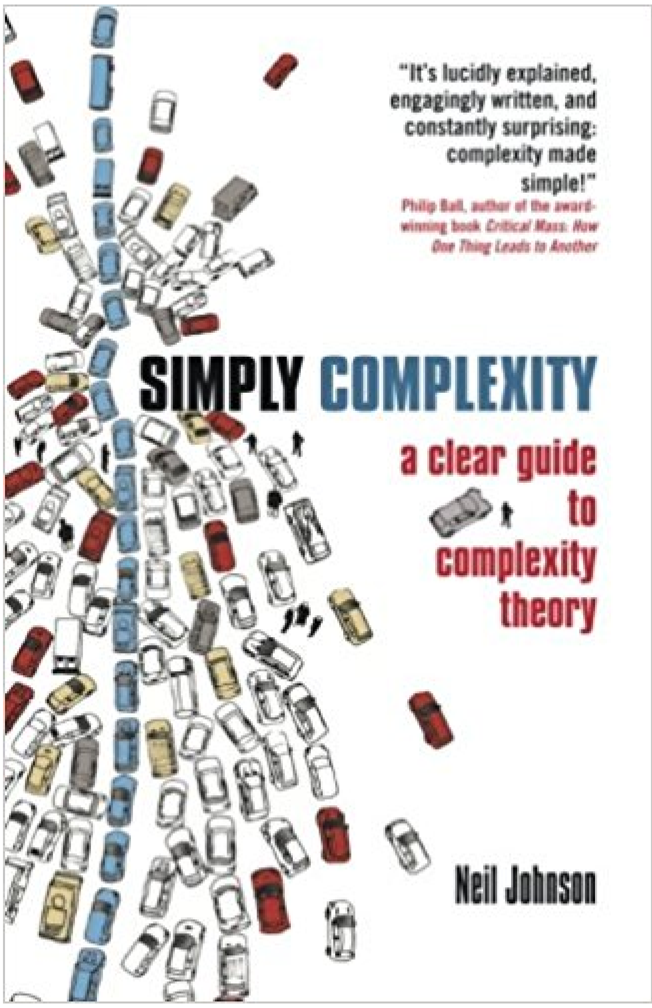
Simply Complexity: A Clear Guide To Complexity Theory



Synopsis

What do traffic jams, stock market crashes, and wars have in common? They are all explained using complexity, an unsolved puzzle that many researchers believe is the key to predicting – and ultimately solving—everything from terrorist attacks and pandemic viruses right down to rush hour traffic congestion.Complexity is considered by many to be the single most important scientific development since general relativity and it promises to make sense of no less than the very heart of the Universe. Using it, scientists can find order emerging from seemingly random interactions of all kinds, from something as simple as flipping coins through to more challenging problems such as the patterns in modern jazz, the growth of cancer tumours, and predicting shopping habits.

Book Information

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Customer Reviews

"Johnson’s book fills a long-overdue need for an engaging semipopular book about complexity science, one that is also strong on the underlying scientific and theoretical concepts." "Highly recommended." Choice "Neil Johnson has provided a readable account of the science of complexity" Oxford Times

Neil Johnson is the head of a new inter-disciplinary research group in Complexity at University of Miami in Florida. Previously he was Professor of Physics and co-director of research collaboration into Complexity at Oxford University.

If you are unfamiliar with Complexity Theory ("The Science of Sciences") then this is a great book to start with. Neil Johnson has done an impeccable job of keeping the intricacies of Complexity within a very manageable framework that any layman can understand. Take this quote for example: "Complexity can be summed up by the phrase "Two's company, three is a crowd." In other words, Complexity Science can be seen as the study of the phenomena which emerge from a collection of interacting objects - and a crowd is a perfect example of such an emergent phenomenon, since it is a phenomenon which emerges from a collection of interacting people." The real strength of this book lies in Johnson's unsophisticated and plain approach towards Complexity Science which he couples with many real world examples. But neither does Johnson leave anything out; Self-Similarity, Fractals, Power-Laws, Networks, etc. - it's all here.My only complaint about this book comes on page 100. Here, Johnson explains how the "six degrees of separation" network was conceived by Stanly Milgram in 1967. I am sure that Johnson knows that this was debunked by later research, but Johnson fails to mention this in the book (one only has to look to Wikipedia, Complexity: A Guided Tour by Melanie Mitchell orÂ The Numbers Game: The Commonsense Guide to Understanding Numbers in the News, in Politics, and inLifeÂ for confirmation. I do not fault Johnson here because given the 'basic' level at which this book was written, he probably didn't feel like complicating the issue - the point he was trying to make was satisfied - and he therefore surely didn't feeling like going into the whole mess by upending the urban legend. So, with that aside, I do recommend this book as a great introduction to Complexity and recommendÂ Complexity: A Guided TourÂ by Melanie Mitchell for the interested reader as a great book to continue learning about Complexity Science.

I came to this book as a physicist with a hobby-level interest in complexity theory. And to me this was a disappointment. Mathematical depth is non-existent. In its course, the book goes over several problems, approaching them from the point of view of complexity theory. This perspective is interesting and instructive, sure enough. However, these explanations tend to be too long and convoluted. A point that could be made effectively in a paragraph often takes several pages. Even for a non-scientist looking for an overview of a subject, I can't imagine this is a helpful treatment.Basically, imagine someone's dad went to a lawn mower convention, and now insists on telling everyone all the cool lawn mower gadgets he saw. It's exactly like that, except it's complexity theory and not lawn mowers. And it goes on for over 200 pages.Melanie Mitchell's "Complexity: A guided tour" is a far better book. Just get that one.

One of the best books I've read this year. I HIGHLY recommend it to anyone who wonders how complicate problems (hint: they all involve human behavior) could be modeled and possibly solved. So insightful yet very easy and enjoyable to read. Get this book! Read it! You will be amazed.

Easy read, definitely connects many dots! Its the simple form and combination of organized chaos of economy, sustainability and engineering!

Complexity science is a broad field with vague boundaries, so no single book can cover the whole field in depth. In this book, Neil Johnson focuses on a definition of complexity associated with a particular class of computational models, and he describes these models and their resulting behaviors at a level suitable for the general reader (somewhat detailed descriptions, but essentially no formal math). He has a PhD in physics and has himself done considerable research on these types of models (see the references at the end of the book), so his knowledge in this area is fairly authoritative.For Johnson, a complex system has the following characteristics:(1) A population of multiple (at least three) interacting objects or "agents" which typically form a network. These objects may be very simple, but they don't have to be.(2) Competition among the objects for limited resources. As part of this overall competition, there can also be local cooperation within the system.(3) Feedback processes, which give the system memory and history.(4) Ability of the objects to adapt their strategies in response to their history.(5) Ability of the system to interact with its environment.(6) Self-organization of system behavior, without the need for a central controller.(7) Emergence of non-trivial patterns of behavior, including a complicated mixture of ordered and disordered behavior. This can include chaotic behavior, as well as extreme ordered behavior (eg, traffic jams, market crashes, human diseases and epidemics, wars, etc.).Johnson gives many examples of complex systems, and a jazz band is among the most interesting of these examples (the jazz performance is the behavior of the system).Here are some of the key results from the models he describes:(1) Even if the objects comprising the population of the system are complicated and heterogeneous (eg, people), this variability tends to "average out" in a way that allows the objects to be modeled as being fairly simple and homogeneous (at least as a first approximation).(2) Due to competition, the population of objects will often become polarized into two opposing groups (eg, bears and bulls in financial markets, opposing political parties, etc.). This competition tends to reduce fluctuations in the behavior of the system.(3) It's sometimes possible to steer the behavior of a system by manipulating a subset of the system's objects.(4) Network structure tends to make complex systems more robust.(5) The overall behavior of a system, and the ability of individual objects in the system obtain resources, depends on both the amount of available resources and the level of connectivity (network structure) between objects. When resources are only moderate, adding a small amount of connectivity widens the disparity between successful and unsuccessful objects, whereas adding a high level of connectivity reduces this disparity. By contrast, when resources are plentiful, adding a small amount of connectivity is sufficient to increase the average success rate and enable most objects to be successful. These patterns are consistent with what I've observed in the competition among engineering firms over the years (including during the current recession, a time of reduced resources).(6) The behavioral outcomes of complex systems often follow a power law distribution, with smaller events being most common, but with extreme events also occurring more often than one might expect.One of my main motivations to read this book was to get insight into how malignant tumors might be modeled as complex systems, with the hope that such models might provide clues regarding more effective ways to treat cancer. I was pleased to see that Johnson does discuss cancer at several points in the book, but I was disappointed to find that his discussion of cancer modeling is relatively superficial. Nevertheless, I'm firmly convinced that cancer is best modeled as a complex system, so I believe that much more research along these lines is (urgently) needed.Overall, I do recommend this book. Johnson is qualified to write it, and it works well as an easily understood introduction at a level of detail suitable for general readers. However, again, keep in mind that the scope of the book is fairly narrow, so many important topics aren't mentioned at all. As a result, the book provides a good understanding of some of the trees in the forest of complexity science, but not much sense of the overall forest. For a broader introduction to complexity science, I recommendÂ Complexity: A Guided TourÂ by Melanie Mitchell.

This was an enjoyable read, enjoyable enough that I picked up the author's text book as the ideas presented are definitely worth learning.

This text provides a relatively straight forward approach to examining common situations in life that can be categorized as 'complex'. These examples then enable the reader to view these, and other, complex systems from a new perspective. It makes for an interesting read, but don't expect it to provide you "the meaning of life".

Easy to read, eye opener into complexity science and quantum physics. I read it on Kindle and it's great in digital form, better than hard copy I think

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