FOREWORD

Simultaneity — The Next Revolution in Physics

Relativity theory (Einstein), quantum mechanics (Planck) and endophysics (Rössler) are the outstanding contributions of the 20th century to the science of space and time. What they have in common is a new conception of the role of the observer. These physical theories of the world have made us aware that the existence of the world is dependent on observation. We cannot prove the existence of the world without an observer. But even more: there is a relation between the world and the observer that defines each other mutually. The world is not a physical system with purely intrinsic qualities, just as the observer, the human subject, is not either. The observer is evidently part of the world, of the system, which he observes. The three theories we have mentioned could be defined in a common book with the title "Being and Observing" or "Existence and Observation", complementing the classics of Heidegger's "Being and Time" (1927) and Sartre's "Being and Nothingness" (1943).
The observer-dependency of the world declares an end to the classical dichotomies of subjectivity and objectivity, even in physics. Questions like whether time and space are subjective modes of perception (Kant) or absolute features of an objective reality are solved in a new way. George Berkeley said already in his "Treatise Concerning the Principles of Human Knowledge" (1710): "Esse est percipi" ["To be is to be perceived"]. He contended that individuals could only directly know sensations and ideas of objects, not abstractions such as "matter". His dictum "To be is to be perceived" means precisely "to be is to be observed". Not only is physics, the science and theory of the material world, evidently a construction of observers, but also the world itself is dependent on the perspectives and interactions of the observers.

Therefore we have to investigate not only space and time, but also spatial and temporal observer perspectives.

If we understand and accept that time and space are neither subjective nor objective notions, but products of the interaction between the world and the observer inhabiting the world, in the sense of systemic qualities of the interface which constitutes the relation between the world and the observer and are, therefore, neither qualities of the world itself nor the observer alone, we will be enabled to investigate and analyze in a new way the concepts of synchronicity, simultaneity versus succession, and sequence.

The phenomenon of entanglement is not only the quantum effect of twin photons, describing two particles in a single quantum state such that when one is observed to be spin-up, the other one will always be observed to be spin-down and vice versa – this despite the fact that it is impossible to predict, according to quantum mechanics, which set of measurements will be observed. As a result, measurements performed on one system seem to be instantaneously influencing other systems entangled with it. In this example, we see very clearly the decisive role of observable physical properties of systems and their correlations. We can describe the world as a system of correlations between observable physical properties. This description evidently includes the observer in the description of the world. Therefore the classical strong assumption of the objectivity of the world can perhaps be replaced by a weaker assumption: the objectivity of correlations. But the properties of the observed system depend on the observer. Because only between observable physical properties can correlations be established. These correlations predicted by quantum mechanics, which Einstein famously derided as "*spukhafte Fernwirkung*" or "spooky action at a distance", have been theoretically confirmed in 1964 by John Stewart Bell, in what is known as Bell's inequality. It dismantles the principle of locality, which states that information about the state of a system can only be mediated by interactions in its immediate surroundings. Results of subsequent experiments have supported Bell's non-locality.

The universe, up to now built on absolute space and time, has, under the influence of relativity theory, quantum mechanics and endophysics, become a system of correlations between observable particles in space

and time. It is, therefore, a system that includes not only space but also non-locality, not only time but also non-temporality. In such a system, which is characterized by observer-dependent concepts of the world, simultaneity becomes a key concept in the description of the world. This is because simultaneity can only be stated by an observer, who observes different events and measures them in the parameter of space and time. In such a universe of correlations simultaneity can be seen as the principal structure of the world. After the concepts of relativity and observability, which revolutionized classical physics, the concept of simultaneity is the logical consequence and the next step towards another revolution in physics. Simultaneity clearly is an observer perspective which calls into question all our assumptions about space and time hitherto described as a succession of events. Simultaneity describes the world as the nucleus of the Now. It divides the world not only into observable and unobservable, into measurable and immeasurable, into compatible and incompatible elements, but also into spatial and non-spatial, temporal and non-temporal states. The Now can metaphorically be described as a church where all physical beliefs and concepts of spacetime cohabit. A philosophy of the Now, described as the physics of simultaneity, is the ultimate extinction of the standard model of physics describing the material world.

Space and time, described in the classical absolute way, are "the prison bars of reality" (O.E. Rössler). If the observer is part of the fabric of the world, the prison of space and time becomes also a mutual interaction between the observer and the prison. Simultaneity becomes the escape button of the prison of space and time. Symmetry and complementarity support the concept of simultaneity in destroying the concept of a linear succession. Symmetry described as self-similarity and connected to scale theory produces a theory of scale relativity, which is a fractal structure. Fractality of space and time rather than absolute space and time turns the universe into a Cantorian spacetime manifold, in the sense of Mohamed El Naschie. The universe described as the mechanics of time and space, as a time and space machine, was one side of the story, told today in digital philosophy as the universe as a quantum computer. The brain as a time and space machine is the other side of the story. With the concept of simultaneity we start a new story of the

universe. It provides the key to open a new door, a new interface into the world of space and time and a new tool to liberate us from the prison of space and time.

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