**Unbelivable similarity between Christian de Ronde’s ideas (2017) and my ideas (2006-2008)[[1]](#footnote-1)**

Christian de Ronde’s article is this one: (2017) “Quantum Superpositions and the Representation of Physical Reality Beyond Measurement Outcomes and Mathematical Structures”

(<http://philsci-archive.pitt.edu/13443/1/THIRD%20VERSION%20de%20Ronde%20-%20Qunatum%20Superpositions%20-%20FOS%202017.pdf>)

In this paper, the reader can find UNBELIEVABLE similar ideas to my ideas on QM.

We will argue that in order to restate the problem of interpretation of quantum mechanics in truly ontological terms we require a radical revision of the problems and definitions addressed within the orthodox literature. On the one hand we will discuss the need of providing a formal redefinition of superpositions which captures explicitly their contextual character. On the other hand, we will attempt to replace the focus on the measurement problem, which concentrates on the justification of measurement outcomes from “weird” superposed states, and introduce the superposition problem which focuses instead on the conceptual representation of superpositions themselves.In this respect, after presenting three necessary conditions for objective physical representation, we will provide arguments which show why the classical (actualist) representation of physics faces severe difficulties to solve the superposition problem. Finally, we will also argue that, if we are willing to abandon the (metaphysical) presupposition according to which ‘Actuality = Reality’, then there is plenty of room to construct a conceptual representation for quantum superpositions.

Reading this paragraph from the Abstract of the paper, the reader can see very similar ideas to my ideas.

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on the justification of measurement outcomes from “weird” superposed states, and introduce the superposition problem which focuses instead on the conceptual representation of superpositions themselves. In this respect, after presenting three necessary conditions for objective physical representation, we will provide arguments which show why the classical (actualist) representation of physics faces severe difficulties to solve the superposition problem. Finally, we will also argue that, if we are willing to abandon the (metaphysical) presupposition according to which ‘Actuality = Reality’, then there is plenty of room to construct a conceptual representation for quantum superpositions. (p. 2)

In fact, the author moves from “mathematics” to “reality”: “Every theory possesses not only its own mathematical formalism but also its own specific set of physical notions.” [[2]](#footnote-2)(p. 2)

De Ronde writes about the role of the observer into discussion: “According to our stance, individual subjects (also called agents, users, etc.) should play no role in the description of physical reality.”

Exactly this idea is in my works (2002-2008 and later). But anyway, this is not something new, of course. But I want to emphasize de Ronde prepares his framework which is UNBELIEVABLE similar to my EDWs perspective.

In order to discuss and analyze physical interpretations we need to agree on the definition of what should

be considered a Meaningful Operational Statements (MOS) within a theory.

*Definition 2.1 Meaningful Operational Statements: Every operational statement within a theory capable of predicting the outcomes of possible measurements must be considered as meaningful with respect to the representation of physical reality provided by that theory.* (de Ronde 2017, p. 5, his italics)

Again, this definition moves his framework very close to my EDWs perspective. It seems to be very close to EDWs, no more or less. The same verdict is about these statements:

The notion of basis, and thus also of superposition as we defined it above, possesses a physical content

which relates a specific set of epistemic inquiries regarding the abstract state \_ to a set of MOS which provide

an answer to each specific question. All MOS are context-dependent. (p. 9)

The simplest way to escape this paradox would be to argue that the probabilities that accompany the

states are *epistemic probabilities*. (p. 10, his italics) (This “epistemic probabilities” are very close to my EDWs). However, just few lines later, de Ronde moves from “epistemology” to “ontology” (his main goal):

An analogous interpretation would be to argue that quantum probabilities need to be interpreted in terms

of future events (see e.g. [67]) or conscious observations (see e.g. [42]). These responses escape the question at stake for the problem of interpretation of quantum superpositions is not that of epistemic prediction, it is that of ontological representation. We are not discussing here whether QM predicts the correct measurement outcomes in an experiment —we already know it does—, we want to understand how this occurs in terms of a conceptual physical representation. And this is why the physical explanation we seek requires necessarily a conceptual level. (pp. 10-11)[[3]](#footnote-3)

Immediately after this paragraph, de Ronde emphases the role of “interactions” (my main concept):

The necessity of considering the multiple terms of a quantum superposition as physically real is supplemented by the fact that the terms ‘evolve’ and ‘interact’ according to the Schrödinger equation producing specific predictions which can be empirically tested and are in accordance to such ‘evolution’ and ‘interaction’. (p. 11)

A detailed analysis of these interpretations exceeds the space of this article which we leave for a future

work. In the present paper we attempt to consider a radically different path. That is, to address the question of how to extend the notion of reality in order to produce an objective description of physical reality in accordance with the orthodox formalism of QM. The price we are willing to pay is the abandonment of a metaphysical equation which has become a silent dogma within philosophy of physics, the idea that ‘Reality = Actuality’. (p. 13)

I mention that Actuality seems to be very very close to the EDWs! The same about this paragraph:

Our representational realist stance seems to force us, given the predictions provided by QM, to extend

the realm of what is considered to be real. Since both certain (probability equal to unity) and statistical

(probability between zero and unity) predictions about physical quantities provide empirical knowledge, we believe there is no reason —apart from dogmatism regarding actualist metaphysics— not to relate both predictions to physical reality. This means we need to be creative enough to produce a new understanding of probability in terms of objective knowledge, abandoning its classical understanding in terms of ignorance about an ASA. If we accept the challenge of representational realism and admit that quantum superpositions must be related to a conceptual level of description, then there are two main mathematical elements we need to conceptually represent in terms of objective physical concepts. Firstly, we need to provide a clear representation of the kets that constitute each quantum superposition —orthodoxly interpreted through their one-to-one relation to projection operators as properties of a quantum system. Secondly, we need to explain the physical meaning of the numbers that accompany the kets —orthodoxly interpreted as related to the probability of finding the respective property. If we were able to extend the limits of what can be considered as physically real, we might be also able to open the door to a new understanding of QM beyond the orthodox classical reference to ‘systems’, ‘states’ and ‘properties’. (pp. 13-14)

The reader wants more UNBELIEVABLE similarities? See this one:

Our approach to QM begins by discussing the extension of the notion of physical reality beyond the limits

of the actual realm taking into account the famous definition of an element of physical reality discussed in the EPR paper [38]. According to it: if, without in any way disturbing a system, we can predict with certainty (i.e., with probability equal to unity) the value of a physical quantity, then there exists an element of reality corresponding to that quantity. As remarked by Aerts and Sassoli de Bianchi [9, p. 20]: “the notion of ‘element of reality’ is exactly what was meant by Einstein, Podolsky and Rosen, in their famous 1935 article. An element of reality is a state of prediction: a property of an entity that we know is actual, in the sense that, should we decide to observe it (i.e., to test its actuality), the outcome of the observation would be certainly" successful.” Indeed, certainty, taken as the condition of possibility to make reference to the actual realm, has been up to the present the restrictive constraint of what can be considered as part of physical reality. Our redefinition stays close the relation imposed between predictive statements and physical reality, but leaves aside both the actualist constraint imposed by certainty —restricting existence only to probability equal to unity— and the strict focus in the process of measurement —which should be only regarded as confirming or disconfirming a specific prediction of the theory. Taking into account these general remarks we have proposed in [24] the following generalization:

Generalized Element of Physical Reality: If we can predict in any way (i.e., both probabilistically or with certainty) the value of a physical quantity, then there exists an element of reality corresponding to that quantity.

When considering this redefinition the problem is clearly framed: we need to find a set of physical oncepts that are capable of being statistically defined in objective terms. (p. 15)

It seems that this “generalization” sends us directly to the EDWs! However, to avoid the complete similar ideas, de Ronde claims that he talks about “ontological potentiality”, but according to his “representational realism”, “physis is represented in different ways.” (p. 16) However, in next footnote, he embraces a view very close to Spinoza’s philosophy:

11There is in our neo-Spinozist account an implicit ontological pluralism of multiple representations which can be related to

one reality through a univocity principle. This is understood in analogous manner to how Spinoza considers in his immanent

metaphysics the multiple attributes as being expressions of the same one single substance, namely, nature (see [22, 25]). Our

non-reductionistic answer to the problem of inter-theory relation escapes in this way the requirement present in almost all

interpretations of QM which implicitly or explicitly attempt to explain the formalism in substantialist atomistic terms. We believe

there might be an interesting connection between our neo-Spinozist approach and the ‘multiplex realism’ recently proposed by

Aerts and Sassoli de Bianchi [8]. Due to the limited space of this paper we leave this particular analysis and comparison for a

future work. (p. 16)

Again, ther reader will habve the feeling of reading one of my works!

“Once again, using a formal scheme that “works” and provides the correct measurement outcomes in probabilistic terms, is clearly very different from understanding and representing what is really going on according to the theory. The ontological question about what there is (independently of subjects) according to a theory obviously cannot be solved from an epistemic viewpoint which assumes that theories only make reference to the prediction of observations by individual subjects (agents or users).” (p. 12) I draw the attention that this paragraph is not from my writings! This “potentiality” is very close to “reality”:

VI. Potentia (Born Rule): A potentia quantifies the intensity of an immanent power which exist (in ontological terms) in the potential realm; it also provides a measure of the possibility to express itself (in epistemic terms) in the actual realm.” (p. 17)

The potential state of affairs as a set of immanent powers with definite potentia. Our choice to develop an

ontological realm of potentiality absolutely independent of the actual realm of existence implies obviously the need to characterize this realm in an independent manner to classical physical concepts such as ‘particles’, ‘waves’ and ‘fields’ —notions which are defined in strict relation to the actual mode of existence and the principles that define it. According to our viewpoint, while classical physics talks about systems with definite properties (‘particles’, ‘waves’ and ‘fields’), QM talks about the existence of powers with definite potentia.” (p. 17)

The notion of “interactions” is very important for de Ronde:

The interaction in terms of entanglement, the evolution in terms of the Schrödinger equation of motion and the prediction of quantum possibilities in statistical terms through the Born rule are maybe the most important features which point towards the need of developing an ontological idea of possibility which is truly independent of actuality. This development is not a mathematical one; rather, it is a metaphysical or conceptual enterprise. (p. 18)

In my works, the meaning of “interactions” is very close to this meaning. Also, “complementarity” was very important in my first works:

This move implies the development of existence beyond the gates of certitude and the complementary need of characterizing the basic elements of our ontology —namely, immanent powers— in intensive terms; i.e. as relating to a value which pertains to the interval [0; 1]. In this way, each immanent power has an intensive characterization which we call potentia. (p. 18)

The next movement places us very very close to the EDWs: ‘Immanent powers and contextuality.” (p. 18)

Obviously, an atom cannot be ‘decayed’ and ‘not decayed’ at the same time —just like a cat cannot be ‘dead’ and ‘alive’ simultaneously. Any classical physical object —an atom, a cat, a table or a chair—, by definition, can only posses non-contradictory properties. (p. 18) And see this:

The relation and independence of immanent powers with respect to the actual realm. Immanent powers

have an independent potential existence with respect to the actual realm. Measurement outcomes are not

what potential powers attempt to describe… Within our approach, the quantum measurement process is modeled in terms of the Spinozist notion of immanent causality. The immanent cause allows for the expression of effects remaining both in the effects and its cause. It does not only remain in itself in order to produce, but also, that which it produces stays within… (p. 19)

It seems that we are already in the EDWs! de Ronde’s conclusion is very very close to my conclusion about QM:

From a representational realist stance, we have argued in favor of the necessity to consider a conceptual

representational level defined through a metaphysical architectonic which describes quantum superpositions beyond the reference to mathematical structures and measurement outcomes. We have also provided a formal redefinition of quantum superpositions which takes into account their contextual nature. We presented three necessary conditions for any objective physical representation and introduced the superposition problem which, contrary to the measurement problem, focuses on the conceptual interpretation of superpositions themselves. Furthermore, we provided several arguments which point in the direction of considering quantum superpositions as real physical existents. (de Ronde 2017, p. 20)

I am sure the reader will have her conclusion about the UNBELIEVABLE similarities between de Ronde’s ideas and my ideas referring to QM…

**C. de Ronde\_ and R. Fernandez Moujan (2017) “Epistemological vs. Ontological Relationalism in Quantum Mechanics: Relativism or Realism?”,** (Philosophy Institute Dr. A. Korn Buenos Aires University, CONICET – Argentina Center Leo Apostel and Foundations of the Exact Sciences Brussels Free University – Belgium)

Very similar ideas to my ideas: These ontological relational schemes expose the fact that relationalism does not

entail relativism. Thus, at this point of our analysis, it is useful to distinguish between two different types of

relations:

Epistemic relations: Relations as modeled from the empirical subject-object model. What is observed or

perceived (the object or system) is not only related but also is —more importantly— relative to a subject

(an agent, another system or an apparatus). Epistemic relations entail relativism, since we only know how

things (observed or perceived) seem to be as relative to a given perspective, and never how they really are

independently of a perceiving actor (an agent, another system or an apparatus).

Ontic relations: Relations are the metaphysical building-blocks of reality, they are essential to the representation

of phúsis. Relations exist within reality right from the start and their existence is absolutely independent

of observations or a perceiving subject (an agent, another system or experimental arrangement). (p. 15)

Going now back to modal interpretations, we might remark that it is only in the case of ontological7

relations that it would make sense to look for joint probability distributions. (16)

Ronde\_ and R. Fernandez Moujan (2017) reject Rovelli’s ideas (1996):

“Rovelli’s interpretation takes distance from Bohr’s distinction between macroscopic and microscopic systems.

“The disturbing aspect of Bohr’s view is the inapplicability of quantum theory to macrophysics. This

disturbing aspect vanishes, I believe, at the light of the discussion in this paper.” Instead of the privileging

certain observers (classical systems) Rovelli centers his interpretation in the concept of information.

“Information indicates the usual ascription of values to quantities that founds physics, but emphasizes their

relational aspect. This ascription can be described within the theory itself, as information theoretical

information, namely correlation. But such a description, in turn, is quantum mechanics and observer

dependent, because a universal observer-independent description of the states of affairs of the world does

not exist.” [Op. cit.]

Rovelli recognizes the impossibility of presenting an objective description in terms of systems and replaces

this notion by “net of relations”. According to him: “[...] at the present level of experimental knowledge

(hypothesis 2), we are forced to accept the result that there is no objective, or more precisely observerindependent

meaning to the ascription of a property to a system. Thus, the properties of the systems are to

be described by an interrelated net of observations and information collected from observations.” [Op. cit.]

The question becomes then: what can we say about this net of relations. Rovelli, talks about the notion of

information: “The notion of observer independent state of a system is replaced by the notion of information

about a system that a physical system may possess.” Still, as in the case of Bohr, Kochen, Bene and Dieks,

the ontological question that any realist would want to answer is still present even though in a different form:

information about what? Although it is possible to maintain a relational view of quantum states in terms of

information, the ontological status of such information seems to remain a problematic issue —at least, from

a realist perspective.” (p. 18)

We can see that Rovelli’s ideas in 1996 were very different than much later: 2017 (about Rovelli’s UNBELIEVABLE similar ideas to my ideas - Rovelli’s ideas from 1996 are much different than his ideas from 2015!!! In other words: “nothing new!” just Bohr’s perspective - see this manuscript!). He was working on “information” under Bohr’s framework.

The authors returned to their ideas. They reject “epistemology” and replaces it with “ontology” (exactly what I have done in my works 2005, 2006, 2008). So part 6 of their paper refers to “Ontological Relationalism in Quantum Mechanics: A New Proposal”: “The ontic viewpoint —as we understand it— differs radically with respect to the epistemic account of physics.” (19)

Their last words:

Our proposal is to develop, taking inspiration from some of the elements found in the revisions of both Plato’s and Spinoza’s philosophies, a truly relational ontology (this is, one that considers relation as being fundamental) which is capable of providing a new (representational) realist way of understanding the theory of quanta. Both philosophers’ understanding of ‘potency’ or ‘possibility’ in ontological terms, as well as the connection between that understanding and their relational views —which, as we saw, are capable of articulating a specific knowledge of the world without producing substantial separations—, might allow us to throw new light on some key features of the quantum formalism such as: contextuality, superposition, non-individuality, non-separability, etc. The specific consideration of these features in ontic relational terms will be addressed in future works. (20)

Of course, in their future works, I am convinced that we will find many other UNBELIEVABLE similar ideas to my ideas!

1. I wrote this chapter on 18.09.2017. [↑](#footnote-ref-1)
2. “Empirically adequate mathematical structures are not enough to produce a meaningful physical representation

   of reality. Physics cannot be exclusively reduced to mathematical models which predict measurement outcomes simply because neither mathematical models nor empirical facts contain in themselves the physical concepts the theory talks about.” (p. 4) Very similar idea to my idea! I rejected the role of “mathematics” in explaining the reality. He continues writing: “In order to provide such representation we must necessarily complement mathematical formalisms with networks of physical concepts. It is simply not enough to claim that “according to QM the structure of the world is like Hilbert space”, or that “reality, according to QM is described through the quantum wave function”. That is just mixing the formal and conceptual levels of discourse (see for discussion [28, Section 4]). That is not doing the job of providing a conceptual physical representation in the sense discussed above. Pure mathematics is simply incapable of producing physical concepts. To find adequate concepts and representations that explain what QM is talking about in not the task of mathematicians, it is the task of both physicists and philosophers of physics.” (de Ronde 2017, p. 5) [↑](#footnote-ref-2)
3. Also this: “Once again, using a formal scheme that “works” and provides the correct measurement outcomes in probabilistic terms, is clearly very different from understanding and representing what is really going on according to the theory. The ontological question about what there is (independently of subjects) according to a theory obviously cannot be solved from an epistemic viewpoint which assumes that theories only make reference to the prediction of observations by individual subjects (agents or users).” (p. 12) I draw the attention that this paragraph is not from my writings! [↑](#footnote-ref-3)