Information in Operation: Probability

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This is an attempt at looking at information 'in action' within complex descriptions of issues in science and philosophy, here, probability. I will refer to my new non-propositional, non-truth-functional logic, designated as Logic in Reality (LIR). Application of LIR provides a logical, physical-ontological interpretation of probability in the course of which new informational relations between science, philosophy and logic can be discerned.

From the LIR standpoint, current probability theory is a set of epistemological constructions, of which an example is a Bayesian probability network. These can have enormously important practical applications, for example in medicine. However, the complex real systems of interest here are those for which compartmentalized mathematization is not possible, and non-computability is the rule rather than the exception.

The application of this new synthesis of logic, science and philosophy is not proposed as an academic exercise. My synthesis it is not a substitute for science and the knowledge gained thereby. But I also focus on the 'negative' and 'vague' properties of phenomena to which my logical system gives the proper ontological, that is, scientific value in the broadest sense, that have probabilistic features: change; uncertainty; potentiality; inconsistency; incompleteness; non-computability; anticipation; expectation; and intuition. As well as describing their interaction, information in my view possesses many of these properties, and this may be one reason it has been so difficult to characterize.

The relevant logic of my framework is a logic of and in reality a non-propositional and non-truth-functional logic of real processes, grounded in physics. This non-propositional nonlogic establishes a dialectic relation between, among other things, uncertainty and its positive counterpart - certainty. It is a *non*-Boolean logic and I explore the non-Boolean characteristics of LIR as they are at the core of my interpretation of information, probability and their relation.

The operation of Boolean logic in classical systems is reflected in the two major methodological principles defined by Bohr (1935) as complementarity and correspondence. The complementarity of oppositions, when they are actualized from the potential field, means that both opposite concepts can work and interact in the course of realization determining the dynamics of the whole system. The duality of oppositions appears as a complementary realization of potentiality. It forms a new potentiality and possesses the energy as a measure of difference (opposition) that can be converted into work.

The problems with the assumption that there is an objective absolute physical reality behind quantum measurement thus become problems of a non-Boolean extension of probability theory, or of a non-Boolean logic. State-independent conditional probabilities depend only on the underlying logico-algebraic structure of the events/propositions and may therefore be regarded more as a logical than a stochastic phenomenon. These probabilities themselves have an objective character and thus differ from classical probabilities the origin of which always lies in the observer's *subjective lack of information*. This approach thus can be applied directly to non-Boolean phenomena in the macroscopic world. It illustrates the essential point of Logic in Reality that its probabilities have an *objective* character that is defined by informational operators. I thus move from standard numerical measures of probability toward a more dynamic concept of the probable informational states of processes, more or less actual or potential. Extension of the informational model used to areas such as causality and mereology is planned, as well as to the implications of this approach for social issues.

References

This list is obviously not exhaustive. It consists of a few articles easily accessible on-line which give an overview of my approach.

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