First order language and its constraints

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Classical physics was developed assuming, a priori, that sharp identification of objects is possible. On the contrary, in quantum mechanics, the possibility of separating and identifying objects cannot be always assumed. However, the mathematical formalism, that had already been developed to describe physics, considered the identification as an "a priori". In turn, the logical foundations were based on the characterization of first order language, which included the notions of closed term and of variable, and did not bring the problem into question otherwise.

Then it is important to analyze how our assumptions on the formal language are related to our concept of logical, and physical, object. Investigating a model of quantum states by first order variables, we have seen how closed terms and variables are related to the identification of states. From our analysis, we have found that a different approach to variables discovers a "symmetric" logic, namely a different logical mode, proper of the unconscious thinking [1, 2].

In the present paper, we would like to develop some hints from the symmetric mode of logic. Then we introduce modal operators, since they seem to represent a way to recover logical consequence from the symmetric mode. In particular, we discuss how our view could deal with identical particles and show how our approach is related to the exponentials operators of linear logic [3], that represents the strongest logical proposal to go beyond the constraints of first order language.

References

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