A BRIEF NOTE ON THE RELATIONSHIP BETWEEN PROBABILITY, SELECTIVE STRATEGIES AND POSSIBLE MODELS.

Whenever a discussion arises about the concept of probability, the fact emerges that the verification of a possible event excludes everything that would have been possible if that event had not occurred.

The eternal debate concerning causality, probability and indeterminism would therefore be endless if a rigorous systematization of the information screening underlying scientific models had not clarified the selective strategies by which formally compact and consistent models are constructed; models which, even if they do not account for the innumerable variations of natural events, nevertheless permit an adequate representation of them within determinate limits of error and approximation.

From the historical point of view, the day of reckoning came when Louis de Broglie proposed a "causale et non linéaire" representation, by means of "la théorie de la double solution de la mécanique ondulatoire" so as to provide "une image du corpuscule où celui-ci apparaît comme le centre d'un phénomène ondulatoire étendu auquel il est intimement incorporé". But in a subsequent measuring operation, "il faudra construire un nouveau train d'onde de dimensions beaucoup plus réduites que celles du premier dans son état final. cette nouvelle forme de l'onde sera naturellement le point de départ d'une évolution des probabilités."

De Broglie, like Einstein, was dissatisfied with a conception of quantum mechanics which exacerbated the controversy Kon tinuität versus Diskontinuität without solving it. It was just this question of the wave of probability proposed by de Broglie which induced me to write a note, which appeared in the March–April, 1948, number of "Scientia", entitled Déterminisme

"et Indéterminisme," which focused on the crucial point in a dispute which had often reached a dramatic pitch in Einstein, Bohr and Born. It is unnecessary for me to recall either the crisis of Hilbert's systematics, provoked by Gödel's theorem, or Hermann Weyl's *Philosophy of Mathematics and Natural Science,* published in 1927, in order to arrive at what Husserl defined as the crisis of European science; a crisis which created paradoxes that always originated in a certain persistent dissension between the empirical mentality and logical formalism, between the reality of operational praxis and nomology. Such mutual incomprehension was fundamentally due to the fact that the sense of one irrefutable reality had been lost: that of the irreversibility of the real time in which any action occurs in a determinate structure.

The development of information theory in to a genuine theory of scientific knowledge has brought to light the fact that what is physically observable is the result of a complex informative operation within the field of a research project which continually reacts, historically and dialectically, with that aspect of reality which is being investigated. Hence the complexity challenge: it is now universally recognized that no single explicative system is sufficient to represent the structure of reality in all the innumerable varieties of its processes. Possible models of reality are the fruit of lengthy information strategies, necessarily selective, which can be simulated and represented logically and algorithmically, according the theoretical paradigms that are formally compact, but different, even antithetical. Today these paradigms can be divided into four fundamental and contrastive categories: deterministic, probabilistic, indeterministic and cybernetic. No model constructed on the basis of one or another of these categories may be said to provide a descriptive and explicative procedure that is complete and exhaustive in itself; it can provide a more or less adequate interpretation and explanation of reality which is valid only in so far as it is the result of a well-controlled selective strategy. Today there are more sophisticated models concerned with neg-entropic, metastable (Prigogine), catastrophic (Thom) and autopoeitic (Maturana, Varela) processes; but I maintain that they are fundamentally developments of one or the other of the four basic