
Understanding the "machine metaphor": organizational similarities and differences between machines and living beings

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Abstract

The aim of this paper is to analyze the concepts of organism and machine, and identify if there are irreconcilable incompatibilities between them. To put aside superficial differences, we investigate them as natural systems, in order to highlight possible similarities and differences in the constitution, organization and functional dynamics. In doing so, a certain parallel becomes obvious: as physical entities, both organisms and machines are heterogeneous systems, internally differentiated, and composed of a large number of microscopic particles, which are arranged in functional components, thereby allowing a description of behavior based on general notions such as operation and coordination. As Robert Rosen points out, what machines and organisms have in common is that they are material systems that admit relational description, and that is precisely why Maturana and Varela define organisms as "autopoietic machines". Howard Pattee famously utilized the concept of 'constraint' to base the relational representation of dynamical systems. More recently, authors such as Deacon, Moreno and Mossio are reclaiming the idea of constraint to explain the specificity of life itself. It is at this level of abstraction that an essential difference between organisms and machines appears: while the organization of the machine is defined from the outside, with externally enforced constraints, in organisms just the opposite happens, for their constraints are permanently established and regenerated as a result of the very dynamics of the system - there is not, as in the first case, a split between the system's activity and its own production process.

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