

Chapter 62

Information and Informational Modeling in Living Structures

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ABSTRACT

Information is a concept not easily penetrated in science when this refers to the involved mechanisms in the body structuration and functionality. Limited only to describing the genetic info-activity, a general coherent approach and modeling of the human organism and of the composing eukaryotic cells has not yet been explored, so this chapter is dedicated to this issue. For this, the concept of matter-related information, operating by structuration/destructuration mechanisms typical for living structures, is defined. This allows us to approach/describe the body structuration and functionality in relation to the mind and consciousness, independently on the informational sources and their nature, and to reveal a similar informational system at the human/eukaryotic composing cell level, referred to as metabolism, genetic transmission/info-generation, info-selectivity, and cognitive/sentience/decisional processes, well supported in animals, plants, and micro-organisms (bacteria) by the experimental data.

INTRODUCTION

Information is a powerful tool in industry, healthcare and scientific investigations, managed by artificial intelligence (AI) machines in big data analysis and processing (Filip, 2020) for decision making (Filip, 2022) under conditions of compatibility with human health (Filip, 2021) with remarkable results, in particular for the control and prediction of the evolution of COVID-19 infections and variants in the entire world (Gaiseanu, 2021c, 2022a), an urgent task which still preoccupies the entire society at the worldwide scale. However, when this concept is used to investigate the involved mechanisms in body structuration and functionality, and the relation between the body and mind, the question concerning the

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role and implications of information is not yet well understood (Gaiseanu, 2022b). However, information is actually a major component of biological organisms, not only to self-organize them (Gaiseanu, 2020a), but also to animate and capacitate them to communicate permanently with their environment (Gaiseanu, 2022b) and with their own body (Gaiseanu, 2020a, 2021d), allowing/supporting their existence, maintenance and adaptation. In this regard, remarkable advances have been made in the last several years to observe/reveal from the informational perspective the human mind-body mechanisms and the nature of structuration and self-organization processes of our own body (Gaiseanu, 2021e). Such investigations revealed fundamental information-assisted mechanisms involved in biologic creatures on the entire scale – cells, plants (Gaiseanu, 2022c,d), animals (Gaiseanu, 2022b), and humans (Gaiseanu, 2020b) – within their permanent effort to maintain and adapt their structure with respect to environmental cues and body tasks (Gaiseanu, 2021f, 2022e), highlighting ultimately the implication of information in living structures (Gaiseanu, 2020c,2021e,2022c) (Schrödinger, 1944).

In this chapter is presented a new concept of information defined as matter-related information in biological organisms, allowing to achieve informational modeling on the entire biological scale, in particular referring to the human body, eukaryotic cells, and plants within the informational model of the human body and living structures.

BACKGROUND

Information was not a concept easily penetrating in science, and long time efforts were made to crystallize its meaning during the human and science evolution (Gaiseanu, 2021b), starting from the antique philosopher like Plato, who believed that ideas/forms are the fundamental element of universe, in opposition with Aristotle's view, promoting matter as basic composing material of the world (Gaiseanu, 2021a, 2021b). Passing by the Maxwell's demon paradox (Dougal et al., 2015; Gaiseanu, 2021a), an imaginary experiment based on the intervention of an "intelligent" demon which opens a small door between two recipient to pass the more rapid molecules from one side to another, infringing therefore the thermodynamic laws, and arriving to Szilard, who resolved this paradox showing that the system receive actually information by such a demon intervention (Szilard, 1929), the concept of information was defined in electronic communication systems by Shannon, in probabilistic terms (Shannon, 1948). However, the role of information in living and non-living systems was intuitively expressed by Draganescu's philosophic view, suggesting that matter structuration is the result of the intervention of an "informatter" agent, able to activate this process, while the structuration of the living systems results by the intervention of this "informatter" agent on the structured matter (Draganescu, 1990). It is still not well understood however the operability of information in the living systems, although its role is acknowledged in terms of information theory, referred in particular to the genetic activity in the cell (Jiang & Xu, 2010), and no a general coherent approach and modeling of the human organism and of the constituting eukaryotic cells was given so far, so the goal of this chapter is to cover this gap.

INFORMATION AND INFORMATIONAL MODELING IN THE LIVING STRUCTURES

Information from the perspective of the science and technology of information is related in its initial form with the communication between an information source and a receiver, linked by a communication

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