Emergence From Chaos To Order

BALLARD LACEY

Signals and Boundaries Springer
The scientific discovery that chaotic systems embody deep structures of order is one of such wide-ranging implications that it has attracted attention across a spectrum of disciplines, including the humanities. In this volume, fourteen theorists explore the significance for literary and cultural studies of the new paradigm of chaotics, forging connections between contemporary literature and the science of chaos. They examine how changing ideas of order and disorder enable new readings of scientific and literary texts, from Newton's Principia to Ruskin's autobiography, from Victorian serial fiction to Borges's short stories. N. Katherine Hayles traces shifts in meaning that chaos has undergone within the Western tradition, suggesting that the science of chaos articulates categories that cannot be assimilated into the traditional dichotomy of order and disorder. She and her contributors take the relation between order and disorder as a theme and develop its implications for understanding texts, metaphors, metafiction, audience response, and the process of interpretation itself. Their innovative and diverse work opens the interdisciplinary field of chaotics to literary inquiry.
Emergence of Order from the Chaos of Geostrophic Turbulence?. MIT Press
“If you liked Chaos, you’ll love Complexity. Waldrop creates the most exciting intellectual adventure story of the year” (The Washington Post). In a rarified world of scientific research, a revolution has been brewing. Its activists are not anarchists, but rather Nobel Laureates in physics and economics and pony-tailed graduates, mathematicians, and computer scientists from all over the world. They have formed an iconoclastic think-tank and their radical idea is to create a new science: complexity. They want to know how a primordial soup of simple molecules managed to turn itself into the first living cell—and what the origin of life some four billion years ago can tell us about the process of technological innovation today. This book is their story—the story of how they have tried to forge what they like to call the science of the twenty-first century. “Lucidly shows physicists, biologists, computer scientists and economists swapping metaphors and reveling in the sense that epochal discoveries are just around the corner . . . [Waldrop] has a special talent for relaying the exhilaration of moments of intellectual insight.” —The New York Times Book Review “Where I enjoyed the book was when it dove into the actual question of complexity, talking about complex systems in economics, biology, genetics, computer modeling, and so on. Snippets of rare beauty here and there almost took your breath away.” —Medium “[Waldrop] provides a good grounding of what may indeed be the first flowering of a new science.” —Publishers Weekly
Chaos Springer Science & Business Media
A major scientific revolution has begun, a new paradigm that rivals Darwin's theory in importance. At its heart is the discovery of the order that lies deep within the most complex of systems, from the origin of life, to the workings of giant corporations, to the rise and fall of great civilizations. And more than anyone else, this revolution is the work of one man, Stuart Kauffman, a MacArthur Fellow and visionary pioneer of the new science of complexity. Now, in At Home in the Universe, Kauffman brilliantly weaves together the excitement of intellectual discovery and a fertile mix of insights to give the general reader a fascinating look at this new science--and at the forces for order that lie at the edge of chaos. We all know of instances of spontaneous order in nature--an oil droplet in water forms a sphere, snowflakes have a six-fold symmetry. What we are only now discovering, Kauffman says, is that the range of spontaneous order is enormously greater than we had supposed. Indeed, self-organization is a great undiscovered principle of nature. But how does this spontaneous order arise? Kauffman contends that complexity itself triggers self-organization, or what he calls "order for free," that if enough different molecules pass a certain threshold of complexity, they begin to self-organize into a new entity--a living cell. Kauffman uses the analogy of a thousand buttons on a rug--join two buttons randomly with thread, then another two, and so on. At first, you have isolated pairs; later, small clusters; but suddenly at around the 500th repetition, a remarkable transformation occurs--much like the phase transition when water abruptly turns to ice--and the buttons link up in one giant network. Likewise, life may have originated when the mix of different molecules in the primordial soup passed a certain level of complexity and self-organized into living entities (if so, then life is not a highly improbable chance event, but almost inevitable). Kauffman uses the basic insight of "order for free" to illuminate a staggering range of phenomena. We see how a single-celled embryo can grow to a highly complex organism with over two hundred different cell types. We learn how the science of complexity extends Darwin's theory of evolution by natural selection: that self-organization, selection, and chance are the engines of the biosphere. And we gain insights into biotechnology, the stunning magic of the new frontier of genetic engineering--generating trillions of novel molecules to find new drugs, vaccines, enzymes, biosensors, and more. Indeed, Kauffman shows that ecosystems, economic systems, and even cultural systems may all evolve according to similar general laws, that tissues and terra cotta evolve in similar ways. And finally, there is a profoundly spiritual element to Kauffman's thought. If, as he argues, life were bound to arise, not as an incalculably improbable accident, but as an expected fulfillment of the natural order, then we truly are at home in the universe. Kauffman's earlier volume, The Origins of Order, written for specialists, received lavish praise. Stephen Jay Gould called it "a landmark and a classic." And Nobel Laureate Philip Anderson wrote that "there are few people in this world who ever ask the right questions of science, and they are the ones who affect its future most profoundly. Stuart Kauffman is one of these." In At Home in the Universe, this visionary thinker takes you along as he explores new insights into the nature of life.
The Origins of Order Open Road Media
The world around us seems to be a complex place. But, as John Gribbin explains, chaos and complexity obey simple laws - essentially, the same straightforward principles that Isaac Newton discovered more than 300 years ago.
Bioactive Natural Products Basic Books
In this work, change specialist Holman reframes how we deal with chaos and change, and explains to leaders how to turn upheaval into opportunity and renewal.
Emergence CRC Press
Please note that the content of this book primarily consists of articles available from Wikipedia or other free sources online. Pages: 49. Chapters: Chaos theory, Butterfly effect, Ginnungagap, Bifurcation diagram, Emergence, Turbulence, Quantum chaos, For Want of a Nail, Self-organized criticality, Coupled map lattice, Stability of the Solar System, Recurrence quantification analysis, Fractal dimension, Recurrence plot, Chaotic mixing, Synchronization of chaos, Feigenbaum function, Chaotic bubble, Chaotic hysteresis, Bus bunching, Transfer operator, Oscillon, Correlation dimension, Poincare plot, Control of chaos, Nonlinear Dynamics, Chirikov criterion, Chaos communications, Chaos game, Interconnectivity, Edge of chaos, Quantum ergodicity, Uncertainty exponent, Complexor, Correlation integral, Correlation sum, Lagrangian coherent structure, Stable attractor, Mixmaster dynamics. Excerpt: Chaos theory is a field of study in mathematics, with applications in several disciplines including physics, economics, biology, and philosophy. Chaos theory studies the behavior of dynamical systems that are highly sensitive to initial conditions, an effect which is popularly referred to as the butterfly effect. Small differences in initial conditions (such as those due to rounding errors in numerical computation) yield widely diverging outcomes for chaotic systems, rendering long-term prediction impossible in general. This happens even though these systems are deterministic, meaning that their future behavior is fully determined by their initial conditions, with no random elements involved. In other words, the deterministic nature of these systems does not

make them predictable. This behavior is known as deterministic chaos, or simply chaos. Chaotic behavior can be observed in many natural systems, such as the weather. Explanation of such behavior may be sought through analysis of a chaotic mathematical model, or through analytical techniques such as recurrence plots and...

Complexity and Emergence Oxford University Press

In this very short introduction, John Holland presents an introduction to the science of complexity. Using examples from biology and economics, he shows how complexity science models the behaviour of complex systems.

Chaos, Complexity and Leadership 2014 Routledge

Much of the modern period was dominated by a `reductionist' theory of science. On this view, to explain any event in the world is to reduce it down to fundamental particles, laws, and forces. In recent years reductionism has been dramatically challenged by a radically new paradigm called `emergence'. According to this new theory, natural history reveals the continuous emergence of novel phenomena: new structures and new organisms with new causal powers. Consciousness is yet onemore emergent level in the natural hierarchy. Many theologians and religious scholars believe that this new paradigm may offer new insights into the nature of God and God's relation to the world.This volume introduces readers to emergence theory, outlines the major arguments in its defence, and summarizes the most powerful objections against it. Written by experts but suitable as an introductory text, these essays provide the best available presentation of this exciting new field and its potentially momentous implications.

Engaging Emergence Addison Wesley Publishing Company

Genetic algorithms are playing an increasingly important role in studies of complex adaptive systems, ranging from adaptive agents in economic theory to the use of machine learning techniques in the design of complex devices such as aircraft turbines and integrated circuits. Adaptation in Natural and Artificial Systems is the book that initiated this field of study, presenting the theoretical foundations and exploring applications. In its most familiar form, adaptation is a biological process, whereby organisms evolve by rearranging genetic material to survive in environments confronting them. In this now classic work, Holland presents a mathematical model that allows for the nonlinearity of such complex interactions. He demonstrates the model's universality by applying it to economics, physiological psychology, game theory, and artificial intelligence and then outlines the way in which this approach modifies the traditional views of mathematical genetics. Initially applying his concepts to simply defined artificial systems with limited numbers of parameters, Holland goes on to explore their use in the study of a wide range of complex, naturally occuring processes, concentrating on systems having multiple factors that interact in nonlinear ways. Along the way he accounts for major effects of coadaptation and coevolution: the emergence of building blocks, or schemata, that are recombined and passed on to succeeding generations to provide, innovations and improvements.

Chaos and Life Oxford University Press

For many years I was organizing a weekly seminar on dynamical astronomy, and I used to make some historical remarks on every subject, including some anecdotes from my contacts with many leading scientists over the years. I described also the development of various subjects and the emergence of new ideasindynamicalastronomy. Thenseveralpeoplepromptedmetowritedown these remarks, which cannot be found in papers, or books. Thus, I decided to write this book, which contains my experiences over the years. I hope that this book may be helpful to astronomy students all over the world. During my many years of teaching, as a visiting professor, in American Universities (1962-1994, Yale, Harvard, MIT, Cornell, Chicago, Maryland and Florida) I was impressed by the quality of my graduate students. Most of them were very bright, asking penetrating questions, and preparing their homework in a perfect way. In a few cases, instead of a ?nal examination, I assigned to them some small research projects and they presented their results at the end of the course. They were excellent in preparing the appropriate slides and in presenting their results in a concise and clear way.

A New Theory for American Poetry Penguin UK

Harold Innis was one of the most profound thinkers that Canada ever produced. Such was his influence on the field of communication that Marshall McLuhan once declared his own work was a mere footnote to Innis. But over the past sixty years scholars have had a hard time explaining his brilliance, in large measure because Innis's dense, elliptical writing style has hindered easy explication and interpretation. But behind the dense verbiage lies a profound philosophy of history. In Emergence and Empire, John Bonnett offers a fresh take on Innis's work by demonstrating that his purpose was to understand the impact of self-organizing, emergent change on economies and societies. Innis's interest in emergent change induced him to craft an original and bold philosophy of history informed by concepts as diverse as information, Kantian idealism, and business cycle theory. Bonnett provides a close reading of Innis's oeuvre that connects works of communication and economic history to present a fuller understanding of Innis's influences and influence. Emergence and Empire presents a portrait of an original and prescient thinker who anticipated the importance of developments such as information visualization and whose understanding of change is remarkably similar to that which is promoted by the science of complexity today.

The Re-Emergence of Emergence Elsevier

Written in Alwyn Scott’s inimitable style, one that readers will find both lucid and accessible, this masterwork elucidates the explosion of activity in nonlinear science in recent decades. The book explains the wide-ranging implications of nonlinear phenomena for future developments in many areas of modern science, including mathematics, physics, engineering, chemistry, biology, and neuroscience. Arguably as important as quantum theory, modern nonlinear science is essential for understanding the scientific developments of the twenty-first century.

Science, Order and Creativity University-Press.org

In this important book, John H. Holland dramatically shows us that the “emergence” 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.” 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.

Emergence Springer Science & Business Media

'Gribbin takes us through the basics with his customary talent for accessibility and clarity' Sunday Times The world around us can be a complex, confusing place. Earthquakes happen without warning, stock markets fluctuate, weather forecasters seldom seem to get it right - even other people continue to baffle us. How do we make sense of it all? In fact, John Gribbin reveals, our seemingly random universe is actually built on simple laws of cause and effect that can explain why, for example, just one vehicle braking can cause a traffic jam; why wild storms result from a slight atmospheric change; even how we evolved from the most basic materials. Like a zen painting, a fractal image or the pattern on a butterfly's wings, simple elements form the bedrock of a sophisticated whole. Synthesizing chaos and complexity theory for the perplexed, Deep Simplicity brilliantly illuminates the harmony underlying our existence.

Swarm Intelligence Hachette Books

Why, in a scientific age, do people routinely turn to astrologers, mediums, cultists, and every kind of irrational practitioner rather than to science to meet their spiritual needs? The answer, according to Richard J. Bird, is that science, especially biology, has embraced a view of life that renders meaningless the coincidences, serendipities, and other seemingly significant occurrences that fill people's everyday existence. Evolutionary biology rests on the assumption that although events are fundamentally random, some are selected because they are better adapted than others to the surrounding world. This book proposes an alternative view of evolving complexity. Bird argues that randomness means not disorder but infinite order. Complexity arises not from many random events of natural selection (although these are not unimportant) but from the "playing out" of chaotic systems—which are best described mathematically. When we properly understand the complex interplay of chaos and life, Bird contends, we will see that many events that appear random are actually the outcome of order.

Emergence Routledge

Stuart Kauffman here presents a brilliant new paradigm for evolutionary biology, one that extends the basic concepts of Darwinian evolution to accommodate recent findings and perspectives from the fields of biology, physics, chemistry and mathematics. The book drives to the heart of the exciting debate on the origins of life and maintenance of order in complex biological systems. It focuses on the concept of self-organization: the spontaneous emergence of order that is widely observed throughout nature Kauffman argues that self-organization plays an important role in the Darwinian process of natural selection. Yet until now no systematic effort has been made to incorporate the concept of self-organization into evolutionary theory. The construction requirements which permit complex systems to adapt are poorly understood, as is the extent to which selection itself can yield systems able to adapt more successfully. This book explores these themes. It shows how complex systems, contrary to expectations, can spontaneously exhibit stunning degrees of order, and how this order, in turn, is essential for understanding the emergence and development of life on Earth. Topics include the new biotechnology of applied molecular evolution, with its important implications for developing new drugs and vaccines; the balance between order and chaos observed in many naturally occurring systems; new insights concerning the predictive power of statistical mechanics in biology; and other major issues. Indeed, the approaches investigated here may prove to be the new center around which biological science itself will evolve. The work is written for all those interested in the cutting edge of research in the life sciences.

Chaos and Complexity Theory for Management: Nonlinear Dynamics MIT Press

An overarching framework for comparing and steering complex adaptive systems is developed through understanding the mechanisms that generate their intricate signal/boundary hierarchies. Complex adaptive systems (cas), including ecosystems, governments, biological cells, and markets, are characterized by intricate hierarchical arrangements of boundaries and signals. In ecosystems, for example, niches act as semi-permeable boundaries, and smells and visual patterns serve as signals; governments have departmental hierarchies with memoranda acting as signals; and so it is with other cas. Despite a wealth of data and descriptions concerning different cas, there remain many unanswered questions about "steering" these systems. In Signals and Boundaries, John Holland argues that understanding the origin of the intricate signal/border hierarchies of these systems is the key to answering such questions. He develops an overarching framework for comparing and steering cas through the mechanisms that generate their signal/boundary hierarchies. Holland lays out a path for developing the framework that emphasizes agents, niches, theory, and mathematical models. He discusses, among other topics, theory construction; signal-processing agents; networks as representations of signal/boundary interaction; adaptation; recombination and reproduction; the use of tagged urn models (adapted from elementary probability theory) to represent boundary hierarchies; finitely generated systems as a way to tie the models examined into a single framework; the framework itself, illustrated by a simple finitely generated version of the development of a multi-celled organism; and Markov processes.

Engineering Emergence Oxford University Press

This work represents the third entry of the series of works on “Chaos, Complexity and Leadership”. Contents of the book are composed from broad range of chaos, complexity and their applications in multi disciplines. Articles reflect different perspectives in the field of applied nonlinear methods, modeling of data and simulations as well as theoretical achievements of chaos and complex systems. In addition to this, readers are going to find new applications in leadership and management of chaos and complexity theory such as in fields from education to politics. It is completely new and fresh piece of mind for readers who are interested in chaos, complexity and especially leadership.

Hidden Order University of Chicago Press

"Put together one of the world's best science writers with one of the universe's most fascinating subjects and you are bound to produce a wonderful book. . . . The subject of complexity is vital and controversial. This book is important and beautifully done."—Stephen Jay Gould "[Complexity] is that curious mix of complication and organization that we find throughout the natural and human worlds: the workings of a cell, the structure of the brain, the behavior of the stock market, the shifts of political power. . . . It is time science . . . thinks about meaning as well as counting information. . . . This is the core of the complexity manifesto. Read it, think about it . . . but don't ignore it."—Ian Stewart, Nature This second edition has been brought up to date with an essay entitled "On the Edge in the Business World" and an interview with John Holland, author of Emergence: From Chaos to Order.

Emergence (From Chaos?) of Regulatory Order in the Transplanted Heart Berrett-Koehler Publishers

One of the foremost scientists and thinkers of our time, David Bohm worked alongside Oppenheimer and Einstein. In Science, Order and Creativity he and physicist F. David Peat propose a return to greater creativity and communication in the sciences. They ask for a renewed emphasis on ideas rather than formulae, on the whole rather than fragments, and on meaning rather than mere mechanics. Tracing the history of science from Aristotle to Einstein, from the Pythagorean theorem to quantum mechanics, the authors offer intriguing new insights into how scientific theories come into being, how to eliminate blocks to creativity and how science can lead to a deeper understanding of society, the human condition and the human mind itself. Science, Order and Creativity looks to the future of science with elegance, hope and enthusiasm.