



# Discovering Complexity: Decomposition and Localization as Strategies in Scientific Research

*William Bechtel, Robert C. Richardson*

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*Discovering Complexity* offers an account of scientific discovery that aims to be psychologically and historically realistic. Drawing on cases from a number of life sciences, including biochemistry, genetics, and neuroscience, this study of the dynamics of theory development focuses on two psychological heuristics, decomposition and localization. William Bechtel and Robert Richardson identify a number of "choice-points" that scientists confront in developing mechanistic explanations and describe how different choices result in divergent explanatory models. According to Bechtel and Richardson's analysis, decomposition is the attempt to differentiate components of a system, while localization assigns responsibility for specific tasks to these components. The book examines in detail the usefulness of these heuristics in biological science, but also discusses their fallibility: underlying their use is the sometimes false assumption that nature is significantly decomposable and hierarchical. When a system does not appear to be decomposable, a classic response has been to abandon the pursuit of mechanistic explanation and to settle for accurate descriptions of phenomena. More recently, with advances in mathematical modeling, an alternative has emerged. Described in this work is an approach to explanation that appeals to interactions between simple components, rather than assigning functions to individual components.

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