

Second-Order Complex Systems: Case Studies of Autonomy and Free Will

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Abstract : Although there does not exist a definitive consensus on a precise definition of a complex system, it is generally considered that a system is complex by nature. The presented work illustrates a different point of view: a system becomes complex only with regard to the question posed to it, i.e., with regard to the problem which has to be solved. A complex system is a couple (question, object). Because the number of questions posed to a given object can be potentially substantial, complexity does not present a uniform face. Two types of complex systems are clearly identified: first-order complex systems and second-order complex systems. First-order complex systems physically exist. They are well-known because they have been studied by the scientific community for a long time. In second-order complex systems, complexity results from the system composition and its articulation that are partially unknown. For some of these systems, there is no evidence of their existence. Vagueness is the keyword characterizing this kind of systems. Autonomy and free will, two mental productions of the human cognitive system, can be identified as second-order complex systems. A classification based on the properties structure makes it possible to discriminate complex properties from the others and to model this kind of second order complex systems. The final outcome is an implementable synthetic property that distinguishes the solid aspects of the actual property from those that are uncertain.

Keywords : autonomy, free will, synthetic property, vaporous complex systems

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