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Stephen J. Gould's Legacy: Nature, History, Society

Venice, May 10–12, 2012

Organized by Istituto Veneto di Scienze, Lettere ed Arti
in collaboration with Università Ca' Foscari di Venezia

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Randomness increases biological organization: a mathematical understanding of Gould's critique of evolutionary progress

Abstract

Physical randomness is "noise'', it affects robustness, it is related to entropy growth, thus to energy dispersal or increasing disorder. In biology, randomness is an essential component of variability, thus of diversity, thus of robustness of ecosystems, species, organisms. In his long-lasting fight against any sort of finalism, J.-S. Gould proposed an elegant answer to the anthropocentric myth of increasing phenotypic organization or complexity along evolution. His answer is grounded on an insightful, but informal understanding of randomness in the phylogenetic drift. We will hint to a rigorous mathematical approach to his fundamental ideas, by discussing as well some general questions: what is physical/biological randomness? How do they relate or differ? Can we make a difference between complexity and organization, in biology?

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