The statistical interpretation of Quantum mechanics rests upon a separation of system and observer. While the system remains unobserved, its state changes deterministically according to a time dependent wave equation. While the statistical interpretation insists that an interaction (measurement) between the system and observer will lead to probabilistic (unpredictable) results which are perceived by the observer.

The difficulty arises in the event that an observer is incorporated into a system, which is in turn the object of interest of another observer. According to the formalism, when the second observer is not interacting with the system (including \( O_2 \)), then the system develops deterministically in time— even though all the while \( O_1 \) may be making observations on a subsystem within \( S' \) of \( S \).

The question then arises— to what extent is the formalism (wave function of \( S + O_1 \)) for \( O_2 \) an adequate and complete description of physical reality?

As an example, suppose that I am in a laboratory out in space making a series of quantum mechanical measurements upon some system (say first the component spin of an electron, then a companion, then again, etc.) and that I am recording the results in a notebook. Furthermore, imagine that before I began the series of experiments there was an observer \( O_2 \) outside
of the room (and not interacting) who was in possession of the entire wave function of the room, including the electron, the spin, measuring apparatus, and myself, and who furthermore has the computational ability to solve for this wave function at any late time.

Now suppose that O is interested in the contents of my notebook - in particular he asks himself: the question what will be found if he opens the door to my room and looks at it (which could be construed as a position measurement of the marks) at a future time t. He then calculates the wave function for t and finds a bewildering number of possibilities - i.e. the wave function (as will be shown later) contains equal amplitudes for all of the possible sequences which might have been written down. Being an orthodox quantum mechanist O concludes that the probabilities are equal that he will discover any of the possible sequences, and furthermore that prior to his intervention there in fact did not exist any definite sequence i.e. that he rejects the idea that there is "in reality" a definite physical result (definite sequence recorded in notebook) and that his wave function is simply an incomplete description of physical reality - but believes that a definite result was brought about only at the time of his intervention, and that prior to that
his wave function was a complete
description of the physical situation. He
then rushes up, opens the door, bursts
into the room and looks at the notebook.
Amusingly he turns to me and in a patronizing
manner informs me that until this moment
I had no objective physical existence, and that
it was only through his courtesy that the
latent possibilities of my existence were
brought to reality. This startling revelation
is quite discouraging— the fact that I owe my
objective existence to this patronizing gentleman—
until it occurs to me to deflate him by
pointing out that this is nothing for him to be
so happy about since probably this whole
interview and himself included have no reality
yet, and depend upon the effects of the action
of some third observer sometime in the future.
Having thus spoken I turn my back upon my builder
intruder and continue my experiments, hoping that
my works will not be in vain, and not be changed
by late servers.

Was it really meaningless (Bohm) or determined (Richardson)
or undetermined (Bohm) to talk about the
objective existence of a definite but unknown
physical situation in the room before the intervention?
This would deny any reality to our present existence
making it dependent upon the actions of future observers
there an incompleteness in the formulation, such as the existence of hidden variables, which would satisfactorily resolve the difficulty, since \( \Omega \) would then regard his probabilities simply as measures of his ignorance of the true situation.

We shall see that there is another alternative in which all of the possibilities seen by \( \Omega \) have equal reality, and in which the intervention does not change this reality at all, but instead affects \( \Omega ! \) (which serves him right anyhow). Furthermore, this new interpretation requires nothing new, but follows from pure wave mechanics without any statistical interpretation. The statistical interpretation then follows from the theory as a subjective phenomenon.

Briefly, all the phenomena (effects) of measurement are simply transformed from system to observer.