Reflexive Dynamics and the foundations of a cybernetic interpretation for quantum and relativistic phenomena based upon stochastic perturbation, approximation and random fitting

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This is an exploratory work, based upon the hypothesis of an underlying process dynamic governing quantum events that may be described in physical and informational terms but which is essentially non-algorithmic (in the classic Penrose sense) and non-computable in the Church-Turing model. Randomized and stochastic perturbation models have originated and developed principally in the domain of control theory and formal cybernetics, with applications to extremely complex state-spaces and highly non-linear dynamics within the same. The question of how a spacetime geometry may evolve from "pre-dimensional" action-relations is considered in the light of such models, with a view toward a horizon that suggests something comparable to cellular automata behavior, in a Planck-scale-limited, probability-density controlled "action-space." Such relational processes give rise to emergent and increasingly stable structures that are consistent with observation and representation as four-dimensional space. Time serves as a different measure, mathematically consistent with time in general relativity but ontologically different, providing a correlation of 3D spatial constructs (observables) transiting in a fourth dimension. Analogies may be found with the motion of image frames within a video stream or to holographic image constructions. This investigation further suggests that increasing complexity of structure, including emergent behavior of mass and particle-concentration (as a topological condensation process), is a necessary consequence of a universal "principle of least action" ("stationary action") governing all energetic relations. Expansion of scale implies increasing expansion of interactions and the principles cogently stated by Fermat, Maupertuis and Euler are satisfied through complexity of structure.

Certain issues that have been dilemmas within quantum mechanics and relativity theory are addressed with the suggestion, not dissimilar from Susskind's "EPR = GR" papers, that superposition and entanglement, at the scale of photons or in more complex structures including molecules, derives from a pre-spacetime unity that is logically and physically prior to an observable spacetime. Within the observable realm of finitized, 3D objects measured as separable in location, the phenomenon of gravity is an expression of that underlying unity and should be regarded as a relationship entirely different from a force between separable objects.

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