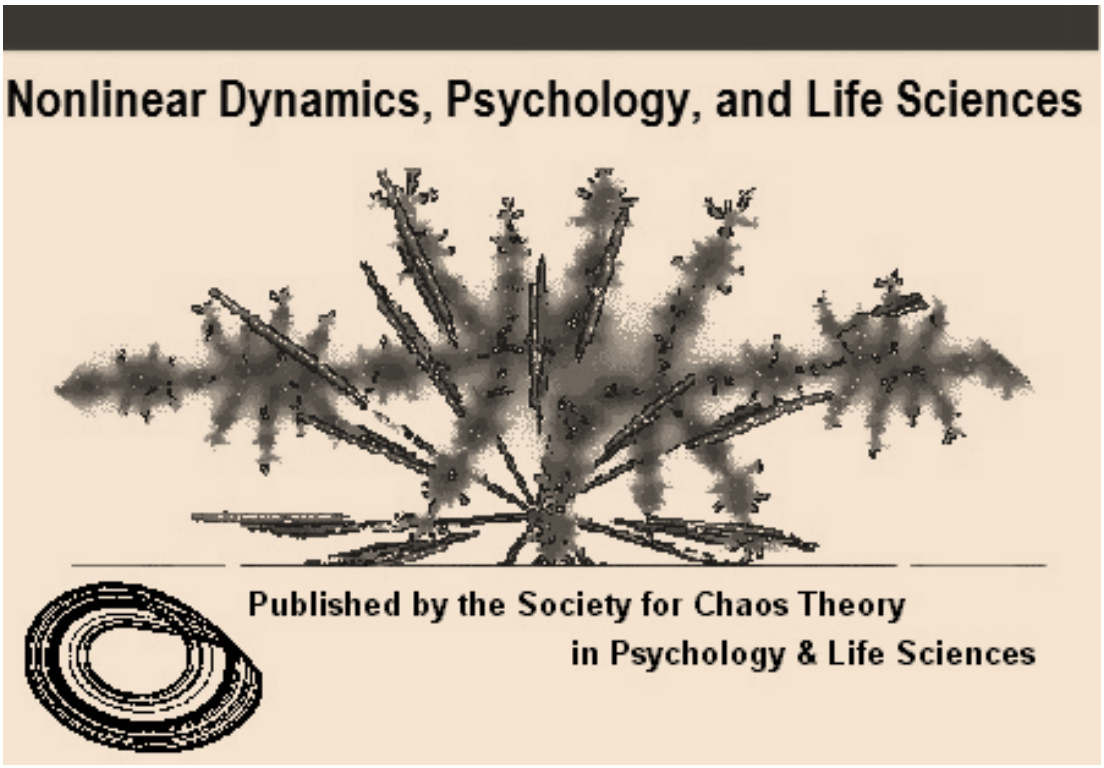


CALL FOR BOOK REVIEWS

August 22, 2016

Dear Nonlinear Colleagues,

Are you falling behind on your reading? If you're like me, my pile of stuff-to-read has avalanched into a 1/f distribution of piles of various sizes. We can help each other by reading something and publishing **book reviews**.

Nonlinear Dynamics, Psychology, and Life Sciences has always supported reviews of books on nonlinear and closely related topics. *NDPLS* is now making a specific call for book reviews. The next pages of this call contain more than 70 book synopses that have appeared in the ***Nonlinear Dynamical Bookshelf*** column of the ***SCTPLS Newsletter*** over the last two years. (*Please pardon the homespun reformatting; it was the fastest way to produce this document.*) The publication dates on the books stretch back a bit further in time; sometimes news travels faster than it does at other times. All books you see listed are potential targets for a review in NDPLS. The descriptions from publishers' statements and may have been written by the authors. There may be some books that we missed, or were already reviewed in NDPLS, but this is a good place to start browsing.

Format

Book reviews are brief, usually running between 1000-1500 words. The review should start with the bibliographic information, formatted as follows:

Nonlinear Analysis for Human Movement Variability, edited by Nikolas Stergiou. Boca Raton, FL: CRC Press, 2016. 408 pages. ISBN: 1498703321.

The text should start by describing what the book's content, who would be the likely readers, and what they might expect. The remainder of the review should provide evaluative information about questions such as, "Does the book deliver what it promises?" "How well does it accomplish its objective?"

It is not necessary to describe the book chapter by chapter if it is written by a single author or author team. It is helpful to focus attention of particular chapters, however, if there is something striking about them. Edited collections tend to be more disconnected between chapters, so reviews of edited collections tend to call out specific chapters more often.

Sometimes reviews contain references to other sources that are closely related to the target book. References should be formatted in the APA/NDPLS style. If you are not familiar with this reference format, please see the Instructions for Authors on the NDPLS web site (www.societyforchaostheory.org/ndpls).

Obtaining Books

Publishers are much less likely to send complimentary copies of books to journals hoping for some reviews as in (many) years past. Even if they did, the cost of re-mailing books around the world to potential reviewers would be prohibitive for NDPLS. Publishers might still be willing to supply a book for review if *you* contact them with your request. It would be fair to tell them that you were planning to review for *NDPLS*. *Please understand that such a request implies a commitment to actually complete the review in a reasonable amount of time*.

If you are a university faculty member, you can ask your librarian to acquire books that you recommend. This is a standard procedure at most universities, and a good way to build a collection that will be available for your use and your students' use.

The third option should be fairly obvious – buy a book. Pick something that looks relevant to your interests. Hopefully the enclosed list will instigate some new directions for you.

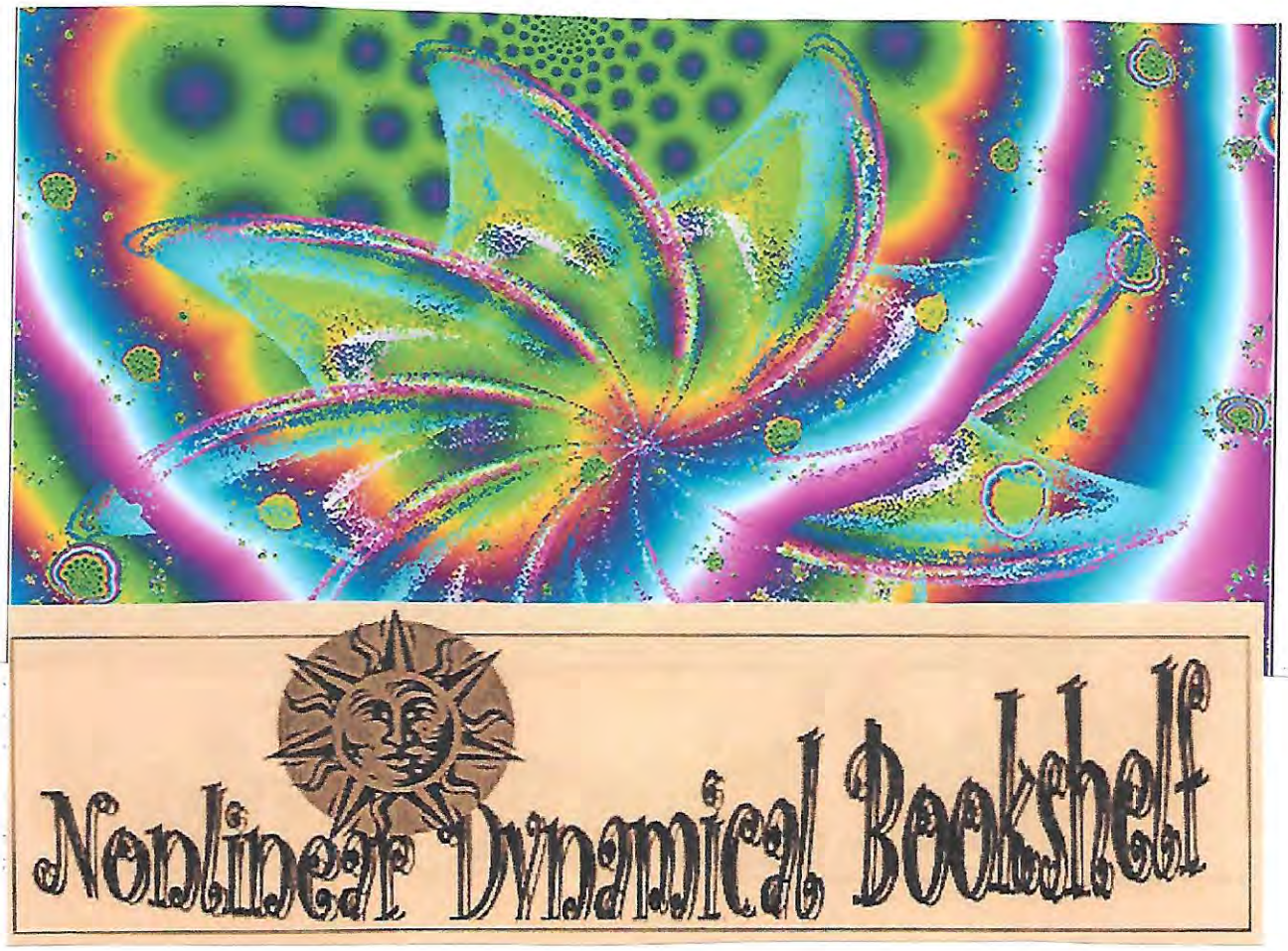
Submitting Your Review

The procedure is the same as with regular articles for NDPLS. Send your review to Stephen.guastello@marquette.edu the Editor in Chief by e-mail. It usually only requires a few days to reach a decision or recommendations for revision.

We look forward to a coordinated effort to cut through the collective reading list. The more we share, the more we learn, and the faster we can each move forward with our work plans.

Best regards,

Stephen J. Guastello, Ph.D.
Editor in Chief, NDPLS



Bischi, G. I., Chiarella, C., & Gardini, L. (Eds.) (2010). ***Nonlinear Dynamics in Economics, Finance and the Social Sciences: Essays in Honour of John Barkley Rosser Jr.*** **New York: Springer.** Over the last two decades there has been a great deal of research into nonlinear dynamic models in economics, finance and the social sciences. This book contains twenty papers that range over very recent applications in these areas. Topics covered include structural change and economic growth, disequilibrium dynamics and economic policy as well as models with boundedly rational agents. The book illustrates some of the most recent research tools in this area and will be of interest to economists working in economic dynamics and to mathematicians interested in seeing ideas from nonlinear dynamics and complexity theory applied to the economic sciences. *Contents*: Transferring Negative Externalities: Feedback Effects of Self-Protection Choices in a Two-Hemispheres Model.- Structural Change, Economic Growth and Environmental Dynamics with Heterogeneous Agents.- Bifurcations and Chaotic Attractors in an Overlapping Generations Model with Negative Environmental Externalities.- Stock Dynamics in Stage Structured Multi-agent Fisheries.- International Environmental Agreement.- R&D Cooperation in Real Option Game Analysis.- Unifying Cournot and Stackelberg Action in a Dynamic Setting.- Issues on Strategy-Switching Dynamics.- R&D Public Expenditure, Knowledge Spillovers and Agglomeration.- Dynamics in Non-binding Procurement Auctions with Boundedly Rational Bidders.- Delay Differential Nonlinear Economic Models.- Imperfect Competition, Learning and Fluctuations.- Persistent Disequilibrium Dynamics and Economic Policy.- On the Transition Dynamics in Endogenous Recominant Growth Models.- Political Accountability - A Stochastical Control Approach.- Behavioral Portfolio Choice and Disappointment Aversion - An Analytical Solution with Small Risks.- A Simple Agent-Based Financial Market Model.- Global Bifurcations in a Three-Dimensional Financial Model of 'Bull and Bear' Interactions.- A Framework for CAPM with Heterogeneous Beliefs.- Optimal Monetary Policy for Commercial Banks Involving Lending Rates Setting and Defaults Rates?

Bischi, G.I., Chiarella, C., Kopel, M., Szidarovszky, F. (2010). ***Nonlinear Oligopolies.*** **New York: Springer.** ISBN 978-3-642-02105-3. The book focuses on the dynamics of nonlinear oligopoly models. It discusses the classical Cournot model with a large variety of demand and cost functions that illustrate the many different types of possible best response functions and it shows the existence of unique and multiple equilibria. Particular emphasis is placed on the influence of nonnegativity and capacity constraints. Dynamics are introduced under various assumptions for the

adjustment process. An introduction to the analysis of global dynamics is given through some specific examples. The book also considers concave and general oligopolies and gives conditions for the local asymptotic stability of their equilibria, and it investigates global dynamics in some special cases. Other oligopolies examined include market share attraction games, labor-managed oligopolies, partially cooperating firms and models with intertemporal demand attraction. Local/global stability analyses are carried out for these models and the impact of constraints is discussed. The book contains a number of technical appendices that summarize techniques of global dynamics not easily accessible elsewhere.

Borovkov, K. (2014). *Elements of stochastic modeling* (2nd ed.). Singapore: World Scientific. This is the expanded second edition of a successful textbook that provides a broad introduction to important areas of stochastic modelling. The original text was developed from lecture notes for a one-semester course for third-year science and actuarial students at the University of Melbourne. It reviewed the basics of probability theory and then covered the following topics: Markov chains, Markov decision processes, jump Markov processes, elements of queueing theory, basic renewal theory, elements of time series and simulation. The present edition adds new chapters on elements of stochastic calculus and introductory mathematical finance that logically complement the topics chosen for the first edition. This makes the book suitable for a larger variety of university courses presenting the fundamentals of modern stochastic modelling. Instead of rigorous proofs we often give only sketches of the arguments, with indications as to why a particular result holds and also how it is related to other results, and illustrate them by examples. Wherever possible, the book includes references to more specialised texts on respective topics that contain both proofs and more advanced material.

Broom, M., & Rychtar, J. (2013). *Game theoretical models in biology*. Boca Raton, FL: CRC Press. Use Evolutionary Game Theory to Model Diverse Biological Phenomena. "... a comprehensive, up-to-date introduction that uniquely blends mathematical clarity and biological intuition. ... Students of evolutionary game theory ... would do well to read Game-Theoretical Models in Biology all the way to the finish line. This engaging primer demonstrates that there is no tension between mathematical elegance and biological fidelity: both are needed to further our understanding of evolution." —Benjamin Allen and Martin A. Nowak, *Science*, August 2013.

Coombes, S., Bressloff, P. C. (Eds.). (2014). *Bursting: The genesis of rhythm in the nervous system*. Singapore: World Scientific. ISBN: 978-981-256-506-8. Neurons in the brain communicate with each other by transmitting sequences of electrical spikes or action potentials. One of the major challenges in neuroscience is to understand the basic physiological mechanisms underlying the complex spatiotemporal patterns of spiking activity observed during normal brain functioning, and to determine the origins of pathological dynamical states such as epileptic seizures and Parkinsonian tremors. A second major challenge is to understand how the patterns of spiking activity provide a substrate for the encoding and transmission of information, that is, how do neurons compute with spikes? It is likely that an important element of both the dynamical and computational properties of neurons is that they can exhibit bursting, which is a relatively slow rhythmic alternation between an active phase of rapid spiking and a quiescent phase without spiking. This book provides a detailed overview of the current state-of-the-art in the mathematical and computational modeling of bursting, with contributions from many of the leading researchers in the field.

Dieci, R,, He, X-Z., & Hommes, C. (Eds.). (2014). *Nonlinear Economic Dynamics and Financial Modelling: Essays in Honour of Carl Chiarella*. New York: Springer. This book reflects the state of the art on nonlinear economic dynamics, financial market modelling and quantitative finance. It contains eighteen papers with topics ranging from disequilibrium macroeconomics, monetary dynamics, monopoly, financial market and limit order market models with boundedly rational heterogeneous agents to estimation, time series modelling and empirical analysis, and from risk management of interest-rate products, futures price volatility and American option pricing with stochastic volatility to evaluation of risk and derivatives of electricity market. The book illustrates some of the most recent research tools in these areas and will be of interest to economists working in economic dynamics and financial market modelling, to mathematicians who are interested in applying complexity theory to economics and finance, and to market practitioners and researchers in quantitative finance interested in limit order, futures and electricity market modelling, derivative pricing and risk management.

Frame, M. (Ed.). (2015). *Benoit Mandelbrot: A life in many dimensions*. Singapore: World Scientific. ISBN: 978-981-4366-06-9. This is a collection of articles, many written by people who worked with Mandelbrot, memorializing the remarkable breadth and depth of his work in science and the arts. Contributors include mathematicians, physicists, biologists, economists, and engineers, as expected; and also artists, musicians, teachers, an historian, an architect, a filmmaker, and a comic. Some articles are quite technical, others entirely descriptive. All include stories about Benoit. Also included are chapters on fractals and music by Charles Wuorinen and by Harlan Brothers, on fractals and finance by Richard Hudson and by Christian

Walter, on fractal invisibility cloaks by Nathan Cohen, and a personal reminiscence by Aliette Mandelbrot. While he is known most widely for his work in mathematics and in finance, Benoit influenced almost every field of modern intellectual activity. No other book captures the breadth of all of Benoit's accomplishments. – *Publisher*. Yes you are reading correctly, the book is expected to be available in 2015, but you can buy it now. – *Newsletter*.

Fuchs, A., & Jirsa, V. K. (Eds.). (2008). *Coordination: Neural, Behavioral and Social Dynamics*. New York: Springer. ISBN 978-3-540-74476-4. One of the most striking features of Coordination Dynamics is its interdisciplinary character. The problems we are trying to solve in this field range from behavioral phenomena of interlimb coordination and coordination between stimuli and movements (perception-action tasks) through neural activation patterns that can be observed during these tasks to clinical applications and social behavior. It is not surprising that close collaboration among scientists from different fields as psychology, kinesiology, neurology and even physics are imperative to deal with the enormous difficulties we are facing when we try to understand a system as complex as the human brain. The chapters in this volume are not simply write-ups of the lectures given by the experts at the meeting but are written in a way that they give sufficient introductory information to be comprehensible and useful for all interested scientists and students.

Fujimoto, T., & Aruka, Y. (Eds.) (2015). *Evolutionary Economics and Social Complexity Science*. Tokyo: Springer. ISSN: 2198-4204. The Japanese Association for Evolutionary Economics (JAFEE) always has adhered to its original aim of taking an explicit "integrated" approach. This path has been followed steadfastly since the Association's establishment in 1997 and, as well, since the inauguration of our international journal in 2004. We have deployed an agenda encompassing a contemporary array of subjects including but not limited to: foundations of institutional and evolutionary economics, criticism of mainstream views in the social sciences, knowledge and learning in socio-economic life, development and innovation of technologies, transformation of industrial organizations and economic systems, experimental studies in economics, agent-based modeling of socio-economic systems, evolution of the governance structure of firms and other organizations, comparison of dynamically changing institutions of the world, and policy proposals in the transformational process of economic life. In short, our starting point is an "integrative science" of evolutionary and institutional views. Furthermore, we always endeavor to stay abreast of newly established methods such as agent-based modeling, socio/econo-physics, and network analysis as part of our integrative links. More fundamentally, "evolution" in social science is interpreted as an essential key word, i.e., an integrative and /or communicative link to understand and re-domain various preceding dichotomies in the sciences: ontological or epistemological, subjective or objective, homogeneous or heterogeneous, natural or artificial, selfish or altruistic, individualistic or collective, rational or irrational, axiomatic or psychological-based, causal nexus or cyclic networked, optimal or adaptive, micro- or macroscopic, deterministic or stochastic, historical or theoretical, mathematical or computational, experimental or empirical, agent-based or socio/econo-physical, institutional or evolutionary, regional or global, and so on. The conventional meanings adhering to various traditional dichotomies may be more or less obsolete, to be replaced with more current ones vis-à-vis contemporary academic trends. Thus we are strongly encouraged to integrate some of the conventional dichotomies. These attempts are not limited to the field of economic sciences, including management sciences, but also include social science in general. In that way, understanding the social profiles of complex science may then be within our reach. In the meantime, contemporary society appears to be evolving into a newly emerging phase, chiefly characterized by an information and communication technology (ICT) mode of production and a service network system replacing the earlier established factory system with a new one that is suited to actual observations. In the face of these changes we are urgently compelled to explore a set of new properties for a new socio/economic system by implementing new ideas. We thus are keen to look for "integrated principles" common to the above-mentioned dichotomies throughout our serial compilation of publications. We are also encouraged to create a new, broader spectrum for establishing a specific method positively integrated in our own original way.

Galam, S. (2012). *Sociophysics*. New York: Springer. ISBN 978-1-4614-2031-6. Do humans behave much like atoms? Sociophysics, which uses tools and concepts from the physics of disordered matter to describe some aspects of social and political behavior, answers in the affirmative. But advocating the use of models from the physical sciences to understand human behavior could be perceived as tantamount to dismissing the existence of human free will and also enabling those seeking manipulative skills. This thought-provoking book argues it is just the contrary. Indeed, future developments and evaluation will either show sociophyics to be inadequate, thus supporting the hypothesis that people can primarily be considered to be free agents, or valid, thus opening the path to a radically different vision of society and personal responsibility. This book attempts to explain why and how humans behave much like atoms, at least in some aspects of their collective lives, and then proposes how this

knowledge can serve as a unique key to a dramatic leap forwards in achieving more social freedom in the real world. At heart, sociophysics and this book are about better comprehending the richness and potential of our social interaction, and so distancing ourselves from inanimate atoms.

Gitterman, M. (2005). ***The noisy oscillator: The first hundred years, from Einstein until now.*** **Singapore: World Scientific.** ISBN: 978-981-256-512-9. This book contains comprehensive descriptions of stochastic processes described by underdamped and overdamped oscillator equations with additive and multiplicative random forcing. The latter is associated with random frequency or random damping. The coverage includes descriptions of various new phenomena discovered in the last hundred years since the explanation of Brownian motion by Einstein, Smoluchovski and Langevin, such as the shift of stable points, noise-enhanced stability, stochastic resonance, resonant activation, and stabilization of metastable states. In addition to many applications in physics, chemistry, biology, medicine, economics and sociology, these discoveries have clarified the deep relationship between determinism and stochasticity, which turns out to be complimentary rather than contradictory, with noise playing both constructive and destructive roles.

Gross, T., & Sayama, H. (Eds.). (2009). ***Adaptive Networks.*** **New York: Springer.** ISBN 978-3-642-01283-9. With adaptive, complex networks, the evolution of the network topology and the dynamical processes on the network are equally important and often fundamentally entangled. Recent research has shown that such networks can exhibit a plethora of new phenomena which are ultimately required to describe many real-world networks. Some of those phenomena include robust self-organization towards dynamical criticality, formation of complex global topologies based on simple, local rules, and the spontaneous division of "labor" in which an initially homogenous population of network nodes self-organizes into functionally distinct classes. These are just a few. This book is a state-of-the-art survey of those unique networks. In it, leading researchers set out to define the future scope and direction of some of the most advanced developments in the vast field of complex network science and its applications.

Helbing, Dirk (Ed.). (2012). ***Social Self-Organization.*** **New York: Springer.** ISBN 978-3-642-24003-4. What are the principles that keep our society together? This question is even more difficult to answer than the long-standing question, what are the forces that keep our world together. However, the social challenges of humanity in the 21st century ranging from the financial crises to the impacts of globalization, require us to make fast progress in our understanding of how society works, and how our future can be managed in a resilient and sustainable way. This book can present only a few very first steps towards this ambitious goal. However, based on simple models of social interactions, one can already gain some surprising insights into the social, "macro-level" outcomes and dynamics that is implied by individual, "micro-level" interactions. Depending on the nature of these interactions, they may imply the spontaneous formation of social conventions or the birth of social cooperation, but also their sudden breakdown. This can end in deadly crowd disasters or tragedies of the commons (such as financial crises or environmental destruction). Furthermore, we demonstrate that classical modeling approaches (such as representative agent models) do not provide a sufficient understanding of the self-organization in social systems resulting from individual interactions. The consideration of randomness, spatial or network interdependencies, and nonlinear feedback effects turns out to be crucial to get fundamental insights into how social patterns and dynamics emerge. Given the explanation of sometimes counter-intuitive phenomena resulting from these features and their combination, our evolutionary modeling approach appears to be powerful and insightful. The chapters of this book range from a discussion of the modeling strategy for socio-economic systems over experimental issues up the right way of doing agent-based modeling. We furthermore discuss applications ranging from pedestrian and crowd dynamics over opinion formation, coordination, and cooperation up to conflict, and also address the response to information, issues of systemic risks in society and economics, and new approaches to manage complexity in socio-economic systems. *Parts of this book were previously published in peer reviewed journals.*

Huang, N. E., & Shen S. S. P. (2014). ***Hilbert–Huang transform and its applications (2nd Edition).*** **Singapore: World Scientific.** ISBN: 978-981-4508-23-0. This book is written for scientists and engineers who use HHT (Hilbert–Huang Transform) to analyze data from nonlinear and non-stationary processes. It can be treated as a HHT user manual and a source of reference for HHT applications. The book contains the basic principle and method of HHT and various application examples, ranging from the correction of satellite orbit drifting to detection of failure of highway bridges. The thirteen chapters of the first edition are based on the presentations made at a mini-symposium at the Society for Industrial and Applied Mathematics in 2003. Some outstanding mathematical research problems regarding HHT development are discussed in the first three chapters. The three new chapters of the second edition reflect the latest HHT development, including ensemble empirical mode decomposition (EEMD) and modified EMD. The book also provides a platform for researchers to develop the HHT method further and to identify more applications.

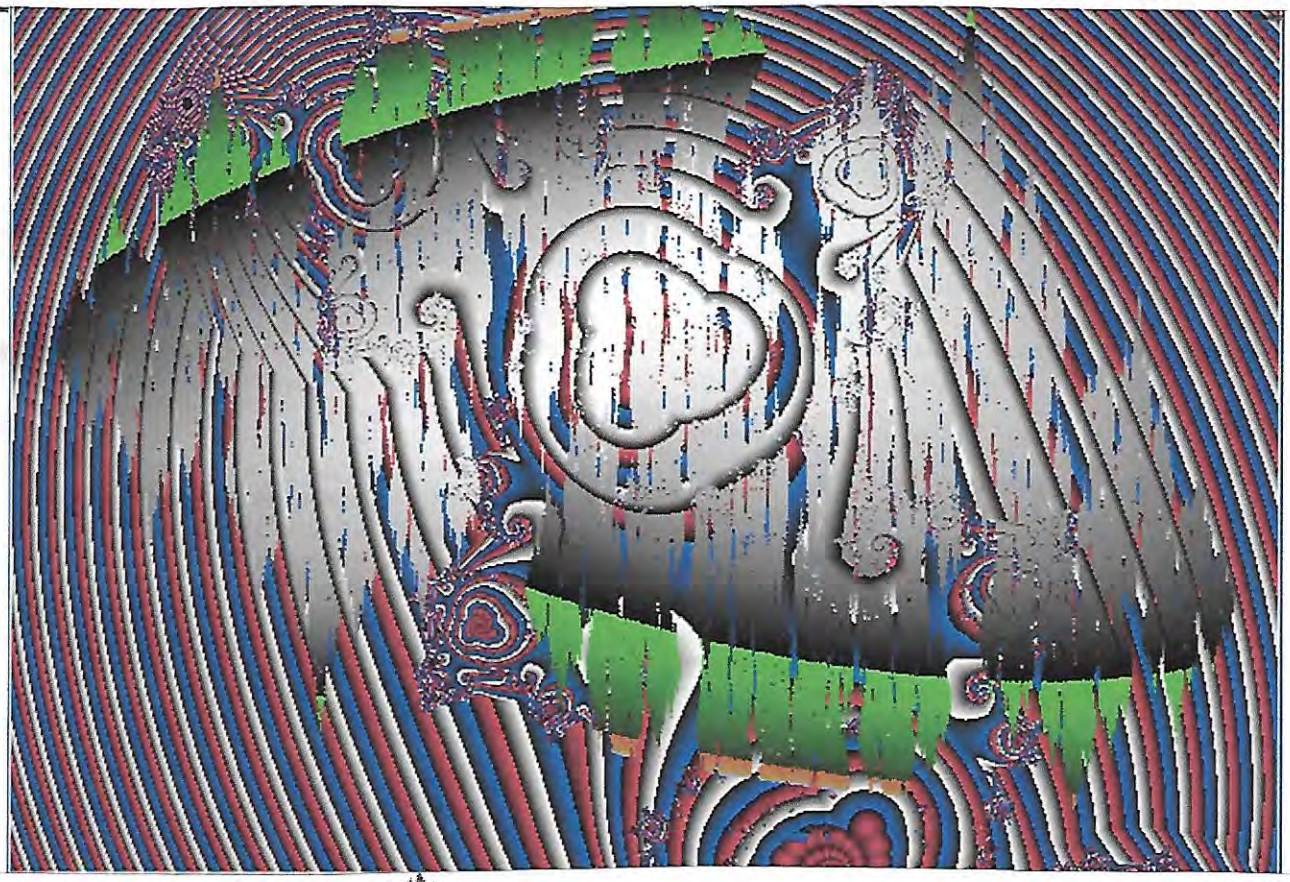
Iordache, O. (2012). *Self-Evolvable Systems.* New York: Springer. ISBN 978-3-642-28881-4. This monograph presents key method to successfully manage the growing complexity of systems where conventional engineering and scientific methodologies and technologies based on learning and adaptability come to their limits and new ways are nowadays required. The transition from adaptable to evolvable and finally to self-evolvable systems is highlighted, self-properties such as self-organization, self-configuration, and self-repairing are introduced and challenges and limitations of the self-evolvable engineering systems are evaluated.

Jarzebowska, E. (2012). *Model-Based Tracking Control of Nonlinear Systems.* Boca Raton, FL: Chapman & Hall/CRC. Presents model-based control techniques for nonlinear, constrained systems. It covers constructive control design methods with an emphasis on modeling constrained systems, generating dynamic control models, and designing tracking control algorithms for the models. The book's interdisciplinary approach illustrates how system modeling and control theory are essential to control design projects. Organized according to the steps in a control design project, the text first discusses kinematic and dynamic modeling methods, including programmed constraints, Lagrange's equations,Boltzmann-Hamel equations, and generalized programmed motion equations. The next chapter describes basic control concepts and the use of nonlinear control theory. After exploring stabilization strategies for nonlinear systems, the author presents existing model-based tracking control algorithms and path-following strategies for nonlinear systems. The final chapter develops a new model reference tracking strategy for programmed motion. Throughout the text, two examples of mechanical systems are used to illustrate the theory and simulation results. The first example is a unicycle model (nonholonomic system) and the second is a two-link planar manipulator model (holonomic system). With a focus on constructive modeling and control methods, this book provides the tools and techniques to support the control design process.

Johnson, J. (2014). *Hypernetworks in the science of complex systems.* Singapore: World Scientific. ISBN: 978-1-86094-972-2. The modern world is complex beyond human understanding and control. The science of complex systems aims to find new ways of thinking about the many interconnected networks of interaction that defy traditional approaches. Thus far, research into networks has largely been restricted to pairwise relationships represented by links between two nodes. This volume marks a major extension of networks to multidimensional hypernetworks for modeling multi-element relationships, such as companies making up the stock market, the neighborhoods forming a city, people making up committees, divisions making up companies, computers making up the internet, men and machines making up armies, or robots working as teams. This volume makes an important contribution to the science of complex systems by: (i) extending network theory to include dynamic relationships between many elements; (ii) providing a mathematical theory able to integrate multilevel dynamics in a coherent way; (iii) providing a new methodological approach to analyze complex systems; and (iv) illustrating the theory with practical examples in the design, management and control of complex systems taken from many areas of application.

Kirchgässner, G., Wolters, J., &Hassler, U. (2013). *Introduction to Modern Time Series Analysis* (2nd ed.). New York: Springer. This book presents modern developments in time series econometrics that are applied to macroeconomic and financial time series, bridging the gap between methods and realistic applications. It presents the most important approaches to the analysis of time series, which may be stationary or non-stationary. Modelling and forecasting univariate time series is the starting point. For multiple stationary time series, Granger causality tests and vector autogressive models are presented. As the modelling of nonstationary uni- or multivariate time series is most important for real applied work, unit root and cointegration analysis as well as vector error correction models are a central topic. Tools for analysing nonstationary data are then transferred to the panel framework. Modelling the (multivariate) volatility of financial time series with autogressive conditional heteroskedastic models is also treated.

Letellier, C. (2013). *Chaos in Nature.* Singapore: World Scientific. Chaos theory deals with the description of motion (in a general sense) which cannot be predicted in the long term although produced by deterministic system, as well exemplified by meteorological phenomena. It directly comes from the Lunar theory — a three-body problem — and the difficulty encountered by astronomers to accurately predict the long-term evolution of the Moon using "Newtonian" mechanics. Henri Poincaré's deep intuitions were at the origin of chaos theory. They also led the meteorologist Edward Lorenz to draw the first chaotic attractor ever published. But the main idea consists of plotting a curve representative of the system evolution rather than finding an analytical solution as commonly done in classical mechanics. Such a novel approach allows the description of population interactions and the solar activity as well. Using the original sources, the book draws on the history of the concepts underlying chaos theory from the 17th century to the last decade, and by various examples, show how general is this theory in a wide range of applications: meteorology, chemistry, populations, astrophysics, biomedicine, etc.



Nonlinear Dynamical Bookshelf

Argyros, I. K., & Hilout, S. (2013). Computational methods in nonlinear analysis: Efficient algorithms, fixed point theory and applications. Singapore: World Scientific. The field of computational sciences has seen a considerable development in mathematics, engineering sciences, and economic equilibrium theory. Researchers in this field are faced with the problem of solving a variety of equations or variational inequalities. We note that in computational sciences, the practice of numerical analysis for finding such solutions is essentially connected to variants of Newton's method. The efficient computational methods for finding the solutions of fixed point problems, nonlinear equations and variational inclusions are the first goal of the present book. The second goal is the applications of these methods in nonlinear problems and the connection with fixed point theory. This book is intended for researchers in computational sciences, and as a reference book for an advanced computational methods course in nonlinear analysis. We collect the recent results on the convergence analysis of numerical algorithms in both finite-dimensional and infinite-dimensional spaces, and present several applications and connections with fixed point theory. The book contains abundant and updated bibliography, and provides comparison between various investigations made in recent years in the field of computational nonlinear analysis.

Bosma, H. A., & Kunnen, E. S. (Eds.). (2005). *Identity and emotion : Development through self-organization*. New York: Cambridge University Press. Identity and Emotion focuses on the individual development of identity and the processes involved. By

working from a dynamic systems perspective the book offers a new and exciting approach to human identity and its development across the lifespan. The contributors to the book are specialists in this new approach, and offer new and challenging ideas on the development of identity as a self-organizing process. The book offers a wealth of new ideas and insights, but also concentrates on the ways these insights can be translated into research.

Byrne, D., & Callaghan, G. (2014). *Complexity theory and the social sciences: The state of the art*. Routledge/Taylor and Francis. For the past two decades, "complexity" has informed a range of work across the social sciences. There are diverse schools of complexity thinking, and authors have used these ideas in a multiplicity of ways, from health inequalities to the organization of large-scale firms. Some understand complexity as emergence from the rule-based interactions of simple agents and explore it through agent-based modeling. Others argue against such "restricted complexity" and for the development of case-based narratives deploying a much wider set of approaches and techniques. Major social theorists have been reinterpreted through a complexity lens and the whole methodological programme of the social sciences has been recast in complexity terms. –Back cover.

Farmer, M. F. (2014). *Application of chaos and fractals to computer vision*. Sharjah, UAE: Bentham Books. ISBN: 978-1-60805-901-0. This book provides a thorough investigation of the application of chaos theory and fractal analysis to computer vision. The field of chaos theory has been studied in dynamical physical systems, and has been very successful in providing computational models for very complex problems ranging from weather systems to neural pathway signal propagation. Computer vision researchers have derived motivation for their algorithms from biology and physics for many years as witnessed by the optical flow algorithm, the oscillator model underlying graphical cuts and of course neural networks. These algorithms are very helpful for a broad range of computer vision problems like motion segmentation, texture analysis and change detection. The contents of this book include chapters in biological vision systems, foundations of chaos and fractals, behavior of images and image sequences in phase space, mathematical measures for analyzing phase space, applications to pre-attentive vision and applications to post-attentive vision.

Jadczyk, A. (2014). *From Heisenberg's uncertainty to Barnsley's fractality*. Singapore: World Scientific. Starting with numerical algorithms resulting in new kinds of amazing fractal patterns on the sphere, this book describes the theory underlying these phenomena and indicates possible future applications. The book also explores the following questions: What are fractals? How do fractal patterns emerge from quantum observations and relativistic light aberration effects? What are the open problems with iterated function systems based on Mobius transformations? Can quantum fractals be experimentally detected? What are quantum jumps? Is quantum theory complete and/or universal? Is the standard interpretation of Heisenberg's uncertainty relations accurate? What is Event Enhanced Quantum Theory and how does it differ from spontaneous localization theories? What are the possible applications of quantum fractals?

Kazumufi, I., & Bangti, J. (2014). *Inverse problems: Tikhonov theory and algorithms*. Singapore: World Scientific. ISBN: 978-981-4596-19-0. Inverse problems arise in practical applications whenever one needs to deduce unknowns from observables. This monograph is a valuable contribution to the highly topical field of computational inverse problems. Both mathematical theory and numerical algorithms for model-based inverse problems are discussed in detail. The mathematical theory focuses on nonsmooth Tikhonov regularization for linear and nonlinear inverse problems. The computational methods include nonsmooth optimization algorithms, direct inversion methods and uncertainty quantification via Bayesian inference. The book offers a comprehensive treatment of modern techniques, and seamlessly blends regularization theory with computational methods, which is essential for developing accurate and efficient inversion algorithms for many practical inverse problems. It demonstrates many current developments in the field of computational inversion, such as value function calculus, augmented Tikhonov regularization, multi-parameter Tikhonov regularization, semismooth Newton method, direct sampling method, uncertainty quantification and approximate Bayesian inference. It is written for graduate students and researchers in mathematics, natural science and engineering.

Laycraft, K.C. *Creativity as an Order through Emotions,* Promontory Press, Victoria, BC, Canada

The book contains three parts. In the first part, the basic concepts of chaos theory and the idea of self-organization are introduced. Some contemporary approaches to emotions are also discussed. In the second part, the lives of young people are presented and by applying these theories, their psychological development and creative processes are interpreted and analyzed. Finally, in the third part, a conceptual model of creativity development is discussed. The book shows how studying the creativity of adolescents has contributed to research on the psychological development of young people as a self-organizing process.

Lichtenstein, B. (2014). *Generative Emergence: A New Discipline of Organizational, Entrepreneurial, and Social Innovation*. New York: Oxford University Press. How do organizations become created? Entrepreneurship scholars have debated this

question for decades, but only recently have they been able to gain insights into the non-linear dynamics that lead to organizational emergence, through the use of the complexity sciences. Written for social science researchers, *Generative Emergence* summarizes these literatures, including the first comprehensive review of each of the 15 complexity science disciplines. In doing so, the book makes a bold proposal for a discipline of Emergence, and explores one of its proposed fields, namely Generative Emergence. The book begins with a detailed summary of its underlying science, dissipative structures theory, and rigorously maps the processes of order creation discovered by that science to identify a 5-phase model of order creation in entrepreneurial ventures. The second half of the book presents the findings from an experimental study that tested the model in four fast-growth ventures through a year-long, week-by-week longitudinal analysis of their processes, based on over 750 interviews and 1000 hours of on-site observation. These data, combined with reports from over a dozen other studies, confirm the dynamics of the 5-phase model in multiple contexts. By way of conclusion, the book explores how the model of Generative Emergence could be applied to enact emergence within and across organizations.

Lines, **Marji (Ed.) (2005). *Nonlinear Dynamical Systems in Economics*. New York: Springer.** Many problems in theoretical economics are mathematically formalized as dynamical systems of difference and differential equations. In recent years a truly open approach to studying the dynamical behavior of these models has begun to make its way into the mainstream. That is, economists formulate their hypotheses and study the dynamics of the resulting models rather than formulating the dynamics and studying hypotheses that could lead to models with such dynamics. This is a great progress over using linear models, or using nonlinear models with a linear approach, or even squeezing economic models into well-studied nonlinear systems from other fields. There are today a number of economic journals open to publishing this type of work and some of these have become important. There are several societies which have annual meetings on the subject and participation at these has been growing at a good rate. And of course there are methods and techniques avail able to a more general audience, as well as a greater availability of software for numerical and graphical analysis that makes this type of research even more exciting. The lecturers for the Advanced School on Nonlinear Dynamical Systems in Economics, who represent a wide selection of the research areas to which the theory has been applied, agree on the importance of simulations and computer-based analysis. The School emphasized computer applications of models and methods, and all contributors ran computer lab sessions.

Lucas, K., & Roosen, P. (Eds.). (2012). *Emergence, Analysis and Evolution of Structures*. New York: Springer. ISBN 978-3-642-00869-6. The study of structures and structure generating processes is a common concern of all scientific and technical disciplines. The present volume presents an interdisciplinary investigation of the different methods of analysis and modelling which, while differing considerably in detail, usually have evolutionary adaption or development schemes at their core. The book naturally falls into three parts - a first part summarizing the transdisciplinary fundamentals, a second part discussing in detail case studies from various fields (production engineering, medicine, management, molecular biology, energy engineering, civil engineering, logistics, sociology, physics) and a shorter outlook on the transdisciplinary perspective.

Ma, **J.**, **& Wohar, M. (Eds.). (2014). *Recent Advances in Estimating Nonlinear Models: With Applications in Economics and Finance*. New York: Springer.** This edited volume provides a timely overview of nonlinear estimation techniques, offering new methods and insights into nonlinear time series analysis. The focus is on such topics as state-space model and the identification issue, use of Markov Switching Models and Smooth Transition Models to analyze economic series, and how best to distinguish between competing nonlinear models. Most economic theory suggests that the economic relationships among economic variables in the real world are fairly complex and nonlinear. Nonlinear models are necessary to capture these important channels through which economic variables can influence each other and various policies can affect economic activities. This volume features cutting-edge research from leading academics in economics, finance, and business management. The principles and techniques used here will appeal to econometricians, finance professors teaching quantitative finance, researchers, and graduate students interested in learning how to apply advances in nonlinear time series modeling to solve complex problems in economics and finance. *Contents:* Chapter 1 Stock Return and Inflation: An Analysis Based on the State-Space Framework.- Chapter 2 Diffusion Index Model Specification and Estimation: Using Mixed Frequency Datasets.- Chapter 3 Testing for Neglected Nonlinearity Using Regularized Artificial Neural Networks.- Chapter 4 On the Use of the Flexible Fourier Form in Unit Roots Tests, Endogenous Breaks, and Parameter Instability.- Chapter 5 Testing for a Markov-Switching Mean in Serially-Correlated Data.- Chapter 6 Nonlinear Time Series Models and Model Selection.- Chapter 7 Nonstationarities and Markov Switching Models.- Chapter 8 Has Wealth Effect Changed Over Time? Evidence from Four Industrial Countries.- Chapter 9 A Simple Specification Procedure for the Transition Function in Persistent Nonlinear Times Series Models.- Chapter 10 Small Area Estimation with Correctly

Specified Linking Models.- Chapter 11 Forecasting Stock Returns: Does Switching between Models Help?.- Chapter 12 The Global Joint Distribution of Income and Health.

Mazza C., & Benaim, M. (2014). *Stochastic dynamics for systems biology*. Boca Raton, FL: CRC Press. Get Insight on Simulating Biological Processes. This is one of the first books to provide a systematic study of the many stochastic models used in systems biology. The book shows how the mathematical models are used as technical tools for simulating biological processes and how the models lead to conceptual insights on the functioning of the cellular processing system. Examples cover the phage lambda genetic switch, eukaryotic gene expression, noise propagation in gene networks, and more.

Mortad, H. M. (2014). *Introductory topology*. Boca Raton, FL: CRC Press. ISBN: 978-981-4583-81-7. The book offers a good introduction to topology through solved exercises. It is mainly intended for undergraduate students. Most exercises are given with detailed solutions. Contents: Exercises and Solutions: General Notions: Sets, Functions et al., Metric Spaces, Topological Spaces, Continuity and Convergence, Compact Spaces, Connected Spaces, Complete Metric Spaces, Function Spaces.

Nicolis, G., & Basios, V. (Eds.). (2014). *Chaos, information processing, and paradoxical games: The Legacy of John S Nicolis*. Singapore: World Scientific. This volume provides a self-contained survey of the mechanisms presiding information processing and communication. The main thesis is that chaos and complexity are the basic ingredients allowing systems composed of interesting subunits to generate and process information and communicate in a meaningful way. Emphasis is placed on communication in the form of games and on the related issue of decision making under conditions of uncertainty.

Nicolis, G., & Nicolis, N. (2014). *Foundations of Complex Systems: Emergence, Information and Prediction* (2nd Edition). Singapore: World Scientific. ISBN: 978-981-4366-60-1. This book provides a self-contained presentation of the physical and mathematical laws governing complex systems. Complex systems arising in natural, engineering, environmental, life and social sciences are approached from a unifying point of view using an array of methodologies such as microscopic and macroscopic level formulations, deterministic and probabilistic tools, modeling and simulation. The book can be used as a textbook by graduate students, researchers and teachers in science, as well as non-experts who wish to have an overview of one of the most open, markedly interdisciplinary and fast-growing branches of present-day science.

Novikov, D. A., & Alexander G. Chkhartishvili (2014). *Reflexion and control: Mathematical models*. Boca Raton, FL: Chapman & Hall/CRC. Intended for experts in decision making and control of systems, this book is dedicated to modern approaches to mathematical modeling of reflexive processes in control. The book discusses development of modern trends in game theory, Integrates mathematics, psychology, and other cognitive sciences, uses uniform methodology and mathematical framework to describe and analyze various situations of collective decision making, and considers reflexive games that describe the game theoretical interaction of agents making decisions based on a hierarchy of beliefs.

Rosser, J. B., Holt, R. P. F. & Colander, D. (2010). *European economics at a crossroads*. Cheltenham, UK: Edward Elgar. As Europe moves toward an integrated academic system, European economics is changing. This book discusses that change, along with the changes that are happening simultaneously within the economics profession. The authors argue that modern economics can no longer usefully be described as ǹeoclassical', but is much better described as complexity economics. The complexity approach embraces rather than assumes away the complexities of social interaction. The authors also argue that despite all the problems with previous European academic structures, those structures allowed for more diversity than exists in US universities, and thus were often ahead of US universities in exploring new cutting-edge approaches. The authors further argue that by trying to judge themselves by US-centric measures and to copy US universities the European economics profession is undermining some of the strengths of the older system - strengths on which it should be building. While the authors agree that European economics needs to go through major changes in the coming decade, they argue that by building on Europe's strengths, rather than trying to follow a US example, Europe will be more likely to become the global leader in economics in the coming decades rather than a second-rate copy of the US. The book consists of two chapters spelling out the authors' view of the changes in economics and European economics. This is followed by 11 interviews with a diverse set of innovative European economists from a range of European countries. In the interviews these European economists reflect on the ongoing changes in economics generally and in European economics specifically. These interviews demonstrate how the economics profession is moving away from traditional neoclassical economics into a dynamic set of new methods and approaches (incorporating work in behavioral economics, experimental economics, evolutionary game theory and ecological approaches, complexity and nonlinear dynamics, methodological analysis, and agent-based modeling) that the authors classify as complexity economics.

Ruth, **M., & Hannon, B. (2012). *Modeling Dynamic Economic Systems* (2nd ed.).New York: Springer.** Models in this book were created using STELLA software. Economists model the ways in which humans meet their needs using given endowments of resources and technologies. This book explores the dynamic processes in economic systems, concentrating on the extraction of resources that are required to meet economic needs. Using the STELLA® software, *Modeling Dynamic Economic Systems* applies methods of computer modeling to a wide range of real-world economic phenomena, demonstrating how to make informed decisions about economic performance and environmental quality. Sections of the book cover: methods for dynamic modeling economics with special emphasis on the microeconomic models of firms, modeling optimal use of both nonrenewable and renewable resources, and chaos in economic models. The book does not require a substantial background in mathematics or computer science and encourages all students and scholars to actively incorporate modeling into their education and research. A save-disabled version of STELLA and the computer models of this book are available at www. iseesystems.com/modelingeconomicsystems.

Salem, P. J. (2013). *The complexity of human communication* (2nd ed.). Cresskill, NJ: Hampton Press.

Most communication research and most applications of that research acknowledge the process nature of communication. However, the material following that acknowledgment conforms to traditional linear and static approaches treating communication as little more than printed text. This Print Paradigm persists despite repeated calls to explore the more dynamic nature of communication. In this second edition, the author updates and expands his argument that communication is a process analogous to the complexity of other living systems. The author reviews material stretching over three centuries leading to the development of paradigmatic principles. He describes human information processing as an autocatalytic process and provides a model of human communication as a socially emergent process. The author then applies the model to current thinking across a range of common communication topics. The second edition concludes with two glossaries: a communication glossary for complexity researchers and a complexity glossary for communication researchers.

Sibani, P., & Jensen, H. J. (2013). *Stochastic dynamics of complex systems from glasses to evolution.* Singapore: World Scientific. ISBN: 978-1-84816-993-7. Dynamical evolution over long time scales is a prominent feature of all the systems we intuitively think of as complex — for example, ecosystems, the brain or the economy. In physics, the term ageing is used for this type of slow change, occurring over time scales much longer than the patience, or indeed the lifetime, of the observer. The main focus of this book is on the stochastic processes which cause ageing, and the surprising fact that the ageing dynamics of systems which are very different at the microscopic level can be treated in similar ways. The first part of this book provides the necessary mathematical and computational tools and the second part describes the intuition needed to deal with these systems. Some of the first few chapters have been covered in several other books, but the emphasis and selection of the topics reflect both the authors' interests and the overall theme of the book. The second part contains an introduction to the scientific literature and deals in some detail with the description of complex phenomena of a physical and biological nature, for example, disordered magnetic materials, superconductors and glasses, models of co-evolution in ecosystems and even of ant behaviour. These heterogeneous topics are all dealt with in detail using similar analytical techniques. This book emphasizes the unity of complex dynamics and provides the tools needed to treat a large number of complex systems of current interest. The ideas and the approach to complex dynamics it presents have not appeared in book form until now.

Tsonis, A. A. (2008). *Randomnicity: Rules and randomness in the realm of the infinite*. Singapore: World Scientific. ISBN: 978-1-84816-197-9. This unique book explores the definition, sources and role of randomness. A joyful discussion with many non-mathematical and mathematical examples leads to the identification of three sources of randomness: randomness due to irreversibility which inhibits us from extracting whatever rules may underlie a process, randomness due to our inability to have infinite power (chaos), and randomness due to many interacting systems. Here, all sources are found to have something in common: infinity. The discussion then moves to the physical system (our universe). Through the quantum mechanical character of small scales, the second law of thermodynamics and chaos, randomness is shown to be an intrinsic property of nature — this is consistent with the three sources of randomness identified above. Finally, an explanation is given as to why rules and randomness cannot exist by themselves, but instead have to coexist. Many examples are presented, ranging from pure mathematical to natural and social processes, that clearly demonstrate how the combination of rules and randomness produces the world we live in.

Vallacher, R.R., Coleman, P.T., Nowak, A., Bui-Wrzosinska, L., Liebovitch, L., Kugler, K., Bartoli, A. (2013). *Attracted to conflict: Dynamic foundations of destructive social relations*. New York: Springer. ISBN 978-3-642-35279-9. Conflict is inherent in virtually every aspect of human relations, from sport to parliamentary democracy, from fashion in

the arts to paradigmatic challenges in the sciences, and from economic activity to intimate relationships. Yet, it can become among the most serious social problems humans face when it loses its constructive features and becomes protracted over time with no obvious means of resolution. This book addresses the subject of intractable social conflict from a new vantage point. Here, these types of conflict represent self-organizing phenomena, emerging quite naturally from the ongoing dynamics in human interaction at any scale—from the interpersonal to the international. Using the universal language and computational framework of nonlinear dynamical systems theory in combination with recent insights from social psychology, intractable conflict is understood as a system locked in special attractor states that constrain the thoughts and actions of the parties to the conflict. The emergence and maintenance of attractors for conflict can be described by means of formal models that incorporate the results of computer simulations, experiments, field research, and archival analyses. Multi-disciplinary research reflecting these approaches provides encouraging support for the dynamical systems perspective. Importantly, this text presents new views on conflict resolution. In contrast to traditional approaches that tend to focus on basic, short-lived cause-effect relations, the dynamical perspective emphasizes the temporal patterns and potential for emergence in destructive relations. Attractor deconstruction entails restoring complexity to a conflict scenario by isolating elements or changing the feedback loops among them. The creation of a latent attractor trades on the tendency toward multi-stability in dynamical systems and entails the consolidation of incongruent (positive) elements into a coherent structure. In the bifurcation scenario, factors are identified that can change the number and types of attractors in a conflict scenario. The implementation of these strategies may hold the key to unlocking intractable conflict, creating the potential for constructive social relations.

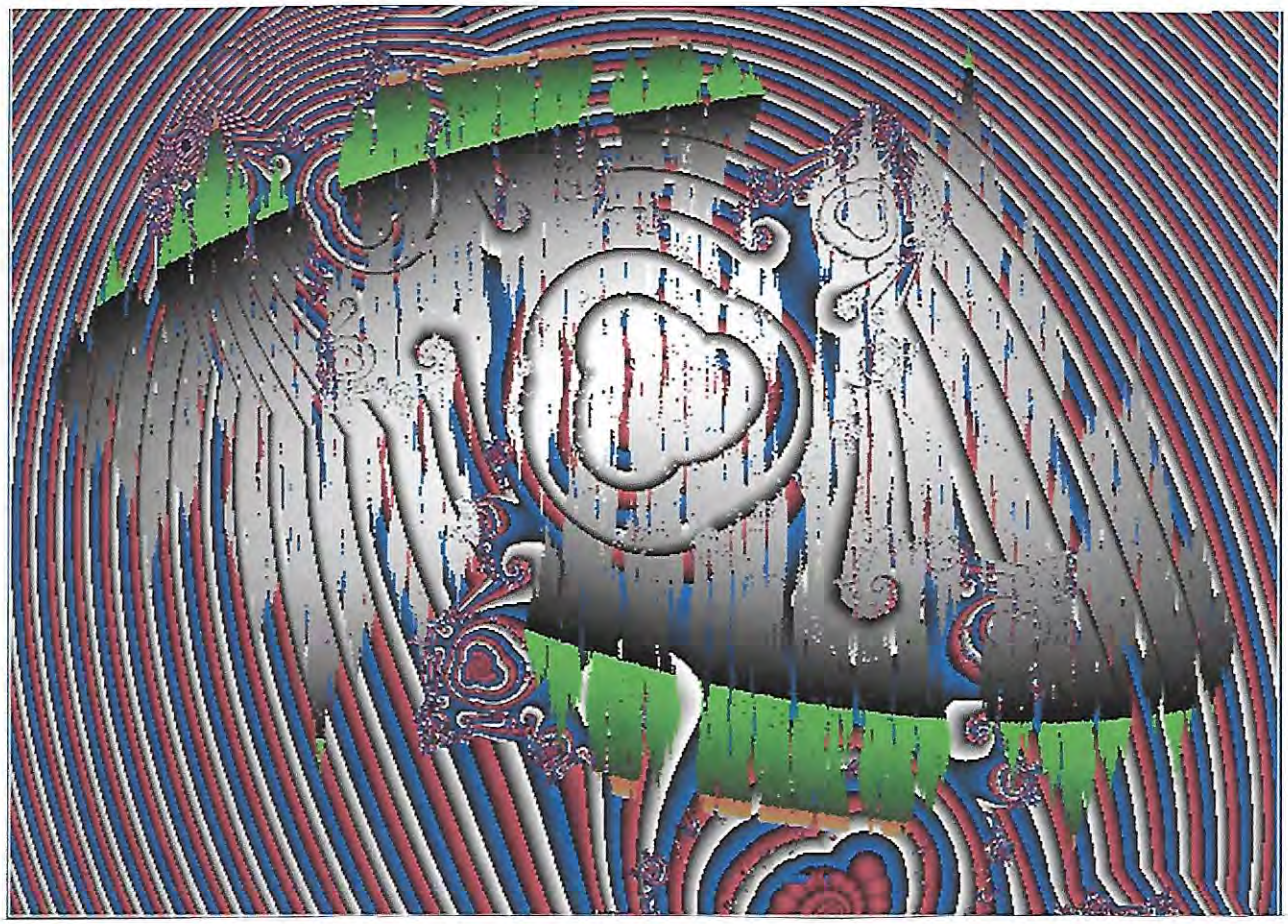
Vialar, **T. (2009)*. Complex and chaotic nonlinear dynamics: Advances in economics and finance, mathematics and statistics*. New York: Springer.** Presents comprehensive and interdisciplinary knowledge on complex dynamics. Complex dynamics constitute a growing and increasingly important area as they offer a strong potential to explain and formalize natural, physical, financial and economic phenomena. This book pursues the ambitious goal to bring together an extensive body of knowledge regarding complex dynamics from various academic disciplines. Beyond its focus on economics and finance, including for instance the evolution of macroeconomic growth models towards nonlinear structures as well as signal processing applications to stock markets, fundamental parts of the book are devoted to the use of nonlinear dynamics in mathematics, statistics, signal theory and processing. Numerous examples and applications, almost 700 illustrations and numerical simulations based on the use of Matlab make the book an essential reference for researchers and students from many different disciplines who are interested in the nonlinear field. An appendix recapitulates the basic mathematical concepts required to use the book.

SCTPLS 2015

SAVE THE DATE: The 25th Annual International SCTPLS Conference is scheduled for Gainesville, Florida (USA) July 29-31, 2015. Watch this space for the CALL FOR PAPERS, impending special guests, dinner with a woolly mammoth, and other good stuff.

Wonderful Webbage

The RESOURCES FOR STUDENTS and TEACHERS on the SCTPLS web site have been overhauled. So much so that it needed a new table of contents at the front end. The "page" contains four menus of additional resources, including readings lists, tutorial powerpoints, software downloads, etc.



Bayés de Luna, A. (2014). ***ECG for beginners.*** **New York: Wiley.** Mastery of ECG interpretation is achieved not only by pattern recognition, but equally importantly, by a clear, practical understanding of how electricity moves through the heart and how disruption of that movement manifests itself via ECG tracings. ECGs for Beginners, written by one of the world's most respected electrophysiologists with over 40 years experience of training clinicians, will provide cardiology and electrophysiology trainees with an easy to follow, step-by-step guide to the topic, thus enabling them to both understand and interpret ECG readings in order to to best manage their patients. Packed with over 250 high-quality ECG tracings, as well as management algorithms and key points throughout, every chapter also contains self-assessment questions, allowing the reader to test themselves on what they've just learnt. All kinds of arrhythmias will be covered, as well as morphological abnormalities such as atrial and ventricular problems. Importantly, normal ECG readings will be presented alongside abnormal readings, to best demonstrate how and why abnormalities occur. ECGs for Beginners is an essential purchase for all cardiology and electrophysiology trainees, as well as being a handy refresher guide for the experienced physician. It also looks like an excellent resource for those engaged in nonlinear analyses of ECG and HRV.

Ben-Naim, A. (2014). ***Discover probability: How to use it, how to avoid misusing it, and how it affects every aspect of your life.*** **Singapore: World Scientific.** ISBN: 978-981-4616-31-7. This is a unique book which explains the concept of probability and its applications with almost no mathematics. As the title states, the reader will discover the concept of probability, learn how to use it, and be made aware of some misuses of, and sometimes even abuse of, probability. The reader will come to know that a basic knowledge of probability is useful in life. It is a novel, self-teaching book that is easy to read, oftentimes entertaining and full of useful information on both probability and information theory. The style is reader-friendly. It will appeal to anyone who is interested in the "laws" that govern our daily lives. The detailed examples in the book are taken from daily life which anyone can identify with. The last section introduces the Shannon measure of information and its relationship to probabilities.

Gottman, J. M. (2015). ***Principia Amoris: The New Science of Love.*** **New York: Routledge.** ISBN - 978-0-415-64156-2. From the author of *Mathematics of*

Marriage. Just as science has helped us to understand the physical world, it's now helping us understand the emotional world, too. In his new book, renowned family therapist John Gottman delves into the unquantifiable realm of love armed with science and logic and emerges with the knowledge that relationships can be not only understood, but predicted as well. Based on research done at his Love Lab and other laboratories, Gottman has discovered that the future of love relationships can be predicted with a startling 91% success rate. These predictions can help couples to prevent disasters in their relationships, recognize the signs of a promising relationship, and perhaps more importantly, recognize the signs of a doomed one. Principia Amoris also introduces Love Equations, a mathematical modeling of relationships that helps understand predictions. Love Equations are powerful tools that can prevent relationship distress and heal ailing relationships. Readers learn about the various research and studies that were done to discover the science behind love, and are treated to a history of the people, ideas, and events that shaped our current understanding. They also learn about: The "Four Horsemen of the Apocalypse," 45 natural principles of love, 5 couple types, 5 recipes for good relationships, and much more!

Murthy, K. G. (2014). *Computational and algorithmic linear algebra and n-dimensional geometry*. Singapore: World Scientific. ISBN: 978-981-4366-62-5. This undergraduate textbook on Linear Algebra and n-Dimensional Geometry, in a self-teaching style, is invaluable for sophomore level undergraduates in mathematics, engineering, business, and the sciences. These are classical subjects on which there are many mathematics books in theorem-proof style, but this unique volume has its focus on developing the mathematical modeling as well as computational and algorithmic skills in students at this level. The explanations in this book are detailed, lucid, and supported with numerous well-constructed examples to capture the interest and encourage the student to master the material.

Ostrovsky, L. (2014). *Asymptotic perturbation pheory of waves*. Singapore: World Scientific. ISBN: 978-1-84816-235-8. This book is an introduction to the perturbation theory for linear and nonlinear waves in dispersive and dissipative media. The main focus is on the direct asymptotic method which is based on the asymptotic expansion of the solution in series of one or more small parameters and demanding finiteness of the perturbations; this results in slow variation of the main-order solution. The method, which does not depend on integrability of basic equations, is applied to quasi-harmonic and non-harmonic periodic waves, as well as to localized waves such as solitons, kinks, and autowaves. The basic theoretical ideas are illustrated by many physical examples throughout the book.

Tartakovsky, A., Nikiforov, I., & Basseville, M. (2015). *Sequential Analysis: Hypothesis Testing and Changepoint Detection*. Boca Raton, FL: CRC Press. The book systematically develops the theory of sequential hypothesis testing and quickest changepoint detection. It also describes important applications in which theoretical results can be used efficiently. The book reviews recent accomplishments in hypothesis testing and changepoint detection both in decision-theoretic (Bayesian) and non-decision-theoretic (non-Bayesian) contexts. The authors not only emphasize traditional binary hypotheses but also substantially more difficult multiple decision problems. They address scenarios with simple hypotheses and more realistic cases of two and finitely many composite hypotheses. The book primarily focuses on practical discrete-time models, with certain continuous-time models also examined when general results can be obtained very similarly in both cases. It treats both conventional i.i.d. and general non-i.i.d. stochastic models in detail, including Markov, hidden Markov, state-space, regression, and autoregression models. Rigorous proofs are given for the most important results. Written by leading authorities in the field, this book covers the theoretical developments and applications of sequential hypothesis testing and sequential quickest changepoint detection in a wide range of engineering and environmental domains. It explains how the theoretical aspects influence the hypothesis testing and changepoint detection problems as well as the design of algorithms.

Xiong, B., & Li, P. Y. (2010). *Mathematical Olympiad in China (2009-2010): Problems and Solutions*. Singapore: World Scientific. ISBN: 978-981-4390-21-7. The International Mathematical Olympiad (IMO) is a competition for high school students. China has taken part in the IMO 21 times since 1985 and has won the top ranking for countries 14 times, with a multitude of golds for individual students. The six students China has sent every year were selected from 20 to 30 students among approximately 130 students who took part in the annual China Mathematical Competition during the winter months. This volume of comprises a collection of original problems with solutions that China used to train their Olympiad team in the years from 2009 to 2010. Mathematical Olympiad problems with solutions for the years 2002–2008 appear in an earlier volume, *Mathematical Olympiad in China*.

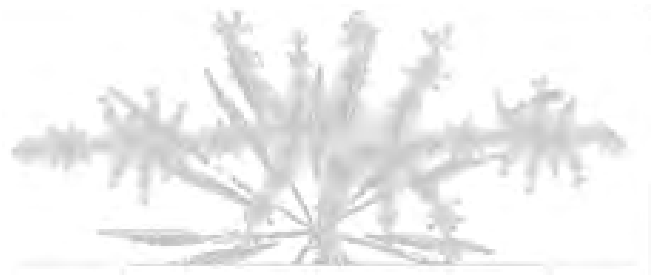
Xiong, B., Zheng, Z., Liu, R., Zhai, M., & Lin, Y. (2010). *Graph theory*. Singapore: World Scientific. ISBN: 978-981-4271-12-7. In 1736, the mathematician Euler invented graph theory while solving the Konigsberg seven-bridge problem. Over 200 years later, graph theory remains the skeleton content of discrete mathematics, which serves as a theoretical basis for computer science and network information science. This book introduces some basic knowledge and the primary methods in graph theory by many interesting problems and games.

Nonlinear Dynamical Bookshelf

Baofu, P. (2007). The Future of Complexity: Conceiving a Better Way to Understand Order and Chaos. Singapore: World Scientific. ISBN: 978-981-270-898-4. Contrary to the conventional wisdom held by many contemporaries in our time, the popularity of studying complexity is fast becoming a new fad in the intellectual scene. However, can the study of complex phenomena truly reveal recognizable patterns (with predictable outcomes) to enhance our understanding of reality, especially when it is embedded within the messy web of complexity? If so, what then are the limits? This book strives to demolish some of the myths surrounding the nature of complexity and, in the process, to provide an original theory to understand it in this world and beyond. It introduces the author's dialectic theory of complexity, together with the theoretical debate in the literature. It expounds on the concept of complexity from various perspectives, including chemistry, micro- and macro-physics, biology and psychology. It also examines the nature of complexity from societal and cultural perspectives. This book presents a broad view on the nature of complexity, adequately introducing the reader to this emerging field.

Ivancevic, V. G., & Reid, D. J. (2014). Complexity and control: Towards a rigorous behavioral theory of complex dynamical systems. Singapore: World Scientific. ISBN: 978-981-4635-86-8. The book Complexity and Control: Towards a Rigorous Behavioral Theory of Complex Dynamical Systems is a graduate-level monographic textbook, intended to be a novel and rigorous contribution to modern Complexity Theory. This book contains 11 chapters and is designed as a one-semester course for engineers, applied and pure mathematicians, theoretical and experimental physicists, computer and economic scientists, theoretical chemists and biologists, as well as all mathematically educated scientists and students, both in industry and academia, interested in predicting and controlling complex dynamical systems of arbitrary nature.

Stefański, A. (2009). Determining Thresholds of Complete Synchronization, and Application. Singapore: World Scientific. ISBN: 978-981-283-766-0. This book is devoted to the phenomenon of synchronization and its application for determining the values of Lyapunov exponents. In recent years, the idea of synchronization has become an object of great interest in many areas of science, e.g., biology, communication or laser physics. Over the last decade, new types of synchronization have been identified and some interesting new ideas concerning the synchronization have also appeared. This book presents the complete synchronization problem rather than just results from the research. The problem is demonstrated in relation to a kind of coupling applied between dynamical systems, whereby a unique classification of possible couplings is introduced. Another novel feature is the connection presented between synchronization and the problem of determining the Lyapunov exponents, especially for non-differentiable systems. A detailed proposal of such an estimation method and examples of its application are included.



Coming Soon from NDPLS

Special Issue Scheduled for 2015: Optimum Variability. It is now well known that healthy heart rate variability is chaotic and not rigidly oscillating. The principle of healthy variability has extended to other biomedical and psychological phenomena. What is the status of the research in any of the application areas? To elaborate further, some thought has been given to the idea that optimum variability results from a combination of the minimum entropy or free energy principle that pushes in a downward direction, and Ashby's Law of Requisite Variety that pushes in an upward direction. As a result, NDPLS would like to expand the scope of this particular topic into a special issue. Certain aspects of this topic area have been well subscribed already, and manuscripts by several author groups are in progress. Articles that we would like to present next include: new empirical studies that expand our understanding of one or more applications of the optimum variability principle; review studies that are specific to applications of the optimum variability principles in social psychology, abnormal psychology, organizational behavior, and economics; and empirical studies in the areas described above.

Boehm-Davis, D. A., Durso, F. T., & Lee, J. D. (Eds.). (2015). *APA Handbook of Human Systems Integration*. Washington, DC: American Psychological Association. ISBN: 978-1-4338-1828-8.

The APA Handbook of Human Systems Integration is a practical tool for both students and professionals who need specific knowledge about human considerations in systems design. It is intended to sensitize readers to basic design issues, enhance their understanding of the influence of these issues, and guide them in appropriately combining human performance with a system's numerous interacting components. A central tenet of this book is that it is not sufficient to examine items independently — one must go beyond a focus on individual workers, tools, tasks, or environments. Thus, the handbook is a "how to" resource that reflects the state-of-the-art on work in this enterprise. The book's opening chapters define what is meant by human systems integration, provide a historical overview of the field, and describe a set of case studies to which many chapter authors apply their expertise. Succeeding chapters reflect on the physical, physiological, perceptual, cognitive, and organizational considerations that affect human systems performance and discuss how the knowledge base of the field has been applied in various domains. The remaining chapters describe the trade-offs associated with integrating individual considerations and systems performance, discussing how a decision that optimizes performance in one area (e.g., display design) may entail a reduction of performance in another area (e.g., staffing or personnel selection).

Boulton, J. G., Allen, P. M., & Bowman, C. (2015). *Embracing Complexity Strategic Perspectives for an Age of Turbulence.* Oxford, UK and New York: Oxford University Press. 978-0-19-956526-9.

The book describes what it means to say the world is complex and explores what that means for managers, policy makers and individuals. The first part of the book is about the theory and ideas of complexity. This is explained in a way that is thorough but not mathematical. It compares differing approaches, and also provides a historical perspective, showing how such thinking has been around since the beginning of civilization. It emphasizes the difference between a complexity worldview and the dominant mechanical worldview that underpins much of current management practice. It defines the complexity worldview as recognizing the world is interconnected, shaped by history and the particularities of context. The comparison of the differing approaches to modelling complexity is unique in its depth and accessibility. The second part of the book uses this lens of complexity to explore issues in the fields of management, strategy, economics, and international development. It also explores how to facilitate others to recognize the implications of adopting a complex rather than a mechanical worldview and suggests methods of research to explore systemic, path-dependent emergent aspects of situations. The authors of this book span both science and management, academia and practice, thus the explanations of science are authoritative and yet the examples of changing how you live and work in the world are real and accessible. The aim of the book is to bring alive what complexity is all about and to illustrate the importance of loosening the grip of a modernist worldview with its hope for prediction, certainty and control.

Hiroyasu, I. (2015). *Predicting the impact of patents*. Tokyo: Springer.

This is the first book that comprehensively analyzes joint applications of patents from the European Union, Japan and the United States, which directly signify collaborations between companies or inventors, using the methodology of network science. Network science approaches enable us to predict structures of joint-application networks and to predict the impact of patents applied jointly. Regression analyses, which are broadly used in the field of economics, may be effective for determining what parameters are important for companies or inventors that are going to be connected, but they normally cannot rebuild the structures of networks from the model found through the analyses. Generative models in network science predict the probability of new connections for nodes. In line with this approach, this book also shows specific characteristics of joint-application networks of patents, such as link distance and layer interaction and it

introduces models explaining the characteristics. This book discusses not only network structures but the impact of patents on networks, which is practically important. Again, a model found through regression analyses may show significant variables that make it possible to predict the impact of patents but such a model is generally not practically beneficial because the actual situations in which patents are created are so complex. However, if we restrict the situations for joint applications, that is, networks, we can get clear distributions of the impact of patents. This book describes how the impact of patents repeatedly applied by the same team decays and what the proper timing is to leave a decaying relationship.

Hopcraft, K. I., Jakeman, E., Ridley, K. D. (2014). *The Dynamics of Discrete Populations and Series of Events*. Boca Raton, FL: C R C Press. ISBN 9781420060676.

Discrete phenomena are an important aspect of various complex systems, acting both as underlying driving mechanisms and as manifestations of diverse behaviors. However, the characterization of these discrete phenomena requires models that go beyond those featured in existing books. Largely concerned with mathematical models used to describe time-varying populations and series of events. This book demonstrates how analytical tools are used to develop, simulate, and solve discrete stochastic models. It provides an understanding of the effect of the competing processes governing the changing number of individuals present in a population, and shows how relatively simple models can be used to generate a wide range of behaviors. The authors present a comprehensive analysis of the classic problem of the evolution of a population subjected to births, deaths, and immigration, and the process of monitoring such a population, either by counting individuals within the population or individuals that leave the population, consider less familiar population models which have no continuous counterparts and shows how these may exhibit sub-Poisson traits and odd/even effects in their fluctuations, and develop models of populations subject to simultaneous multiple immigrations and shows how these can be used to produce a model with any desired equilibrium distribution. Applications to the important class of stable distributions is examined in detail.

Makato, M. (2016) *Complex Modeling of Consumer Behavior.* Tokyo: Springer.

This book reports what progress is being and should be made in marketing science by social complexity science through such means as agent-based modeling and complex networks, which is seldom addressed by books reviewing the state of the art of marketing research or marketing science. Recently, as the penetration of brand-new communication technologies such as social media or mobile phones is connecting consumers more tightly than ever, marketers should understand and harness complex social interactions between consumers as well as between consumers and firms. Traditional marketing science does not sufficiently capture such phenomena; hence, the emerging alternative approaches are reflecting advances in social complexity science. The aim of this book is to give an overview of these newly emerging research trends, focusing mainly on the following three topics: diffusion of new products, choice and relationship with existing brands and marketing communication including consumers' word-of-mouth. These topics have attracted a lot of attention among marketers in particular in rapidly growing markets such as hi-tech or services, where consumers' mutual interaction and their bounded-rational behavior play critical roles. The prospective readers of this book include researchers, graduate students and practitioners with high expertise (e.g. data scientists) in both marketing/consumer research areas and complexity science areas such as computer science, physics and mathematical social science. The book serves as a bridge by providing the evolving knowledge on social complexity modeling for marketing researchers and the accumulated knowledge on marketing/consumer research for complexity researchers. In addition to reviewing previous and ongoing studies, this book offers the agenda for future researchers to discuss what problems have not been solved yet and need social complexity science approaches. Available now in e-book form.

Meron, E. (2015). *Nonlinear Physics of Ecosystems*. Boca Raton, FL: C R C Press. ISBN 9781439826317.

This book introduces the concepts and tools of pattern formation theory and demonstrates their utility in ecological research using problems from spatial ecology. Written in language understandable to both physicists and ecologists in most parts, the book reveals the mechanisms of pattern formation and pattern dynamics. It also explores the implications of these mechanisms in important ecological problems. The first part of the book gives an overview of pattern formation and spatial ecology, showing how these disparate research fields are strongly related to one another. The next part presents an advanced account of pattern formation theory. The final part describes applications of pattern formation theory to ecological problems, including self-organized vegetation patchiness, desertification, and biodiversity in changing environments. It focuses on the emerging interface between spatial ecology and pattern formation, this book shows how pattern formation methods address a variety of ecological problems using water-limited ecosystems as a case study. Readers with basic knowledge of linear algebra and ordinary differential equations will develop a general understanding of pattern formation theory while more advanced readers who are familiar with partial differential equations will appreciate the descriptions of analytical tools used to study pattern formation and dynamics.

Mills, T. (Ed.). (2015). *Time series econometrics*. Abbington, Oxon, UK: Routledge.

In the memorable words of Ragnar Frisch, econometrics is 'a unification of the theoretical–quantitative and the empirical–quantitative approach to economic problems'. Beginning to take shape in the 1930s and 1940s, econometrics is now recognized as a vital subdiscipline supported by a vast—and still rapidly growing—body of literature. Following the positive reception of *The Rise of Econometrics* (2013) (978-0-415-61678-2), Routledge now announces a new collection from its Critical Concepts in Economics series. With a comprehensive introduction, newly written by the editor, which places the assembled materials in their historical and intellectual context, *Time Series Econometrics* is an essential work of reference. This fully indexed collection will be particularly useful as an essential database allowing scattered and often fugitive material to be easily located. It will also be welcomed as a crucial tool permitting rapid access to less familiar—and sometimes overlooked—texts. For researchers and students, as well as economic policy-makers, it is a vital one-stop research and pedagogic resource.

Nicolis, G., & Basios, V. (Eds.). (2015). *Chaos, Information Processing and Paradoxical Games: The Legacy of John S Nicolis*. Singapore: World Scientific. ISBN: 978-981-4602-12-9.

This volume provides a self-contained survey of the mechanisms presiding information processing and communication. The main thesis is that chaos and complexity are the basic ingredients allowing systems composed of interesting subunits to generate and process information and communicate in a meaningful way. Emphasis is placed on communication in the form of games and on the related issue of decision making under conditions of uncertainty. Biological, cognitive, physical, engineering and societal systems are approached from a unifying point of view, both analytically and by numerical simulation, using the methods of nonlinear dynamics and probability theory. Epistemological issues in connection with incompleteness and self-reference are also addressed. Contents: Glimpses at Nonlinear Dynamics & Chaos: Bohmian Trajectories in the Scattering Problem (G Contopoulos, N Delis & C Efthymiopoulos); Scaling Properties of the Lorenz System and Dissipative Nambu Mechanics (Minos Axenides & Emmanuel Floratos); Extreme Events in Nonlinear Lattices (G P Tsironis, N Lazarides, A Maluckov & Lj Hadžievski); Coarse Graining Approach to Chaos (Donal MacKernan); Fractal Parameter Space of Lorenz-like Attractors: A Hierarchical Approach (Tingli Xing, Jeremy Wojcik, Michael A Zaks & Andrey Shilnikov). Chaos and Information: Quantum Theory of Jaynes' Principle, Bayes' Theorem, and Information (Hermann Haken); Information Processing with Page–Wootters States (Stam Nicolis); Stochastic Resonance and Information Processing (C Nicolis); Selforganization of Symbols and Information (Werner Ebeling & Rainer Feistel). Biological Information Processing: Historical Contingency in Controlled Evolution (Peter Schuster); Long-Range Order and Fractality in the Structure and Organization of Eukaryotic Genomes (Dimitris Polychronopoulos, Giannis Tsiagkas, Labrini Athanasopoulou, Diamantis Sellis & Yannis Almirantis); Towards Resolving the Enigma of HOX Gene Collinearity (Spyros Papageorgiou). Complexity, Chaos & Cognition: Thermodynamics of Cerebral Cortex Assayed by Measures of Mass Action (Walter J Freeman); Describing the Neuron Axons Network of the Human Brain by Continuous Flow Models (J Hizanidis, P Katsaloulis, D A Verganelakis & A Provata); Cognition and Language: From Apprehension to Judgment — Quantum Conjectures (F T Arecchi); Dynamical Systems++ for a Theory of Biological System (Kunihiko Kaneko); Logic Dynamics for Deductive Inference — Its Stability and Neural Basis (Ichiro Tsuda);. Dynamical Games and Collective Behaviours: Microscopic Approach to Species Coexistence Based on Evolutionary Game Dynamics (Celso Grebogi, Ying-Cheng Lai & Wen-Xu Wang); Phase Transitions in Models of Bird Flocking (H Christodoulidi, K van der Weele, Ch G Antonopoulos & T Bountis); Animal Construction as a Free Boundary Problem: Evidence of Fractal Scaling Laws (S C Nicolis); Extended Self Organised Criticality in Asynchronously Tuned Cellular Automata (Yukio-Pegio Gunji); Epilogue: A Posthumous Dialogue with John Nicolis: IERU (Otto E Rössler); Appendix: Selected References from John Nicolis' Bibliography.

Rinaldi, S. Della Rossa, F., Dercole, F., Gragnani, A., & Landi, P. (2015). Modeling love dynamics. Singapore: World Scientific.

From the preface: This book shows how love stories—an issue of vital concern in our lives—can be tentatively described using mathematical models. As modeling will be a relatively unfamiliar technique to some readers, we first explain in this Preface why have we developed mathematical models and why are they important for scientific research. We then focus on the aim of the book, namely, on obtaining and analyzing some of the most reliable mathematical models available in the literature for describing love stories. These models allow us to formally derive, in agreement with the basic principles of the psychology of love, how love affairs are expected to evolve from the initial state of indifference to the final romantic regime. Here we present the conceptual models used in the last decades to describe the development of love affairs. The most simple of them are oversimplified given the complexity of the phenomena characterizing interpersonal relationships. They aim to capture the involvement of an individual by means of a single variable, called feeling (or love). Thus, the conceptual models of a couple are composed of two ODEs, one for each individual. This extreme simplicity prevents a rich variety of interesting details—discovered on the basis of interviews, self-reports, and psychoanalysis—being included in the model. The two ODEs are a simple balance between production and consumption flows of love. In accordance with the basic and well established principles of the psychology of love, the production flow is the reaction of an individual to the care expected from the partner. To be more specific, this expectation is split into two components. The first is associated with the involvement of the partner and is responsible for what is called the reaction to love, while the second depends only on other traits (beauty, age, social position, wealth, etc.) and gives rise to the

reaction to appeal. The consumption flow is simply the consequence of the oblivion process— the forgetting of past involvements is necessary to make possible a return to the "gene market" after abandoning or being abandoned by a partner. Oblivion thus has an obvious evolutionary origin. Given that reaction functions depend on love, different classes of individuals with different behaviors can be identified (secure, insecure, unbiased, synergic, platonic). The aim of this book is, in a sense, to show how the evolution of a love story can be virtually predicted from the behavioral characteristics identifying the different categories to which the individuals belong. The identification of micro-macro links of this kind has always been an important issue in the social sciences.

Tatarinova, T., & Schumitzky, A. (2015). ***Nonlinear Mixture Models: A Bayesian Approach. Singapore: World Scientific.*** ISBN: 978-1-84816-756-8.

This book, **written by two mathematicians from the University of Southern California,** provides a broad introduction to the important subject of nonlinear mixture models from a Bayesian perspective. It contains background material, a brief description of Markov chain theory, as well as novel algorithms and their applications. It is self-contained and unified in presentation, which makes it ideal for use as an advanced textbook by graduate students and as a reference for independent researchers. The explanations in the book are detailed enough to capture the interest of the curious reader, and complete enough to provide the necessary background material needed to go further into the subject and explore the research literature. In this book the authors present Bayesian methods of analysis for nonlinear, hierarchical mixture models, with a finite, but possibly unknown, number of components. These methods are then applied to various problems including population pharmacokinetics and gene expression analysis. In population pharmacokinetics, the nonlinear mixture model, based on previous clinical data, becomes the prior distribution for individual therapy. For gene expression data, one application included in the book is to determine which genes should be associated with the same component of the mixture (also known as a clustering problem). The book also contains examples of computer programs written in BUGS. This is the first book of its kind to cover many of the topics in this field. **Contents:** Introduction, Mathematical Description of Nonlinear Mixture Models, Label Switching and Trapping, Treatment of Mixture Models with an Unknown Number of Components, Applications of BDMCMC, KLMCMC, and RPS, Nonparametric Methods, Bayesian Clustering Methods.

West, B. J. (2015). Tomorrow's Science: Fractional Calculus View of Complexity. Boca Raton, FL: CRC Press.

From the preface: This book is based, in large part, on a lecture I gave at the Network Frontier Workshop at Northwestern University in December of 2013. The lecture was a tutorial intended to explain the quantitative reasoning entailed by the fractional calculus applied to complex physical, social and biological phenomena. The reason to study the fractional calculus is its inextricable link to complexity and that it provides a way to think systematically about complex phenomena in general and complex networks in particular. The ordinary calculus provided ways to organize our thinking about such physical phenomena as acoustic and electromagnetic waves, diffusion and even quantum mechanics. However, it does not do well with the complexity of earthquakes, avalanches, turbulence, cognition and stock market crashes. For these and other complex phenomena the notions of scaling and fractals were introduced and through them new ways of thinking were developed.

West, B. J., Turalska, M., & Grigolini, P. (2014). Network of echoes: Imitation, innovation and invisible leaders. New York: Springer.

From chapter 1: It is not only our external world that is cluttered with networks, but our internal world as well. The neuronal network carrying the brain's signal to the body's physiological networks is even more complex than the modern city or typical ecological network. Consequently it is premature to assign preeminence to any one network or collection of networks from any particular discipline before we understand the patterns form by the multiple interactions within and among them. Thus, basic research into network science must span and encompass the complete spectrum of scientific disciplines from the weights and measure of physical experiments to the questionnaires of social trials. The problem address in this book is to determine if foundational principles of networks exist that support the linkages and interpenetration of the physical (computers and smartphones) and human (cognitive and social) domains and if indication of their existence are found to develop them as they relate to the complex phenomenon of decision making. This approach is not directed at the totality of developing a Network Science, but has the more modest goal of understanding the deeply interdependent physical and human networks of crucial importance to the understanding of the phenomenon of decision making.

Alvarenga, M., & Byrne, D. (Eds.). (2016). Handbook of psychocardiology. New York: Springer. This handbook brings together the full weight of contemporary evidence bearing on what is now commonly termed "psycho-cardiology". It focuses on the role of psycho-social factors in the genesis and clinical management of cardiovascular disease (CVD). The book constitutes a critically reviewed compendium of current knowledge in the area, coupled with guides to evidence-based best practice in the field of psycho-cardiology. The following categories are covered: Social/demographic risk for CVD, Personality and CVD risk, Stress and CVD risk, Psychopathology (particularly affective disorders) and CVD risk, the psychological management of those with clinical CVD, Psychology in the prevention of CVD. The book integrates the evidence into a compelling argument that clinicians, researchers and those in public health will discount the role of psychological factors in regard to CVD at their own peril. And importantly for clinicians charged with the care of patients with CVD, the book poses the argument that failure to recognize the links between psychological factors and CVD may well be at the considerable peril of those patients under their care. Includes nonlinear dynamics and heart rate variability.

Biggiero, L., Angelini, P. P., Basevi, M., Carbonara, N., Mastrogiorgio, A., Pessa, E., Sevi, E., & Valente, M. (2016). ***Relational methodologies and epistemology in economics and management sciences.*** **Hershey, PA: IGI Global.** The social sciences, especially economics, management, and organizational science, are experiencing a tremendous renewed interest for their epistemological and methodological statutes, as witnessed by the many books and specialized journals established during the last two decades. This book identifies and presents the four main network-based methodologies including network analysis, Boolean network simulation modeling, artificial neural network simulation modeling, and agent-based simulation modeling in addition to their conceptual-epistemological implications and concrete applications within the social and natural sciences. Contents, section 1, Theoretical Aspects presents network analysis, NK simulations, neural networks and agent-based models. Section 2 presents a variety of applications in organizational behavior and economics.

Cloutier, R., Baldwin, C., & Bone, M. A. (2015). ***Systems engineering simplified*****. Boca Raton, FL: CRC Press.** Designed to give non-engineers an understanding of systems engineering, *Systems Engineering Simplified* presents a gentle introduction to the subject and its importance in any profession. The book shows you how to look at any system as a whole and use this knowledge to gain a better understanding of where a system might break down, how to troubleshoot the issues, and then quickly resolve them. And does it all in a way that does not require sophisticated technical training or complicated mathematics. The book takes a holistic approach to thinking about the complex systems, providing a deeper understanding of the underlying nature of the system and the vocabulary of systems engineering. The authors give you working knowledge of the processes used to design, build, test, operate, and maintain the systems that we depend on every day. They break down the systems engineering life cycle, describing in the simplest terms what should be done along the development process. Although there are many facets of systems engineering, it can be explained as focusing on addressing *why* a system is needed, *what* the system must do, and then *how* the system will accomplish the task over the entire life of the system—in that order. This fundamental review covers the processes from beginning to end, in plain language, giving you an overview of systems engineering that you can translate into your work in any field.

Gruyitch, L. T. (2016). ***Nonlinear systems tracking*****. Boca Raton, FL: CRC Press.** Tracking is the goal of control of any object, plant, process, or vehicle. From vehicles and missiles to power plants, tracking is essential to guarantee high-quality behavior. This book establishes the tracking theory, track ability theory, and tracking control synthesis for time-varying nonlinear plants and their control systems as parts of control theory. Treating general dynamical and control systems, including subclasses of input-output and state-space nonlinear systems, the book: describes the crucial tracking control concepts that comprise effective tracking control algorithms; defines the main tracking and trackability properties involved, identifying properties both perfect and imperfect; details the corresponding conditions needed for the controlled plant to exhibit each property; discusses various algorithms for tracking control synthesis, attacking the tracking control synthesis problems themselves; depicts the effective synthesis of the tracking control, under the action of which, the plant behavior satisfies all the imposed tracking requirements resulting from its purpose.

Kamath, M. V., Watanabke, M., & Upton, A. (Eds., 2012). ***Heart rate variability (HRV) signal analysis: Clinical applications*****. Boca Raton, FL: CRC Press.** Open a window into the autonomic nervous system. Quantifying the amount of autonomic nervous system activity in an individual patient can be extremely important, because it provides a gauge of disease severity in a large number of diseases. Heart rate variability (HRV) calculated from both short-term and longer-term electrocardiograms is an ideal window into such autonomic activity for two reasons: one, heart rate is sensitive to autonomic activity in the entire body, and two, recording electrocardiograms is inexpensive and non-invasive unlike other techniques currently available for autonomic assessment, such as microneurography and metaiodobenzylguanidine (MIBG) scanning. Heart Rate Variability (HRV) Signal Analysis: Clinical Applications provides a comprehensive review of three major aspects of HRV: mechanism, technique, and clinical applications. Learn techniques for HRV signal analysis. Edited by an engineer, a cardiologist, and a neurologist, and featuring contributions by widely published international researchers, this interdisciplinary book begins by reviewing the many signal processing techniques developed to extract autonomic activity information embedded in heart-rate records. The classical time and frequency domain measures, baroreceptor sensitivity, and newer non-linear measures of HRV are described with a fair amount of mathematical detail with the biomedical engineer and mathematically oriented physician in mind. The book also covers two recent HRV methods, heart-rate turbulence and phase-rectified signal averaging. Use of HRV in clinical care: The large clinical section is a must-read for clinicians and engineers wishing to get an insight into how HRV is applied in medicine. Nineteen chapters altogether are devoted to uses of HRV in: Monitoring—for example to predict potential complications in pregnancies, fetal distress, and in neonatal critical care; Acute care—for gauging the depth of anesthesia during surgery and predicting change in patient status in the intensive care unit; Chronic disorders—for assessing the severity of congestive heart failure, stroke, Parkinson's disease, and depression. Bringing together the latest research, this comprehensive reference demonstrates the utility and potential of HRV signal analysis in both the clinic and physiology laboratory.

Koopmans, M., & Stamovlasis, D. (2016). ***Complex Dynamical Systems in Education: Concepts, Methods and Applications*****. New York: Springer.** This book capitalizes on the developments in dynamical systems and education by presenting some of the most recent advances in this area in seventeen non-overlapping chapters. The first half of the book discusses the conceptual framework of complex dynamical systems and its applicability to educational processes. The second half presents a set of empirical studies that illustrate the use of various research methodologies to investigate complex dynamical processes in education, and help the reader appreciate what we learn about dynamical processes in education from using these approaches.

Magnusson, M. S., Burgoon, J. K., & Casarrubea, M. (Eds., 2016). Discovering Hidden Temporal Patterns in Behavior and Interaction T-Pattern Detection and Analysis with THEME™. New York: Springer. Discovering hidden recurring patterns in observable behavioral processes is an important issue frequently faced by numerous advanced students and researchers across many research areas, including psychology, biology, sports, robotics, media, finance, and medicine. As generally, the many powerful methods included in statistical software packages were not developed for this kind of analysis, discovering such patterns has proven a particularly difficult task, due to a lack of (a) adequate formalized models of the kinds of patterns to look for, (b) corresponding detection algorithms and (c) their implementation in available software. The research described in this book is based on the application of such pattern types, algorithms and software developed from the late seventies to the present in the context of research in collaboration with human and animal behavioral research teams at internationally leading universities in the US and Europe, thus testing the usefulness and validity of the pattern types, algorithms and software in numerous research areas. With the (scale independent statistical hierarchical and fractal-like) T-Pattern at its heart, a set of proposed pattern types, called the T-System, forms the basis for the search algorithms implemented as the software THEME (TM) (vs. 6), which is easily available in free educational and full commercial versions.

Masys, A. J. (Ed.). (2015). ***Applications of systems thinking and soft operations research in managing complexity: From problem framing to problem solving*****. NY: Springer.** This book captures current trends and developments in the field of systems thinking and soft operations research which can be applied to solve today's problems of dynamic complexity and interdependency. Such 'wicked problems' and messes are seemingly intractable problems characterized as value-laden, ambiguous, and unstable, that resist being tamed by classical problem solving. Actions and interventions associated with this complex problem space can have highly unpredictable and unintended consequences. Examples of such complex problems include health care reform, global climate change, transnational serious and organized crime, terrorism, homeland security, human security, disaster management, and humanitarian aid. Moving towards the development of solutions to these complex problem spaces depends on the lens we use to examine them and how we frame the problem. It will be shown that systems thinking and soft operations research has had great success in contributing to the management of complexity.

Bornas, X. (2016). ***Psicopatología y caos*** **(2nd ed.). Madrid, Spain: Bubok. [in Spanish.]**
Nonlinear Dynamical Systems (NDS) theory provides powerful tools, both conceptual and methodological, for the study of psychopathology (e.g. anxiety disorders). However, Psychology students often lack the required mathematical background to fully understand the main NDS concepts and methods, and therefore they need non-technical (though rigorous) explanations and examples. This book has been written for them and for those in the Clinical Psychology field who are not familiar with the NDS approach. The first chapters (1 to 6) are devoted to concepts (e.g. irregularity and health, fractal phenomena in psychophysiology, etc.) and methods to estimate complexity (e.g. entropy indexes, detrended fluctuation analysis, correlation dimension...). There is one chapter devoted to Psychotherapy where a model of change based on the interplay between emotional inertia and treatment energy is introduced. Chapters 8 to 11 summarize current NDS based findings for psychological disorders (anxiety, bipolar, depression). Specific parts of the book can be of interest for Neuroscience students also. For instance, in chapter 11 we describe how the nonlinear analysis of EEG signals has proved to be relevant to understand some brain dynamics' features associated with depression.

Casals, J., Garcia-Hiernaux, A., Jerez, M., Sotoca, C., & Trindade, A. T. (2016). State-space methods for time series analysis: Theory, applications and software. Boca Raton, FL: CRC Press. The state-space approach provides a formal framework where any result or procedure developed for a basic model can be seamlessly applied to a standard formulation written in state-space form. Moreover, it can accommodate with a reasonable effort nonstandard situations, such as observation errors, aggregation constraints, or missing in-sample values. Exploring the advantages of this approach, the book presents many computational procedures that can be applied to a previously specified linear model in state-space form. After discussing the formulation of the state-space model, the book illustrates the flexibility of the state-space representation and covers the main state estimation algorithms: filtering and smoothing. It then shows how to compute the Gaussian likelihood for unknown coefficients in the state-space matrices of a given model before introducing subspace methods and their application. It also discusses signal extraction, describes two algorithms to obtain the VARMAX matrices corresponding to any linear state-space model, and addresses several issues relating to the aggregation and disaggregation of time series. The book concludes with a cross-sectional extension to the classical state-space formulation in order to accommodate longitudinal or panel data. Missing data is a common occurrence here, and the book explains imputation procedures necessary to treat missingness in both exogenous and endogenous variables. The authors' *E*^{4} MATLAB® toolbox offers all the computational procedures, administrative and analytical functions, and related materials for time series analysis. This flexible, powerful, and free software tool enables readers to replicate the practical examples in the text and apply the procedures to their own work.

Flach, J. M., & Voorhorst, F. A. (2014). What matters? Putting common sense to work. Core Scholar.
http://corescholar.libraries.wright.edu/books/127/ **.** (Free download). A cognitive psychologist and an industrial design engineer draw from their experiences trying to make technology work for people to reflect on the foundations of Cognitive Science and Product Design. This work is motivated by the sense that there is a large gap between the type of experiences studied in laboratories and the everyday experiences of people working with technology. This has led the authors to question the metaphysical foundations of cognitive science and to suggest alternative directions that might provide better insights for design. An important inspiration for this alternative direction is Pirsig's Metaphysics of Quality described in *Zen and the Art of Motorcycle Maintenance* and *Lila*. The goal is to move beyond 'information processing' and the computer metaphor, toward 'meaning creation' as inspired by recent discoveries in dynamics

and self-organizing systems. This book takes the reader on a journey beyond the conventional dichotomy of mind and matter to explore a world of 'what matters' in hopes of inspiring the design of human-technology systems that work beautifully.

Jabbari, E., Kim, D-H., Lee, L. P., Ghaemmaghami, A., & Khademhosseini, A. (Eds., 2016). ***Handbook of Biomimetics and Bioinspiration*****. Singapore: World Scientific.** Global warming, pollution, food and water shortage, cyberspace insecurity, over-population, land erosion, and an overburdened health care system are major issues facing the human race and our planet. These challenges have presented a mandate to develop "natural" or "green" technologies using nature and the living system as a guide to rationally design processes, devices, and systems. This approach has given rise to a new paradigm, one in which innovation goes hand-in-hand with less waste, less pollution, and less invasiveness to life on earth. Bioinspiration has also led to the development of technologies that mimic the hierarchical complexity of biological systems, leading to novel highly efficient, more reliable multifunctional materials, devices, and systems that can perform multiple tasks at one time. This multi-volume handbook focuses on the application of biomimetics and bioinspiration in medicine and engineering to produce miniaturized multi-functional materials, devices, and systems to perform complex tasks. Our understanding of complex biological systems at different length scales has increased dramatically as our ability to observe nature has expanded from macro to molecular scale, leading to the rational biologically-driven design to find solution to technological problems in medicine and engineering. This three-volume set covers the fields of bioinspired materials, electromechanical systems developed from concepts inspired by nature, and tissue models respectively.

Manneville, P. (2010). ***Instabilities, Chaos and Turbulence*** **(2nd Edition). Singapore: World Scientific.** This book (2nd edition) is a self-contained introduction to a wide body of knowledge on nonlinear dynamics and chaos. Manneville emphasises the understanding of basic concepts and the nontrivial character of nonlinear response, contrasting it with the intuitively simple linear response. He explains the theoretical framework using pedagogical examples from fluid dynamics, though prior knowledge of this field is not required. Heuristic arguments and worked examples replace most esoteric technicalities. Only basic understanding of mathematics and physics is required, at the level of what is currently known after one or two years of undergraduate training: elementary calculus, basic notions of linear algebra and ordinary differential calculus, and a few fundamental physical equations (specific complements are provided when necessary). Methods presented are of fully general use, which opens up ample windows on topics of contemporary interest. These include complex dynamical processes such as patterning, chaos control, mixing, and even the Earth's climate. Numerical simulations are proposed as a means to obtain deeper understanding of the intricacies induced by nonlinearities in our everyday environment, with hints on adapted modelling strategies and their implementation.

Mills, T. (Ed.). (2015). Time series econometrics. Abbington, Oxon, UK: Routledge. In the memorable words of Ragnar Frisch, econometrics is 'a unification of the theoretical–quantitative and the empirical–quantitative approach to economic problems'. Beginning to take shape in the 1930s and 1940s, econometrics is now recognized as a vital subdiscipline supported by a vast—and still rapidly growing—body of literature. Following the positive reception of The Rise of Econometrics (2013) (978-0-415-61678-2), Routledge now announces a new collection from its Critical Concepts in Economics series. With a comprehensive introduction, newly written by the editor, which places the assembled materials in their historical and intellectual context, Time Series Econometrics is an essential work of reference. This fully indexed collection will be particularly useful as an essential database allowing scattered and often fugitive material to be easily located. It will also be welcomed as a crucial tool permitting rapid access to less familiar—and sometimes overlooked—texts. For researchers and students, as well as economic policy-makers, it is a vital one-stop research and pedagogic resource.

Schiepek, G., Eckert, H., Aas, B., Wallot, S., & Wallot, A. (2015). ***Integrative psychotherapy: A feedback-driven dynamic systems approach*****. Gottingen, Germany: Hogrefe.** This book introduces a new, integrative systemic approach to psychotherapy and counseling and shows how the principles of dynamic complex systems can guide everyday clinical work. Our mental, interpersonal and biological (e.g. neuronal) systems are complex and nonlinear, and allow spontaneous pattern formation and chaotic dynamics. Their self-regulating nature sometimes maneuvers the systems into pathological states. However, the very same principles can be utilized therapeutically to encourage change for the better. The feedback-driven nonlinear dynamics approach described here basically attempts to facilitate positive self-organizing process, such as order transitions, healthy patterns of behavior, and learning processes. From the forward by David Pincus: In chapters 5 and 6 the authors explain the Synergetic Navigation System (NSS) grounded in the broader science of self-organization. This approach brings together our best practices in nonlinear science, experience sampling, and behavioral medicine, each applied to the process of psychotherapy. Well beyond the German mental health systems, the authors have created here a blueprint for modern mobile medicine that can serve as a model for the world.

Till, F. (Ed., 2016). Stochastic Resonation, Paramagnetism and Emotional Contagion in Collective Behavior. New York; Nova Science. "Collective behavior" is can be defined as human individuals acting together in groups; these groups can be as small as three people, or as large as millions of people. Collective behavior is also concerned with animals forming swarms and flocks, neurons firing in synchrony, and chemical and biochemical particles with on-board energy depots acting together as a whole. As such, collective behavior refers to units (humans, animals, neurons, biochemical substances, etc.) interacting with each other to form a whole. In physics, collective phenomena have been studied for a long time for systems that are in thermodynamic equilibrium. Magnetism produced by the alignment of elementary spins is a well-known example. In contrast, in this book, collective behavior refers to systems composed of units that operate far from thermodynamical equilibrium. It is about lifeforms and active biochemical substances. This book presents recent developments in the research field of collective behavior. Various disciplines are addressed, ranging from economy, leisure sciences, and psychology to neurosciences, physics and biology. This book is intended both for the general reader interested in collective behavior and for the quantitative researcher looking for an update in this rapidly developing field. This book has two parts. The first part presents theoretical fundamentals and concepts. The second part provides chapters with mathematical modeling and simulations. Although the individual chapters of this book report from a variety of research disciplines, the chapters are interconnected with each other and give rise to a general picture of the state-of-the-art research on collective behavior. Contents: Understanding Online Group Purchasing Behavior (Giuliana Isabella and Suzi Elen Ferreira Dias, University of Sao Paulo and Faculdades Metropolitanas Unidas, Brazil); Modeling Social Interactions in Game Play (Jason Gordon, Department of Psychology, University of Connecticut, USA); Leisure Phenomenon as a Complex System: Exploring its Potential for a Dynamical Approach (Gabriela Baranowski Pinto, Federal Agency for the Support and Evaluation of Graduate Education, CAPES, Brazilian Government, Brazil); Stochastic Resonation, Paramagnetism and Emotional Contagion in Collective Behaviours (Alan McDonnell, Emergent Dynamic Technologies Ltd, Bristol, United Kingdom); Analysis of Behavior Stability in a Multiagent System; (Florin Leon, Department of Computer Science and Engineering, Gheorghe Asachi Technical University of Iasi, Romania; Collective Behavior of Active Particles (Olga V. Yushchenko, Nanolectronics Department, Sumy State University, Ukraine); Considerations on the SET Model of Swarm Behavior in the Case of Very Large Swarms; (T. D. Frank, Department of Psychology and Department of Physics, University of Connecticut, USA); Collective Behavior in Adaptive Systems: Application to Prism Adaptation (T. D. Frank, Department of Psychology and Department of Physics, University of Connecticut, USA); The Lotka-Volterra-Haken Model for Group Buying, Apples-to-Apples Group Play and the Competition and Attraction of Leisure Activities (T. D. Frank, Department of Psychology and Department of Physics, University of Connecticut, USA); Index.