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KEY=COMPLEXITY - ESSENCE JESUS

CHAOS UNDER CONTROL

THE ART AND SCIENCE OF COMPLEXITY

W H Freeman & Company *Presents an introduction to the dynamics of order and chaos, fractals, and complexity.*

COMPLEXITY THEORY AND THE SOCIAL SCIENCES

AN INTRODUCTION

Routledge *Chaos and complexity are the new buzz words in both science and contemporary society. The ideas they represent have enormous implications for the way we understand and engage with the world. Complexity Theory and the Social Sciences introduces students to the central ideas which surround the chaos/complexity theories. It discusses key concepts before using them as a way of investigating the nature of social research. By applying them to such familiar topics as urban studies, education and health, David Byrne allows readers new to the subject to appreciate the contribution which complexity theory can make to social research and to illuminating the crucial social issues of our day.*

SYSTEM ANALYSIS IN ENGINEERING AND CONTROL

Springer Nature

COMPLEXITY AND THE ART OF PUBLIC POLICY

SOLVING SOCIETY'S PROBLEMS FROM THE BOTTOM UP

Princeton University Press *How ideas in complexity can be used to develop more effective public policy Complexity science—made possible by modern analytical and computational advances—is changing the way we think about social systems and social theory. Unfortunately, economists' policy models have not kept up and are stuck in either a market fundamentalist or government control narrative. While these standard narratives are useful in some cases, they are damaging in others, directing thinking away from creative, innovative policy solutions. Complexity and the Art of Public Policy outlines a new, more flexible policy narrative, which envisions society as a complex evolving system that is uncontrollable but can be influenced. David Colander and Roland Kupers describe how economists and society became locked into the current policy framework, and lay out fresh alternatives for framing policy questions. Offering original solutions to stubborn problems, the complexity narrative builds on broader philosophical traditions, such as those in the work of John Stuart Mill, to suggest initiatives that the authors call "activist laissez-faire" policies. Colander and Kupers develop innovative bottom-up solutions that, through new institutional structures such as for-benefit corporations, channel individuals' social instincts into solving societal problems, making profits a tool for change rather than a goal. They argue that a central role for government in this complexity framework is to foster an ecostructure within which diverse forms of social entrepreneurship can emerge and blossom.*

COMPLEXITY SCIENCE, LIVING SYSTEMS, AND REFLEXING INTERFACES: NEW MODELS AND PERSPECTIVES

NEW MODELS AND PERSPECTIVES

IGI Global *There are new and important advancements in today's complexity theories in ICT and requires an extraordinary perspective on the interaction between living systems and information technologies. With human evolution and its continuous link with the development of new tools and environmental changes, technological advancements are paving the way for new evolutionary steps. Complexity Science, Living Systems, and Reflexing Interfaces: New Models and Perspectives is a collection of research provided by academics and scholars aiming to introduce important advancements in areas such as artificial intelligence, evolutionary computation, neural networks, and much more. This scholarly piece will provide contributions that will define the line of development in complexity science.*

COMPLEXITY THEORY AND THE SOCIAL SCIENCES

THE STATE OF THE ART

Routledge *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 modelling. 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. In four parts, this book seeks to establish 'the state of the art' of complexity-informed social science as it stands now, examining: the key issues in complexity theory the implications of complexity theory for social theory the methodology and methods of complexity theory complexity within disciplines and fields. It also points ways forward towards a complexity-informed social science for the twenty-first century, investigating the argument for a post-disciplinary, 'open' social science. Byrne and Callaghan consider how this might be developed as a programme of teaching and research within social science. This book will be particularly relevant for, and interesting to, students and scholars of social research methods, social theory, business and organization studies, health, education, urban studies and development studies.

SCIENCE, TECHNOLOGY, AND THE MODERN NAVY

THIRTIETH ANNIVERSARY, 1946-1976

When it was established in 1946, the Office of Naval Research was the main channel for Federal support of science in the United States. Since there are few fields of science or technology that cannot be related directly or indirectly to Navy requirements, the real choice becomes one of emphasizing areas of particular interest where anticipated results may have a direct bearing on future naval activities. Most research programs within ONR are organized along disciplinary lines, the main disciplines being the physical, mathematical, information, biological, medical, psychological, earth, material, and ocean sciences; but some programs center on such fields as aviation, vehicle, and sensor technologies. The Physical Science Program pursues research on radiation, lasers, acoustics, optics, electronics, superconductivity, magnetism, and surfaces. Research in the Mathematical Sciences Program covers the mathematical and computer sciences, the design of techniques for logistics and systems analysis, and the mechanics of fluids. The objectives of Biomedical research are to understand principles essential to maintaining the health and work capacity of personnel, to prevent disease, and to reduce stress factors such as pressure in diving. The Psychological Research Program seeks a better basis for understanding, improving, and predicting human performance in military environments. Thus, the reduction of manpower costs and the betterment of personnel effectiveness are anticipated benefits from investments in man-job and man-machine designs. The Earth Sciences Program has the objective of providing comprehensive knowledge of physical environments in which the Navy and Marine Corps must operate.

JOINT OPERATIONS: INSIGHTS AND BEST PRACTICES

Jeffrey Frank Jones This is the Fourth Edition, written by the Deployable Training Division (DTD) of the Joint Staff J7 and published under the auspices of the Joint Staff J7. This edition incorporates Chairman of the Joint Chiefs of Staff recent guidance and publications together with emergent insights and best practices observed by the DTD. Previous editions were written and distributed by the former United States Joint Forces Command (USJFCOM) which was disestablished on 31 August 2011. General Gary E. Luck, USA (Ret) led development of the first two editions of this publication as an employee of Northrop Grumman Corporation supporting the former United States Joint Forces Command (USJFCOM). General Luck subsequently supported development of the third and fourth editions as a Senior Fellow for the National Defense University in support of the Pinnacle, Capstone, and Keystone programs.

BIG DATA SCIENCE AND ANALYTICS FOR SMART SUSTAINABLE URBANISM

UNPRECEDENTED PARADIGMATIC SHIFTS AND PRACTICAL ADVANCEMENTS

Springer We are living at the dawn of what has been termed 'the fourth paradigm of science,' a scientific revolution that is marked by both the emergence of big data science and analytics, and by the increasing adoption of the underlying technologies in scientific and scholarly research practices. Everything about science development or knowledge production is fundamentally changing thanks to the ever-increasing deluge of data. This is the primary fuel of the new age, which powerful computational processes or analytics algorithms are using to generate valuable knowledge for enhanced decision-making, and deep insights pertaining to a wide variety of practical uses and applications. This book addresses the complex interplay of the scientific, technological, and social dimensions of the city, and what it entails in terms of the systemic implications for smart sustainable urbanism. In concrete terms, it explores the interdisciplinary and transdisciplinary field of smart sustainable urbanism and the unprecedented paradigmatic shifts and practical advances it is undergoing in light of big data science and analytics. This new era of science and technology embodies an unprecedentedly transformative and constitutive power—manifested not only in the form of revolutionizing science and transforming knowledge, but also in advancing social practices, producing new discourses, catalyzing major shifts, and fostering societal transitions. Of particular relevance, it is instigating a massive change in the way both smart cities and sustainable cities are studied and understood, and in how they are planned, designed, operated, managed, and governed in the face of urbanization. This relates to what has been dubbed data-driven smart sustainable urbanism, an emerging approach based on a computational understanding of city systems and processes that reduces urban life to logical and algorithmic rules and procedures, while also harnessing urban big data to provide a more holistic and integrated view or synoptic intelligence of the city. This is increasingly being directed towards improving, advancing, and maintaining the contribution of both sustainable cities and smart cities to the goals of sustainable development. This timely and multifaceted book is aimed at a broad readership. As such, it will appeal to urban scientists, data scientists, urbanists, planners, engineers, designers, policymakers, philosophers of science, and futurists, as well as all readers interested in an overview of the pivotal role of big data science and analytics in advancing every academic discipline and social practice concerned with data-intensive science and its application, particularly in relation to sustainability.

NON-EQUILIBRIUM SOCIAL SCIENCE AND POLICY

INTRODUCTION AND ESSAYS ON NEW AND CHANGING PARADIGMS IN SOCIO-ECONOMIC THINKING

Springer The overall aim of this book, an outcome of the European FP7 FET Open NESS project, is to contribute to the ongoing effort to put the quantitative social sciences on a proper footing for the 21st century. A key focus is economics, and its implications on policy making, where the still dominant traditional approach increasingly struggles to capture the economic realities we observe in the world today - with vested interests getting too often in the way of real advances. Insights into behavioral economics and modern computing techniques have made possible both the integration of larger information sets and the exploration of disequilibrium behavior. The domain-based chapters of this work illustrate how economic theory is the only branch of social sciences which still holds to its old paradigm of an equilibrium science - an assumption that has already been relaxed in all related fields of research in the light of recent advances in complex and dynamical systems theory and related data mining. The other chapters give various takes on policy and decision making in this context. Written in nontechnical style throughout, with a mix of tutorial and essay-like contributions, this book will benefit all researchers, scientists, professionals and practitioners interested in learning about the 'thinking in complexity' to understand how socio-economic systems really work.

MANAGING THE COMPLEXITY OF CRITICAL INFRASTRUCTURES

A MODELLING AND SIMULATION APPROACH

Springer This book is open access under a CC BY 4.0 license. This book summarizes work being pursued in the context of the CIPRNet (Critical Infrastructure Preparedness and Resilience Research Network) research project, co-funded by the European Union under the Seventh Framework Programme (FP7). The project is intended to provide concrete and on-going support to the Critical Infrastructure Protection (CIP) research communities, enhancing their preparedness for CI-related emergencies, while also providing expertise and technologies for other stakeholders to promote their understanding and mitigation of the consequences of CI disruptions, leading to enhanced resilience. The book collects the tutorial material developed by the authors for several courses on the modelling, simulation and analysis of CIs, representing extensive and integrated CIP expertise. It will help CI stakeholders, CI operators and civil protection authorities understand the complex system of CIs, and help them adapt to these changes and threats in order to be as prepared as possible for mitigating emergencies and crises affecting or arising from CIs.

CONTROLS AND ART

INQUIRIES AT THE INTERSECTION OF THE SUBJECTIVE AND THE OBJECTIVE

Springer Science & Business Media Dancing humanoids, robotic art installations, and music generated by mathematically precise methods are no longer science fiction; in fact they are the subject of this book. This first-of-its-kind anthology assembles technical research that makes such creations possible. In order to mechanize something as enigmatic and personal as dance, researchers must delve deeply into two distinct academic disciplines: control theory and art. Broadly, this research uses techniques from the world of art to inspire methods in control, enables artistic endeavours using advanced control theory and aids in the analysis of art using metrics devised by a systems theoretic approach. To ensure that artistic influences are well represented, the individual chapters are focused so that they relate their contribution to the arts meaningfully and explicitly. Specially composed introductions set up the contributions either in terms of inspiration by artistic principles or their contribution to the arts through new analysis tools. To facilitate this, the majority of the chapters are authored jointly by experts in control theory and by artists, including dancers, choreographers, puppeteers and painters. Connections between controls and art then permeate the text so that these important relationships play a central role in the book. Controls and Art surveys current projects in this area—including a disco dancing robot, a reactive museum exhibit and otherworldly music—and illuminates open problems and topics for research in this emerging interdisciplinary field. It will draw attention both from experts in robotics and control interested in developing the artistic side of their creations and from academics studying dance, theater, music and the visual arts with an interest in avant-garde means of production.

IT'S NOT COMPLICATED

THE ART AND SCIENCE OF COMPLEXITY IN BUSINESS

University of Toronto Press *It's Not Complicated* offers a paradigm shift for business professionals looking for simplified solutions to complex problems. Rick Nason introduces the principles of "complexity thinking" which empower managers to understand, correlate, and explain a diverse range of business phenomena.

THE ART OF ARTIFICIAL EVOLUTION

A HANDBOOK ON EVOLUTIONARY ART AND MUSIC

Springer Science & Business Media This comprehensive book gives an up-to-date survey of the relevant bioinspired computing research fields - such as evolutionary computation, artificial life, swarm intelligence and ant colony algorithms - and examines applications in art, music and design. The editors and contributors are researchers and artists with deep experience of the related science, tools and applications, and the book includes overviews of historical developments and future perspectives.

FROM COMPLEXITY IN THE NATURAL SCIENCES TO COMPLEXITY IN OPERATIONS MANAGEMENT SYSTEMS

Wiley-ISTE Although complexity makes up the very fabric of our daily lives and has been more or less addressed in a wide variety of knowledge fields, the approaches developed in the Natural Sciences and the results obtained over the past century have not yet

permeated Management Sciences very much. The main features of the phenomena that the Natural Sciences deal with are: non-linear behavior, self-organization and chaos. They are analyzed with the framing of what is called "systems thinking", popularized by the mindset pertaining to cybernetics. All pioneers in systems thinking either had direct or indirect connections with Biology, which is the discipline considered complex par excellence by the public. When applying these concepts to Operations Management Systems and modeling organizations by BDI (Beliefs, Desires, Intentions) agents, the lack of predictability in the conduct of change management that is prone to bifurcations (tipping points) in terms of organizational structures and in forecasting future activities, reveals them to be ingrained in the interplay of complexity and chaos.

COMPLEXITY APPLICATIONS IN LANGUAGE AND COMMUNICATION SCIENCES

Springer This book offers insights on the study of natural language as a complex adaptive system. It discusses a new way to tackle the problem of language modeling, and provides clues on how the close relation between natural language and some biological structures can be very fruitful for science. The book examines the theoretical framework and then applies its main principles to various areas of linguistics. It discusses applications in language contact, language change, diachronic linguistics, and the potential enhancement of classical approaches to historical linguistics by means of new methodologies used in physics, biology, and agent systems theory. It shows how studying language evolution and change using computational simulations enables to integrate social structures in the evolution of language, and how this can give rise to a new way to approach sociolinguistics. Finally, it explores applications for discourse analysis, semantics and cognition.

ART(A)SCIENCE

Springer The Arts and Sciences have long been regarded as separated disciplines. In this era of rapidly developing computer technologies a novel interdisciplinary spirit has emerged that promises a new collaboration between research and art. Computer Graphics, Interactive Arts, Scientific Visualization, Artificial Life, Chaos and Complexity, newly emerging Media Museums and Media Centers as well as Telecommunications are areas where artistic thinking influences science and where scientific methodology reaches into the arts.

COMPLEX SCIENCE FOR A COMPLEX WORLD

EXPLORING HUMAN ECOSYSTEMS WITH AGENTS

ANU E Press It is well known that human activities are endangering the stability and sustainability of many fragile ecosystems. This title looks at the science that addresses the frontiers of interactions between human behavior and environmental responses.

COMPLEXITY AND HEALTHCARE ORGANIZATION

A VIEW FROM THE STREET

CRC Press Statistics and evidence-based medicine are assessed in most postgraduate and undergraduate medical examinations and degrees in health sciences. All clinicians have to acquire skills in this area. This book aims to provide a brief overview of basic medical statistics and the numerical aspects of evidence-based medicine to give realistic worked examples to illustrate the interpretation of studies relevant to clinical practice and to allow examination practice. It aims to cover all major topics covered in the undergraduate and postgraduate examinations. Each chapter begins with an overview and summary of the main points followed by worked examples and exercises with full answers. It will be ideal for all postgraduate medical examination candidates. Other clinicians and undergraduate students in medicine and health sciences will also find it useful.

NARRATING COMPLEXITY

Springer This book stages a dialogue between international researchers from the broad fields of complexity science and narrative studies. It presents an edited collection of chapters on aspects of how narrative theory from the humanities may be exploited to understand, explain, describe, and communicate aspects of complex systems, such as their emergent properties, feedbacks, and downwards causation; and how ideas from complexity science can inform narrative theory, and help explain, understand, and construct new, more complex models of narrative as a cognitive faculty and as a pervasive cultural form in new and old media. The book is suitable for academics, practitioners, and professionals, and postgraduates in complex systems, narrative theory, literary and film studies, new media and game studies, and science communication.

HANDBOOK OF RESEARCH METHODS IN COMPLEXITY SCIENCE

THEORY AND APPLICATIONS

Edward Elgar Publishing This comprehensive Handbook is aimed at both academic researchers and practitioners in the field of complexity science. The book's 26 chapters, specially written by leading experts, provide in-depth coverage of research methods based on the sciences of complexity. The research methods presented are illustratively applied to practical cases and are readily accessible to researchers and decision makers alike.

THE PARADOX OF CONTROL IN ORGANIZATIONS

Routledge Business leaders are expected to be 'in control' of the situation in which their businesses find themselves. But how can organizational leaders and managers control matters entirely out of their hands; such as the next action a competitor takes, or the next law a government may pass? In this book, Philip Streatfield reflects on his own experience as a manager to explore the question: who, or what is 'in control' in an organization? Adopting the perspective of complex responsive processes developed in the first two

volumes of this series, the author takes self-organization and emergence as central themes in thinking about life in organizations. He focuses on the tension between spontaneously forming patterns of conversation and intentional actions arguing that the order of organizations emerges through a combination of collective interaction and individual intentions. The argument is developed by considering the day-to-day experiences of life in a large pharmaceutical organization, SmithKline Beecham. In today's organization, managers find that they have to live with the paradox of being 'in control' and 'not in control' simultaneously. It is this capacity to live with paradox, and to continue to participate creatively in spite of 'not being in control', that constitutes effective management.

A PLANNER'S ENCOUNTER WITH COMPLEXITY

Routledge Spatial planning is about dealing with our 'everyday' environment. In *A Planner's Encounter with Complexity* we present various understandings of complexity and how the environment is considered accordingly. One of these considerations is the environment as subject to processes of continuous change, being either progressive or destructive, evolving non-linearly and alternating between stable and dynamic periods. If the environment that is subject to change is adaptive, self-organizing, robust and flexible in relation to this change, a process of evolution and co-evolution can be expected. This understanding of an evolving environment is not mainstream to every planner. However, in *A Planner's Encounter with Complexity*, we argue that environments confronted with discontinuous, non-linear evolving processes might be more real than the idea that an environment is simply a planner's creation. Above all, we argue that recognizing the 'complexity' of our environment offers an entirely new perspective on our world and our environment, on planning theory and practice, and on the *raison d'être* of the planners that we are. *A Planner's Encounter with Complexity* is organized into 17 chapters. It begins with the interplay of planning and complexity from the perspective of contemporary planning theory. It continues by critically assessing planning theory and practice in the light of the interdisciplinary debate regarding complexity thinking. As the book progresses, it positions itself ever closer to the perspective of complexity thinking, looking at the planning discipline 'from the outside in', clarifying the facets of complexity and its importance in planning. Finally, conceptual and theoretical developments towards more applied examples are identified in order to see the interplay of planning and complexity in practice. This book emphasizes the importance of complexity in planning, clarifies many of the concepts and theories, presents examples on planning and complexity, and proposes new ideas and methods for planning.

COMPREHENDING THE COMPLEXITY OF COUNTRIES

THE WAY AHEAD

Springer Nature This book argues for computer-aided collaborative country research based on the science of complex and dynamic systems. It provides an in-depth discussion of systems and computer science, concluding that proper understanding of a country is only possible if a genuinely interdisciplinary and truly international approach is taken; one that is based on complexity science and supported by computer science. Country studies should be carefully designed and collaboratively carried out, and a new generation of country students should pay more attention to the fast growing potential of digitized and electronically connected libraries. In this frenzied age of globalization, foreign policy makers may -- to the benefit of a better world -- profit from the radically new country studies pleaded for in the book. Its author emphasizes that reductionism and holism are not antagonistic but complementary, arguing that parts are always parts of a whole and a whole has always parts.

COMPLEX SYSTEMS

MECHANISM OF ADAPTATION

IOS Press The last few years have seen an extraordinary growth in many areas of complex systems. In the field of synergetics and cooperative behaviour in neural systems a new vocabulary emerged to describe discoveries of wide-ranging and fundamental phenomena, like for example artificial life, biocomplexity, cellular automata, chaos, criticality, fractals, learning systems, neural networks, non-linear dynamics, parallel computation, percolation, self-organization. One of the contributing factors to this growth is the extraordinary increase in computing power. Previously intractable non-linear systems are now amenable to analysis and simulation and parallel computers are ever more important in these areas. The book contains papers exploring many aspects of complex systems, covering theory and applications and deal with material drawn from many different disciplines and specialities.

COMPLEXITY LEADERSHIP

PART 1: CONCEPTUAL FOUNDATIONS

IAP This book introduces leadership and organizational scholars to the potential of complexity science for broadening leadership study beyond its traditional focus on leaders' actions and influence, to a consideration of leadership as a broader, dynamically and interactive organizing process. The book offers a primer on complexity science and its applications to organization studies, and compares the logics of complexity science with those underlying traditional leadership approaches. It describes methodological approaches for studying leadership from a complexity perspective, and offers examples of applications of complexity science to leadership theory. Chapters are written by top scholars in complexity and leadership theory.

COMPLEX SYSTEMS

FUNDAMENTALS & APPLICATIONS

WIT Press The papers contained in this volume were originally presented at the 2015 International Conference on Complex Systems in Business, Administration, Science and Engineering. Included are the latest works of practitioners from a variety of disciplines who have developed new approaches for resolving complex issues that cannot be formulated using conventional, mathematical or software models. Complex Systems occur in an infinite variety of problems, not only in the realm of physical sciences and engineering,

but also in such diverse fields as economics, the environment, humanities, and social and political sciences. The papers in the book cover such topics as: Complex ecological systems; Complexity science and urban developments; Complex energy systems; Complex issues in biological and medical sciences; Extreme events: natural and human made disasters; Climate change; Complexity of the internet-based global market; Complex business processes; Supply chain complexity; Transportation complexity; Logistics complexity; Closed and open systems; Attractions and chaotic systems; Complex adaptive software; Complexity of big data; Management of complexity; Global economy as a complex system; Complexity in social systems; Complex political systems; Administrations as complex systems; Complexity in engineering; Complexity and environment; Complexity and evolution; Complexity in linguistics, literature and arts.

COMPLEXITY SCIENCE IN AIR TRAFFIC MANAGEMENT

Routledge Air traffic management (ATM) comprises a highly complex socio-technical system that keeps air traffic flowing safely and efficiently, worldwide, every minute of the year. Over the last few decades, several ambitious ATM performance improvement programmes have been undertaken. Such programmes have mostly delivered local technological solutions, whilst corresponding ATM performance improvements have fallen short of stakeholder expectations. In hindsight, this can be substantially explained from a complexity science perspective: ATM is simply too complex to address through classical approaches such as system engineering and human factors. In order to change this, complexity science has to be embraced as ATM's 'best friend'. The applicability of complexity science paradigms to the analysis and modelling of future operations is driven by the need to accommodate long-term air traffic growth within an already-saturated ATM infrastructure. *Complexity Science in Air Traffic Management* is written particularly, but not exclusively, for transport researchers, though it also has a complementary appeal to practitioners, supported through the frequent references made to practical examples and operational themes such as performance, airline strategy, passenger mobility, delay propagation and free-flight safety. The book should also have significant appeal beyond the transport domain, due to its intrinsic value as an exposition of applied complexity science and applied research, drawing on examples of simulations and modelling throughout, with corresponding insights into the design of new concepts and policies, and the understanding of complex phenomena that are invisible to classical techniques.

COMPLEXITY, SCIENCE AND SOCIETY

CRC Press 'The following sections are a very good representation of the core developments of complexity thinking in a number of major fields. Our intention is to provide an accessible interdisciplinary introduction to the wonderful intellectual breadth that complexity can offer.' - Jan Bogg and Robert Geyer in the Introduction. Complexity is a new and exciting interdisciplinary approach to science and society that challenges traditional academic divisions, frameworks and paradigms. This book helps the expert, student or policy practitioner have a better understanding of the enormous potential of complexity, and how it relates to their particular area of interest or expertise. It provides excellent representations of the core developments of complexity thinking in a number of major fields. "Complexity, Science and Society" brings together an unrivalled selection of new applications of complexity from leading experts across subjects including medicine and healthcare, education, public policy and social theory, ecology, philosophy, international politics, the arts, modelling and design, and others. Together they offer an unprecedented review of the latest developments. This book is an accessible interdisciplinary introduction to the wonderful intellectual breadth that complexity can offer.

ASPECTS OF KOLMOGOROV COMPLEXITY THE PHYSICS OF INFORMATION

River Publishers The research presented in *Aspects of Kolmogorov Complexity* addresses the fundamental standard of defining randomness as measured by a Martin-Lof level of randomness as found in random sequential binary strings. A classical study of statistics that addresses both a fundamental standard of statistics as well as an applied measure for statistical communication theory. The research points to compression levels in a random state that are greater than is found in current literature. A historical overview of the field of Kolmogorov Complexity and Algorithmic Information Theory, a subfield of Information Theory, is given as well as examples using a radix 3, radix 4, and radix 5 base numbers for both random and non-random sequential strings. The text also examines monochromatic and chromatic symbols and both theoretical and applied aspects of data compression as they relate to the transmission and storage of information. The appendix contains papers on the subject given at conferences and the references are current.

DATA SCIENCE AND SOCIAL RESEARCH

EPISTEMOLOGY, METHODS, TECHNOLOGY AND APPLICATIONS

Springer This edited volume lays the groundwork for *Social Data Science*, addressing epistemological issues, methods, technologies, software and applications of data science in the social sciences. It presents data science techniques for the collection, analysis and use of both online and offline new (big) data in social research and related applications. Among others, the individual contributions cover topics like social media, learning analytics, clustering, statistical literacy, recurrence analysis and network analysis. Data science is a multidisciplinary approach based mainly on the methods of statistics and computer science, and its aim is to develop appropriate methodologies for forecasting and decision-making in response to an increasingly complex reality often characterized by large amounts of data (big data) of various types (numeric, ordinal and nominal variables, symbolic data, texts, images, data streams, multi-way data, social networks etc.) and from diverse sources. This book presents selected papers from the international conference on *Data Science & Social Research*, held in Naples, Italy in February 2016, and will appeal to researchers in the social sciences working in academia as well as in statistical institutes and offices.

MILITARY THOUGHT

A SYSTEMIC PERSPECTIVE TO MANAGING COMPLEXITY WITH ENTERPRISE ARCHITECTURE

IGI Global Organizational complexity is an unavoidable aspect of all businesses, even larger ones, which can hinder their ability to react to sudden or disruptive change. However, with the implementation of enterprise architecture (EA), businesses are able to provide their leaders with the resources needed to address any arising challenges. *A Systemic Perspective to Managing Complexity with Enterprise Architecture* highlights the current advances in utilizing enterprise architecture for managing organizational complexity. By demonstrating the value and usefulness of EA, this book serves as a reference for business leaders, managers, engineers, enterprise architects, and many others interested in new research and approaches to business complexity.

NURSING, CARING, AND COMPLEXITY SCIENCE

FOR HUMAN ENVIRONMENT WELL-BEING

Springer Publishing Company 2011 AJN Book of the Year Winner in Professional Development and Issues! "This collected scholarship...will inform the personal/professional evolution of caring and nursing into this century and beyond, inviting new visions of the evolved human in the world of practice, education, research, administration, and clinical care. It is truly a visionary futuristic manifesto for this time in nursing and health sciences at all levels." Jean Watson, PhD, RN, AHN-BC, FAAN University of Colorado Denver College of Nursing Founder: Watson Caring Science Institute, Boulder, Colorado (From the Reflection) This innovative volume explores nursing and complexity science, and investigates how they relate in research, education, and practice. The book examines best methods for using complex systems, with expert contributing authors drawn from nursing, sociology, informatics, and mathematics. Each author is actively involved in studying and applying complexity science in diverse populations and various settings-especially in terms of nursing, chronic care, health care organizations, and community health networks. Chapters conclude with a response written by a nursing scholar, administrator, or practitioner, focusing on chapter concepts relevant to the complex systems seen in nursing. Chapters also include models that relate how these concepts can be used in practice, management, education, and research-from micro to macro scales. The first of its kind, this book demonstrates the potential of complex systems perspectives in nursing and health care research, education, and practice. Key Features Presents the central concepts of complexity science as they relate to nursing Facilitates greater understanding of human caring relationships through the lens of complex organizational systems Provides examples of how to create and implement complex systems models that enhance care for individuals, and in leadership roles, organizational caring, nursing informatics, and research methods

NEW SOFTWARE ENGINEERING PARADIGM BASED ON COMPLEXITY SCIENCE

AN INTRODUCTION TO NSE

Springer Science & Business Media This book describes a complete revolution in software engineering based on complexity science through the establishment of NSE - Nonlinear Software Engineering paradigm which complies with the essential principles of complexity science, including the Nonlinearity principle, the Holism principle, the Complexity Arises From Simple Rules principle, the Initial Condition Sensitivity principle, the Sensitivity to Change principle, the Dynamics principle, the Openness principle, the Self-organization principle, and the Self-adaptation principle. The aims of this book are to offer revolutionary solutions to solve the critical problems existing with the old-established software engineering paradigm based on linear thinking and simplistic science complied with the superposition principle, and make it possible to help software development organizations double their productivity, halve their cost, and remove 99% to 99.99% of the defects in their software products, and efficiently handle software complexity, conformity, visibility, and changeability. It covers almost all areas in software engineering. The tools NSE_CLICK- an automatic acceptance testing platform for outsourcing (or internally developed) C/C++ products, and NSE_CLICK_J - an automatic acceptance testing platform for outsourcing (or internally developed) Java products are particularly designed for non-technical readers to view/review how the acceptance testing of a software product developed with NSE can be performed automatically, and how the product developed with NSE is truly maintainable at the customer site.

INTERACTIVE STORYTELLING

14TH INTERNATIONAL CONFERENCE ON INTERACTIVE DIGITAL STORYTELLING, ICIDS 2021, TALLINN, ESTONIA, DECEMBER 7-10, 2021, PROCEEDINGS

Springer Nature This book constitutes the refereed proceedings of the 14th International Conference on Interactive Digital Storytelling, ICIDS 2021, held in Tallinn, Estonia, in December 2021. The 18 full papers and 17 short papers, presented together with 17 posters and demos, were carefully reviewed and selected from 99 submissions. The papers are categorized into the following topical sub-headings: Narrative Systems; Interactive Narrative Theory; Interactive Narrative Impact and Application; and the Interactive Narrative Research Discipline and Contemporary Practice.

SYMMETRY AND COMPLEXITY

THE SPIRIT AND BEAUTY OF NONLINEAR SCIENCE

World Scientific Publishing Company Incorporated Cosmic evolution leads from symmetry to complexity by symmetry breaking and phase transitions. The emergence of new order and structure in nature and society is explained by physical, chemical, biological, social and economic self-organization, according to the laws of nonlinear dynamics. All these dynamical systems are considered computational systems processing information and entropy. Are symmetry and complexity only useful models of science or are they universals of reality? *Symmetry and Complexity* discusses the fascinating insights gained from natural, social and computer sciences, philosophy and the arts. With many diagrams and pictures, this book illustrates the spirit and beauty of nonlinear science. In the

complex world of globalization, it strongly argues for unity in diversity.

A CRITIQUE OF CREATIVITY AND COMPLEXITY

DECONSTRUCTING CLICHÉS

Springer *In an increasingly complex world the natural human inclination is to oversimplify issues and problems to make them seem more comprehensible and less threatening. This tendency usually generates forms of dogmatism that diminish our ability to think creatively and to develop worthy talents. Fortunately, complexity theory is giving us ways to make sense of intricate, evolving phenomena. This book represents a broad, interdisciplinary application of complexity theory to a wide variety of phenomena in general education, STEM education, learner diversity and special education, social-emotional development, organizational leadership, urban planning, and the history of philosophy. The contributors provide nuanced analyses of the structures and dynamics of complex adaptive systems in these academic and professional fields.*

HANDBOOK OF SYSTEMS AND COMPLEXITY IN HEALTH

Springer Science & Business Media *This book is an introduction to health care as a complex adaptive system, a system that feeds back on itself. The first section introduces systems and complexity theory from a science, historical, epistemological, and technical perspective, describing the principles and mathematics. Subsequent sections build on the health applications of systems science theory, from human physiology to medical decision making, population health and health services research. The aim of the book is to introduce and expand on important population health issues from a systems and complexity perspective, highlight current research developments and their implications for health care delivery, consider their ethical implications, and to suggest directions for and potential pitfalls in the future.*

THE VALUE OF SYSTEMS AND COMPLEXITY SCIENCES FOR HEALTHCARE

Springer *This visionary reframing of health and healthcare uses a complexity science approach to building healthcare systems that are accessible, effective, and prepared for change and challenges. Its holistic map for understanding the human organism emphasizes the interconnectedness of the individual's physical, psychological, cognitive, and sociocultural functioning. Applications of this approach are described in primary, specialist, and emergency care and at the organizational and policy levels, from translating findings to practice, to problem solving and evaluation. In this model, the differences between disease and illness and treating illness and restoring health are not mere wordplay, but instead are robust concepts reflecting real-world issues and their solutions. Based on the Proceedings of the 1st International Conference of Systems and Complexity for Healthcare, topics covered include:*

- *Coping with complexity and uncertainty: insights from studying epidemiology in family medicine*
- *Anticipation in complex systems: potential implications for improving safety and quality in healthcare*
- *Monitoring variability and complexity at the bedside*
- *Viewing mental health through the lens of complexity science*
- *Ethical complexities in systems healthcare: what care and for whom?*
- *The value of systems and complexity thinking to enable change in adaptive healthcare organizations supported by informatics*
- *If the facts don't fit the theory, change the theory: implications for health system reform*

The Value of Systems and Complexity Sciences for Healthcare will interest and inspire health and disease researchers, health professionals, health care planners, health system financiers, health system administrators, health services administrators, health professional educators, and, last but not least, current and future patients.