



Open Research Online

The Open University's repository of research publications
and other research outputs

Non-Equilibrium Social Science and Policy: Introduction and Essays on New and Changing Paradigms in Socio-Economic Thinking

Edited Book

How to cite:

Johnson, Jeffrey; Nowak, Andrzej; Ormerod, Paul; Rosewell, Bridget and Zhang, Yi-Cheng eds. (2017). Non-Equilibrium Social Science and Policy: Introduction and Essays on New and Changing Paradigms in Socio-Economic Thinking. Understanding Complex Systems. Cham, Switzerland: Springer.

For guidance on citations see [FAQs](#).

© 2017 The Editor(s) (if applicable) and The Author(s)

Version: Front Cover

Link(s) to article on publisher's website:

<http://www.springer.com/gb/book/9783319424224>

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

oro.open.ac.uk

Springer Complexity

Springer Complexity is an interdisciplinary program publishing the best research and academic-level teaching on both fundamental and applied aspects of complex systems – cutting across all traditional disciplines of the natural and life sciences, engineering, economics, medicine, neuroscience, social and computer science.

Complex Systems are systems that comprise many interacting parts with the ability to generate a new quality of macroscopic collective behavior the manifestations of which are the spontaneous formation of distinctive temporal, spatial or functional structures. Models of such systems can be successfully mapped onto quite diverse “real-life” situations like the climate, the coherent emission of light from lasers, chemical reaction-diffusion systems, biological cellular networks, the dynamics of stock markets and of the internet, earthquake statistics and prediction, freeway traffic, the human brain, or the formation of opinions in social systems, to name just some of the popular applications.

Although their scope and methodologies overlap somewhat, one can distinguish the following main concepts and tools: self-organization, nonlinear dynamics, synergetics, turbulence, dynamical systems, catastrophes, instabilities, stochastic processes, chaos, graphs and networks, cellular automata, adaptive systems, genetic algorithms and computational intelligence.

The three major book publication platforms of the Springer Complexity program are the monograph series “Understanding Complex Systems” focusing on the various applications of complexity, the “Springer Series in Synergetics”, which is devoted to the quantitative theoretical and methodological foundations, and the “SpringerBriefs in Complexity” which are concise and topical working reports, case-studies, surveys, essays and lecture notes of relevance to the field. In addition to the books in these two core series, the program also incorporates individual titles ranging from textbooks to major reference works.

Editorial and Programme Advisory Board

Henry Abarbanel, Institute for Nonlinear Science, University of California, San Diego, USA

Dan Braha, New England Complex Systems Institute and University of Massachusetts Dartmouth, USA

Péter Érdi, Center for Complex Systems Studies, Kalamazoo College, USA and Hungarian Academy of Sciences, Budapest, Hungary

Karl Friston, Institute of Cognitive Neuroscience, University College London, London, UK

Hermann Haken, Center of Synergetics, University of Stuttgart, Stuttgart, Germany

Viktor Jirsa, Centre National de la Recherche Scientifique (CNRS), Université de la Méditerranée, Marseille, France

Janusz Kacprzyk, System Research, Polish Academy of Sciences, Warsaw, Poland

Kunihiko Kaneko, Research Center for Complex Systems Biology, The University of Tokyo, Tokyo, Japan

Scott Kelso, Center for Complex Systems and Brain Sciences, Florida Atlantic University, Boca Raton, USA

Markus Kirkilionis, Mathematics Institute and Centre for Complex Systems, University of Warwick, Coventry, UK

Jürgen Kurths, Nonlinear Dynamics Group, University of Potsdam, Potsdam, Germany

Andrzej Nowak, Department of Psychology, Warsaw University, Poland

Hassan Qudrat-Ullah, School of Administrative Studies, York University, Toronto, ON, Canada

Peter Schuster, Theoretical Chemistry and Structural Biology, University of Vienna, Vienna, Austria

Frank Schweitzer, System Design, ETH Zurich, Zurich, Switzerland

Didier Sornette, Entrepreneurial Risk, ETH Zurich, Zurich, Switzerland

Stefan Thurner, Section for Science of Complex Systems, Medical University of Vienna, Vienna, Austria

Understanding Complex Systems

Founding Editor: S. Kelso

Future scientific and technological developments in many fields will necessarily depend upon coming to grips with complex systems. Such systems are complex in both their composition – typically many different kinds of components interacting simultaneously and nonlinearly with each other and their environments on multiple levels – and in the rich diversity of behavior of which they are capable.

The Springer Series in Understanding Complex Systems series (UCS) promotes new strategies and paradigms for understanding and realizing applications of complex systems research in a wide variety of fields and endeavors. UCS is explicitly transdisciplinary. It has three main goals: First, to elaborate the concepts, methods and tools of complex systems at all levels of description and in all scientific fields, especially newly emerging areas within the life, social, behavioral, economic, neuro- and cognitive sciences (and derivatives thereof); second, to encourage novel applications of these ideas in various fields of engineering and computation such as robotics, nano-technology and informatics; third, to provide a single forum within which commonalities and differences in the workings of complex systems may be discerned, hence leading to deeper insight and understanding.

UCS will publish monographs, lecture notes and selected edited contributions aimed at communicating new findings to a large multidisciplinary audience.

More information about this series at <http://www.springer.com/series/5394>

Jeffrey Johnson • Andrzej Nowak • Paul Ormerod •
Bridget Rosewell • Yi-Cheng Zhang
Editors

Non-Equilibrium Social Science and Policy

Introduction and Essays on New and
Changing Paradigms in Socio-Economic
Thinking

 Springer Open



Editors

Jeffrey Johnson
Faculty of Science, Technology,
Engineering and Mathematics
The Open University
Milton Keynes, UK

Andrzej Nowak
Faculty of Psychology
University of Warsaw
Warsaw, Poland

Paul Ormerod
London, United Kingdom

Bridget Rosewell
Volterra Partners
London, United Kingdom

Yi-Cheng Zhang
Department of Physics
University of Fribourg
Fribourg, Switzerland

ISSN 1860-0832
Understanding Complex Systems
ISBN 978-3-319-42422-4
DOI 10.1007/978-3-319-42424-8

ISSN 1860-0840 (electronic)
ISBN 978-3-319-42424-8 (eBook)

Library of Congress Control Number: 2016961938

© The Editor(s) (if applicable) and The Author(s) 2017. This book is published open access.

Open Access This book is distributed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, duplication, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this book are included in the work's Creative Commons license, unless indicated otherwise in the credit line; if such material is not included in the work's Creative Commons license and the respective action is not permitted by statutory regulation, users will need to obtain permission from the license holder to duplicate, adapt or reproduce the material.

This work is subject to copyright. All commercial rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Acknowledgments

This book is one of the main outcomes of the European FP7 FET Open NESS Project, and we are grateful to the Commission for its support. We are particularly grateful to our project officer Ralph Dum for all his input and help.

We are grateful to the many scientists who contributed to our meetings and to the synthesis of ideas in this book.

Contents

Non-Equilibrium Social Science and Policy	1
Jeffrey Johnson, Paul Ormerod, Bridget Rosewell, Andrzej Nowak, and Yi-Cheng Zhang	
Economics	19
Paul Ormerod	
Social Psychology and the Narrative Economy	45
Andrzej Nowak, Marta Kacprzyk-Murawska, and Ewa Serwotka	
Sociology and Non-Equilibrium Social Science	59
David Anzola, Peter Barbrook-Johnson, Mauricio Salgado, and Nigel Gilbert	
Geography Far from Equilibrium	71
Denise Pumain	
Cities in Disequilibrium	81
Michael Batty	
Global Political Dynamics and the Science of Complex Systems	97
Hilton L. Root	
Systems, Networks, and Policy	111
Jeffrey Johnson, Joyce Fortune, and Jane Bromley	
Towards a Complexity-Friendly Policy: Breaking the Vicious Circle of Equilibrium Thinking in Economics and Public Policy	135
Flaminio Squazzoni	
The Information Economy	149
Yi-Cheng Zhang	
Complexity Science and the Art of Policy Making	159
Bridget Rosewell	

The Complexity of Government	179
Greg Fisher	
The Room Around the Elephant: Tackling Context-Dependency in the Social Sciences	195
Bruce Edmonds	
Global Systems Science and Policy	209
Ralph Dum and Jeffrey Johnson	
Index	227