Abstract Submitted
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Measurement of organization in complex and co-evolving networks[1] GEORGI GEORGIEV, Assumption College and Tufts University — We apply a new method for measurement of organization of complex and co-evolving networks using the quantity of physical action. We consider simple arrangements of elements in a network and constraints to their motion along paths and calculate the amount of organization in each system using the following measure: organization is the inverse of the average sum of physical actions of all elements in a system per unit motion multiplied by the Planck's constant. The meaning of quantity of organization here is the number of quanta of action per one unit motion along a path of an element. A unit motion along a path for a network, such as internet, is the transmission of one bit of information. The calculation can be expanded to systems consisting of many elements and constraints and also can be followed as a function of time with improvement of the organization of a system or connected systems and networks. Thus, the principle of least action becomes the driving force, and the least action state of the system, the attractor for all of the paths of its elements and states of its constraints. We consider also the rate of constraint minimization, or decrease of action per element and motion, as a function of the number of elements i.e. quality as a function of quantity. Increase of quantity, within specified limits, leads to increase of level of organization and vice versa.

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