

# Beyond Qbism with the Knowledge Ontology

Jean-Louis Boucon

## Abstract objective

As far as the philosophy of quantum mechanics QM is concerned in general, one can only advise the reading of Michel Bitbol's book "Mecanique Quantique, une introduction philosophique" (ref MQIP). What is needed to know about the subject is presented in a comprehensive, structured and easily understandable way.

Let us quote-in these words (translated): "The new theory presents itself above all (...) as a contextual predictive formalism." It allows the agent to assign probabilities to future experiments based on an experimental context.

Qbism (quantum bayesism) is an interpretation of the QM that places the agent and her expectations at the heart of the theory. The QBists advocate a "subjectivist" interpretation of probabilities that allows to understand the Quantum laws of Born and to eliminate certain enigmas of interpretation of the QM "beyond" the interpretation of Copenhagen.

The Ontology of Knowledge (OK) is in agreement with the main ideas of the Qbism.

For the OK indeed:

The agent is the focal point of the representation

The representation is specific to the agent

There are no "states of the world" but only "states of Knowledge"

There is no probability of evolution of the "state of the world" but only probabilities, for the subject, of evolution of his Knowledge.

These probabilities lead to the agent's future actions and experiences.

The aim of this article is to propose, according to the OK, ways for an extension of the explanatory power of the Qbism.

## The Qbism in (very) brief

The easiest way is to read "An Introduction to Qbism with an Application to the Locality of Quantum Mechanics" Ref QBI.

We have reproduced (translated and summarized) the essential elements of this article below.

*According to Qbism, quantum mechanics is a tool that anyone can use to evaluate, based on their past experience, their probabilistic expectations for their later experience.*

*Unlike Copenhagen, the Qbism explicitly adopts the "subjective" or "judgmental" or "personal" view of probability: the probabilities are attributed to an event by an agent and are specific to that agent. The agent's probability assignments express her own personal degrees of belief about the event. This personal nature of probability includes cases in which the agent\* is certain of the event: even probabilities 0 and 1 are measures of an agent's belief.*

*This subjective view refers the theory of probabilities to its historical origins in gambling: an agent's probability assignments must never place her in a position where she would necessarily suffer a loss.*

*\* "Agent" means "the one who acts." We follow the widespread practice in the quantum information community of calling the agent Alice, and a second agent with whom she might be dealing, Bob.*

*One measure for Qbism is any action an agent takes to get a set of possible experiences. So obtained the experience is special to this agent. Taking into account the result of this measurement, quantum formalism guides the agent in updating its probabilities for future measurements. A measure does not reveal a pre-existing situation, as the term unfortunately suggests. This is an action on the world by an agent, who results in the creation of a result - a new experience for this agent. Quantum states determine probabilities using the Born rule.*

Note: A quantum state is not a state of affairs but a "list" of the probabilities of outcome of all possible future experiments. All future experiments made possible by an experimental device are

formalized by a "state space" and the probability of measurements are the coordinates of a vector (the state vector) in that space.

*Since probabilities are the personal judgments of an agent, a quantum state is also a personal judgment of the agent attributing that state.*

*The famous "collapse of the wave function" is nothing more than updating an agent's status assignment based on his or her experience.*

*In the QBism, the only phenomenon available to Alice (the agent) that she does not model with quantum mechanics is her own direct internal awareness of her own private experience. The awareness of her past experience forms the basis of the beliefs on which her assignments of probability for her future experience are based.*

*The personal internal awareness of Bob's private experience is, by its very nature, inaccessible to Alice. But Bob's verbal or written reports are experiments for Alice adapted to the application of quantum mechanics. She can deduce of this a quantum state as with any other quantum measure. Bob's answer only comes to exist for Alice when it enters her experience.*

*This means that the reality differs from one agent to another. It's not as strange as it sounds. What is real for an agent is based entirely on what that agent is experiencing, and different agents have different experiences. An agent-dependent reality is limited by the fact that different agents can communicate their experience to each other, limited only by the language's inability to represent the full flavor of personal experience.*

### **The Ontology of Knowledge**

The simplest would also be to read "Introduction to the Ontology of Knowledge" (ref OK).

The basics for understanding this article are listed below:

- There is a Reality.
- Reality has no form.
- Reality is In-act, not subjected to time.
- Reality is Interdependence.
- Interdependence is unfounded, with no end point, no substance.
- The "I" is reality, so it is interdependent of reality.
- The vocabulary of the OK differentiates what is Real (informal, interdependent, In-act, unspeakable), what is Actual (all possible ordering of Reality are Actual), what is Existing (which makes sense for a knowing subject).
- A Knowledge is a bundle of Interdependence stemming from a Viewpoint.
- The Viewpoint is the subject of Knowledge, it is his own "I".
- Knowledge is complex.
- Knowledge is metastable because in a complex and interdependent system infinities of infinities of singularities are Actual that tend to reduce complexity.
- Facts are quantified singularities.
- This metastable reduction of complexity aggregates a Knowledge into parts (into Knowledge Facts) separable by cuts of finite dimension (by Acts).
- The Act is a "surface" crossed by a Transaction by which the unspeakable content of the Fact of Knowledge is associated with a countable and finite set of probabilities assigned to the possible appearances of new Facts.
- This set of probabilities is the Meaning of the Fact of Knowledge as it appears to the subject.
- The subject is not a being in itself. He is Individuation of his Knowledge.
- The subject is the convergence of all his probability assignments towards the asymptotic certainty of the persistence of the "I". This convergence is the essence of the subject.
- Since the Individuation of one's Knowledge is the essence of the subject, all Facts are interdependent within Knowledge.
- The meaning of each Fact emerges from Global Knowledge according to a Perspective imposed by its interdependence with other Facts of Knowledge.
- Since meaning is revealed in the form of probabilities, the meaning is in essence animated by a

eigen time. The time of the expansion of meaning emerges according to a Perspective imposed by the interdependence of the Facts of Knowledge. It is not Knowledge that extends but its meaning.

- The subject is a Knowledge.
- The World is Knowledge by a subject. The Shape of the World is specific to each subject.
- The meaning of a Knowledge does not refer to a reality vis-à-vis but to the laws of probabilities that rule its expansion towards its neighborhood.
- The truth of the "I" is a certainty for the "I".
- The "I" of the subject combines and subsumes all these probabilities in the certainty of his own persistence.
- The meaning of the world, for a subject, cannot therefore exceed the meaning of his own Existence.
- The Existence of the World is contained in the Existence of the Subject.

### **Similarities between Qbism and OK**

Despite different objectives, research areas and paths, the agreement between Qbism and OK seemed remarkable wherever comparison was possible:

There is a Reality,

- the "substance of the world" precedes the separation between object and subject,
- the representation is unique to the agent
- the predicate does not qualify the thing 'out there' but the expectations of the agent,
- of the thing 'out there' we cannot say anything,
- there are no "states of affairs" but only "states of Knowledge",
- there is no probabilities of evolution of the "state of affairs" but only probabilities, for the subject, of evolution of his Knowledge,
- these probabilities lead the agent's future actions and experiences,
- agents exchange and adjust their representations,
- neither the Qbism nor the OK are solipsistic,
- for both Qbism and OK science is necessarily anthropocentric.

### **Differences between Qbism and OK**

We will quickly move on to the obvious difference in objectives and areas:

The Qbism aims to solve the difficulties of interpreting quantum theory while the OK tries to understand the relationship of consciousness to the world it represents.

The Qbism is concerned with science and uses metaphysics, while the OK is an ontology that tests its compatibility with science.

The differences between OK and QBism are not contradictions: I would rather say that, despite the profuse literature that describes and justifies QBism, some proposals (metaphysical) do not seem sufficiently resolutely expressed and their implications have not been exploited at their end.

To answer the quantum question: "How can we take into account, in a scientific approach, the interdependence between the mind of the subject and the object of his knowledge?", did the Qbists prefer to minimize the use of non-necessary metaphysical proposals, even if it means leaving certain questions open, rather than taking the risk of permanently guiding the QM towards false leads?

As a result, the Qbism suffers from the same flaws as the theories of Kant and Schopenhauer, from the same lack of focus that leaves it somewhere between an Idealism of which it defends and which would in fact say nothing of the nature of the Spirit and a Realism that it claims but which would say nothing about Reality, so-called "unspeakable".

There is even a sort of regression from the Position of Kant, who, at a minimum, tried to define transcendental rules, conditions of any experience, intervening before the object took existence for the subject; The draft of a "how" of the QBist assignment of probabilities.

Abandonment is even more sensitive compared to Schopenhauer in that the Qbism expresses only with the lips the identity of the nature of the subject and the object: While Schopenhauer would

have explicitly stated: "Alice does not have a knowledge of the world but she is her knowledge of the world and this world she knows is Alice." Fuchs will only write: "*The Qbism would say that the substance of the world is in the character of what each of us encounters at every moment of our life, a substance that is neither outside nor inside, but the substance of the world is before the separation between object and subject.* »

From the OK's point of view this is all the more damaging because the identity of nature of the object and the subject, the fact that 'the world of Alice' and 'Alice' are the same Knowledge, provides answers to so many questions.

In this article we will detail this according to five main themes:

- The nature of probabilities and the reality they point to.
- The nature of the subject (the agent) and its relationship to the object.
- The time of the subject - the Anima.
- How the Fact and the assignment of probabilities emerge to the consciousness of the subject.

-Intelligibility or intelligence?

These themes will be addressed from the OK's point of view and with its terminology.

I apologise in advance to the QBists if this article betrays some of their proposals or if the terminology used does not have the scientific rigor of the QM.

### **1-The nature of probabilities and the reality they point to.**

Let's mention the ref QBI :

*"Unlike Copenhagen, QBism explicitly takes the "subjective" or "judgmental" or "personalist" view of probability ... probabilities are assigned to an event by an agent and are particular to that agent. The agent's probability assignments express her own personal degrees of belief about the event. The personal character of probability includes cases in which the agent is certain about the event: even probabilities 0 and 1 are measures of an agent's (very strongly held) belief. The subjective view returns probability theory to its historic origins in gambling..."*

The OK fully agrees with the QBiste proposition: "the probabilities are assigned to an event by an agent and are particular to that agent" in its literal, strongest sense.

But from this proposal the OK points out that the following propositions can be inferred without further assumption:

probabilities are assigned to an event by an agent and are particular to that agent

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The probability relationship is not between a "state of the world" and possible "events of the world" but between a "state of Knowledge\*" and possible "Facts of Knowledge\*"

↓

Quantum contextual probability is not determined by the laws of the world but by the laws of Knowledge\*

\* Knowledge as per OK definition

To illustrate this let's take the example of a chess game between two human players.

-Both players can decide to do without parts as entities and designate each by their attachment to a player and their "dematerialized" rules of movement. The position of such a part on a particular box can then be replaced by a law of possibility on its future position, i.e. by a state of knowledge.

-Players can also do without the chessboard and keep in mind the positions of all the parts, each in turn announcing his movement.

-The notion of the position of the boxes localized in the two-dimensional space of the chessboard (e.g. a3) is also not necessary, a system of relationships adjoining each box to 2, 3 or 4 others boxes,

having a unique solution (notwithstanding some symmetries) is enough to order the game boxes.

-The very identity of the boxes is in fact superfluous, the boxes as 'places' and their positions on the chessboard can be replaced each by their set of "dematerialized" relationships of adjoinment. The chessboard is no longer a thing but a knowledge.

-It is also possible to replace the state of the game, i.e. the attachment of each part to a box, by the succession of movements that cause it, i.e. by a list of choices of dematerialized statements among those authorized.

-Each of these "past" movements can itself be replaced by the context of knowledge that made it possible and a judgment of the player.

Thus described, the part is no longer a fact of the world but a fact of knowledge (in the natural sense of the term). Players do not assign probabilities to possible material events from a state of affairs but assign probabilities to possible expansions of their knowledge from their state of knowledge. With each move players exchange information that extends and partially adjusts their states of consciousness.

The player's representation of a game thus dematerialized is made very complex, but "in reality" nothing has changed compared to the hardware version of the game. We have only removed meaningful stopping points that must then be replaced by the bundle of interdependencies that are their reality.

Because the bundle of interdependencies goes far beyond the horizon of Meaning for the subject, it can no more be spoken about knowledge in the usual sense of the world but of Knowledge according to the OK definition.

The nuance between the fact of the world and the Fact of knowledge may seem incidental. On the contrary, it is essential:

If from a (possible) fact of the world it can be said that it has or has not yet happened in the absolute; that it was, it is or is not yet real; from a (possible) fact of knowledge it must be said that it makes sense (that it Exists) or that it does not yet make sense for the subject, which does not detract from its reality or its interdependence to what already Exists.

NB: A logical theorem not yet demonstrated, although it does not yet Exist is nevertheless real and interdependent of what is already demonstrated (of the Existing).

Thus, in our dematerialized game, all possible movements of players have the same reality, all are Actual in the sense of the OK although some do not yet Exist to the consciousness of the players.

To illustrate the difference between Actual and Existing, let us cite another example: that of a chest filled with Legos: as long as the chest is closed, I can, by thought, order the parts according to all possible orders, all these orders are Actual. As soon as I open the chest, my thought makes Exist a structure of order: it separates the red parts from the yellow and the blue; then in each class it separates the pieces to a stud, two studs, then three studs etc...

Nothing has changed "in reality", yet an order comes to Exist for me among all the Actual Orders, to the exclusion of the others.

If on one hand the assignment of probability to a fact of the world can be akin, by its nature, to a conscious judgment of the subject, or even to a gambling, on the other hand the probability relationship between a state of Knowledge and a Fact of Knowledge not yet Existing (for the subject) is already Actual, its reality is in the Actual interdependence relationships between the Reality of the State of Knowledge of the Subject and its logical neighbourhood.

It is not "what will become real" that is affected by a probability but "what will make sense to the subject", following which paths the Knowledge of the Subject will extend in a neighbourhood of already Actual interdependencies, which new forms will appear to the Knowledge of the subject among all Actual forms, which New Facts will make sense to him.

In the dematerialized chess game, just before player A announces his movement, what has already taken Existence for a minute for the consciousness of A, is still for B only an Actual possibility. As A announces his movement, this possibility takes on the meaning of an Existing Fact for B's consciousness.

We see that time does not affect what is Actual but only what Exists. And since Existence is relative to the subject, time is relative to the subject.

Returning to the QM, the experimental device prepared by Alice made possible a set of Facts of Knowledge according to a distribution of probabilities.

A Fact of Knowledge is not "something that becomes real", a Fact of Knowledge is real as soon as it is possible, the OK says it is Actual non-Existing. By the time one of these Facts appears to Alice's Knowledge, this Fact comes to Exist for her. It takes form for her and takes place among the other Existing Facts that constitute her representation of the world.

The question of the "collapse of the wave-function" disappears when we speak of Facts of Knowledge and not facts of the world, as long as we differentiate Actuality and Existence.

What Alice refers to as a wave-function is an Actual reality: a set of "possible" Facts given her state of Knowledge. "Possible" then having the meaning of "Fact likely to Exist for the agent." All these possible Facts are Actual but only one (generally) will come to Exist for Alice's consciousness.

Among these Actual Facts, the probabilities of Existing are not equal. The law of distribution of these probabilities depends on the state of Knowledge of the subject (the experimental device is part of her state of Knowledge) and the interdependence (Actual) between these Facts not yet Existing and the state of Knowledge.

Two conclusions to this:

1) It is not necessary to refer the meaning of the state of Knowledge of the subject to the meaning of a "state of the world" vis-à-vis, present or past. The state of Knowledge of the Subject has no other meaning, no other reference, than the law of distribution of probability of Facts that it makes possible, as we explain in article ref OK.

2) The distribution of probabilities of these non-Existent Facts corresponds to the Actual reality of the Knowledge of the subject, although for his consciousness the assignment of probabilities seems to be a bet on future realities.

How in the 21st century could one imagine that the facts of a knowledge (language, memories, sensitive abilities, procedures etc.) exist (in the common sense) in the present state of the brain or body of the subject, as an isomorphic set of things or actions of which it would represent the meaning, as in the present state of a conventional computer?

The idea that a memory that does not Exist, that is not present in the consciousness of the subject would not be a reality is absurd.

The idea that the reality of this memory would be somehow isomorphic to its meaning, that its meaning would always be present, present in its form, is absurd.

A state of knowledge should not be regarded as an Existing reality, present in its form, but as an Actual reality, interdependent, not subject to form, not subject to time.

The reality of what is Actual is not subject to time. Only Existence is subject to time.

A Knowledge presents Actual singularities in its interdependence relationships. These singularities are the possibility and only the possibility of Knowledge Facts.

The probability relationships between a state of Knowledge and the Facts of Knowledge it makes possible are Actual, not subject to time.

The "subjective" view of probabilities claimed by the QBists is only the appearance of that at the conscious level.

Note that the concept of multiple universes proposed by Everett is included in the OK as long as one differentiates the Actual from the Existing. These multiple universes are a set of possibilities, beyond the horizon of meaning, they do not Exist, they are only Actual. Only one universe Exists and will Exist for me in my universe, in essence.

In the language used by Qbism pros the assignment of probability appears to be at the level of the consciousness or thought/subject of the agent. This feeling is reinforced by frequent reminders of the origin of probability theory related to strategies to follow in gambling and by the identification

of the assignment of probability to a "degree of belief" of the agent.

The problem is not so much what thought/subject has of subjectivity, because after all Alice's feeling can be based on an objective assessment of objective criteria and objectively justify her decisions.

The QBist position lacks clarity in various aspects: on how the object of these assignments is defined (how are defined the facts on which Alice can bet?), on what grounds the possibility of assigning probabilities and on the level of consciousness at which these probability assignments emerge, the level of consciousness at which the predicates that attach to the object appear to the agent.

The first point regarding the QBist position is that it remains "in-between", what weakens it: it essentially states "the probability of such an event occurring is a judgment of the agent" as if the event, uncertain in its probability, was defined in its nature or at least in the nature of its attributes; as if the event were a priori describable in a space of meaning of finite dimension.

Facts of Knowledge, contrary to the facts of the world, have no nature by themselves.

Their meaning is not a priori but emerges from their interdependence with the other Facts of the Knowledge of the subject. The meaning emerges from the way Facts of Knowledge make each other possible, make possible the appearance to the Knowledge of the subject of new Facts while ensuring the Individuation of his Knowledge.

The Fact of Knowledge has no other meaning than the possibilities it creates for the subject, in the global context of his Knowledge.

In fact, when from a state O Alice assigns 50% probability for fact A and 50% for fact B, the individuations of A and B are not necessary facts of the world but are already made necessary by the context of Alice's global Knowledge and the 50/50 assignment is a residue of the formation of the meaning of O as a possibility of A and B.

If the agent's assignment of probability was pure "*willingness to place or accept any bets she believes to be favorable*", if there were not "in reality" contextual constraints on her future experiences, on possible ways of expanding her Knowledge, Alice would not even know on what facts to bet, she could not designate any individual fact as possible because her Knowledge would be formless.

But, as De Saussure wrote: without words, thought would be nothing "but an amorphous and indistinct mass." Language is not a tool invented by Man to share his thoughts, nor is language the cause of thought. Language and thought co-determine each other as meta-Facts of Knowledge derived from a more general principle of knowledge.

We see with this example of language how the context of Knowledge essentially imposes the form of what consciousness could bet on.

Conscious thinking expands by quanta of meaning. Words, concepts, signs are generally quantified Facts of Knowledge. What will appear to Alice's consciousness, her future experiences, are ever-already being constrained by the laws of the formation of meaning. Alice will know only the new Facts of Knowledge that are already made possible by her present state of Knowledge.

The principle that aggregates the meaning in quanta is no more a "mystery of the Spirit" than a "machine". This is a principle of logic that the OK calls the Logos, described by the ref articles. OK and PLOC.

All of the Facts of Knowledge that determine the possibilities of Alice's thought are Actual (in the sense of the OK) although they do not necessarily exist for the Conscious Knowledge and in the present time of Alice. The same is true of all the meta-Facts of Knowledge that define the possible structures of her conscious thinking. Only the Act of thought brings these Facts to Existence, into Alice's present time and into the world described by her Consciousness.

**-Probability values can only be assigned to significant elements and according to significant structures made possible by the laws of formation of meaning.**

**-The possibles described by these probabilities are however Actual in the thought/object before they take Meaning for the thought/subject.**

If all these words, classes of words and possible syntaxes are Actual, who can say in what space-time they reside?

Let's take for example how a subject becomes aware of a speech (verbal, written, filmed or even musical): what is com-prehended from the discourse already determines, at all times, a set of possibles, in the form of expectations and these expectations are updated as a new word appears in the meaning of the subject.

Everyone understands that outside the linear space of discourse meaning there is an Actual context in which each word (each Fact of Knowledge) is interdependent with other words (other Facts), that these interdependencies cluster in meta-facts of Knowledge: syntagms, syntactic rules, language norms, social ...

From the structure of this Actual context we can only say that it is complex, unrelated to the one-dimensional space of discourse.

What the OK calls the In-act of Knowledge: Interdependencies Actual but which do not Exist as Facts of Knowledge for Consciousness, does not belong to the space-time in which consciousness describes the world.

The In-act reality of our Knowledge "does not belong" to the four-dimensional world described by our Consciousness. They are immeasurable to each other.

Thought/object "does not belong" to the four-dimensional world of thought/subject. They are immeasurable to each other.

**-The thought/object in which meaningful facts and structures are made possible cannot be described in the world of the thought/subject.**

The In-Act reality of Knowledge is interdependent. It is the interdependence of the In-Act Knowledge that determines according to which laws of probability other Facts will appear to the consciousness of the subject.

The possibility or probability of a Fact raising from my experience is grounded by the principle that all the interdependencies that are the In-act of my experience impose a constraint on its expansion.

The Actual interdependence between the "already com-prehended" experience and its expansion toward its neighbourhood is so strong that the laws of probability on the possible appearances of New Facts are extremely restrictive. This, in principle, justifies the degree of confidence (not subjective but statistical) that one may have in a probability assignment based on an "infinite" set of causes, a greater proportion of which are common to each of the Facts of the Knowledge.

Examples include the Gnedenko and Kolmogorov theorem (1954), which states that "a normal random variable (X) is the sum of a large number of small independent random variables (xi) none of which are predominant."

These are mathematics, the truths stated by this law in its generality as in all its possible instantiations are not subject to time. These truths are Actual in the meaning of the OK. It should also be noted that the logical relationship between (xi) and (X) is not causal.

In a very general way, this law tells us that a subject whose knowledge would com-prehend a set of experiences {Xj} can, de facto, assign probability values to his future experiences (future according to the time of the subject). The probability relationship between {Xj} and {Xe} does have a reality, even if the {Xj} are in no way the causes of the {Xe}, and if it cannot be said either that the (xi) are the common causes of the {Xj} and {Xe}.

This example shows that if the {Xe} come to Exist only for the agent according to his own time, the situation of interdependence is In-act, all truths (X) are Actual in their interdependence to the (xi).

It also shows that values (X) are only labels attached to a mode of Actual interdependence between (xi). Although this mode of interdependence is inexpressible by the subject because it is Complex (in the sense of the OK), the law of probability that can be inferred from the Knowledge of the {Xj} gives it a "usable" means to predict the evolution of the Knowledge of the subject.



The probability of  $\{X_e\}$  "knowing"  $\{X_j\}$ , which is rated  $P(\{X_e\}|\{X_j\})$  is the operational meaning of the  $\{X_j\}$ , but this operational meaning is only a "form" of the in-act reality of interdependence links derived from the (xi).

This form is the result of a double act: that of individualizing under the label  $\{X_j\}$  of the singularities of interdependence paths and that of individualizing under the label  $P(\{X_e\}|\{X_j\})$  the relationship of each  $X_j$  to all the others.

**-The probability relationship between Facts already com-prehended and Facts to be com-prehended, far from being a "belief" of Alice, are justified by the reality of an In-act interdependence.**

**-The probability relationship between Facts already com-prehended and Facts to be com-prehended is the (operational) Meaning of the Fact already com-prehended.**

The Act, which replaces the unspeakable complexity of In-act interdependence between (xi) with the meaning  $P(\{X_e\}|\{X_j\})$  can be described as a "judgment". This term "judgment" will only then express that the In-Act and the Consciousness being immeasurable to each other, the relation from the In-act to the meaning is unprovable by the conscience of the agent. But we understand that beyond the meaning, ahead of the Act that gives Existence (for the agent) to the Facts of Knowledge, Interdependence is very real, Actual.

Assigning probabilities to possible Facts from Facts already com-prehended is not an "act of faith", even if it seems so to the agent's conscience.

This is the validity of this example because on the one hand the subject is "overhanging" the situation and on the other hand he chooses "randomly" his experiences in an already ordained space (a space of numbers for example).

It is not so in the reality we study:

-on the one hand Alice is an integral part of the situation. The experience for Alice is inseparable from all the conditions of possibility, all the In-Act Interdependencies that already determine Alice as a knowing subject and which are no other than the In-act (the formless substance) of her global Knowledge. Not only what she consciously represents of the world and her in the world, but also all the unspoken reality that justifies her existing to herself, there and now, endowed with thought, sight, hearing, touch etc., language, instruments Etc... in the presence of the individuated object of her observation.

Any possible experience of the  $\{X_j\}$  is inseparable from this reality.

-on the other hand Alice does not choose her future experiences "randomly". Nor are her future experiences imposed on her by the laws of a world "out-there". (Indeed, who can believe that the laws that make any representation possible are precisely limited to those designed by the representation?)

To understand how events come to Exist in Alice's time we must put Alice at the starting point of our reflection.

There's Alice.

There is a future for Alice because Alice's Meaning for herself is none other than the certainty of her future existence.

There is a future of Alice's world because the meaning of each thing in its representation contributes to the certainty of her future existence and the possible new experiences that her Knowledge makes possible (this point will be detailed later).

Alice's Knowledge is driven by its own nature and not by time.

In an In-act, unfounded (no primary substance) and formless (without a priori order), the attributes of the world do not present themselves individualized and meaningful to the knowledge of Alice. To identify a new experience, Alice's Knowledge can only be based on singularities of paths. The only sense, the only values that Alice can give to an experience to distinguish it lies precisely in the probabilities of future singularities.

Kolmogorov must then be rethought as expressing not a (universal) relationship between

mathematical facts existing by themselves in an orderly world, but as describing the mode of expansion of Knowledge and the relationship between the dynamic expansion of Knowledge and its meaning.

**-It is not the thing that makes sense, it is not even the In-Act Knowledge. The meaning is only in the Act of knowing. The meaning is revealed by the Act, it designates the possible and it is 'de jure' based on the perspective that the In-Act of Knowledge constitutes.**

The possibilities are like labels affixed to the infinity of the happened, to the In-act.

Alice's possible experiences are still-already Actual (already there) in the logical neighbourhood of her already Com-prehended Knowledge. What Alice com-prehends now is already Interdependent In-act of what Alice can com-prehend. The probability of her future experiences is Actual in the In-act of her Knowledge. Although unspeakable because complex this relationship is Actual before the meaning appears. These experiences will come to Exist for Alice as meaningful Facts only by the Act, the Transaction that replaces the unspeakable with a probability or a state vector of finite size. Note: In the ref OK we show that this Transaction crosses an N-dimensional Cut in the complexity of the In-act, that all of these Cuts constitute the horizon of the meaning or horizon of Knowledge.

**-The meaning of a meaningful Fact is a law of probability on Facts that it makes possible, not by itself, but in its relationship to the whole Knowledge of the subject, i.e. in its Existence.**

Thus, just as meaningful Facts are representations, the "probabilistic or causal" relationship between Facts is representation. The same is true for the generalization of all these relationships in the form of laws of the world, and so is the general framework of the laws of the world called space-time.

**-It is not the In-Act Reality that is subject to Facts, probabilistic or causal laws and space-time representation. Facts, Laws and Space-Time representation emerge from the In-act Reality according to the laws of the Logos.**

This proposal should help us to dissolve the apparent paradoxes of our quantum experiments.

The probability of experiment results on variables, considered in a theoretical probabilistic space, has no reason to be subject to time or space. It is a set of experiences that are not governed by time. One could browse the set in any order, in any way, one would get from experience results, represented in any space, always and again invariant laws.

Michel Bitbol (ref MQIP P 28) quotes Heisenberg (1932) p. 38 *"In modern physics, atoms lose these last properties; they do not possess geometric qualities to a higher degree than color, taste, etc. All the qualities of an atom of modern physics are derived, it has no immediate and direct physical property."... the algebraic operations of quantum mechanics substitute to the values of variables interpretable as intrinsic determinations, and their changes in value interpretable as absolute events, observable aimed to represent determinations and events relating to various classes of experimental devices.... Space and cinematic coordinates are no exception to this rule. »*

For Heisenberg, the 'place' is not an intrinsic determination, it is not as such a sensitive phenomenon, before the global ability to know gives it the sense of place. The same is true for all other Facts and Attributes.

But then the "ability to know" must be given a broader meaning. Thus, when the global ability to know "focuses its attention" on the "place" attribute of a Fact, it creates the perspective that will make it likely, if not certain, that the "place" Fact-of-sensation will emerge at the conscious level. Of course this is simple "awareness" but also when the agent sets up an experimental device that will impose the class "place" among the classes of possible Facts, it is still her faculty of Knowledge that is at work.

Michel Bitbol (ref MQIP p230) quoting E.P. Wigner states that the (probabilistic) contextual predictive formalism of the QM must be supplemented by principles of invariance towards movements in space and time.

However, we have seen that the laws of probabilities are the reality from which space and time forms are born. One cannot therefore speak of the invariance of probabilistic predictive laws in space and time as a "property" of these laws but as properties of the process by which time and space emerge from probabilistic laws, i.e. of the Logos.

## **2-The nature of the subject and its relationship to the object**

QBism says "*Knowing is assigning probabilities*"

In accordance with QBism, the OK states that "*The Meaning of a Meaningful Fact is a law of probability on the meaning Facts it makes possible.*"

Note: Even in a Darwinian justification of meaning, the reference to a truth vis-à-vis is useless: If representation offers a selective advantage it is because of the relevance of the expectations it allows and not because it refers to a truth vis a vis.

To introduce a new difference between OK and QBism, let's mention D. Mermin (ref MBSMQ)

*"There is indeed a common external world in addition to the many distinct individual personal external worlds. But that common world must be understood at the foundational level to be a mutual construction that all of us have put together from our distinct private experiences, using our most powerful human invention: language."*

The OK shares this view. Nevertheless, the construction of the "common world" mentioned by D. Mermin is described too superficially. It seems once again as a conscious act of men. Language is presented as a human invention, a tool designed to share our private experiences at the conscious level.

We'll show in the following lines:

- 1- the extraordinary consequences of the QBist proposition "*Knowing is assigning probabilities*" on the nature of the subject,
- 2- that language is much more than a tool of sharing, that knowledgeable subjects have in common much more than language.

Pre-note

-The attitude of the OK (and of QBism) is in no way anti-realistic. As we have stated above, there is indeed a Reality. The meaning emerges from interdependent (but formless) Reality according to the strict laws of the Logos.

-It is also not an idealistic attitude, because for the OK, Idealities are either directly akin to eigen-solutions of the Logos which are possible "universal forms" or to generic Facts of Knowledge made possible by the state of a culture: language, tools, general concepts.

If the meaning that Alice gives to the Facts of her Knowledge does not refer to a truth vis-à-vis but to a law of probability, what about the meaning that Alice gives herself?

For the OK the answer is made evident by the above and can be summed up by an additive to the Descartes's Cogito: "*I am*" is also the affirmation of the certainty\* that "*I will be*".

\*The term "near certainty" would be more prudent than certainty, to give way to a possible existential hiatus: Does the possibility that I no longer exist for myself in the next moment make sense to me now? We propose to ignore this doubt in the rest of this article.

According to Descartes, the truth of the "*I am*" is certain for the subject, but the truth of this proposal only makes sense to himself through the Act that states it, this Act which always projects the consciousness of the subject towards the future experience of himself and the world he knows. By saying "*I will exist*" Alice exists and her Knowledge exists with certainty at the (always) present moment of her Knowledge. There are no other ways to exist.

This certainty is not only a subjective opinion or belief because it is contained in the In-act reality of her Knowledge.

Because the In-act reality of her Knowledge is complex and unfounded, Alice's certainty of still

existing the next moment is unprovable. Existing is a judgment, a predicate which truth is necessary although contingent to infinity; An everlasting victorious fight of Individuation over complexity. The "certainty that I will be," that I will have the meaning of "myself" is a judgment, a meta-fact. This meta-Fact expresses that all the Facts of my Knowledge will help to make possible the "I" of the following moment, it is also the principle of Individuation of G.Simondon (ref ILFI) "I am by the act of always becoming myself", stripped by the OK of everything materialistic.

The In-Act of Alice's Knowledge contains the necessity (**power**) of its expansion towards its logical neighborhood and the law of probabilities over - (the **will** that directs-) this expansion.

The necessary expansion of meaning and the law of probabilities on Facts that will appear during this expansion, this power and this will, are the meaning of her Knowledge and this meaning is not psychological but purely logical.

We have therefore given Alice as a knowing subject the meaning of "law of probability on her future experience of herself," and to the world that she knows the meaning of "law of probability on future expansions of her Knowledge."

The law of expansion of each Fact therefore merges to that of all other Facts to form the law of expansion and individuation of the subject.

A Fact Exists for Alice if it makes Alice possible.

The Importance of a Fact for Alice is  $P(\text{Alice}|\text{Fact})$ .

A Fact Exists for Alice if its importance is not zero.

The Existence of Alice is the union of the  $P(\text{Alice}|\text{Fact})$  of all Facts of her Knowledge

### **3- The time of the subject - The anima**

Now let's try to dispel what seems to me to be an ambiguity of the QBism.

This ambiguity can be illustrated by the following quotations

C. Fuchs ref QBI: "Alice's awareness of her past experience forms the basis for the beliefs on which her *state assignments rest*. And her probability assignments express her expectations for her future experience."

D Mermin ref:MBSMQ: "my Now advances along my trajectory at one second of my personal experience for each second that passes on my watch, which follows the same trajectory (*NDLR: of space-time*) as I do."

Lubos Motl (ref DMQB) " D. Mermin also claims that Qbism solves "the Now" problem in philosophy, a discussion between Einstein and Carnap on whether or not the special awareness of the present is accessible ... even though relativity wants us to look at things "eternalistically" because the whole spacetime is the only invariant thing, quantum mechanics really overrides it and does give the present a special status – because it assigns a special role to the observers' experiences and those are attached to some particular moments (or periods of time)... The Now problem ... is "reification" of something (fallacy of incorrect attribution of "real existence" to some auxiliary theoretical constructs such as the spacetime or the quantum state"

D. Mermin quotes (ref MBQM) Einstein's remark "Space and time are modes in which we think and not conditions in which we live", and comments: "*Th(is) feeling is pure CBism (Editor's note CBism - QBism), ... I would love to think that Einstein said and believed this.*"

Although D. Mermin doubts that Einstein actually uttered this proposition, his comment clearly shows his agreement.

If once again the OK approves these quotations on the merits, the question left unanswered would be: "Alice assigns probabilities to her future experiences, but why would Alice have future experiences? So what is the nature of this change? If there is no time that, imposing itself on Alice, would change her representation of "Now" and also turn her watch, is this future also only a conjecture, a creation of Alice's spirit?"

When one takes Alice as an object, the Qbist (subjective) view of probabilities does not appear satisfactory, the explanation given is circular: Alice's conjecture of the change in her Knowledge

would be the very nature of this change.

The "my 'Now'" that D. Mermin speaks of is not really defined. It cannot be the present physical state of my brain (was it extended), nor all the logical facts that would constitute my thought at a moment of my subjective time. We have already seen that the logical reality of thought does not belong to the time or space of the subject. At best it can be said that "my 'Now'" would be the meaning I give to the world with me at the centre, but that does not advance us much.

It should be noted that this is not a question of criticizing the QBist position. Both Fuchs and D. Mermin have made it clear that they prefer to leave unresolved metaphysical questions whose solution is not essential to the completeness of quantum theory rather than to take the risk of directing it permanently towards false Tracks.

On the contrary, the OK must propose an unambiguous answer to this question of change.

The answer is given by the OK under the name **anima** (ref OK). Here's the gist:

-The In-act reality is not subject to time, it is Current.

-Reality is interdependent. Any part (see \*) participates in the possibility of any other part (see \*).

-All Knowledge, i.e. any bundle of Interdependence from a point of view, is Complex.

-Because of its Complexity, the In-act reality of knowledge is unspeakable, unrepresentable, there is no space of finite dimension in which it can be ordained.

-However, Complex reality necessarily has cuts through which unspeakable complexity can be replaced by a N-dimensional (N finite) system of probabilities or Fact of Knowledge.

-Cuts are "crossed" by an Act that agglomerates and reduces complexity into Facts of Knowledge.

(\*) The Facts of Knowledge are parts.

-This is the transcendent principle of Logos.

-The reduction in complexity by the Logos is metastable. It does not cease until the approach of a necessary asymptote on which each cut would be of zero dimension, crossed by a one-dimensional link of interdependence or link of Individuation  $A_{i-1} \leftrightarrow A_i \leftrightarrow A_{i+1}$ .

-There are infinities of infinities of solutions to the Logos, i.e. infinities of infinities of orders, of possible representations.

-All these possible solutions do not change reality. Nothing happens "in reality."

-All these solutions: representations, Facts of Knowledge as well as Interdependencies between Facts are Acrua, not subject to time.

To come to the case of Alice, to the asymptote who carries her Individuation one can write:

Alice  $\leftrightarrow$  Alice  $\leftrightarrow$  Alice

The one-dimensional link Alice  $\leftrightarrow$  Alice, which expresses the certainty that Alice will exist and existed for Alice, is at the same time the Act that "crosses" the cut (of zero dimension) that "contains" Alice's unspeakable reality.

This link, this certainty is Alice's "I," her ultimate meaning for herself. It's her Existence.

The Meaning of Alice for herself therefore does not refer to Alice's "state of reality" because this reality is unspeakable, but to the Act by which Alice "becomes herself".

This is the principle of **Anima** according to the OK.

There is therefore no external time, no subjective assignment of probabilities, but the reality of an Interdependence In-act. Alice's In-act reality 'now' contains the possibility of Alice 'in the next moment' and this possibility is the Meaning of Alice.

The Act, orthogonal to the Cut that "contains" the reality of Alice, carries the time of Alice.

Alice's time is orthogonal to the meaning of Alice.

We say orthogonal because the unspeakable reality of Alice's Knowledge projects itself as a point (Alice's "Now") on a line (the "time"). This is by definition an additional dimension to Alice's N-dimensional World.

Of course Interdependence is in principle reversible, but the reality of the Facts of Knowledge being unfounded, the Meaning of a Fact is akin to an infinite predicate, more precisely to a set of predicates that form probabilities arising from a reality seemingly bottomless. The logical Transaction that represents this transition from the unspeakable to the dicible is in essence an

irreversible reduction in complexity. Formal equality is inherently approximate. It is inferred that the time under which Alice represents the billions of facts that populate her world is irreversible. Note that this definition of orthogonality allows a definition of the continuity of the Meaning: the meaning attached to each point being the projection of an unfounded and complex reality, the interdependence between two points is also the projection of a reality unfounded and complex.

The above lines could be repeated by replacing "Alice" each time with "Alice's " I " " or "Alice as an object for herself," or "Alice's World with Alice in the middle."

With some adjustments, they would also be worth "such an object of Alice's world." This could be an interesting exercise for the reader.

These explanations of the OK reinforce and extend the QBist position: There is neither the present 'state' of things nor the 'space-time' outside, invariant, possibly infinite, but N-dimensional Cuts in the Reality (Facts) crossed orthogonally by an Act. The crossing of these Cuts is a Transaction. The Transaction carries the Meaning of Fact and the orthogonal Act carries the Meaning of the Fact's Time.

Note that this proposal is ontologically compatible with General Relativity while giving 'locally' a specific role to time.

It should also be noted that the Transaction, which, through a Cut, replaces complexity with the Meaning of a Fact of Knowledge, which replaces the possible with the Existing, although it can be referred to as a "collapse" of complexity, does not change reality In-act. Only the Meaning that appears to the agent, the Meaning produced by its overall ability to know is affected.

This also applies to the representation of the link  $X \leftrightarrow Y$  which is a Fact of Knowledge.

We have stated in a new form the identity of nature and the fusion of the object and the subject, as stated by Schopenhauer (ref MVR): "I am my Knowledge, the world is my Knowledge, my Knowledge is the world and it is me."

In this fusion, the "I" is the Fact of Knowledge conceived as the asymptote of the aggregation of all Facts of My Knowledge.

Although her nature is one of its kind, Alice can be designated for three levels:

1) Alice's In-Act Knowledge, which would be the bundle of Interdependencies stemming from Alice as a point of view

2) Alice's "Thinking Self" which would be Alice's Conscious representation of herself in the world she represents, which is in a way the projection of her In-act Knowledge on the horizon of Meaning.

3) Alice's "I," a virtual asymptote to which the aggregation of Alice's Meaning seems to converge. This "I" can also be referred to as the point of view. The Ultimate Quantum of Knowledge.

The fusion of the object and the subject into one Knowledge, the identification of the Meaning of the Facts of this knowledge with a law of probability on its future expansions, the identification of the "I am" with the certainty of "I will be", allow us to state that:

-The Meaning of "I am" is the fusion of the Meaning of everything I comprehend

-The meaning of "I am" is the union of all the probabilities I assign.

-Since the "I am" is the certainty of "I will be," the union of probabilities that I assign to everything I comprehend leads to the certainty of "I will be"

-In the asymptote, the union of all probabilities I assign is therefore equal to 1 (certainty) by definition.

These statements have two major consequences, already mentioned in article ref LAMG

- The sciences, the representation of the world are not only centered on the knowing subject but the union of their semantic content is limited to the existence of the subject. We will not elaborate on this in this article.

- Since the union of the Facts of my Knowledge is limited to my Existence, the Facts of my Knowledge are not independent. The Probability of my Existence "knowing" a Fact X:  $P(\{I\}|\{X\})$ , the Importance of a Fact is not independent of the other Facts of my Knowledge.  
-The meaning of each Fact emerges from my Knowledge based on a perspective drawn by the context of interdependence of all Facts.

This perspective defines the "Importance" to me of each Fact, according to which structures these Facts merge and merge their importance etc., (see ref LAMG, Appendix V)

It is unfortunate that the Qbism preferred to leave this process hidden under the mystery of thought/consciousness rather than attempt its elucidation in the form of a logical process and give Schopenhauer's luminous intuition the scientific and contemporary form it deserves.

The analogy is so obvious with the QM that one is tempted to describe the Perspective as a state-space of Knowledge, the referential of which would be built of Facts made possible by the general context of Knowledge. The Meaning of each State of Fact can be represented in this state-space by a state-of-Fact vector, i.e. a set of probabilities of the appearance of the possibles of the referential. We will leave this exercise to more qualified.

We can say, however, that the principles of representation of reality by "contextual probabilities", a term that Mr. Bitbol rightly prefers to "quantum mechanics" or "undulating mechanics" (see ref MQIP) are infinitely better suited to the description of a world as Knowledge of the subject than that of a world as "external reality".

#### **4- How attributes emerge**

Appendix III of the LAMG ref "From Maine de Biran to Poincaré's Geometry" deals in detail with this subject and we will specifically develop the excerpt below:

*The fact of the sensation is detached from the ability to know and not from a fact opposite.*

*Common sense dictates that the sensation comes from a fact in vis-à-vis and enters the mind in the form of a sensitive phenomenon, transformed by understanding into an intelligible phenomenon recognized by reason as a fact-of-sensation. The fact-of-sensation, once revealed to reason is combined with others to, ultimately, synthesize a representation of the world.*

*For Maine de Biran (Ref NoK and DAI), this view is wrong, it is applying to thought/object the modes of reasoning that describe material or logical systems developed by consciousness (thought/subject) and whose relevance is not established to describe thought/object.*

*It is only after having globally affected the mind, in a diffuse form, that the sensitive phenomenon appears as a fact-of-sensation.*

*The sensation is present (although formless), as an affection of thought/object and it is the overall ability to know that gives it shape.*

*But the combination of sensation with other sensations and concepts, is not done at the level of the sensation revealed, it affects, still informal or at least diffuse, the thought /object.*

*The reflex acts are proof of this.*

*The sensations do not combine as facts-of-sensation revealed as such, but spread as an affection in thought/object, still informal, or at least diffuse from where they emerge and combine.*

*Only then formal concepts can reveal themselves to the subject in the form of Facts of Consciousness.*

*Sensations are not combined by reason as logical propositions would be, but sensations merge in their diffuse form as chaos and only then new formal concepts can emerge from this chaos.*

*Knowledge operates by detachment and not by synthesis.*

*The (formal) facts of the world ... stand out as Knowledge Facts of the global ability to know.*

*However, the Fact of Knowledge cannot be seen without the watermark presence of the knowing subject.*

*The Fact can only appear to the "knowing self."*

*Without a subject there can be no objects.*

*At the moment when the Fact of sensation reveals itself to the subject, it is already part of the All of his Knowledge.*

*To the idea that reason synthesizes the universe of knowledge by adding, at every moment, one-on-one, the facts-of-sensation, revealed for themselves, it must then be opposed that it is the global ability to know that lets emerge outside it, the Fact of Knowledge, as part of an All, designed and organized globally in the self/object....*

*We see then that the fact-of-sensation in its form and also its position in the universe of our representation, is just as and certainly much more determined by knowledge and its laws, than by the eventuality of the a priori form of a cause 'out-there' or its position relative to other objects.*

To support this, let's quote Mr. Bitbol (ref MQIP p112 113) who, referring to Goodman and Wittgenstein writes: ". . . a probabilistic estimate at first glance offers great resistance to its possible experimental rebuttal. It would even be fair to say that it is a law irrefutable by the only finished experience.... If the probabilistic assessment is based on solid reasons, if the renunciation to these reasons leads with it the fall of a pan too broad and too well validated of knowledge, the finding of a frequency that deviates from the projected value will not be enough to refute the latter. Many more experiments will have to be done, many more discrepancies will have to arise before the possibility of replacing the projection system from which probabilities derive is simply considered. » This remark is relevant in the context in which it was written, i.e. in the relation of the experimental fact to the conscious conditions that warranted the agent's assessment of its probability. It is infinitely more relevant if one relates the In-act of a Fact of Knowledge to the In-Act of Knowledge as a whole.

In other words: Estimates of probabilities produced by knowledge, understood as a probabilistic structure are much more the result of the laws of probability that structure knowledge than of supposed experimental facts. Logos defines how such knowledge expands.

Let's quote C. Tiercelin: ref PHP

*"The line between fact and value is tenuous"*

There is nothing in the extract of the ref. LAMG above, it seems to me, that the proponents of QBism could dispute.

Nothing new, actually.

Yet when QBists use phrases such as "... her own personal degrees of belief about the event..." or "... probabilities are the personal judgments of an agent..." (ref QBI), the least that can be said is that these expressions are ambiguous as to the relationship of the agent's consciousness to sensitive phenomena.

To dispel these ambiguities one would like to read explicitly phrases such as: "*What appears as a judgment to the consciousness of the agent is already "Actual" in her thought/object before having made sense*" and above all that it is explicitly applied to the judgments about time and space. Let it be clear that the predicates of moment or place are no more realities vis-à-vis than any other predicate.

Only then can the true nature of space that both separates and unites be understood.

Mr. Bitbol wrote in the introduction to his book (ref MQAP): "*Any critical investigation into the object of quantum physics is (so) stopped, watered down, diluted, because of the presuppositions of the language used and the familiar circumstances of its employment.* »

Let us say that the above lines add to Mr. Bitbol's quotation the logical implications of merging the object and the subject, namely that the language and the familiar circumstances of its employment stop, water down and dilute any critical investigation into the object of investigation that is the subject for itself, i.e. into the thought/object.

**-Meaning does not allow us to describe what thought is before meaning.**

It is not a question of language inadequacy, lack of information, misrepresentation (i.e. that could have been accurate), nor epistemology, but a fundamental question of Complexity (in the OK sense)



that makes Interdependent Reality unordainable in the four-dimensional space-time of our representations, nor in any finite dimension space.

The reality before the Meaning is immeasurable to the universe of representation, of any representation. The In-act of thought does not belong to the four-dimensional world of conscious thought. There is a "Cut" between the Meaning and its In-act reality.

What seems to "happen" to us on our side of the horizon of Meaning (of the Cut) is In-act (not located in time) beyond that horizon. Not the signs and symbols, not the synaptic connections that remain descriptions, but the Complex and unfounded reality of logical interdependencies beyond the horizon of Meaning.

Representation only gives meaning to a formless reality "located" in an 'beyond' where always-already merge objects and subject, things and thought. The predicates of representation express a form of infinite contingency.

However, the quote from the OK above tells us that "it is the global ability to know that lets emerge outside it, the Fact of Knowledge, as part of an All conceived and organized globally in the self/object. (Editor's note: in thought/object)"

**The relationship between such Fact of Knowledge and Knowledge as a whole cannot be properly described according to the patterns available in the world of representation because the reality of this relationship is in the In-Act of Knowledge, beyond the horizon of Meaning.**

We believe that we are "taking notice" of a fact at the moment when it appears to our conscience, but this is only a (poor) picture of reality.

In the In-Act Reality of Knowledge, the Fact we believe we are aware of must be replaced by all the In-act interdependencies that determine all possible Facts of Knowledge. The experimental device, the language, all the exchanges between agents, all the mental or physical acts that brought Alice to the place and time of the experiment, capable of her experience, merge to constitute the State of Knowledge that determines the possible of her experience.

It is from this reality that the meaning of the Fact of Knowledge emerges among the other Facts of Knowledge.

The reality of this merger is in the In-act complexity. Its representation by language as a (present) state of Knowledge is certainly necessary for our limited minds but it is necessarily deceiving. (see in particular the OK and PDL ref to detail what the "present moment" is).

On this basis we can get rid of the concept of 'hidden variables' which for the OK is meaningless. The variables Exist below the horizon of representation. Beyond this horizon of Meaning, there are no "hidden" variables because there are no variables at all: The In-act reality is not representable by attributes because it is complex (in the sense of the OK).

The above lines complement the explanations given by Mr. Bitbol (ref MQPI p 189 190) to the famous question of the non-separability of measurements made on either of the two systems of a pair:

In preparing the experimental device Alice changes her state of Knowledge and thus the perspective with which she apprehends the object of her experience (both systems). It creates Knowledge conditions that make certain specific Facts of Knowledge likely. However, Alice's perspective generally determines which Facts or Classes of Facts will appear and in what relationship to her global worldview. There is total non-separability between the preparation and the object of the experiment, just as there is non-separability between the Knowledge of Alice and each Fact that composes it. Perspective is the global relationship of Facts to her representation of the world, this probabilistic perspective may well include correlations or exclusions between the possibility of Facts.

The "container" Knowledge, where images of existing Facts, Laws and Procedures would be stored for themselves, is a misleading representation. "Actually" Knowledge of the subject is an informal, interdependent whole, in which Facts, laws and procedures are Actual according to laws of probability.

The experimental device is the dicible and present representation of the global conditions of Knowledge that make possible and correlate the appearance, for Alice of measurement results on the systems of the pair.

Here are some examples to illustrate this:

-In the example of the chess game we described earlier, what has the meaning of a present state of the game, a physical reality or at least a state of Knowledge describable by common language is in fact the fusion of a considerable set of rules, choice, immaterial relationships that are almost impossible to link unequivocally to its description through language.

-At the moment when Marcel Proust's consciousness remembers the madeleine of his childhood, the State of Knowledge that makes this mental experience possible merges all the conditions of possibility of past 'gouters' which are in themselves a bottomless reality, but also all the emotional contexts that made it such a dear memory, but also all the conditions that make possible its reappearance in the present of his consciousness, starting with the fact that Proust is still alive at this instant.

As Schopenhauer (ref MVR) explains so well, none of these conditions (which he refers to as a causal "activity") deserves more than another the title of "cause" of remembrance.

As soon as one tries to go back to the In-Act reality of the State of Knowledge, beyond the horizon of Meaning and ready-made images, where all these conditions really merge, the inextricable complexity of this reality and the fact that it is unfounded, that any condition is itself conditioned by others.

Who can reasonably believe that the reality of the relationship between the madeleine and the global capacity to feel belongs to a present (was it subjective) moment in M. Proust's three-dimensional universe?

-If now it is assumed that it is by writing "The Search" that Proust remembers the taste of the madeleine; Since writing creates the conditions for the possibility of remembrance, it must be integrated into the State of Knowledge.

How then can we bring the act of writing, the time of writing, the norms of writing and all the physical and mental conditions that underlie the possibility, in the present moment of M. Proust's three-dimensional universe?

This Transaction is precisely what the QBists call a probability judgment, a bet, a will to believe, an Act that replaces the In-act complexity of the State of Knowledge with a state vector, i.e. by combining a set of possible (observable) probabilities. Except that this Act does not have the subjectivity QBists implied by the terms of judgment, bet and will.

**Since the object and the subject are one and the same Knowledge. The states of things that appear to me as the physical conditions of possibility of my experiences are in fact states of my Knowledge.**

In an "ordinary" representation of a quantum experiment, the distinction between knowledge and experimental device is already particularly tenuous. Given the amount of knowledge used in its preparation, a QM experience is a thought experiment long before it is a realization of the physical world.

With the QBism, the probability relationship is not between a state of the physical device and possible physical events but between a state of knowledge and possible facts of Knowledge. Since the conditions of possibility of a quantum experiment merge into a state of knowledge, all the details made in the above lines apply to it.

We must therefore go back beyond the horizon of meaning to consider all the In-act interdependencies that determine our State of Knowledge and from which emerges, for the agent and himself alone, the meaning of a physical device located in the world.

One might be surprised that a knowledge can modify or create what we see as a state of physical

affairs. The examples below show that there is nothing there but very ordinary.

-At the moment when my mind turns its attention to such a memorized subject, my Knowledge sets itself in a state, a perspective that makes possible the appearance at the conscious level of such a class of new Facts of Knowledge. My perspective directs the expansion of my Knowledge.

- As I turn my gaze to a particular subject of the world, my Knowledge sets itself as a perspective (extended to the senses) that makes possible the appearance at the conscious level of such a class of new Facts of Knowledge. My perspective directs the expansion of my Knowledge.

-The moment I extend my hand to a particular subject of the world, etc. , because the gesture is a fact of Knowledge that represents itself as a physical fact. My perspective directs the expansion of my Knowledge, including through gesture.

-The moment I open a book, etc.

-It is quite easy to admit that "language and thought co-determine as meta-Facts of Knowledge."

What may seem less obvious but was perfectly demonstrated by G Simondon (Ref MEOT) is that the tool and thought co-determine according to the same principle.

The acquired technical gestures, the primary tools are facts of knowledge that determine the possibilities of a new experience. This possibility is in turn the seed of a new Fact of Knowledge, whose Meaning is the probability of the experiences it makes possible.

As with the language sign, the Meaning of the tool is shareable, it forms culture.

The tools, mechanisms, physical devices that surround us and their operation modes must therefore be considered as Facts of Knowledge, the Meaning of which is the expectation of what they make possible.

Heisenberg had already written that the experimental device is an extension of the agent's knowledge which, because it helps define the possible results of her experiment, is part of the global perspective that drives the expansion of her knowledge.

There is no difference in nature between Alice's Knowledge and the experimental device she implements.

As I implement an experimental device, my knowledge (including the device which is a fact of Knowledge) is arranged as a perspective (a state space) that defines which classes of new Facts can appear at the conscious level.

The set of classes of phenomena (new Facts) that are made possible, is the basis of my perspective, of my state-space. The probability of new Facts appearing is both the Meaning of my Knowledge and the expectation of new Facts. Meaning is a law of probability that can be expressed as a state-vector.

Using the terms of the QM, a state of Knowledge defines a perspective that is formalized (in the space of representations) by a state-space composed of all possible Transaction vectors, vectors of the expansion of Knowledge quantified in the form of new Facts. To each of the Transaction vectors is attached a probability of the appearance of the new Fact, the sum of the Transaction vectors, weighted by their probability defines the state-vector of the Fact, which is also its meaning, which is also the expectations it raises

Every actual appearance of a new Fact of Knowledge updates my Knowledge and eventually my perspective.

### **5-Intelligibility or intelligence.**

Let's quote again D. Mermin (ref MBSQM):

*"I have used myself as one example of a perceiving subject. I could equally well have written "you" or "Alice" or "Bob". I focus on one particular subject, both to underline the unbreakable privacy of the directly perceived experience of each and every one of us, and also to emphasize that each of us has their own personal model of the world, based on their own private body of experience. »*

The OK shows that if our representations of the world evolve individually, this individuation is infinitely less "solipsistic" than the individuation of our physical becomings.

To eliminate redundancies between the former and the latter why not make our physical becoming a mere representation of that of our Knowledge?

Why not reverse the direction of intelligibility?

Again, the OK shares the QBiste point of view, except that the word "experience", if not defined, casts doubt on the meaning of the proposition.

A thought experiment is an "experience" according to the QBism

Is there anything other than thought experiments?

Does knowledge of the subject change by its own power or is it forced to change because of an outside world?

As we have seen before, the OK clearly responds ,"*Knowledge of the subject changes by its own Power and its own Will according to the Principle of Logos*"

**Power** and **Will** are not psychological but refer to meta-facts of pure logic.

The consequences of this proposition alone would deserve a book.

Let's settle for general ideas hereunder:

-It is not the world that is intelligible to us, it is our knowledge that gives form to an otherwise formless reality.

-Each subject gives form to the world according to an universal principle that transcends him and within a framework that overwhelms him and which could be referred to as his cultural framework in the broadest sense.

-Man's representation of the world is necessarily anthropocentric

-The separation is not between object and subject but between the In-Act, formless reality and the Meaning, between the below and the beyond a horizon of the Meaning.

-This Separation is a Cut, the beyond the horizon is not describable by the forms that describe the below.

-This horizon closes our representation, not only towards the infinitely large but also towards the infinitely small.

-Science, pure sciences and physical sciences must integrate the knowing subject and his horizon of knowledge.

-Pure sciences (see ref LAMG) as well as the physical sciences (cosmology, RG, QM) can only demonstrate the certainty of our Existence.

-Darwinian evolution can also be rethought in terms of knowledge.

-Knowledge is not a container of semantic Beings ordained according to an N-dimensional logic (otherwise impossible to describe) but a system of possible interdependent Facts.

-The Meaning of Knowledge extends (for itself) through the appearance of Facts among the possible, according to a law of probabilities that represents its Power and its Will.

-The Meaning of our Knowledge and Facts that it com-prehends is represented in the world we know.

-The Reality of our Knowledge and its possible Facts cannot be represented in the world we know.

-Our Reality cannot be represented in the world we know.

This final statement may sound as a revival of the Cretan paradox, and it is actually.

OK cannot pretend to describe with words what it demonstrates as not describable with words.

Let's consider that as a good new: there is still some truth beyond OK.

### **The author:**

Jean-Louis **Boucon**

E-mail : [boucon.jean-louis@neuf.fr](mailto:boucon.jean-louis@neuf.fr)

Blog : <http://jlboucon-philosophie.over-blog.com/>

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Appendix  
The OK and the tractatus (TMP) by L. Wittgenstein

It seems interesting to me for the reader to reinterpret in the light of the OK the few stanzas below from L. Wittgenstein's Tractatus.

1 - The world is all that takes place.

1.1 - The world is the totality of facts, not things.

1.11 - The world is determined by the facts, and by that they are all facts.

1.12 - For the totality of the facts determines what takes place, and also everything that does not take place.

1.13 - Facts in logical space are the world.

1.2 - The world breaks down into facts.

1.21 - Something in isolation may or may not happen, and everything else will remain unchanged.

2 - What takes place, the fact, is the subsistence (1) of states-of-thing .

2.0141 - The possibility of its occurrence in states of things is the shape of the object.

2.0121 - .... (Something logical can only be possible. Logic deals with every possibility and all possibilities are its facts.)

(1). Subsistence translates here the word 'das Bestehen'. the translator of the TMP notes: The translation "existence" seems to me to refer too directly to the encroachment, when it is essentially existence in logical space. "Existence" will translate: Existenz, a term that seems to be used most often in an even more abstract sense, for example the existence of a concept.

Author's Note: While I understand the translator's intent, the term Existence as defined by the OK seems to me to be quite appropriate to convey LW's idea that "all (logical) possibilities are facts" (are actual according to the Definition OK) while only some come to Exist (according to the OK definition) as "state-of-thing", thus moving from the logical world to the physical world.