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Book Review*

Complex Worlds: Uncertain, Unequal and Unfair by Bruce J. West. Black Rose Writing: Castroville, TX, 2012. 276 pages. ISBN 978-1-61296-130-9.

Dr. West describes his life in the world. His description would be the same for every person since every person is part of the continuously changing and interacting environment. The uncertainty, inequality and unfairness are the three points of view of the dynamic life of every individual in the complex environment.

The author shows many pictures ranging from daily life to complex scientific knowledge. Cognition is also a part of a complex system consisting of "internal" brain components and influences from the fluctuating environment. Dr. West describes the nonlinear dynamics as an important knowledge base and a tool to study many phenomena in life and nature.

Chaos theory is derived from the nonlinear phenomena expressing the evolution, which seems to be unpredictable. Small changes in the beginning of a chaotic system produce very great changes in the final phenomena. Fractal geometry and fractal statistics are chaos-theory expressions of nonlinear phenomena describing the motif that repeats itself on ever diminishing scales. The third chapter of the book describes many chaotic phenomena of our life and our environment.

Uncertainty as a natural phenomenon is expressed as unpredictability, although unpredictability obeys laws similar to the laws of predictable phenomena. Druckard's Walk and the Brownian motion phenomena giving the impression of unpredictability but obeying laws.

Complex systems, time, space, frequency are described in relation to inequality,: Their behavior and the exchange of energy and information. The author's intent is to show the many pictures existing that do not obey in clear rules but show uncertainties. The descriptions are extensive, and the many examples present a picture of inequality at rest and during interactions.

Concerning unfairness, Dr. West begins with the Pareto's imbalance, which he relates to the complexity of networks. Pareto's inverse power-law distribution seems to be a more general rule and expresses a complexity that Dr. West interprets as unfairness. Here he describes many complex phenomena that

* *Editor's note:* Because of the resonance between the subject matter of this book and recent world events, I thought it would be enlightening to engage reviews from two different parts of the world.

could be described with other laws as well. The writer appears to express all these phenomena as unfairness to intonate their special behavior.

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At some point, perhaps after the age of fifty, there is an urge on the part of some scholars to share their knowledge in a manner unencumbered by the formal requirements of journal articles. In the most positive of such cases the scholar shares his/her knowledge without concern for remuneration or concern for accolades from a very limited audience. The intent of such positively motivated works is simply to share what one has learned over a lifetime. Bruce West's *Complex Worlds* fits well into this positive category.

For those readers not familiar with Dr. West's work, you should be. West's contributions to the science of complexity range from the mathematics of fractals, to human cognition, to explorations of financial and healthcare systems. I raise these points largely to stipulate the facts but also to calm the concerns of readers unaware of the publisher of this book. West chose to publish this book through an independent publisher thus, I assume, avoiding the time demands imposed by reviewers who often know less than the author. Dr. West's body of work coupled with his current title as Chief Scientist of Mathematics for the U.S. Army Research Office negate the need for such oversight in this reviewer's mind.

Complex Worlds is West's effort to apply an intimate knowledge of the mathematics and dynamics of complexity to the social realm. One could be concerned that a physicist, such as West, can claim adequate knowledge of the social realm to conduct such an effort. But alas, one element of either well-deserved or undeserved immodesty among "complexity" scholars is an interdisciplinary bent that does not always receive credence in a specialized world. On the other hand, complexity should teach us of the value of humility when trying to understand dynamic complex systems.

This is wide ranging work with many historical notes of value. West clearly reads widely and can speak with authority about both Adam Smith and John Steinbeck. The goal of the book is though best identified in the subtitle. West tackles issues that social philosophers throughout the ages have attempted to answer. The most obvious issues surround the topics of equity and fairness in social systems. West views inequity and unfairness as the result of a complexity that results in diversity and hierarchy.

My only criticism of West's book is founded on wanting to hear more directly about what should be done given the imbedded inequity and its apparent inevitability in a world in which nature and nurture mix and create uncertainties that result in a diversity of skills, abilities and ultimately income. In a dynamic and uncertain world, fairness and equity appear to assume a requirement of stability that sounds perhaps inhuman and lacking in dynamics. On the other

hand, hierarchy may be inevitable but how much hierarchy is actually beneficial? Consider that the more equal income arrangements of the northern European countries also reveal the highest levels of global personal and social well-being.

West's discussion of inverse power laws and scaling should be edifying not in so much as the phenomena examined but rather in the affirmation that these mathematics represent the underlying dynamics of both important social facts and physical realities. West concludes a discussion of these topics with the following poignant statement:

> In short, complexity is how we experience phenomena when the central limit theorem breaks down and enhanced variability takes over. The one or two parameters characteristic of simple networks are replaced by a distribution of possible parameters values. It is this loss of the simple mental model and our reluctance to replace it with a less desirable but more realistic power-law model that engenders despair about complexity (p. 216).

West concludes his work with the presentation of his notion of the "Principle of Complexity Management." The principle is aimed at resolving some of the challenges associated with managing complex human networks. The principle is somewhat cybernetic in its origin and is founded on the "transfer and control of information" (p. 222) flows between networks at all levels of analysis. Using this principle allows West to explore an array of topics ranging from global warming, to music preferences to decision making. Perhaps, most importantly, West recognizes that the challenges of networks are major and significant challenges for all of science. "Managing" these complex networks is essential since management can be seen as a means for avoiding entropy.

The audience for this book is largely the more sophisticated group of complexity students and scholars. Some of the explanations of the analytical methods, especially the details of the principle of complexity management, may overtax the reader new to this literature. Finally, this reviewer cannot think of another scholar who has tackled such a wide array of significant topics using the tools of complexity in such a consistently rigorous way. This thought alone should serve as an impetus to read this book.

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