THE MEASUREMENT PROBLEM OF A CONSCIOUS OBSERVATION

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ABSTRACT

The measurement problem is defined by von Neumann to be a discrepancy between reversible evolution by the Schrödinger equation and an irreversibility characterizing the measurement process [1]. In that respect, it fits well to the time operator formalism of complex systems which is aimed to unify reversible and irreversible theories in physics [2]. Von Neumann moreover indicated a relation to the principle of psychophysical parallelism which had already been mentioned by Bohr [3]. He referred to the Fechner psychophysics which was termed the *identity view*, since the observer is not considered a conglomeration of two substances but one single entity [4]. Fechner still distinguished the outer psychophysics which is a link between sensation and stimulation from the inner psychophysics which is a link between sensation and consciousness [5]. The problem is therefore related to a discernment of the conscious observation from a crude perception [6].

The time operator formalism developed by the Brussels school of thermodynamics concerns a change in representation linking reversible and irreversible evolution of a system [2]. Von Neumann has also remarked significance of the time operator for resolution of the measurement problem [1]. The change in representation that corresponds to an operator function of time should relate the outer to an inner psychophysics which is denoising the crude perception [5]. In that regard, an observation is about the optimal base which is aimed to denoise a signal [6]. It is an eigenbase of the time operator that has characterized a process which the signal originates from [7]. The process refers to measurement which is a reason to be presented by the Euclidean algorithm that is automorphous to a time series of binary digits [5]. The evolution is concerned by a shift in the binary code, which relates an eigenbase of the time operator to wavelets [8]. A step towards the general measurement involves as well wavelet frames which are redundant dictionaries that should warrant a stable reconstruction of the signal [9]. Duality in frame theory has tied the psychophysical parallelism to a relation between states and devices of the measurement process [5].

Keywords: general measurement; psychophysical parallelism; time operator; wavelet frames; optimal decomposition

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