

Models of Time for Reductive Explanations in Experimental Biology

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Abstract

Although most analyses of reduction focus on spatial relationships among natural phenomena (e.g., part-whole relations), time is also an important aspect of reductive explanations in biology. Three different models of time can be distinguished: historical, iterated compositional and causal process. After characterizing each of these, I show that the causal process model of time corresponds most closely to reductive explanations of ontogeny and explains the success of generalizations derived from the laboratory study of model organisms that differ compositionally. Philosophical preoccupation with synchronic, compositional relations has obscured this model of time in the practice of experimental biology. Additionally, focusing on the causal process model uncovers a new conceptual possibility: conflicting explanatory preferences between spatial and temporal variables in a reductive explanation. This possibility raises new questions about reductionism related to the diversity of temporal measures utilized by scientists.