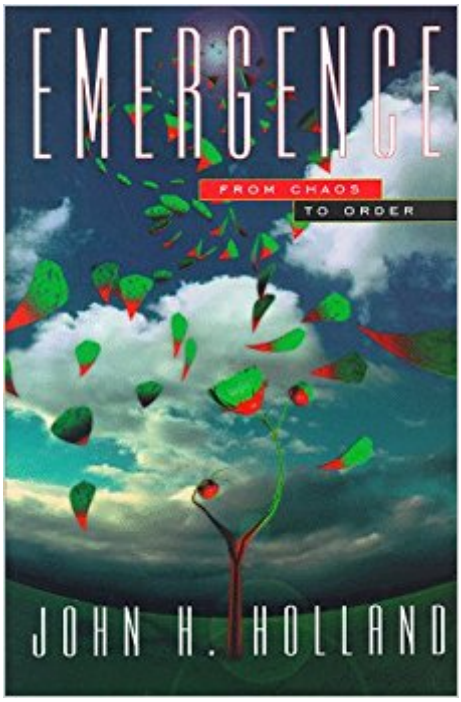
Emergence: From Chaos To Order (Helix Books)



Synopsis

In this important book, John H. Holland dramatically shows us that the “emergenceÃ¢â ¬Â• of order from disorder has much to teach us about life, mind and organizations. Creative activities in both the arts and the sciences depend upon an ability to model the world. The most creative of those models exhibits emergent properties, so that “what comes out is more than what goes in.Ã¢â ¬Â• From the ingenious checkers-playing computer that started beating its creator in game after game, to the emotive creations of the poet, Emergence shows that Holland's theory successfully predicts many complex behaviors in art and science.

Book Information

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Customer Reviews

"Emergence" is the notion that the whole is more than the sum of its parts. John Holland, a MacArthur Fellow known as the "father of genetic algorithms," says this seemingly simple notion will be at the heart of the development of machines that can think for themselves. And while he claims that he'd rather do science than write about it, this is his second scientific philosophy book intended to increase public understanding of difficult concepts (his first was Hidden Order: How Adaptation Builds Complexity). One of the questions that Holland says emergence theory can help answer is: can we build systems from which more comes out than was put in? Think of the food replicators in the imaginary future of Star Trek--with some basic chemical building blocks and simple rules, those machines can produce everything from Klingon delicacies to Earl Grey tea. If scientists can understand and apply the knowledge they gather from studying emergent systems, we may soon

witness the development of artificial intelligence, nanotech, biological machines, and other creations heretofore confined to science fiction. Using games, molecules, maps, and scientific theories as examples, Holland outlines how emergence works, emphasizing the interrelationships of simple rules and parts in generating a complex whole. Because of the theoretical depth, this book probably won't appeal to the casual reader of popular science, but those interested in delving a little deeper into the future of science and engineering will be fascinated. Holland's writing, while sometimes self-consciously precise, is clear, and he links his theoretical arguments to examples in the real world whenever possible. Emergence offers insight not just to scientific advancement, but across many areas of human endeavor--business, the arts, even the evolution of society and the generation of new ideas. --Therese Littleton

Emergence, where simple systems generate complex ones, is a fundamental concept in many modern scientific theories. Phenomena as diverse as a game of checkers, neural networks, and even the origin of life are emergent. Holland, the developer of "genetic algorithms," demonstrates how mathematical models can represent the essential elements of emergent systems. Though the subject is arcane, Holland's emphasis on modeling appeals to readers' common sense, and he handles the mathematics very adeptly. Frequent recapitulation also helps. Most of the text focuses on the model-building process, with a few selected examples, and thus this book would be a good companion to others that are broader and more speculative, such as Murray Gell-Mann's The Quark and the Jaguar (LJ 4/15/94). For larger public and academic libraries.?Gregg Sapp, Univ. of Miami Lib., Coral Gables, Fla.

Having done some work with genetic algorithms, I was very excited to read a book by John Holland. I was hoping to learn more about how to create models of complex systems and how new behavior can be exhibited by computer programs that were not inherent in the programmer's intent or design.I certainly came away with knowledge of how to create models because that seemed to be the main point that Professor Holland made throughout the book. Don't get me wrong. Modeling is critically important to understanding the world we live in and the phenomena we observe in the world. I just had no idea from the title or the blurbs that modeling would be such a central theme. In a way it is reassuring since modeling is something that I am very comfortable with, and to me, relatively straight forward.The book covers such novel concepts as cell assemblies, anticipation, signaling, and indefinite memory in relatively easy to understand language. There is a fair amount of dense mathematical notation that adds a bit of depth if you are comfortable with the subject matter,

but can be skipped by the casual reader. I also like the point Professor Holland made about macrolaws and microlaws - that once basic structures and patterns are in place (microlaws), emergent, higher level structures and patterns emerge (macrolaws) that can be explained without reverting back to a knowledge of the microlaws. This provides a road map to understanding more about emergent behavior as we better develop and understand the microlaws describing emergent behavior.I do think that some of the material was repetitive. Although many reviewers liked the last chapter or two, the end of the book seemed to drag on for me. It was a combination of recap (which is fine), and a philosophical discourse on innovation and creativity. The material was fine, but it seemed just tacked on at the end, and was less interesting to me than the rest of the book.I have not yet read "Hidden Order", so I cannot compare the two books. Overall, I am very glad I read the book. I learned many new concepts regarding emergent behavior, and reinforced my prior knowledge about things like neural nets, genetic algorithms, and game trees.

I WANT TO SEE THE TABLE CONTENTS OF BOOKS!!!

Good, but pretty simple. An interesting, well-paced introductory level text.

Fascinating book..

The finest book on CAS I have read!

I just read Emergence in preperation for my oral qualifying exams for a Ph.D. in computer science and cognitive science. I disagree with many of the negative reviewers -- this book is well-worth the read. I share some frustration over this book due to the way it seems to scratch the surface. The book’s strength seems to be in asking the right questions and pointing the way towards some future science of emergent behavior.The book is too short for my taste -- in many of the later chapters Holland makes thought-provoking, deep remarks, without the follow-up and commentary that they leave me hoping for. But again, his main purpose seems to be in making people think about the issues. And he provides some formalisms that might be part of some future theory -- his constrained generating procedures (CGPs) and the variable "CGP-v" recall constructs such as the Turing machine for studying computability.The strengths of the book lie in:1) Discussion of the nature of modeling in science, and computer modeling in particular. This is discussed with clarity and pragmatism.2) The beginnings of a framework in which to study emergence in multi-agent

systems.3) Discussion of the importance of metaphor/analogy in the creative scientific process. I didn't expect this to appear in the book but it was very welcome, and especially appropriate due to the role played by Mitchell's and Hofstadter's "Copycat" model (of analog-making itself) as it motivates the expansion of CGPs to CGP-v's as the book progresses.Overall, I recommend this book highly to readers interested in the beginnings of this exciting new science, that really is in its infancy. I gave it 4 stars just because I felt like Holland had a lot more to say in the later chapters and left too much "as an exercise for the reader." I hope he does follow-on work that clarifies his vision for a future science of emergence!

Having just read Holland's other book "Hidden Order", I was psyched to hear that he had written another book on the science of complex adaptive systems. This book, however, was quite disappointing. While the first few chapters were interesting, the second half of the book was a loss to me. There seemed to be too many divergent themes upon which he was trying to comment. I feel like he ran out of ideas and started just writing down anything that came to mind. The last chapter provided a good summary of the ideas he tried to express concerning emergence, but the book on the whole left more questions than it answered. If you really want to learn something about emergence and related science of complexity, check out his other book "Hidden Order". It's much better and a bit easier to understand in my opinion.

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