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On operational determinants of biological processes

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The central puzzle of nature is the drastic difference between dead and living matter. Routinely, physics explores dead matter while live matter lies in a completely different realm of biology. A fundamental physical theory that cannot empower the material world with life is not merely incomplete, it is wrong. Purposeful behavior of complex systems depends on continuous influx of information and energy. With current advancements of information technology such resourceful facilities of nature can be exemplified in terms of "Cloud Computing" and "Internet of Things". We have suggested a construction of the physical world using a Cellular Automaton model, which basically displays the behavior of elementary particles of matter. At the next level, it produces the operative capacities of the Holographic Universe exhibiting the inconceivable physical property of nonlocality. This construction incorporates all the tremendous diversity and sophistication of biological phenomena. The suggested worldview shapes the operational capabilities of the genome as the apparatus for organisms' development. As long as the genome does not contain sufficient amount of information, organisms are built by reference architecture with DNA as classification labels. The pivot process of morphogenesis mobilizes the given resources in a sort of "3-D printing". Proper understanding of biological information processing is decisive for confronting challenging biomedical situations, in particular, the troublesome antibiotics resistance, which is one of the greatest threats to modern health.

Biography

Simon Berkovich received MS in Applied Physics from Moscow Physical-Technical Institute (1960) and PhD in Computer Science from the Institute of Precision Mechanics and Computer Technology of the USSR Academy of Sciences (1964). He played a leading role in a number of projects on the design of advanced hardware and software systems. He has several hundred publications in various areas of physics, electronics, computer science, and biology. In 2002, he was elected as a member of the European Academy of Sciences for an outstanding contribution to computer science and the development of fundamental computational algorithms.

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