

# Review of: "Occupation from a perspective of complementarity - Part 1 - Background to the development of a concept"

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Potential competing interests: No potential competing interests to declare.

Review of the article Occupation from a perspective of complementarity - Part 1 - Background to the development of a concept.

The article is scattered all over the place without concentrating on any point with detailed discussion.

The authors need to dig more into the concept of complementarity and the other concepts deployed in their article. There are many points throughout the article that are misinterpreted by the authors.

The authors need to look to the literature about the topic: a recent paper by Shomar 2020, "Complementarity Revisited" (<https://link.springer.com/article/10.1007/s10699-019-09641-4>) and the references therein can help in articulating their position (without going into the experimental details, but just the introduction and the conclusion.), also see Shomar 2008, "Bohr as a Phenomenological Realist".

Two more profound experts on Bohr have not been addressed in the article these are Faye 1991, and Folse 1985 and 1986 (references can be found in Shomar 2008, 2020).

As for the position on the other in relation to I, intersubjectivity, and intentionality, a more mature phenomenological position can be found in Maurice Merleau-Ponty writings especially in the Phenomenology of Perception (Phenomenology of Perception, Donald Landes (trans.), London: Routledge, 2012), and in the Visible and Invisible, (The Visible and the Invisible, Alphonso Lingis (trans.), Evanston: Northwestern University Press, 1968.) an overview on his philosophy can be found here: <https://plato.stanford.edu/entries/merleau-ponty/>.

Detailed points:

- On the account of the dispute among physicists regarding whether to account the quantum mechanical nature as dealing with waves or with particles as the authors noted: "This dispute was entirely to be expected, since it was in accordance with an assumption in classical physics that no two mutually exclusive accounts of a single phenomenon could both be correct. Either only one was correct, or both were false. In this case, both accounts were equally substantiated by the evidence along with their different, but internally consistent, mathematical descriptions". This point was resolved very early in the development of quantum mechanics, the equivalency between Matrix mechanics and

wave mechanics was resolved by Jhon von Neumann in 1929.

- The point in regard to Bohr changing his position as stated by the authors: “phenomena can henceforth be regarded as unpicturable subject-object entanglements” but looking at the 1948 Bohr’s paper we see that: “Consequently, evidence obtained under different experimental conditions cannot be comprehended within a single picture, but must be regarded as complementary in the sense that only the totality of the phenomena exhausts the possible information about the objects.” (Bohr 1949, 210) It is clear here that “information” is about the real properties of the objects out there, regardless of the number (two or more pictures).
- The authors claim that “In 1928, Bohr thought that the ‘wave’ and ‘particle’ models were incomplete descriptions of the behaviour of electrons under different experimental conditions” this is not true, because in the debate between Bohr and Einstein (the EPR paper 1935 and Bohr reply 1935) on whether quantum mechanics is complete Bohr insisted on the completeness of the quantum description of the phenomena in quantum world but he had a different understanding of completeness (see Shomar 2008).
- Although the discussion on Bohr and Heisenberg might be accepted a more detailed discussion is necessary.
- I do not think that physicists who accept the Copenhagen Interpretation of quantum mechanics accept the authors’ connotation of “There could not have been a complementarity hypothesis (the so-called Copenhagen interpretation)”.
- The relation between the I and Thou should be discussed in detail to accept the authors discussion, I recommend that they read the discussion within the phenomenological tradition on the point, especially Merleau-ponty’s position.

These are but some points that can be found in the article.

The article needs revision in order for it to be publishable.

Yours.