

Complex Systems : Problems of Reproducibility

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From an engineering perspective, it is well known that numerous problems hamper the proper control and prediction of complex systems which are essential for the reproducibility of their behavior. In addition, it is not obvious how the concept of complexity ought to be understood within the tradition of physics and its epistemology. Both issues have important ramifications for complex systems in other disciplines as well.

Three outstanding topics in this regard are discussed.

(1) Many definitions of complexity stress its difference from randomness and are fundamentally context-dependent rather than universal.

(2) Complexity measures are often defined in information-theoretical terms, but extend the scope of pure syntax toward semantic and pragmatic dimensions.

(3) Mathematical limit theorems, expressing the stability of a result, are often not straightforwardly applicable to complex systems.