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Mechanisms in Dynamically Complex Systems

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Abstract

In recent debates mechanisms are often discussed in the context of 'complex systems' which are understood as having a complicated compositional structure. I want to draw the attention to another, radically different kind of complex system, in fact one that many scientists regard as the only genuine kind of complex system. Instead of being compositionally complex these systems rather exhibit highly non-trivial dynamical patterns on the basis of structurally simple arrangements of large numbers of non-linearly interacting constituents. The characteristic dynamical patterns in what I call "dynamically complex systems" arise from the interaction of the system's parts largely irrespective of many properties of these parts. Dynamically complex systems can exhibit surprising statistical characteristics, the robustness of which calls for an explanation in terms of underlying generating mechanisms. However, I want to argue, dynamically complex systems are not sufficiently covered by the available conceptions of mechanisms. I will explore how the notion of a mechanism has to be modified to accommodate this case. Moreover, I will show under which conditions the widespread, if not inflationary talk about mechanisms in (dynamically) complex systems stretches the notion of mechanisms beyond its reasonable limits and is no longer legitimate.

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