Theory Self Reproducing Automata Neumann John Edited

Presents a series of short science-fiction stories that tells of encounters between humans and the intelligent, self-aware death machines known as the Berserkers.

This is a social history of refugees escaping Hungary after the Bolshevik-type revolution of 1919, the ensuing counterrevolution, and the rise of anti-Semitism. Largely Jewish and German before World War I, the Hungarian middle class was torn by the disastrous war, the partitioning of Hungary in the Treaty of Trianon, and the numerus clausus act XXV in 1920 that seriously curtailed the number of Jews admitted to higher education. Hungary's outstanding future professionals, whether Jewish, Liberal or Socialist, felt compelled to leave the country and head to German-speaking universities in Austria, Czechoslovakia, and Germany. When Hitler came to power, these exiles were to flee again, many on the fringes of the huge German emigration. Emotionally prepared by their earlier threatening experiences in Hungary, they were quick to recognize the need to uproot themselves again. Many fled to the United States where their double exile catalyzed the USA into an active enemy of Nazi Germany and stimulated the transplantation of European modernism into American art and music. To their surprise, the refugees also encountered anti-Semitism in the USA. The book is based on extensive archival work in the USA and Germany.

Cellular automata are regular uniform networks of locally-connected finite-state machines. They are discrete systems with non-trivial behaviour. Cellular automata are ubiquitous: they are mathematical models of computation and computer models of natural systems. The book presents results of cutting edge research in cellular-automata framework of digital physics and modelling of spatially extended non-linear systems; massive-parallel computing, language acceptance, and computability; reversibility of computation, graph-theoretic analysis and logic; chaos and undecidability; evolution, learning and cryptography. The book is unique because it brings together unequalled expertise of inter-disciplinary studies at the edge of mathematics, computer science, engineering, physics and biology.

Reprint of the fine biography first published by Doubleday in 1992.

John Von Neumann

Automata-2008

John Von Neumann, 1903-1957

Chemoton Theory

Selected Letters

Berserker

William Aspray provides the first broad and detailed account of von Neumann's many different contributions to computing. John von Neumann (1903-1957) was unquestionably one of the most brilliant scientists of the twentieth century. He made major contributions to quantum mechanics and mathematical physics and in 1943 began a new and all-too-

short career in computer science. William Aspray provides the first broad and detailed account of von Neumann's many different contributions to computing. These, Aspray reveals, extended far beyond his well-known work in the design and construction of computer systems to include important scientific applications, the revival of numerical analysis, and the creation of a theory of computing.Aspray points out that from the beginning von Neumann took a wider and more theoretical view than other computer pioneers. In the now famous EDVAC report of 1945, von Neumann clearly stated the idea of a stored program that resides in the computer's memory along with the data it was to operate on. This stored program computer was described in terms of idealized neurons, highlighting the analogy between the digital computer and the human brain. Aspray describes von Neumann's development during the next decade, and almost entirely alone, of a theory of complicated information processing systems, or automata, and the introduction of themes such as learning, reliability of systems with unreliable components, self-replication, and the importance of memory and storage capacity in biological nervous systems; many of these themes remain at the heart of current investigations in parallel or neurocomputing.Aspray allows the record to speak for itself. He unravels an intricate sequence of stories generated by von Neumann's work and brings into focus the interplay of personalities centered about von Neumann. He documents the complex interactions of science, the military, and business and shows how progress in applied mathematics was intertwined with that in computers. William Aspray is Director of the Center for the History of Electrical Engineering at The Institute of Electrical and Electronics Engineers.
This book represents the views of one of the greatest mathematicians of the twentieth century on the analogies between computing machines and the living human brain. John von Neumann concludes that the brain operates in part digitally, in part analogically, but uses a peculiar statistical language unlike that employed in the operation of man-made computers. This edition includes a new foreword by two eminent figures in the fields of philosophy, neuroscience, and consciousness.
This book consists of five acts and two interludes, which are all written as dialogues between three main characters and other supporting characters. Each act discusses the epistemological, institutional and methodological foundations of game theory and economics, while using various stories and examples. A featured aspect of those discussions is that many forms of mutual misunderstanding are involved in social situations as well as in those fields themselves. One Japanese traditional comic story called the Konnyaku Mondo is representative and gives hints of how our thought is constrained by incorrect beliefs. Each dialogue critically examines extant theories and common misunderstanding in

game theory and economics in order to find possible future developments of those fields.

After three decades since the first nearly complete edition of John von Neumann's papers, this book is a valuable selection of those papers and excerpts of his books that are most characteristic of his activity, and reveal that of his continuous influence. The results receiving the 1994 Nobel Prizes in economy deeply rooted in Neumann's game theory are only minor traces of his exceptionally broad spectrum of creativity and stimulation. The book is organized by the specific subjects-quantum mechanics, ergodic theory, operator algebra, hydrodynamics, economics, computers, science and society. In addition, one paper which was written in German will be translated and published in English for the first time. The sections are introduced by short explanatory notes with an emphasis on recent developments based on von Neumann's contributions. An overall picture is provided by Ulam's, one of his most intimate partners in thinking, 1958 memorial lecture. Facsimilae and translations of some of his personal letters and a newly completed bibliography based on von Neumann's own careful compilation are added. Contents:Quantum Mechanics:Mathematical Foundations of Quantum MechanicsThe Logic of Quantum Mechanics (with G Birkhoff)Ergodic Theory:Proof of the Quasi-Ergodic HypothesisOperator Methods in Classical Mechanics, II (with P R Halmos)Operator Algebra:Algebra of Functional Operations and Theory of Normal OperatorsOn Rings of Operators I – IVUse of Variational Methods in HydrodynamicsEconomics:Theory of Games and Economic Behavior (with O Morgenstern)Computers:On the Principles of Large Scale Computing Machines (with H H Goldstine)Science and Society:The MathematicianMethod in the Physical SciencesThe Role of Mathematics in the Sciences and in Societyand other papers Readership: Mathematicians. keywords:Mathematics;Science History;Computer Science;J V Neumann;Science and Society;Game Theory;Quantum Mechanics;Operator Algebra;Hydrodynamics;Ergodic Theory " The collection bears testimony to the lasting influence of John von Neumann's work on the course of modern mathematics. " R Siegmund-Schultze Mathematical Abstracts " This collection is a fascinating introduction to the work of John von Neumann ⋯ it has much to offer even to the casual browser and will also be relevant and interesting to those working today in the fields on which von Neumann had such enormous influence. " Mathematical Reviews

Cybernetics, Artificial Life, and the New AI

Rise of the Self-Replicators

Systems and Computer Science

Mathematical Problems in the Biological Sciences

Advances in Artificial Life

Self-organization and Emergence in Life Sciences

John von Neumann was perhaps the most influential mathematician of the twentieth century, especially if his broad influence outside mathematics is included. The present volume is the first substantial collection of (previously mainly unpublished) letters written by von Neumann to colleagues, friends, government officials, and others. The letters give us a glimpse of the thinking of John von Neumann about mathematics, physics, computer science, science management, education, consulting, politics, and war. Readers of quite diverse backgrounds will find much of interest in this first-hand look at one of the towering figures of twentieth century science.

Life is all around us, abundant and diverse. It is truly a marvel. But what does it actually mean to be alive, and how do we decide what is living and what is not? After a lifetime of studying life, Nobel Prize-winner Sir Paul Nurse, one of the world's leading scientists, has taken on the challenge of defining it. Written with great personality and charm, his accessible guide takes readers on a journey to discover biology's five great building blocks, demonstrates how biology has changed and is changing the world, and reveals where research is headed next. To survive all the challenges that face the human race today - population growth, pandemics, food shortages, climate change - it is vital that we first understand what life is. Never before has the question 'What is life?' been answered with such insight, clarity, and humanity, and never at a time more urgent than now. 'Paul Nurse is about as distinguished a scientist as there could be. He is also a great communicator. This book explains, in a way that is both clear and elegant, how the processes of life unfold, and does as much as science can to answer the question posed by the title. It's also profoundly important, at a time when the world is connected so closely that any new illness can sweep from nation to nation with immense speed, that all of us - including politicians - should be as well-informed as possible. This book provides the sort of clarity and understanding that could save many thousands of lives. I learned a great deal, and I enjoyed the process enormously.' -Sir Philip Pullman 'A nearly perfect guide to the wonder and complexity of existence.' -Bill Bryson 'Nurse provides a concise, lucid response to an age-old question. His writing is not just informed by long experience, but also wise, visionary, and personal. I read the book in one sitting, and felt exhilarated by the end, as though I'd run for miles - from the author's own garden into the interior of the cell, back in time to humankind's most distant ancestors, and through the laboratory of a dedicated scientist at work on what he most loves to do.' -Dava Sobel

An account of the creation of new forms of life and intelligence in cybernetics, artificial life, and artificial intelligence that analyzes both the similarities and the differences among these sciences in actualizing life.The Allure of Machinic Life

Cellular automata were introduced in the first half of the last century by John von Neumann who used them as theoretical models for self-reproducing machines. The authors present a self-contained exposition of the theory of cellular automata on groups and explore its deep connections with recent developments in geometric group theory, symbolic dynamics, and other branches of mathematics and theoretical computer science. The topics treated include in particular the Garden of Eden theorem for amenable groups, and the Gromov-Weiss surjunctivity theorem as well as the solution of the

Kaplansky conjecture on the stable finiteness of group rings for sofic groups. The volume is entirely self-contained, with 10 appendices and more than 300 exercises, and appeals to a large audience including specialists as well as newcomers in the field. It provides a comprehensive account of recent progress in the theory of cellular automata based on the interplay between amenability, geometric and combinatorial group theory, symbolic dynamics and the algebraic theory of group rings which are treated here for the first time in book form.

Proceedings of the NATO Advanced Workshop on Robots and Biological Systems, held at Il Ciocco, Toscana, Italy, June 26 – 30, 1989

Theory and Applications of Cellular Automata

Double Exile

Early Visions of Machines, AI and Robots That Can Reproduce and Evolve

THEORY OF SELF-REPRODUCING AUTOMATA.

Theory of Self-reproducing Automata

This volume contains 71 revised refereed papers, including seven invited surveys, presented during the Third European Conference on Artificial Life, ECAL '95, held in Granada, Spain in June 1995. Originally AL was concerned with applying biologically inspired solutions to technology and with examining computational expertise in order to reproduce and understand life processes. Despite its short history, AL now is becoming a mature scientific field. The volume reports the state of the art in this exciting area of research; there are sections on foundations and epistemology, origins of life and evolution, adaptive and cognitive systems, artificial worlds, robotics and emulation of animal behavior, societies and collective behavior, biocomputing, and applications and common tools.

The two-volume set LNAI 5777 and LNAI 5778 constitutes the thoroughly refereed post-conference proceedings of the 10th European Conference, ECAl 2009, held in Budapest, Hungary, in September 2009. The 141 revised full papers presented were carefully reviewed and selected from161 submissions. The papers are organized in topical sections on evolutionary developmental biology and hardware, evolutionary robotics, protocells and prebiotic chemistry, systems biology, artificial chemistry and neuroscience, group selection, ecosystems and evolution, algorithms and evolutionary computation, philosophy and arts, optimization, action, and agent connectivity, and swarm intelligence.

Bionics evolved in the 1960s as a framework to pursue the development of artificial systems based on the study of biological systems. Numerous disciplines and technologies, including artificial intelligence and learningdevices, information processing, systems architecture and control, perception, sensory mechanisms, and bioenergetics, contributed to bionics research. This volume is based on a NATO Advanced Research Workshop within the Special Programme on Sensory Systems for Robotic Control, held in Il Ciocco, Italy, in June 1989. A consensus emerged at the workshop, and is reflected in the book, on the value of learning from nature in order to derive guidelines for the design of intelligent machines which operate in unstructured environments. The papers in the book are grouped into seven chapters: vision and dynamic systems, hands and tactile perception, locomotion, intelligent motor control, design technologies, interfacing robots to nervous systems, and robot societies and self-

organization.
John von Neumann was a Jewish refugee from Hungary — considered a “genius” like fellow Hungarians Leo Szilard, Eugene Wigner and Edward Teller — who played key roles developing the A-bomb at Los Alamos during World War II. As a mathematician at Princeton’s Institute for Advanced Study (where Einstein was also a professor), von Neumann was a leader in the development of early computers. Later, he developed the new field of game theory in economics and became a top nuclear arms policy adviser to the Truman and Eisenhower administrations. “I always thought [von Neumann’s] brain indicated that he belonged to a new species, an evolution beyond man. Macrae shows us in a lively way how this brain was nurtured and then left its great imprint on the world.” — Hans A. Bethe, Cornell University “The book makes for utterly captivating reading. Von Neumann was, of course, one of this century’s geniuses, and it is surprising that we have had to wait so long... for a fully fleshed and sympathetic biography of the man. But now, happily, we have one. Macrae nicely delineates the cultural, familial, and educational environment from which von Neumann sprang and sketches the mathematical and scientific environment in which he flourished. It’s no small task to render a genius like von Neumann in ordinary language, yet Macrae manages the trick, providing more than a glimpse of what von Neumann accomplished intellectually without expecting the reader to have a Ph.D. in mathematics. Beyond that, he captures von Neumann’s qualities of temperament, mind, and personality, including his effortless wit and humor. And [Macrae] frames and accounts for von Neumann’s politics in ways that even critics of them, among whom I include myself, will find provocative and illuminating.” — Daniel J. Kevles, California Institute of Technology “A lively portrait of the hugely consequential nonmathematician-physicist-et al., whose genius has left an enduring impress on our thought, technology, society, and culture. A double salute to Steve White, who started this grand book designed for us avid, nonmathematical readers, and to Norman Macrae, who brought it to a triumphant conclusion.” — Robert K. Merton, Columbia University “The first full-scale biography of this polymath, who was born Jewish in Hungary in 1903 and died Roman Catholic in the United States at the age of 53. And Mr. Macrae has some great stories to tell... Mr. Macrae’s biography has rescued a lot of good science gossip from probable extinction, and has introduced many of us to the life story of a man we ought to know better.” — Ed Regis, The New York Times “A nice and fascinating picture of a genius who was active in so many domains.” —Zentralblatt MATH “Biographer Macrae takes a ‘viewspaperman’ approach which stresses the context and personalities associated with von Neumann’s remarkable life, rather than attempting to give a detailed scholarly analysis of von Neumann’s papers. The resulting book is a highly entertaining account that is difficult to put down.” — Journal of Mathematical Psychology “A full and intimate biography of ‘the man who consciously and deliberately set mankind moving along the road that led us into the Age of Computers.’” — Freeman Dyson, Princeton, NJ “It is good to have a biography of one of the most important mathematicians of the twentieth century, even if it is a biography that focuses much more on the man than on the mathematics.” — Fernando Q. Gouvêa, Mathematical Association of America “Based on much research, his own and that of others (especially of Stephen White), Macrae has written a valuable biography of this remarkable genius of our century, without the opacity of technical (mathematical) dimensions that are part of the hero’s intellectual

contributions to humanity. Interesting, informative, illuminating, and insightful." — Choice Review "Macrae paints a highly readable, humanizing portrait of a man whose legacy still influences and shapes modern science and knowledge." — Resonance, Journal of Science Education "In this affectionate, humanizing biography, former Economist editor Macrae limns a prescient pragmatist who actively fought against fascism and who advocated a policy of nuclear deterrence because he foresaw that Stalin's Soviet Union would rapidly acquire the bomb and develop rocketry... Macrae makes [von Neumann's] contributions accessible to the lay reader, and also discusses von Neumann's relationships with two long-suffering wives, his political differences with Einstein and the cancer that killed him." — Publishers Weekly "Macrae's life of the great mathematician shows dramatically what proper care and feeding can do for an unusually capacious mind." — John Wilkes, Los Angeles Times

Deciphering Biology with Fine-Scale Techniques

Essays on Cellular Automata

Theory of Reversible Computing

Global Dynamics Of Cellular Automata

Proceedings of a Conference held at the University of Western Ontario September 10-11, 1965

The Neumann Compendium

John von Neumann's kinematic and cellular automaton systems are described. A complete informal description of the cellular system is presented including an explanation of the realization of logical components, the design of computer organs, the construction, destruction and movement of organs by sequences of internally originated pulses, universal computation and construction, and self-reproduction. Connections between von Neumann's automaton research and his work on computer design are brought out, and the significance of cellular arrays for biological research discussed. (Author).

Introduction: Adaptation, Evolution, and Intelligence, Lashon Booker, Stephanie Forrest, Melanie Mitchell, and Rick Riolo. PART 1: GENETIC ALGOROTHMS AND BEYOND. 1. Genetic Algorithms: A 30 Year Perspective, Kenneth DeJong. 2. Human-Competitive Machine Intelligence by Means of Genetic Algorithms, John R. Koza. 3. John Holland, Facetwise models, and Economy of Thought, David E. Goldberg. PART 2: COMPUTATION, ARTIFICIAL INTELLIGENCE, AND BEYOND. 4. An Early Graduate Program in Computers and Communications, Arthur W. Burks. 5. Had We But World Enough and Time, Oliver G. Selfridge. 6. Discrete Eve.

Dr. Gànti has introduced Chemoton Theory to explain the origin of life. Theoretical Foundations of Fluid Machineries is a discussion of the theoretical foundations of fluid automata. It introduces quantitative methods - cycle stoichiometry and stoichiokinetics - in order to describe fluid automata with the methods of algebra, as well as their construction, starting from elementary chemical reactions up to the complex, program-directed, proliferating fluid automata, the chemotons. Chemoton Theory outlines the development of a theoretical biology, based on exact quantitative considerations and the consequences of its application on biotechnology and on the artificial synthesis of living systems.

This volume comprises ten thoroughly refereed and revised full papers originating from an interdisciplinary workshop on biocomputation entitled "Evolution as a Computational Process", held in Monterey, California in July 1992. This book is devoted to viewing biological evolution as a giant computational process being carried out over a vast spatial and temporal scale. Computer scientists, mathematicians and physicists may learn about optimization from looking at natural evolution and biologists may learn about evolution from studying artificial life, game theory, and mathematical optimization. In addition to the ten full papers addressing e.g. population genetics, emergence, artificial life, self-organization, evolutionary algorithms, and selection, there is an introductory survey and a subject index.

From Mathematics to the Technologies of Life and Death
Operators, Ergodic theory and almost periodic functions in a group
John von Neumann and the Origins of Modern Computing
Evolution and Biocomputation
10th European Conference, ECAL 2009, Budapest, Hungary, September 13-16, 2009, Revised Selected Papers
Understand Biology in Five Steps

The book introduces a powerful new global perspective for the study of discrete dynamical systems. After first looking at the unique trajectory of a system's future, an algorithm is also presented that directly computes the multiple merging trajectories that may have constituted the system's past. A given set of cellular parameters will, in a sense, crystallize state space into a set of basins of attraction that will typically have the topology of branching trees rooted on attractor cycles. The book makes accessible the explicit portraits of these mathematical objects through computer-generated graphics. (Book/disk package disk requires an 80286, or higher, IBM PC or compatible with 640K of memory, VGA graphics, and DOS 2.0 or higher.

With extraordinary clarity,the Systems Biology: Principles, Methods, and Concepts focuses on the technical practical aspects of modeling complex or organic general systems. It also provides in-depth coverage of modeling biochemical, thermodynamic, engineering, and ecological systems. Among other methods and concepts based in logic, computer science, and dynamical systems, it explores pragmatic techniques of General Systems Theory. This text presents biology as an autonomous science from the perspective of fundamental modeling techniques. A complete resource for anyone interested in biology as an exact science, it includes a comprehensive survey, review, and critique of concepts and methods in Systems Biology.

A metamathematician best known for his discovery of the Omega number explains how Darwin's theory of evolution succeeds on a mathematic level and argues that no one can be certain about evolution without a proven mathematical theory. Original.

This is Bulletin , Volume 64, Number 3, Part II, May 1958. A memorial to the late John von Neumann edited by J. C. Oxtoby, B. J. Pettis and E. B. Price.

Theory of Games and Economic Behavior
The Man from the Future: The Visionary Ideas of John von Neumann
The Microstructure of Dinosaur Bone
Game Theory and Mutual Misunderstanding
John Von Neumann and Norbert Wiener
An Atlas Of Basin Of Attraction Fields Of One-dimensional Cellular Automata

Self-organization constitutes one of the most important theoretical debates in contemporary life sciences. The present book explores the relevance of the concept of self-organization and its impact on such scientific fields as: immunology, neurosciences, ecology and theories of evolution. Historical aspects of the issue are also broached. Intuitions relative to self-organization can be found in the works of such key western philosophical figures as Aristotle, Leibniz and Kant. Interacting with more recent authors and cybernetics, self-organization represents a notion in keeping with the modern world's discovery of radical complexity. The themes of teleology and emergence are analyzed by philosophers of sciences with regards to the issues of modelization and scientific explanation. The implications of self-organization for life sciences are here approached from an interdisciplinary angle, revealing the notion

as already rewarding and full of promise for the future.
A double biography compares the lives and careers of two innovative mathematicians and assesses their respective contributions in the areas of quantum mechanics and cybernetics
In 1942, Lt. Herman H. Goldstine, a former mathematics professor, was stationed at the Moore School of Electrical Engineering at the University of Pennsylvania. It was there that he assisted in the creation of the ENIAC, the first electronic digital computer. The ENIAC was operational in 1945, but plans for a new computer were already underway. The principal source of ideas for the new computer was John von Neumann, who became Goldstine's chief collaborator. Together they developed EDVAC, successor to ENIAC. After World War II, at the Institute for Advanced Study, they built what was to become the prototype of the present-day computer. Herman Goldstine writes as both historian and scientist in this first examination of the development of computing machinery, from the seventeenth century through the early 1950s. His personal involvement lends a special authenticity to his narrative, as he sprinkles anecdotes and stories liberally through his text.
This book presents the papers delivered at the Conference on Systems and Computer Science held at the University of Western Ontario in September 1965. The primary purposes of the Conference were the promotion of research and the development of the teaching of computer science in Canadian universities. The papers focus attention on some of the concepts of Computer Science as a new field of study and at the same time provide a background for scientists looking at the subject for the first time. The chief developments in computer science have been concerned with the "applied" rather than the "pure" areas of the field: numerical analysis, applied statistics and operations research, and data processing. But there is something more to computers than the physical components and this book represents an attempt to correct the imbalance between "applied" and "pure" by drawing attention to certain theoretical aspects of computer and information science. Among the topics discussed are the theory of finite and infinite automata, aspects of formal language theory, heuristic and non-heuristic approaches to theorem proving and the mathematical formulation of the theory of general systems. There are also references to the problems of machine design, to software systems including higher-level languages, to multiple control computer models and to applied systems. This collection of papers will appeal first to graduate students and professors in Computer Science. It will also be of interest to computer scientists in industry and in government and university research groups and to the scientific public interested in discovering some of the principal ingredients and directions of the computer and information sciences.
The Allure of Machinic Life
Theory of Self-reproducing Automata. Edited and Completed by Arthur W. Burks
Scientific Dialogues in Five Acts
Robots and Biological Systems: Towards a New Bionics?
John von Neumann: The Scientific Genius Who Pioneered the Modern Computer, Game Theory, Nuclear Deterrence, and Much More
Von Neumann's self-reproducing automata
This book offers a general review of the voluminous theoretical and experimental literature pertaining to physical self-replicating systems. The principal focus here is on self-replicating machine systems. Most importantly, we are concerned with kinematic self-replicating machines: systems in which actual physical objects, not mere patterns of information, undertake their own replication. Following a brief burst of activity in the 1950s and 1980s, the field of kinematic replicating systems design received new interest in the 1990s with the emerging recognition of the feasibility of molecular nanotechnology. The field has experienced a renaissance of research activity since 1999 as researchers have come to recognize that replicating systems are simple enough to permit experimental laboratory demonstrations of working devices.
Is it possible to design robots and other machines that can reproduce and evolve? And, if so, what are the implications: for the machines, for ourselves, for our environment, and for the

future of life on Earth and elsewhere? In this book the authors provide a chronological survey and comprehensive archive of the early history of thought about machine self-reproduction and evolution. They discuss contributions from philosophy, science fiction, science and engineering, and uncover many examples that have never been discussed in the Artificial Intelligence and Artificial Life literature before now. In the final chapter they provide a synthesis of the concepts discussed, offer their views on the field's future directions, and call for a broad community discussion about the significant implications of intelligent evolving machines. The book will be of interest to general readers, and a valuable resource for researchers, practitioners, and historians engaged with ideas in artificial intelligence, artificial life, robotics, and evolutionary computing.

An electrifying biography of one of the most extraordinary scientists of the twentieth century and the world he made. The smartphones in our pockets and computers like brains. The vagaries of game theory and evolutionary biology. Nuclear weapons and self-replicating spacecrafts. All bear the fingerprints of one remarkable, yet largely overlooked, man: John von Neumann. Born in Budapest at the turn of the century, von Neumann is one of the most influential scientists to have ever lived. A child prodigy, he mastered calculus by the age of eight, and in high school made lasting contributions to mathematics. In Germany, where he helped lay the foundations of quantum mechanics, and later at Princeton, von Neumann's colleagues believed he had the fastest brain on the planet—bar none. He was instrumental in the Manhattan Project and the design of the atom bomb; he helped formulate the bedrock of Cold War geopolitics and modern economic theory; he created the first ever programmable digital computer; he prophesized the potential of nanotechnology; and, from his deathbed, he expounded on the limits of brains and computers—and how they might be overcome. Taking us on an astonishing journey, Ananyo Bhattacharya explores how a combination of genius and unique historical circumstance allowed a single man to sweep through a stunningly diverse array of fields, sparking revolutions wherever he went. The Man from the Future is an insightful and thrilling intellectual biography of the visionary thinker who shaped our century.

Drawing from sources across the field of bone histology, Chinsamy-Turan paints a holistic view of the current state of the science and presents a fresh perspective on the relevance of the field to understanding the Dinosauria.

The Computer from Pascal to von Neumann

Proving Darwin

Making Biology Mathematical

The Computer and the Brain

Perspectives on Adaptation in Natural and Artificial Systems

Computational Models of Evolution

This book describes reversible computing from the standpoint of the theory of automata and computing. It investigates how reversibility can be effectively utilized in computing. A reversible computing system is a "backward deterministic" system such that every state of the system has at most one predecessor. Although its definition is very simple, it is closely related to physical reversibility, one of the fundamental microscopic laws of Nature. Authored by the leading scientist on the subject, this book serves as a valuable reference work for anyone working in reversible computation or in automata theory in general. This work deals with various reversible computing models at several different levels, which range from the microscopic to the macroscopic, and aims to clarify how

computation can be carried out efficiently and elegantly in these reversible computing models. Because the construction methods are often unique and different from those in the traditional methods, these computing models as well as the design methods provide new insights for future computing systems. Organized bottom-up, the book starts with the lowest scale of reversible logic elements and circuits made from them. This is followed by reversible Turing machines, the most basic computationally universal machines, and some other types of reversible automata such as reversible multi-head automata and reversible counter machines. The text concludes with reversible cellular automata for massively parallel spatiotemporal computation. In order to help the reader have a clear understanding of each model, the presentations of all different models follow a similar pattern: the model is given in full detail, a short informal discussion is held on the role of different elements of the model, and an example with illustrations follows each model.
John von Neumann and Oskar Morgenstern conceived a groundbreaking mathematical theory of economic and social organization, based on a theory of games of strategy. Not only would this revolutionize economics, but the entirely new field of scientific inquiry it yielded--game theory--has since been widely used to analyze a host of real-world phenomena from arms races to optimal policy choices of presidential candidates, from vaccination policy to major league baseball salary negotiations. And it is today established throughout both the social sciences and a wide range of other sciences.
Principles, Methods, and Concepts
Systems Biology
Kinematic Self-Replicating Machines
Prisoner's Dilemma/John Von Neumann, Game Theory and the Puzzle of the Bomb
Theory of Living Systems
Cellular Automata and Groups