[DOC] A New Kind Of Science

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New Kind of Science-Stephen Wolfram 2002-12-01
A New Kind of Science-Stephen Wolfram 2018-11-30 NOW IN PAPERBACK"€"Starting from a collection of simple computer experiments"€"illustrated in the book by striking computer graphics"€"Stephen Wolfram shows how their unexpected results force a whole new way of looking at the operation of our universe.
A New Kind of Science-Stephen Wolfram 2002 This work presents a series of dramatic discoveries never before made public. Starting from a collection of simple computer experiments---illustrated in the book by striking computer graphics---Wolfram shows how their unexpected results force a whole new way of looking at the operation of our universe. Wolfram uses his approach to tackle a remarkable array of fundamental problems in science: from the origin of the Second Law of thermodynamics, to the development of complexity in biology, the computational limitations of mathematics, the possibility of a truly fundamental theory of physics, and the interplay between free will and determinism.
Irreducibility and Computational Equivalence-Hector Zenil 2012-12-25 It is clear that computation is playing an increasingly prominent role in the development of mathematics, as well as in the natural and social sciences. The work of Stephen Wolfram over the last several decades has been a salient part in this phenomenon helping founding the field of Complex Systems, with many of his constructs and ideas incorporated in his book A New Kind of Science (ANKS) becoming part of the scientific discourse and general academic knowledge--from the now established Elementary Cellular Automata to the unconventional concept of mining the Computational Universe, from today's widespread Wolfram's Behavioural Classification to his principles of Irreducibility and Computational Equivalence. This volume, with a Foreword by Gregory Chaitin and an Afterword by Cris Calude, covers these and other topics related to or motivated by Wolfram's seminal ideas, reporting on research undertaken in the decade following the publication of Wolfram's NKS book. Featuring 39 authors, its 23 contributions are organized into seven parts: Mechanisms in Programs & Nature Systems Based on Numbers & Simple Programs Social and Biological Systems & Technology Fundamental Physics The Behavior of Systems & the Notion of Computation Irreducibility & Computational Equivalence Reflections and Philosophical Implications.
Reinventing Discovery-Michael Nielsen 2013-12 A pioneer of quantum computing describes how the Internet and powerful new online tools are democratising and accelerating scientific discovery.
A Project to Find the Fundamental Theory of Physics-Stephen Wolfram 2020-03-23 Description to come
Why Society is a Complex Matter-Philip Ball 2012-06-09 Society is complicated. But this book argues that this does not place it beyond the reach of a science that can help to explain and perhaps even to predict social behaviour. As a system made up of many interacting agents – people, groups, institutions and governments, as well as physical and technological structures such as roads and computer networks – society can be regarded as a complex system. In recent years, scientists have made great progress in understanding how such complex systems operate, ranging from animal populations to earthquakes and weather. These systems show behaviours that cannot be predicted or intuited by focusing on the individual components, but which emerge spontaneously as a consequence of their interactions: they are said to be ‘self-organized’. Attempts to direct or manage such emergent properties generally reveal that ‘top-down’ approaches, which try to dictate a particular outcome, are ineffectual, and that what is needed instead is a ‘bottom-up’ approach that aims to guide self-organization towards desirable states. This book shows how some of these ideas from the science of complexity can be applied to the study and management of social phenomena, including traffic flow, economic markets, opinion formation and the growth and structure of cities. Building on these successes, the book argues that the complex-systems view of the social sciences has now matured sufficiently for it to be possible, desirable and perhaps essential to attempt a grander objective: to integrate these efforts into a unified scheme for studying, understanding and ultimately predicting what happens in the world we have made. Such a scheme would require the mobilization and collaboration of many different research communities, and would allow society and its interactions with the physical environment to be explored through realistic models and large-scale data collection and analysis. It should enable us to find new and effective solutions to major global problems such as conflict, disease, financial instability, environmental despoliation and poverty, while avoiding unintended policy consequences. It could give us the foresight to anticipate and ameliorate crises, and to begin tackling some of the most intractable problems of the twenty-first century.
A Nonlinear Dynamics Perspective of Wolfram's New Kind of Science-Leon O. Chua 2013 This text uncovers secret recipes from the abstract theory of one-dimensional cellular automata for predicting the long-term evolution of a ring of identical elementary cells where the binary state of each cell during each generation of an attractor is determined uniquely by the state of its left and right neighbors in the previous generation, as decreed by one of 256 truth tables.
Loonshots-Safi Bahcall 2019-03-19 * Instant WSJ bestseller * Translated into 18 languages * #1 Most Recommended Book of the year (Bloomberg annual survey of CEOs and entrepreneurs) * An Amazon, Bloomberg, Financial Times, Forbes, Inc., Newsweek, Strategy + Business, Tech Crunch, Washington Post Best Business Book of the year * Recommended by Bill Gates, Daniel Kahneman, Malcolm Gladwell, Dan Pink, Adam Grant, Susan Cain, Sid Mukherjee, Tim Ferriss Why do good teams kill great ideas? Loonshots reveals a surprising new way of thinking about the mysteries of group behavior that challenges everything we thought we knew about nurturing radical breakthroughs. Bahcall, a physicist and entrepreneur, shows why teams, companies, or any group with a mission will suddenly change from embracing new ideas to rejecting them, just as flowing water will suddenly change into brittle ice. Mountains of print have been written about culture. Loonshots identifies the small shifts in structure that control this transition, the same way that temperature controls the change from water to ice. Using examples that range from the spread of fires in forests to the hunt for terrorists online, and stories of thieves and geniuses and kings, Bahcall shows how a new kind of science can help us become the initiators, rather than the victims, of innovative surprise. Over the past decade, researchers have been applying the tools and techniques of this new science—the science of phase transitions—to understand how birds flock, fish swim, brains work, people vote, diseases erupt, and ecosystems collapse. Loonshots is the first to apply this science to the spread of breakthrough ideas. Bahcall distills these insights into practical lessons creatives, entrepreneurs, and visionaries can use to change our world. Along the way, readers will learn how chickens saved millions of lives, what James Bond and Lipitor have in common, what the movie Imitation Game got wrong about WWII, and what really killed Pan Am, Polaroid, and the Qing Dynasty. “If The Da Vinci Code and Freakonomics had a child together, it would be called Loonshots.” —Senator Bob Kerrey
Facing Up-Steven Weinberg 2012-02-01 Each of these essays struggles in one way or another with the necessity of facing up to the discovery that the laws of nature are impersonal, with no hint of a special status for human beings. Defending the spirit of science against its cultural adversaries, these essays express a viewpoint that is reductionist, realist, and devoutly secular. Together, they afford the general reader the unique pleasure of experiencing the superb sense, understanding, and knowledge of one of the most interesting and forceful scientific minds of our era.ease fill in marketing copy
Quantum Legacies-David Kaiser 2020 "Physicists have grappled with quantum theory for over a century. They have learned to wring precise answers from the theory's governing equations, and no experiment to date has found compelling evidence to contradict it. Even so, the conceptual apparatus remains stubbornly, famously bizarre. Physicists have tackled these conceptual uncertainties while navigating still larger ones: the rise of fascism, cataclysmic world wars and a new nuclear age, an unsteady Cold War stand-off and its unexpected end. Quantum Legacies introduces readers to physics' still-unfolding quest by treating iconic moments of discovery and debate among well-known figures like Albert Einstein, Erwin Schrödinger, and Stephen Hawking, and many others whose contributions have indelibly shaped our understanding of nature"--
New Kind of Conservative (Large Print 16pt)-Joel C. Hunter 2011-08 Conservative spokesman, author and pastor Dr. Joel C. Hunter forges a new path with A New Kind of Conservative. Hunter takes a provocative look at how faith and politics have interacted in America, giving civic - minded people a balanced and biblically - based approach to political involvement. The author speaks as a conservative Christian with traditional biblical stands regarding abortion and homosexuality, but expands it to include other biblical concerns, such as the environment, poverty, justice issues, AIDS, etc. This is not the ideology and rhetoric associated with the extreme religious right, but rather a broader look at politics that the Bible would have us address. Hunter shows how religion and politics do not have to be at odds with one another, and offers the information and motivation needed to take responsible action. Can a Christian/biblical worldview effectively mesh with postmodern society and secular government? Should Christians be involved in political action and, if so, how? How can Christians more effectively relate and present their faith in the context of contemporary and political society? Readers, regardless of their beliefs, will find this thoughtful, helpful and compelling reading.
Real Life-Brandon Taylor 2020 Almost everything about Wallace, an introverted African-American transplant from Alabama, is at odds with the lakeside Midwestern university town where he is studying for a biochem degree. For reasons of self-preservation, he has kept a distance even from his own friends - some dating each other, some dating women, some feigning straightness. But a series of confrontations with colleagues, and an unexpected encounter with a young straight man, conspire to fracture his defences, while revealing hidden currents of resentment and desire that threaten the equilibrium of their community.
Axiom's End-Lindsay Ellis 2020-07-21 THE INSTANT NEW YORK TIMES BESTSELLER The alternate history first contact adventure Axiom's End is an extraordinary debut from Hugo finalist and video essayist Lindsay Ellis. Truth is a human right. It’s fall 2007. A well-timed leak has revealed that the US government might have engaged in first contact. Cora Sabino is doing everything she can to avoid the whole mess, since the force driving the controversy is her whistleblower father. Even though Cora hasn’t spoken to him in years, his celebrity has caught the attention of the press, the Internet, the paparazzi, and the government—and with him in hiding, that attention is on her. She neither knows nor cares whether her father’s leaks are a hoax, and wants nothing to do with him—until she learns just how deeply entrenched her family is in the cover-up, and that an extraterrestrial presence has been on Earth for decades. Realizing the extent to which both she and the public have been lied to, she sets out to gather as much information as she can, and finds that the best way for her to uncover the truth is not as a whistleblower, but as an intermediary. The alien presence has been completely uncommunicative until she convinces one of them that she can act as their interpreter, becoming the first and only human vessel of communication. Their otherworldly connection will change everything she thought she knew about being human—and could unleash a force more sinister than she ever imagined.
Collaborative Society-Dariusz Jemielniak 2020-02-18 How networked technology enables the emergence of a new collaborative society. Humans are hard-wired for collaboration, and new technologies of communication act as a super-amplifier of our natural collaborative mindset. This volume in the MIT Press Essential Knowledge series examines the emergence of a new kind of social collaboration enabled by networked technologies. This new collaborative society might be characterized as a series of services and startups that enable peer-to-peer exchanges and interactions though technology. Some believe that the economic aspects of the new collaboration have the potential to make society more equitable; others see collaborative communities based on sharing as a cover for social injustice and user exploitation. The book covers the “sharing economy,” and the hijacking of the term by corporations; different models of peer production, and motivations to participate; collaborative media production and consumption, the definitions of “amateur” and “professional,” and the power of memes; hactivism and social movements, including Anonymous and anti-ACTA protest; collaborative knowledge creation, including citizen science; collaborative self-tracking; and internet-mediated social relations, as seen in the use of Instagram, Snapchat, and Tinder. Finally, the book considers the future of these collaborative tendencies and the disruptions caused by fake news, bots, and other challenges.
Seeing Students Learn Science-National Academies of Sciences, Engineering, and Medicine 2017-04-24 Science educators in the United States are adapting to a new vision of how students learn science. Children are natural explorers and their observations and intuitions about the world around them are the foundation for science learning. Unfortunately, the way science has been taught in the United States has not always taken advantage of those attributes. Some students who successfully complete their Kâ€"12 science classes have not really had the chance to "do" science for themselves in ways that harness their natural curiosity and understanding of the world around them. The introduction of the Next Generation Science Standards led many states, schools, and districts to change curricula, instruction, and professional development to align with the standards. Therefore existing assessmentsâ€"whatever their purposeâ€"cannot be used to measure the full range of activities and interactions happening in science classrooms that have adapted to these ideas because they were not designed to do so. Seeing Students Learn Science is meant to help educators improve their understanding of how students learn science and guide the adaptation of their instruction and approach to assessment. It includes examples of innovative assessment formats, ways to embed assessments in engaging classroom activities, and ideas for interpreting and using novel kinds of assessment information. It provides ideas and questions educators can use to reflect on what they can adapt right away and what they can work toward more gradually.
The Story of Science-Joy Hakim 2007 Take a journey through time with an author who understands the politics, intrigue, and human nature of science inquiry. Be prepared to spend hours of delightful reading learning about everything you wanted to know about the quantum world, physics, and relativity.
Competing in the Age of AI-Marco Iansiti 2020-01-07 "a provocative new book" -- The New York Times AI-centric organizations exhibit a new operating architecture, redefining how they create, capture, share, and deliver value. Marco Iansiti and Karim R. Lakhani show how reinventing the firm around data, analytics, and AI removes traditional constraints on scale, scope, and learning that have restricted business growth for hundreds of years. From Airbnb to Ant Financial, Microsoft to Amazon, research shows how AI-driven processes are vastly more scalable than traditional processes, allow massive scope increase, enabling companies to straddle industry boundaries, and create powerful opportunities for learning--to drive ever more accurate, complex, and sophisticated predictions. When traditional operating constraints are removed, strategy becomes a whole new game, one whose rules and likely outcomes this book will make clear. Iansiti and Lakhani: Present a framework for rethinking business and operating models Explain how "collisions" between AI-driven/digital and traditional/analog firms are reshaping competition, altering the structure of our economy, and forcing traditional companies to rearchitect their operating models Explain the opportunities and risks created by digital firms Describe the new challenges and responsibilities for the leaders of both digital and traditional firms Packed with examples--including many from the most powerful and innovative global, AI-driven competitors--and based on research in hundreds of firms across many sectors, this is your essential guide for rethinking how your firm competes and operates in the era of AI.
Cellular Automata Machines-Tommaso Toffoli 1987 Theory of Computation -- Computation by Abstracts Devices.
Regional Intelligence-Eric Vaz 2020-03-16 Regional Intelligence is an emerging field that leverages the lessons learned through decades of regional science. By merging spatial analysis with quantitative analytical techniques in the Anthropocene, this book contributes to the multidisciplinary understanding of regional issues. The locational aspects of regional paradigms are explored through various empirical studies that promote a rich and diversified understanding of regional issues concerning policy, governance, land use, and territorial decisions. Given its scope, the book will appeal to scholars and students of regional and spatial sciences and geography, as well as practitioners and decision makers engaged in regional planning and policymaking, looking for new methodological approaches that offer insights into sustainable development, regional prosperity, and livability. As a unique contribution, this book challenges the status quo on how complex spatial problems at an international level and at multiple scales can be comprehended.
Automatic Sequences-Jean-Paul Allouche 2003-07-21 This book is the first integrated treatment of sequences generated by finite automata and their generalizations.
Re-Thinking Science-Helga Nowotny 2013-04-24 Re-Thinking Science presents an account of the dynamic relationship between society and science. Despite the mounting evidence of a much closer, interactive relationship between society and science, current debate still seems to turn on the need to maintain a 'line' to demarcate them. The view persists that there is a one-way communication flow from science to society - with scant attention given to the ways in which society communicates with science. The authors argue that changes in society now make such communications both more likely and more numerous, and that this is transforming science not only in its research practices and the institutions that support it but also deep in its epistemological core. To explain these changes, Nowotny, Scott and Gibbons have developed an open, dynamic framework for re-thinking science. The authors conclude that the line which formerly demarcated society from science is regularly transgressed and that the resulting closer interaction of science and society signals the emergence of a new kind of science: contextualized or context-sensitive science. The co-evolution between society and science requires a more or less complete re-thinking of the basis on which a new social contract between science and society might be constructed. In their discussion the authors present some of the elements that would comprise this new social contract.
Building the Intentional University-Stephen Michael Kosslyn 2018-08-24 "We start with a simple question: If you could reinvent higher education for the 21st century, what should it look like? We began by taking a hard look at problems in traditional higher education, and innovated in many ways to address these problems head-on: We have created a new curriculum, focusing on what we call "practical knowledge"; we have developed new pedagogy, based on the science of learning; we have used technology in novel ways, to deliver small seminars in real time; and we have developed an international hybrid residential model, where students take classes on the computer but live together, rotating through seven different cities around the world. The Minerva Schools at the Keck Graduate Institute (KGI) are the first university experience built for the twenty-first century. In setting up this program, we have had to confront the realities of all aspects of higher education--from admissions, through instruction, to career development, to establishing a reputation. The goal of this book is to provide an evidence-based model for a future of higher education. We have learned a lot about how to reshape all facets of higher education and this book summarizes what we have learned. We hope that our innovations can serve as models of "best practices"--And thereby have a major influence on higher education writ large"--
All We Can Save-Ayana Elizabeth Johnson 2020 "Two powerful phenomena are simultaneously unfolding on Earth: the rise of the climate movement and the rise of women and girls. The People's Climate March and the Women's March. School strikes for climate and the #MeToo movement. Rebellions against extinction and declarations that time's up. More than concurrent, the two trends are deeply connected. From sinking islands to drought-ridden savannas, the global warming crisis places an outsized burden on women, largely because of gender inequalities. In many parts of the world, women hold traditional roles as the primary caregivers in families and communities, and as the main providers of food and fuel, they are more vulnerable when flooding and drought occur; the U.N. estimates 80% of those who have been displaced by climate change are women. Women are on the front line of

the climate-change battle, and are uniquely situated to be agents of change--to find ways to mitigate the causes of global warming and adapt to its impacts on the ground. Today, across the world, from boardrooms and policy positions to local communities, from science to activism, women everywhere are using their voices to take leadership and call for action on climate change. This anthology is a collection and celebration of these diverse voices, asking critical questions and providing invaluable insight and solutions. Curated by two climate leaders, this book leads us away from the brink and toward the possibility of a life-giving future"--

Cellular Automata And Complexity-Stephen Wolfram 2018-03-08 Are mathematical equations the best way to model nature? For many years it had been assumed that they were. But in the early 1980s, Stephen Wolfram made the radical proposal that one should instead build models that are based directly on simple computer programs. Wolfram made a detailed study of a class of such models known as cellular automata, and discovered a remarkable fact: that even when the underlying rules are very simple, the behaviour they produce can be highly complex, and can mimic many features of what we see in nature. And based on this result, Wolfram began a program of research to develop what he called A Science of Complexity."The results of Wolfram's work found many applications, from the so-called Wolfram Classification central to fields such as artificial life, to new ideas about cryptography and fluid dynamics. This book is a collection of Wolfram's original papers on cellular automata and complexity. Some of these papers are widely known in the scientific community others have never been published before. Together, the papers provide a highly readable account of what has become a major new field of science, with important implications for physics, biology, economics, computer science and many other areas.

Mapping Out the Research-policy Matrix-Germán Solinís 2011 Social science research provides not only abstract, conceptual knowledge about society but also concrete, instrumental knowledge. It enables us to take action to recompose the world we live in. However, this book rejects narrow and simplistic conceptions of research use and its impact on policy-making, to embrace a more complex approach to seeing and dealing with social science. In the paradigm of "evidence-based policy", "evidence" is understood in its broad sense as information that helps form policies. Nonetheless, within current practices and discourse, it is not clear what "information" is, what is really meant by "evidence", and how it can be obtained objectively. The book draws on papers presented at the International Forum on the Social Science-Policy Nexus, where experts examined current practices and problems in areas such as social policy, migration, urban policies and globalisation. The Forum set a precedent in terms of dialogue between researchers and policy-makers. The authors contribute to enriching and elucidating the most common conceptualisations of the research-policy nexus. They represent a rich diversity of views, although most agree that an effective strategy to enhance social science-policy linkages should be underpinned by a theoretical and methodological framework that takes into account the interplay of different social actors.

Adventures of a Computational Explorer-Stephen Wolfram 2019 Through his pioneering work in science, technology and language design, Stephen Wolfram has developed his own signature way of thinking about an impressive range of subjects. From science consulting for a Hollywood movie, solving problems of AI ethics, hunting for the source of an unusual polyhedron, communicating with extraterrestrials, to finding the fundamental theory of physics and exploring the digits of pi, Adventures of a Computational Explorer captures the infectious energy and curiosity of one of the great pioneers of the computational world.

The Wisdom of Crowds-James Surowiecki 2005-08-16 In this fascinating book, New Yorker business columnist James Surowiecki explores a deceptively simple idea: Large groups of people are smarter than an elite few, no matter how brilliant—better at solving problems, fostering innovation, coming to wise decisions, even predicting the future. With boundless erudition and in delightfully clear prose, Surowiecki ranges across fields as diverse as popular culture, psychology, ant biology, behavioral economics, artificial intelligence, military history, and politics to show how this simple idea offers important lessons for how we live our lives, select our leaders, run our companies, and think about our world.

The Second Digital Turn-Mario Carpo 2017-10-20 The first digital turn in architecture changed our ways of making; the second changes our ways of thinking. Almost a generation ago, the early software for computer aided design and manufacturing (CAD/CAM) spawned a style of smooth and curving lines and surfaces that gave visible form to the first digital age, and left an indelible mark on contemporary architecture. But today's digitally intelligent architecture no longer looks that way. In The Second Digital Turn, Mario Carpo explains that this is because the design professions are now coming to terms with a new kind of digital tools they have adopted—no longer tools for making but tools for thinking. In the early 1990s the design professions were the first to intuit and interpret the new technical logic of the digital age: digital mass-customization (the use of digital tools to mass-produce variations at no extra cost) has already changed the way we produce and consume almost everything, and the same technology applied to commerce at large is now heralding a new society without scale—a flat marginal cost society where bigger markets will not make anything cheaper. But today, the unprecedented power of computation also favors a new kind of science where prediction can be based on sheer information retrieval, and form finding by simulation and optimization can replace deduction from mathematical formulas. Designers have been toying with machine thinking and machine learning for some time, and the apparently unfathomable complexity of the physical shapes they are now creating already expresses a new form of artificial intelligence, outside the tradition of modern science and alien to the organic logic of our mind.

The Mystery of a New Kind of Rays-Harold Berger 2012-09-06 You will be able to watch a capable scientist work to uncover the mystery of what he suspects is a new kind of radiation, a radiation he eventually calls x-rays. A German scientist, Wilhelm Conrad Roentgen, is the main character in this book. His experimental expertise was the key element in his successful science career. When he saw something unusual as he pursued one of his experiments, he investigated to learn more. Long before Roentgen discovered x-rays many other scientists around the world had seen unusual effects, including fogging of film or electrical changes, effects that they never followed up and that later proved to have resulted from x-rays. So many scientists had the opportunity to discover x-rays. Roentgen was the only one who persisted. He learned much about these new rays, and, even though he had some misgivings about his conclusions about a new kind of rays, accepted the challenge to inform fellow scientists about his discovery. His discovery was the start of many new ideas that changed the world perception of science – and changed the lives of Roentgen and his wife Bertha.Roentgen's story is inspiring and unusual, in that he had to overcome many obstacles on his long journey to become a recognized scientist and teacher. Even after he had earned his doctorate in physics his unusual education path to an advanced degree presented problems. He persisted; his story may inspire the reader not to give up in the pursuit of a goal.

The Story of Science: Newton at the Center-Joy Hakim 2016-04-26 In volume two, students will watch as Copernicus's systematic observations place the sun at the center of our universe—to the dismay of establishment thinkers. After students follow the achievements and frustrations of Galileo, Kepler, and Descartes, they will appreciate the amazing Isaac Newton, whose discoveries about gravity, motion, colors, calculus, and Earth's place in the universe set the stage for modern physics, astronomy, mathematics, and chemistry. In the three-book The Story of Science series, master storyteller Joy Hakim narrates the evolution of scientific thought from ancient times to the present. With lively, character-driven narrative, Hakim spotlights the achievements of some of the world's greatest scientists and encourages a similiar spirit of inquiry in readers. The books include hundreds of color photographs, charts, maps, and diagrams; informative sidebars; suggestions for further reading; and excerpts from the writings of great scientists.

Reinventing the Sacred-Stuart A. Kauffman 2008-01-10 Consider the complexity of a living cell after 3.8 billion years of evolution. Is it more awesome to suppose that a transcendent God fashioned the cell at a stroke, or to realize that it evolved with no Almighty Hand, but arose on its own in the changing biosphere? In this bold and fresh look at science and religion, complexity theorist Stuart Kauffman argues that the qualities of divinity that we revere--creativity, meaning, purposeful action--are properties of the universe that can be investigated methodically. He offers stunning evidence for this idea in an abundance of fields, from cell biology to the philosophy of mind, and uses it to find common ground between belief systems often at odds with one another. A daring and ambitious argument for a new understanding of natural divinity, Reinventing the Sacred challenges readers both scientifically and philosophically.

A Nonlinear Dynamics Perspective of Wolfram's New Kind of Science-Leon O. Chua 2006

Complexity-Melanie Mitchell 2009-04-01 What enables individually simple insects like ants to act with such precision and purpose as a group? How do trillions of neurons produce something as extraordinarily complex as consciousness? In this remarkably clear and companionable book, leading complex systems scientist Melanie Mitchell provides an intimate tour of the sciences of complexity, a broad set of efforts that seek to explain how large-scale complex, organized, and adaptive behavior can emerge from simple interactions among myriad individuals. Based on her work at the Santa Fe Institute and drawing on its interdisciplinary strategies, Mitchell brings clarity to the workings of complexity across a broad range of biological, technological, and social phenomena, seeking out the general principles or laws that apply to all of them. Richly illustrated, Complexity: A Guided Tour--winner of the 2010 Phi Beta Kappa Book Award in Science--offers a wide-ranging overview of the ideas underlying complex systems science, the current research at the forefront of this field, and the prospects for its contribution to solving some of the most important scientific questions of our time.

The Knowledge Machine: How Irrationality Created Modern Science-Michael Strevens 2020-10-13 “The Knowledge Machine is the most stunningly illuminating book of the last several decades regarding the all-important scientific enterprise.” —Rebecca Newberger Goldstein, author of Plato at the Googleplex A paradigm-shifting work, The Knowledge Machine revolutionizes our understanding of the origins and structure of science. • Why is science so powerful? • Why did it take so long—two thousand years after the invention of philosophy and mathematics—for the human race to start using science to learn the secrets of the universe? In a groundbreaking work that blends science, philosophy, and history, leading philosopher of science Michael Strevens answers these challenging questions, showing how science came about only once thinkers stumbled upon the astonishing idea that scientific breakthroughs could be accomplished by breaking the rules of logical argument. Like such classic works as Karl Popper’s The Logic of Scientific Discovery and Thomas Kuhn’s The Structure of Scientific Revolutions, The Knowledge Machine grapples with the meaning and origins of science, using a plethora of vivid historical examples to demonstrate that scientists willfully ignore religion, theoretical beauty, and even philosophy to embrace a constricted code of argument whose very narrowness channels unprecedented energy into empirical observation and experimentation. Strevens calls this scientific code the iron rule of explanation, and reveals the way in which the rule, precisely because it is unreasonably close-minded, overcomes individual prejudices to lead humanity inexorably toward the secrets of nature. “With a mixture of philosophical and historical argument, and written in an engrossing style” (Alan Ryan), The Knowledge Machine provides captivating portraits of some of the greatest luminaries in science’s history, including Isaac Newton, the chief architect of modern science and its foundational theories of motion and gravitation; William Whewell, perhaps the greatest philosopher-scientist of the early nineteenth century; and Murray Gell-Mann, discoverer of the quark. Today, Strevens argues, in the face of threats from a changing climate and global pandemics, the idiosyncratic but highly effective scientific knowledge machine must be protected from politicians, commercial interests, and even scientists themselves who seek to open it up, to make it less narrow and more rational—and thus to undermine its devotedly empirical search for truth. Rich with illuminating and often delightfully quirky illustrations, The Knowledge Machine, written in a winningly accessible style that belies the import of its revisionist and groundbreaking concepts, radically reframes much of what we thought we knew about the origins of the modern world.

Fractals Everywhere-Michael F. Barnsley 2014-05-10 Fractals Everywhere, Second Edition covers the fundamental approach to fractal geometry through iterated function systems. This 10-chapter text is based on a course called "Fractal Geometry", which has been taught in the School of Mathematics at the Georgia Institute of Technology. After a brief introduction to the subject, this book goes on dealing with the concepts and principles of spaces, contraction mappings, fractal construction, and the chaotic dynamics on fractals. Other chapters discuss fractal dimension and interpolation, the Julia sets, parameter spaces, and the Mandelbrot sets. The remaining chapters examine the measures on fractals and the practical application of recurrent iterated function systems. This book will prove useful to both undergraduate and graduate students from many disciplines, including mathematics, biology, chemistry, physics, psychology, mechanical, electrical, and aerospace engineering, computer science, and geophysical science.

Something Deeply Hidden-Sean Carroll 2019-09-10 INSTANT NEW YORK TIMES BESTSELLER A Science News favorite science book of 2019 As you read these words, copies of you are being created. Sean Carroll, theoretical physicist and one of this world’s most celebrated writers on science, rewrites the history of 20th century physics. Already hailed as a masterpiece, Something Deeply Hidden shows for the first time that facing up to the essential puzzle of quantum mechanics utterly transforms how we think about space and time. His reconciling of quantum mechanics with Einstein’s theory of relativity changes, well, everything. Most physicists haven’t even recognized the uncomfortable truth: physics has been in crisis since 1927. Quantum mechanics has always had obvious gaps—which have come to be simply ignored. Science popularizers keep telling us how weird it is, how impossible it is to understand. Academics discourage students from working on the "dead end" of quantum foundations. Putting his professional reputation on the line with this audacious yet entirely reasonable book, Carroll says that the crisis can now come to an end. We just have to accept that there is more than one of us in the universe. There are many, many Sean Carrolls. Many of every one of us. Copies of you are generated thousands of times per second. The Many Worlds Theory of quantum behavior says that every time there is a quantum event, a world splits off with everything in it the same, except in that other world the quantum event didn't happen. Step-by-step in Carroll's uniquely lucid way, he tackles the major objections to this otherworldly revelation until his case is inescapably established. Rarely does a book so fully reorganize how we think about our place in the universe. We are on the threshold of a new understanding—of where we are in the cosmos, and what we are made of.

Egyptian textiles and their production: □word□ and □object□-Maria Mossakowska-Gaubert 2020-02-28 This volume presents the results of a 2017 workshop at the Centre for Textile Research (CTR), University of Copenhagen, an event within the framework of the MONTEX project-including support from a Marie Sk

Time of the Magicians-Wolfram Eilenberger 2020 A grand narrative of the intertwining lives of Walter Benjamin, Martin Heidegger, Ludwig Wittgenstein, and Ernst Cassirer, major philosophers whose ideas shaped the twentieth century The year is 1919. The horror of the First World War is still fresh for the protagonists of Time of the Magicians, each of whom finds himself at a crucial juncture. Benjamin, whose life is characterized by false starts and unfinished projects, is trying to flee his overbearing father and floundering in his academic career, living hand to mouth as a jobbing critic. Wittgenstein, by contrast, has dramatically decided to divest himself of the monumental fortune he stands to inherit, as a scion of one of the biggest industrial families in Europe, in order to commit himself unswervingly to a life of the mind. Meanwhile, Heidegger, having managed to avoid combat in war by serving instead as a meteorologist, is carefully cultivating his career, aligning himself with the great Edmund Husserl, and renouncing his prior Catholic associations. Finally, Cassirer is working furiously on the margins of academia, applying himself intensely to his writing and the possibility of a career at Hamburg University. The stage is set for a great intellectual drama, which will unfold across the next decade. The lives and ideas of this great philosophical quartet will converge as they become world historical figures. But as the Second World War looms on the horizon, their fates will be very different. Wolfram Eilenberger, internationally-bestselling author, stylishly traces the paths of these remarkable and turbulent lives, which feature not only philosophy but some of the most important economists, politicians, journalists, and artists of the century, including John Maynard Keynes, Hannah Arendt, and Bertrand Russell. In doing so, he tells a gripping story about some of history's most ambitious and passionate thinkers, as well as illuminating with rare clarity and economy their brilliant ideas, which all too often have been regarded as enigmatic or opaque.

Idea Makers-Stephen Wolfram 2016-07-07 This book of thoroughly engaging essays from one of today's most prodigious innovators provides a uniquely personal perspective on the lives and achievements of a selection of intriguing figures from the history of science and technology. Weaving together his immersive interest in people and history with insights gathered from his own experiences, Stephen Wolfram gives an ennobling look at some of the individuals whose ideas and creations have helped shape our world today. Contents includes biographical sketches of: Richard Feynman Kurt Godel Alan Turing John von Neumann George Boole Ada Lovelace Gottfried Leibniz Benoit Mandelbrot Steve Jobs Marvin Minsky Russell Towle Bertrand Russell Alfred Whitehead Richard Crandall Srinivasa Ramanujan Solomon Golomb