

BOOK REVIEW

## Steven French, *A Phenomenological Approach to Quantum Mechanics: Cutting the Chain of Correlations*

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As the history of the first century of quantum mechanics is written (and rewritten), this book may emerge as a high point of a – perhaps surprising – late development: the resurgence of ‘observer-oriented’ interpretations of quantum mechanics. Recent decades have seen increasingly serious observer-oriented accounts being taken increasingly seriously, including: QBism, pragmatist accounts and phenomenological accounts. The final class, to which this book belongs, has received major consideration in two collected volumes edited by Philipp Berghofer and Harald A. Wiltsche, *Phenomenological Approaches to Physics* (2020) and *Phenomenology and QBism* (2023) – French has contributed to both collections.

French provides a novel correction to a standard history of the measurement problem – the incompatibility of the dynamics of superpositions, their probabilistic interpretation and our determinate observations – and its reception. The standard response to the measurement problem is that the observation of a system collapses the superposition into an unambiguous state. It is important to emphasize that this view held the connection between the conscious observer and the system to be *causal*. Put crudely, the observer either *kills* or *saves* Schrödinger’s cat, though they do not have a choice which. Rather than survey the physical and metaphysical alternatives which have attempted to replace the problematic ‘standard’ or ‘Princeton’ account, French performs some much-needed epistemic archaeology and reveals that this account rested on sand.

I mention Princeton because two major figures in the development of the family of causal-consciousness-collapse accounts of quantum measurement are John von Neumann and Eugene Wigner. The new history goes something like this: von Neumann was something of a patsy. His influential *Mathematische Grundlagen der Quantenmechanik* (1932) certainly left room for the observer, but he was careful to allow the superposition-collapsing ‘cut’ to happen anywhere in the chain between the measurement apparatus and the consciousness of the observer. It is Wigner who truly introduced the consciousness of the observer as *the cause* of superposition collapse, largely based on a misreading of Fritz London and Edmond Bauer’s ‘little book’, *La théorie de l’observation en mécanique quantique* (1939). Wigner’s misreading has largely persisted to the current day: their book was a summary, or at most an extension, of von Neumann’s causal-consciousness-collapse account. This misreading notably influenced the subsequent Wigner–Margenau–Putnam–Shimony debate that more or less brought an end to the viability of causal-consciousness-collapse accounts of quantum measurement.

French rescues London and Bauer from this misinterpretation by building on the little-noted fact of London’s phenomenological background. All readers should take away the

fact that the London–Bauer account is not a *causal-consciousness-collapse* account of quantum measurement, though the observer, via introspection, plays a central role in resolving superpositions into determinate states (where ‘resolve’ is used without any causal connotation). The interpretation turns on this quote from London and Bauer:

Thus it is not a mysterious interaction between the apparatus and the object that produces a new  $\psi$  for the system during the measurement. It is only the consciousness of an ‘I’ who can separate himself from the former function  $\psi(x, y, z)$  and, by virtue of his observation, *set up a new objectivity* in attributing to the object henceforward a new function  $\psi(x) = u_k(x)$ . (quoted by French on p. 146, emphasis by London and Bauer)

French gives a convincing phenomenological read of the nature of the ‘I’ and its separation from the wave function describing the apparatus object. Central to this is an accounting for the ‘faculty of introspection’ that eliminates the possibility of indeterminate states and creates this ‘new objectivity’.

Although French recognizes that London and Bauer were satisfied with their account, his further task is to put flesh to the bones and show its value both as a new orientation towards quantum measurement and as an advance in phenomenology as a philosophy. Notably, French presents London and Bauer as completing Husserl’s unfinished project in his *Crisis*. The latter half of the book will appeal to those interested in a phenomenological philosophy of science as well as those interested in contemporary debates in the foundations of quantum mechanics – particularly those interested in QBist, relationalist or Everettian approaches to quantum measurement, as the book closes with a comparison of the relative merits of these approaches as sources for a full phenomenological account of quantum mechanics.

The book is written lucidly and accessibly, with a minimum of formalism (sequestered in a few pages). It is not the case, however, that it is written for those new to quantum mechanics – one need not be an expert, but one must know the formalism and understand the general structure of quantum mechanics to follow the arguments and even the prose (which is not jargon-free). In contrast, Chapter 5 serves as an able introduction to phenomenology sufficient to understand everything that follows. As something of an outsider, French’s writing on phenomenology is clear and unpretentious, while backed by copious quotations from leading phenomenologists, historical and contemporary.

Central to French’s phenomenological interpretation of London and Bauer is what I consider to be the dark heart of phenomenology: the epoché and the ego. French follows Zahavi in taking a correlationist approach to the relation between the ego and objects of consciousness – they are mutually created (and separated) in the act of observation. This supplies an account of the ‘creative act’ central to quantum measurement, which supposedly yields a ‘third way’ between epistemic and ontological interpretations of the wave function,  $\psi$  (p. 232). Unfortunately, for all French’s dialectical clarity, the exact position is unclear. He inherits a common vice of phenomenologists: they often claim that their account of X or Y does not fall into the traps of this or that -ism, only to fail to give an adequate positive characterization of their position. We can only hope that this book spurs on further work that will allow a fuller understanding of both phenomenology and the role of the observer in quantum mechanics.