

Protagoras: The Human is the measure of all things

## Introduction

Marc Lachièze-Rey (MLR) will introduce the subject:

*The quantum revolution introduced an entirely new view of light, one that made descriptions in terms of [continuous] waves or [discontinuous] particles obsolete. It had to be described by new entities: wave functions or quantum fields.*

*It then appeared that we had to describe matter in the same way. Both aspects were present in matter or radiation, both quantified.*

*From a mathematical point of view, the situation can be described geometrically [...] or algebraically [...]. Various arguments nevertheless suggest that our current description of nature is not satisfactory, and that we must seek a more complete and unified physical theory.*

*Most physicists believe that it must involve a quantification of gravitation, in one form or another. This could be presented as a quantification of geometry itself. This motivates a large part of current research in fundamental physics, which considers different approaches: quantum geometry, loop gravity, spin networks or causal networks, dynamic triangulation... Each introduces new conceptions of space and time where these geometric entities appear quantized; like matter in the original quantum theory, they incorporate continuous or discontinuous characteristics. We don't know if any of these theories will prove adequate.  
[Ref MLR]*

Notice : Although this paper will discuss about Quantum physics and General Relativity issues, it does not pretend to be scientific. Ontology of Knowledge is about integrating the knowing subject and the object of his knowledge as an unique reality. Whether the conclusions of this paper could or could not be used by science is an open question to scientists.

The model of reality proposed by the Ontology of Knowledge (OK) (see ref RLPS, OdC, MOND, ) modifies the understanding of quantification and continuity concepts for at least two reasons:

1- Non-substantiality: reality is Interdependence (let's say that reality is an unfounded field of probabilistic expectations  $\Pr(B|A) > 0$ ) in which the individuated element (eg. A) is not a substance but is a singularity such that  $\Pr(A|A) = 1$ , which we call Individuation.

2- Reversion of intelligibility: The subject (Je) is an Individuation and it is in the subject and by separation of his own necessity  $\Pr(Je|Je) = 1$  that the sense of nature and of his mind emerge.

The concepts of quantification and continuity must be redefined on the **ontological** level :

Quantification: in essence a probabilistic singularity A creates a quantum since infinities of infinities of probabilistic relations are “brought together” in the simple relation  $\Pr(A|A) = 1$ .

Continuity: in an unfounded reality we cannot “cut” an Interdependence because the cuts (in the sense of Poincaré) would be of infinite dimension, the “limits” of the element as well as the disjunction between elements are therefore probabilistic.

The knowing subject does not think nature, he is thought of nature and of himself, not of a world which would be other to him but of a world of which he is the meaning. This meaning emerges by separation of his own individuation into participating singularities. Then the question, on the **epistemic** level, is how the fundamental concepts of mathematics and physics emerge, including the One, the quantified, the continuous, the more and the less etc.. what relationship is there between

the (objectified) meaning of these concepts and their real nature in the subject?

### **Preliminary thoughts:**

MLR's expression: "*our description... of nature*" could suggest that the question of continuity and/or discontinuity concerns the form of a nature "facing" the subject who describes it.

Such simple reasoning certainly does not apply to quantum mechanics for which we already know that the relationship of the subject (agent) to the object "acts" on possible knowledge.

So our problem concerns "the description of our knowledge of nature" and not "our description of nature."

The mathematical tools that MLR refers to must take into account the laws of knowledge: what thoughts are possible and what formal properties they have.

We must study the meaning of things not as simple data about nature, which would have meaning and which the subject would use consciously, we must understand\* how the objectified meaning of things and their attributes emerges in the knowing subject.

And since we want to deal with the continuous and the quantified, we must understand how the idea of the continuous and the quantified can be born in the subject.

*\* Not by neurology or psychology but by logic or probability.*

For the OK, there is a reality. It is not subject to form in itself but takes form by taking on meaning for the subject. There are no beings in reality.

The subject is neither "outside" nor "something other" than this reality.

We must then differentiate the meaning *for what it says* (that light is continuous or discontinuous) and the meaning *for what it is* (what is, in reality, the meaning of continuity in the subject?).

To analyze meaning *for what it says* would amount to making meaning "something that makes sense" and send us back to a science that eludes the subject as a part of reality.

When we write: "nothing has proper meaning, there is only extensional meaning", this extensional meaning is not the relation of the concept *for what it says* to other concepts *for what they say*, even if our multiplicity appears that way to us. The concept *for what it says* as well as the relationship between concepts are only the objectified image of an unfounded reality in the subject.

The meanings of the attributes of continuity and discontinuity are not founded, they are only possible experiences at the objectified level.

We need to understand the ontological nature of meaning and how it emerges through association and separation.

Let us quote R. Dedekind:

*If space only has real existence, it does not necessarily need to be continuous [...]. And if we knew with certainty that space is discontinuous, nothing could prevent us, if we wished, from making it mentally continuous by filling in its gaps. [Ref Dedekind]*

The space Dedekind is talking about is the space of our knowledge in its objectified form, which would have *a priori* the sayable meaning of space. But the idea of space is, in the subject, a reality before having meaning and this reality of thought before meaning has no reason to reproduce the formal structures of meaning.

So if Dedekind only offers us two alternatives (continuous vs. discontinuous), he does not consider a space "more than continuous" or "other than discontinuous." When Dedekind imagines letting conscious thought fill the gaps in space, he eludes conscious thought's own essential gaps, attributing to it *a priori* infinite flexibility and capacity to fill its own gaps.

Mathematics and space it creates are based on our ability to count but this ability transcends conscious thought and is not immanent to it. We need a metaphysics that tells us the emergence of the meaning of the One and the continuous in the subject.

The simplicity that we attribute to the number (integer, rational, irrational, etc.) is linked to the way it is defined. The importance of the number is linked to its frequency of use ( $\Pi$ ,  $\sqrt{2}$ ,  $e$ ... are more important than  $28/3$  which is nevertheless simpler). The attributes of simplicity and importance therefore do not refer to the number "for its own sake" but to the mind of the subject and to intersubjective norms. Let us then ask ourselves the question: "Are not the One or the Integer in the nature of the mind rather than in the nature of things? »

For example: the objectified One that appears present to our mind emerges from a structure that, in our own reality, could be neither One nor present. Who could believe that the idea of Bob (whose meaning is One) would correspond in my mind to a One (and unique) reality disjoint from the rest? The objectified idea of the One does not arise from a One reality in the mind.

The temptation to empirically justify the reality (or isomorphism) of the One will result at best in an infinite regression, at worst in an act of faith.

The metaphysical question is then reformulated: "*If the idea of the One is not proof of the reality of the One, what is mathematics the representation of: of nature in its formal rules or of the mind in its formal rules?*»

And the epistemic question is then formulated: "*Can we conceive of mathematics which eludes the mind?* »

In other words: we think we have constructed mathematics and science from elementary attributes of nature, "recognized and idealized" by the mind; would these elementary attributes not rather be the "eigen values" of the process of emergence of meaning in the subject, which would impose themselves on its representation? As they emerge with meaning these elementary forms are real, because meaning is real, but do they have a formal counterpart in facing "objects"?

According to Poincaré, mathematical language says nothing about the objects of which mathematical symbols are the sign. Only the relationships between objects are of interest to the mathematician, just as, according to him, only the reality of the relationships between things is accessible to the physicist.

But is it not incoherent to believe that the reality of the relationship between (mathematical) objects can be defined absolutely if the objects themselves are unfounded, that is to say incalculable.

The mathematical relationship is an object in the same way as the objects it connects. It has no more proper reality than the object. Its formal definition, as pure as it may be, is based on prior objectification.

The idea of the relation emerges from the same process as the idea of the object.

Since reality is unfounded, the mind is unfounded, extensional mathematics is unfounded.

Let us quote Gustave Guillaume:

*The speaking subject, in the moment of expression, passes [...] from language to effective, momentary speech, that which can be heard, which has a physical existence. But this transition...is...that of virtual speech, indissolubly linked to the psyche of language, to actual, effective and physical speech. Virtual speech, linked to language, and forming an integral part of it, is non-physical, silent speech, which the psyche of language units brings with it. It is easy to realize the reality of this non-physical word. Each notion of language carries with it the idea of the meaningful sound(s), but only the idea of this sound(s), not their reality. [...] It follows from this that idea-speech, being part of language, is something other than effective speech, which is a materialization of it. [...] [Ref Guillaume]*

From this quote "about language" and knowing the indissoluble relationship of language to thought, it is possible to broaden its applicability to realize that the formal structures of the idea *for what it is* are fundamentally different from those of the idea *for what it says*. But common sense and science present us in a sayable world, having the formal structures of thought *for what it says*, whereas this world in which we believe we live is fundamentally drawn by the structures of our thought *for what it is*, objectified under the primary constraint of our persistent Unity (and the persistent Unity of our Humanity) that is to say according to the laws of thought.

Henri Bergson wrote:

*The word with well-defined contours, the brutal [non-contradictory] word, which stores what is stable, common and therefore impersonal in the impressions of humanity, crushes or at least covers the delicate and fleeting [contradictory] impressions of our individual consciousness. To fight on equal terms, they should express themselves through precise words; but these words, barely formed, would turn against the sensation which gave birth to them, and invented to testify that the sensation is unstable, they would impose their own stability on it. [Ref bergson]*

These words from Bergson illustrate the principles mentioned previously: Language imposes its norm on intersubjective exchange and at the same time, on the multiplicity by which the world takes on meaning for the subject. A process “objectifies” the confused, indistinct, contradictory singularities that emerge from the depths of what-does-not-have-sense in the subject and from this process, objectified thought and intersubjective language are born. To do this, this process eliminates contradictions by grouping them in the form of necessities, probabilistic singularities, attractors “with well-defined contours”.

### **The continuous**

Henri Poincaré gives the following formula for the physical continuum, as experience reveals it to us:

*“It was observed, for example, that a weight A of 10 grams and a weight B of 11 grams produced identical sensations, that weight B could not either be discerned from a weight C of 12 grams, but that we easily distinguished weight A from weight C. The raw results of the experiment can therefore be expressed by the following relationships:  $A=B$ ,  $B=C$ ,  $A<C$  which can be viewed as the formula for the physical continuum. There is an intolerable disagreement with the principle of contradiction and it is the need to put an end to it which forced us to invent the mathematical continuum. » [Ref Poincaré]*

This formula of the physical continuum, in its principle, is hardly convincing because even after having reduced the difference from 1 gr. to 1/1000gr. it always seems to confuse our imperfect sensitivity, numeration in general and the variation of magnitudes in “reality”.

To try to see things more clearly, let's think of the subject in the first person:

“I (subject) am the thought of my existence.”

Not from my existence in itself because my existence is unfounded. I am not “something that exists.” My existence has no proper meaning but only the extensional meaning ( $\text{Pr}(\text{Je}|\text{Je})=1$ ) which is the probabilistic necessity of my individuation.

The singularity that is my individuation is not determined “in me” but induced globally in reality. The extensional meaning ( $\text{Pr}(\text{Je}|\text{Je})=1$ ), the necessity of my existence, is induced by a probabilistic singularity in reality.

This extensional meaning is “I become myself” and its reality is my thought.

“I exist” is not a truth that is immanent to me, it emerges in reality.

If, imitating Poincaré, we write the “moments” A ( $\text{Pr}(\text{Je}_B|\text{Je}_A)=1$ ) and B ( $\text{Pr}(\text{Je}_C|\text{Je}_B)=1$ ) of my existence; the probabilistic path which leads from moment A to moment B is an unfounded part of reality, it is so complex that no finite dimension cut is possible.

In the logic of Poincaré himself, to say that thought is not cuttable amounts to saying that any cut in thought would be overdetermined, impossible to represent in the form of existents-in-the-present in a space of countable dimensions.

For example, a three-dimensional cut that would allow the thought of a 4-dimensional block universe presents overdeterminations towards an incommensurable Real.

The path towards the individuation of thought disperses into a space of innumerable dimensions.

These paths, *imaginary* compared to objectified representation, come together in the form of contingent singularities, representable but not cuttable.

So my thought, *for what it is* in reality, is not cuttable.

The Reality of my thought cannot be represented in my objectified world  
It is complex, but complex does not mean continuous.

The process which brings out the "objectified" meaning of my individuated existence, which represents me as a series of states in the world, will digest the impossibility of cutting the real path of my representation from state A to state state B, and produce the "objectified" form of a physical continuum, then idealized into geometric and analytical continuums.

*Note: The physical One changes by remaining itself at every moment. The physical continuum describes the One as "that which exists by becoming itself", carried by the continuum of conscious thought, while the mathematical continuum describes the One as "that which is itself", eluding the thought which carries it. The physical continuous appears submitted to time whereas the mathematical continuous appears timeless.*

Continuous existence is not a reality but an objectified thought that is not cuttable because it is induced by conditions of possibility that are incommensurable to it.

The idea of continuous existence therefore results from the fact that the subject and all its knowledge are an individuation without possible cut.

Existence must be rethought not as a fact of the world but as a fact of knowledge.

The same reasoning applies to any existent X whose meaning emerges in my thought.

If X exists for the knowing subject, X is necessary for his existence.

The necessity for the subject of the existence of X, that is written :  $\Pr(X|Je)=1$ , emerges by separation of the necessity of his own existence ( $\Pr(Je|Je)=1$ ).

Nothing exists for me of an actual (and not merely potential) existence that is not necessary for my own existence.

The representations of the world and of myself that appear to me emerge not from reality but from the "trace" of my individuation in reality.

The necessity, for me subject, of the existing thing X is not determined in X (because X has no proper meaning) but induced by conditions of possibility in the Whole of this trace.

A cut in the necessity of X is impossible because it would imply a cut in my necessity.

The continued existence of objects and their attributes is not a reality but an objectified thought induced by conditions of possibility which are incommensurable to it.

The thought of the existence of X not being cuttable "in its reality", in the objectified world of my representation, the path from state  $X_A$  to state  $X_B$  is represented as a physical continuum

What is thought in me is not "something other" than what thinks in me.

What is thought (the meaning of the world and my conscious thought) is a mode of order of what thinks (the reality of my individuation) and yet one to the other is incommensurable.

No cut in what thinks can be conscious thought.

We can only think of our world as continuous.

In mundo non datur hiatus.

Individuations, necessities, singular probabilistic expectations, compatible with my own singularity, nevertheless allow the meaning of individuated existents to emerge for me as a subject.

But we will see that a singularity does not have the formal properties of an object.

## **Individuated and quantified singularity**

### **Preliminary thoughts:**

The transcendental subject is not an object but a probabilistic singularity, without reference to a causal foundation, nor to time, nor to any dimension. We will also use here the term **singularity-subject**.

The knowing subject in the block-universe of General Relativity.

General Relativity proposes the “objectified” model of a universe-singularity in a 4-dimensional space-time continuum. In this model the “trajectory” of an object is described by concepts of line-, surface- or volume- of universe.

Einstein and his contemporaries wondered a lot about the ontological meaning of GR and this still raises questions today. Not that science in general has solved all its other "ontological problems", but the specific question of the free existence of the knowing subject in a block universe exposes either the incompleteness or the ontological inconsistency of the GR and physics which adopts it.

*Einstein wrote this to Carnap: “The experience of the “now” has something special for Human which radically differentiates it from that of the past and the future, but this difference is not and cannot be highlighted within physics [...] there is something essential about the “now” that remains beyond the reach of science.” (Editor's note I would specify: ...of a science which eludes the knowing subject)*

Some remarks about the concept of the subject's existence as a ligne of univers:

1-The subject, like everything that lives and thinks, is the focal point of an infinity of infinities of interactions following a complex and non-deterministic proliferation. What determines the subject and what he determines is therefore essentially incalculable.

Even limited to its “energy-matter”, the “trajectory” of the knowing subject in the block universe cannot therefore be described as a line- not even a 4D volume- of universe.

2 - The subject knows his universe and this knowledge is an integral part of reality, to the point that it plays a macroscopic role. A description of the block universe which does not take into account knowledge, its emergence and the action of the subject as one of its contents or at least as a mode of order in a four-dimensional reality cannot be complete. This is not about psychology or ethics but about science, let us not forget that the interaction of the knowledge of the subject and the object of his knowledge is at the heart of quantum science.

3 - Knowledge is the very thing that describes the world and states science. On the epistemic level, we shall understand that the block-universe as described by the GR (and science in general) is only the « trace » of the singularity-subject in the Real, the part of reality that the subject (each subject and all subjects in the inter- subjectivity) can know because it is what he becomes as knowledge. The knowing subject represents his own Reality. No empirical experience can show him the incompleteness and limits of this representation.

*Note: To say that the singularity-subject only involves a tiny part of reality is not simply a comparison of cardinality or N-dimensional extent. This means that the singularity-subject is not a dense part of reality: Not only is the reality of the subject unfounded, but the neighborhood in the Real to which each “Fact” of the subject is interdependent is itself incalculable, unfounded, unfathomable.*

*In its reality, the neighborhood of a point in the space-time of our experience is not a priori the four-dimensional volume that we represent but a law of probability distribution which is objectified in a four-dimensional volume.*

*To image this (knowing that images are misleading) we could say that the Reality of the subject-singularity is infinitely diffuse in Reality.*

4 - In the block universe which “contains” time, the singularity-subject is not determined but induced as a necessity. It is under the constraint of this necessity that the knowing subject, representing the universe, represents and becomes himself. The singularity-subject is a winning game even before it makes sense for the knowing subject.

On the epistemic level we must therefore understand that the representation by the subject is by necessity idoneous: any hiatus in the experience which would call into question his existence fades away by itself, because nothing exists for the subject which does not participate to his persistent unity.

In addition to the Cartesian and Kantian question of the truth of science (the isomorphism between a model built by science and an external reality), the question of its object therefore arises: does the block Universe describe the (presupposed) singularity external to the knowing subject ? or is it only the singularity-subject which represents, in a necessarily idoneous way, its own singularity as the

OK proposes?

According to the OK, the singularity-subject is altogether and without discontinuity the “I am” and “the world that I can know”.

We shall not say “the world makes sense for the subject but “the subject is the world that he can know”.

The singularity-subject is nothing other than a mode of order, that the Unified (singularized) consideration of the probabilistic interdependence which constitutes its reality.

As a model the singularity-subject is a probability attractor.

The topology of such an attractor is fundamentally different from that of an object: An attractor has neither its own substance nor a strictly defined boundary.

The concept of attractor allows a coherent representation of the subject in the block universe.

The laws of the world are nothing other than the laws of meaning.

The facts of knowledge are unfounded, there is no proper meaning but only extensional meaning.

Reality being non-substantial, the mind has no substance. We must not think of the Reality of meaning in the form of substantial contents but only in the form of interdependencies, dynamic relations.

Concepts of objects do not “by themselves” have attributes: position, mass, inertia, speed, etc., but these properties emerge from a structure of probability relations between attractors. This structure is the multiplicity of the subject.

It would be vain to link the notion of quantity, of more and less, to that of a content specific to the facts of thought; it is in probabilistic interdependencies and their structures that we must look for quantity.

The Existence of the subject is the judgment of necessity of his Individuation.

The Existence of the subject takes on meaning in the structure of contingent paths towards this necessity.

There is only common sense in this:

- To exist is, for the subject, to become oneself. Only that which determines the subject as Existent-One and therefore contributes to his Individuation can exist in his representation. What does not contribute to this necessity does not exist for the subject.
- The meaning of his existence and of the world, everything that appears to the subject as Existent, these are the contingent paths of his Individuation. The freedom, the indetermination of what happens in the subject's time are real but nevertheless constrained by the timeless need to become oneself.

**Only makes sense for the subject the trace of his individuation in Reality.**

Individualized thoughts are not “things” but paths which, from attractors to attractors, merge and fulfill the necessity of “I become myself”.

This is another manner to express the thought as acting Cogito.

The multiplicity of the subject is precisely the structure of probabilistic expectations “outside of time” which, from attractors to attractors, separates the necessity of “I become myself”.

The probabilistic expectation relation is a separation which designates, individuates and quantifies in a selective way (because probabilistic) the contingent paths which converge towards the necessity of the subject.

The probabilistic expectation relation is not a semantic creation tool but the act by which meaning unfolds.

The probabilistic expectation relation is the Reality of thought.

Probabilistic expectation is not a measure relating to substantial facts, it is in itself the reality of the attraction between singularities with no substantial basis.

In the relation of probabilistic expectation, what thinks and what is thought, what acts and what is

done, are the same reality.

The meaning that emerges and the multiplicity that regulates this emergence are only one reality. Just like in Spinoza a substance and its affection.

What appears to the subject as Existing is its objectified aspect: certain, present, necessary, non-contradictory.

Let's highlight these two aspects of the same reality:

- 1) on the one hand the timeless necessity of the individuation of the subject which induces, by separation, the contingent paths of its fulfillment
- 2) on the other hand probabilistic expectation (from which the meaning experienced by the subject emerges) which seems to determine the future of the subject according to a time specific to him.

The first aspect describes (in the third person) the subject-singularity, the second describes (in the first person) the knowing subject.

The objectivation of thought consists of the ordering of the unspeakable Reality of individuation towards the simple necessity of the asymptote ( $\Pr(Je|Je)=1$ )

The law of probabilistic expectations which links the Existing to the Possible is in a way the "differential equation" in Act by which meaning unfolds and objectifies (puts itself in order) under the constraint of the persistent unity of the subject .

For the subject, it is the dynamic meaning of a present world.

## Quanta, quantity

We owe the notion of importance to A.N. Whitehead, philosopher and mathematician, co-author with B. Russell of "Principia mathematica", a founding work of modern logic and arithmetic.

*In 1938 Whitehead gave nine readings presenting his metaphysics [ref:Whitehead]:*

*In one of them he deals with the notion of **importance***

*Whitehead first states that "Fact and its importance are inseparable" and that "these two associated notions underlie the whole extent of our experience." "...there is no such thing as an isolated Fact. Interdependence is in the essence of all things"*

*For Whitehead, the importance of a Fact is not a simple judgment (even if unconscious) of the subject, applied like an attribute to the Fact existing by itself. Importance is a joint condition for the appearance of the Fact in the perception of the subject, for its Existence.*

*A Fact exists or not for the subject depending on a judgment of importance.*

*In another reading he deals with the notion of **perspective**.*

*For Whitehead, the judgment of importance is that aspect of our sensation of the world by which a "perspective of the world of felt things" imposes itself on the subject.*

*"The two notions of importance and perspective are closely intertwined."*

*The importance of the fact does not lie in the Fact but in the overall relational structures which determine the modes of judging importance and form the perspective.*

We could consider that importance qualifies the objectified Fact while perspective describes the pattern of a structure in the Knowledge of the subject. However, if importance is a criterion of more or less, it is according to a judgment emerging simultaneously with perspective. Perspective defines importance and importances build up perspective.

We find in Whitehead, under the term "perspective", a notion close to the "multiplicity" dear to Husserl.

Note, however, that perspective is not a tool of objectification, it is the structure of objectification in Act or (as one wishes) of the Act of objectification.

The knowing subject cannot name his perspective because he is his perspective. Saying "I see the world" is already for the subject to take the point of view of a third person.

Likewise, the knowing subject cannot name the importance because the importance is the meaning that occurs in him. To say "this exists" is already for the subject to take the point of view of a third

person.

By designating the knowing subject as the epicenter of the perspective, Whitehead shows us that the criterion of importance is not an attribute of the Fact's own Reality but qualifies the participation of the Fact in the Existence of the knowing Subject.

The OK does not say anything else: the Fact Exists if it is necessary for the becoming-self of the subject. Perspective is the structure of convergence of the paths of objectification until the ultimate objectification which is the existence of the knowing subject.

In a sense, Whitehead's texts are transcendental (it is in the knowing subject that meaning is born). It even deepens the Kantian notion of "synthetic *a priori* concept", making the criterion of importance a condition of possibility of the concept.

But, like Kant, Whitehead does not explain the transcendent Reality of the singularity-subject. For Whitehead everything seems to occur in the subject "as it exists in the world," a subject as it describes himself in the world.

But we cannot understand the quanta of Existence by the classical logic of non-contradictory objectified facts.

The OK identifies "that which thinks" (the perspective) and "that which is thought" (the importance of the Fact) as two aspects of the same Act through which meaning emerges.

Importance is not a value in itself or even the property of something in itself.

Thought is an Act, it is not something that becomes, it has no states.

The Reality of importance is in the participation of a Fact in the necessity of the subject, compared to the participation of other Facts.

Above all, we must not confuse the Reality of importance, this Act by which meaning happens in the subject, with the meaning that we, third parties, try to give it.

The relation of probabilistic expectation designates Possibilities in an unspeakable Reality.

This relation is quantification in that the space of Possibilities presents fewer dimensions (more order) than the Real which is of innumerable dimension, unfounded, insubstantial.

At the level of Reality the Fact borders on the impossible while a non-negligible Possibility is already a preliminary form of Existence.

Since the Real is not substantial, this quantification is not *a priori* a matter of quantity of substance.

Quantification is a matter of form.

The quanta are the formal eigenvalues, the eigenforms, the attractors, resulting from the application *ad infinitum* of this same mode of designation which is probabilistic expectation.

Quanta result from the modalities of objectification and not from what is objectified.

Quanta are fixed by rules of structure and not of substance.

Quanta are in the conditions of possibility of meaning and not in the proper meaning of the Existent.

Once again there is only extensional meaning.

If these (formal) quanta appear to us as quantities it is fundamentally because all modes of objectification do not contribute with the same effectiveness to the ultimate objectification which is "I become myself":

A necessity can be fulfilled in an infinite number of contradictory ways.

The Reality of the singularity-subject presents an infinity of modes of singularization, of possible multiplicities.

But Reality is complex, it has too many degrees of freedom to be ordered in a single, sayable sense.

Meaning is emergence. The law of probability is an Act and not a state.

Each Fact of Knowledge makes other Facts Possible, creating the conditions of possibility for a readjustment of the multiplicity.

A readjustment, however minimal, creates in the multiplicity the conditions for a quantified

bifurcation towards another attractor which is itself interdependent on other attractors.  
Finally, the meaning of new Facts with certain, necessary Existence can emerge for the subject.  
Although Reality is not subject to change, multiplicity and therefore the meaning that emerges from it are unstable. Unstable by quanta.  
In pictorial terms: For the subject, the “origin” of the change of meaning is beyond the horizon of meaning, it has no meaning, it does not Exist.  
This allows the reconciliation of the freedom experienced by the subject with his insertion into the block universe of the GR.

The multiplicities are not disjoint. The horizon that “delimits” each participatory singularity, at all levels of the objectification structure, is only a minimum of interdependence with other singularities, a minimum of Shannon entropy.

By its very nature, the *ad infinitum* reiteration of the probabilistic expectation relation favors\* among the participating singularities those with minimal entropy, for which the necessity  $\Pr(X|X)$  is closest to 1. The closer the probabilistic expectation  $\Pr(X|X)$  is to 1, the more the participation of X in « Je » will be stable, that is to say resilient to readjustment.

*The possible demands to exist by its nature, and does so in proportion to its possibility, that is to say, to its degree of essence [Ref Leibniz]*

As it is put in order\* by probabilistic expectation, the meaning passes\* from impossible to possible then from possible to certain.

Its participation in the becoming-self of the subject comes closer\* to unity:  $\Pr(X|Je) \rightarrow 1$

Thus appears\* the Existent for the subject.

This ordering tends at the same time to disjoint the Existings, to minimize their interdependence, to erase the possible contradictions between their meanings.

But meaning is not a state, it is an Act.

A singularity, including the singularity-subject, is only a minimum of interdependence.

Even for the Existing which borders on certainty there remains a probability of unstable readjustment\*.

This probability for the Existent to no longer Exist\*, for the disjoint meaning to merge\* into another or to separate\*, is a quantity, it is importance as quantity.

*The Self is the Existent whose meaning is the most stable. It is the most important, the (logically) closest to the simple-digit necessity of “I become myself”.*

Thus the purely formal order becomes quantity.

Thus existence is associated to quantities which vary by quanta.

*\* This description is a heuristic convenience. The terms marked with an \* could lead us to believe that this process determines the subject by fusion of meaning while, conversely, the persistence of the subject's unity as singularity is the prior necessity which, through separation, induces the infinitely complex, interdependent, contingent paths of its fulfillment.*

*The subject-singularity is necessary before taking on meaning.*

appendix I  
**The fact and its importance**

A.N. Whitehead (Wh), philosopher and mathematician, is with B. Russel co-author, in 1910-1913 of "Principia mathematica", a founding work of modern logic and arithmetic.

In 1938 Wh gave 9 lectures presenting his metaphysics, whose texts have been grouped into a collection entitled « Modes of Thought » (ref WMdP)

In the following lines, we will start from the notions of "Importance of the Fact", theme of the first of these lectures and "Perspective", theme of the Fourth, which we will reinterpret according to the terms of the OK and then try to go beyond them to draw conclusions applicable to arithmetic and geometry.

Let's start by solving two vocabulary details:

- (1) The term matter-of-fact: We will rather use the term "Fact" as defined by the OK, as it may be involved in the terms "Fact of Knowledge" or "Fact of Sensation"
- (2) The terms "being connected" or "connectedness". We will prefer "Interdependence" which is well defined by the OK.

Development

Wh first states that *"There are two contrasted ideas which seem inevitably to underlie all width of experience, one of them is the notion of importance...The other is the notion of matter-of-fact"*. We will see that in this quote, the expression *"all width of experience"* is not incidental.

For Wh, the importance of a Fact is not a mere judgment (would it be unconscious) of the subject, applied as an attribute to the Fact existing by itself. Importance is a condition associated with the appearance of the Fact in the perception of the subject, its Existence as the OK defines the term.

*"... characteristic modes of thought as we first recall ourselves to civilised experience .... are "this is important" , " that is difficult", "this is lovely" etc."*

For Wh, here is no surprise that one can qualify as "important" a Fact even though it is only vaguely characterized by the terms "this" or "that", for importance is not a mere qualifier of the Fact.

Not that importance is a prerequisite for the Existence of the Fact.

As the OK shows, since the Fact has no substance, it is the association of meta-Facts, of judgments of belonging to classes of Facts. Thus, judgments such as unity, importance ... co-exist in the Fact, like all the meta-Facts that constitute it. Importance co-Exist in the Fact.

As an illustration, a movement rapidly converging towards our axis of vision triggers in us a physical state of alertness, even before it has been individuated as a Fact of perception and acknowledged as "a danger" by our spirit.

Having shown co-existence in the Facts of the importance judgment, Wh then exposes the nature of importance, beyond its usual psychological meaning.

For Wh: *"the notion of a mere Fact is the triumph of the abstractive power of the intellect" "A single fact in isolation is the primary myth required for finite thought, that is to say, a thought unable to embrace totality (3)"*

(3) This term of totality would have deserved more precision. We propose *" ... the totality of its Knowledge "* or *" ... a thought/subject unable to give meaning to the totality of his thought/object "*. Knowledge and thought/object designate here the same notion.

Wh: *"This mythological character arises because there is no such fact. Connectedness is of the essence of all things "*

We will move from Interdependence inside the Fact to come to the Interdependence between the Facts of Knowledge and its role in the constitution of a perspective that will make possible a judgment on their respective importance.

For Wh, the judgment of importance is that aspect of our feelings of the world by which a "*perspective of the world of things felt*" imposes itself on the subject. It is according to this perspective that our consciousness neglects such unimportant Facts and gives Existence to such important facts.

*"The two notions of importance and perspective are closely intertwined."*

The importance of the fact lies not "in" the fact but in the global relational structures that determine the modes of judgment of importance and is called perspective.

One could consider that importance qualifies the individuated Fact while the perspective describes the scheme of a structure in the Knowledge of the subject. This simplistic vision should not make us forget that on the one hand the importance is a relationship of "more or less", relative in essence, order relationship between Facts, necessary to an orderly structure; and that, on the other hand, the perspective is in the proper sense according to a point of view: that of the subject.

At this point, the reader of Wh's lectures feels the same discomfort as when reading Kant or Schopenhauer. As long as the terms: importance, perspective, judgment keep a psychological connotation, nothing is clear.

The OK proposes to the reader, by explaining this notion of "point of view of the perspective", to deepen the intuition of Wh to highlight by which objective process the Facts of our Knowledge seem to emerge in a space ordered by the importance and more generally by order relationships.

For this, let us quote a somewhat obscure passage from Wh: "*We may well ask whether the doctrine of perspective is not an endeavour to reduce the concept of importance to mere matter-of-fact devoid of intrinsic interest.... It is true to say that perspective is the dead abstraction of mere fact from the living importance of things felt. The concrete truth is the variation of the interest, the abstraction is the universe in perspective, the consequent science is the scheme of physical laws which, with unexpressed presuppositions, expresses the patterns of perspective as observed by the average of human beings*".

According to Wh, perspective results from systematization, in the form of laws, of invariances of structure (patterns) in the importance of Facts of Knowledge, as felt by the subject.

For the OK, Wh's analysis lacks the following premise: "*The subject is individuation of his Knowledge*"

Let us recall some principles enunciated in ref. OK: The Logos tends to aggregate the Knowledge of the subject into individuated singularities that are the Facts of Knowledge which, themselves, being interdependent, will be aggregated in turn and so on into a global process of individuation that converges to an asymptote : the "I", the knowing subject, the Point of view. The meaning of each Fact is expressed by a law of probability on the Facts to appear.

From a global view we can say that the agglomeration of the Facts of a Knowledge, by its convergence, gives Existence to the subject. It is the individuation of the subject.

G. Simondon has clearly stated (ref ILFI, IPC): The subject is not the result of individuation, it is the principle, the Act of individuation. Individuation does not end with the appearance of the subject. The convergence is perpetuated indefinitely towards the always repulsed focal point that is the "I". Thus, the flow of appearance of the Facts and their agglomeration "towards" the "I" is endless.

This convergent agglomeration is not regular.

The contributions to the individuation of the "I" are not equal.

The conditional probability of Existence of the subject, knowing the Existence of a Fact is not the same for all Facts.

Existence of certain Facts is objectively more important than others for the Existence of the subject. The importance is therefore not a psychological or physiological phenomenon but a distribution of objective probabilities in a system of interdependencies.

It is the probability of Existence of the subject knowing the Existence of the Fact.

According to the same principle by which the Facts are individuated, singularities in the importance of the Facts appear and subsist. They individuate in meta-facts of importance.

The dynamics individuate and persist, as the convection in the atmosphere is individuated in cyclones and anticyclones.

Importance is not an exclusive attribute of the Fact, according to an absolute scale, but a characteristic that judges the Fact as one of the Facts, from a perspective of which we now know that the point of view is the "I".

Now, by virtue of the Cogito, the Existence of the subject is certain for the subject, in essence. It follows that the sum of the importance, integrated over the whole extent of his Knowledge is equal to one for the thought/subject.

Importance is only one of the modes of Existence, one of the formal elements that coexist in the Fact and carry the meaning.

Importance is only one way of qualifying the remarkable singularities resulting from the Logos.

It is here that the remarkable consequence emerges.

In a reality according to the OK, which would not be ruled by physical laws a priori but by the laws of Knowledge, by the principle of the Logos:

The world of the subject is not the juxtaposition of Facts disjoint, with an absolute Existence, possibly ordered according to a priori scales.

The meaning of the world is not a possibly infinite addition of independently existing, or loosely interdependent, meanings of Fact.

Since the Meaning of a Logical Fact is the assertion of the Existence of the subject, the world is a set of Facts whose cumulative Existence results in the certainty of the Existence of the subject.

For the representation of the subject, the world is distributed according to a distribution of probabilities of Existence whose integral on the totality of the extension of his Knowledge is 100%.

This distribution is not equal, it is even metastable according to the principle of individuation.

There are singularities.

From the global interdependence between the singularities, the Logos' laws define, according to a perspective centered on the subject, the rules and the parameters that order the representation of the world.

Thus, the limitations to the extent of the world as it appears to us, our inability to qualify the infinite to large and small scales, result neither from insufficient means of observation, nor from an intrinsic limit to the world, but from the fact that the Existence of the world is included in the Existence of the subject, the totality of which can not exceed a mere certainty.

This principle can be expressed very concretely: In order for the subject to be able to make A and B exist in the same representation, the In-act of A and that of B can not be disjoint, then the Senses of A and B, expressed in terms of conditional probability of "I" do not add up completely.

Such a conclusion is not without consequences on the validity conditions of arithmetic and geometry.

Arithmetic: If we consider the number (integer) as the Fact of arithmetic, then only pure numbers, numbers which would be nothing for the subject, numbers with a zero Existence can constitute an infinite according to the classical principle of recurrence. Of such numbers nothing could be said. In particular their importance would be nil ( $1/\infty$ ) and therefore uniform, as moreover it would be impossible to attach to them the sense of the logical operations which define them, these numbers could not be ordered.

An arithmetic of numbers with non-zero existence should respect the above stated constraint: that the integral sum of the existences of numbers, extended to the whole field of this arithmetic, is limited to 1.

Let us say that if the conditions necessary for that each number  $n$  can be represented by the subject,

occupy a fraction  $F_n$  of its existence, the series will be limited by  $\sum F_n \ll 1$

One can probably conceive several classes of solutions respecting this constraint, that they limit the extension of the domain or the density of probability of Existence. I even suppose that they have already been elaborated for the solution of relativistic and quantum problems.

Geometry: If we consider the point as Fact of geometry, then only points with zero Existence can populate a continuous and/or infinite space. This space could not be ordered.

The constraints that would impose to points with non-zero existence, to "physical" points, would be of the same types as for the numbers of arithmetic.

I will not venture on this terrain.

It can be argued, however, that the solutions to this constraint:

- Will be centered on the subject
- The Facts will necessarily be without substance, unfounded. In other words, in these facts, there will be judgments of structure, singularity, and importance. They will possibly be defined only by intersections of classes.
- The Facts will be interdependent so that:

$$\sum_i P(\text{subject} \mid \text{Fact}_i) \ll P(\text{subject}) = 1$$

In conclusion :

It is remarkable that this Mode of Thoughts was written (in 1938) by the co-author of Principia mathematica (written with B Russell in 1910-1913).

In purely ontological terms, it will be noted that it is not the "totality" or "cardinality" of a world being which is limited in reality, but the Existence of the world which is limited to the Existence of the subject by the laws of the Logos .

Only the representation of a world is limited by an horizon.

Any question of form related to what is beyond this horizon is useless.

Should we deduce a new cosmology?

This text has brought us an objective answer to two questions concerning the OK:

- How, among the infinity of infinites of actual orders, a particular order is brought to Exist for the subject ?
- What is the principle of the relations of "more or less" that will order and qualify the individuated Facts?

In philosophical terms, this throws light on Kant's "*in mundo non datur hiatus*" in his "Critique" ref CRP:

A hole in the representation of the world would be for the subject a quantum of uncertainty about his own existence. But such uncertainty is impossible under the Cogito.

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