



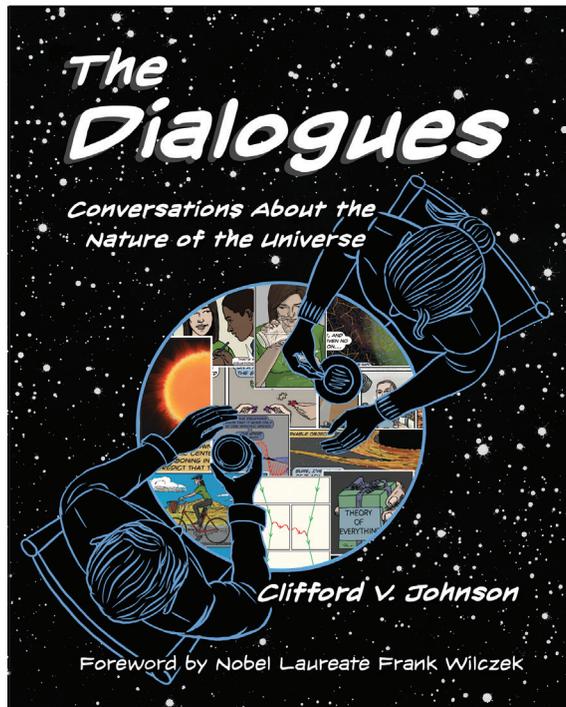
# THE MIT PRESS

LONDON RIGHTS GUIDE

2018



science | graphic novel



October  
8 1/4 x 10, 246 pp.  
248 color illus.

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## The Dialogues

Conversations about the Nature of the Universe

**Clifford V. Johnson**

foreword by Frank Wilczek, 2004 Nobel Laureate in Physics

Physicist Clifford Johnson thinks that we should have more conversations about science. Science should be on our daily conversation menu, along with topics like politics, books, sports, or the latest prestige cable drama. Conversations about science, he tells us, shouldn't be left to the experts. In *The Dialogues*, Johnson invites us to eavesdrop on a series of nine conversations, in graphic-novel form—written and drawn by Johnson—about “the nature of the universe.” The conversations take place all over the world, in museums, on trains, in restaurants, in what may or may not be Freud's favorite coffeehouse. The conversationalists are men, women, children, experts, and amateur science buffs. The topics of their conversations range from the science of cooking to the multiverse and string theory. The graphic form is especially suited for physics; one drawing can show what it would take many words to explain.

**Clifford V. Johnson**, Professor of Physics at the University of Southern California, gives many public lectures about his research and appears often in television documentaries as an expert. He has been science advisor for several movies and television series, including Marvel's *Thor: Ragnarok* and the National Geographic Channel's *Genius*.

“A most unusual visual eavesdropping on a cast of intelligent, relatable characters discussing some of the most fascinating frontiers of science.”

—**Maria Popova, *Brain Pickings***

“I found *The Dialogues* to be compelling, and the use of the graphic novel format only deepened that impression.”

—**Adam Frank, NPR**

“The author shows himself to be a highly talented graphic artist as well as being a distinguished theoretician.”

—**Andrew Crumley, *The Spectator***



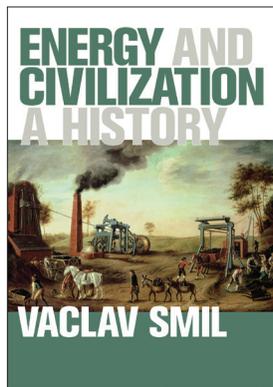
history | environment

## Energy and Civilization

A History

**Vaclav Smil**

Energy is the only universal currency; it is necessary for getting anything done. In this monumental history, Vaclav Smil provides a comprehensive account



of how energy has shaped society, from pre-agricultural foraging societies through today's fossil fuel-driven civilization. Humans are the only species that can systematically harness energies outside their bodies, using the power of their intellect and an enormous variety of artifacts—from the simplest tools to internal combustion engines and nuclear reactors. The epochal transition to fossil fuels affected everything: agriculture, industry, transpor-

tation, weapons, communication, economics, urbanization, quality of life, politics, and the environment. Smil describes humanity's energy eras in panoramic and interdisciplinary fashion, offering readers a magisterial overview.

**Vaclav Smil** is Distinguished Professor Emeritus at the University of Manitoba. He is the author of forty books, including *Power Density: A Key to Understanding Energy Sources and Uses* and *Made in the USA: The Rise and Retreat of American Manufacturing*, both published by the MIT Press. In 2010 he was named by *Foreign Policy* as one of the Top 100 Global Thinkers. In 2017 Bill Gates wrote on his website that "I'd read just about any topic he found interesting and wanted to dissect."

"I wait for new Smil books the way some people wait for the next *Star Wars* movie."

—**Bill Gates, 2017 Best Books List**

"[A] magisterial history of how advances in energy technology . . . have driven and underpinned the advances of humanity."

—**New Scientist**

"Original and enlightening. . . . Read it and be dazzled." —**Nature**

October | 6 x 9, 568 pp. | 113 illus.

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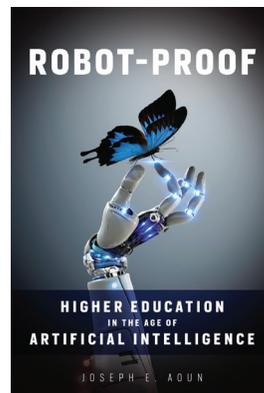
higher education

## Robot-Proof

Higher Education in the Age of Artificial Intelligence

**Joseph E. Aoun**

Driverless cars are hitting the road, powered by artificial intelligence. Robots can climb stairs, open doors, win Jeopardy,



analyze stocks, work in factories, find parking spaces, advise oncologists. In the past, automation was considered a threat to low-skilled labor. Now, many high-skilled functions, including interpreting medical images, doing legal research, and analyzing data, are within the skill sets of machines. How can higher education prepare students for their professional lives when professions themselves are disappearing? In *Robot-Proof*, Northeastern University president Joseph Aoun proposes a way to

educate the next generation of college students to invent, to create, and to discover—to fill needs in society that even the most sophisticated artificial intelligence agent cannot.

Aoun lays out the framework for a new discipline, humanics, which builds on our innate strengths and prepares students to compete in a labor market in which smart machines work alongside human professionals. Students will need data literacy to manage the flow of big data, and technological literacy to know how their machines work, but human literacy—the humanities, communication, and design—to function as a human being. Life-long learning opportunities will support their ability to adapt to change.

The only certainty about the future is change. Higher education based on the new literacies of humanics can equip students for living and working through change.

**Joseph E. Aoun** is President of Northeastern University.

"An authoritative call for action and a compelling model for the next step in the evolution of higher education. Aoun offers an optimistic—and more important, realistic—vision of how we can educate ourselves for an AI economy."

—**Jeffrey S. Bornstein, CFO, GE**

August | 5 3/8 x 8, 216 pp.

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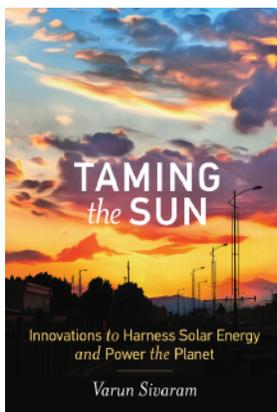
*energy*

## Taming the Sun

Innovations to Harness Solar Energy and Power the Planet

**Varun Sivaram**

Solar energy, once a niche application for a limited market, has become the cheapest and fastest-growing power source on earth. What's more, its potential is



nearly limitless—every hour the sun beams down more energy than the world uses in a year.

But in *Taming the Sun*, energy expert Varun Sivaram warns that the world is not yet quipped to harness erratic sunshine to meet most of its energy needs. If solar's current surge peters out, prospects for averting catastrophic climate change will dim.

Innovation can brighten those prospects, Sivaram tells us. Financial innovation is already enticing deep-pocketed investors to fund solar projects around the world, from the sunniest deserts to the poorest villages. Technological innovation could replace today's solar panels with coatings as cheap as paint and employ artificial photosynthesis to store intermittent sunshine as convenient fuels. And systemic innovation could add flexibility to the world's power grids and other energy systems so they can dependably channel the sun's unreliable energy dependably.

Although solar can't power the planet by itself, it can be the centerpiece of a global clean energy revolution.

**Varun Sivaram** is a Fellow at the Council on Foreign Relations. He teaches at Georgetown University, is a Fellow at Columbia University's Center for Global Energy Policy, and serves on Stanford University's energy and environment boards. A Rhodes Scholar, he has advised both the mayor of Los Angeles and the governor of New York on energy. He holds a PhD in condensed matter physics from Oxford University.

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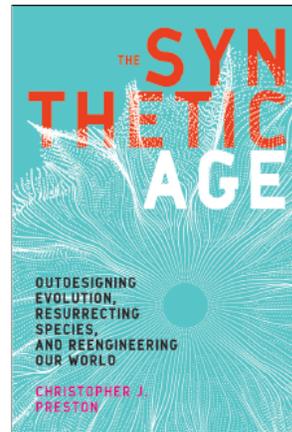
*science*

## The Synthetic Age

Outdesigning Evolution, Resurrecting Species, and Reengineering Our World

**Christopher J. Preston**

We have all heard that there are no longer any places left on Earth untouched by humans. The significance of this goes beyond statistics documenting melting glaciers and shrinking species counts. It signals a



We have all heard that there are no longer any places left on Earth untouched by humans. In *The Synthetic Age*, Christopher Preston argues that what is most startling about this coming epoch is not only how much impact humans have had but, more important, how much deliberate shaping they will start to do. Emerging technologies promise to give us the power to take over some of Nature's most basic operations.

It is not just that we are exiting the Holocene and entering the Anthropocene; it is that we are leaving behind the time in which planetary change is just the unintended consequence of unbridled industrialism. A world designed by engineers and technicians means the birth of the planet's first Synthetic Age.

Preston describes a range of technologies that will reconfigure Earth's very metabolism: nanotechnologies that can restructure natural forms of matter; "molecular manufacturing" that offers unlimited repurposing; synthetic biology's potential to build, not just read, a genome; "biological mini-machines" that can outdesign evolution; the relocation and resurrection of species; and climate engineering attempts to manage solar radiation by synthesizing a volcanic haze, cool surface temperatures by increasing the brightness of clouds, and remove carbon from the atmosphere with artificial trees that capture carbon from the breeze.

What does it mean when humans shift from being caretakers of the Earth to being shapers of it? And in whom should we trust to decide the contours of our synthetic future? These questions are too important to be left to the engineers.

**Christopher J. Preston** is Professor of Philosophy and a Research Fellow in the Mansfield Center's Program on Ethics and Public Affairs at the University of Montana.

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science

## The Deep Learning Revolution

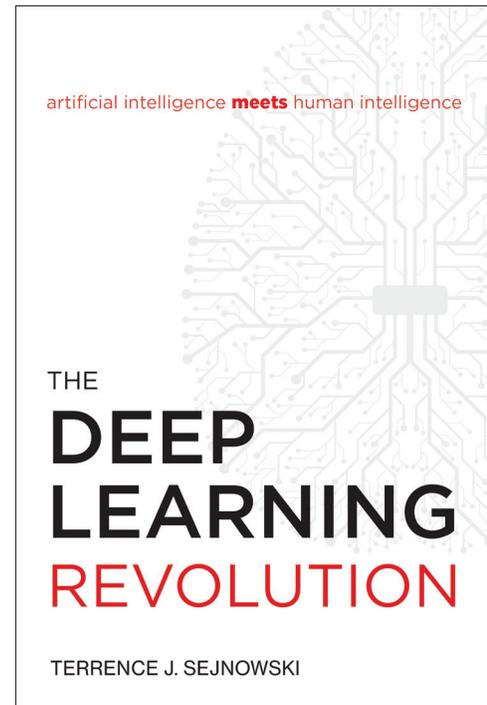
**Terrence J. Sejnowski**

The deep learning revolution has brought us driverless cars, the greatly improved Google Translate, fluent conversations with Siri and Alexa, and enormous profits from automated trading on the New York Stock Exchange. Deep learning networks can play poker better than professional poker players and defeat a world champion at Go. In this book, Terry Sejnowski explains how deep learning went from being an arcane academic field to a disruptive technology in the information economy.

Sejnowski played an important role in the founding of deep learning, as one of a small group of researchers in the 1980s who challenged the prevailing logic-and-symbol based version of AI. The new version of AI Sejnowski and others developed, which became deep learning, is fueled instead by data. Deep networks learn from data in the same way that babies experience the world, starting with fresh eyes and gradually acquiring the skills needed to navigate novel environments. Learning algorithms extract information from raw data; information can be used to create knowledge; knowledge underlies understanding; understanding leads to wisdom. Someday a driverless car will know the road better than you do and drive with more skill; a deep learning network will diagnose your illness; a personal cognitive assistant will augment your puny human brain. It took nature many millions of years to evolve human intelligence; AI is on a trajectory measured in decades. Sejnowski prepares us for a deep learning future.

**Terrence J. Sejnowski** holds the Francis Crick Chair at the Salk Institute for Biological Studies and is a Distinguished Professor at the University of California, San Diego. He was a member of the advisory committee for the Obama administration's BRAIN initiative and is President of the Neural Information Processing (NIPS) Foundation. He has published twelve books, including (with Patricia Churchland) *The Computational Brain* (25th Anniversary Edition, MIT Press).

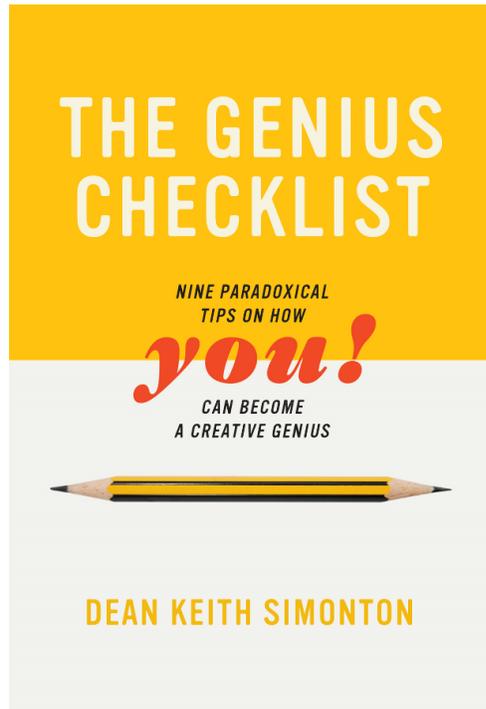
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**How deep learning—from Google Translate to driverless cars to personal cognitive assistants—is changing our lives and transforming every sector of the economy.**

September  
6 x 9, 336 pp.  
88 color illus., 47 b&w illus.

**\$27.95T/£22.95 cloth**  
978-0-262-03803-4



**What it takes to be a genius: nine essential and contradictory ingredients.**

September  
5 3/8 x 8, 320 pp.  
8 illus.

**\$29.95T/£24.95 cloth**  
978-0-262-03811-9

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## The Genius Checklist

Nine Paradoxical Tips on How You Can Become a Creative Genius

**Dean Keith Simonton**

What does it take to be a genius? A high score on an IQ test? Brilliant physicist Richard Feynman's IQ was too low for membership in Mensa. Suffering from varying degrees of mental illness? Creativity is often considered a marker of mental health. Be a child prodigy like Mozart, or a later bloomer like Beethoven? Die tragically young, like Keats, or live to a ripe old age like Goethe? In *The Genius Checklist*, Dean Keith Simonton examines the key factors in creative genius and finds that they are more than a little contradictory.

Simonton, who has studied creativity and genius for more than four decades, draws on both scientific research and stories from the lives of famous creative geniuses that range from Isaac Newton to Vincent van Gogh to Virginia Woolf. He explains the origin of IQ tests and the art of estimating the IQ of long-dead historical figures (John Stuart Mill: 200; Charles Darwin: 160). He compares IQ scores with achieved eminence as measures of genius, and he draws a distinction between artistic and scientific genius. He offers a nuanced view of birth order as an influential factor (in the James family, for example, three geniuses at three different birth-order positions: William James, firstborn; Henry James, second born; Alice James, born fifth and last); considers Malcolm Gladwell's 10,000 Hour Rule; and describes how the "lone" genius gets enmeshed in social networks.

Genius, Simonton explains, operates in ways so subtle that they seem contradictory. Genius is born and made, the domain of child prodigies and their elders. Simonton's checklist gives us a new, integrative way to understand geniuses—and perhaps even to nurture your own genius!

**Dean Keith Simonton**, an expert on creativity and genius, is Distinguished Professor Emeritus in the Department of Psychology at the University of California, Davis. He is the author of *Origins of Genius*, *Creativity in Science*, *Genius 101*, and other books.

computer science

## Bits to Bitcoin

How Our Digital Stuff Works

**Mark Stuart Day**

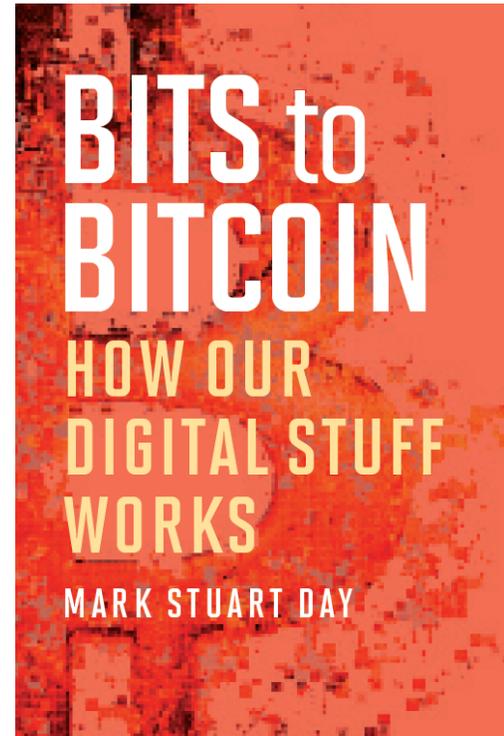
illustrated by C. A. Jennings

Most of us feel at home in front of a computer; we own smartphones, tablets, and laptops; we look things up online and check social media to see what our friends are doing. But we may be a bit fuzzy about how any of this really works. In *Bits to Bitcoins*, Mark Stuart Day offers an accessible guide to our digital infrastructure, explaining the basics of operating systems, networks, security, and related topics for the general reader. He takes the reader from a single process to multiple processes that interact with each other; he explores processes that fail and processes that overcome failures; and he examines processes that attack each other or defend themselves against attacks.

Day tells us that steps are digital but ramps are analog; that computation is about “doing something with stuff” and that both the “stuff” and the “doing” can be digital. He explains timesharing, deadlock, and thrashing; virtual memory and virtual machines; packets and networks; resources and servers; secret keys and public keys; Moore’s law and Thompson’s hack. He describes how building in redundancy guards against failure and how endpoints communicate across the Internet. He explains why programs crash or have other bugs, why they are attacked by viruses, and why those problems are hard to fix. Finally, after examining secrets, trust, and cheating, he explains the mechanisms that allow the Bitcoin system to record money transfers accurately while fending off attacks.

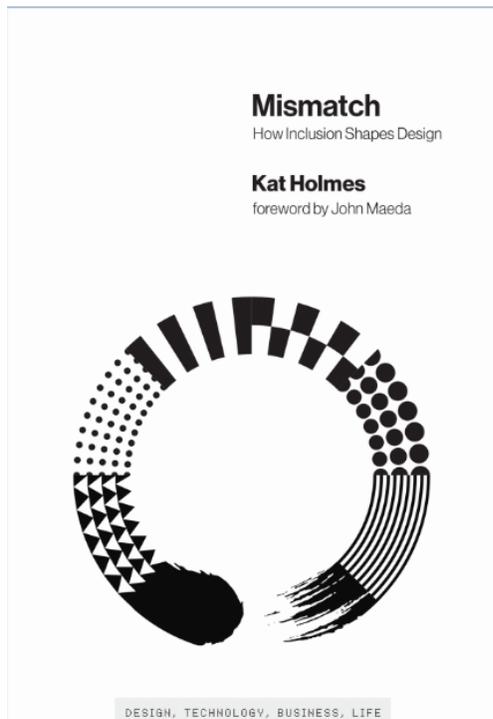
**Mark Stuart Day** was Chief Scientist at Riverbed Technology for a decade and is currently Visiting Lecturer at MIT. With more than thirty patented inventions, he has also made technical contributions at Dropbox, IBM, Cisco, Digital, and BBN.

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**An accessible guide to our digital infrastructure, explaining the basics of operating systems, networks, security, and other topics for the general reader.**

September  
6 x 9, 360 pp.  
100 illus.



**How inclusive methods  
can build elegant design  
solutions that work for all.**

September  
5 3/8 x 8, 128 pp.  
29 illus.

**\$22.95T/£18.95 cloth**  
978-0-262-03888-1

**Simplicity: Design, Technology,  
Business, Life series**

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## Mismatch

How Inclusion Shapes Design

**Kat Holmes**

foreword by John Maeda

Sometimes designed objects reject their users: a computer mouse that doesn't work for left-handed people, for example, or a touchscreen payment system that only works for people who read English phrases, have 20/20 vision, and use a credit card. Something as simple as color choices can render a product unusable for millions. These mismatches are the building blocks of exclusion. In *Mismatch*, Kat Holmes describes how design can lead to exclusion, and how design can also remedy exclusion. Inclusive design methods—designing objects with rather than for excluded users—can create elegant solutions that work well and benefit all.

Holmes tells stories of pioneers of inclusive design, many of whom were drawn to work on inclusion because of their own experiences of exclusion. A gamer and designer who depends on voice recognition shows Holmes his “Wall of Exclusion,” which displays dozens of game controllers that require two hands to operate; an architect shares her firsthand knowledge of how design can fail communities from growing up in Detroit’s housing projects; an astronomer who began to lose her eyesight adapts a technique called “sonification” so she can “listen” to the stars.

Designing for inclusion is not a feel-good sideline. Holmes shows how inclusion can be a source of innovation and growth, especially for digital technologies. It can be a catalyst for creativity and a boost for the bottom line as a customer base expands. And each time we remedy a mismatched interaction, we create an opportunity for more people to contribute to society in meaningful ways.

**Kat Holmes**, named one of Fast Company’s “Most Creative People in Business” in 2017, is founder of Kata, a design firm with the mission of advancing inclusive product development. At Microsoft from 2010 to 2017, she led that company’s executive program for inclusive product innovation.

computer science

## How Smart Machines Think

Sean Gerrish

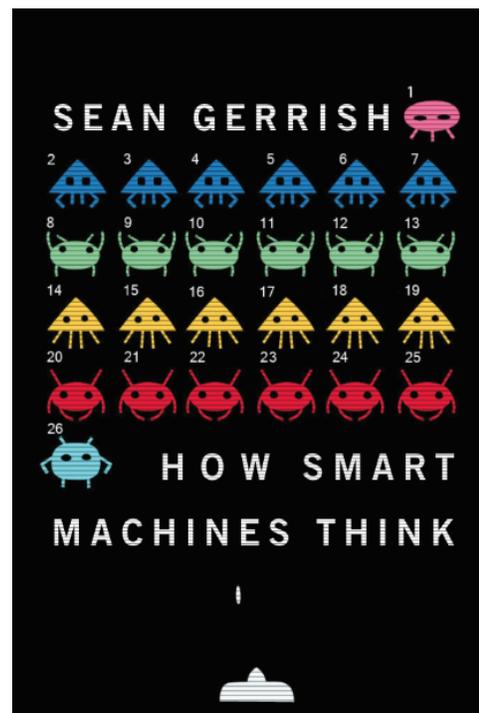
The future is here: Self-driving cars are on the streets, an algorithm gives you movie and TV recommendations, IBM's Watson triumphed on *Jeopardy* over puny human brains, computer programs can be trained to play Atari games. But how do all these things work? In this book, Sean Gerrish offers an engaging and accessible overview of the breakthroughs in artificial intelligence and machine learning that have made today's machines so smart.

Gerrish outlines some of the key ideas that enable intelligent machines to perceive and interact with the world. He describes the software architecture that allows self-driving cars to stay on the road and to navigate crowded urban environments; the million-dollar Netflix competition for a better recommendation engine (which had an unexpected ending); and how programmers trained computers to perform certain behaviors by offering them treats, as if they were training a dog. He explains how artificial neural networks enable computers to perceive the world—and to play Atari video games better than humans. He explains Watson's famous victory on *Jeopardy*, and he looks at how computers play games, describing AlphaGo and Deep Blue, which beat reigning world champions at the strategy games of Go and chess. Computers have not yet mastered everything, however; Gerrish outlines the difficulties in creating intelligent agents that can successfully play video games like *StarCraft* that have evaded solution—at least for now.

Gerrish weaves the stories behind these breakthroughs into the narrative, introducing readers to many of the researchers involved, and keeping technical details to a minimum. Science and technology buffs will find this book an essential guide to a future in which machines can outsmart people.

**Sean Gerrish** is a software engineer and machine learning geek. He has worked as an engineer at Teza Technologies and as an engineering manager for machine learning and data science teams at Google.

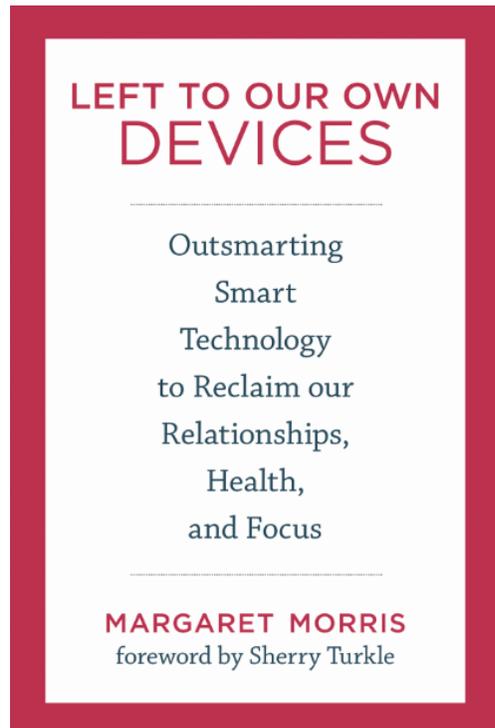
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Everything you've always wanted to know about self-driving cars, Netflix recommendations, IBM's Watson, and video game-playing computer programs.

September  
6 x 9, 296 pp.  
62 illus.

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978-0-262-03840-9



**How people adapt technologies to meet their own social and individual needs, from using Facebook for grieving to finding self-affirmation in Tinder.**

October  
6 x 9, pp.  
8 illus.

**\$24.95T/£19.95 cloth**  
978-0-262-03913-0

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## Left to Our Own Devices

Outsmarting Smart Technology to Reclaim our Relationships, Health, and Focus

**Margaret Morris**

foreword by Sherry Turkle

We have been warned about the perils of technology and social media: social isolation, difficulty in empathizing, and loss of the ability (or desire) to carry on a conversation. Yet few seem ready to abandon their smart phones and social media accounts. One reason for this might be that many of us adapt our technologies to serve our own needs—using it creatively, in ways not intended by developers and designers. In *Left to Our Own Devices*, Margaret Morris examines these kinds of personalized life hacks, chronicling the ways that people have used technology to strengthen social connection, increase well-being, and affirm identity.

Morris, a clinical psychologist and an app creator, describes WeLight, an app that creates a “warm vibe” by allowing users to change each other’s lights through text message. (“Amazing sunset here” sends shades of pink and blue.) She reports, among other things, that playing Words with Friends drew someone back into the family circle; how a woman started eating healthier foods when her photographs of salads got more “likes” than those of more carbohydrate-laden dishes; why a widow “leaned into” mourning on Facebook; what led someone getting over a breakup to find self-affirmation on Tinder; and a how trans woman celebrated her transition with selfies. These and the other “off-label” adaptations described by Morris, cast technology not as a temptation that we struggle to resist but as an ally in discovering new things about ourselves and our social lives. The stories Morris tells invite us to be more creative when left to our own devices.

**Margaret Morris** is a clinical psychologist, researcher, and inventor of technologies to support well-being. A Senior Research Scientist at Intel from 2002 to 2016, she now teaches Human-Centered Design and Engineering at the University of Washington and is an Experience Researcher at Amazon.

science

## The Tales Teeth Tell

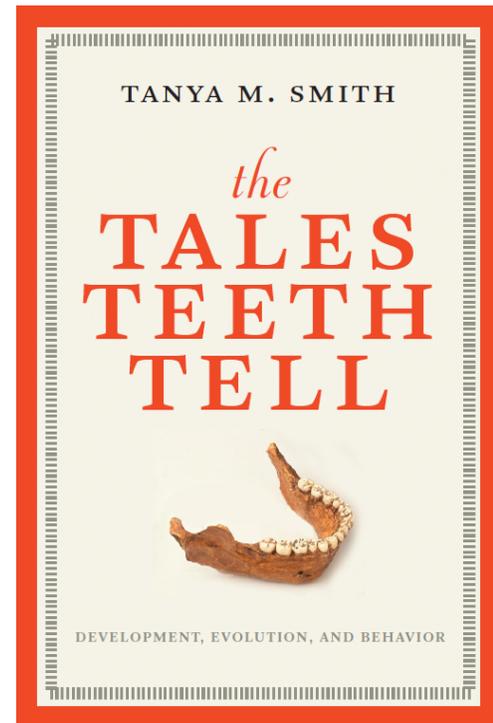
**Tanya M. Smith**

Our teeth have intriguing stories to tell. These sophisticated time machines record growth, diet, and evolutionary history as clearly as tree rings map a redwood's lifespan. Each day of childhood is etched into tooth crowns and roots—capturing birth, nursing history, environmental clues, and illnesses. The study of ancient, fossilized teeth sheds light on how our ancestors grew up, how we evolved, and how prehistoric cultural transitions continue to affect humans today. In *The Tales Teeth Tell*, biological anthropologist Tanya Smith offers an engaging and surprising look at what teeth tell us about the evolution of primates—including our own uniqueness.

Humans' impressive set of varied teeth provides a multipurpose toolkit honed by the diet choices of our mammalian ancestors. Fossil teeth, highly resilient because of their substantial mineral content, are all that is left of some long-extinct species. Smith explains how researchers employ painstaking techniques to coax microscopic secrets from these enigmatic remains. Counting tiny daily lines provides a way to estimate age that is more powerful than any other forensic technique. Dental plaque—so carefully removed by dental hygienists today—records our ancestral behavior and health in the form of fossilized food particles and bacteria, including their DNA. Smith also traces the grisly origins of dentistry, reveals that the urge to pick one's teeth is not unique to humans, and illuminates the age-old pursuit of “dental art.” The book is generously illustrated with original photographs, many in color.

**Tanya M. Smith** is an Associate Professor in the Australian Research Centre for Human Evolution at Griffith University in Brisbane, Australia. She has held a professorship at Harvard University, and fellowships at the Radcliffe Institute for Advanced Study and the Max Planck Institute for Evolutionary Anthropology.

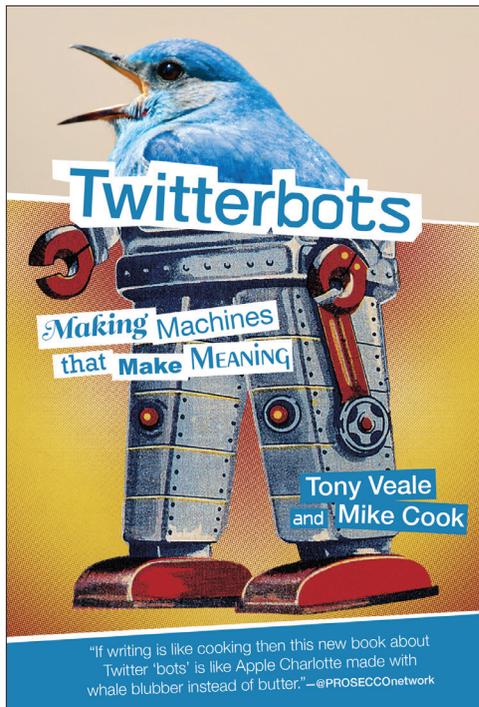
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**What teeth can tell us  
about human evolution,  
development, and behavior.**

November  
6 x 9, 296 pp.  
45 color illus., 20 b&w illus.

**\$29.95T/£24.95 cloth**  
978-0-262-03871-3



**The world of Twitterbots, from botdom's greatest hits to bot construction to the place of the bot in the social media universe.**

September  
6 x 9, 360 pp.  
98 illus.

**\$26.95T/£21.95 cloth**  
978-0-262-03790-7

## Twitterbots

Making Machines that Make Meanings

**Tony Veale and Mike Cook**

Twitter offers a unique medium for creativity and curiosity for humans and machines. The tweets of Twitterbots, autonomous software systems that send messages of their own composition into the Twittersphere, mingle with the tweets of human creators; the next person to follow you on Twitter or to “like” your tweets may not a person at all. The next generator of content that you follow on Twitter may also be a bot. This book examines the world of Twitterbots, from botdom’s greatest hits to the hows and whys of bot-building to the place of bots in the social media landscape.

In *Twitterbots*, Tony Veale and Mike Cook examine not only the technical challenges of bending the affordances of Twitter to the implementation of your own Twitterbots but also the greater knowledge-engineering challenge of building bots that can craft witty, provocative, and concise outputs of their own. Veale and Cook offer a guided tour of some of Twitter’s most notable bots, from the deadpan @big\_ben\_clock, which tweets a series of BONGs every hour to mark the time, to the delightful @pentametrone, which finds and pairs tweets that can be read in iambic pentameter, to the disaster of Microsoft’s @TayAndYou (which “learned” conspiracy theories, racism, and extreme politics from other tweets). They explain how to navigate Twitter’s software interfaces to program your own Twitterbots in Java, keeping the technical details to a minimum and focusing on the creative implications of bots and their generative worlds. Every Twitterbot, they argue, is a thought experiment given digital form; each embodies a hypothesis about the nature of meaning making and creativity that encourages its followers to become willing test subjects and eager consumers of automated creation.

**Tony Veale** is Associate Professor of Computer Science at University College Dublin. **Mike Cook** is Senior Research Fellow at the University of Falmouth, UK.

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science | biography

## The Autobiography of a Transgender Scientist

**Ben Barres**

foreword by Nancy Hopkins

Ben Barres was known for his groundbreaking scientific work and for his groundbreaking advocacy for gender equality in science. In this book, completed shortly before his death from pancreatic cancer in December 2017, Barres (born Barbara Barres in 1954) describes a life full of remarkable accomplishments—from his childhood as a precocious math and science whiz to his experiences as a female student at MIT in the 1970s to his female-to-male transition in his forties, to his scientific work and role as teacher and mentor at Stanford.

Barres recounts his early life—his interest in science, first manifested as a fascination with the mad scientist in Superman; his academic successes; and his gender confusion. Barres felt even as a very young child that he was assigned the wrong gender. After years of being acutely uncomfortable in his own skin, Barres transitioned from female to male. He reports he felt nothing but relief on becoming his true self. He was proud to be a role model for transgender scientists.

As an undergraduate at MIT, Barres experienced discrimination, but it was after transitioning that he realized how differently male and female scientists are treated. He became an advocate for gender equality in science, and later in life responded pointedly to Larry Summers's speculation that women were innately unsuited to be scientists. Privileged white men, Barres writes, “miss the basic point that in the face of negative stereotyping, talented women will not be recognized.” At Stanford, Barres made important discoveries about glia, the most numerous cells in the brain, and he describes some of his work. “The most rewarding part of his job,” however, was mentoring young scientists. That, and his advocacy for women and transgender scientists, ensures his legacy.

**Ben Barres** (1954–2017) was Professor and Chair of the Department of Neurology at Stanford University and one of the world's leading researchers on the role of the brain cells known as glia.

“A great scientist, leader, mentor, and friend; Ben leaves a towering legacy of goodness.”

—**Jo Handelsman, Director, Wisconsin Institute for Discovery**

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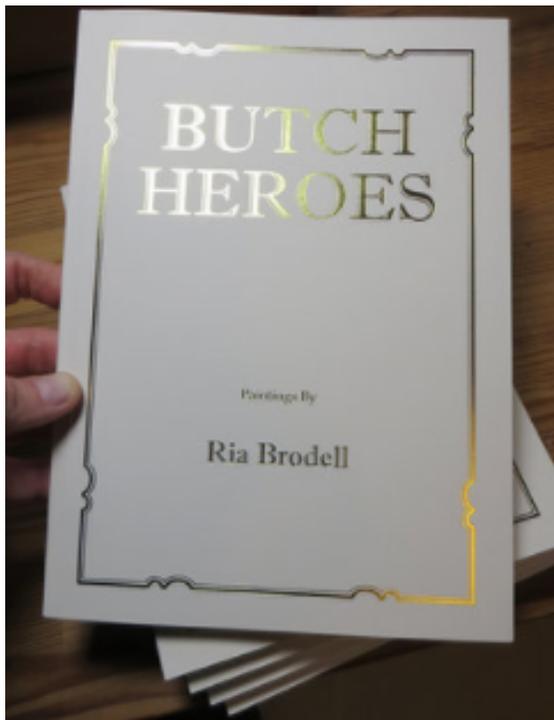


**A leading scientist describes his life, his gender transition, his scientific work, and his advocacy for gender equality in science.**

October  
5 3/8 x 8, 176 pp.

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 r' 6 Yb' 6 UffYg'



Portraits and texts recover lost queer history: the lives of people who didn't conform to gender norms, from the fifteenth through the twentieth centuries.

September  
6 x 9, 88 pp.  
28 color plates

**\$24.95T/£19.95 cloth**  
978-0-262-03897-3

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## Butch Heroes

Ria Brodell

Katherina Hetzeldorfer, tried “for a crime that didn’t have a name” (same sex sexual relations) and sentenced to death by drowning in 1477; Charles aka Mary Hamilton, publicly whipped for impersonating a man in eighteenth-century England; Clara, aka “Big Ben,” over whom two jealous women fought in 1926 New York: these are just three of the lives that the artist Ria Brodell has reclaimed for queer history in *Butch Heroes*. Brodell offers a series of twenty-eight portraits of forgotten but heroic figures, each accompanied by a brief biographical note. They are individuals who were assigned female at birth but whose gender presentation was more masculine than feminine, who did not want to enter into heterosexual marriage, and who often faced dire punishment for being themselves.

Brodell’s detailed and witty paintings are modeled on Catholic holy cards, slyly subverting a religious template. The portraits and the texts offer intriguing hints of lost lives: cats lounge in the background of domestic settings; one of the figures is said to have been employed variously as “a prophet, a soldier, or a textile worker”; another casually holds a lit cigarette. Brodell did extensive research for each portrait, piecing together a life from historical accounts, maps, journals, paintings, drawing, and photographs, finding the heroic in the forgotten.

**Ria Brodell** is an artist and educator based in Boston who has had solo and group exhibitions throughout the United States and whose work has been featured in the *Guardian*, *ARTNews*, the *Boston Globe*, and *New American Paintings*. Brodell is a part-time lecturer at the School of the Museum of Fine Arts at Tufts University.



**Katherina Hetzeldorfer**

**K**atherina Hetzeldorfer was tried, and then drowned in the Rhine, for a crime that didn't have a name in 1477.

She or He had moved to the city of Speier from Nuremberg with a woman who, during the trial, Hetzeldorfer said was a sister. They had lived in Speier for two years before Hetzeldorfer was arrested. They had apparently cohabited in members of the community describing the nature of their relationship like that of a husband and wife. After intense cross examination Hetzeldorfer revealed that the woman was not a sibling but that they had a long standing sexual relationship. (Hetzeldorfer's wife may have escaped, because she was not heard from in the trial transcripts.)

Hetzeldorfer was described by female witnesses who claimed to have been seduced by him/her as "being like a man in both physique and behavior, a sexually aggressive character and a potent lover." Hetzeldorfer and witnesses were made to describe in detail how it was that Hetzeldorfer acted like a man including describing the use of an "instrument" and how it was made: "with a red piece of leather, at the front filled with cotton, and a wooden stick stuck into it, and made a hole through the wooden stick, put a string through, and tied it round." It was the use of this "instrument," combined with Hetzeldorfer's gender transgressions that lead to death by drowning, a particularly demeaning sentence reserved for women.

12



Katherina Hetzeldorfer c. 1477 Germany  
gouache on paper, 11 x 7 inches, 2012

13

science | photography

## Picturing Science and Engineering

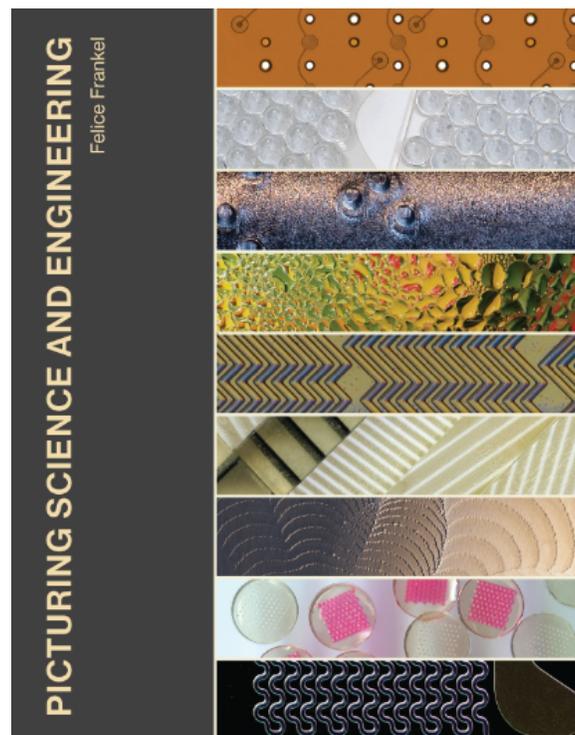
Felice Frankel

One of the most powerful ways for scientists to document and communicate their work is through photography. Unfortunately, most scientists have little or no training in that craft. In this book, celebrated science photographer Felice Frankel offers a guide for creating science images that are both accurate and visually stunning. *Picturing Science and Engineering* provides detailed instructions for making science photographs using the DSLR camera, the flatbed scanner, and the phone camera. The book includes a series of step-by-step case studies, describing how final images were designed for cover submissions and other kinds of visualizations. Lavishly illustrated in color throughout, the book encourages the reader to learn by doing, following Frankel as she recreates the stages of discovery that lead to a good science visual.

Frankel shows readers how to present their work with graphics—how to tell a visual story—and considers issues of image adjustment and enhancement. She describes how developing the right visual to express a concept not only helps make science accessible to nonspecialists, but also informs the science itself, helping scientists clarify their thinking. Within the book are specific URLs where readers can view Frankel’s online tutorials—visual “punctuations” of this printed edition. Additional materials, including tutorials and videos, can be found online at the book’s website.

**Felice Frankel** is an award-winning science photographer whose photographs have appeared in many publications. A research scientist in the Materials Research Laboratory at MIT, she is the author of *Envisioning Science* (MIT Press), *No Small Matter* (with G. M. Whitesides), *On the Surface of Things* (with G. M. Whitesides), and *Visual Strategies* (with Angela H. DePace).

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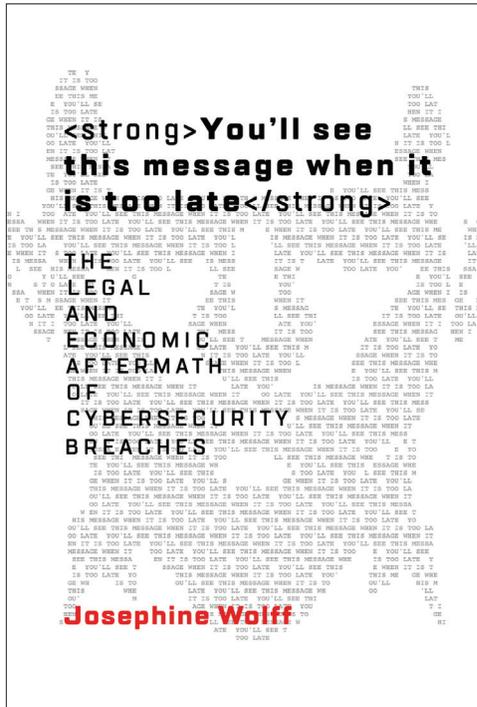


**A guide to making scientific photographs for presentations, journal submissions, and covers, featuring step-by-step instructions and case studies, by an award-winning science photographer; illustrated in color throughout.**

November  
9 x 10, 356 pp.  
508 color illus.

**\$39.95T/£32.95 cloth**  
978-0-262-03855-3

**Published with the help of funding from Furthermore: a program of the J. M. Kaplan fund**



**What we can learn from the aftermath of cybersecurity breaches and how we can do a better job protecting online data.**

November  
6 x 9, 280 pp.

**\$29.95/£24.95 cloth**  
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**Information Policy series**

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political science | technology

## You'll See This Message When It Is Too Late

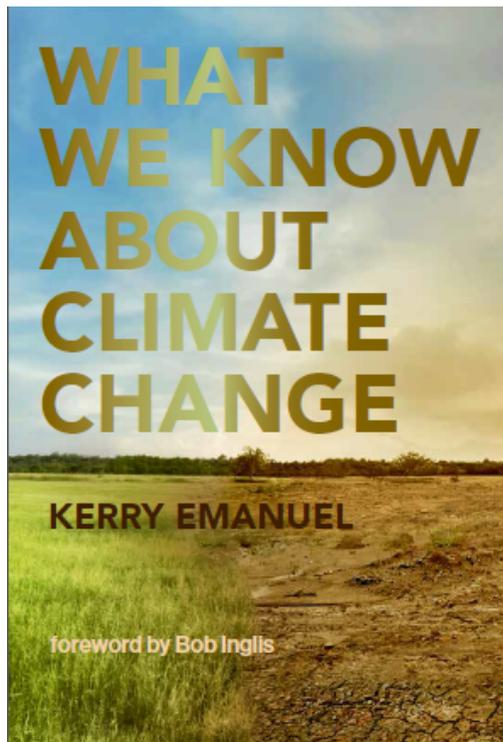
The Legal and Economic Aftermath of Cybersecurity Breaches

Josephine Wolff

Cybersecurity incidents make the news with startling regularity. Each breach—the theft of 145.5 million Americans' information from Equifax, for example, or the Russian government's theft of National Security Agency documents, or the Sony Pictures data dump—makes headlines, inspires panic, instigates lawsuits, and is then forgotten. The cycle of alarm and amnesia continues with the next attack, and the one after that. In this book, cybersecurity expert Josephine Wolff argues that we shouldn't forget about these incidents, we should investigate their trajectory, from technology flaws to reparations for harm done to their impact on future security measures. We can learn valuable lessons in the aftermath of cybersecurity breaches.

Wolff describes a series of significant cybersecurity incidents between 2005 and 2012, mapping the entire life cycle of each breach in order to identify opportunities for defensive intervention. She outlines three types of motives underlying these attacks—financial gain, espionage, and public humiliation of the victims—that have remained consistent through a decade of cyberattacks, offers examples of each, and analyzes the emergence of different attack patterns. The enormous TJX breach in 2006, for instance, set the pattern for a series of payment card fraud incidents that led to identity fraud and extortion; the Chinese army conducted cyberespionage campaigns directed at U.S.-based companies from 2006 to 2014, sparking debate about the distinction between economic and political espionage; and the 2014 breach of the Ashley Madison website was aimed at reputations rather than bank accounts.

**Josephine Wolff** is Assistant Professor in the Public Policy Department and at Rochester Institute of Technology. She is a Faculty Associate at Harvard's Berkman Klein Center for Internet & Society and a Fellow at the New America Cybersecurity Initiative. She has written for *Internet Policy Review*, *Slate*, the *Atlantic*, *Scientific American*, the *New Republic*, and other publications.



**An updated edition of a guide to the basic science of climate change, and a call to action.**

October  
5 3/8 x 8, 88 pp.  
2 illus.

**\$15.95T/£13.95 paper**  
978-0-262-53591-5

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## What We Know about Climate Change

updated edition

**Kerry Emanuel**

with a new foreword by Bob Inglis

The vast majority of scientists agree that human activity has significantly increased greenhouse gases in the atmosphere—most dramatically since the 1970s. Yet global warming skeptics and ill-informed elected officials continue to dismiss this broad scientific consensus.

In this updated edition of his authoritative book, MIT atmospheric scientist Kerry Emanuel outlines the basic science of global warming and how the current consensus has emerged. Although it is impossible to predict exactly when the most dramatic effects of global warming will be felt, he argues, we can be confident that we face real dangers. Emanuel warns that global warming will contribute to an increase in the intensity and power of hurricanes and flooding and more rapidly advancing deserts. But just as our actions have created the looming crisis, so too might they avert it. Emanuel calls for urgent action to reduce greenhouse gases and criticizes the media for downplaying the dangers of global warming (and, in search of “balance,” quoting extremists who deny its existence).

This edition has been updated to include the latest climate data, a discussion of the earth’s carbon cycle, the warming hiatus of the first decade of this century, the 2017 hurricanes, advanced energy options, the withdrawal from the Paris climate agreement, and more. It offers a new foreword by former U.S. Representative Bob Inglis (R-SC), who now works on climate action through his organization RepublicEN.

**Kerry Emanuel** is Professor of Atmospheric Science in the Department of Earth, Atmospheric, and Planetary Science at MIT. He is the author of *Divine Wind: The History and Science of Hurricanes and Atmospheric Convection*.

### Praise for earlier editions

“Emanuel’s words are measured and authoritative. His book should help reduce the huge gap between what is understood by the scientific community and what is known by the people who need to know, the public and policymakers.”

—**James Hansen, former Director, NASA Goddard Institute for Space Studies**

“Perhaps even the single best thing written about climate change for a general audience.”

—**Justin Gillis, the *New York Times* Green blog**

business

## When Innovation Moves at Digital Speed

Strategies and Tactics to Provoke, Sustain, and Defend Innovation in Today's Unsettled Markets

### MIT Sloan Management Review

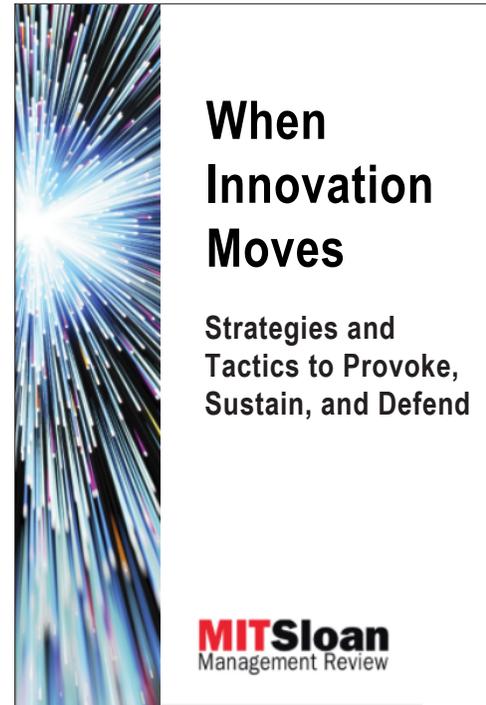
All organizations grapple with what digitalization means for their business and, in particular, how digital forces will drive their approaches to innovation. But very few organizations have clearly defined the scale, speed, and scope of their engagement with the digital world. These essays, from the pages of the preeminent journal *MIT Sloan Management Review*, offer practical advice from experts on how to create, facilitate, and manage innovation in and for today's digital markets.

The essays emphasize the power of intersections, where different mindsets and skills collide. These connections can be external—LEGO, for example, has engaged more than 100,000 adult fans in user communities—or internal, as when “brokers,” “connectors,” and “energizers” act within organizations. Contributors stress the value of action over analysis, citing examples that show that affirm the power of trial-and-error experimentation. They demonstrate that innovation success requires thinking beyond technology. Innovation is not created by white-coated scientists in a lab; it is not the job of the few but of the many. And finally, the contributors warn that the greatest enemy lies within; innovators often encounter fierce internal resistance. They consider innovations in the innovation process itself, describing the promise and pitfalls of “design thinking” and offering advice on how to manage the tension between new and existing business models.

Innovation is not a magical act practiced by a select few with rare gifts. Innovation is a discipline that can be measured, managed, and improved. *When Innovation Moves at Digital Speed* provides practical guidance for innovation success.

#### Contributors

Daniel Amaral, Jamie Anderson, Scott D. Anthony, Yun Mi Antorini, Michael Arena, Tormod Askildsen, Michael Ballé, Thomas Bartman, Jennie Björk, Marcel Bogers, Anna Brattström, Clayton M. Christensen, Edivandro Carlos Conforto, Rob Cross, Charles Dhanaraj, Thomas Fink, Nicolai J. Foss, Johan Frishammar, Johann Harnoss, Srivardhini K. Jha, Lâle Kesebi, Rishikesh T. Krishnan, Martin Kupp, Sean Looram, Mats Magnusson, Ann Majchrzak, Arvind Malhotra, James Morgan, Albert M. Muñoz, Jr., Ramiro Palma, Ishwardutt Parulkar, Eric Rebentisch, Jörg Reckhenrich, Martin Reeves, Anders Richtnér, Dave Rochlin, Duncan Simester, Jonathan Sims, Joseph V. Sinfield, Durward K. Sobek II, Freddy Solis, Kristian J. Sund, Mary Uhl-Bien, Derek van Bever, J. Andrei Villarroel, Amy Webb



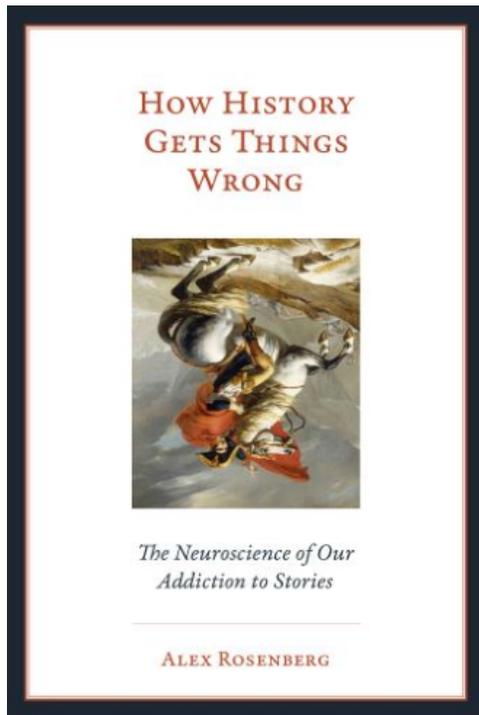
**Practical advice from experts on how to create, manage, measure, and improve innovation in and for today's digital markets.**

September  
5 3/8 x 8, 280 pp.  
17 illus.

**\$19.95T/£14.95 paper**  
978-0-262-53571-7

**The Digital Future of Management**

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**Why we learn the wrong things from narrative history, and how our love for stories is hard-wired.**

October  
6 x 9, 296 pp.  
10 color illus., 37 b&w illus.

**\$27.95T/£22.95 cloth**  
978-0-262-03857-7

## How History Gets Things Wrong

The Neuroscience of our Addiction to Stories

**Alex Rosenberg**

To understand something, you need to know its history. Right? Wrong, says Alex Rosenberg in *How History Gets Things Wrong*. Feeling especially well-informed after reading a book of popular history on the best-seller list? Don't. Narrative history is always, always wrong. It not just incomplete or inaccurate but deeply wrong, as wrong as Ptolemaic astronomy. We no longer believe that the earth is the center of the universe. Why do we still believe in historical narrative? Our attachment to history as a vehicle for understanding has a long Darwinian pedigree and a genetic basis. Our love of stories is hard-wired. Neuroscience reveals that human evolution shaped a tool useful for survival into a defective theory of human nature.

Stories historians tell, Rosenberg continues, are not only wrong but harmful. Israel and Palestine, for example have dueling narratives of dispossession that prevent one side from compromising with the other. Henry Kissinger applied lessons drawn from the Congress of Vienna to American foreign policy with disastrous results. Human evolution improved primate mind reading—the ability to anticipate the behavior of others, whether predators, prey, or cooperators—to get us to the top of the African food chain. Now, however, this hard-wired capacity makes us think we can understand history—what the Kaiser was thinking in 1914, why Hitler declared war on the United States—by uncovering the narratives of what happened and why. In fact, Rosenberg argues, we will only understand history if we don't make it into a story.

**Alex Rosenberg** is R. Taylor Cole Professor of Philosophy at Duke University. He is the author of *The Atheist's Guide to Reality: Enjoying Life without Illusions* and other books.

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economics

## Craft Weed

Family Farming and the Future of the Marijuana Industry

**Ryan Stoa**

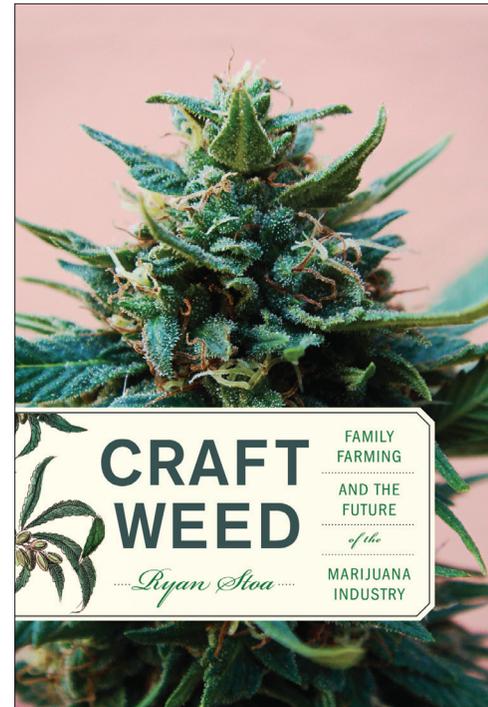
What will the marijuana industry look like as legalization spreads? Will corporations sweep in and create Big Marijuana, flooding the market with mass-produced weed? Or will marijuana agriculture stay true to its roots in family farming, and reflect a sustainable, local, and artisanal ethic? In *Craft Weed*, Ryan Stoa argues that the future of the marijuana industry should be powered by small farms—that its model should be more craft beer than Anheuser-Busch.

To make his case for craft weed, Stoa interviews veteran and novice marijuana growers, politicians, activists, and investors. He provides a history of marijuana farming and its post-hippie resurgence in the United States. He reports on the amazing adaptability of the cannabis plant and its genetic gifts, the legalization movement, regulatory efforts, the trade-offs of indoor versus outdoor farms, and the environmental impacts of marijuana agriculture. To protect and promote small farmers and their communities, Stoa proposes a Marijuana Appellation system, modeled after the wine industry, which would provide a certified designation of origin to local crops. A sustainable, local, and artisanal farming model is not an inevitable future for the marijuana industry, but *Craft Weed* makes clear that marijuana legalization has the potential to revitalize rural communities and the American family farm.

As the era of marijuana prohibition comes to an end, now is the time to think about what kind of marijuana industry and marijuana agriculture we want. *Craft Weed* will help us plan for a future that is almost here.

**Ryan Stoa** is Associate Professor of Law at Concordia University School of Law in Boise, Idaho.

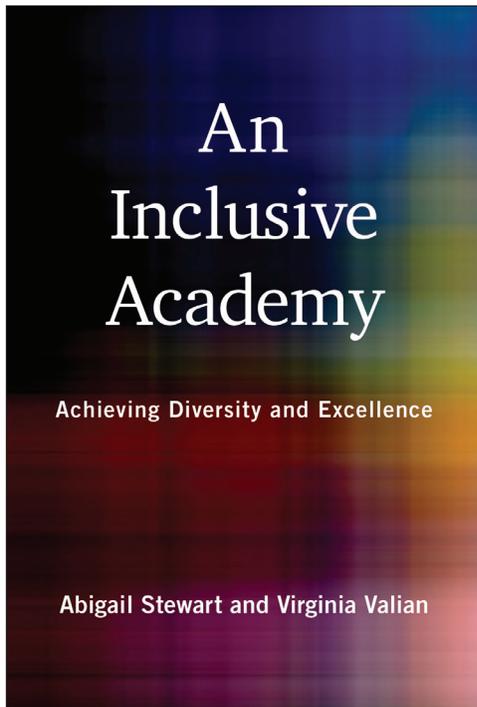
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**How the future of post-legalization marijuana farming can be sustainable, local, and artisanal.**

November  
6 x 9, 248 pp.

**\$27.95T/£22.95 cloth**  
978-0-262-03886-7



**How colleges and universities can live up to their ideals of diversity, and why inclusivity and excellence go hand in hand.**

September  
6 x 9, 528 pp.

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*education*

## An Inclusive Academy

Achieving Diversity and Excellence

**Abigail Stewart and Virginia Valian**

Most colleges and universities embrace the ideals of diversity and inclusion, but many fall short, especially in the hiring, retention, and advancement of faculty who would more fully represent our diverse world—in particular women and people of color. In this book, Abigail Stewart and Virginia Valian argue that diversity and excellence go hand in hand and provide guidance for achieving both.

Stewart and Valian, themselves senior academics, support their argument with comprehensive data from a range of disciplines. They show why merit is often overlooked; they offer statistics and examples of individual experiences of exclusion, such as being left out of crucial meetings; and they outline institutional practices that keep exclusion invisible, including reliance on proxies for excellence, such as prestige, that disadvantage outstanding candidates who are not members of the white male majority.

Perhaps most important, Stewart and Valian provide practical advice for overcoming obstacles to inclusion. This advice is based on their experiences at their own universities, their consultations with faculty and administrators at many other institutions, and data on institutional change. Stewart and Valian offer recommendations for changing structures and practices so that people become successful in ways that benefit everyone. They describe better ways of searching for job candidates; evaluating candidates for hiring, tenure, and promotion; helping faculty succeed; and broadening rewards and recognition.

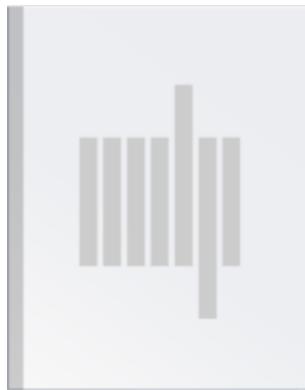
**Abigail Stewart** is Sandra Schwartz Tangri Distinguished University Professor of Psychology and Women's Studies at the University of Michigan. She is the coauthor of *Theorizing Feminism: Parallel Trends in the Humanities and Social Sciences*. **Virginia Valian** is Distinguished Professor of Psychology, Linguistics, and Speech-Language-Hearing Sciences at Hunter College and CUNY Graduate Center. She is the author of *Why So Slow: The Advancement of Women* (MIT Press).

*politics*

## Extremism

**J. M. Berger**

A rising tide of extremist movements threaten to destabilize civil societies around the globe. It has never been more important to



understand extremism, yet the dictionary definition—a logical starting point in a search for understanding—tells us only that extremism is “the quality or state of being extreme.” In this volume in the MIT Press Essential Knowledge series, J. M. Berger offers a nuanced introduction to extremist movements, explaining what extremism is, how extremist ideologies are constructed, and why extremism can escalate into violence. Berger shows that

although the ideological content of extremist movements varies widely, there are common structural elements.

Berger, an expert on extremist movements and terrorism, explains that extremism arises from a perception of “us versus them,” intensified by the conviction that the success of “us” is inseparable from hostile acts against “them.” Extremism differs from ordinary unpleasantness—run-of-the-mill hatred and racism—by its sweeping rationalization of an insistence on violence. Berger illustrates his argument with case studies and examples from around the world and throughout history, from the destruction of Carthage by the Romans—often called “the first genocide”—to the apocalyptic jihadism of Al Qaeda, America’s new “alt-right,” and the anti-Semitic conspiracy tract *The Protocols of the Elders of Zion*. He describes the evolution of identity movements, individual and group radicalization, and more. If we understand the causes of extremism, and the common elements of extremist movements, Berger says, we will be more effective in countering it.

**J. M. Berger** is a Fellow with the Counter-Terrorism Strategic Communications (CTSC) Project, led by the International Centre for Counter-Terrorism–The Hague, and a consultant for private companies and government agencies on issues related to homegrown terrorism, foreign fighters, and online extremism. He is the author of *Jihad Joe: Americans Who Go to War in the Name of Islam* and *ISIS: The State of Terror* (with Jessica Stern).

September | 5 x 7, 200 pp. | 4 illus.

**\$15.95T/£13.95 paper**  
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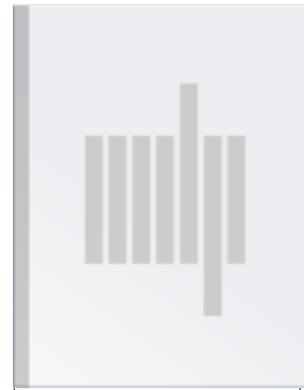
BILL SMITH | SMITHWMJ@MIT.EDU

*science | technology*

## GPS

**Paul E. Ceruzzi**

GPS is ubiquitous in everyday life. GPS mapping is standard equipment in many new cars and geolocation services are



embedded in smart phones. GPS makes Uber and Lyft possible; driverless cars won’t be able to drive without it. In this volume in the MIT Press Essential Knowledge series, Paul Ceruzzi offers a concise history of GPS, explaining how a once-obscure space technology became an invisible piece of our infrastructure, as essential to modern life as electric power or clean water.

GPS relays precise time and positioning information from orbiting satellites to receivers on the ground, at sea, and in the air. It operates worldwide, and its basic signals are free, although private companies can commodify the data provided. Ceruzzi recounts the origins of GPS and its predecessor technologies, including early aircraft navigation systems and satellites. He describes the invention of GPS as a space technology in the post-Apollo, pre-Space Shuttle years and its first military and commercial uses. Ceruzzi explains how the convergence of three major technological developments—the microprocessor, the Internet, and cellular telephone—enabled the development and application of GPS technology. Recognizing the importance of satellite positioning systems in a shifting geopolitical landscape—and perhaps doubting U.S. assurances of perpetual GPS availability—other countries are now building or have already developed their own systems, and Ceruzzi reports on these efforts in the European Union, Russia, India, China, and Japan.

**Paul E. Ceruzzi** is Curator at the National Air and Space Museum at the Smithsonian Institution. He is the author of *Computing: A Concise History*, *A History of Modern Computing*, and *Internet Alley: High Technology in Tysons Corner, 1945–2005*, all published by the MIT Press, and other books.

October | 5 x 7, XXX pp. | 21 illus.

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The MIT Press Essential Knowledge series

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*technology*

## Haptics

**Lynette Jones**

Haptics, or haptic sensing, refers to the ability to identify and perceive objects through touch. This is active touch, involving exploration of an object with the hand rather than the passive sensing of a vibration or force on the skin. The development of new technologies, including prosthetic hands and tactile surfaces for flat screen displays, depends on our knowledge of haptics. In this volume in the MIT Press Essential Knowledge series, Lynette Jones offers an accessible overview of haptics, or active touch sensing, and its applications.

Jones explains that haptics involves integrating information from touch and kinesthesia—that is, information both from sensors in the skin and from sensors in muscles, tendons, and joints. The challenge for technology is to reproduce in a virtual world some of the sensations associated with physical interactions with the environment.

Jones maps the building blocks of the tactile system, the receptors in the skin and the skin itself, and how information is processed at this interface with the external world. She describes haptic perception, the processing of haptic information in the brain; haptic illusions, or distorted perceptions of objects and the body itself; tactile and haptic displays, from braille to robotic systems; tactile compensation for other sensory impairments; surface haptics, which creates virtual haptic effects on physical surfaces such as touch screens; and the development of robotic and prosthetic hands that mimic the properties of human hands.

**Lynette Jones** is Senior Research Scientist in the Department of Mechanical Engineering at MIT and is Editor-in-Chief of the *IEEE Transactions on Haptics*.

September | 5 x 7, 176 pp. | 15 photos

**\$15.95T/£13.95 paper**  
978-0-262-53580-9

The MIT Press Essential Knowledge series

*environment | technology*

## Carbon Capture

**Howard J. Herzog**

The burning of fossil fuels releases carbon dioxide (CO<sub>2</sub>), and these CO<sub>2</sub> emissions are a major driver of climate change.

Carbon capture offers a path to climate change mitigation that has received relatively little attention. In this volume in the MIT Press Essential Knowledge series, Howard Herzog offers a concise guide to carbon capture, covering basic information as well as the larger context of climate technology and policy. Carbon capture, or carbon dioxide capture and storage (CCS), refers to a suite of technologies that reduce CO<sub>2</sub> emissions by “capturing” CO<sub>2</sub> before it is released into the atmosphere and then transporting it to where it will be stored or used. It is the only climate change mitigation technique that deals directly with fossil fuels rather than providing alternatives to them.

Herzog, a pioneer in carbon capture research, begins by discussing the fundamentals of climate change and how carbon capture can be one of the solutions. He explains capture and storage technologies, including chemical scrubbing and the injection of CO<sub>2</sub> deep underground. He reports on current efforts to deploy CCS at factories and power plants and attempts to capture CO<sub>2</sub> from the air itself. Finally, he explores the policies and politics in play around CCS and argues for elevating carbon capture in the policy agenda.

**Howard J. Herzog** is Senior Research Engineer in the MIT Energy Initiative. He ran an industrial consortium on CCS from 2000 to 2016, served as a US delegate to the Carbon Sequestration Leadership Forum’s Technical Group from 2003 to 2007, and was a Coordinating Lead Author for the IPCC (Intergovernmental Panel on Climate Change) Special Report on Carbon Dioxide Capture and Storage (2005).

September | 5 x 7, 256 pp. | 7 illus.

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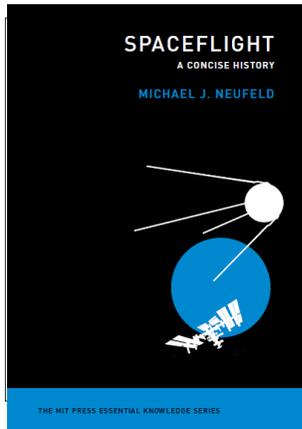
science | history

## Spaceflight

A Concise History

**Michael J. Neufeld**

Spaceflight is one of the greatest human achievements of the twentieth century. The Soviets launched Sputnik, the first satellite, in 1957; less than twelve



years later, the American Apollo astronauts landed on the Moon. In this volume of the MIT Essential Knowledge series, Michael Neufeld offers a concise history of spaceflight, mapping the full spectrum of activities that humans have developed in space.

Neufeld explains that “the space program” should not be equated only with human spaceflight. Since the 1960s, unmanned military

and commercial spacecraft have been orbiting near the Earth, and robotic deep-space explorers have sent back stunning images of faraway planets. Neufeld begins with the origins of space ideas and the discovery that rocketry could be used for spaceflight. He then discusses the Soviet-U.S. Cold War space race, reminds us that NASA resisted adding female astronauts even after the Soviets sent the first female cosmonaut into orbit. He analyzes the two rationales for the Apollo program: prestige and scientific discovery (this last something of an afterthought). He describes the internationalization and privatization of human spaceflight after the Cold War, the cultural influence of space science fiction, including *Star Trek* and *Star Wars*, space tourism for the ultra-rich, and the popular desire to go into space. Whether we become a multiplanet species, as some predict, or continue to call Earth home, this book offers a useful primer.

**Michael J. Neufeld** is Senior Curator in the Space History Department of the Smithsonian National Air and Space Museum. He has appeared on History Channel, PBS, NPR, and BBC programs, and is the author of the award-winning *The Rocket and the Reich*, *Von Braun* and other books.

October | 5 x 7, 216 pp. | 12 illus.

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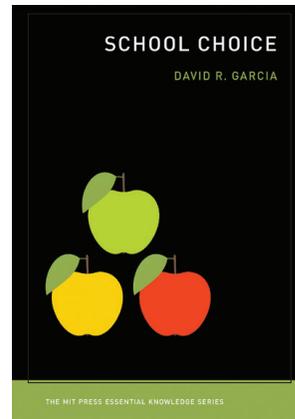
The MIT Press Essential Knowledge series

education

## School Choice

**David R. Garcia**

The issues and arguments surrounding school choice are sometimes hijacked to make political points about government control, democratic ideals, the public good, and privatization. In this volume in the MIT Press Essential Knowledge series,



David Garcia avoids partisan arguments to offer an accessible, objective, and comprehensive guide to school choice. He first outlines the different types of school choice, including home schooling, private schools, freedom-of-choice plans, magnet schools, charter schools, vouchers, and education savings accounts. Two themes emerge as particularly resonant in the American school choice debate: the long history of school desegregation,

and debates over the roles and responsibilities of government. Is education a public good, for the collective benefit of society, or a private good, to benefit the individual?

Garcia describes and evaluates the major arguments supporting school choice policies: the elimination of government bureaucracies, the introduction of competition into education through market forces, the promotion of parental choice, and the casting of school choice as a civil right. He examines the research on the effects of school choice and summarizes general trends. Finally, he considers how school choice policies are likely to evolve. He notes that the Trump administration’s Secretary of Education, Betsy DeVos, is an advocate for school choice, and that the administration’s budget allocations signal a deliberate shift from long-standing federal policies that provide supplemental funding for low-income schools. Instead, new policies provide incentives for low-income families to leave public schools altogether through choice. This book will be an essential resource for participating in the debates that are sure to follow.

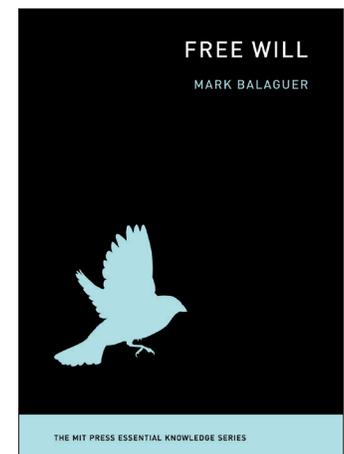
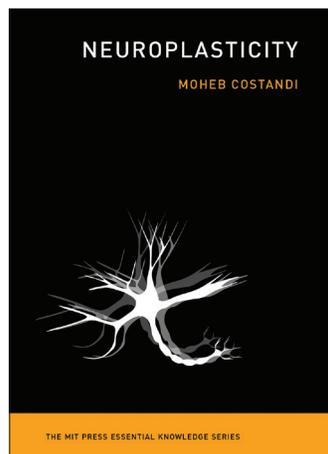
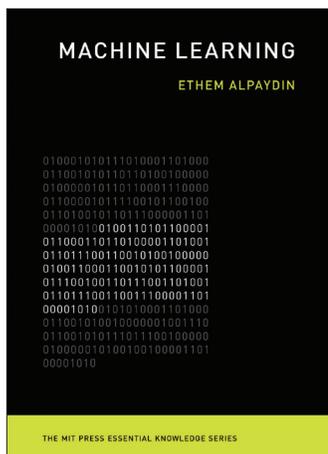
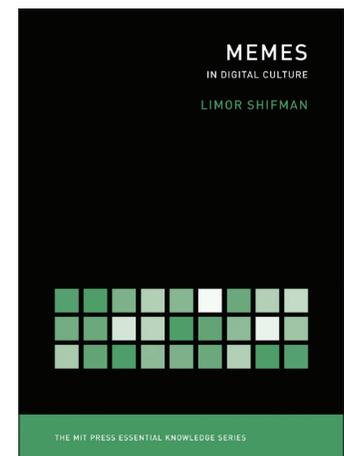
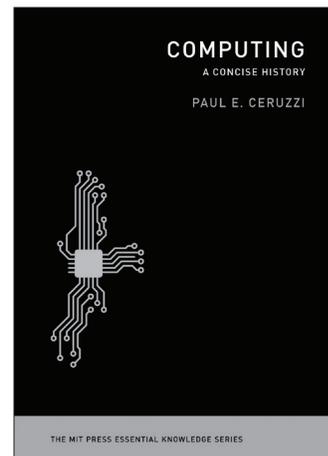
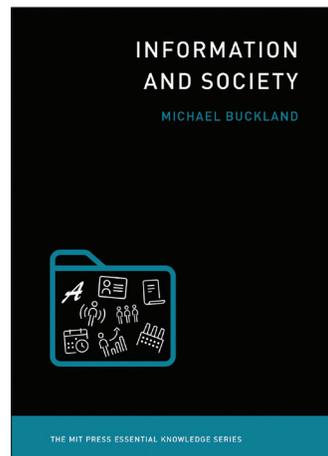
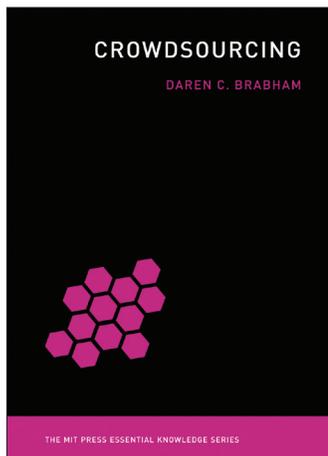
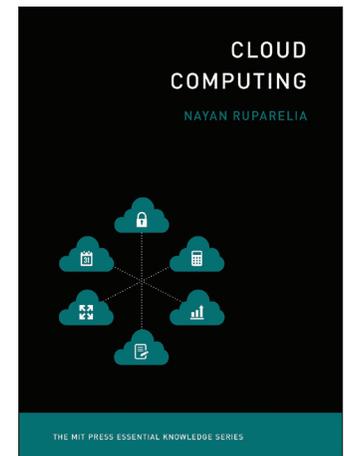
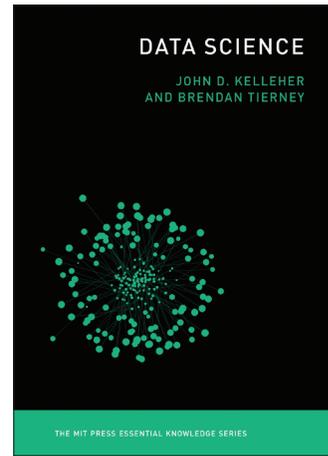
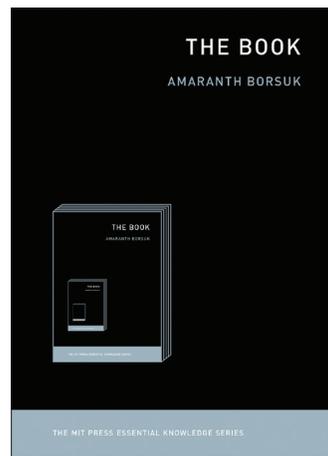
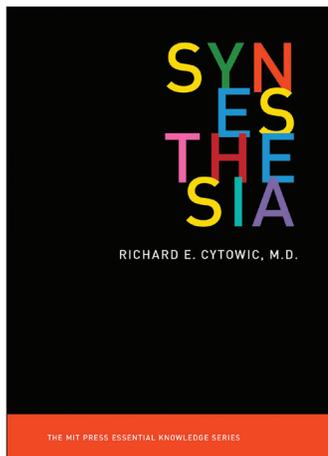
**David R. Garcia** is Associate Professor at the Mary Lou Fulton Teachers College at Arizona State University.

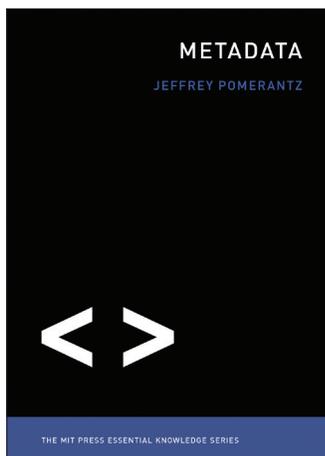
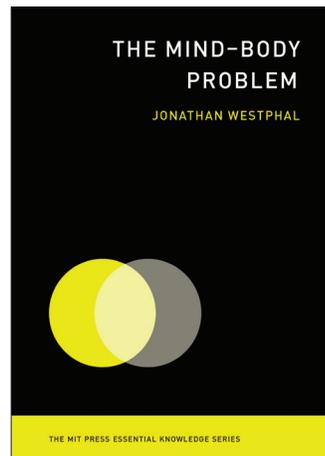
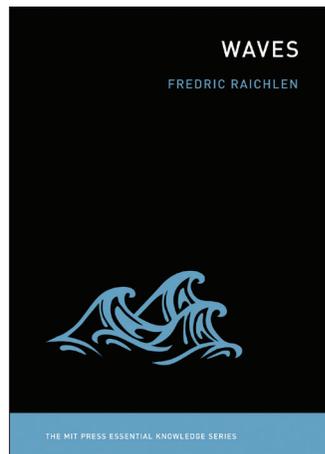
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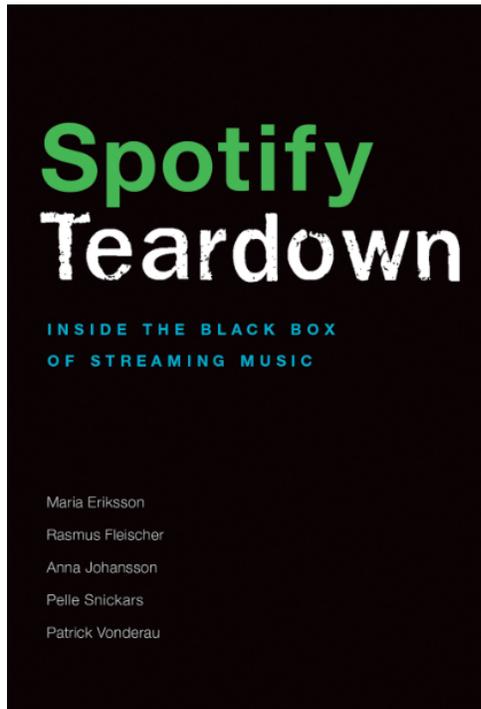
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## Spotify Teardown

Inside the Black Box of Streaming Media

**Maria Eriksson, Rasmus Fleischer, Anna Johansson, Pelle Snickars, and Patrick Vonderau**

Spotify began as a semi-legal enterprise that grew out of the Swedish file-sharing community. Today, it offers consumers a commodified streaming experience, featuring music organized around mood accompanied by changing motivational messages. The moods and music preferences of subscribers are transformed into data and sold to marketers. Spotify has been hailed as the solution to the music industry's downward earnings spiral; its à la carte on-demand streaming seems to have created a sustainable revenue model for artists. But is Spotify a music provider, a tech company, a media company, or a data broker? *Spotify Teardown* investigates the inner workings of Spotify, tracing the transformation of audio files into streamed experience.

*Spotify Teardown* combines interviews, observations, and other analysis of Spotify's "frontend" with experimental, covert investigation of the "backend." The authors distribute sounds and music through Spotify to get first-hand experience with its aggregators while simultaneously programming bots to listen to the music. They describe a series of "inventions," which include establishing a record label for research purposes, intercepting network traffic with packet sniffers, and web-scraping corporate materials. The authors' innovative methods earned them a stern letter from Spotify accusing them of violating its Terms of Use; the company later threatened their research funding. Thus the book itself became an intervention into the ethics and legal framework of corporate behavior.

**Maria Eriksson** is PhD candidate in media and communications studies at the Department of Culture and Media Studies, Umeå University. **Rasmus Fleischer** is a historian, essayist, and occasional musician, currently a Researcher at the Department of Economic History at Stockholm University. **Anna Johansson** is an Associate Senior Lecturer in Ethnology at HUMlab at Umeå University.

**Pelle Snickars** is Professor of Media and Communication Studies at Umeå University. **Patrick Vonderau** is Professor in Cinema Studies at the Department for Media Studies at Stockholm University.

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## The Blockchain and the New Architecture of Trust

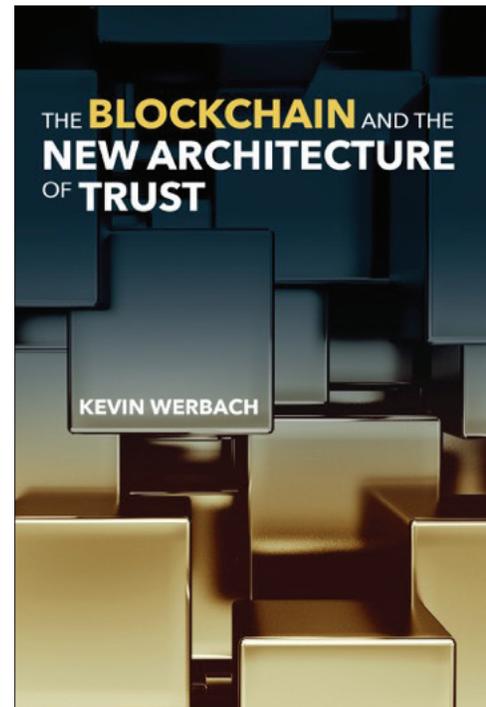
**Kevin Werbach**

The blockchain entered the world on January 3, 2009, introducing an innovative new trust architecture: an environment in which users trust a system—for example, a shared ledger of information—without necessarily trusting any of its components. The cryptocurrency Bitcoin is the most famous implementation of the blockchain, but hundreds of other companies have been founded and billions of dollars invested in similar applications since Bitcoin’s launch. Some see the blockchain as offering more opportunities for criminal behavior than benefits to society. In this book, Kevin Werbach shows how a technology resting on foundations of mutual mistrust can become trustworthy.

The blockchain, built on open software and decentralized foundations that allow anyone to participate, seems like a threat to any form of regulation. In fact, Werbach argues, law and the blockchain need each other. Blockchain systems that ignore law and governance are likely to fail, or to become outlaw technologies irrelevant to the mainstream economy. That, Werbach cautions, would be a tragic waste of potential. If, however, we recognize the blockchain as a kind of legal technology, which shapes behavior in new ways, it can be harnessed to create tremendous business and social value.

**Kevin Werbach** is Associate Professor of Legal Studies and Business Ethics at the Wharton School of the University of Pennsylvania. Founder of the technology consulting firm Supernova Group, he has advised the FCC and Department of Commerce on communication policy. He is the coauthor of *For the Win: How Game Thinking Can Revolutionize Your Business*.

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**How the blockchain—a system built on foundations of mutual mistrust—can become trustworthy.**

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## Playing Smart

On Games, Intelligence and Artificial Intelligence

**Julian Togelius**

Can games measure intelligence? How will artificial intelligence inform games of the future? In *Playing Smart*, Julian Togelius explores the connections between games and intelligence to offer a new vision of future games and game design. Video games already depend on AI. We use games to test AI algorithms, challenge our thinking, and better understand both natural and artificial intelligence. In the future, Togelius argues, game designers will be able to create smarter games that make us smarter in turn, applying advanced AI to help design games. In this book, he tells us how.

Games are the past, present, and future of artificial intelligence. In 1948, Alan Turing, one of the founding fathers of computer science and artificial intelligence, handwrote a program for chess. Today we have IBM's Deep Blue and DeepMind's AlphaGo, and huge efforts go into developing AI that can play such arcade games as Pac-Man. Programmers continue to use games to test and develop AI, creating new benchmarks for AI while also challenging human assumptions and cognitive abilities. Game design is at heart a cognitive science, Togelius reminds us—when we play or design a game, we plan, think spatially, make predictions, move, and assess ourselves and our performance. By studying how we play and design games, Togelius writes, we can better understand how humans and machines think. AI can do more for game design than providing a skillful opponent. We can harness it to build game-playing and game-designing AI agents, enabling a new generation of AI-augmented games. With AI, we can explore new frontiers in learning and play.

**Julian Togelius** is Associate Professor in the Department of Computer Science and Engineering at New York University and Codirector of the NYU Game Innovation Lab.

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## Designing an Internet

**David D. Clark**

How do you design an internet? The architecture of the current Internet is the product of basic design decisions made early in its history. What would an internet look like if it were designed, today, from the ground up? In this book, MIT computer scientist David Clark explains how the Internet is actually put together, what requirements it was designed to meet, and why different design decisions would create different internets. He does not take today's Internet as a given but tries to learn from it, and from alternative proposals for what an internet might be, in order to draw some general conclusions about network architecture.

Clark discusses the history of the Internet, and how a range of potentially conflicting requirements—including longevity, security, availability, economic viability, management, and meeting the needs of society—shaped its character. He addresses both the technical aspects of the Internet and its broader social and economic contexts. He describes basic design approaches and explains, in terms accessible to nonspecialists, how networks are designed to carry out their functions. (An appendix offers a more technical discussion of network functions for readers who want the details.) He considers a range of alternative proposals for how to design an internet, examines in detail the key requirements a successful design must meet, and then imagines how to design a future internet from scratch. It's not that we should expect anyone to do this; but, perhaps, by conceiving a better future, we can push toward it.

**David D. Clark** is a Senior Research Scientist at the MIT Computer Science and Artificial Intelligence Lab and a leader in the design of the Internet since the 1970s.

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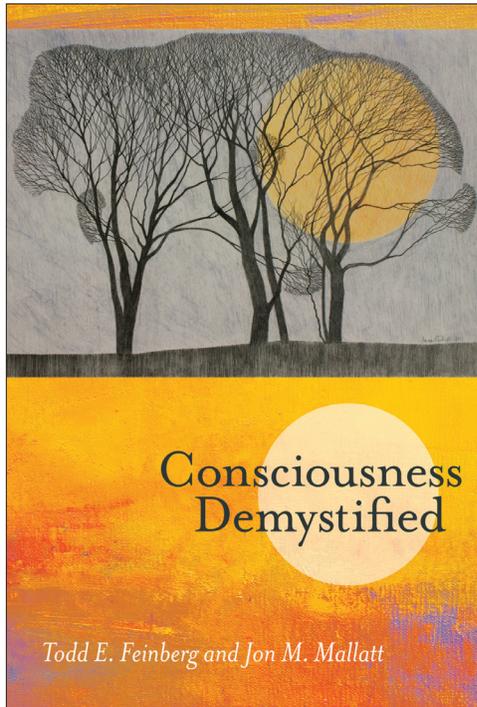
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## Consciousness Demystified

**Todd E. Feinberg and Jon M. Mallatt**

Consciousness is often considered a mystery. How can the immaterial experience of consciousness be explained by the material neurons of the brain? There seems to be an unbridgeable gap between understanding the brain as an objectively observed biological organ and accounting for subjective experience. In this book, Todd Feinberg and Jon Mallatt attempt to demystify consciousness—to naturalize it, by explaining that the subjective, experiencing aspects of consciousness are created by natural brain processes that evolved in natural ways. Although subjective experience is unique in nature, they argue, it is not necessarily mysterious. We need not invoke the unknown or unknowable to explain its creation.

Feinberg and Mallatt propose a theory of neurobiological naturalism (after John Searle's biological naturalism) that recognizes the many features that the brain shares with other living things, accounts for neurobiological features unique to conscious brains, and explains the subjective-objective barrier naturally. They investigate common neural features among animals with both sensory (rudimentary) and affective (sophisticated) consciousness, and they conclude that there are many common factors in the creation of all forms of consciousness. They map the evolutionary development of consciousness and find a steady progression over time. Finally, bridging the previously unbridgeable, they explain how subjective experience, although different from objective observation, can be naturally explained.

**Todd E. Feinberg** is Clinical Professor of Psychiatry and Neurology at Icahn School of Medicine at Mount Sinai, New York. **Jon M. Mallatt** is Clinical Associate Professor in the WWAMI Medical Education Program at the University of Washington and the University of Idaho. Feinberg and Mallatt are authors of *The Ancient Origins of Consciousness: How the Brain Created Experience* (MIT Press).

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## Anxiety and the Equation

Understanding Boltzmann's Entropy

**Eric Johnson**

Ludwig Boltzmann's grave in Vienna's Central Cemetery bears a cryptic epitaph:  $S = k \log W$ . This equation was Boltzmann's great discovery, and it contributed significantly to our understanding of the second law of thermodynamics. In *Anxiety and the Equation*, Eric Johnson tells the story of a man and his equation: the anxiety-plagued nineteenth-century physicist who did his most important work as he struggled with mental illness.

Johnson explains that "S" in Boltzmann's equation refers to entropy, and that entropy is the central quantity in the second law of thermodynamics. The second law is always on, running in the background of our lives, providing a way to differentiate between past and future. We know that the future will be a state of higher entropy than the past, and we have Boltzmann to thank for discovering the equation that underlies that fundamental trend. Johnson, accessibly and engagingly, reassembles Boltzmann's equation from its various components and presents episodes from Boltzmann's life—beginning at the end, with "Boltzmann Kills Himself" and "Boltzmann Is Buried (Not Once, But Twice)." Johnson explains the second law in simple terms, introduces key concepts through thought experiments, and explores Boltzmann's work. He argues that Boltzmann, diagnosed by his contemporaries as neurasthenic, suffered from an anxiety disorder. He was, says Johnson, a man of reason who suffered from irrational concerns about his work, worrying especially about opposition from the scientific establishment of the day.

Johnson's clear and concise explanations will acquaint the nonspecialist reader with such seemingly esoteric concepts as microstates, macrostates, fluctuations, the distribution of energy, log functions, and equilibrium. He describes Boltzmann's relationships with other scientists, including Max Planck and Henri Poincaré, and, finally, imagines "an alternative ending," in which Boltzmann lived on and died of natural causes.

**Eric Johnson** is Associate Professor in the Department of Chemistry at Mount St. Joseph University in Cincinnati.

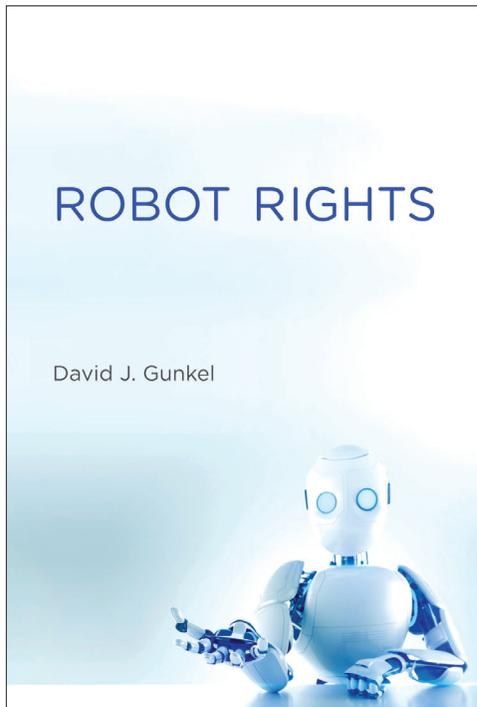
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**A provocative attempt to think about what was previously considered unthinkable: a serious philosophical case for the rights of robots.**

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## Robot Rights

**David J. Gunkel**

We are in the midst of a robot invasion, as devices of different configurations and capabilities slowly but surely come to take up increasingly important positions in everyday social reality—self-driving vehicles, recommendation algorithms, machine learning decision making systems, and social robots of various forms and functions. Although considerable attention has already been devoted to the subject of robots and responsibility, the question concerning the social status of these artifacts has been largely overlooked. In this book, David Gunkel offers a provocative attempt to think about what has been previously regarded as unthinkable: whether and to what extent robots and other technological artifacts of our own making can and should have any claim to moral and legal standing.

In his analysis, Gunkel invokes the philosophical distinction (developed by David Hume) between “is” and “ought” in order to evaluate and analyze the different arguments regarding the question of robot rights. In the course of his examination, Gunkel finds that none of the existing positions or proposals hold up under scrutiny. In response to this, he then offers an innovative alternative proposal that effectively flips the script on the is/ought problem by introducing another, altogether different way to conceptualize the social situation of robots and the opportunities and challenges they present to existing moral and legal systems.

**David J. Gunkel** is Distinguished Teaching Professor of Communication Technology at Northern Illinois University and the author of *The Machine Question: Critical Perspectives on AI, Robots, and Ethics*, *Of Remixology: Ethics and Aesthetics after Remix*, both published by the MIT Press, and other books.

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technology | media

## The Problem with Software

**Adam Barr**

Why is software so prone to bugs? So vulnerable to viruses? Why are software products so often delayed, or even canceled? Is software development really hard, or are software developers just not that good at it? In *The Problem With Software*, Adam Barr examines the proliferation of bad software, explains what causes it, and offers some suggestions on how to improve the situation.

For one thing, Barr points out, academia doesn't teach programmers what they actually need to know to do their jobs: how to work in a team to create code that works reliably and can be maintained by somebody other than the original authors. As the size and complexity of commercial software have grown, the gap between academic computer science and industry has widened. It's an open secret that there is little engineering in software engineering, which continues to rely not on codified scientific knowledge but on intuition and experience.

Barr, who worked as a programmer for more than twenty-five years, describes how the industry has evolved, from the era of mainframes and Fortran to today's embrace of the cloud. He explains bugs and why software has so many of them, and why today's interconnected computers offer fertile ground for viruses and worms. The difference between good and bad software can be a single line of code, and Barr includes code to illustrate the consequences of seemingly inconsequential choices by programmers. Looking to the future, Barr writes that the best prospect for improving software engineering is the move to the cloud. When software is a service and not a product, companies will have more incentive to make it good rather than "good enough to ship."

**Adam Barr** worked as a programmer and manager at Microsoft for more than twenty years.

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## Power Button

A History of Pleasure, Panic, and the Politics of Pushing

**Rachel Plotnick**

Push a button and turn on the television; tap a button and get a ride; click a button and “like” something. The touch of a finger can set an appliance, a car, or system in motion, even if the user doesn’t understand the underlying mechanisms or algorithms. How did buttons become so ubiquitous? Why do people love them, loathe them, and fear them? In *Power Button*, Rachel Plotnick traces the origins of today’s push-button society by examining how buttons have been made, distributed, used, rejected, and refashioned throughout history. Focusing on the period between 1880 and 1925, when “technologies of the hand” proliferated (including typewriters, telegraphs, and fingerprinting), Plotnick describes the ways that button pushing became a means for digital command, which promised effortless, discreet, and fool-proof control. Emphasizing the doubly digital nature of button pushing—as an act of the finger and a binary activity (on/off, up/down)—Plotnick suggests that the tenets of precomputational digital command anticipate contemporary ideas of computer users.

Plotnick discusses the uses of early push buttons to call servants, and the growing tensions between those who work with their hands and those who command with their fingers; automation as “automagic,” enabling command at a distance; instant gratification, and the victory of light over darkness; and early twentieth-century imaginings of a future push-button culture. Push buttons, Plotnick tells us, have demonstrated remarkable staying power, despite efforts to cast button pushers as lazy, privileged, and even dangerous.

**Rachel Plotnick** is Assistant Professor of Communication at the University of North Carolina at Charlotte.

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## Energy at the End of the World

An Orkney Islands Saga

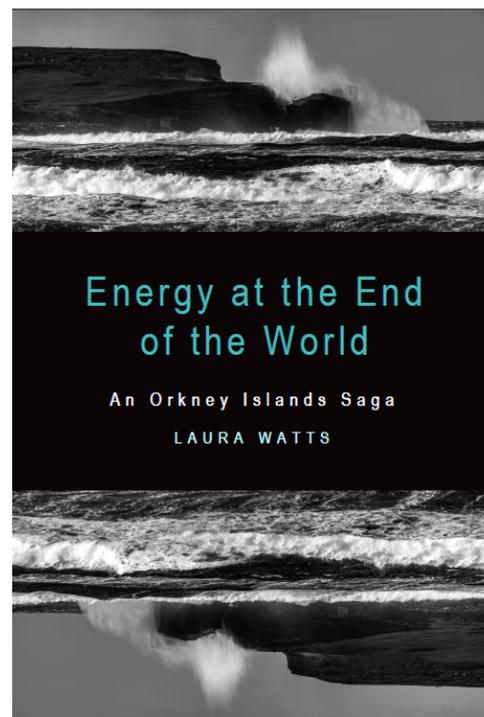
**Laura Watts**

The islands of Orkney, off the northern coast of Scotland, are closer to the Arctic Circle than to London. Surrounded by fierce seas and shrouded by clouds and mist, the islands seem to mark the edge of the known world. And yet they are a center for energy technology innovation, from marine energy to hydrogen fuel networks, attracting the interest of venture capitalists and local communities. In this book, Laura Watt tells a story of making energy futures at the edge of the world.

Orkney, Watts tells us, has been making technology for six thousand years, from arrowheads and stone circles to wave and tide energy prototypes. Artifacts and traces of all the ages—Stone, Bronze, Iron, Viking, Silicon—are visible everywhere. The islanders turned to energy innovation when forced to contend with an energy infrastructure they had outgrown. Today, Orkney is home to the European Marine Energy Centre, established 2003. There are about forty open-sea marine energy test facilities in the world, many of which draw on Orkney expertise. The islands generate more renewable energy than they use, are growing hydrogen fuel and electric car networks, and have hundreds of locally-owned micro wind turbines, and a decade-old smart grid. Mixing storytelling and ethnography, empiricism and lyricism, Watt tells an Orkney energy saga—an account of how the islands are creating their own low-carbon future, in the face of the seemingly impossible. The Orkneys, Watt shows, are playing a long game, making energy futures for another six thousand years.

**Laura Watts**, writer, poet, and artist, is Interdisciplinary Senior Lecturer in Energy and Society at University of Edinburgh.

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edited by Cynthia Solomon and Xiao Xiao  
illustrated by Xiao Xiao

Marvin Minsky was a pioneering researcher in artificial intelligence whose work led to both theoretical and practical advances. He was interested in making machines that think—in part for the light this might shed on the workings of our own minds. Minsky's insights about the mind provide fresh perspectives on education and how children learn. This book collects for the first time six essays by Minsky on children, learning, and the potential of computers in school to enrich children's development. In these essays Minsky discusses the shortcomings of conventional education (particularly in mathematics) and considers alternative approaches; reflects on the role of mentors; describes higher-level strategies for thinking across domains; and suggests projects for children to pursue. Each essay is paired with commentary by one of Minsky's former colleagues or students, which identifies Minsky's key ideas and connects his writings to current research. Minsky once observed that in traditional teaching, "instead of promoting inventiveness, we focus on preventing mistakes." These essays offer Minsky's unique insights into how education can foster inventiveness.

**Marvin Minsky** (1927–2016) was Toshiba Professor of Media Arts and Sciences and Donner Professor of Electrical Engineering and Computer Science at MIT. He was a cofounder of the MIT Media Lab and a consultant to the One Laptop Per Child project. **Cynthia Solomon** worked with Marvin Minsky at the MIT Media Lab and at the Atari Research Center. She is the author of *Computer Environments for Children*. **Xiao Xiao** is a computer scientist, artist, and Research Affiliate with the Tangible Media Group at the MIT Media Lab.

### Commentary by

Hal Abelson, Walter Bender, Alan Kay, Brian Silverman, Gary Stager,  
Patrick H. Winston, Xiao Xiao

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architecture

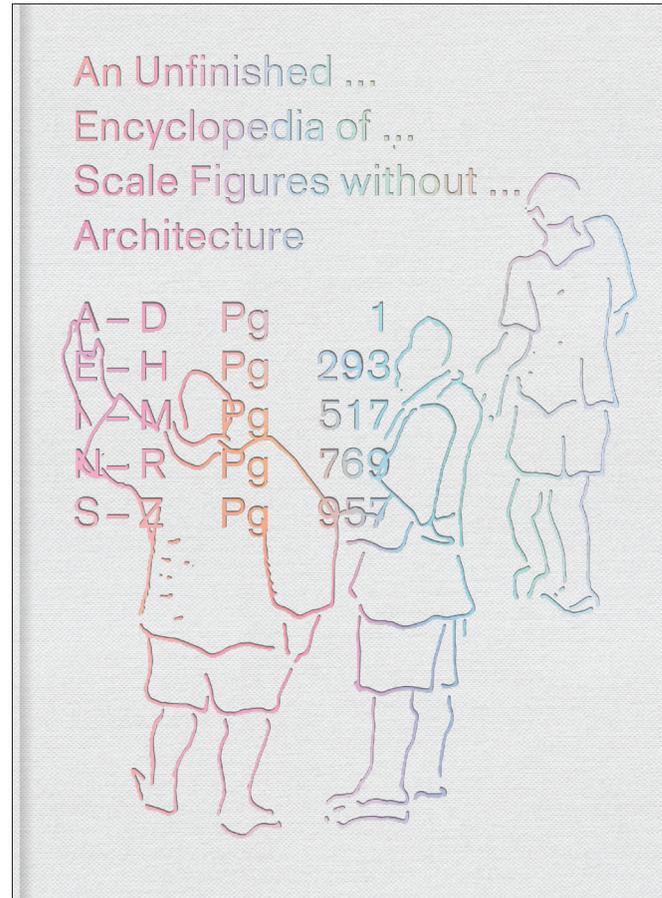
## An Unfinished Encyclopedia of Scale Figures without Architecture

Michael Meredith, Hilary Sample, and MOS

Architects draw buildings, and the buildings they draw are usually populated by representations of the human figure—drawn, copied, collaged, or inserted—most often to suggest scale. It is impossible to represent architecture without representing the human form. This book collects more than 1,000 scale figures by 250 architects but presents them in a completely unexpected way: it removes them from their architectural context, displaying them on the page, buildingless, giving them lives of their own. They are presented not thematically or chronologically but encyclopedically, alphabetically by architect (Aalto to Zumthor). In serendipitous juxtapositions, the autonomous human figures appear and reappear, displaying endless variations of architecturally rendered human forms.

Some architects' entries are casually scawled; others are drawn carefully by hand or manipulated by Photoshop; some are collaged and pasted, others rendered in charcoal or watercolors. Leon Battista Alberti presents a trident-bearing god; the Ant Farm architecture group provides a naked John and Yoko; Archigram supplies its Air Hab Village with a photograph of a happy family. Without their architectural surroundings, the scale figures present themselves as architecture's refugees. They are the necessary but often overlooked reference points that give character to spaces imagined for but not yet occupied by humans. Here, they constitute a unique sourcebook and architectural citizenry of their own.

**Michael Meredith** is a Principal at MOS, an internationally recognized architectural practice based in New York. His writing has appeared in *Artforum*, *LOG*, *Perspecta*, *Harvard Design Magazine*, and other publications. **Hilary Sample** is a Principal at MOS, Associate Professor at Columbia University's Graduate School of Architecture and Planning, and author of *Maintenance Architecture* (MIT Press). MOS, cofounded by Meredith and Sample in 2003, was the recipient of the 2015 Cooper Hewitt, Smithsonian Design Museum National Design Award in Architecture, the 2010 American Academy of Arts and Letters Architecture Award, and the 2008 Architectural League of New York Emerging Voices Award.



More than 1,000 representations of the human figure in architectural drawings by architects ranging from Aalto to Zumthor, removed from their architectural context

October  
8 x 11, 1,280 pp.  
1,248 illus.

**\$84.95T/£70.95 cloth**  
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**An examination of a 1970s  
Conceptual art project—  
advertisements for fictional  
shows by fictional artists  
in a fictional gallery—  
that hoodwinked the New  
York art world.**

September  
5 1/2 x 8 1/2, 272 pp.  
53 color illus., 82 b&w illus.

**\$27.95T/£22.95 cloth**  
978-0-262-03846-1

art

## The Jean Freeman Gallery Does Not Exist

**Christopher Howard**

From the summer of 1970 to March 1971, advertisements appeared in four leading art magazines—*Artforum*, *Art in America*, *Arts Magazine*, and *ARTnews*—for a group show and six solo exhibitions at the Jean Freeman Gallery at 26 West Fifty-Seventh Street, in the heart of Manhattan’s gallery district. As gallery goers soon discovered, this address did not exist—the street numbers went from 16 to 20 to 24 to 28—and neither did the art supposedly exhibited there. The ads were promoting fictional shows by fictional artists in a fictional gallery. The scheme, eventually exposed by a *New York Times* reporter, was concocted by the artist Terry Fugate-Wilcox as both work of art and critique of the art world. In this book, Christopher Howard brings this forgotten Conceptual art project back into view.

Howard demonstrates that Fugate-Wilcox’s project was an exceptionally clever embodiment of many important aspects of Conceptualism, incisively synthesizing the major aesthetic issues of its time—documentation and dematerialization, serialism and process, text and image, publishing and publicity. He puts the Jean Freeman Gallery in the context of other magazine-based work by Mel Bochner, Judy Chicago, Yoko Ono, and Ed Ruscha, and compares the fictional artists’ projects with actual Earthworks by Walter De Maria, Peter Hutchinson, Dennis Oppenheim, and more. Despite the deadpan perfection of the Jean Freeman Gallery project, the art establishment marginalized its creator, and the project itself was virtually erased from art history. Howard corrects these omissions, drawing on deep archival research, personal interviews, and investigation of fine-printed clues to shed new light on a New York art world mystery.

**Christopher Howard** is an art historian, critic, and editor based in New York. His writing has appeared in *Artforum*, *Art Papers*, the *Brooklyn Rail*, and other publications.

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art | China studies

## Dissidence

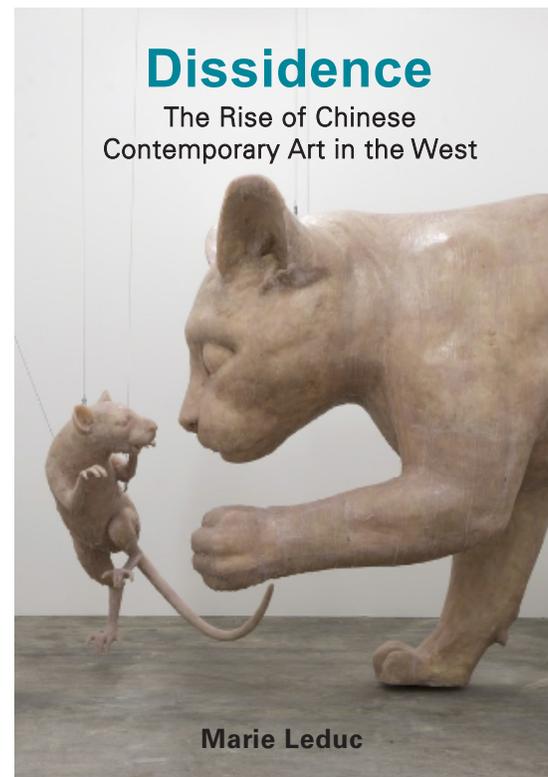
The Rise of Chinese Contemporary Art in the West

**Marie Leduc**

Chinese contemporary art emerged in the West shortly after the 1989 Tiananmen Square incident. Sparked by political sympathy and the mediatized response to the event, Western curators, critics, and art historians were quick to view the new art as an expression of dissident resistance to the Chinese regime. In this book, Marie Leduc proposes that this attribution of political dissidence is not only the result of latent Cold War perceptions about China, but also indicative of the art world's demand for artistically and politically provocative work—a demand that mirrors the valorization of free expression in liberal democracies.

Focusing on nine Chinese artists—Wang Du, Wang Keping, Huang Yong Ping, Yang Jiechang, Chen Zhen, Yan Pei-Ming, Shen Yuan, Ru Xiaofan, and Du Zhenjun—who migrated to Paris in and around 1989, Leduc explores how their work was recognized before and after the Tiananmen Square incident. Drawing on personal interviews with the artists and curators, and through an analysis of important exhibitions, events, reviews, and curatorial texts, she demonstrates how these and other Chinese artists have been celebrated both for their artistic dissidence—their formal innovations and introduction of new media and concepts—and for their political dissidence—how their work challenges political values in both China and the West. As Leduc concludes, the rise of Chinese contemporary art in the West highlights the significance of artistic and political dissidence in the production of contemporary art, and the often-unrecognized relationship between contemporary art and liberal democracy.

**Marie Leduc** is an art historian and writer who has lectured internationally on contemporary art. In addition to teaching at universities in Canada, she has published reviews, feature articles, and interviews in *Canadian Art*, *Yishu: Journal of Contemporary Chinese Art*, and *Media-N: The Journal of the New Media Caucus*.



**How the valorization of artistic and political dissidence has contributed to the rise of Chinese contemporary art in the West.**

September  
7 x 9, 240 pp.  
21 color illus., 2 b&w illus.

**\$32.95T/£27.95 cloth**  
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**Tools for navigating today's  
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contingent world.**

November

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volume 2  
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**Infrastructures series**

*design*

## Design Unbound

volume 1: Designing for Emergence in a White Water World

volume 2: Ecologies of Change for a White Water World

**Ann M. Pendleton-Julian and John Seely Brown**

The volumes of *Design Unbound* present a new tool set for having agency in the twenty-first century. These are not the tools of a coder or a carpenter but tools that are directly associated with a new kind of design—the offspring of complexity science and architecture. These are tools for navigating today's hyper-connected, rapidly changing, and radically contingent world. Having agency today requires thinking and designing with an understanding that we cannot design for absolute outcomes in a world in which propensities overrule causality. *Design Unbound* presents and illustrates these tools through a series of case studies that range from the success of the Venezuelan Youth Orchestra to the advantages of “fast iteration” to the skills of the whitewater kayaker.

*Design Unbound* makes the case that we need to design for emergence. Architecture is about designing contexts in which things happen. From a room, a house, a complex ensemble of buildings, cities, landscapes, and territorial systems of occupation, it takes only one more level of abstraction to imagine design, unbound from its material thingness and from its disciplinary boundaries, set free to design contexts as complex systems.

**Ann M. Pendleton-Julian** is an architect, writer, and educator. She is a Fellow at Stanford University's Center for Advanced Study in the Behavioral Sciences (CASBS) and Distinguished Visiting Professor of Design at Georgetown University. Previously, she was a Professor at Ohio State University, where from 2007 to 2012 she served as Director of the Austin E. Knowlton School of Architecture, and a Professor at MIT. **John Seely Brown**, former Chief Scientist at Xerox and Director of the Palo Alto Research Center (PARC), is the author of *The Social Life of Information* (with Paul Dugald) and other books.

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*design*

## Discursive Design

Critical, Speculative, and Alternative Things

**Bruce M. Tharp and Stephanie M. Tharp**

Good design provides solutions to problems. It improves our buildings, medical equipment, clothing, and kitchen utensils, among other objects. But what if design could also improve societal problems by prompting positive ideological change? In this book, Bruce and Stephanie Tharp survey recent critical design practices and propose a new, more inclusive field of socially minded practice: discursive design. While many consider good design to be unobtrusive, intuitive, invisible, and undemanding intellectually, discursive design instead targets the intellect, prompting self-reflection and igniting the imagination. Discursive design (derived from “discourse”) expands the boundaries of how we can use design—how objects are, in effect, good(s) for thinking.

*Discursive Design* invites us to see objects in a new light, to understand more than their basic form and utility. Beyond the different foci of critical design, speculative design, design fiction, interrogative design, and adversarial design, Bruce and Stephanie Tharp establish a more comprehensive, unifying vision as well as innovative methods. They not only offer social criticism but also explore how objects can, for example, be used by counselors in therapy sessions, by town councils to facilitate a pre-vote discussions, by activists seeking engagement, and by institutions and industry to better understand the values, beliefs, and attitudes of those whom they serve. Discursive design sparks new ways of thinking, and it is only through new thinking that our sociocultural futures can change.

**Bruce and Stephanie Tharp** run the design studio Materious, established in 2005, where they have done work for such companies as Ligne Roset, Moët-Hennessy, The Art Institute of Chicago, Crate & Barrel, and Kikkerland. They are both Associate Professors in the Penny W. Stamps School of Art & Design at University of Michigan.

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Exploring how design can be used for good—prompting self-reflection, igniting the imagination, and affecting positive social change.

November  
6 15/16 x 9 13/16, 438 pp.  
311 color illus.

**\$39.95T/£32.95 cloth**  
978-0-262-03898-0

**Design Thinking, Design Theory series**



A collection of writing about design from the influential, eclectic, and adventurous *Design Observer*.

October  
8 x 10, 240 pp.  
77 color illus., 1 b&w illus.

**\$34.95T/£27.95 cloth**  
978-0-262-03910-9

*design*

## Culture Is Not Always Popular

Fifteen Years of *Design Observer*

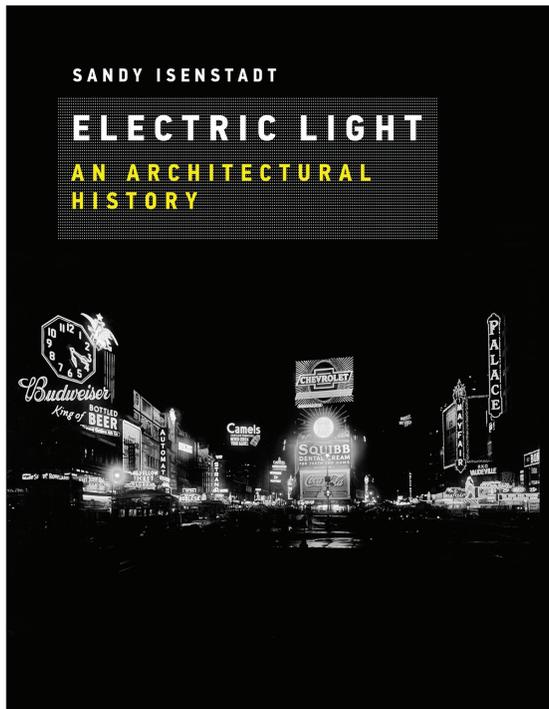
edited by Michael Bierut and Jessica Helfand

Founded in 2003, *Design Observer* inscribes its mission on its homepage: Writings about Design and Culture. Since its inception, the site has consistently embraced a broader, more interdisciplinary, and circumspect view of design's value in the world—one not limited by materialism, trends, or the slipperiness of style. Dedicated to the pursuit of originality, imagination, and close cultural analysis, *Design Observer* quickly became a lively forum for readers in the international design community. Fifteen years, 6,700 articles, 900 authors, and nearly 30,000 comments later, this book is a combination primer, celebration, survey, and salute to a certain moment in online culture. This collection includes reassessments that sharpen the lens or dislocate it; investigations into the power of design idioms; off-topic gems; discussions of design ethics; and experimental writing, new voices, hybrid observations, and other idiosyncratic texts.

Since its founding, *Design Observer* has hosted conferences, launched a publishing imprint, hosted three podcasts, and attracted more than a million followers on social media. All of these enterprises are rooted in the original mission to engage a broader community by sharing ideas on ways that design shapes—and is shaped by—our lives.

**Michael Bierut** is a partner in the New York office of Pentagram. His book *How to Use Graphic Design to Sell Things, Explain Things, Make Things Look Better, Make People Laugh, Make People Cry, and (Every Once in a While) Change the World* accompanied a 2015 retrospective of his work, which was part of the School of Visual Art's Masters Series. **Jessica Helfand** is the author of numerous books on design and visual culture including *Design: The Invention of Desire*. Cofounders of *Design Observer* and cohosts of two podcasts, the authors are on the faculty at Yale School of Art and Yale School of Management. Each is a recipient of the AIGA Medal, the design profession's highest honor.

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**How electric light created new spaces that transformed the built environment and the perception of modern architecture.**

September  
7 x 9, 296 pp.  
27 color illus., 109 b&w illus.

**\$44.95T/£37.95 cloth**  
978-0-262-03817-1

## Electric Light

An Architectural History

**Sandy Isenstadt**

In this book, Sandy Isenstadt examines electric light as a form of architecture—as a new, uniquely modern, kind of building material. Electric light was more than just a novel way of brightening a room or illuminating a streetscape; it brought with it new ways of perceiving and experiencing space itself. If modernity can be characterized by rapid, incessant change, and modernism as the creative response to such change, Isenstadt argues, then electricity—instantaneous, malleable, ubiquitous, evanescent—is modernity’s medium.

Isenstadt shows how the introduction of electric lighting at the end of the nineteenth century created new architectural spaces that altered and sometimes eclipsed previously existing spaces. He constructs an architectural history of these new spaces through five examples, ranging from the tangible miracle of the light switch to the immaterial and borderless gloom of the wartime blackout. He describes what it means when an ordinary person can play God by flipping a switch; when the roving cone of automobile headlights places driver and passenger at the vertex of a luminous cavity; when lighting in factories is seen to enhance productivity; when Times Square became an emblem of illuminated commercial speech; and when the absence of electric light in a blackout produced a new type of space. In this book, the first sustained examination of the spatial effects of electric lighting, Isenstadt reconceives modernism in architecture to account for the new perceptual conditions and visual habits that followed widespread electrification.

**Sandy Isenstadt** is a Professor in the Art History Department and Director of the Center for Material Culture Studies at the University of Delaware. He is the author of *The Modern American House: Spaciousness and Middle-Class Identity*.

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urbanism | technology

## Inventing Future Cities

**Michael Batty**

We cannot predict future cities, but we can invent them. Cities are largely unpredictable because they are complex systems that are more like organisms than machines. Neither the laws of economics nor the laws of mechanics apply; cities are the product of countless individual and collective decisions that do not conform to any grand plan. They are the product of our inventions; they evolve. In *Inventing Future Cities*, Michael Batty explores what we need to understand about cities in order to invent their future.

Batty outlines certain themes—principles—that apply to all cities. He investigates not the invention of artifacts but inventive processes. Today form is becoming ever more divorced from function; information networks now shape the traditional functions of cities as places of exchange and innovation. By the end of this century, most of the world's population will live in cities, large or small, sometimes contiguous, and always connected; in an urbanized world, it will be increasingly difficult to define a city by its physical boundaries.

Batty discusses the coming great transition from a world with few cities to a world of all cities; argues that future cities will be defined as clusters in a hierarchy; describes the future “high-frequency,” real-time streaming city; considers urban sprawl and urban renewal; and maps the waves of technological change, which grow ever more intense and lead to continuous innovation—an unending process of creative destruction out of which future cities will emerge.

**Michael Batty** is Bartlett Professor of Planning at University College London and the author of *Cities and Complexity* and *The New Science of Cities*, both published by the MIT Press.

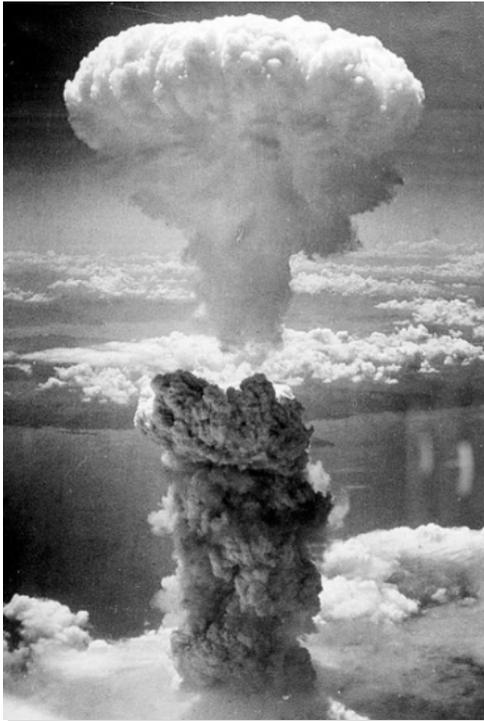
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**How we can invent  
—but not predict—  
the future of cities.**

November  
6 x 9, 264 pp.  
46 b&w illus.

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978-0-262-03895-9



**How art makes visible what had been invisible—the effects of radiation, the lives of atomic bomb survivors, and the politics of the atomic age.**

December  
6 x 9, 400 pp.  
168 illus.

**\$34.95T/£27.95 cloth**  
978-0-262-03854-6

**A Leonardo Book**

*art*

## Invisible Colors

The Arts of the Atomic Age

**Gabrielle Decamous**

The effects of radiation are invisible, but art can make it and its effects visible. Artwork created in response to the events of the nuclear era allow us to see them in a different way. In *Invisible Colors*, Gabrielle Decamous explores the atomic age from the perspective of the arts, investigating atomic-related art inspired by the work of Marie Curie, the bombings of Hiroshima and Nagasaki, the disaster at Fukushima, and other episodes in nuclear history.

Decamous looks at the “Radium Literature” based on the work and life of Marie Curie; “A-Bomb literature” by Hibakusha (bomb survivor) artists from Nagasaki and Hiroshima; responses to the bombings by Western artists and writers; art from the irradiated landscapes of the Cold War—nuclear test sites and uranium mines, mainly in the Pacific and some African nations; and nuclear accidents in Fukushima, Chernobyl, and Three Mile Island. She finds that the artistic voices of the East are often drowned out by those of the West. Hibakusha art and Japanese photographs of the bombing are little known in the West and were censored; poetry from the Marshall Islands and Moruroa is also largely unknown; Western theatrical and cinematic works focus on heroic scientists, military men, and the atomic mushroom cloud rather than the aftermath of the bombings.

Emphasizing art by artists who were present at these nuclear events—the “global Hibakusha”—rather than those reacting at a distance, Decamous puts Eastern and Western art in dialogue, analyzing the aesthetics and the ethics of nuclear representation.

**Gabrielle Decamous** is Associate Professor in the Faculty of Languages and Cultures at Kyushu University in Fukuoka, Japan. She has taught at Goldsmiths, University of London, and was the recipient of a Hilla Rebay International Fellowship, working with curators at museums in New York, Bilbao, and Venice and the recipient of a KAKENHI (Grants-in-aid for Scientific Research) in Japan.

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architecture | art

## Garage

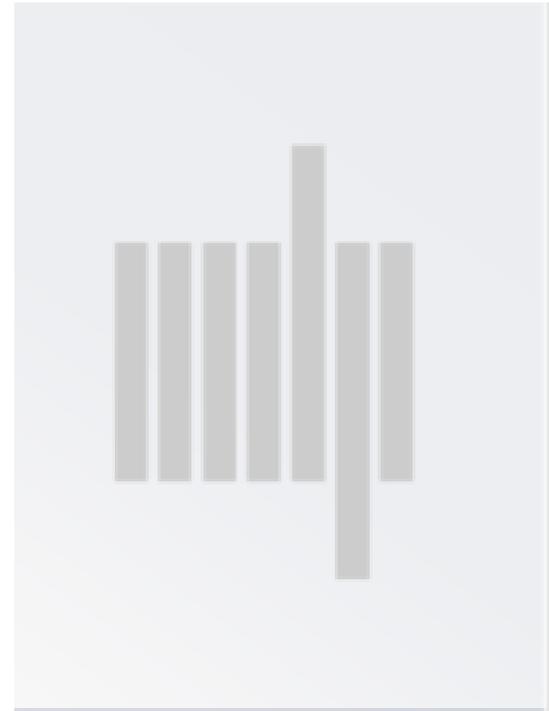
**Olivia Erlanger and Luis Ortega Govela**

Frank Lloyd Wright invented the garage when he moved the automobile out of the stable into a room of its own. Steve Jobs and Steve Wozniak (allegedly) started Apple Computers in a garage. Suburban men turned garages into man caves to escape from family life. Nirvana and No Doubt played their first chords as garage bands. The garage began as an architectural technology and became a cultural construct. In this provocative history and deconstruction of an American icon, Olivia Erlanger and Luis Ortega Govela use the garage as a lens through which to view the advent of suburbia, the myth of the perfect family, and the distortion of the American dream into delusion.

The stories of what happened in these garages became self-fulfilling prophecies the more they were repeated. Hewlett-Packard was founded in a garage that now bears a plaque: The Birthplace of Silicon Valley. Also conceived in a garage: the toy company Mattel, creator of Barbie, the postwar, posthuman representation of American women. Garages became guest rooms, game rooms, home gyms, wine cellars, and secret bondage lairs, a no-commute destination for makers and DIYers—surfboard designers, ski makers, pet keepers, flannel-wearing musicians, weed-growing nuns. The garage was an aboveground underground, offering both a safe space for withdrawal and a stage for participation—opportunities for isolation or and empowerment.

**Olivia Erlanger** is an artist based in New York. She has shown her work internationally, received the inaugural BMW Open Work Frieze commission, and is working on a documentary. She has been a visiting artist and lecturer at Brown University and the Architectural Association. **Luis Ortega Govela** is a Mexican architect based in Los Angeles. He has lectured at the Architectural Association and is a founder of the arts collective AYR. He is currently at work on his first film.

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**A secret history of the garage as a quintessentially creative space, from its invention by Frank Lloyd Wright to its use by start-ups and**

September  
6 x 8 3/8, 224 pp.  
52 color illus.

**\$21.95T/£17.95 cloth**  
978-0-262-03834-8

landscape architecture | gardening

## Overgrown

Practices between Landscape Architecture and Gardening

**Julian Raxworthy**

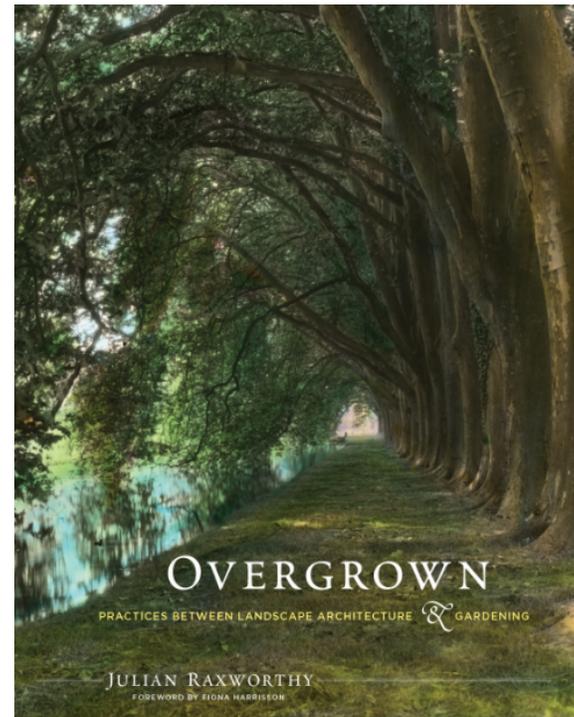
foreword by Fiona Harrison

Addressing one of the most repressed subjects in landscape architecture, this book could only have been written by someone who is both an experienced gardener and a landscape architect. With *Overgrown*, Julian Raxworthy offers a watershed work in the tradition of Ian McHarg, Anne Spirn, Kevin Lynch, and Gyorgy Kepes.

As a discipline, landscape architecture has distanced itself from gardening, and landscape architects take pains to distinguish themselves from gardeners or landscapers. Landscape architects tend to imagine gardens from the office, representing plants with drawings or other simulations, whereas gardeners work in the dirt, in real time, planting and pruning. In *Overgrown*, Julian Raxworthy calls for the integration of landscape architecture and gardening. Each has something to offer the other: Landscape architecture can design beautiful spaces, and gardening can enhance and deepen the beauty of garden environments over time. Growth, says Raxworthy, is the medium of garden development; landscape architects should leave the office and go into the garden in order to know growth in an organic, nonsimulated way.

Raxworthy proposes a new practice for working with plant material that he terms “the viridic” (after “the tectonic” in architecture), from the Latin word for green, with its associations of spring and growth. He builds his argument for the viridic through six generously illustrated case studies of gardens that range from “formal” to “informal” approaches—from a sixteenth-century French Renaissance water garden to a Scottish poet-scientist’s “marginal” garden, barely differentiated from nature. Raxworthy argues that landscape architectural practice itself needs to be “gardened,” brought back into the field. He offers a “Manifesto for the Viridic” that casts designers and plants as vegetal partners in a renewed practice of landscape gardening.

**Julian Raxworthy** is a landscape architect from Australia. He convenes the Landscape Architecture and Urban Design programs in the School of Architecture, Planning, and Geomatics at the University of Cape Town.



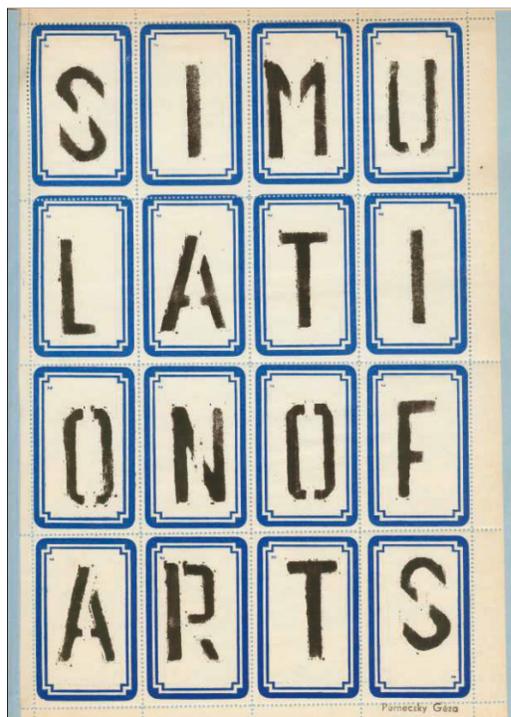
**A call for landscape architects to leave the office and go into the garden.**

October  
7 x 9, 336 pp.  
12 color illus., 137 b&w illus.

**\$24.95T/£19.95 cloth**  
978-0-262-03853-9

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art



**The story of the experimental zeitgeist in Eastern European art, seen through personal encounters, pioneering dialogues, collaborative projects, and cultural exchanges.**

December  
7 x 9, 400 pp.  
36 color illus., 198 b&w illus.  
**\$49.95T/£41.95 cloth**  
978-0-262-03830-0

## Networking the Bloc

Experimental Art in Eastern Europe, 1965–1981

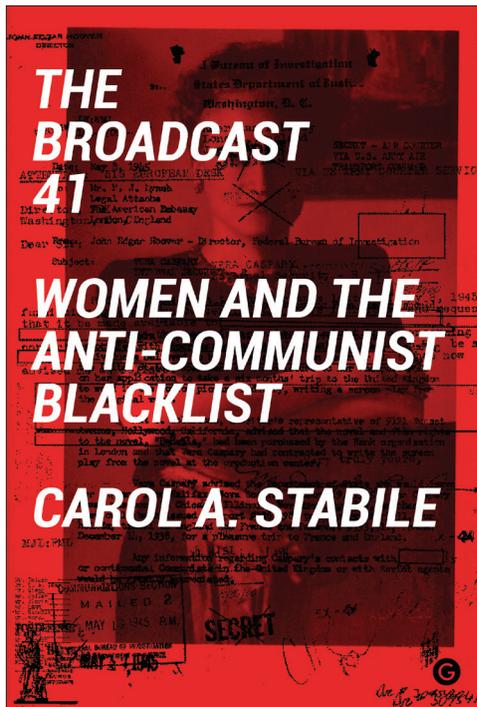
**Klara Kemp-Welch**

Throughout the 1970s, a network of artists emerged to bridge the East-West divide. Originating with a series of creative initiatives by artists, art historians, and critics and centered in places like Budapest, Poznań, and Prague, this experimental dialogue involved Western participation but is today largely forgotten in the West. In *Networking the Bloc*, Klara Kemp-Welch vividly recaptures this lost chapter of art history, documenting an elaborate web of artistic connectivity that came about through a series of personal encounters, pioneering dialogues, collaborative projects, and cultural exchanges. Countering the conventional Cold War narrative of Eastern bloc isolation, Kemp-Welch shows how artistic ideas were relayed among like-minded artists across ideological boundaries and national frontiers.

Much of the work created was collaborative, and personal encounters were at its heart. Drawing on archival documents and interviews with participants, Kemp-Welch focuses on the exchanges and projects themselves rather than the personalities involved. Each of the projects she examines relied for its realization on a network of contributors. She looks first at the mobilization of the network, from 1964 to 1972, exploring five pioneering cases: a friendship between a Slovak artist and a French critic, an artistic credo, an exhibition, a conceptual proposition, and a book. She then charts a series of way stations for experimental art from the Soviet bloc between 1972 and 1976—points of distribution between studios, private homes, galleries, and certain cities. Finally, she investigates convergences—a succession of shared exhibitions and events in the second half of the 1970s in locations ranging from Prague to Milan to Moscow. With *Networking the Bloc*, Kemp-Welch invites us to rethink the art of the late Cold War period from Eastern European perspectives.

**Klara Kemp-Welch** is a Lecturer in twentieth-century modernism at the Courtauld Institute of Art, London. She is the author of *Antipolitics in Central European Art*.

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**How forty-one women—  
including Dorothy Parker,  
Gypsy Rose Lee, and Lena  
Horne—were forced out of  
American television and radio  
in the 1950s “Red Scare.”**

November  
6 x 9, 368 pp.  
19 b&w ills

**\$29.95T/£24.95 cloth**  
978-1-906897-86-4

**Distributed for Goldsmiths Press**

## The Broadcast 41

Women and the Anti-Communist Blacklist

**Carol A. Stabile**

At the dawn of the Cold War era, forty-one women working in American radio and television were placed on a media blacklist and forced from their industry. The ostensible reason: so-called Communist influence. But in truth these women—among them Dorothy Parker, Lena Horne, and Gypsy Rose Lee—were, by nature of their diversity and ambition, a threat to the traditional portrayal of the American family on the airwaves. This book from Goldsmiths Press describes what American radio and television lost when these women were blacklisted, documenting their aspirations and achievements.

Through original archival research and access to FBI blacklist documents, *The Broadcast 41* details the blacklisted women’s attempts in the 1930s and 1940s to depict America as diverse, complicated, and inclusive. The book tells a story about what happens when non-male, non-white perspectives are excluded from media industries, and it imagines what the new medium of television might have looked like had dissenting viewpoints not been eliminated at such a formative moment. The all-white, male-dominated *Leave it to Beaver* America about which conservative politicians wax nostalgic existed largely because of the forcible silencing of these forty-one women and others like them. For anyone concerned with the ways in which our cultural narrative is constructed, this book offers an urgent reminder of the myths we perpetuate when a select few dominate the airwaves.

**Carol A. Stabile** is Chair of the Department of Women’s Studies at the University of Maryland and the author of *Feminism and the Technological Fix*, *White Victims*, *Black Villains: Gender, Race, and Crime News in US Culture*, and other books.

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cultural studies

## Many Splendored Things

Thinking Sex and Play

**Susanna Paasonen**

We all know that sex involves a quest for pleasure, that sexual palates vary across people's lifespans, and that playful experimentations play a key role in how people discover their diverse sexual turn-ons and turn-offs. Yet little attention has been paid to thinking through the interconnections of sex and play, sexuality and playfulness. In *Many Splendored Things* from Goldsmiths Press, Susanna Paasonen considers these interconnections. Paasonen examines the notions of playfulness and play as they shed light on the urgency of sexual pleasures, the engrossing appeal of sex, and the elasticity of sexual desires, and considers their connection to categories of identity. Drawing on a broad range of scholarship on sexuality, play, and the media, Paasonen moves from the conceptual to the concrete, examining advice literature on sexual play, the vernacular aesthetics of the *Fifty Shades* series, girls' experiences of online sexual role-playing, popular media coverage of age-play, and Jan Soldat's documentary films on BDSM culture.

Paasonen argues that play in the realm of sexuality involves experimentation with what bodies can feel and do and what people may imagine themselves as doing, liking, and preferring. Play involves the exploration of different bodily capacities, appetites, orientations, and connections. Occasionally strained, dark, and even hurtful in the forms that it takes and the sensory intensities that it engenders, sex presses against previously perceived and imagined horizons of embodied potentiality. Play pushes sexual identifications into motion.

**Susanna Paasonen** is Professor of Media Studies at the University of Turku in Finland and the author of *Carnal Resonance: Affect and Online Pornography* (MIT Press).

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