

Autopoiesis and Cognition

Paul Bourguine, CREA-Ecole Polytechnique

The course will revisit the concepts of autopoiesis and cognition as the two main properties of the living. It will then describe a general protocol for reproducing minimally – bottom-up or top-down — these properties on artificial systems.

First a modified definition of autopoiesis is proposed after looking at the history of this concept: "An autopoietic system is a network of processes which produces the components which reproduce the network, and which also regulates the boundary conditions necessary for its ongoing existence as a network". A thesis and its consequences are then derived from this definition. The insufficiency of autopoiesis for characterizing life is then discussed, leading to the additional criterium of cognition.

A definition of cognition will be also proposed: "a system is cognitive if and only if sensory inputs serve to trigger actions in a specific way, so as to satisfy a viability constraint". It follows from these definitions that the concepts of "autopoiesis" and "cognition", although deeply related concerning the regulation of the boundary conditions of the system, are not immediately identical: a system can be autopoietic without being cognitive, and cognitive without being autopoietic.

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