From Catastrophe To Chaos A General Theory Of Economic Discontinuities

As the age of Big Data emerges, it becomes necessary to take the five dimensions of Big Data- volume, variety, velocity, volatility, and veracity- and focus these dimensions towards one critical emphasis - value. The Encyclopedia of Business Analytics and Optimization confronts the challenges of information retrieval in the age of Big Data by exploring recent advances in the areas of knowledge management, data visualization, interdisciplinary communication, and others. Through its critical approach and practical application, this book will be a must-have reference for any professional, leader, analyst, or manager interested in making the most of the knowledge resources at their disposal.

Finally, there is now a new edition of Professor Gandolfo`s acclaimed text on Economic Dynamics. Long out of print, but still in demand, this completely rewritten and updated edition treats all of the mathematical methods used in economic dynamics, from elementary linear difference and differential equations and simultaneous systems to the qualitative analysis of non-linear dynamical systems.

Chaos Theory in the Social Sciences: Foundations and Applications offers the most recent thinking in applying the chaos paradigm to the social sciences. The book explores the methodological techniques--and their difficulties--for determining whether chaotic processes may in fact exist in a particular instance and examines implications of chaos theory when applied specifically to political science, economics, and sociology. The contributors to the book show that no single technique can be used to diagnose and describe all chaotic processes and identify the strengths and limitations of a variety of approaches. The essays in this volume consider the application of chaos theory to such diverse phenomena as public opinion, the behavior of states in the international arena, the development of rational economic expectations, and long waves. Contributors include Brian J. L. Berry, Thad Brown, Kenyon B. DeGreene, Dimitrios Dendrinos, Euel Elliott, David Harvey, L. Ted Jaditz, Douglas Kiel, Heja Kim, Michael McBurnett, Michael Reed, Diana Richards, J. Barkley Rosser, Jr., and Alvin M. Saperstein. L. Douglas Kiel and Euel W. Elliott are both Associate Professors of Government, Politics, and Political Economy, University of Texas at Dallas.

While many books have discussed methodological advances in nonlinear dynamical systems theory (NDS), this volume is unique in its focus on NDS's role in the development of psychological theory. After an introductory chapter covering the fundamentals of chaos, complexity and other nonlinear dynamics, subsequent chapters provide in-depth coverage of each of the specific topic areas in psychology. A concluding chapter takes stock of the field as a whole, evaluating important challenges for the immediate future. The chapters are written by experts in the use of NDS in each of their respective areas, including biological, cognitive, developmental, social, organizational and clinical psychology. Each chapter provides an in-depth examination of theoretical foundations and specific applications and a review of relevant methods. This edited collection represents the state of the art in NDS science across the disciplines of psychology.

Chaos, catastrophe, self-organization, and complexity theories (nonlinear dynamics) now have practical and measurable roles in the functioning of work organizations. Managing Emergent Phenomena begins by describing how the concept of an organization has changed from a bureaucracy, to a humanistic and organic system, to a complex adaptive system. The dynamics concepts are then explained along with the most recent research methods for analyzing real data. Applications include: work motivation, personnel selection and turnover, creative thinking by individuals and groups, the development of social networks, coordination in work groups, the emergence of leaders, work performance in organizational hierarchies, economic problems that are relevant to organizations, techniques for predicting the future, and emergency management. Each application begins with a tight summary of standard thinking on a subject, followed by the new insights that are afforded by nonlinear dynamics and the empirical data supporting those ideas. Unusual concepts are also encountered, such as the organizational unconscious, collective intelligence, and the revolt of the slaved variables. The net results are a new perspective on what is really important in organizational life, original insights on familiar experiences, and some clear signposts for the next generation of nonlinear social scientists.

Archeologist Jack Stanton is the sole survivor of an expedition into the Himalayan mountains gone horribly wrong. Against all odds, he returns with proof of an advanced civilization that walked the Earth before mankind. A civilization of immense power, and incredible evil... Preparing for the book tour promoting his findings, he’s haunted by visions and attacked by a religious zealot warning of the dangers of his discovery. Dangers he doesn’t take seriously until a supertanker runs aground in New York and the catastrophe leaves him stranded in an infernal dimension. Could it actually be Hell? And if Jack is in Hell, what forces are now running amok on Earth?

This important book introduces perturbation and qualitative methods for differential equations in terms understandable to students with only a basic knowledge of calculus and ordinary linear differential equations. Theorems are stated clearly with their limitations and restrictions and are applied to solve examples from various disciplines. The writing style is informal and new ideas are introduced gradually via concepts already familiar to the reader.

The 1980s saw a whole wave of practical applications of fuzzy theory, mainly in the field of process control, with Japan as pioneer. In the '90s there has been a flood of applications to household electrical appliances, and“fuzzy” has become a high-tech buzz-word in Japan. Since then many countries have followed suit and developed their own fuzzy applications. This book reviews the burgeoning industrial applications of fuzzy theory. The contributors are mostly industrial engineers or research experts in the field. The areas covered include automobiles, home appliances, voice recognition, medical techniques, fuzzy design, process control, space operations and mobile autonomous robots. Very recently the development of fuzzy theory has become intertwined with fields such as neural networks and chaos. This volume also summarizes such trends in an industrial context. The book will be of use to senior undergraduates or graduate students, industrial research scientists, and anyone interested in the wide-ranging applicational aspects of fuzzy theory today. Contents:Industrial Fuzzy Control Review: A Perspective from Feedback and Manufacturing (S Isaka & V K Chu)Fuzzy Logic Control in Finnish Industry (H N Koivo)Recursive Fuzzy Reasoning and Its Application to an Auto-Tuning Controller (K Nomoto)A Practical Application of Fuzzy Theory to an Auto-Regulation System for Extra-Corporeal Circulation (ECC) (T Tobi)Automatic Crane Operation Using Fuzzy Cooperative Control Method (O Itoh, H Migita, J Itoh & Y Irie)Integration of Knowledge-Based Configuration with Fuzzy Logic and Optimization (A Günter, M Kopisch & H-J Sebastian)Fuzzy Applications for Automobiles (H Takahashi)Voice Recognition Using Fuzzy Pattern Matching and Its Applications (J-I Fujimoto)Intelligent Home Appliances Using Fuzzy Technology (N Wakami, H Nomura & S Araki)Fusion Technology of Fuzzy and Chaos Theory, and Its Applications (R Katayama)Fusion of Chaos and Fuzzy Logic, and Its Applications: Short-Term Prediction on Chaotic Time Series (T Iokibe, S Murata & M Koyama)Applications of Fuzzy Logic and Neural Networks in Space Operations (Y Jani, R N Lea & R H Brown)Reactive Fuzzy Control of Autonomous Robots (E H Ruspini) Readership: Senior undergraduates, graduate students and practising engineers with interests in the applicational aspects of fuzzy theory. keywords:Computational Intelligence;Control;Expert system;Fuzzy;Image Processing;Industrial Application;Neuro;Robotics;Sensor;Soft Computing

What happens to scientific knowledge when researchers outside the natural sciences bring elements of the latest trend across disciplinary boundaries for their own purposes? Researchers in fields from anthropology to family therapy and traffic planning employ the concepts, methods, and results of chaos theory to harness the disciplinary prestige of the natural sciences, to motivate methodological change or conceptual reorganization within their home discipline, and to justify public policies and aesthetic judgments. Using the recent explosion in the use (and abuse) of chaos theory, Borrowed Knowledge and

the Challenge of Learning across Disciplines examines the relationship between science and other disciplines as well as the place of scientific knowledge within our broader culture. Stephen H. Kellert's detailed investigation of the myriad uses of chaos theory reveals serious problems that can arise in the interchange between science and other knowledge-making pursuits, as well as opportunities for constructive interchange. By engaging with recent debates about interdisciplinary research, Kellert contributes a theoretical vocabulary and a set of critical frameworks for the rigorous examination of borrowing.

Catastrophe Theory was introduced in the 1960s by the renowned Fields Medal mathematician René Thom as a part of the general theory of local singularities. Since then it has found applications across many areas, including biology, economics, and chemical kinetics. By investigating the phenomena of bifurcation and chaos, Catastrophe Theory proved to

Calculating Catastrophe has been written to explain, to a general readership, the underlying philosophical ideas and scientific principles that govern catastrophic events, both natural and man-made. Knowledge of the broad range of catastrophes deepens understanding of individual modes of disaster. This book will be of interest to anyone aspiring to understand catastrophes better, but will be of particular value to those engaged in public and corporate policy, and the financial markets. The author, Dr. Gordon Woo, was trained in mathematical physics at Cambridge, MIT and Harvard, and has made his career as a calculator of catastrophes. His diverse experience includes consulting for IAEA on the seismic safety of nuclear plants and for BP on offshore oil well drilling. As a catastrophist at Risk Management Solutions, he has advanced the insurance modelling of catastrophes, including designing a model for terrorism risk.

Attractors, Bifurcations, & Chaos - now in its second edition - begins with an introduction to mathematical methods in modern nonlinear dynamics and deals with differential equations. Phenomena such as bifurcations and deterministic chaos are given considerable emphasis, both in the methodological part, and in the second part, containing various applications in economics and in regional science. Coexistence of attractors and the multiplicity of development paths in nonlinear systems are central topics. The applications focus on issues such as business cycles, oligopoly, interregional trade dynamics, and economic development theory.

From Catastrophe to Chaos: A General Theory of Economic Discontinuities presents and unusual perspective on economics and economic analysis. Current economic theory largely depends upon assuming that the world is fundamentally continuous. However, an increasing amount of economic research has been done using approaches that allow for discontinuities such as catastrophe theory, chaos theory, synergetics, and fractal geometry. The spread of such approaches across a variety of disciplines of thought has constituted a virtual intellectual revolution in recent years. This book reviews the applications of these approaches in various subdisciplines of economics and draws upon past economic thinkers to develop an integrated view of economics as a whole from the perspective of inherent discontinuity.

Chaos and Dynamical Systems presents an accessible, clear introduction to dynamical systems and chaos theory, important and exciting areas that have shaped many scientific fields. While the rules governing dynamical systems are well-specified and simple, the behavior of many dynamical systems is remarkably complex. Of particular note, simple deterministic dynamical systems produce output that appears random and for which long-term prediction is impossible. Using little math beyond basic algebra, David Feldman gives readers a grounded, concrete, and concise overview. In initial chapters, Feldman introduces iterated functions and differential equations. He then surveys the key concepts and results to emerge from dynamical systems: chaos and the butterfly effect, deterministic randomness, bifurcations, universality, phase space, and strange attractors. Throughout, Feldman examines possible scientific implications of these phenomena for the study of complex systems, highlighting the relationships between simplicity and complexity, order and disorder. Filling the gap between popular accounts of dynamical systems and chaos and textbooks aimed at physicists and mathematicians, Chaos and Dynamical Systems will be highly useful not only to students at the undergraduate and advanced levels, but also to researchers in the natural, social, and biological sciences.

In this lively comedy of love and money in sixteenth-century Venice, Bassanio wants to impress the wealthy heiress Portia, but lacks the necessary funds. He turns to his merchant friend, Antonio, who is forced to borrow from Shylock, a Jewish moneylender. When Antonio's business falters, repayment becomes impossible, and by the terms of the loan agreement, Shylock is able to demand a pound of Antonio's flesh. Portia cleverly intervenes, and all ends well (except of course for Shylock).

This book focuses on the tensions between processes of consciousness and their products like worldviews, theories, models of thought etc. Staying close to their technical meanings in chaos and catastrophe theory, chaotic processes are described in mainly neurobiological and evolutionary terms while products are delineated in their evolutionary logic. Given both a relative opacity of processes of the mind and of the outside world, the dramatic quality of the processes, a certain closeness to 'hysterical' and 'schizophrenic' tendencies and, within the context of the weakening orientating power of worldviews, an alarming catastrophic potential emerge. As a consequence, the book aims at a comparative cost-benefit analysis of the transitionality between 'chaotic' processes of consciousness and the often 'catastrophic' implications of their products within historical frameworks. The central thesis consists in the increasing failure in the orientation of action which cannot be contained by systems of ethics. Materials for this analysis are mainly drawn from texts normally called literary in which the tension between biographical and historical dimensions provides profiles of chaos and catastrophe.

A foundational book explaining the sources and uses of nonlinear dynamics in the social sciences

This book presents a survey of the aspects of economic complexity, with a focus on foundational, interdisciplinary ideas. The long-awaited follow up to his 2011 volume Complex Evolutionary Dynamics in Urban-Regional and Ecologic-Economic Systems: From Catastrophe to Chaos and Beyond, this volume draws together the threads of Rosser's earlier work on complexity theory and its wide applications in economics and an expanded list of related disciplines. The book begins with a full account of the broader categories of complexity in economics--dynamic, computational, hierarchical, and structural--before shifting to more detailed analysis. The next two chapters address problems associated with computational complexity, especially those of computability, and discuss the Godel Incompleteness Theorem with a focus on reflexivity. The middle chapters discuss the relationship between entropy, econophysics, evolution, and economic complexity, respectively, with applications in urban and regional dynamics, ecological economics, general equilibrium theory, as well as financial market dynamics. The final chapter works to bring together these themes into a broader framework and expose some of the limits concerning analysis of deeper foundational issues. With applications in all disciplines characterized by interconnected nonlinear adaptive systems, this book is appropriate for graduate students, professors and practitioners in economics and related disciplines such as regional science, mathematics, physics, biology, environmental sciences, philosophy, and psychology.

Drawing on the middle chapters from the first edition of J. Barkley Rosser's seminal work, From Catastrophe to Chaos, this book presents an unusual perspective on economics and economic analysis. Current economic theory largely depends upon assuming that the world is fundamentally continuous. However, an increasing amount of economic research has been done using approaches that allow for discontinuities such as catastrophe theory, chaos theory, synergetics, and fractal geometry. The spread of such approaches across a variety of disciplines of thought has constituted a virtual intellectual revolution in recent years. This book reviews the applications of these approaches in various subdisciplines of economics and draws upon past economic thinkers to develop an integrated view of economics as a whole from the perspective of inherent discontinuity.

The aim of this book is to critically examine whether it is methodologically possible to combine mathematical rigor – topology with a systematic dialectical methodology in Hegel, and if so, to provide as result

of my interpretation the outline of Hegel's Analysis Situs, also with the proposed models (build on the topological manifold, cobordism, topological data analysis, persistent homology, simplicial complexes and graph theory, to provide an indication of how the merger of Hegel's dialectical logic and topology may be instrumental to a systematic logician and of how a systematic dialectical logic perspective may help mathematical model builders.

For much of the twentieth century scientists sought to explain objects and processes by reducing them to their components—nuclei into protons and neutrons, proteins into amino acids, and so on—but over the past forty years there has been a marked turn toward explaining phenomena by building them up rather than breaking them down. This collection reflects on the history and significance of this turn toward "growing explanations" from the bottom up. The essays show how this strategy—based on a widespread appreciation for complexity even in apparently simple processes and on the capacity of computers to simulate such complexity—has played out in a broad array of sciences. They describe how scientists are reordering knowledge to emphasize growth, change, and contingency and, in so doing, are revealing even phenomena long considered elementary—like particles and genes—as emergent properties of dynamic processes. Written by leading historians and philosophers of science, these essays examine the range of subjects, people, and goals involved in changing the character of scientific analysis over the last several decades. They highlight the alternatives that fields as diverse as string theory, fuzzy logic, artificial life, and immunology bring to the forms of explanation that have traditionally defined scientific modernity. A number of the essays deal with the mathematical and physical sciences, addressing concerns with hybridity and the materials of the everyday world. Other essays focus on the life sciences, where questions such as "What is life?" and "What is an organism?" are undergoing radical re-evaluation. Together these essays mark the contours of an ongoing revolution in scientific explanation. Contributors. David Aubin, Amy Dahan Dalmedico, Richard Doyle, Claus Emmeche, Peter Galison, Stefan Helmreich, Ann Johnson, Evelyn Fox Keller, Ilana Löwy, Claude Rosental, Alfred Tauber

This book outlines the great resource strength of the Canadian oil and gas industry but in the broader sense it details a struggle between private industry and endless government bureaucracy and never-ending virtue-signaling debate. I have become increasingly troubled in recent years over the direction which our government and our society have been taking. North America was built on Free Enterprise and personal initiative. It remains the basis of democracy and productivity in spite of how much popular socialists would like to claim to the contrary. The two big tools of this threat are Climate Hysteria and Covid 19 shutdowns. They are being misused to put forward ever-increasing government bureaucracy and control. The book documents the fallacy of Climate Hysteria. It outlines how resource development is the creator of Indigenous opportunity as opposed to the threat to rights put forward by media and government. Government handouts are in dire circumstances sometimes needed BUT they are not, in the long run, the answer. The oil and gas experiences are detailed herein but they are applicable to broader society both in Canada and the United States.

What is chaos? How can it be measured? How are the models estimated? What is catastrophe? How is it modelled? How are the models estimated? These questions are the focus of this volume. Beginning with an explanation of the differences between deterministic and probabilistic models, Brown then introduces the reader to chaotic dynamics. Other topics covered are finding settings in which chaos can be measured, estimating chaos using nonlinear least squares and specifying catastrophe models. Finally a nonlinear system of equations that models catastrophe using real survey data is estimated.

Providing an integrated and multi-level analysis of the impacts of COVID-19 on people, place, economies and policies, across the globe, this timely book explores how the global response to the COVID-19 pandemic combines failure with success. It focuses on exploring rapid adaptation and improvisation by individuals, organisations, and governments as they attempted to minimise and mitigate the socio-economic and health impacts of the pandemic.

Volume 18 Entangled Political Economy of the Book Series Advances in Austrian Economics examines the concept 'entangled political economy' from several distinct but complementary points of view. The volume is proof that Wagner's notion of entanglement opens new vistas for political economy in all its dimensions.

Contents: what disaster response management can learn from chaos theory; disaster in aisle 13 revisited; nonlinear analysis of disaster response data; disaster responder's perception of time; fractals & path dependent processes: a theoretical approach for characterizing emergency medical responses to major disasters; self-organization in disaster response: global strategies to support local action; & chaos theory & disaster response management: lessons for managing periods of extreme instability. Bibliography.

These proceedings are from a conference held at the Centre for Regional Science (CERUM) at Umea Umeâ University, Sweden, 17-18 June 2001. Unlike Un1ike many conference proceedings, this volume contains only on1y invited invited contribu contribu tions tions on specified topics so as to make the book coherent and self-contained. The authors and editors hope that this coherence will make the volume use fu1 fuI also as a text for courses in industrial organisation. To this end two chap ters on the history of oligopoly theory, from the beginnings with Cournot 1838, to the present day, and one chapter on modem methods for analysing iterated discrete time maps, have been inserted at the beginning ofthe book. Unlike Un1ike most current literature on games and oligopoly, this book is not focused on the usual topics of game theory: optimal strategies, dominance, and equilibrium. Rather it is the evolutionary dynamics, often of a complex type, inc1uding deterministic chaos, which are in focus. The contributions, after the historical and the methodological introductions, represent various segments of the research frontier in this area, though pains have been taken to tie some of the models to a number of most promising contributions from the frugal period 1929-1941, which have suffered from unjust neglect in the following industrial organisation literature.

Whether talking about steering a wheelbarrow over rugged terrain or plotting the course of international relations, human performance systems involve change. Sometimes changes are subtle or evolutionary, sometimes they are catastrophic or revolutionary, and sometimes the changes are from periods of relative calm to periods of vibrant oscillations to periods of chaos. As a general rule, more complex systems are likely to produce more complex forms of change. Although social scientists have long acknowledged that change occurs and have considered ways to effect desirable change, the dynamical processes of change have been poorly understood in the past. This volume combines recent advances in mathematics and experimental design with the best available social science theories to produce a new, integrated, and compact theory of work, organizations, and social evolution. The domains of application extend from human decision-making processes to personnel selection and work motivation, work performance under conditions of stress, accident and health risk analysis, the development of social institutions and economic systems, creativity and innovation, organizational development and group dynamics, and political revolutions and war. Relative to other literature on nonlinear dynamical systems theory (NDS), this book is unique in that it integrates new developments in NDS with substantive psychological theory. It builds on many recent developments in organizational theory to show that nonlinear dynamics were often implicit in those works all along. The result is an entirely new way of viewing social events, understanding change processes, and asking questions about social systems. This book also contains much new empirical work and explains the newly developed methods for testing these new hypotheses.

From Africa to Asia and Latin America, the era of climate wars has begun. Extreme weather is breeding banditry, humanitarian crisis, and state failure. In Tropic of Chaos, investigative journalist Christian Parenti travels along the front lines of this gathering catastrophe--the belt of economically and politically battered postcolonial nations and war zones girding the planet's midlatitudes. Here he finds failed states amid climatic disasters. But he also reveals the unsettling presence of Western military forces and explains

how they see an opportunity in the crisis to prepare for open-ended global counterinsurgency. Parenti argues that this incipient "climate fascism"--a political hardening of wealthy states-- is bound to fail. The struggling states of the developing world cannot be allowed to collapse, as they will take other nations down as well. Instead, we must work to meet the challenge of climate-driven violence with a very different set of sustainable economic and development policies.

"All disasters are in some sense man-made." Setting the annus horribilis of 2020 in historical perspective, Niall Ferguson explains why we are getting worse, not better, at handling disasters. Disasters are inherently hard to predict. Pandemics, like earthquakes, wildfires, financial crises. and wars, are not normally distributed; there is no cycle of history to help us anticipate the next catastrophe. But when disaster strikes, we ought to be better prepared than the Romans were when Vesuvius erupted, or medieval Italians when the Black Death struck. We have science on our side, after all. Yet in 2020 the responses of many developed countries, including the United States, to a new virus from China were badly bungled. Why? Why did only a few Asian countries learn the right lessons from SARS and MERS? While populist leaders certainly performed poorly in the face of the COVID-19 pandemic, Niall Ferguson argues that more profound pathologies were at work--pathologies already visible in our responses to earlier disasters. In books going back nearly twenty years, including Colossus, The Great Degeneration, and The Square and the Tower, Ferguson has studied the foibles of modern America, from imperial hubris to bureaucratic sclerosis and online fragmentation. Drawing from multiple disciplines, including economics, cliodynamics, and network science, Doom offers not just a history but a general theory of disasters, showing why our ever more bureaucratic and complex systems are getting worse at handling them. Doom is the lesson of history that this country--indeed the West as a whole--urgently needs to learn, if we want to handle the next crisis better, and to avoid the ultimate doom of irreversible decline.

"Now, however, weface an Age of Discontinuity in world economy and tech nology. We might succeed in making it an age of great economic growth as weil. But the one thing that is certain so far is that it will be a period of change-in technology and in economic policy, in industry structures and in economic theo ry, in the knowledge needed to govern and manage, and in economic issues. While we have been busy finishing the great nineteenth-century economic ed ijice, the foundations have shifted beneath our feet." Peter F. Drucker, 1968 The A~e Qf DiscQntinuity, p. 10 This project has had a lQng gestatiQn period, probably ultimately dating to a YQuthful QbsessiQn with watershed divides and bQundaries. My awareness Qf the problem Qf discQntinuity in eCQnQmics dates tQ my first enCQunter with the capi tal theQry paradQxes in the late 1960s, the fruits Qf which can be seen in Chapter 8 Qf this book. This awareness led tQ a frostratiQn Qver the apparent lack Qf a mathematics Qf discQntinuity, a lack that was in the process of rapidly being QverCQme at that time.