# Book Review

Modularity: Understanding the Development and Evolution of Natural Complex Systems, edited by Werner Callebaut and Diego Rasskin-Gutman. Cambridge: MIT Press, 2005, pp. xvi + 455. ISBN 0-262-03326-7.

*Modularity: Understanding the Development and Evolution of Natural Complex Systems* is undoubtedly intended for deep-rooted experts in biology. The book is the sixth title in the *Vienna Series in Theoretical Biology*, but while it does indeed have deeply rooted exposure to theoretical biology, in some respects, the material reaches well beyond the target of the series. Readers grounded in Psychology and the Life Sciences will find value in examining several parts of this book. While the book is not a front-to-back read, it certainly has many pages, possibly even full chapters, for nearly every visitor. For example, the book's Forward, written by the late Herbert A. Simon, is in itself a reason for a scholar in any field to at least briefly peruse this book.

This collection of 18 chapters, brings together many of the ideas presented during the fifth Altenberg (Austria) Workshop in Theoretical Biology, which was held over four days in October 2000. The stated goal of the book is to expand the conversation about modularity beyond its "home disciplines" to a much broader domain. The editors have been somewhat successful in bringing in other disciplines in which modularity has become a part. Overall, they seek to clarify what modules are, present the implications of module change dynamics, and bring about knowledge transfer among diverse fields. The chapters are each a separate paper that was presented at the Altenberg workshop, which leaves the front-to-back reader a bit overcome with the somewhat disjoint nature of the collection. Essentially, this book seems a workshop-proceedings publication with an added and invaluable wrapper, in the form of the Forward and Introduction section.

For the vast majority of *Nonlinear Dynamics, Psychology, and Life Sciences* (*NDPLS*) readers, only selected chapters will be of interest. The chapters in the second and third sections cover material only a well-trained Evolutionary Biologist would appreciate; I will not detail these two sections in this review, except to mention that Chapters 12 and 13 provide some relief from the Biosciences as they present modularity

from an alluring perspective, namely graphic arts and broader general sciences. The Forward, Introduction and the last section, however, are likely of wide interest.

Simon's Forward, which was written just a few months before his death and was read aloud to the participants at the workshop, is an undemanding and effortless entry into modularity's broader context. Simon, who the editors call "the master of modularity" (p. xvi), discusses the concepts of complexity, systems, evolution, hierarchy, and fitness, in a manner as you might imagine sitting by the fireplace, alone with "the master", who is astutely sharing his fatherly-like stories of the universe.

The Introduction section consists of only a single article, written by Werner Callebaut, who is one of the book's two editors and a co-organizer of the workshop. His introduction serves as an excellent summary of ideas within the entire book and may actually be the most powerful chapter in the book, at least from the perspective of the *NDPLS* audience. The chapter, entitled "The Ubiquity of Modularity", introduces the various dimensions and different kinds of modularity, as well as the structure, process, and function of modularity. Callebaut presents the top-down and bottom-up research strategies, then introduces three aspects of modularity; to prepare the reader for the last section of the book, he succinctly presents modularity concepts as they relate to the brain and the human mind.

The last section, entitled "Modularity of Mind and Culture", I found to be most interesting. The section consists of five fascinating chapters that, in order, cover: (a) a specialized modularity versus connectionist view of the brain and human cognition, (b) via a computer simulation, how modularity concepts are in use in psychology, (c) by utilizing experiments of human eye movements, a discussion that suggest that modularity is only one part of the human cognitive architecture, (d) a look at modularity through the lens of economic theory, and (e) ties thought, language, and natural logic that posits that cognitive organization is modular.

While I can not go so far as to sturdily recommend this book as one that we all should own, I would offer that it is a work that deserves at least a quick look to establish which of the parts individually *call out* to you for your reading time.

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