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Book Review: *The Lure of Modern Science*

The Lure of Modern Science. B. J. West and B. Deering, World Scientific; Singapore, 1995.

There are few statistical physicists who will not enjoy reading this book and sharing it with their students. Why? Because the book fills a gap intermediate between a terse review article and the broad brush approach of a book for the lay person. Like a review article, topics are chosen to reflect scholarly importance, and every idea and concept is well documented with ample references to the literature. Like a trade book, the book does not require extensive background in physics and has a style that makes it hard to put down.

So what is the book about? The title suggests it is a seduction into a lifestyle that many of us have become addicted to. That it is indeed, but the seduction takes the form of actually explaining much of what practitioners in the area of complex systems do day in and day out. The book, in fact, is the among the best introductions for the newcomer to the area of "statistical thinking" that I have seen. The reader is held by the hand and led from simple to complex. Unlike many introductions, the book postpones introducing the concept of fractals until page 195. Rather, it begins with concepts like nonlinear models, and with experimental facts such as power laws and lognormal distributions. It describes how physicists get a handle on complex random systems using distribution functions, correlation functions, and the concept of noise. Every new concept is illustrated profusely with well-chosen examples.

Chapter 4, which introduces fractals, does not dwell on the formal properties, as they are well treated in other books. Rather, it emphasizes subjects which range from materials science and biology to physiology and econophysics. Indeed, this book is the first I have seen to carefully treat the fractal dynamics of stock market indices, neuronal shape, and heartbeat intervals.

Chapter 5, Maps and Dynamics, is a coherent and readable introduction to dynamical systems. The pedagogy is comparable to the treatment in

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the text by Cvitanovic, but in some ways is more fun to read because of numerous historical anecdotes and the infusion of the spirit of the late Elliott W. Montroll, the former advisor of Dr. West.

Chapter 6, Dynamics in fractal dimensions is perhaps the most interesting of all, in that it attempts to discuss that most subtle of all subjects, noise. It addresses head-on the problem of how to distinguish colored noise from chaotic processes, both of which are characterized by fractal random time series. There are lovely examples of considerable practical interest, exemplified by the use of long-range correlations in interbeat time series as a diagnostic tool for distinguishing between healthy and abnormal hearts.

I recommend this book to undergraduates and beginning graduate students who want to get a concrete impression of what many statistical mechanicians are actually doing today. Much of what they are doing could not have been guessed a decade ago, except perhaps by that man who was a decade (or more) ahead of his time, Elliott W. Montroll.

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