Four questions about Quantum Bayesianism and their answers by Ontology of Knowledge.

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If it is true that clear and straightforward writing is “the honesty of the philosopher”, then Michel Bitbol is certainly one of the most honest philosophers of science I have ever read.
His writing stays away from metaphors and seductive images, without ambiguity either in the words or in the turns of phrase, preferring the right word - see repetition - to elegance, taking care not to exclude any reader by insufficiently explicited references.
His articles show that he obeys the requirement to "do his job well" as a philosopher: to carry out information work, so as to facilitate access to the most difficult questions (and the philosophy of quantum mechanics is one of more arduous).
In doing so he also shows us, by example, the right way to tackle problems, to delve deeper into them and to obtain a better understanding.

We will take here as a initial reference the article by Michel Bitbol: *A phenomenology of identity - QBism and quantum (non-)particles* (Ref MB-PI)
In this article Michel Bitbol...

> *...advocates a strategy, which consists in going below the level of logic and set theory to inquire how their categories are generated in the experience and activity of knowing subjects, and whether this mode of category generation is still relevant in the field of experimental quantum physics.*
> *This project of a “genealogy of logic” is borrowed from Husserl’s last treatise, entitled Experience and Judgment. It is applied to the case of quantum physics through a QBist approach to Mott’s theorization of quasi-“trajectories” in Wilson cloud chambers. It is also shown that one of the most appropriate ontologies for quantum objects or quasi-objects is to reverse the (grammatical) roles of subject and predicate, as advocated by the Japanese philosopher Nishida Kitarô in reasonable agreement with both Schrödinger’s and Krause’s approaches to the concept of “particle”. (extract from abstract)*

The writing of M. Bitbol's is so clear, everything is so necessary that it would seem counterproductive to draw a summary from it. I simply recommend reading this article before reading mine. The benefit will be well worth the effort.
My article does not aim to explain or contest what Michel Bitbol writes. The clarity of his text allows us to understand the theories to which he refers and to grasp the evolution of the concept of "object" from Husserl to QBism.... but this clarity also reveals, by contrast, some shadows in the QBist approach.
As far as I can tell from the many writings of the fathers of QBism Christopher Fuchs or David Mermin (see References QPR, QNW, NBQP), they don't pretend that QBism is exempt of open questions.
The following article will attempt to highlight four questions which, in my opinion, are left unanswered (or overlooked) by QBism and to show the clarifications that the Ontology of Knowledge (OK) can provide.
The subject QBism vs OK is covered in much more detail in another article of mine (ref RQOC) which I also recommend to read.

Let us first note that the objectives of QBism and OK are different:

- Qbism aims to resolve the difficulties of interpreting quantum theory while OK attempts to understand the relationship of consciousness to the world it represents.
- Qbism has science as its domain and uses ontology to give it rational meaning whereas OK

is an ontology which tests its compatibility with science as a validation means.

The four questions to QBism:

To initiate this let's quote John.A. Wheeler whose ideas are at the origin of QBism as C. Fuchs keeps expressing with gratitude.

> *Everything, physics included, derives from two parents [...]. One is the «participant.» The other is the complex of undecidable propositions of mathematical logic. The «participator» assigns true-false values to appropriate ones among these propositions at his own free will. As he does so, the corresponding world unrolls on his screen.* ***No participator, no world!*** *(from ref QPR appendix)*

As M. Bitbol and QBism advocate, it would be necessary to go beyond logic and replace '*undecidable propositions of mathematical logic'* by '*probabilistic expectations'*.

That said, OdC agrees with the main idea of: « *no participator no world », y*et the following ideas in Wheelers quote would still need clarification :

« *two parents » :* Are the *participator* and the *complex of undecidable propositions of mathematical logic* two different kinds of reality ? if yes how can the participator be (divine will left aside) ?

« *free will assignements of true-false values by the participator » :* What makes the participator select the *appropriate* undecidable propositions and what are his truth-falsity judgements if not logic itself ?

*« The world unrolls » * :* logical propositions are not substance, hence they are *a priori* not related to time and yet events seem to happen in the participant's representation of the world, so what is the exact status of the *complex of propositions* with regards to time.

* one could also quote C. Fuchs (ref QPR p.9) « When an experimentalist reaches out and touches a quantum system [...] that process gives rise to a [...] little act of creation. »

● The rejection by phenomenology as by QBism of the object in itself, individuated and persistent, necessarily raises the question of the nature of the subject itself.

The sentence below (ref MB-PI), shows this ambiguity:

> *"Pre-predicative experience thus associates a variety of presentations and sensuous contents whose only initial unity is established by their being recollected by the knowing ego,..."*

So what is this knowing ego? and if its persistent unity is the condition of possibility of all knowledge * how does it enjoy such an *a priori* unity? (* cf the Kantian concept of transcendental apperception (ref CRP)

It would indeed be incoherent to conceive of the subject (or the agent) as having in itself the properties of individuation and persistence that we deny to the object. The subject is real, his thought is real. The knowing subject is not a container having a reality different from what it contains. At the most elementary level of understanding, what the subject knows is the subject and becomes of the same becoming as the subject.

To be complete, an ontology based on the principles of QBism must therefore explain how the subject comes to exist, individuated and persistent, for itself.

● As M. Bitbol shows (ref MB-PI), Qbism is in the lineage of Kant and Husserl wrt the use of the words *objective* and *subjective*. That use is far from the common sense for which *objective* means verifiable information based on facts and evidence.

For example C. Fuchs quoting W Pauli (ref RQP p.25) :

> *...For the objective character of this description it is of course sufficient,that every individual observer can be replaced by every other one which fulfills the same conditions*

and obeys the same rules...

So much so that the terms « *objective meaning »* should rather be replaced by « *objectived meaning »*. This means that some normative process of *objectivation* happened to the *subjective* information to make it inter-subjectively shareable.

But this is too simplistic and does not fit with with linguists views : Ferdinand de Saussure postulated (ref 1) :

> *"there cannot be thought without language" ... "Abstracted from its expression by words, our thought is only an amorphous and indistinct mass (...) taken into account thought itself is like a nebula where nothing is necessarily delimited..."*

By this postulate, de Saussure denied thought any prevalence over language.There cannot be thought without language. According to him, the word participates, at a minimum, in the structuring of thought into interdependent entities.

This leads us to the point that there is a certain confusion between "what the concept says once objectived " (its meaning) and "what it is": (its « formless » reality before objectived meaning). If the concept *for what it says* can be the concept "of something," the concept *for what it is* cannot be "something" individuated and persistent.

> *Not that concept for what it says and concept for what it is would be different things nor that objectivation would be a physical change to the unformal, the difference is just a matter of ordaining modes.*

We study the subject's mind at ontological level, so it would be inconsistent to make the mind combine (even in the subject's unconscious) **what the concepts say**. It is in **what they are** that concepts combine and construct meaning.

This objection was already made by Maine de Biran to the Kantian critique (ref NOK):

> *II - Determination of the primitive fact of the intimate sense. p77-89 : (summary)*
> *It is only after affecting the mind, in a diffuse form, that the sensation/phenomenon appears as a revealed fact of the sensation. The sensation is present (although formless), as an affection in the thought (for what it is) and it is the faculty of feeling which gives it form. But the combination of the sensation with other sensations and concepts does not take place at the level of the revealed fact of sensation (for what it says), but spreads like an affection in the thought (for what it is), still informal, or at least diffuse. In other words, the ability to combine sensations does not lie at the level of the subject's understanding but at the level of the mind/object.*

It is obvious that the concepts *for what they are* do not have the attributes of existing, they are not disjoint, non-contradictory, present, localized, ordered, etc... Likewise the relation A→B between the concepts of objects A and B does not have, *for what it is*, the attributes that we associate to this relationship *for what it says*. The reality of relationship between A and B is not this pretty arrow that we have become accustomed to. This includes the relation of conditionnal probability Pr(B|A)

Although the meaning of the concept emerges from a reality, the concept *for what it is* is not "meaning" and it is not at the level of meaning that concepts combine. Meaning is not founded on a sayable reality.

The mind is neither a 'container' (existing, individuated) nor a 'processor' of meaning, meaning does not 'circulate' in the mind, it emerges from it.

The ego is reality before it takes on the meaning of "I become myself" and it would be inconsistent for a QBist to claim that the reality of the ego has the attributes of the experienced ego, in particular that it is located in the brain or the body or the world, or in the present moment that the subject represents.

We need to understand from what common reality world, mind and meaning emerge.

● The concept of probabilistic expectation, fundamental for the QBist, must be redefined in its connection to the agent.

Neither QBism nor OK do base probabilistic expectation on the attributes of things that would exist

prior to experience. Probabilistic deduction and induction do not have to be founded *a priori* on a causal reality, itself unfounded. Although the attachment of probabilistic expectation to facts of the world is at the origin of Rev. Bayes induction theory, it is not in its essence, as for all mathematics.
Let's call Bruno de Finetti's representation theorem as quoted by C. Fuchs (ref RFQ p.3)

> *(it) established ..that ..there was a way of thinking of the resultant of statistical sampling purely in terms of a transition from prior subjective probabilities (for the sampler himself) to posterior subjective probabilities (for the sampler himself).*

The way the term '*subjective'* is used here and the 3rd Tenet of QBism « *Measurement Outcomes Are Personal to the Agent* » and 8th tenets : « *Quantum Theory Is a Single-User Theory for Each of Us* » (see ref QWN) seem to connect measurement outcomes to the thought (expectation, hope, betting or any related concept) even unconscious of an Agent *a priori* individuated and becoming.
The prejudice of an *a priori* individuated and becoming Agent is not fully consistent in the context of QBism.
The Agent is not a simple witness to the relationship of what she knows to what she may bet on, this relationship is the Agent. The knowing subject is not "a mind that bets on possibilities", the knowing subject is knowledge and the reality of this knowledge is probabilistic expectation.
From probabilistic expectation we must put aside worldly interpretation and only consider the mathematical fact and try to understand how the knowing subject emerges from it in its persistent Unity and how the meaning of the world emerges from it.

● I quote here an article from C. Fuchs « Notwithstanding Bohr, the Reasons for QBism » (ref NBRQ)

> « *My Probabilities Cannot Tell Nature What To Do* » (2.2 tenet 2)
> « *...a quantum state has no "ontic hold" on the world.* » (2.2 line 5)

This rises the questions : if my probabilities can't tell nature what to do, how could they tell it to do anything at all ? If quantum state has no "ontic hold" on the world how could it force the world to change ?
If the object of physics is a construction by the subject based on concepts that are neither present nor ordained, changes in this construction are also a construction. How then can QBism justify the prejudice that the same time which animates the world representation, also animates the prior reality from which this representation emerges?
Should we not rather consider our representation as an «animated affect* » of a reality not subject to time ? Should we not consider that if meaning is made of probabilistic expectation, it shall be animated by its own nature? (*in the Spinozian sense)

The four questions to QBism are therefore:
● How does the subject come to exist for itself, individuated and persistent?
● From what common reality do world, mind, and meaning emerge?
● How does meaning emerge from the mathematical fact of probabilistic expectation?
● Is meaning animated by its own nature?

<u>The answers proposed by the Ontology of Knowledge (OK):</u>

The OK does not claim to expose the truth of reality but only to propose a coherent model of representation according to which:

> -Reality is subject neither to form nor to time.
> -The Knowing Subject is a wave of meaning riding through immobile reality.

As an introduction, the reader will find below a very brief summary of the basics of the OK:

<u>Summary of the OK:</u>

Let's start with a simple heuristic model: that of a purely logical structure of links between elements with more than two links per element.
On a large scale, the abundance of links in this structure is such that it would be impossible to ordain the elements in a space regardless of its number of dimensions. Such a structure would in itself be unspeakable.
Let us call “ordering modes” all the possible ways to follow the links, without excluding the superposition of ordering modes.
OK postulates that among these complex ordering modes there necessarily exist some which present a statistical equilibrium between expansion and contraction of complexity. Equilibrium occurs simply because its probability increases with complexity. This probabilistic equilibrium must therefore necessarily “be the case” for infinitely many ordering modes.
The OK calls this case an Individuation.
The Shannon entropy of such an ordering mode is zero by definition.
An Individuation therefore merges the complexity that constitutes it into a simple information digit E carried by a one-dimensional link.
The information carried is written: conditionnal probability of E “knowing” E =1 (Pr(E|E)=1) and expresses a One and persistent necessity.
Note:

> *The term individuation characterizes the ordering modality and not what is ordered which remains unspeakable.*
> *Although we use to represent the logical relationship of existence as a space-time line the term “one-dimensional link” must be considered in a purely logical sense of One to One relationship and not in a geometric sense. Likewise the logical concept of "continuity" means that between the experience of E and the experience of E the experience of E is possible but not that E would be endowed in itself with a continuous existence (we will come back on this).*

Reality is unfounded:
An Individuation associates a persistent statistical singularity with a complex unfounded set of relationships. This set is always “separable” into component individuations and can always “merge” with others into a compound individuation. It is not possible to enumerate the components of an individuation nor the compounds to which it contributes.

> ***The non-foundation of the real.***
> *That the world ceaselessly comes to exist for us, emerging from the horizon of meaning with the meaning (the forms) given to it by our extensional multiplicity, leads us to believe that what is still beyond the horizon of meaning, what does not exist yet (or no longer) for us because it is "future", "past", "too far away", "too small", "too complex", etc... the intensional inaccessible to our immediate understanding, is nevertheless governed by these same laws of our multiplicity.*
> *The laws of what makes sense to us appear to us as Universal laws.*
> *Our present representation projects, beyond what exists for us, present and certain, beyond the horizon of meaning, a universe of possibilities, a universe of possible meanings a priori conforming to the laws of the existing universe imposed on us by our multiplicity.*
> *We think that what is only possible is nevertheless possible in space-time and according to the different structures of meaning. We draw a possible future, immediate or distant, a possible interior, a possible causal explanation, all images conforming to the strict formal rules of our multiplicity and which we would not even be able to think outside of these rules.*
>
> > *NB: We know, however, that the possible does not respect the rule of non-contradiction which is at the basis of our representation of the existing.*
>
> *The intensional, beyond the horizon of meaning, that which does not yet have meaning and from which meaning must emerge, has no a priori reason to conform to our multiplicities.*
> *The fact that we have been able, at every lived moment and throughout the millennia, to*

always push back the horizon of meaning in order to enlarge the extensional representation and explanation of the world, has anchored in us the opinion that the horizon of meaning is only a veil that separates the known (the extensional) from an unknown (the intensional) that are formally similar.
It is not so: The unknown is not a subset of the known. The known is not isomorphic to the unknown. What is beyond the horizon of meaning simply does not make sense.

The disjunction between Individuations would be unprovable.
Non-foundation implies that the relation A=A is unprovable

Reality is not substantial:
By a probabilistic necessity, complexity generates One and persistent singularities which are its own "objects". We can then abandon the "substantial object" element of the initial heuristic model and replace it with Individuation: persistent statistical singularity which does not have the attributes of a substance element (locality, disjunction, etc.).

Note: Here is undoubtedly the conceptual « revolution » proposed by the OK: probabilistic expectation must no longer be considered as an analytical tool for the use of the mind, concerning relations of interdependence in the substantial world, but as the very essence of reality.
We must abandon the substantial nature of reality and consider a purely relational nature. Reality is made up of probability relations between unfounded relational singularities.
OK shows that this paradigm shift makes it possible to merge the world and the mind into a single essence; thus completing the Kantian revolution.
The quantum mechanics "phenomenon" and the Agent's "gambles" are one and the same reality.

The (transcendental) subject is an Individuation among possible Individuations.

Note : There is a taboo about the word « transcendental ». Please note that the meaning given by OdC is very different from the Kantien definition: rather than assessing reality of a priori concepts, « transcendental » refers to the meaningless reality out of which meaning emerges. The Kantien transcendental is like a bridge by foggy weather, it only shows its first half. No wonder if it is considered idealist.

The information it carries is the Existence of the subject: (Pr(E|E)=1).

Note: The expression (Pr(E|E)=1) is that of a virtual third party perspective, the philosopher's perspective. Speaking in the name of the subject itself, from the inside one could say, the expression will be (pr(Je|Je)=1). It then denotes a necessity.

This information is not a "thought" of the subject but a fact of probability.
It is not the state of something but a singular relationship between probability facts.
The transcendental subject does not designate what we call the spiritual or corporeal envelope of the subject but an ordering mode of reality, without topological limit and not subject to time.

Individuation (I), being unfounded, it also separates into possible component Individuations X (pr(X|X)=1). Since separation does not imply disjunction, there are infinity of infinities of "possible modes of separation" which we will call "**representations**".
A necessity (individuation) can be fulfilled according to an infinity of infinities of contingent paths and this non-calculability is essential.
The representations are *a priori* constrained by the necessary fact that they participate in the unity and continuity of the Je (pr(Je|Je)=1) and this infinitely, from separation to separation, from compound to components:

- The Individuations of the Xs composing a representation eventually merge into the One Existence of the subject.

- The continuity of the Je imposes a law of probability distribution on the possible modes of separation of any X "knowing" Je.
- The **meaning** of X for Je is this law of distribution. It is the law of probability distribution over all possible modes for X to contribute to Je, knowing that if X exists for Je then (Pr(X|Je)=1), that is to say, all these (contingents) possibilities merge into the necessity for the subject to "become him.her.self."

In the transcendental subject, the relation (pr(Je|Je)=1) splits into a structure of probabilities over all possible Xs "knowing" Je: (pr(X|Je)>0).
The possible Xs are themselves singularities, attractors of meaning.
The meaning of a representation is the law of probability on the representations that it makes possible. Not as a thought but as a probalistic fact.
This structure of probabilistic expectations animates meaning and representation in a continuous and irreversible way.
The representation therefore takes the form of a **wave of meaning** which expands according to a law of probabilistic expectations and contracts under the necessity of the individuation of the transcendental subject.
This wave of meaning is the **knowing subject**.

On a philosophical level:
-Meaning is not data for thought but the very principle of thought.
-Contrary to the laws of the world which would determine the change of meaning in a prior time, the individuation of the subject induces meaning and its changes by a necessity out of time.
-A representation of the Existing is a law of probabilistic expectations on possibles which globally preserves the unity, coherence and continuity of the knowing subject and his representations.
This law of representation is inductive, it is idoneous because it is constrained by the prior necessity for the subject to "become oneself".
The possible objects of expectation are the concepts, they act as attractors of meaning « from a present representation ». The field of concepts and their interdependance is the subject's multiplicity.
The multiplicity rules idoneously the emergence of meaning because it is constrained by the prior necessity for the subject to "become oneself".
-Although the meaning is constrained by the necessity pr(Je|Je)=1, its probabilistic and unfounded nature allows this necessity to be fulfilled according to an infinity of infinities of possible modes.
-Some of the possibilities come to Existence (pr(X|Je) $\rightarrow$1) and so on.
-For the knowing subject what Exists is certain, present (in the representation), necessary and non-contradictory, the possible is probable, out of time, contingent and possibly contradictory.
-The notion of **concept** is stated:

In the subject, what Exists (in the present) is possible (out of time).

-The **principle of causality** is stated:

In the subject, what Exists (in the present) separates into possibles (out of time).

-The statistical equilibrium (out of time) between expansion and contraction of complexity, which characterizes the transcendental subject, takes on the meaning for the knowing subject of a parametric law which is imposed on what Exists in the world and time represented. Starting with space-time parameters.
- The Individuation of the transcendental subject is not disjoint from the Individuation of other subjects and all participate in other "Individuations" which could be designated as Humanity, Languages, Cultures etc... The OK is therefore in no way idealistic or solipsistic.

The ideas presented in this summary are not justified. To learn more about the OK and its relationship to the representation of the world, it is recommended to read the refs OK, MOND, LOGEX
Based on this summary we will nevertheless be able to answer the four questions.

Answers to questions :

Q:How does the subject come to exist for himself, individuated and persistent?

A:

Reality is like a field of probabilistic interdependence (NB: the term field is misleading insofar as it presupposes a space), what M. Bitbol designates as the pre-individual background. Individuation in its principle is a necessary singularity. The attributes of individuality and persistence of the transcendental subject are therefore not determined by laws in time but induced by this necessity out of time.

The reality of the transcendental subject, a probabilistic singularity, is out of time.

The relation of Individuation (pr(Je|Je)=1) strictly takes the meaning of "I exist, I become myself" in the knowing subject. In doing so, it passes from the status of truth out of time of a probabilistic singularity to the status of truth of the subject's knowledge in his present time.

Note that this relation is not meaning "for the use of the knowing subject" it is the subject himself, at its first logical degree : the condition of possibility of all knowledge.

Q:From what common reality do world, mind and meaning emerge?

A: The world, the physical subject and his mind are meaning that emerges from the field of probabilistic interdependence, in the transcendental subject, under the constraint of its Individuation.

The subject only knows of reality what participates in its individuation.

There is not a physical world that the subject's mind would know, there is only the probabilistic singularity that is the individuation of the transcendental subject and the wave of meaning that runs through it that we call the knowing subject.

The primary, containing meaning of all possible meanings is "I become myself." This primary meaning "separates" into the world, the physical subject, its knowledge.

The distinction between the "Self" and the "non-Self" is a matter of second-degree probabilities: the Self is for the subject that which Exists and cannot not Exist.

Q: How does meaning emerge from the mathematical fact of probabilistic expectation?

A: The subject does not know "something" that is Other to him, he only knows himself.

The subject "becomes" as the meaning becomes.

What the meaning "says" is nothing other than what it "is."

Meaning is not data processed by the mind. The mind does not "think" meaning.

Mind is meaning. Meaning is mind.

Facts of Knowledge have no proper meaning, no "internal" meaning. Meaning has neither content nor container. There is only extensional meaning.

Meaning (and therefore the mind) is nothing other than the laws of probabilistic expectations which associate a fact of knowledge with the facts of knowledge that it makes possible, a concept with the concepts whose emergence it makes probable, the present representation to the representations that it makes possible.

Neither sense nor mind have a state because they are probabilistic expectation.

The present moment of representation is only present in the subject's consciousness to the extent that what it presents to him is certain: pr(X|Je)=1.

Neither sense nor spirit has substance and is not attached to any substance. There is no substance.

Individuation (pr(Je|Je)=1) is a singular mode of order in reality. The mind of the knowing subject therefore finds not in itself but in reality the simple meaning of his existence which

conditions all knowledge.
This simple digit meaning then separates into interdependent singular modes of orders from the field of possible concepts and their interdependencies (the subject's multiplicity).
The concept is not in the memory of the knowing subject as an existing datum, always (more or less) available for the use of the understanding. The concept is due to the fact that "what is certain is possible"*: the certainty of X (as existing in the present), entails the possibility of X (as a concept out of space-time) and this possibility of X makes of X the possible object of probabilistic expectations associated with the Y to come.

> ** To provide an emphatic illustration of that : The once Existence of X (pr(X|Je)=1 is how OdC defines the present evidence of X's Existence) shows the meaning X as an out-of time connection towards the meaning of the subject's Existence (pr(Je|Je)=1). Then this connection is a possible way to the Existence of any Y probabilistically related to X.*

This probability relation is the meaning and the complex field of these relations is the mind of the subject. It does not need to be attached to any substance.

> *Note : The 'concept' as defined above is not the 'category' as used by QBism. That X is a possible meaning (ie. a concept) is not a free choice for the subject, it results from the evidence of X in a once present representation. The concept might be conventional because an evidence can be achieved by inter-subjective exchange with a trusted partner.*

It is the principle of individuation which makes speakable the unspeakable, by aggregating the “infinitely improbable facts” which constitute reality, in the form of possible singularities which are concepts.

Q: Is meaning animated by its own nature while reality is not subject to time?

A: The image of a wave traveling across the surface of a still ocean should be enough to answer this question.
To do this, we must understand that probabilistic induction is a mathematical fact and get rid of the idea that it is based on material facts.
Reality being unfounded, it is vain to seek a proper meaning for the concept; there is only an extensional meaning.
Meaning is none other than the relationship of the certain (meaning) to the probable (meanings).
This essential relationship of the certain (known, present) to the probable, stripped of its material prejudice, is formally the logical equation of a wave which animates meaning under the constraint of the necessity of “I become myself”:
The present meanings induce possible meanings, concepts (Pr (Y|Je)> 0) according to a law of probabilistic induction.
The field of all possible meanings resulting from all present meanings necessarily aggregate into singularities that are certain, defining another present.
The present meanings of these new Existings induce other possible meanings, etc.
Probabilistic induction is irreversible.
The knowing subject is indeed a “wave of meaning” which irreversibly travels through the transcendental subject, a singular mode of order of a reality not subject to change.

Conclusion :

As far as my knowledge allows me to speak about QBism, the OK and the answers above do not

call into question its specific explanation of Quantum mechanics.
These four responses rather consolidate the foundations of QBism by providing a rational response to the immanence of the knowing subject and his "hopes", to the subjectivity of all representation and to the non-substantiality of the object.

> *Note: On the other hand, the OK shows that time and space are not 'per se' but emerge with meaning. As meaning, their representation must necessarily conform to the constraint of Individuation of the knowing subject and to the concept of non-foundation; which calls into question (among other things) the notions of infinity and continuity.*

In the eyes of QBism, the “conceptual revolution” proposed by the OK is not really revolutionary: for QBism already represents the world as relative to the knowing subject, the subject as participant to the permanent creation of his world and the object as not “substancial”.
In fact, the OdC “conceptual revolution” imposes itself more widely on Western culture whose representation of “reality” has until now remained underpinned by a mind-matter dichotomy whose limits E. Schrödinger had sensed.
Can we accept the immanence of spirit without falling into the error of believing in the transcendence of matter?

Let's quote C Fuchs again (ref QPR p.10)

> *Most of the time one sees Bayesian probabilities characterized as measures of ignorance or imperfect knowledge. [..] Imperfect knowledge? It sounds like something that, at least in imagination, could be perfected [..] but there might be uncertainty because the world itself does not yet know what it will give - i.e., (because) there is an objective indeterminism.*

OdC stands with that and would add :
knowledge cannot be perfect because the subject is real, meaning is real* and the real cannot have meaning by itself in its ultimate detail. The ultimate detail cannot be known because it cannot be disjoint, H. Poincaré would say that to isolate A would need a cut of infinite dimension, A=A cannot be calculated. There is not ultimate information. Knowledge is un-founded.
Only order modes involving infinities of events in a unified singularity carry information and can know (be subject) or be known (be object).
* The dichotomy between reality and mind is religion.

OdC could also help brigging clarification to N. Bohr statement (ref RFQ p.4) :

> *My emphasis of the point that the classical description of experiments is unavoidable amounts merely to the seemingly obvious fact that the description of any measuring arrangement must, in an essential manner, involve the arrangement of the instruments in space and their functioning in time, if we shall be able to state anything at all about the phenomena .*

According to OdC, in the agent's representation the existing must be non-contradictory because contradictory existings would prevent her own Unity. Hence, before she could get the evidence of results as existing they shall be "irreversibly amplified" to eliminate contradictions ie. to be made compatible with classical description (including in space and time). That's what the measuring arrangement is for.

What OdC proposes as a change to QBism is to enhance the Wheeler's statement that « *quantum measurements gives rise to new creation within the universe »* (see ref QPR p. 8), by « *the universe is the {present,certain, necessary, non-contradictory} meaning of the subject's existence, quantum measurement rises new creation of meaning within the subject's existence, out of meaningless reality* »
Wheeler's statement gives an opportunity for cklarification : the *act of creation* is not only the timely event « quantum measurement » in itself, because the decision-to-know and the space-of-meanings that could possibly arise from the measurement timely event, emerge out of the global

agent's multiplicity which defines the prior conditions of possibility of any inquiry. This explains the apparent unity and coherence of the universe resulting from these unnumerable acts of morphogenesis.

Because such a statement 1) makes of the universe a representation relative to the subject, 2) derives the multidimensionnal universe formal description from the single-digit subject's existence, 3) makes of the knowing subject no more a participant to the creation but the very act of creation, 4) allows for indeterminacy (in meaning creation) in a reality not subject to time, and also because probabilistic expectation is by nature a quantum of meaning, we believe that OdC could possibly help a reconciliation between Quantum physics and Relativity theories.

Note on Ontic Structural Realism:

The ontic version of structural realism (OSR) proposes to abandon not only the intrinsic predicability of being « one cannot know being » but also being itself "there is no being".
The OK takes up this proposal.
The OK, like OSR and QBism, denies the object any ontic reality and, in its model, puts the relationship of interdependence at the forefront.
But the OK differs from the OSR precisely in that the relationship of interdependence, the structure of interdependencies, has no more ontic reality than the object, it is an unfounded probabilistic singularity which has only extensional meaning, in its contribution to other probabilistic singularities.
Structures are only probabilities that cannot be disjoint.
And as we have seen, the knowing subject does not witness the world he knows, he is the world he knows.

Note on the idoneity of the agent's presuppositions:

We will use the extract below from ref MB-PI page 23 to show how the OK accounts for the fact that the agent's presuppositions come true and for the phenomenon of collapse of the Ψ-function

> *But then, what is the connection between this way of understanding the quantum formalism and the observed tracks, namely the observed particle-like appearances of water droplets trails in a cloud chamber? Since this connection is not one of description, it must be one of presupposition. Even though a Ψ-function does not describe the features of a "real" particle, its variables are the coordinates of a model-system previously composed (in the agent's mind) of a model particle plus a model-set of ionizable atoms. Inserting these coordinates in the argument of the Ψ-function associated with the cloud chamber, is a way to mentally presuppose that a persistent particle may ionize atoms there. And submitting this Ψ-function to evolution through a Schrödinger's equation whose Hamiltonian depends on particles and fields variables, is a way to mentally presuppose that this particle moves in a certain energy (or potential) landscape. Then, the probabilities calculated by applying the Born rule to this time-evolved Ψ-function show the distribution of events that can be expected when this highly elaborated presupposition is made.*
>
> *At the end of the process, the observed phenomena are compared to such expectations, thus enabling one to test the presupposition. But what is remarkable in the quantum paradigm is that, since the agent's expectations of particle-like behavior of finite sequences of phenomena are purely probabilistic, testing them in various experimental contexts may yield a continuous scale of agreement ranging from strict agreement to complete disagreement. Even in a particle-presupposition-friendly experimental context like the cloud chamber, the outcome is not entirely in favor of the persistent particle model, since the sequence of ionized atoms and droplets is discontinuous, and these droplets are not perfectly aligned.*

> *This is why quantum phenomena can never be anticipated under the presupposition of a single model (such as the model of persistent particles), but only under the presupposition of a mix of mutually exclusive models (such as Goyal's models of persistence and non persistence).*

According to the OK, the Agent's mind is constrained by the necessity of becoming-oneself, which is the condition of possibility of all meaning. The presupposition that she "becomes herself" is in Alice and realizes with certainty and this certainty constrains, on the scale of very large numbers of iterations, all the other presuppositions she can make.

> *In the same way: in the casino at the roulette table, the presupposition "I am ruined" constrains Alice, on the scale of the very large numbers of throws, and the bets that Alice can make on her immediate probabilities of winning.*

The self-becoming of the transcendental subject is a mathematical fact and is not subject to the time which accompanies the emergence of meaning for the knowing subject. Becoming oneself is for the subject forever, a "prior" truth to any possible truth.
The agent's presuppositions about a phenomenon emerge from these conditions of possibility, from the multiplicity of possible meaning attractors, from the agent's model-system as designated in the extract above, and not from the phenomenon considered in isolation, in itself.

> *The necessity of Alice's ruin is not determined by the throws considered in themselves but induced by a "rule of the game": the fact that only 36 squares can win out of 37 possible, a "condition of possibility", not subject to the time which makes the throws follow one another.*

The presuppositions of the agent and their idoneity are induced by the "prior" necessity of self-becoming and not deduced from laws of the world.

> *An image may help to grasp the idoneity of the induction by a necessity : That the horse pushes straight a wagon is determined by the timely action of guides or feedback (laws) but pulling straight the wagon needs no such care because it is induced by the idoneity of the principle.*

This concept of *idoneity* of the agent's multiplicity is to be compared to the concept of *usefulness* of the agent's categories as used by QBism.

> *Here (too), the only justication lies in its usefulness. We are concerned with « categories » or schemes of thought, the selection of which is, in principle, entirely open to us and whose qualication can only be judged by the degree to which its use contributes to making the totality of the contents of consciousness «intelligible» (ref QPR p.5)*

Idoneity, as defined above, helps removing two conceptual drawbacks of *Usefulness* : 1) usefulness remains associated with *determination* ie. looking toward a future and hence requires the timely action of laws 2) it needs a subject with an unified consciousness to freely decide on what will maintain his unity of consciousness.

Becoming-oneself is not continuous in reality. The relation of Je to Je is not something that could be continuous because Je is an unfounded meaning. The relation of Je to Je: pr(Je|Je)=1, is a judgment of necessity. Only the meaning appears continuous to the subject because it is the certainty of the experience of himself.

> *Here we find again the remark on non-foundation: We want to believe that what is between the meaning of Je and the meaning of Je, although it is beyond the horizon of meaning, would nevertheless be con-form with what has meaning for us. Nothing justifies this interpolation.*

Likewise the existence of the object X existing for the agent is not a continuum in itself. It is certain for the agent that an experience of himself will contain the experience of X: pr(X|Je)=1, the experience of himself will be experience of himself knowing X.
The paths to fulfilling the necessity from X to X are infinitely contingent (they are even unfounded) and remain so untill an experience (a macroscopic buble in the buble chamber) makes a new X to Exist as {certain, present, necessary and non-contradictory}.

Between the experience of X and the experience of X there is no meaning Existing but only an unfounded field of meanings that are {possible, out of time, contingent and possibly contradictory}
Thus the “new” experience that the Agent makes of X does not trigger the « collapse » of multiple Existences but gives the meaning of Existing to one among the possibles, makes it to Exist as necessary to her own Existence and therefore as non-contradictory.

Still about idoneity : let's quote C. Fuchs (ref QPR p.8)

> *We believe in a world external to ourselves precisely because we find ourselves getting unpredictable kicks (from the world) all the time.*

Agreed but dreams use to give impredictable kicks.
Those kicks could as well come from impredictability of our expectations. As the theory of dynamic systems would say, the possible predicted futures (the attractors of meaning) are sensitive to the initial condition of knowledge.
Predictions could (use to) give impredictable kicks all the same as the world.
This is true also for our measurement device which is not only a prosthetic hand but also a prosthetic piece of knowledge. Indeterminacy on measurements outcomes do not necessarily result from physical scatter but may also result from impredictability of our expectations.
The decisions taken by the agent to observe this or that are of the same reality as what she observes. These decisions follow the same kind of impredictable probabilistic expectations. The agent's mind is not of another reality as what she observes. The questions are not another reality as the answers.

The multiplicity of conditions of possibility in the subject is a field of interdependent meaning attractors of extraordinary complexity. Let us remember that the concepts and their interdependencies which populate the multiplicity of the subject are unfounded.
As a result, the relevance of presuppositions on the macroscopic scale is extraordinarily resilient.
Impredictable kicks are somehow digested in an higher level in an other dimension of necessity.

> *If we could predict everything to the final T as Laplace had wanted us to, it seems to me, we might as well be living a dream.*

The (Quantic) representation of the world is "within" the « experimentalist ». If, by means of a device, he makes a new existent emerge, since the All of his representation is under constraint of his unity, his multiplicity shall then rearrange to give room to the newcomer's evidence.
The possibilities for this rearrangement are the meaning of the newcomer.
Meaning creation does not come out of the consciousness of the agent, it is the very mecanism of his consciousness.
I wonder if, without prediction kicks, we would Exist at all as knowing subjects or if we would simply remain unaware of knowing.

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