human beings and as such are among the components of the life-world which always exists for us and is always pre-given; and thus, all of science is pulled, along with us, into the merely *subjective-relative* life-world. (HUSSERL, 1976, p. 130-131).

3. THE MICHELSON-MORELY EXPERIMENT AND HUSSERL'S "OVER-THROW": A GOOD EXAMPLE OF PHENOMENOLOGICAL ANALYSIS OF ESSENCE

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“Die Erde ist nicht die ‘ganze Natur’, sie ist einer der Sterne im unendlichen Weltraum”

To comprehend the reason why Husserl strikes out at Einstein’s use of Michelson-Moreley’s experiments about the existence of a luminiferous ether, one should cast a glance over the philosophical-phenomenological implications of these physical experiments, which roughly provide an answer to these questions: How does the ether behave from a mechanical point of view with respect to ponderable bodies? Does it take part in the motions of the bodies, or do its parts remain at rest in relation to each other? Many ingenious experiments have been undertaken to decide this question.

The results of all these experiments and facts, such as the *aberration* of fixed stars in consequence of the annual motion of the earth, and the Doppler effect, i.e. the influence of the relative motion of fixed stars on the frequency of the light reaching us from them, have been explained on the assumption that the ether does not take part in the motions of ponderable bodies, and that the parts of the ether have no relative motions at all with respect to each other. (EINSTEIN, 1920a, p. 63).

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According to this interpretation and the Theory of Relativity, we could not choose anything as a “[...] specially favored (unique) coordinate system to occasion the introduction of the ether idea, and hence there can be not ether drift, nor any experiment with which to demonstrate it”. (EINSTEIN, 1920a, p. 63). Thus for a coordinate system moving with the earth, the mirror system of Michelson-Moreley is not *shortened*, but it is *shortened* for a coordinate system which is at rest relative to the sun. (EINSTEIN, 1920a, p. 63)¹¹. In other words, the light propagation relative to the earth does not show any movement of the earth relative to a preferred coordinate system (or relative to the light source)¹².

According to Michelson's experiments, Einstein says that the earth carries the ether. Then, he wonders if the ether assumption depends on the size of the body. If Michelson's experiments were carried out at a greater distance from a celestial body,

¹¹ Einstein also explains that in his 1905’s famous writing: «Examples of this sort, together with the unsuccessful attempts to discover any motion of the earth relatively to the “light medium” suggest that the phenomena of electrodynamics as well as of mechanics possess no properties corresponding to the idea of absolute rest» (Einstein, 1923a: 1).

¹² «Die Lichtausbreitung relativ zur Erde lässt von einer Bewegung der Erde relativ zu einem bevorzugten Koordinatensystem (bezw. relativ zum Lichtäther) nichts erkennen auch die optischen Erscheinungen Vorgänge scheinen dem speziellen Relativitätsprinzip zu entsprechen—entgegen dem Ergebnis der oben skizzierten theoretischen Überlegung». (Einstein, 1920b: 464).

it purportedly would be a positive outcome¹³. Therefore, Einstein remarks that a telescope on the earth surface would have to be set up exactly vertical for the observation of the stars, as if a translation velocity of the earth were not present at all¹⁴.

Now the phenomenological standpoint can be brought into sight only if we bracket the scientific world (in the sense of phenomenological *epochè*) and turn to an interruption of the validity of physical laws.

In one of his texts parallel to *Crisis* entitled: "Overthrow of the Copernican theory in the usual interpretation of a world view. The originary ark-earth does not move" (FARBER, 1940), Husserl emphasized the role of *relativity* of natural laws such as it arises from Michelson's experiment, dwelling on natural scientific *naïveté*¹⁵. Even though our new understandings may overturn the fundamental sense of the earth as ground, this overturning is possible only because of an unmoving earth. (ROTH, 2014, p. 10).

In the shift to a Copernican worldview, this unmoving earth has not disappeared but has become sedimented into our common sense, in everyday common sense, as the fundamental condition for conceiving of anything such as relative motion. Therefore, even though we eventually come to understand the earth as a thing moving among things, the unmoving earth remains the condition that

¹³ «Nach dem Fizeau'schen Versuche nehmen bewegte Flüssigkeiten den Aether nicht mit, während der Michelson'sche Versuch sich ohne Weiteres verstehen lässt, wenn man annimmt, dass die Erde den Aether mitnehme. Warum sollte die Mitnahme des Aethers nicht von der Grösse der Körper abhängig sein? Würde nicht der Michelson'sche Versuch vielleicht positiv ausfallen, wenn man ihn in genügender Entfernung von einem Himmelskörper anstellen könnte» (Einstein, 1920b: 466).

¹⁴ «Es ist also klar, dass ein an der Erdoberfläche befindliches Fernrohr zur Beobachtung des Sternes genau vertikal gestellt werden müsste, genau wie wenn eine Translationsgeschwindigkeit der Erde gar nicht vorhanden wäre» (Einstein, 1920b: 467). In his Princeton's *Lectures* Einstein goes in greater detail about this experiment: «On the other hand, the Maxwell-Lorentz equations have proved their validity in the treatment of optical problems in moving bodies. No other theory has satisfactorily explained the facts of aberration, the propagation of light in moving bodies (Fizeau), and phenomena observed in double stars (De Sitter). The consequence of the Maxwell-Lorentz equations that in a vacuum light is propagated with the velocity c , at least with respect to a definite inertial system K , must therefore be regarded as proved. According to the principle of special relativity, we must also assume the truth of this principle for every other inertial system. Before we draw any conclusions from these two principles we must first review the physical significance of the concepts "time" and "velocity"» (Einstein, 1956⁵: 28).

¹⁵ Husserl first became acquainted with Einstein's work when Oskar Becker wrote his habilitation paper under Husserl's guidance (Becker, 1923). See also Becker, 1954. Yet, Husserl seems to have familiarized himself with the theory of general relativity rather early primarily through Erwin Freundlich's "Die Einsteinsche Gravitationstheorie: die Stellung der allgemeinen Relativitätstheorie Zu den Hypothesen der klassischen Mechanik" 1917 and Einstein's "Über die spezielle und die allgemeine Relativitätstheorie" 1919 (Hartimo, 2016).

makes any movement intelligible.

From his standpoint, Husserl provides the fundamental argument for why the earth does not move, and even when it eventually comes to move, this is only because a non-moving earth is the essential experience upon which the understanding of movement and rest come to emerge and to be constituted. (HIMANKA, 2005, p. 634).

Following the same phenomenological schema, Pierre Kerszberg affirms that: "The motion of the earth, as it revolves about its axis or around the sun, is never perceived as such". (KERSZBERG, 1987, p. 196). With Merleau-Ponty, we are able to claim that the «earth is neither at rest nor in movement, it is on this side of rest and movement, according to a type of being that includes all further possibilities of experience». In fact, there is a possibility of reality: the earth as a pure fact, the cradle, the basis and the ground of all experiences. (MERLEAU-PONTY, 1992, p. 166).

Thus, Husserl continues to emphasize that: "We Copernicans, we moderns say: the earth is not the 'whole of nature'; it is one of the stars in the infinite world-space. The earth is a globe-shaped body, certainly not perceivable in its wholeness all at once and by one person. Yet, it is a body". (FARBER, 1940, p. 308).

The result of these considerations is that each body moves or could move in relation to the earth-basis (*Erdboden*). For bodies, there is an open horizon of possible movements, and these open horizons are deeply seated in our actual (*wirklich*) world. The worldview, which constitutes the world according to open horizons, grants that rest is given as something decisive and absolute, and likewise, motion; that is to say, they are given at the first level in itself of constitution of the earth as basis. Rest and movement are given absolutely in relation to the earth as a basis. (FARBER, 1940, p. 309).

As long as I do not have a representation of a new ground, as one such that the earth can have in its coherent and circular orbit the sense as a self-contained body in motion and at rest, and as long as I have not acquired a representation of an exchange of grounds such that both grounds become bodies, just so long is the earth itself really the ground, but not a body. The earth does not move, I may say perhaps it is at rest. (FARBER, 1940, p. 313).

For this reason, Husserl's position takes for granted that the earth is only one of the accidental physical bodies in the world [*Weltkörper*], one among others, and that it would be curious to believe after Copernicus that the earth is the midpoint of the world "merely because by accident we live on it", favoured even by its "rest" in

relation to which everything movable does move.

Yet, immediately Husserl raises a question: How within the extended or newly designed "*Weltanschauung*" do movements and rest acquire their true meaning, compelling intuition and evidence? To decide this, one might look at the new conception of space-time and natural-causal laws (FARBER, 1940, p. 313), but rather he has to puzzle out how it is that bodies are in real and possible motion, and each possibility is always an open possibility in reality, extension and direction changes. For this reason, these are also real and possible bodies, and correlative bodies are actually experienced or possibly experienced in their real movements, changes, etc., in their real circumstances. (FARBER, 1940, p. 313).

These possibilities are possible a manner of *being-in-relation* for each body which the scientists deal with and, therefore, they account for "modi" of the earth constitution, for reshaping open conceptual possibilities pertaining world manifolds. (FARBER, 1940, p. 310). For the scientist, who deals with not "actualities" but "*ideal possibilities*", not predicatively formed actuality complexes but predicatively formed eidetic affair-complexes, "the ultimately grounding act is not experience but rather the *seeing of essences*". (HUSSERL, 1982, p. 16).

This does mean that consequently, as Husserl repeats,

[...] the essence of purely eidetic science consists of proceeding in an exclusively eidetic way, from the start and subsequently the only predicatively formed affair-complexes are such as have eidetic validity and can therefore be either made originarily given immediately, as grounded immediately in essences originarily seen or else can become inferred from such axiomatic predicatively formed affair-complexes by pure deduction. (HUSSERL, 1982, p. 16-17).

Thus, phenomenological Relativity raises in all possible conceptual kinesthetic schema, or in other words, in all essential determinations of body motility. If we accept scientific achievements "the earth becomes a world-body" and it follows that rest and motion cease to be absolute: motion and rest necessarily become relative. (FARBER, 1940, p. 310-311).

As we explained above, Husserl sees a primordial distinction between a physical body (a thing) and a lived body. A physical body is something that has a place and can move or rest. A lived body, in contrast to that, is a zero-point of all orientation. As a point of reference for the movement or rest of the physical bodies, a lived body does not move in the sense physical bodies do. The movement of the

physical bodies and the “I move” of the lived body are essentially different. (HIMANKA, 2000, p. 68). According to Husserl, however, we have the earth as a body, the Copernican earth, and we also have the original earth of our experience, which is not a body. Whereas the first concept is empirical, concerning physical sciences, the second is transcendental, pertaining to phenomenological inquiries.

In fact, in the *incipit* of Husserl’s manuscript we find out that: “Regardless of their many repetitions and corrections, the following pages are, in any case, foundational for a phenomenological theory of the origin of spatiality, corporeality, Nature in the sense of the natural sciences, and therefore for a transcendental theory of natural scientific cognition”. (FARBER, 1940, p. 307).

In the wake of these considerations, Husserl does not want to deny the scientific evidence the Copernican theory gained, but rather to address the scientific development towards a more original or primitive level of constitution without which the scientific enterprise does not have sense or value. (HIMANKA, 2005, p. 641).

Physics aims to become *transcendental* in precisely the same sense as mathematical analysis and geometry. They investigate the ideal *a priori* laws under which the pure *possibilities* of consciousness stand, and rule out all questions concerning actual existence. At the same time, Weyl’s “Pure Infinitesimal Geometry” is *pure* in just this sense and is accordingly proposed as a World Geometry: a formal ontology, or *theory of theories* for classical field physics. In this sense, Weyl’s investigations concerning space and time represent a good example of the analysis of essences (*Wesensanalyse*) striven for by phenomenological philosophy. (WEYL, 1952, p. 133; VAN DALEN, 1984).

Everything actual (*Wirkliche*), which is present in the world, is a manifestation of the world metric: physical concepts are none other than geometrical ones. The sole distinction subsisting between geometry and physics is that geometry probes what lies in the essence (*Wesen*) of metrical concepts, but physics ascertains the laws through which the actual world (*wirkliche Welt*) is distinguished among all the four-dimensional metrical spaces according to the geometry. (WEYL, 1918, p. 385). For this purpose, Weyl with Husserl tries to set the actual world (*wirkliche Welt*) upon the background of *possibilities* (of the spacetime continuum with its field structure), which is the occurrence of geometry in physics. (WEYL, 1924, p. 81; RYCKMANN, 2005).

The coordinates, by themselves, for instance, no longer express metric relations, but only the *neighbourness* of the things described, whose coordinates differ but little from one another. All transformations of the coordinates have to be admitted so long as these transformations are free from singularities. Only such equations as are

covariant in relation to arbitrary transformations in this sense have meaning as expressions of general laws of nature (*postulate of general covariance*). (EINSTEIN, 1936, p. 368).

The first aim of the General Theory of Relativity was a preliminary statement which, by giving up the requirement of constituting a closed thing in itself, could be connected in as simple a manner as possible with the *facts directly observed*. For this reason, physics constitutes a logical system of thought which is in a state of evolution, and whose basis cannot be obtained through distillation by any inductive method from the experiences lived through, but which can only be attained by free invention. (EINSTEIN, 1936, p. 381).

Referring to Husserl's phenomenology, as far as I can see, Einstein concludes that:

in our time a new and original thought is beginning to emerge. If this time has produced a progress of the epistemological sphere, so in fact it seems to me that we could not give for granted any reasonable ways that bring us from the *Erleben* (experiencing) to the conceptual *Erfassen* (knowledge) of things, since every thought is founded on a *free* theoretical construction, which systematically derives through sense experiences. (EINSTEIN, 1941, p. 2).

4. PHENOMENOLOGY OF TIME IN AN EINSTEIN'S BRIEF MANUSCRIPT

The following excerpts from one of Einstein's manuscripts show the adherence to an authentically phenomenological point of view about the time problem. Even here Einstein applies a clearly phenomenological representation of the question, drawing out similar terminological expressions:

The physical time-concept answers to the time-concept of the extra-scientific thinking (*des außer-wissenschaftlichen Denkens*). Now, the latter has its root in the time-order of the experiences (*in der zeitlichen Ordnung der Erlebnisse*) of the individual, and this order we must accept as something primarily given. I experience the moment "now," or, expressed more accurately, the present sense-experience (*das jetzige Sinnen-Erlebnis*) combined with the recollection of (earlier) sense-experiences. That is why the sense-experiences seem to form a series, namely the time-series indicated by "earlier" and "later." The experience-series is thought of as a one-dimensional continuum

(*Erlebnisreihe wird als eindimensionales Kontinuum gedacht*). Experience-series can repeat themselves and can then be recognized. They can also be repeated inexactly, wherein some events are replaced by others without the character of the repetition becoming lost for us. In this way we form the time-concept as a one-dimensional frame which can be filled in by experiences in various ways. (EINSTEIN, 1929, p. 1)¹⁶.

Therefore, according to Einstein, on the one hand, all our thoughts and concepts are called up by sense-experiences and have a meaning only in reference to these *sense-experiences* (*Erlebnisse*); on the other hand, they are products of the spontaneous activity of our way of thinking; they are thus in no way logical consequences of the contents of these *sense-experiences*. (EINSTEIN, 1929, p. 1).

In his 1904 *Lectures* on "Internal Time-Consciousness", Husserl focuses on the objective flow of time in consciousness and then he pointed out the subjective conditions of the possibility of an intuition of time and a pure knowledge of time. According to Husserl, we assume not the time of the world of experience but the immanent time of the flow of consciousness. (HUSSERL, 1969, p. 23).

If, on the basis of this, we aim to grasp the *essence* of a complex of abstract notions we must for the one part investigate the mutual relationships between the *concepts* and the assertions made about them; for the other, we must investigate how they are related to *experiences*. As far as the way in which concepts are connected with one another and with the experiences is concerned, for Einstein there is no difference in the principle between the concept-systems of science and those of daily life. The concept-systems of science have grown out of those of daily life and have been modified and completed according to the objects and purposes of the science in question. The more universal a concept is, the more frequently it enters into our thinking; and the more indirect its relation to sense-experience, the more difficult it is for us to comprehend its meaning; this is particularly the case with pre-scientific concepts that we have been accustomed to using since childhood.

However, the phenomenological problem of the relationship between time-consciousness and real being arises up from these considerations:

The same series of experiences answer to the same subjective time-intervals. The transition from this "subjective" time (*Ich-Zeit*) to the time-concept of pre-scientific thought is connected with the formation

¹⁶ This is a draft paper of the Einstein's article published in 1926 on the Encyclopedia Britannica (See Einstein, 1926).

of the idea that there is a real external world (*Außenwelt*) independent of the subject. In this sense the subjective experience (*subjektive Erlebnis*) is made to correspond to the objective event (*das objektive Ereignis*). In the same sense, there is attributed to the “subjective” time of the experience a “time” of the corresponding “objective” event. In contrast with experiences external events and their order in time claim validity for all subjects. (EINSTEIN, 1929, p.1).

If in Husserl's *Lectures*, it was considered senseless to call into question the external time objectivity as the thingly being, this process of objectification, in Einstein's conception, would encounter no difficulties were the time-order of the experiences corresponding to a series of external events the same for all individuals. In the case of the immediate visual perceptions of our daily lives, this correspondence is exact; this is why the idea that there is an objective time-order became established to such an extraordinary extent.

In working out the idea of an objective world of external events (*der Idee einer objektiven Ereigniswelt*) in greater detail, it was found necessary to make events and experiences depend on each other in a more complicated way. This was at first done by means of rules and modes of thought instinctively gained, in which the conception of space plays a particularly prominent part. This process of refinement leads ultimately to natural science. The measurement of time is effected by means of clocks. A clock is a thing which automatically passes in succession through a (practically) equal series of events (period). (EINSTEIN, 1929, p.2).

We might say that the number of periods, or clock-time (*Uhrzeit*) elapsed, serves as a measure of time. At this level, we are well aware of reaching an *essential* meaning of “time” that is intersubjectively constituted. Nevertheless, the meaning of this definition is at once clear if the event occurs in the immediate vicinity of the clock in space;

for all observers then observe the same clock-time simultaneously with the event (by means of the eye) independently of their position. Until the theory of relativity was propounded it was assumed that the conception of simultaneity had an absolute objective meaning also for events separated in space. (EINSTEIN, 1929, p.2).

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The concept “material object” must, therefore, be available if concepts concerning space are to be possible. The *essence* of the concept *object* is a means of taking into account the persistence in time or the continuity, respectively, of certain groups of *experience-complexes*. The existence of objects is thus of a conceptual and subjective nature, and the meaning of the concepts of objects depends wholly on their being intuitively connected with groups of elementary *sense-experiences* (*Erlebnisse*)¹⁷. This connection is the basis of the illusion which makes primitive experience appear to inform us directly about the relation of material bodies (which exist, after all, only in so far as they are thought).

This assumption was demolished by the discovery of the law of propagation of light. For if the velocity of light in empty space is to be a quantity that is independent of the choice (or, respectively, of the state of motion) of the inertial system to which it is referred, no absolute meaning can be assigned to the conception of the simultaneity of events that occur at points separated by a distance in space. Rather, a special time must be allocated to every inertial system. If no co-ordinate system (inertial system) is used as a basis of reference there is no sense in asserting that events at different points in space occur simultaneously. It is in consequence of this that space and time are welded together into a uniform four-dimensional continuum. (EINSTEIN, 1929, p. 2).

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Therefore, space and time exhibit so many noted and significant analogies. Husserl claimed that consciousness of space belongs in the sphere of phenomenological givens; thus, the consciousness of space is the lived experienced in which intuition of space as a perception and phantasy takes place. In fact, if we abstract all transcendental interpretation and reduce perceptual appearance to the primary given content, the latter yields the continuum of the field of vision, which is a twofold, continuous multiplicity. Rather, Husserl affirms that the objective world of real things and events are all transcendencies, in truth, space and reality are not

¹⁷ See also the interesting analyses carried out by Weyl, 1918: 88. He affirms: «By “sense-experiences” I mean what I experience, exactly as I experience it. It do not mean real physical or even physical processes which occur in a definite psychic-somatic individual, belong to a real world and, perhaps, correspond to the direct experiences».

transcendent in a mystical sense; they are not “thing in themselves” but just phenomenal space, phenomenal *spatio-temporal* reality, the appearing spatial form and the appearing temporal form. (HUSSERL, 1969, p. 23-24).

However, for Husserl, if one speaks of a “coincidence” of the exhibitiv with that which is exhibited, it is by no means the coincidence of a consciousness of identity whose correlate is one and the same. If we distinguish between a sensed temporal datum and a perceived temporal datum, we also must distinguish between an objective time and the phenomenological datum through whose empirical apperception the relation to objective time is constituted. What is phenomenologically constituted is finally objective being, the one infinite objective time, in which all things and events (material things with their physical properties and minds with their mental states) have their definite temporal positions which can be measured by clocks and chronometers. (HUSSERL, 1969, p. 25-26).

Then, Husserl points out:

The object, however, is not merely the sum or complexio of this content, which does not enter into object at all. The object is more than the content and other than it. Objectivity belongs to “experience”, that is, to the unity of experience, to the lawfully experienced context of nature. Phenomenologically speaking, objectivity is not even constituted through “primary” content but through characters of apprehension and the regularities which pertain to the *essence* of these characters. It is precisely the business of the phenomenology of cognition to grasp this fully and to make it completely intelligible. (HUSSERL, 1969: 27).

*“Was Einstein influenced by Husserl or was it the other way round ?”¹⁸
An Answer for some conclusive remarks.*

The search for objective knowledge purports to aim at a reality independent of our experience of it, yet we find ourselves dependent upon our sense experience as the only possible access to this purportedly independent reality that is the object of science. Husserl’s phenomenological point of view reveals how this aim is

¹⁸ Here I borrow *Quora*’s question about the relationship between Einstein and Husserl. For this see: <https://www.quora.com/Was-Einstein-influenced-by-Husserl-or-was-it-the-other-way-round/answer/Chingo-Huan-Mare#>.

understandable, and, as the major developments in twentieth-century physics have shown, how science must take account of the role of the observer and the way that variously mathematically structured forms of space and time play a key role in capturing the phenomena scientists describe and explain.

What this short paper claims to prove is the epistemological evidence of an unavoidable gap between purely formal sciences (sciences of essences) and the empirical sciences for which they provide the foundation or, to put it differently, between the *essences* and pure *possibilities* that are described through the formal sciences and the concrete objects that they purport to capture.

The relativity of even the most formal sciences or the natural sciences that seem to have left behind any reference to the limitations of human subjectivity through their reliance upon precisely measurable, abstract and quantifiable properties of objects is an illusion, and the rootedness of scientific theory in the practical concerns of an embodied and knowing agent who actually does the measurements, performs the science, and is the locus of that *objective* knowledge that purports to have made itself independent of any relationship to subjective human perceptions.

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Another key theme is the way that all empirical sciences are grounded in a pure science of essences, but in this case the reference back to the realm of the concrete and the empirical is less in terms of the objects of knowledge than the agents who actually undertake the process of scientific investigations and other forms of the search for knowledge.

At the same time, I endeavour to explain how the insights Weyl gleaned from Husserl played an important role in his scientific work, and then by showing how Einstein's major work exhibit important parallels to Weyl's work, thereby establishing phenomenology both as an indirect historical influence and a systematic underpinning for Einstein's work in theoretical physics. In so doing, this paper seeks to show how some of the most basic problems that Einstein addresses have a kinship not just to problems addressed in a completely different context by Edmund Husserl's phenomenology and his circle, but also to perennial problems in ontology and epistemology that go back to Kant, Hume and Leibniz.

The conclusion seems to suggest that it not only shows how phenomenology both historically and systematically provides a backdrop for Einstein's work; my thesis actually situates issues in twentieth-century scientific thought against the backdrop of a philosophical development, and perhaps the most original idea of this study consists not just in showing how phenomenology influenced Einstein, but also how Einstein's work on relativity had an important influence on the work of the most important phenomenologists of the twentieth century, namely Edmund Husserl in *Crisis of European Sciences* and in his later works.

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Submitted: May 14, 2019

Accepted: June 12, 2019

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