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Spring 2017

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*philosophy*

## A Mark of the Mental

In Defense of Informational Teleosemantics

**Karen Neander**

In *A Mark of the Mental*, Karen Neander considers the representational power of mental states—described by the cognitive

**Drawing on insights from causal theories of reference, teleosemantics, and state space semantics, a theory of naturalized mental representation.**

scientist Zenon Pylyshyn as the “second hardest puzzle” of philosophy of mind (the first being consciousness). The puzzle at the heart of the book is sometimes called “the problem of mental content,” “Brentano’s problem,”

or “the problem of intentionality.” Its motivating mystery is how neurobiological states can have semantic properties such as meaning or reference. Neander proposes a naturalistic account for sensory-perceptual (nonconceptual) representations.

Neander draws on insights from state-space semantics (which appeals to relations of second-order similarity between representing and represented domains), causal theories of reference (which claim the reference relation is a causal one), and teleosemantic theories (which claim that semantic norms, at their simplest, depend on functional norms). She proposes and defends an intuitive, theoretically well-motivated but highly controversial thesis: sensory-perceptual systems have the function to produce inner state changes that are the analogs of as well as caused by their referents. Neander shows that the three main elements—functions, causal-information relations, and relations of second-order similarity—complement rather than conflict with each other. After developing an argument for teleosemantics by examining the nature of explanation in the mind and brain sciences, she develops a theory of mental content and defends it against six main content-determinacy challenges to a naturalized semantics.

**Karen Neander** is Professor of Philosophy at Duke University.

6 x 9, 296 pp. | 13 illus.

**\$40.00S/£29.95 cloth**  
978-0-262-03614-6

**Life and Mind series**

*philosophy | science, technology, and society*

## New Romantic Cyborgs

Romanticism, Information Technology, and the End of the Machine

**Mark Coeckelbergh**

Romanticism and technology are widely assumed to be opposed to each other. Romanticism—understood as a reaction against

**An account of the complex relationship between technology and romanticism that links nineteenth-century monsters, automata, and mesmerism with twenty-first-century technology.**

rationalism and objectivity—is perhaps the last thing users and developers of information and communication technology (ICT) think about when they engage with computer programs and electronic devices. And yet, as Mark Coeckelbergh argues in this book, this way of thinking about technology

is itself shaped by romanticism and obscures a better and deeper understanding of our relationship to technology. Coeckelbergh describes the complex relationship between technology and romanticism that links nineteenth-century monsters, automata, and mesmerism with twenty-first-century technology’s magic devices and romantic cyborgs.

Coeckelbergh argues that current uses of ICT can be interpreted as attempting a marriage of Enlightenment rationalism and romanticism. He describes the “romantic dialectic,” when this new kind of material romanticism, particularly in the form of the cyborg as romantic figure, seems to turn into its opposite. He shows that both material romanticism and the objections to it are still part of modern thinking, and part of the romantic dialectic. Reflecting on what he calls “the end of the machine,” Coeckelbergh argues that to achieve a more profound critique of contemporary technologies and culture, we need to explore not only different ways of thinking but also different technologies—and that to accomplish the former we require the latter.

**Mark Coeckelbergh** is Professor of Philosophy of Media and Technology in the Department of Philosophy at the University of Vienna.

March | 6 x 9, 320 pp. | 4 illus.

**\$50.00S/£37.95 cloth**  
978-0-262-03546-0

## Evolving Enactivism

Basic Minds Meet Content

**Daniel D. Hutto and Erik Myin**

*Evolving Enactivism* argues that cognitive phenomena—perceiving, imagining, remembering—can be best explained in terms of an interface between contentless and content-involving forms of cognition. Building on their earlier book *Radicalizing Enactivism*, which proposes that there can be forms of cognition without content, Daniel Hutto and Erik Myin demonstrate the unique explanatory advantages of recognizing that only some forms of cognition have content while others—the most elementary ones—do not. They offer an account of the mind in duplex terms, proposing a complex vision of mentality in which these basic contentless forms of cognition interact with content-involving ones.

Hutto and Myin argue that the most basic forms of cognition do not, contrary to a currently popular account of cognition, involve picking up and processing of information that is then used, reused, stored, and represented in the brain. Rather, basic cognition is contentless—fundamentally interactive, dynamic, and relational. In advancing the case for a radically enactive account of cognition, Hutto and Myin propose crucial adjustments to our concept of cognition and offer theoretical support for their revolutionary rethinking, emphasizing its capacity to explain basic minds in naturalistic terms. They demonstrate the explanatory power of the duplex vision of cognition, showing how it offers powerful means for understanding quintessential cognitive phenomena without introducing scientifically intractable mysteries into the mix.

**Daniel D. Hutto** is Professor of Philosophical Psychology at the University of Wollongong and the author of *Folk Psychological Narratives: The Sociocultural Basis for Understanding Reasons* (MIT Press). **Erik Myin** is Professor of Philosophy at the University of Antwerp. Hutto and Myin are the authors of *Radicalizing Enactivism: Basic Minds without Content* (MIT Press).

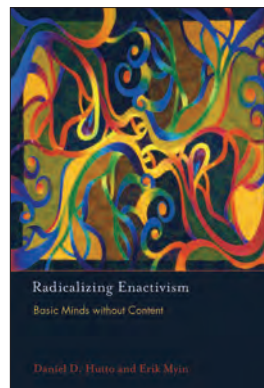
An extended argument that cognitive phenomena—perceiving, imagining, remembering—can be best explained in terms of an interface between contentless and content-involving forms of cognition.

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*Also available*

**Radicalizing Enactivism**  
**Basic Minds without Content**  
Daniel D. Hutto and Erik Myin  
2013, 978-0-262-01854-8  
\$41.00S/£30.95 cloth



## Visual Phenomenology

**Michael Madary**

In this book, Michael Madary examines visual experience, drawing on both phenomenological and empirical methods of investigation. He finds that these two approaches—careful, philosophical description of experience and the science of vision—independently converge on the same result: Visual perception is an ongoing process of anticipation and fulfillment.

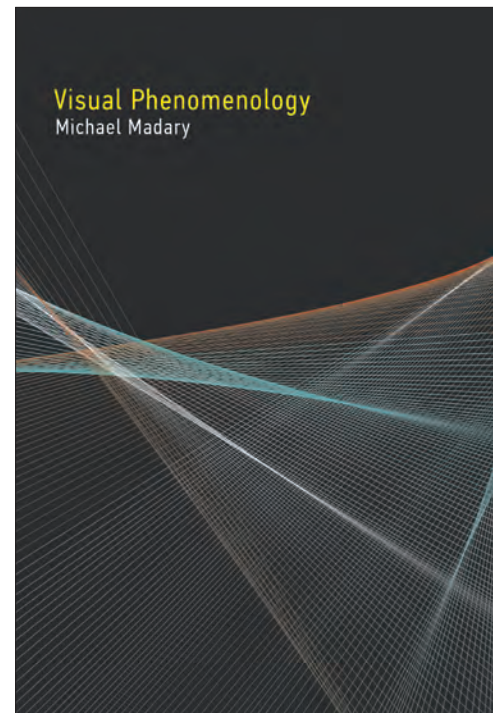
Madary first makes the case for the descriptive premise, arguing that the phenomenology of vision is best described as an ongoing process of anticipation and fulfillment. He discusses visual experience as being perspectival, temporal, and indeterminate; considers the possibility of surprise when appearances do not change as we expect; and considers the content of visual anticipation. Madary then makes the case for the empirical premise, showing that there are strong empirical reasons to model vision using the general form of anticipation and fulfillment. He presents a range of evidence from perceptual psychology and neuroscience, and reinterprets evidence for the two-visual-systems hypothesis. Finally, he considers the relationship between visual perception and social cognition. An appendix discusses Husserlian phenomenology as it relates to the argument of the book.

Madary argues that the fact that there is a convergence of historically distinct methodologies itself is an argument that supports his findings. With *Visual Phenomenology*, he creates an exchange between the humanities and the sciences that takes both methods of investigation seriously.

**Michael Madary** is Assistant Researcher and Lecturer at the Johannes Gutenberg University of Mainz.

“Defending the idea that visual perception is an ongoing process of anticipation and fulfillment, Madary draws from both phenomenological studies and vision science to provide new, important insights into how we see the world and others. His analysis is rich with the empirical and experiential facts. In contrast to many works on vision, this book is bright and clear and eminently readable.”

—**Shaun Gallagher, Lillian and Morrie Moss Professor of Excellence in Philosophy, University of Memphis; author of *How the Body Shapes the Mind* and *The Phenomenological Mind***



**Phenomenological and empirical methods of investigating visual experience converge to support the thesis that visual perception is an ongoing process of anticipation and fulfillment.**

February  
6 x 9, 264 pp.  
12 illus.

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## Moral Psychology, Volume 5

Virtue and Character

edited by **Walter Sinnott-Armstrong**  
and **Christian B. Miller**

**Groundbreaking essays and commentaries on the ways that recent findings in psychology and neuroscience illuminate virtue and character and related issues in philosophy.**

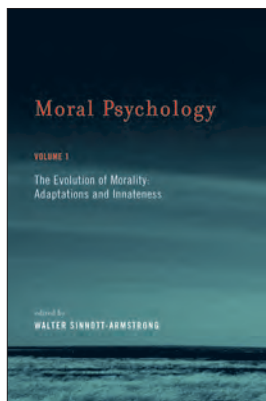
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Philosophers have discussed virtue and character since Socrates, but many traditional views have been challenged by recent findings in psychology and neuroscience. This fifth volume of *Moral Psychology* grows out of this new wave of interdisciplinary work on virtue, vice, and character. It offers essays, commentaries, and replies by leading philosophers and scientists who explain and use empirical findings from psychology and neuroscience to illuminate virtue and character and related issues in moral philosophy. The contributors discuss such topics as eliminativist and situationist challenges to character; investigate the conceptual and empirical foundations of self-control, honesty, humility, and compassion; and consider whether the virtues contribute to well-being.

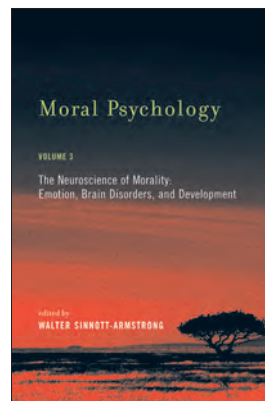
**Walter Sinnott-Armstrong** is Stillman Professor of Practical Ethics in the Philosophy Department and the Kenan Institute for Ethics at Duke University. He edited the previous volumes in *Moral Psychology*. **Christian B. Miller** is Professor of Philosophy at Wake Forest University and Director of the Character Project ([www.thecharacterproject.com](http://www.thecharacterproject.com)).



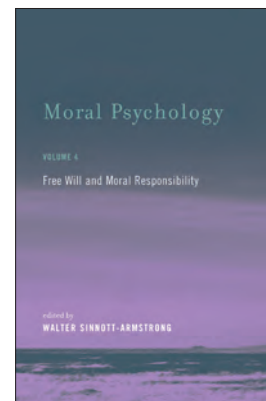
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philosophy of science | psychiatry

## Extraordinary Science and Psychiatry

Responses to the Crisis in Mental Health Research

edited by Jeffrey Poland and Şerife Tekin

Psychiatry and mental health research is in crisis, with tensions between psychiatry's clinical and research aims and controversies

**Leading scholars offer perspectives from the philosophy of science on the crisis in psychiatric research that exploded after the publication of DSM-5.**

over diagnosis, treatment, and scientific constructs for studying mental disorders. At the center of these controversies is the *Diagnostic and Statistical Manual of Mental Disorders* (DSM), which—especially after the publication of DSM-5—many have found seriously

flawed as a guide for research. This book addresses the crisis and the associated “extraordinary science” (Thomas Kuhn’s term for scientific research during a state of crisis) from the perspective of philosophy of science. The goal is to help reconcile the competing claims of science and phenomenology within psychiatry and to offer new insights for the philosophy of science.

The contributors discuss the epistemological origins of the current crisis, the nature of evidence in psychiatric research, and the National Institute for Mental Health’s Research Domain Criteria project. They consider particular research practices in psychiatry—computational, personalized, mechanistic, and user-led—and the specific categories of schizophrenia, depressive disorder, and bipolar disorder. Finally, they examine the DSM’s dubious practice of pathologizing normality.

**Jeffrey Poland** is Visiting Professor of Science and Technology Studies at Brown University and a Senior Lecturer in History, Philosophy, and Social Science at Rhode Island School of Design. He is the coeditor of *Addiction and Responsibility* (MIT Press). **Şerife Tekin** is Assistant Professor in the Department of Philosophy and Religious Studies at Daemen College, Amherst, New York.

### Contributors

Richard P. Bentall, John Bickle, Robyn Bluhm, Rachel Cooper, Kelso Cratsley, Owen Flanagan, Michael Frank, George Graham, Ginger A. Hoffman, Harold Kincaid, Aaron Kostko, Edouard Machery, Jeffrey Poland, Claire Pouncey, Şerife Tekin, Peter Zachar

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**Philosophical Psychopathology series**

philosophy

## Truth in Husserl, Heidegger, and the Frankfurt School

Critical Retrieval

Lambert Zuidervaart

The idea of truth is a guiding theme for German continental philosophers from Husserl through Habermas. In this book,

**An innovative, ambitious, tradition-crossing study drawing on the work of Husserl, Heidegger, Horkheimer, Adorno, and Habermas to propose a new and transformative concept of truth.**

Lambert Zuidervaart examines debates surrounding the idea of truth in twentieth-century German continental philosophy. He argues that the Heideggerian and critical theory traditions have much in common—despite the miscommunication, opposition, and even outright hostility that have prevailed between them—including significant roots in the phenomenology of Edmund Husserl. Zuidervaart sees the tensions between Heideggerian thought and critical theory as potentially generative sources for a new approach to the idea of truth. He argues further that the “critical retrieval” of insights from German continental philosophy can shed light on current debates in analytic truth theory.

Zuidervaart structures his account around three issues: the distinction between propositional truth and truth that is more than propositional (which he calls *existential truth*); the relationship between propositional truth and the discursive justification of propositional truth claims, framed in analytic philosophy by debates between epistemic and nonepistemic conceptions of truth; and the relationship between propositional truth and the objectivity of knowledge, often presented in analytic philosophy as a conflict between realists and antirealists over the relation between “truth bearers” and “truth makers.” In an innovative and ambitious argument, drawing on the work of Husserl, Heidegger, Horkheimer, Adorno, and Habermas, Zuidervaart proposes a new and transformative conception of truth.

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**Lambert Zuidervaart** is Professor of Philosophy Emeritus at the Institute for Christian Studies in Toronto. He is the author of *Adorno's Aesthetic Theory* (MIT Press), *Artistic Truth*, *Social Philosophy after Adorno*, *Religion, Truth, and Social Transformation*, and other books.

July | 6 x 9, 256 pp.

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978-0-262-03628-3



*cognitive science | philosophy*

## Embodiment, Enaction, and Culture

Investigating the Constitution of the Shared World

edited by **Christoph Durt, Thomas Fuchs, and Christian Tewes**

Recent accounts of cognition attempt to overcome the limitations of traditional cognitive science by reconceiving cognition

**The first interdisciplinary investigation of the cultural context of enactive embodiment, offering perspectives that range from the neurophilosophical to the anthropological.**

as enactive and the cognizer as an embodied being who is embedded in biological, psychological, and cultural contexts. Cultural forms of sense-making constitute the shared world, which in turn is the origin and place of cognition. This volume is the first interdisciplinary

collection on the cultural context of embodiment, offering perspectives that range from the neurophilosophical to the anthropological.

The book brings together new contributions by some of the most renowned scholars in the field and the latest results from up-and-coming researchers. The contributors explore conceptual foundations, drawing on work by Husserl, Merleau-Ponty, and Sartre, and respond to recent critiques. They consider whether there is something in the self that precedes intersubjectivity and inquire into the relation between culture and consciousness, the nature of shared meaning and social understanding, the social dimension of shame, and the nature of joint affordances. They apply the notion of radical enactive cognition to evolutionary anthropology, and examine the concept of the body in relation to culture in light of studies in such fields as phenomenology, cognitive neuroscience, psychology, and psychopathology. Through such investigations, the book breaks ground for the study of the interplay of embodiment, enaction, and culture.

**Christoph Durt** is Marie Skłodowska Curie Experienced Researcher at the University of Vienna. **Thomas Fuchs** is Karl Jaspers Professor of Philosophy and Psychiatry at the University of Heidelberg.

**Christian Tewes** is a project manager and coordinator of the research group Embodiment as a Paradigm of Evolutionary Anthropology at the University of Heidelberg.

April | 7 x 9, 464 pp. | 6 illus.

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*philosophy | cognitive science*

## Moral Judgments as Educated Intuitions

**Hanno Sauer**

Rationalists about the psychology of moral judgment argue that moral cognition has a rational foundation. Recent chal-

**An argument that moral reasoning plays a crucial role in moral judgment through episodes of rational reflection that have established patterns for automatic judgment foundation.**

lenges to this account, based on findings in the empirical psychology of moral judgment, contend that moral thinking has no rational basis. In this book, Hanno Sauer argues that moral reasoning does play a role in moral judgment—but not, as is commonly supposed, because

conscious reasoning produces moral judgments directly. Moral reasoning figures in the acquisition, formation, maintenance, and reflective correction of moral intuitions. Sauer proposes that when we make moral judgments we draw on a stable repertoire of intuitions about what is morally acceptable, which we have acquired over the course of our moral education—episodes of rational reflection that have established patterns for automatic judgment foundation. Moral judgments are educated and rationally amenable moral intuitions.

Sauer engages extensively with the empirical evidence on the psychology of moral judgment and argues that it can be shown empirically that reasoning plays a crucial role in moral judgment. He offers detailed counterarguments to the anti-rationalist challenge (the claim that reason and reasoning play no significant part in morality and moral judgment) and the emotionist challenge (the argument for the emotional basis of moral judgment). Finally, he uses Joshua Greene's Dual Process model of moral cognition to test the empirical viability and normative persuasiveness of his account of educated intuitions. Sauer shows that moral judgments can be automatic, emotional, intuitive, and rational at the same time.

**Hanno Sauer** is Assistant Professor of Ethics at Utrecht University.

March | 6 x 9, 328 pp. | 13 illus.

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*philosophy | psychology*

## The Social Turn in Moral Psychology

**Mark Fedyk**

In this book, Mark Fedyk offers a novel analysis of the relationship between moral psychology and allied fields in the social

**An argument that moral psychology can benefit from closer integration with the social sciences and that offers a novel ethical theory bridging the two.**

sciences. Fedyk shows how the social sciences can be integrated with moral philosophy, argues for the benefits of such an integration, and offers a new ethical theory that can be used to bridge research between the two.

Fedyk argues that moral psychology should take a

social turn, investigating the psychological processes that motivate patterns of social behavior defined as ethical using normative information extracted from the social sciences. He points out methodological problems in conventional moral psychology, particularly the increasing methodological and conceptual inconsistency with both philosophical ethics and evolutionary biology. Fedyk's "causal theory of ethics" is designed to provide moral psychology with an ethical theory that can be used without creating tension between its scientific practice and the conceptual vocabulary of philosophical ethics. His account aims both to redirect moral psychology toward more socially realistic questions about human life and to introduce philosophers to a new form of ethical naturalism—a way of thinking about how to use different fields of scientific research to answer some of the traditional questions that are at the heart of ethics.

**Mark Fedyk** is Assistant Professor in the Department of Philosophy at Mount Allison University.

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*psychology | sociology*

## Ageism

Stereotyping and Prejudice against Older Persons

SECOND EDITION

**edited by Todd D. Nelson**

People commonly use age to categorize and stereotype others—even though those who stereotype the elderly are eventually

**Current research and theory from a range of disciplines on ageism, discussing issues from elder abuse to age discrimination against workers, revised and updated.**

bound to become elderly themselves. Ageism is found cross-culturally, but it is especially prevalent in the United States, where most people regard growing older with depression, fear, and anxiety. Older people in the United States are stigmatized and marginalized, with often dev-

astating consequences. This volume collects the latest theory and research on prejudice against older people, offering perspectives from psychology, nursing, medicine, social work, and other fields. The second edition has been completely updated, with new or extensively revised contributions. The contributors, all experts in their fields, consider issues that range from elder abuse to age discrimination against workers.

There has been a relative dearth of research on ageism, perhaps because age prejudice is still considered socially acceptable. This book is still the only one that examines ageism in such detail, from such diverse scholarly perspectives. The contributors discuss the origins and effects of ageism and offer suggestions for how to reduce ageism as the wave of baby boomers heads for old age.

**Todd D. Nelson** is Professor of Psychology at California State University, Stanislaus.

### Contributors

Yoav S. Bergman, Ehud Bodner, Jennifer Barbour, Piers Bayl-Smith, Daphne Blunt Bugental, Maria Clara P. de Paula Couto, Susan T. Fiske, Jeff Greenberg, Barbara Griffin, Jessica A. Hehman, Peter Helm, Sarah H. Kagan, Molly Maxfield, Lynn McDonald, Mary Chase Mize, Joann M. Montepare, Todd D. Nelson, Michael S. North, Amanda Rumsey, Jeff Schimel, Laura Shannonhouse, Dirk Wentura, Susan Krauss Whitbourne

July | 6 x 9, 376 pp. | 3 illus.

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*psychology | cognitive science*

## Invisible Mind

Flexible Social Cognition and Dehumanization

**Lasana T. Harris**

In *Invisible Minds*, Lasana Harris takes a social neuroscience approach to explaining the worst of human behavior. How can a person take part in racially motivated violence and then tenderly cradle a baby or lovingly pet a puppy? Harris argues that our social cognition—the ability to infer the mental states of another agent—is flexible. That is, we can either engage or withhold social cognition. If we withhold social cognition, we dehumanize the other person. Integrating theory from a range of disciplines—social, developmental, and cognitive psychology, evolutionary anthropology, philosophy, economics, and law—with neuroscience data, Harris explores how and why we engage or withhold social cognition. He examines research in these different disciplines and describes biological processes that underlie flexible social cognition, including brain, genetic, hormonal, and physiological mechanisms.

After laying out the philosophical and theoretical terrain, Harris explores examples of social cognitive ability in nonhumans and explains the evolutionary staying power of this trait. He addresses two motives for social cognition—prediction and explanation—and reviews cases of anthropomorphism (extending social cognition to entities without mental states) and dehumanization (withholding it from people with mental states). He discusses the relation of social cognition to the human/nonhuman distinction and to the evolution of sociality. He considers the importance of social context and, finally, he speculates about the implications of flexible social cognition in such arenas for human interaction as athletic competition and international disputes.

**Lasana T. Harris** is Senior Lecturer in Experimental Psychology at University College London and Guest Lecturer in Social and Organizational Psychology at Leiden University.

April | 5 3/8 x 8, 224 pp. | 1 illus.

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*cognitive science | political science | environment*

## Mindmade Politics

The Cognitive Roots of International Climate Governance

**Manjana Milkoreit**

*Mindmade Politics* takes a novel, interdisciplinary approach to understanding the complex and contentious dynamics of global climate politics. Manjana Milkoreit argues that integrating cognitive theories and international relations scholarship can yield valuable insights into multilateral cooperation (or the lack of it) on climate change and the process of negotiating climate agreements.

Milkoreit argues that cognition is at the root of all political behavior and decision making. Some of the most important variables of international relations scholarship—the motivations of political actors—are essentially cognitive variables. Drawing on interviews with participants in the United Nations Framework Convention on Climate Change (UNFCCC), Milkoreit examines the thoughts, beliefs, and emotions of individuals and groups, focusing on the mental mechanisms connecting decision-relevant factors and observed political behavior.

Milkoreit offers a brief introduction to international relations theory and key insights regarding the politics of climate change; outlines the basic cognitive theories and concepts that she applies in her analysis, discussing the cognitive challenges of climate change; and describes the integrated methodological approach she used for her cognitive-political analysis. She presents four cognitive-affective lessons for global change politics, including the “cognitive triangle” of three major concerns of climate negotiators—*threat*, *identity*, and *justice*—and she identifies six major belief systems driving negotiators. Finally, she offers guidance for climate governance based on her findings. Utilizing recent advances in cognitive science, Milkoreit builds a theoretical bridge between two major disciplines that will benefit both scholars and practitioners.

**Manjana Milkoreit** is Assistant Professor of Public Policy in the Department of Political Science at Purdue University.

June | 6 x 9, 352 pp. | 17 illus.

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meteorology | cognitive science

## Minding the Weather

How Expert Forecasters Think

**Robert R. Hoffman, J. Gregory Trafton,  
Paul J. Roebber, H. Michael Mogil,  
and Daphne S. LaDue**

This book argues that human cognition systems is the least understood, yet probably most important, component of

**A detailed study of research on the psychology of expertise in weather forecasting, drawing on findings in cognitive science, meteorology, and computer science.**

forecasting accuracy. *Minding the Weather* investigates how people acquire massive and highly organized knowledge and develop the reasoning skills and strategies that enable them to achieve the highest levels of performance.

The authors consider such topics as the forecasting workplace; atmospheric scientists' descriptions of their reasoning strategies; the nature of expertise; forecaster knowledge, perceptual skills, and reasoning; and expert systems designed to imitate forecaster reasoning. Drawing on research in cognitive science, meteorology, and computer science, the authors argue that forecasting involves an interdependence of humans and technologies. Human expertise will always be necessary.

**Robert R. Hoffman** is Senior Research Scientist at the Institute for Human and Machine Cognition in Pensacola, Florida.

**J. Gregory Trafton** is Cognitive Scientist at the Naval Research Laboratory in Washington, D.C. **Paul J. Roebber** is Distinguished Professor of Atmospheric Sciences at the University of Wisconsin-Milwaukee. **H. Michael Mogil** is currently a Consulting Meteorologist focusing on meteorological education in the primary and secondary school systems. **Daphne S. LaDue** is a Research Scientist at the University of Oklahoma's Center for Analysis and Prediction of Storms and Director of the Research Experiences for Undergraduates Program at the National Weather Center in Norman, Oklahoma.

July | 7 x 9, 528 pp. | 82 black & white illus., 21 color plates

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neuroscience | medicine

## Cannabinoids and the Brain

**Linda A. Parker**

The cannabis plant has been used for recreational and medicinal purposes for more than 4,000 years, but the scientific investigation

**A review of the scientific evidence on the effects of cannabinoids on brain and behavioral functioning, with an emphasis on potential therapeutic use.**

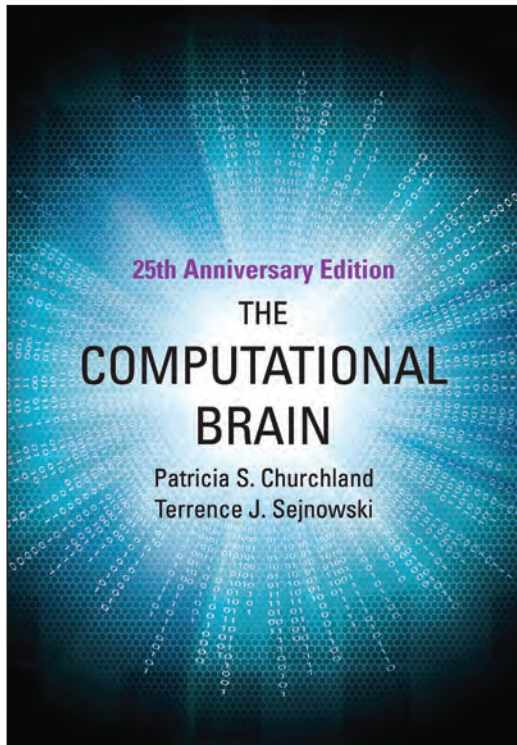
into its effects has only recently yielded useful results. In this book, Linda Parker offers a review of the scientific evidence on the effects of cannabinoids on brain and behavioral functioning, with an emphasis on potential therapeutic uses.

Parker describes the discovery of tetrahydrocannabinol (THC), the main psychoactive component of cannabis, and the further discovery of cannabinoid receptors in the brain. She explains that the brain produces chemicals similar to THC, which act on the same receptors as THC, and shows that the endocannabinoid system is involved in all aspects of brain functioning. Parker reports that cannabis contains not only the psychoactive compound THC, but also other compounds of potential therapeutic benefit, and that one of them, cannabidiol (CBD), shows promise for the treatment of pain, anxiety, and epilepsy. Parker reviews the evidence on cannabinoids and anxiety, depression, mood, sleep, schizophrenia, learning and memory, addiction, sex, appetite and obesity, chemotherapy-induced nausea, epilepsy, and such neurodegenerative disorders as multiple sclerosis and Alzheimer's Disease. Each chapter also links the scientific evidence to historical and anecdotal reports of the medicinal use of cannabis. As debate about the medical use of marijuana continues, Parker's balanced and objective review of the fundamental science and potential therapeutic effects of cannabis is especially timely.

**Linda A. Parker** is Professor in the Psychology and Collaborative Neuroscience Program and Canada Research Chair in Behavioural Neuroscience at the University of Guelph.

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**An anniversary edition of the classic work that influenced a generation of neuroscientists and cognitive neuroscientists.**

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**Computational Neuroscience series**

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Patricia Churchland  
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25th Anniversary Edition

**Patricia S. Churchland and Terrence J. Sejnowski**

Before *The Computational Brain* was published in 1992, conceptual frameworks for brain function were based on the behavior of single neurons, applied globally. In *The Computational Brain*, Patricia Churchland and Terrence Sejnowski developed a different conceptual framework, based on large populations of neurons. They did this by showing that patterns of activities among the units in trained artificial neural network models had properties that resembled those recorded from populations of neurons recorded one at a time. It is one of the first books to bring together computational concepts and behavioral data within a neurobiological framework. Aimed at a broad audience of neuroscientists, computer scientists, cognitive scientists, and philosophers, *The Computational Brain* is written for both expert and novice. This anniversary edition offers a new preface by the authors that puts the book in the context of current research.

This approach influenced a generation of researchers. Even today, when neuroscientists can routinely record from hundreds of neurons using optics rather than electricity, and the 2013 White House BRAIN initiative heralded a new era in innovative neurotechnologies, the main message of *The Computational Brain* is still relevant.

**Patricia S. Churchland** is President's Professor of Philosophy Emerita at the University of California, San Diego, and Adjunct Professor at the Salk Institute for Biological Sciences. She is the author of many books, including *Neurophilosophy* and *Brain-Wise* (both published by the MIT Press). **Terrence J. Sejnowski** is Francis Crick Professor and Director of the Computational Neurobiology Laboratory at the Salk Institute, an Investigator at the Howard Hughes Medical Institute, and Distinguished Professor at the University of California, San Diego. He was a member of the advisory committee for President Obama's BRAIN Initiative.

### Praise for the original edition

"This attractive and well-illustrated volume falls somewhere between a trade book and a textbook. . . . The reader will be well rewarded who seeks to understand, from well-chosen examples, how to merge the analysis of neuroscientific data with the developments of computational principles."

—Michael Arbib, *Science*

linguistics

## 'And'

Conjunction Reduction Redux

Barry Schein

In this book, Barry Schein argues that “and” is always the sentential logical connective with the same, one, meaning. “And”

**A bold argument that “and” always means “&,” the truth-functional sentential connective.**

always means “&,” across the varied constructions in which it is tokened in natural language. Schein examines the constructions that challenge his thesis, and shows that the

objections disappear when these constructions are translated into Eventish, a neo-Davidsonian event semantics, and, enlarged with Cinerama Semantics, a vocabulary for spatial orientation and navigation. Besides rescuing “and” from ambiguity, Eventish and Cinerama Semantics solve general puzzles of grammar and meaning unrelated to conjunction, revealing the book’s central thesis in the process: aspects of meaning mistakenly attributed to “and” are discovered to reflect neighboring structures previously unseen and unacknowledged.

Schein argues that Eventish and Cinerama Semantics offer a fundamental revision to clause structure and what aspects of meaning are represented therein. Eventish is distinguished by four features: supermonadicity, which enlarges verbal decomposition so that every argument relates to its own event; descriptive event anaphora, which replaces simple event variables with silent descriptive pronouns; adverbialization, which interposes adverbials derived from the descriptive content of every DP; and AdrPs, which replace all NPs with Address Phrases that locate what nominals denote within scenes or frames of reference.

With *And'* Schein rehabilitates an old rule of transformational, generative grammar, answering the challenges to it exhaustively and meticulously.

**Barry Schein** is Associate Professor of Linguistics at the University of Southern California and the author of *Plurals and Events* (MIT Press).

April | 7 x 9, 736 pp. | 28 illus.

**\$75.00X/£55.95 cloth**  
978-0-262-03563-7

media | disability studies

## Giving Voice

Mobile Communication, Disability, and Inequality

Meryl Alper

Mobile technologies are often hailed as a way to “give voice to the voiceless.” Behind the praise, though, are beliefs about

**How communication technologies meant to empower people with speech disorders—to give voice to the voiceless—are still subject to disempowering structural inequalities.**

technology as a gateway to opportunity and voice as a metaphor for agency and self-representation. In *Giving Voice*, Meryl Alper explores these assumptions by looking closely at one such case—the use of the iPad and mobile app Proloquo2Go, which converts icons and text into

synthetic speech, by children with disabilities and their families. She finds that despite claims to empowerment, the hardware and software are still subject to disempowering structural inequalities. Views of technology as a great equalizer, she demonstrates, rarely account for all the ways that culture, law, policy, and even technology itself can reinforce disparity, particularly for those with disabilities.

Alper explores, among other things, alternative understandings of voice, the surprising sociotechnical importance of the iPad case, and convergences and divergences in the lives of parents across class. She shows that working-class and low-income parents understand the app and other communication technologies differently from upper- and middle-class parents, and that the institutional ecosystem reflects a bias toward those more privileged.

Handing someone a talking tablet computer does not in itself give that person a voice. Alper finds that the ability to mobilize social, economic, and cultural capital shapes the extent to which individuals can not only speak but be heard.

**Meryl Alper** is Assistant Professor of Communication Studies at Northeastern University and a Faculty Associate with Harvard University’s Berkman Center for Internet and Society. She is the author of a MacArthur Foundation Report, *Digital Youth with Disabilities* (MIT Press).

March | 6 x 9, 280 pp. | 4 illus.

**\$30.00S/£22.95 paper**  
978-0-262-53397-3

**\$75.00S/£55.95 cloth**  
978-0-262-03558-3

**The John D. and Catherine T. MacArthur Foundation Series on Digital Media and Learning**

education | inequality studies

## Stuck in the Shallow End

Education, Race, and Computing

UPDATED EDITION

**Jane Margolis**with Rachel Estrella, Joanna Goode,  
Jennifer Jellison Holme, and Kim Nao

The number of African Americans and Latinos/as receiving undergraduate and advanced degrees in computer science is

**Why so few African American and Latino/a students study computer science: updated edition of a book that reveals the dynamics of inequality in American schools.**

disproportionately low. And relatively few African American and Latino/a high school students receive the kind of institutional encouragement, educational opportunities, and preparation needed for them to choose computer science as a field of study

and profession. In *Stuck in the Shallow End*, Jane Margolis and coauthors look at the daily experiences of students and teachers in three Los Angeles public high schools: an overcrowded urban high school, a math and science magnet school, and a well-funded school in an affluent neighborhood. They find an insidious “virtual segregation” that maintains inequality.

The race gap in computer science, Margolis discovers, is one example of the way students of color are denied a wide range of occupational and educational futures. *Stuck in the Shallow End* is a story of how inequality is reproduced in America—and how students and teachers, given the necessary tools, can change the system. Since the 2008 publication of *Stuck in the Shallow End*, the book has found an eager audience among teachers, school administrators, and academics. This updated edition offers a new preface detailing the progress in making computer science accessible to all, a new postscript, and discussion questions (coauthored by Jane Margolis and Joanna Goode).

**Jane Margolis** is a Senior Researcher at the UCLA Graduate School of Education and Information Studies and the coauthor of *Unlocking the Clubhouse: Women in Computing* (MIT Press). She was a 2016 White House Champion of Change for her work addressing underrepresentation of students of color and women in computer science.

**Joanna Goode** is a Professor of Education at the University of Oregon and is coauthor of the *Exploring Computer Science* program.

March | 6 x 9, 248 pp. | 2 illus.

**\$25.00S/£18.95 paper**  
978-0-262-53346-1

public health | information technology

## Global Health Informatics

Principles of eHealth and mHealth  
to Improve Quality of Care

**edited by Leo Anthony G. Celi, Hamish Fraser,  
Vipan Nikore, Juan Sebastián Osorio,  
and Kenneth Paik**

The widespread usage of mobile phones that bring computational power and data to our fingertips has enabled new models

**Key concepts, frameworks, examples, and lessons learned in designing and implementing health information and communication technology systems in the developing world.**

for tracking and battling disease. The developing world in particular has become a proving ground for innovation in eHealth (using communication and technology tools in healthcare) and mHealth (using the affordances of mobile technology

in eHealth systems). In this book, experts from a variety of disciplines—among them computer science, medicine, public health, policy, and business—discuss key concepts, frameworks, examples, and lessons learned in designing and implementing digital health systems in the developing world.

The contributors consider such topics as global health disparities and quality of care; aligning eHealth strategies with government policy; the role of monitoring and evaluation in improving care; databases, patient registries, and electronic health records; the lifecycle of a digital health system project; software project management; privacy and security; and evaluating health technology systems.

**Leo Anthony Celi** is an attending physician at Beth Israel Deaconess Medical Center, Boston, and Assistant Professor at Harvard Medical School. **Hamish Fraser** is Associate Professor in eHealth at the Leeds Institute of Health Sciences and the Yorkshire Centre for Health Informatics. **Vipan Nikore** is an internal medicine physician at Trillium Health Partners and a lecturer at the University of Toronto. **Juan Sebastián Osorio** is a biomedical engineer, named by *Technology Review* as one of the world’s top innovators under 35 for designing monitors to detect breathing problems in premature infants. **Kenneth Paik** is a Research Scientist in the Institute for Medical Engineering and Science at MIT.

April | 8 x 9, 424 pp. | 65 illus.

**\$40.00X/£29.95 paper**  
978-0-262-53320-1



media

## Remaking the News

Essays on the Future of Journalism in the Digital Age  
**edited by Pablo J. Boczkowski and C. W. Anderson**

The use of digital technology has transformed the way news is produced, distributed, and received. Just as media organizations and journalists have realized that technology is a central and indispensable part of their enterprise, scholars of journalism have shifted their focus to the role of technology. In *Remaking the News*, leading scholars chart the future of studies on technology and journalism in the digital age.

These ongoing changes in journalism invite scholars to rethink how they approach this dynamic field of inquiry. The contributors consider theoretical and methodological issues; concepts from the social science canon that can help make sense of journalism; the occupational culture and practice of journalism; and major gaps in current scholarship on the news: analyses of inequality, history, and failure.

**Pablo J. Boczkowski** is Professor of Communication Studies at Northwestern University. He is the author of *Digitizing the News* and the coauthor, with Eugenia Mitchelstein, of *The News Gap* (both published by the MIT Press). **C. W. Anderson** is Associate Professor of Media Culture at City University of New York and the author of *Rebuilding the News*.

### Contributors

Mike Ananny, C. W. Anderson, Rodney Benson, Pablo J. Boczkowski, Michael X. Delli Carpini, Mark Deuze, William H. Dutton, Matthew Hindman, Seth C. Lewis, Eugenia Mitchelstein, W. Russell Neuman, Rasmus Kleis Nielsen, Zizi Papacharissi, Victor Pickard, Mirjam Prenger, Sue Robinson, Michael Schudson, Jane B. Singer, Natalie (Talia) Jomini Stroud, Karin Wahl-Jorgensen, Rodrigo Zamith

June | 6 x 9, 360 pp. | 2 illus.

**\$40.00X/£29.95 cloth**  
 978-0-262-03609-2

**Inside Technology series**

science, technology, and society | geography

## Mapping Israel, Mapping Palestine

How Occupied Landscapes Shape Scientific Knowledge  
**Jess Bier**

Maps are widely believed to be objective, and data-rich computer-made maps are iconic examples of digital knowledge. It is often claimed that digital maps, and rational boundaries, can solve political conflict. But in *Mapping Israel, Mapping Palestine*, Jess Bier challenges the view that digital maps are universal

and value-free. She examines the ways that maps are made in Palestine and Israel to show how social and political landscapes shape the practice of science and technology.

How can two scientific cartographers look at the same geographic feature and see fundamentally different things? In part, Bier argues, because knowledge about the Israeli military occupation is shaped by the occupation itself. Ongoing injustices—including checkpoints, roadblocks, and summary arrests—mean that Palestinian and Israeli cartographers have different experiences of the landscape. Palestinian forms of empirical knowledge, including maps, continue to be discounted.

Bier examines three representative cases of population, governance, and urban maps. She analyzes Israeli population maps from 1967 to 1995, when Palestinian areas were left blank; Palestinian state maps of the late 1990s and early 2000s, which were influenced by Israeli raids on Palestinian offices and the legacy of British colonial maps; and urban maps after the Second Intifada, which show how segregated observers produce dramatically different maps of the same area. The geographic production of knowledge, including what and who are considered scientifically legitimate, can change across space and time. Bier argues that greater attention to these changes, and to related issues of power, will open up more heterogeneous ways of engaging with the world.

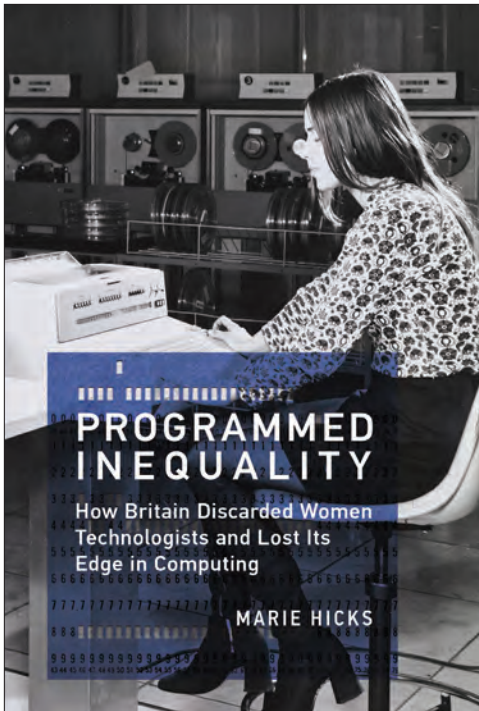
**Jess Bier** is Assistant Professor of Urban Sociology at Erasmus University Rotterdam.

May | 6 x 9, 320 pp. | 4 color illus., 27 black & white illus.

**\$35.00S/£24.95 cloth**  
 978-0-262-03615-3

**Inside Technology series**





**How Britain lost its early dominance in computing by systematically discriminating against its most qualified workers: women.**

March  
6 x 9, 352 pp.  
30 illus.

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**History of Computing series**

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Women's Changing Participation  
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Janet Abbate

2012, 978-0-262-01806-7  
\$36.00S/£26.95 cloth

## Programmed Inequality

How Britain Discarded Women Technologists and Lost Its Edge in Computing

**Marie Hicks**

In 1944, Britain led the world in electronic computing. By 1974, the British computer industry was all but extinct. What happened in the intervening thirty years holds lessons for all postindustrial superpowers. As Britain struggled to use technology to retain its global power, the nation's inability to manage its technical labor force hobbled its transition into the information age.

In *Programmed Inequality*, Marie Hicks explores the story of labor feminization and gendered technocracy that undercut British efforts to computerize. That failure sprang from the government's systematic neglect of its largest trained technical workforce simply because they were women. Women were a hidden engine of growth in high technology from World War II to the 1960s. As computing experienced a gender flip, becoming male-identified in the 1960s and 1970s, labor problems grew into structural ones and gender discrimination caused the nation's largest computer user—the civil service and sprawling public sector—to make decisions that were disastrous for the British computer industry and the nation as a whole.

Drawing on recently opened government files, personal interviews, and the archives of major British computer companies, *Programmed Inequality* takes aim at the fiction of technological meritocracy. Hicks explains why, even today, possessing technical skill is not enough to ensure that women will rise to the top in science and technology fields. *Programmed Inequality* shows how the disappearance of women from the field had grave macroeconomic consequences for Britain, and why the United States risks repeating those errors in the twenty-first century.

**Marie Hicks** is Assistant Professor of History at the Illinois Institute of Technology.

science, technology, and society

## The Handbook of Science and Technology Studies

FOURTH EDITION

edited by **Ulrike Felt, Rayvon Fouché, Clark A. Miller, and Laurel Smith-Doerr**

Science and Technology Studies (STS) is a flourishing interdisciplinary field that examines the transformative power of science

**The fourth edition of an authoritative overview, with all new chapters that capture the state of the art in a rapidly growing field.**

and technology to arrange and rearrange contemporary societies. *The Handbook of Science and Technology Studies* provides a comprehensive and authoritative overview of the field, reviewing current research and major theoretical

and methodological approaches in a way that is accessible to both new and established scholars from a range of disciplines. This new edition, sponsored by the Society for Social Studies of Science, is the fourth in a series of volumes that have defined the field of STS. It features 36 chapters, each written for the fourth edition, that capture the state of the art in a rich and rapidly growing field. One especially notable development is the increasing integration of feminist, gender, and postcolonial studies into the body of STS knowledge.

The book covers methods and participatory practices in STS research; mechanisms by which knowledge, people, and societies are coproduced; the design, construction, and use of material devices and infrastructures; the organization and governance of science; and STS and societal challenges including aging, agriculture, security, disasters, environmental justice, and climate change.

**Ulrike Felt** is Professor of Science and Technology Studies and Dean of the Faculty of Social Sciences at the University of Vienna. **Rayvon Fouché** is Associate Professor in the School of Interdisciplinary Studies and Director of American Studies at Purdue University. **Clark A. Miller** is Associate Professor of Science and Technology Studies and Associate Director of the School for the Future of Innovation in Society at Arizona State University. **Laurel Smith-Doerr** is the Director of the Institute for Social Science Research and Professor of Sociology at the University of Massachusetts.

February | 7 x 9, 1208 pp. | 10 illus., 6 color plates

**\$75.00X/£55.95 cloth**  
978-0-262-03568-2

science, technology, and society | African studies

## What Do Science, Technology, and Innovation Mean from Africa?

edited by **Clapperton Chakanetsa Mavhunga**

In the Science, Technology, and Innovation (STI) literature, Africa has often been regarded as a recipient of science, technology,

**Explorations of science, technology, and innovation in Africa not as the product of “technology transfer” from elsewhere but as the working of African knowledge.**

and innovation rather than a maker of them. In this book, scholars from a range of disciplines show that STI in Africa is not merely the product of “technology transfer” from elsewhere but the working of African knowledge. Their contribu-

tions focus on African ways of looking, meaning-making, and creating. The chapter authors see Africans as intellectual agents whose perspectives constitute authoritative knowledge and whose strategic deployment of both endogenous and inbound things represents an African-centered notion of STI. “Things do not (always) mean the same from everywhere,” observes Clapperton Chakanetsa Mavhunga, the volume’s editor. Western, colonialist definitions of STI are not universalizable.

The contributors discuss topics that include the trivialization of indigenous knowledge under colonialism; the creative labor of *chimurenga*, the transformation of everyday surroundings into military infrastructure; the role of enslaved Africans in America as innovators and synthesizers; the African ethos of “fixing”; the *constitutive appropriation* that makes mobile technologies African; and an African innovation strategy that builds on domestic capacities. The contributions describe an Africa that is creative, technological, and scientific, showing that African STI is the latest iteration of a long process of accumulative, multicultural knowledge production.

**Clapperton Chakanetsa Mavhunga** is Associate Professor of Science, Technology, and Society at MIT and the author of *Transient Workspaces: Technologies of Everyday Innovation in Zimbabwe* (MIT Press).

### Contributors

Geri Augusto, Shadreck Chirikure, Chux Daniels, Ron Eglash, Ellen Foster, Garrick E. Louis, D. A. Masolo, Clapperton Chakanetsa Mavhunga, Neda Nazemi, Toluwalogo Odumosu, Katrien Pype, Scott Remer

May | 7 x 9, 232 pp. | 25 illus.

**\$36.00X/£26.95 paper**  
978-0-262-53390-4

*science, technology, and society | innovation*

## Models of Innovation

The History of an Idea

**Benoît Godin**

Models abound in science, technology, and society (STS) studies and in science, technology, and innovation (STI) studies.

**The emergence and diffusion of the most influential conceptual models of innovation from the early twentieth century to the late 1980s.**

They are continually being invented, with one author developing many versions of the same model over time. At the same time, models are regularly criticized. Such is the case with the most influential model in STS-STI: the linear model of innovation.

In this book, Benoît Godin examines the emergence and diffusion of the three most important conceptual models of innovation from the early twentieth century to the late 1980s: stage models, linear models, and holistic models. Godin first traces the history of the models of innovation constructed during this period, considering why these particular models came into being and what use was made of them. He then rethinks and debunks the historical narratives of models developed by theorists of innovation. Godin documents a greater diversity of thinkers and schools than in the conventional account, tracing a genealogy of models beginning with anthropologists, industrialists, and practitioners in the first half of the twentieth century to their later formalization in STS-STI.

Godin suggests that a model is a conceptualization, which could be narrative, or a set of conceptualizations, or a paradigmatic perspective, often in pictorial form and reduced discursively to a simplified representation of reality. Why are so many things called models? Godin claims that model has a rhetorical function. First, a model is a symbol of “scientificity.” Second, a model travels easily among scholars and policy makers. Calling a conceptualization or narrative or perspective a model facilitates its propagation.

**Benoît Godin** is a Professor at the Institut national de la recherche scientifique, Montreal.

March | 6 x 9, 344 pp. | 21 illus.

**\$37.00X/£27.95 cloth**  
978-0-262-03589-7

**Inside Technology series**

*science, technology, and society | biology*

## Reordering Life

Knowledge and Control in the Genomics Revolution

**Stephen Hilgartner**

The rise of genomics engendered intense struggle over the control of knowledge. In *Reordering Life*, Stephen Hilgartner

**How the regimes governing biological research changed during the genomics revolution, focusing on the Human Genome Project.**

examines the “genomics revolution” and develops a novel approach to studying the dynamics of change in knowledge and control. Hilgartner focuses on the Human Genome Project (HGP)—the symbolic and scientific centerpiece of the

emerging field—showing how problems of governance arose in concert with new knowledge and technology. Using a theoretical framework that analyzes “knowledge control regimes,” Hilgartner investigates change in how control was secured, contested, allocated, resisted, justified, and reshaped as biological knowledge was transformed. Beyond illuminating genomics, *Reordering Life* sheds new light on broader issues about secrecy and openness in science, data access and ownership, and the politics of research communities.

Drawing on real-time interviews and observations made during the HGP, *Reordering Life* describes the sociotechnical challenges and contentious issues that the genomics community faced throughout the project. Hilgartner analyzes how laboratories control access to data, biomaterials, plans, preliminary results, and rumors; compares conflicting visions of how to impose coordinating mechanisms; examines the repeated destabilization and restabilization of the regimes governing genome databases; and examines the fierce competition between the publicly funded HGP and the private company Celera Genomics. The result is at once a path-breaking study of a self-consciously revolutionary science, and a provocative analysis of how knowledge and control are reconfigured during transformative scientific change.

**Stephen Hilgartner** is Professor of Science and Technology Studies at Cornell University.

April | 6 x 9, 320 pp. | 15 illus.

**\$35.00X/£24.95 cloth**  
978-0-262-03586-6

**Inside Technology series**

science, technology and society | political science

## Democratic Experiments

Problematizing Nanotechnology and Democracy in Europe and the United States

**Brice Laurent**

In *Democratic Experiments*, Brice Laurent discusses the challenges that emerging technologies create for democracy today. He

**An examination of nanotechnology as a lens through which to study contemporary democracy in both theory and practice.**

focuses on nanotechnology and its attendant problems, proposing nanotechnology as a lens through which to understand contemporary democracy in both theory and practice. Arguing that democracy is at stake where

nanotechnology is defined as a problem, Laurent examines the sites where nanotechnology is discussed and debated by scientists, policymakers, and citizens. It is at these sites where the joint production of nanotechnology and the democratic order can be observed.

Focusing on the United States, France, and Europe, and various international organizations, Laurent analyzes representations of nanotechnology in science museums, collective discussions in participatory settings, the making of categories such as “nanomaterials” or “responsible innovation” in standardization and regulatory arenas, and initiatives undertaken by social movements. He contrasts American debates, in which the concern for public objectivity is central, with the French “state experiment,” the European goal of harmonization, and the international concern with a global market. In France, public debate proceeded in response to public protest and encountered a radical critique of technological development; the United States experimented with an innovative approach to technology assessment. The European regulatory approach results in lengthy debates over political integration; the United States relies on the adversarial functioning of federal agencies. Because nanotechnology is a domain where concerns over anticipation and participation are pervasive, Laurent argues, nanotechnology—and science and technology studies more generally—provides a relevant focus for a renewed analysis of democracy.

**Brice Laurent** is a Researcher at Mines ParisTech, Centre de Sociologie de l’Innovation.

March | 6 x 9, 288 pp. | 1 illus.

**\$40.00X/£29.95 cloth**

978-0-262-03576-7

**Inside Technology series**

science, technology, and society | history of science

## The Long Arm of Moore’s Law

Microelectronics and American Science

**Cyrus C. M. Mody**

Since the mid 1960s, American science has undergone significant changes in the way it is organized, funded, and practiced.

**How, beginning in the mid 1960s, the US semiconductor industry helped shape changes in American science, including a new orientation to the short-term and the commercial.**

These changes include the decline of basic research by corporations; a new orientation toward the short-term and the commercial, with pressure on universities and government labs to participate in the market; and the promotion of interdisciplinarity. In this book, Cyrus

Mody argues that the changes in American science that began in the 1960s co-evolved with and were shaped by the needs of the “civilianized” US semiconductor industry.

In 1965, Gordon Moore declared that the most profitable number of circuit components that can be crammed on a single silicon chip doubles every year. Mody views “Moore’s Law” less as prediction than as self-fulfilling prophecy, pointing to the enormous investments of capital, people, and institutions the semiconductor industry required—the “long arm” of Moore’s Law that helped shape all of science.

Mody offers a series of case studies in microelectronics that illustrate the reach of Moore’s Law. He describes the pressures on Stanford University’s electrical engineers during the Vietnam era, IBM’s exploration of alternatives to semiconductor technology, the emergence of consortia to integrate research across disciplines and universities, and the interwoven development of the molecular research community and associated academic institutions as the vision of a molecular computer informed the restructuring of research programs.

**Cyrus C. M. Mody** is Professor and Chair of the History of Science, Technology, and Innovation Department at Maastricht University. He is the author of *Instrumental Community: Probe Microscopy and the Path to Nanotechnology* (MIT Press).

February | 6 x 9, 304 pp. | 12 illus.

**\$45.00X/£34.95 cloth**

978-0-262-03549-1

**Inside Technology series**

*science, technology, and society | environmental studies*

## Cryopolitics

Frozen Life in a Melting World

edited by **Joanna Radin** and **Emma Kowal**

As the planet warms and the polar ice caps melt, naturally occurring cold is a resource of growing scarcity. At the same time, energy-intensive cooling technologies are widely used as a means of preservation. Technologies of cryopreservation support global food chains, seed and blood banks, reproductive medicine, and even the preservation of cores of glacial ice used to study climate change. In many cases, these practices of freezing life are an attempt to cheat death. Cryopreservation has contributed to the transformation of markets, regimes of governance and ethics, and the very relationship between life and death. In *Cryopolitics*, experts from anthropology, history of science, environmental humanities, and indigenous studies make clear the political and cultural consequences of extending life and deferring death by technological means.

The contributors examine how and why low temperatures have been harnessed to defer individual death through freezing whole human bodies; to defer nonhuman species death by freezing tissue from endangered animals; to defer racial death by preserving biospecimens from indigenous people; and to defer large-scale human death through pandemic preparedness. The cryopolitical lens, emphasizing the roles of temperature and time, provokes new and important questions about living and dying in the twenty-first century.

**Joanna Radin** is Assistant Professor in the Program in History of Science and Medicine at Yale University. **Emma Kowal** is Professor of Anthropology at Deakin University, Melbourne.

### Contributors

Warwick Anderson, Michael Bravo, Jonny Bunning, Matthew Chrulew, Soraya de Chadarevian, Alexander Friedrich, Klaus Hoeyer, Frédéric Keck, Eben Kirksey, Emma Kowal, Joanna Radin, Deborah Bird Rose, Kim TallBear, Charis Thompson, David Turnbull, Thom van Dooren, Rebecca J. H. Woods

April | 6 x 9, 336 pp. | 26 illus.

**\$40.00X/£29.95 cloth**  
978-0-262-03585-9*economics | Latin America studies*

## The Economics of Contemporary Latin America

Beatriz Armendáriz and Felipe Larraín B.

Latin America is richly endowed with natural resources, fertile land, and vibrant cultures. Yet the region remains much poorer than its neighbors to the north. Most Latin American countries have not achieved standards of living and stable institutions comparable to those found in developed countries, have experienced repeated boom-bust cycles, remain heavily reliant on primary commodities.

**Analysis of Latin America's economy focusing on development, covering the colonial roots of inequality, boom and bust cycles, labor markets, and fiscal and monetary policy.**

This book studies the historical roots of Latin America's contemporary economic and social development, focusing on poverty and income inequality dating back to colonial times. It addresses today's legacies of the market-friendly reforms that took hold in the 1980s and 1990s by examining successful stabilizations and homemade monetary and fiscal institutional reforms. It offers a detailed analysis of trade and financial liberalization, twenty-first-century growth, and the decline in poverty and income inequality. Finally, the book offers an overall analysis of inclusive growth policies for development—including gender issues and the informal sector—and the challenges that lie ahead for the region, with special attention to pressing demands by the vibrant and vocal middle class, youth unemployment and indigenous populations.

**Beatriz Armendáriz** is Senior Lecturer in the Department of Economics at University College London and Research Affiliate at Harvard University. She is coauthor of *The Economics of Microfinance* (MIT Press). **Felipe Larraín B.** is Professor of Economics at the Catholic University of Chile and Director of the Latin American Center of Economics and Social Policies (CLAPES UC). He is coauthor of *Macroeconomics in the Global Economy* and was Finance Minister of Chile from 2010 to 2014.

April | 7 x 9, 392 pp. | 92 illus.

**\$45.00X/£34.95 paper**  
978-0-262-53315-7



economics | sociology

## Social Economics

Current and Emerging Areas

edited by **Joan Costa-Font and Mario Macis**

The growing field of social economics explores how individual behavior is affected by group-level influences, extending the approach of mainstream economics to include broader social motivations and incentives. This book offers a rich and rigorous selection of current work in the field, focusing on some of the most active research areas. Topics covered include culture, gender, ethics, and philanthropic behavior.

Social economics grows out of dissatisfaction with a purely individualistic model of human behavior. This book shows how mainstream economics is expanding its domain beyond market and price mechanisms to recognize a role for cultural and social factors. Some chapters, in the tradition of Gary Becker, attempt to extend the economics paradigm to explain other social phenomena; others, following George Akerlof's approach, incorporate sociological and psychological assumptions to explain economic behavior. Loosely organized by theme—Social Preferences; Culture, Values, and Norms; and Networks and Social Interactions—the chapters address a range of subjects, including gender differences in political decisions, “moral repugnance” as a constraint on markets, charitable giving by the super-rich, value diversity within a country, and the influence of children on their parents' social networks.

**Joan Costa-Font** is Associate Professor of Political Economy at the London School of Economics. **Mario Macis** is Associate Professor in the Carey Business School at Johns Hopkins University.

### Contributors

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## Global Carbon Pricing

The Path to Climate Cooperation

edited by **Peter Cramton, David JC MacKay, Axel Ockenfels, and Steven Stoft**

After twenty-five years of failure, climate negotiations continue to use a “pledge and review” approach: countries pledge (almost

**Why the traditional “pledge and review” climate agreements have failed, and how carbon pricing, based on trust and reciprocity, could succeed.**

anything), subject to (unenforced) review. This approach ignores everything we know about human cooperation. In this book, leading economists describe an alternate model for climate agreements, drawing on the work of the late Nobel laureate Elinor Ostrom

and others. They show that a “common commitment” scheme is more effective than an “individual commitment” scheme; the latter depends on altruism while the former involves reciprocity (“we will if you will”).

The contributors propose that global carbon pricing is the best candidate for a reciprocal common commitment in climate negotiations. Each country would commit to placing charges on carbon emissions sufficient to match an agreed global price formula. The contributors show that carbon pricing would facilitate negotiations and enforcement, improve efficiency and flexibility, and make other climate policies more effective. Additionally, they analyze the failings of the 2015 Paris climate conference.

**Peter Cramton** is Professor of Economics at the University of Maryland. The late **Sir David JC MacKay** was Regius Professor of Engineering at the University of Cambridge and Chief Scientific Advisor to the United Kingdom's Department of Energy and Climate Change. **Axel Ockenfels** is Professor of Economics at the University of Cologne. **Steven Stoft** is an economic consultant and author of *Carbonomics*.

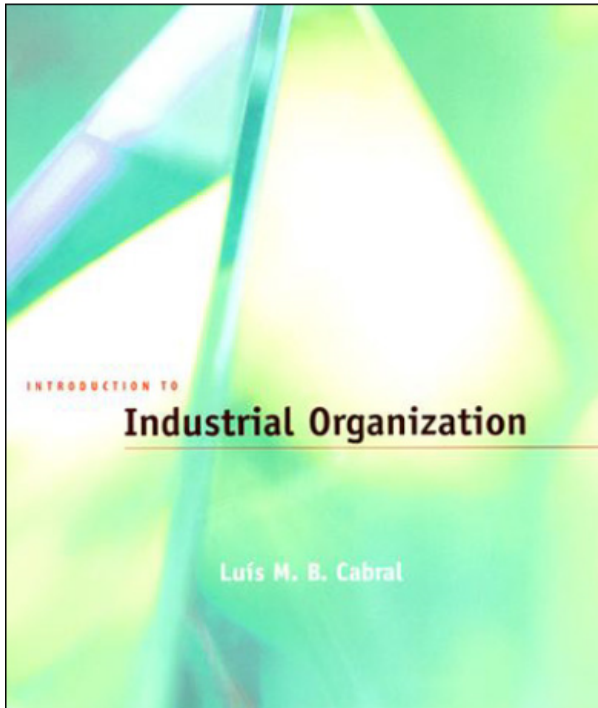
### Contributors

Richard N. Cooper, Peter Cramton, Stéphane Dion, Ottmar Edenhofer, Christian Gollier, Éloi Laurent, David JC MacKay, William Nordhaus, Axel Ockenfels, Joseph E. Stiglitz, Steven Stoft, Jean Tirole, Martin L. Weitzman

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**Luís M. B. Cabral** is Paganelli-Bull Professor of Economics and International Business and Chair of the Department of Economics at the Leonard N. Stern School of Business at New York University.

### Praise for the first edition

*“Cabral’s *Introduction to Industrial Organization* is clear, precise, relevant, even fun. This delightful volume is your best choice for crisp and accessible coverage of I.O. theory.”*

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economics

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This book introduces students to the growing research field of health economics. Rather than offer details about health systems without providing a theoretical context, *Health Economics* combines economic concepts with empirical evidence to enhance readers' economic understanding of how health care institutions and markets function. The book takes a global perspective, with description and analysis of institutional features of health sectors in countries around the world.

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The text includes readings, extensive references, review and discussion questions, and exercises.

**Frank Sloan**, awarded the Victor R. Fuchs Award for Lifetime Contributions to the Field of Health Economics in 2016, is J. Alexander McMahon Professor of Health Policy and Management and Professor of Economics at Duke University. **Chee-Ruey Hsieh** is a Research Professor of Health Economics at Duke Global Health Institute, Duke University, and the Global Health Research Center, Duke Kunshan University.

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## Student Solutions Manual to Accompany *Health Economics, Second Edition*

**Frank A. Sloan and Chee-Ruey Hsieh**

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*Monetary Theory and Policy* continues to be the most comprehensive and up-to-date treatment of monetary economics, not only the leading text in the field but also the standard reference for academics and central bank researchers.

**Carl E. Walsh** is Professor of Economics at the University of California, Santa Cruz. He is a Visiting Scholar at the Federal Reserve Bank of San Francisco.

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In *Money, Payments, and Liquidity*, Ed Nosal and Guillaume Rocheteau provide a comprehensive investigation into the eco-

**A new edition of a book presenting a unified framework for studying the role of money and liquid assets in the economy, revised and updated.**

nomics of money, liquidity, and payments by explicitly modeling the mechanics of trade and its various frictions (including search, private information, and limited commitment). Adopting the last generation of the

New Monetarist framework developed by Ricardo Lagos and Randall Wright, among others, Nosal and Rocheteau provide a dynamic general equilibrium framework to examine the frictions in the economy that make money and liquid assets play a useful role in trade. They discuss such topics as cashless economies; the properties of an asset that make it suitable to be used as a medium of exchange; the optimal monetary policy and the cost of inflation; the coexistence of money and credit; and the relationships among liquidity, asset prices, monetary policy; and the different measures of liquidity in over-the-counter markets.

The second edition has been revised to reflect recent progress in the New Monetarist approach to payments and liquidity. Nosal and Rocheteau have added three new chapters: on unemployment and payments, on asset price dynamics and bubbles, and on crashes and recoveries in over-the-counter markets. The chapter on the role of money has been entirely rewritten, adopting a mechanism design approach. Other chapters have been revised and updated, with new material on credit economies under limited commitment, open-market operations and liquidity traps, and the limited pledgeability of assets under informational frictions.

**Guillaume Rocheteau** is Professor of Economics at the University of California, Irvine. **Ed Nosal** is Vice President and Senior Research Advisor at the Federal Reserve Bank of Chicago.

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economics | policy

## Taxing Ourselves

A Citizen's Guide to the Debate over Taxes

FIFTH EDITION

**Joel Slemrod and Jon Bakija**

To follow the debate over tax reform, the interested citizen is often forced to choose between misleading sound bites and

**The new edition of a popular guide to the key issues in tax reform, presented in a clear, nontechnical, and unbiased way.**

academic treatises. *Taxing Ourselves* bridges the gap between the oversimplified and the arcane, presenting the key issues clearly and without a political agenda. Tax policy experts Joel Slemrod and Jon Bakija lay out in accessible

language what is known and not known about how taxes affect the economy and offer guidelines for evaluating tax systems—both the current tax system and proposals to reform it.

This fifth edition has been extensively revised to incorporate the latest data, empirical evidence, and tax law. It offers new material on recent tax reform proposals, expanded coverage of international tax issues, and the latest enforcement initiatives. Offering historical perspectives, outlining the basic criteria by which tax policy should be judged (fairness, economic impact, enforceability), examining proposals for both radical change (replacement of the income tax with a flat tax or consumption tax) and incremental changes to the current system, and concluding with a voter's guide, the book provides readers with enough background to make informed judgments about how we should tax ourselves.

**Joel Slemrod** is Paul W. McCracken Collegiate Professor of Business Economics and Public Policy and Professor of Economics at the University of Michigan, where he is also Director of the Office of Tax Policy Research. **John Bakija** is Professor of Economics at Williams College.

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economics | political science

## Beyond Austerity

Reforming the Greek Economy

edited by **Costas Meghir, Christopher A. Pissarides, Dimitri Vayanos, and Nikolaus Vettas**

More than eight years after the global financial crisis began, the economy of Greece shows little sign of recovery, and its position in the eurozone seems tenuous. Between 2008 and 2014, Greeks' incomes shrank by more than a quarter, their homes lost more than a third of their value, and the unemployment rate reached 27 percent. Most articles on Greece in the media focus on the effects of austerity, repayment of its debt, and its future in the eurozone. This book takes a broader and deeper view of the Greek crisis, examining the pathologies that made Greece vulnerable to the crisis and the implications for the entire eurozone.

In each chapter, leading economists takes on a specific policy area, examining it terms of Greece's economic past, present, and future. The topics range from macroeconomic issues to markets and their regulation to finance to the public sector. Individual chapters address the costs and benefits of participation in the eurozone, Greece's international competitiveness, taxation, pensions, the labor market, privatization, education, healthcare, the justice system, and corruption. The contributors argue that Greek institutions require a deep overhaul to enable long-term solutions rather than quick fixes.

**Costas Meghir** is Professor of Economics at Yale University. **Christopher A. Pissarides**, 2010 Nobel Laureate in Economics, is School Professor of Economics and Political Science and Regius Professor of Economics at the London School of Economics. **Dimitri Vayanos** is Professor of Finance at the London School of Economics. **Nikolaus Vettas** is Professor of Economics at Athens University of Economics and Business and General Director of the Foundation for Economic and Industrial Research (IOBE).

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economics | evolution

## Investors and Exploiters in Ecology and Economics

Principles and Applications

edited by **Luc-Alain Giraldeau, Philipp Heeb, and Michael Kosfeld**

In the natural world, some agents (investors) employ strategies that provide resources, services, or information, while others (exploiters) gain advantages through these efforts. This behavior coexists and can be observed in many species and at many levels. For example, bacteria depend on the existence of biofilms to synthesize constituent proteins; cancerous cells employ angiogenesis to feed a tumor; and parents forgo vaccinating their children yet benefit from herd immunity. Two independent research traditions have developed to analyze this behavior—one couched in evolutionary theory championed by behavioral ecologists, the other in social science concepts advocated by economists. In this book experts from economics, evolutionary biology, behavioral ecology, public health, and anthropology look for commonalities in understanding and approach.

The contributors consider parasitic strategies in ecological and economic terms; the governance of natural resources, with insights from “producer-scrourger models,” forest management, and game theory; human health, discussing therapeutic opportunities, public health economics, and the integration of perspectives; and behavioral, social, and institutional consequences of exploitation strategies.

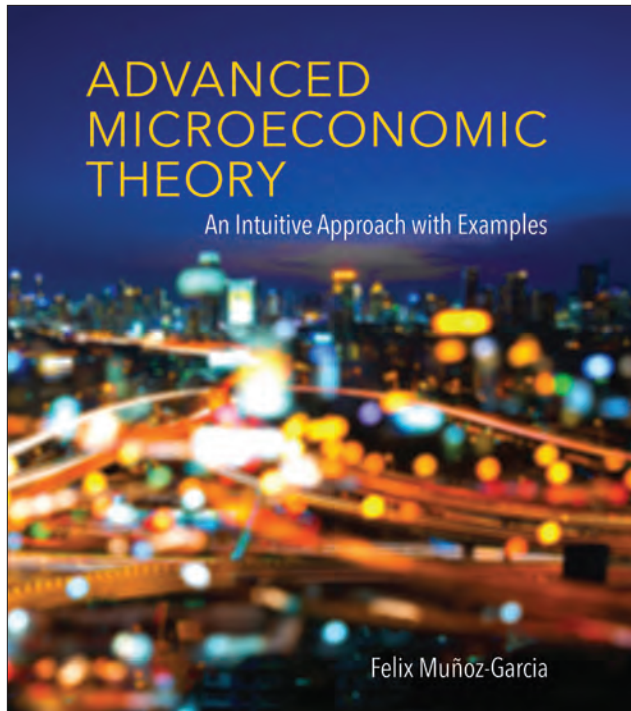
**Luc-Alain Giraldeau** is Professor of Behavioral Ecology and Dean of the Faculty of Science at the Université du Québec à Montréal. **Philipp Heeb** is Director of Research at the Centre national de la Recherche scientifiques (CNRS) in Evolutionary Ecology in the laboratory for Evolution and Biological Diversity. **Michael Kosfeld** is Professor of Business Administration at Goethe University Frankfurt, where he is also Director of the Center for Leadership and Behavior in Organizations (CLBO) and the Frankfurt Laboratory for Experimental Economic Research.

**Luc-Alain Giraldeau** is Professor of Behavioral Ecology and Dean of the Faculty of Science at the Université du Québec à Montréal. **Philipp Heeb** is Director of Research at the Centre national de la Recherche scientifiques (CNRS) in Evolutionary Ecology in the laboratory for Evolution and Biological Diversity. **Michael Kosfeld** is Professor of Business Administration at Goethe University Frankfurt, where he is also Director of the Center for Leadership and Behavior in Organizations (CLBO) and the Frankfurt Laboratory for Experimental Economic Research.

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The text connects each topic with recent findings in behavioral and experimental economics, and discusses these results in context, within the appropriate chapter. Step-by-step examples appear immediately after the main theoretical findings, and end-of chapter exercises help students understand

how to approach similar exercises on their own. An appendix reviews basic mathematical concepts. A separate workbook, *Practice Exercises for Advanced Microeconomic Theory*, offers solutions to selected problems with detailed explanations. The textbook and workbook together help students improve both their theoretical and practical preparation in advanced microeconomics.

**Felix Muñoz-García** is Associate Professor in the School of Economic Sciences at Washington State University.

## Practice Exercises for Advanced Microeconomic Theory

**Felix Muñoz-García**

This workbook provides solutions and step-by-step explanations for the odd-numbered exercises in *Advanced Microeconomic Theory* (107 problems in total). The answer key and detailed explanations emphasize the economic intuition behind the mathematical assumptions and results.

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*business | management*

## Beyond the Triple Bottom Line

Eight Steps toward a Sustainable Business Model

**Francisco Szekely and Zahir Dossa**

foreword by Jeffrey Hollender

Many recent books make the case for businesses to become more sustainable, but few explain the specifics. In this book, Francisco

**A pragmatic new business model for sustainability that outlines eight steps that range from exploring a mission to promoting innovation; with case studies.**

Szekely and Zahir Dossa offer a pragmatic new business model for sustainability that extends beyond the traditional framework of the triple bottom line, describing eight steps that range from exploring a vision and establishing a strategy to implementing

the strategy and promoting innovation.

Szekely and Dossa argue that businesses and organizations need to move away from the business case for sustainability toward a sustainable business model. That is, businesses should go beyond the usual short-term focus on minimizing harm while maximizing profits. Instead, businesses on the path to sustainability should, from the start, focus on addressing a societal need and view profitability not as an end but as a means to support the sustainable organization.

Szekely and Dossa explore key problems organizations face when pursuing a sustainability agenda. Each chapter presents one of the eight steps, describes a business dilemma for sustainability, provides a theoretically grounded strategic framework, offers case studies that illustrate the dilemma, and summarizes key findings; the case studies draw on the experiences of such companies as Tesla Motors, Patagonia, TOMs, and Panera. The book emphasizes leadership, arguing that leaders who question the status quo, inspire others, and take risks are essential for achieving sustainable business practices.

**Francisco Szekely** is Sandoz Foundation Professor of Leadership and Sustainability at IMD Business School in Lausanne, where he is also Director of the Global Centre for Sustainability Leadership. **Zahir Dossa** is a postdoctoral Research Fellow at the Global Centre for Sustainability Leadership at IMD Business School.

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*urban studies | environment*

## Infrastructural Ecologies

Alternative Development Models for Emerging Economies

**Hillary Brown and Byron Stigge**

Many emerging nations, particularly those least developed, lack basic critical infrastructural services—affordable energy, clean

**An integrated, holistic model for infrastructure planning and design in developing countries.**

drinking water, dependable sanitation, and effective public transportation, along with reliable food systems. Many of these countries cannot afford the complex

and resource-intensive systems based on Western, single-sector, industrialized models. In this book, Hillary Brown and Byron Stigge propose an alternate model for planning and designing infrastructural services in the emerging market context. This new model is holistic and integrated, resilient and sustainable, economical and equitable, creating an infrastructural ecology that is more analogous to the functioning of natural ecosystems.

Brown and Stigge identify five strategic infrastructure objectives and illustrate each with examples of successful projects from across the developing world. Each chapter also highlights exemplary preindustrial systems, demonstrating the long history of resilient, sustainable infrastructure. The case studies describe the use of single solutions to solve multiple problems, creating hybridized and reciprocal systems; “soft path” models for water management, including water reuse and nutrient recovery; post carbon infrastructures for power, heat, and transportation such as rural microhydro and solar-powered rickshaws; climate adaptation systems, including a multi-purpose tunnel and a “floating city”; and the need for community-based, equitable, and culturally appropriate projects.

**Hillary Brown** is Principal of the consulting firm New Civic Works and Professor of Architecture at City College of New York, where she directs its interdisciplinary program in Urban Sustainability. As Assistant Commissioner at New York City’s Department of Design and Construction, she founded its Office of Sustainable Design in 1996.

**Byron Stigge** is Founder of the Level Agency for Infrastructure, a New York City based infrastructure planning and engineering firm implementing projects predominantly in developing countries.

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environment | philosophy

## Philosophy, Technology and the Environment

edited by David Kaplan

Environmental philosophy and philosophy of technology have taken divergent paths despite their common interest in examining human modification of the natural world. Yet philosophers from each field have a lot to contribute to the other. Environmental issues inevitably involve technologies, and technologies inevitably have environmental impacts. In this book, prominent scholars from both fields illuminate the intersections of environmental philosophy and philosophy of technology, offering the beginnings of a rich new hybrid discourse.

All the contributors share the intuition that technology and the environment overlap in ways that are relevant in both philosophical and practical terms. They consider such issues as the limits of technological interventions in the natural world, whether a concern for the environment can be designed into things, how consumerism relates us to artifacts and environments, and how food and animal agriculture raise questions about both culture and nature. They discuss, among other topics, the pessimism and dystopianism shared by environmentalists, environmental philosophers, and philosophers of technology; the ethics of geoengineering and climate change; the biological analogy at the heart of industrial ecology; green products and sustainable design; and agriculture as a bridge between technology and the environment.

**David Kaplan** is Associate Professor in the Department of Philosophy and Religion at the University of North Texas, where he is also Director of the Philosophy of Food Project.

### Contributors

Braden Allenby, Raymond Anthony, Philip Brey, J. Baird Callicott, Brett Clark, Wyatt Galusky, Ryan Gunderson, Benjamin Hale, Clare Heyward, Don Idhe, Mark Sagoff, Julian Savulescu, Paul B. Thompson, Ibo van de Poel, Zhang Wei, Kyle Powys Whyte

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environment | China studies

## Resigned Activism

Living with Pollution in Rural China

Anna Lora-Wainwright

Residents of rapidly industrializing rural areas in China live with pollution every day. Villagers drink obviously tainted water and breathe visibly dirty air, afflicted by a variety of ailments—from arthritis to nosebleeds—that they ascribe to the effects of industrial pollution. “Cancer villages,” village-sized clusters of high cancer incidence, have emerged as a political and cultural phenomenon. In *Resigned Activism*, Anna Lora-Wainwright explores the daily grind of living with pollution in rural China and the varying forms of activism that develop in response. She finds that claims of health or environmental damage are politically sensitive, and that efforts to seek redress are frustrated by limited access to scientific evidence, growing socioeconomic inequalities, and complex local realities. Villagers, feeling powerless, often come to accept pollution as part of the environment; their activism is tempered by their resignation.

Lora-Wainwright uses the term “resigned activism” as a lens through which to view villagers’ perceptions and the diverse forms of environmental engagement that result. These range from picketing at the factory gate to quieter individual or family-oriented actions. Drawing on her own extensive fieldwork, Lora-Wainwright offers three case studies of “resigned activism” in rural China, examining the experiences of villagers who live with the effects of phosphorous mining and fertilizer production, lead and zinc mining, and electronic waste processing. These cases make clear the staggering human costs of development and the deeply uneven distribution of costs and benefits that underlie China’s economic power.

**Anna Lora-Wainwright** is Associate Professor in the Human Geography of China at the University of Oxford, and the author of *Fighting for Breath: Living Morally and Dying of Cancer in a Chinese Village*.

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## Carbon Capture and Storage

Efficient Legal Policies for Risk Governance and Compensation

**Michael G. Faure and Roy Partain**

Carbon capture and storage (CCS) systems inject highly compressed carbon dioxide gas deep into geological formations in order to contain the gas, and its harmful effects on the planet, for the foreseeable future and beyond—for centuries or even millennia. Used effectively, CCS could lessen the impact of climate change while carbon-free energy sources are developed. And yet CCS is not widely deployed. In this book, Michael Faure and Roy Partain offer a theoretical and practical discussion of one of the main obstacles to CCS adoption: complex liability and compensation issues.

Faure and Partain point out that current liability rules are unclear in their application to CCS. Causation is complicated, and the timeline of hundreds of years goes beyond the lifetimes of people or corporations. Examining the subject from legal and economic perspectives, they consider whether rules of civil liability can govern CCS risk; how a liability system might address the open-ended timeline; what role public and private regulatory measures could play; and whether compensation should be provided from public or private resources. They investigate the utility of different forms of insurance and of such financial tools as guarantees, deposits, and catastrophe bonds. They offer not only a rigorous framework for assessing policy but also a summary of policy recommendations they develop from their findings.

**Michael G. Faure** is Professor of Comparative and International Environmental Law at Maastricht University and Academic Director of the Maastricht European Institute for Transnational Legal Research. **Roy Partain** is Reader at the University of Aberdeen School of Law.

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environment | political science

## Governing Complex Systems

Social Capital for the Anthropocene

**Oran R. Young**

The onset of the Anthropocene, an era in which human actions have become major drivers of change on a planetary scale, has increased the complexity of socioecological systems. Complex systems pose novel challenges for governance because of their high levels of connectivity, nonlinear dynamics, directional patterns of change, and emergent properties. Meeting these challenges will require the development of new intellectual capital. In this book, Oran Young argues that to achieve sustainable outcomes in a world of complex systems, we will need governance systems that are simultaneously durable enough to be effective in guiding behavior and agile enough to adapt to rapidly changing circumstances.

While some insights from past research on governance remain valid in this setting, Young argues that we need new social capital to supplement mainstream regulatory approaches that feature rule making with an emphasis on compliance and enforcement. He explores the uses of goal setting as a governance strategy, the idea of principled governance, and the role of what is often called good governance in meeting the challenges of the Anthropocene. Drawing on his long experience operating on the science/policy frontier, Young calls for more effective collaboration between analysts and practitioners in creating and implementing governance systems capable of producing sustainable outcomes in a world of complex systems.

**Oran B. Young** is Distinguished Professor Emeritus at the Bren School of Environmental Science and Management at the University of California, Santa Barbara. He is the author of *Institutional Dynamics: Emergent Patterns in International Environmental Governance* (MIT Press) and other books.

March | 6 x 9, 288 pp. | 3 illus.

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## Climate of Capitulation

An Insider's Account of State Power in a Coal Nation

**Vivian E. Thomson**

The United States has pledged to the world community a reduction in greenhouse gas emissions by 26–28 percent below 2005 levels in 2025. Because much of this reduction must come from electric utilities, especially coal-fired power plants, coal states will make or break the U.S. commitment to emissions reduction. In *Climate of Capitulation*, Vivian Thomson offers an insider's account of how power is wielded in environmental policy making at the state level. Thomson, a former member of Virginia's State Air Pollution Control Board, identifies a "climate of capitulation" in state government—a deeply rooted favoritism toward coal and electric utilities in states' air pollution policies.

Thomson narrates three cases involving coal and air pollution from her time on the Air Board. She illuminates the overt and covert power struggles surrounding air pollution limits for a coal-fired power plant just across the Potomac from Washington, for a controversial new coal-fired electrical generation plant in coal country, and for coal dust pollution from truck traffic in a country hollow. Thomson links Virginia's climate of capitulation with campaign donations that make legislators politically indebted to coal and electric utility interests, a traditionalistic political culture tending to inertia, and a part-time legislature that depended on outside groups for information and bill drafting. Extending her analysis to fifteen other coal-dependent states, Thomson offers policy reforms aimed at mitigating the ingrained biases toward coal and electric utilities in states' air pollution policy making.

**Vivian E. Thomson** is Professor in the Department of Environmental Sciences and Politics and Director of the Environmental Thought and Practice BA Program at the University of Virginia.

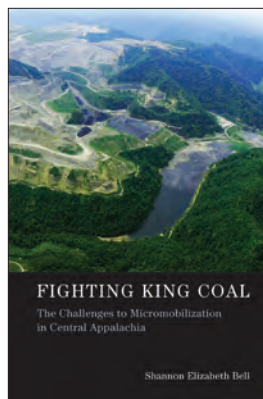
**How power is wielded in environmental policy making at the state level, and how to redress the ingrained favoritism toward coal and electric utilities.**

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environment | policy

## Governing Through Goals

Sustainable Development Goals as Governance Innovation

edited by **Norichika Kanie** and **Frank Biermann**

In September 2015, the United Nations General Assembly adopted the Sustainable Development Goals as part of the

**A detailed examination of the UN's Sustainable Development Goals and the shift in governance strategy they represent.**

2030 Agenda for Sustainable Development. The Sustainable Development Goals built on and broadened the earlier Millennium Development Goals, but they also signaled a larger

shift in governance strategies. The seventeen goals add detailed content to the concept of sustainable development, identify specific targets for each goal, and help frame a broader, more coherent, and transformative 2030 agenda. The Sustainable Development Goals aim to build a universal, integrated framework for action that reflects the economic, social, and planetary complexities of the twenty-first century.

This book examines in detail the core characteristics of goal setting, asking when it is an appropriate governance strategy and how it differs from other approaches; analyzes the conditions under which a goal-oriented agenda can enable progress toward desired ends; and considers the practical challenges in implementation.

**Norichika Kanie** is Professor at the Graduate School of Media and Governance at Keio University, Tokyo, and Senior Research Fellow at United Nations University Institute for the Advanced Study of Sustainability. **Frank Biermann** is Research Professor of Global Sustainability Governance with the Copernicus Institute of Sustainable Development at Utrecht University and the author of *Earth System Governance: World Politics in the Anthropocene* (MIT Press).

### Contributors

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## Environmental Governance Reconsidered

Challenges, Choices, and Opportunities

SECOND EDITION

edited by **Robert F. Durant**, **Daniel J. Fiorino**, and **Rosemary O'Leary**

This survey of current issues and controversies in environmental policy and management is unique in its thematic mix, broad

**Key topics in the ongoing evolution of environmental governance, with new and updated material.**

coverage of key debates, and in-depth analysis. The contributing authors, all distinguished scholars or practitioners, offer a comprehensive examination of key

topics in the continuing evolution of environmental governance, with perspectives from public policy, public administration, political science, international relations, sustainability theory, environmental economics, risk analysis, and democratic theory.

The second edition of this popular reader has been thoroughly revised, with updated coverage and new topics. The emphasis has shifted from sustainability to include sustainable cities, from domestic civic environmentalism to global civil society, and from global interdependence to the evolution of institutions of global environmental governance. A general focus on devolution of authority in the United States has been sharpened to address the specifics of contested federalism, and the treatment of flexibility now explores the specifics of regulatory innovation and change. New chapters address energy security; risk assessment, communication, and technology innovation; regulation-by-revelation; and retrospective regulatory analysis.

The topics are organized and integrated by the book's "3R" framework: *reconceptualizing* governance to reflect ecological risks and interdependencies better, *reconnecting* with stakeholders, and *reframing* administrative rationality. Extensive cross-references pull the chapters together.

**Robert F. Durant** is Professor Emeritus in the School of Public Affairs, American University. **Daniel J. Fiorino** is Director of the Center for Environmental Policy at American University. **Rosemary O'Leary** is Edwin O. Stene Distinguished Professor in the School of Public Affairs at the University of Kansas.

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## Traversals

The Use of Preservation for Early Electronic Writing

**Stuart Moulthrop and Dene Grigar**

foreword by Joseph Tabbi

Many pioneering works of electronic literature are now largely inaccessible because of changes in hardware, software, and

**An exercise in reclaiming electronic literary works on inaccessible platforms, examining four works as both artifacts and operations.**

platforms. The virtual disappearance of these works—created on floppy disks, in Apple’s defunct HyperCard, and on other early systems and platforms—not only puts important electronic literary work out of reach but also

signals the fragility of most works of culture in the digital age. In response, Dene Grigar and Stuart Moulthrop have been working to document and preserve electronic literature, work that has culminated in the Pathfinders project and its series of “traversals”—video and audio recordings of demonstrations performed on historically appropriate platforms, with participation and commentary by the authors of the works.

In *Traversals*, Moulthrop and Grigar mine this material to examine four influential early works: Judy Malloy’s *Uncle Roger* (1986), John McDavid’s *Uncle Buddy’s Phantom Funhouse* (1993), Shelley Jackson’s *Patchwork Girl* (1995) and Bill Bly’s *We Descend* (1997), offering “deep readings” that consider the works as both literary artifacts and computational constructs. For each work, Moulthrop and Grigar explore the interplay between the text’s material circumstances and the patterns of meaning it engages and creates, paying attention both to specificities of media and purposes of expression.

**Stuart Moulthrop** is Professor in the Department of English at the University of Wisconsin–Milwaukee. **Dene Grigar** is Professor and Director of the Creative Media and Digital Culture Program at Washington State University Vancouver.

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*media | Internet studies*

## Minitel

Welcome to the Internet

**Julien Mailland and Kevin Driscoll**

A decade before the Internet became a medium for the masses in the United States, millions of users in France had access to a network for email,

**The first book in English on Minitel, the pioneering French computer network, offers a history of a technical system and a cultural phenomenon.**

e-commerce, chat, research, game playing, blogging, and even an early form of online porn. In 1981, the French government introduced Minitel, a computer network that achieved mass adoption

in just a few years as the government distributed free terminals to every French telephone subscriber. With this volume, Julien Mailland and Kevin Driscoll offer the first book in English on Minitel, examining it as both as technical system and a cultural phenomenon.

Mailland and Driscoll argue that Minitel was a technical marvel, a commercial success, and an ambitious social experiment. Other early networks may have introduced protocols and software standards that continue to be used today, but Minitel foretold the social effects of widespread telecomputing. The book describes Minitel’s key technological components and how they enabled the creation of novel online services and thriving virtual communities; the Minitel platform and the French political tradition of centralization; the innovative private market that formed at the edges of the network; and the effect of public-private partnership on content creation. The seemingly tight grip of the state did not prevent spontaneity, imagination, and creativity.

Minitel was largely abandoned by 2012; but the history of Minitel can inform our Internet policy choices in the future.

**Julien Mailland** is Assistant Professor at the Media School at Indiana University Bloomington. **Kevin Driscoll** is Assistant Professor in the Department of Media Studies at the University of Virginia.

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## Fragile Rise

Grand Strategy and the Fate of Imperial Germany,  
1871-1914

**Xu Qiyu**

translated by Joshua Hill

foreword by Graham Allison

A series of solemn anniversary events have marked the centenary of World War I. Could history repeat itself in today's geopolitics? Now, as then, a land power with a growing economy and a maritime power with global commitments are the two leading states in the international system. Most ominously, the outbreak of war in 1914 is a stark reminder that nations cannot rely on economic interdependence and ongoing diplomacy to keep the peace.

In *Fragile Rise*, Xu Qiyu offers a Chinese perspective on the course of German grand strategy in the decades before World War I. Xu shows how Germany's diplomatic blunders turned its growing power into a liability instead of an asset. Bismarck's successors provoked tension and conflict with the other European great powers. Germany's attempts to build a powerful navy alienated Britain. Fearing an assertive Germany, France and Russia formed an alliance, leaving the declining Austro-Hungarian Empire as Germany's only major ally.

Xu's account demonstrates that better strategy and statesmanship could have made a difference—for Germany and Europe. His analysis offers important lessons for the leaders of China and other countries. *Fragile Rise* reminds us that the emergence of a new great power creates risks that can be managed only by adroit diplomats, including the leaders of the emerging power. In the twenty-first century, another great war may not be inevitable. Heeding the lessons of *Fragile Rise* could make it even less likely.

**Xu Qiyu** is Deputy Director of the Institute for Strategic Studies at National Defense University in Beijing.



**Germany's rise to power  
before World War I from  
a Chinese perspective,  
and the geopolitical lessons  
for today.**

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## Here/There

Telepresence, Touch, and Art at the Interface

**Kris Paulsen**

“Telepresence” allows us to feel present—through vision, hearing, and even touch—at a remote location by means of real-time communication technology. Networked devices such as video cameras and telerobots extend our corporeal agency into distant spaces. In *Here/There*, Kris Paulsen examines telepresence technologies through the lens of contemporary

artistic experiments, from early video art through current “drone vision” works. Paulsen traces an arc of increasing interactivity, as video screens became spaces for communication and physical, tactile intervention. She explores the work of artists who took up these technological tools and questioned the aesthetic, social, and ethical stakes of media that allow us to manipulate and affect far-off environments and other people—to touch, metaphorically and literally, those who cannot touch us back.

Paulsen examines 1970s video artworks by Vito Acconci, Joan Jonas, live satellite performance projects by Kit Galloway and Sherrie Rabinowitz, and CCTV installations by Chris Burden. These early works, she argues, can help us make sense of the expansion of our senses by technologies that privilege real time over real space and model strategies for engagement and interaction with mediated others. They establish a political, aesthetic, and technological history for later works using cable TV infrastructures and the World Wide Web, including tele-robotic works by Ken Goldberg and Wafaa Bilal and artworks about military drones by Trevor Paglen, Omar Fast, Hito Steyerl, and others. These works become a meeting place for *here* and *there*.

**Kris Paulsen** is Assistant Professor of History of Art and Film Studies at the Ohio State University.

March | 7 x 9, 264 pp. | 54 illus.

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**A Leonardo Book**

digital humanities

## Coding Literacy

How Computer Programming Is Changing Writing

**Annette Vee**

The message from educators, the tech community, and even politicians is clear: everyone should learn to code. To emphasize the universality and importance of computer programming, promoters of coding for everyone often invoke the concept of “literacy,” drawing parallels between reading and writing code and reading and writing text. In this book, Annette Vee

examines the coding-as-literacy analogy and argues that it can be an apt rhetorical frame. The theoretical tools of literacy help us understand programming beyond a technical level, and in its historical, social, and conceptual contexts. Viewing programming from the perspective of literacy and literacy from the perspective of programming, she argues, shifts our understandings of both. Computer programming becomes part of an array of communication skills important in everyday life, and literacy, augmented by programming, becomes more capacious.

Vee examines the ways that programming is linked with literacy in coding literacy campaigns, considering the ideologies that accompany this coupling, and she looks at how both writing and programming encode and distribute information. She explores historical parallels between writing and programming, using the evolution of mass textual literacy to shed light on the trajectory of code from military and government infrastructure to large-scale businesses to personal use. Writing and coding were institutionalized, domesticated, and then established as a basis for literacy. Just as societies demonstrated a “literate mentality” regardless of the literate status of individuals, Vee argues, a “computational mentality” is now emerging even though coding is still a specialized skill.

**Annette Vee** is Assistant Professor in the Department of English at the University of Pittsburgh.

June | 6 x 9, 336 pp. | 10 illus.

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## FireSigns

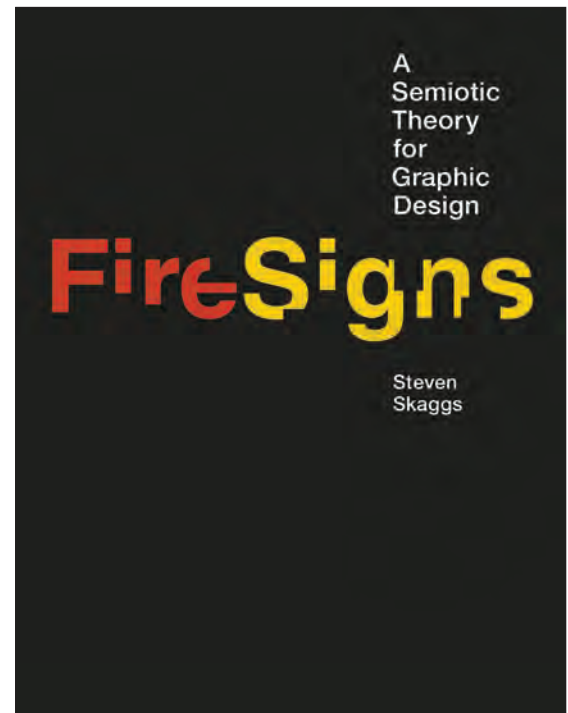
A Semiotic Theory for Graphic Design

**Steven Skaggs**

Graphic design has been an academic discipline since the post-World War II era, but it has yet to develop a coherent theoretical foundation. Instead, it proceeds through styles, genres, and imitation, drawing on sources that range from the Bauhaus to deconstructionism. In *FireSigns*, Steven Skaggs offers the foundation for a semiotic theory of graphic design, exploring semiotic concepts from design and studio art perspectives and offering useful conceptual tools for practicing designers.

Semiotics is the study of signs and significations; graphic design creates visual signs meant to create a certain effect in the mind (a “FireSign”). Skaggs provides a network of explicit concepts and terminology for a practice that has made implicit use of semiotics without knowing it. He offers an overview of the metaphysics of visual perception and the notion of visual entities, and, drawing on the pragmatic semiotics of the philosopher Charles Sanders Peirce, looks at visual experience as a product of the action of signs. He introduces three conceptual tools for analyzing works of graphic design—semantic profiles, the functional metric, and the visual gamut—that allow visual “personality types” to emerge and enable a greater understanding of the range of possibilities for visual elements. Finally, he applies these tools to specific analyses of typography.

**Steven Skaggs** is Professor of Design at the Hite Art Institute of the University of Louisville. A semiotician, calligrapher, and font designer, he explores the connections between the visual and verbal worlds.



**Semiotics concepts from a design perspective, offering the foundation for a coherent theory of graphic design as well as conceptual tools for practicing designers.**

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7 x 9, 296 pp.  
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## Real-World Algorithms

A Beginner's Guide

**Panos Louridas**

Algorithms are what we do in order not to have to do something. Algorithms consist of instructions to carry out tasks—usually

**An introduction to algorithms for readers with no background in advanced mathematics or computer science, emphasizing examples and real-world problems.**

dull, repetitive ones. Starting from simple building blocks, computer algorithms enable machines to recognize and produce speech, translate texts, categorize and summarize documents, describe images, and predict the weather. A task that would

take hours can be completed in virtually no time by using a few lines of code in a modern scripting program. This book offers an introduction to algorithms through the real-world problems they solve. The algorithms are presented in pseudocode and can readily be implemented in a computer language.

The book presents algorithms simply and accessibly, without overwhelming readers or insulting their intelligence. Readers should be comfortable with mathematical fundamentals and have a basic understanding of how computers work; all other necessary concepts are explained in the text. After presenting background in pseudocode conventions, basic terminology, and data structures, chapters cover compression, cryptography, graphs, searching and sorting, hashing, classification, strings, and chance. Each chapter describes real problems and then presents algorithms to solve them. Examples illustrate the wide range of applications, including shortest paths as a solution to paragraph line breaks, strongest paths in elections systems, hashes for song recognition, voting power Monte Carlo methods, and entropy for machine learning. *Real-World Algorithms* can be used by students in disciplines from economics to applied sciences. Computer science majors can read it before using a more technical text.

**Panos Louridas** is Associate Professor in the Department of Management Science and Technology at the Athens University of Economics and Business.

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computer science | electrical engineering

## Introduction to Embedded Systems

A Cyber-Physical Systems Approach

SECOND EDITION

**Edward A. Lee and Sanjit A. Seshia**

The most visible use of computers and software is processing information for human consumption. The vast majority of computers in use, however, are much less visible. They run the engine, brakes, seatbelts, airbag, and audio system in your car. They digitally encode your voice and construct a radio signal

to send it from your cell phone to a base station. They command robots on a factory floor, power generation in a power plant, processes in a chemical plant, and traffic lights in a city. These less visible computers are called embedded systems, and the software they run is called embedded software. The principal challenges in designing and analyzing embedded systems stem from their interaction with physical processes. This book takes a cyber-physical approach to embedded systems, introducing the engineering concepts underlying embedded systems as a technology and as a subject of study. The focus is on modeling, design, and analysis of cyber-physical systems, which integrate computation, networking, and physical processes.

The second edition offers two new chapters, several new exercises, and other improvements. The book can be used as a textbook at the advanced undergraduate or introductory graduate level and as a professional reference for practicing engineers and computer scientists. Readers should have some familiarity with machine structures, computer programming, basic discrete mathematics and algorithms, and signals and systems.

**Edward A. Lee** is the Robert S. Pepper Distinguished Professor in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley. **Sanjit A. Seshia** is a Professor in the Department of Electrical Engineering and Computer Sciences at the University of California, Berkeley.

February | 7 1/4 x 9 1/4, 568 pp.

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## Reasoning about Uncertainty

SECOND EDITION

Joseph Y. Halpern

In order to deal with uncertainty intelligently, we need to be able to represent it and reason about it. In this book, Joseph Halpern examines formal ways of representing uncertainty and considers various logics for reasoning about it. While the ideas presented are formalized in terms of definitions and theorems, the emphasis is on the philosophy of representing and reasoning about uncertainty. Halpern surveys possible formal systems for representing uncertainty, including probability measures, possibility measures, and plausibility measures; considers the updating of beliefs based on changing information and the relation to Bayes' theorem; and discusses qualitative, quantitative, and plausibilistic Bayesian networks.

This second edition has been updated to reflect Halpern's recent research. New material includes a consideration of weighted probability measures and how they can be used in decision making; analyses of the Doomsday argument and the Sleeping Beauty problem; modeling games with imperfect recall using the runs-and-systems approach; a discussion of complexity-theoretic considerations; the application of first-order conditional logic to security.

*Reasoning about Uncertainty* is accessible and relevant to researchers and students in many fields, including computer science, artificial intelligence, economics (particularly game theory), mathematics, philosophy, and statistics.

**Joseph Y. Halpern** is Professor of Computer Science at Cornell University. He is the author of *Actual Causality* and the coauthor of *Reasoning about Knowledge*, both published by the MIT Press.

### Praise for the first edition

"A rich source of unique insights, offering unexpected connections between different fields."

—Peter P. Wakker, Department of Economics, University of Amsterdam

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computer science | machine learning

## Perturbations, Optimization, and Statistics

edited by Tamir Hazan, George Papandreou, and Daniel Tarlow

In nearly all machine learning, decisions must be made given current knowledge. Surprisingly, making what is believed to be the best decision is not always the best strategy, even when learning in a supervised learning setting. An emerging body of work on learning under different rules applies perturbations to decision and learning procedures. These methods provide simple and highly efficient learning rules with improved theoretical guarantees. This book describes perturbation-based methods developed in machine learning to augment novel optimization methods with strong statistical guarantees, offering readers a state-of-the-art overview.

Chapters address recent modeling ideas that have arisen within the perturbations framework, including Perturb & MAP, herding, and the use of neural networks to map generic noise to distribution over highly structured data. They describe new learning procedures for perturbation models, including an improved EM algorithm and a learning algorithm that aims to match moments of model samples to moments of data. They discuss understanding the relation of perturbation models to their traditional counterparts, with one chapter showing that the perturbations viewpoint can lead to new algorithms in the traditional setting. And they consider perturbation-based regularization in neural networks, offering a more complete understanding of dropout and studying perturbations in the context of deep neural networks.

**Tamir Hazan** is Assistant Professor at Technion, Israel Institute of Technology. **George Papandreou** is a Research Scientist for Google, Inc. **Daniel Tarlow** is a Researcher at Microsoft Research Cambridge, UK.

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*computer science*

## Fundamental Proof Methods in Computer Science

**Konstantine Arkoudas and David Musser**

Proof is the primary vehicle for knowledge generation in mathematics. In computer science, proof has found an additional use:

**A textbook that teaches students to read and write proofs using Athena.**

verifying that a particular system (or component, or algorithm) has certain desirable properties. This book teaches students to read and write proofs using Athena,

a freely downloadable computer language. Athena proofs are machine-checkable and written in an intuitive natural-deduction style. The book contains more than 300 exercises, most with full solutions; by putting proofs into practice, it demonstrates the fundamental role of logic and proof in computer science as no other existing text does.

Guided by examples and exercises, students are quickly immersed in the most useful high-level proof methods, including equational reasoning, several forms of induction, case analysis, proof by contradiction, and abstraction/specialization. Athena is particularly suited to the needs of computer science students as proofs are expressed with programming constructs based closely on those used in conventional programming. Block structure, for example, plays a key role in Athena's natural-deduction style. These similarities allow useful analogies to be drawn between proofs-as-programs and ordinary programs. The book also includes auxiliary material on SAT and SMT solving, automated theorem proving, and logic programming.

The book can be used by upper undergraduate- or graduate-level computer science students with a basic level of programming and mathematical experience. Professional programmers, practitioners of formal methods, and researchers in logic-related branches of computer science will find it a valuable reference.

**Konstantine Arkoudas** is a Senior Research Scientist and Software Engineer in the Machine Learning Group for Bloomberg R&D. **David Musser** is Professor Emeritus of Computer Science at Rensselaer Polytechnic Institute.

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*defense | aerospace*

## Perspectives on Space Surveillance

**edited by Ramaswamy Sridharan and Antonio F. Pensa**

In the 1950s, the United States and the Soviet Union raced to develop space-based intelligence gathering capability. The

**The development of deep space surveillance technology and its later application to near-Earth surveillance, covering work at Lincoln Laboratory from 1970 to 2000.**

Soviets succeeded first, with SPUTNIK I in 1957. The United States began to monitor the growing Soviet space presence by developing technology for the detection and tracking of man-made resident space objects (RSOs) in near-Earth orbit. In 1972,

the Soviet Union launched a satellite into deep space orbit, and the U.S. government called on MIT Lincoln Laboratory to develop deep space surveillance technology. This book describes these developments, as well as the later application of deep space surveillance technology to near-Earth surveillance, covering work at Lincoln Laboratory on space surveillance from 1970 to 2000.

The contributors, all key participants in developing these technologies, discuss topics that include narrow beam, narrow bandwidth radar for deep surveillance; wide bandwidth radar for RSO monitoring; ground-based electro-optical deep space surveillance and its adaptation for space-based surveillance; radar as the means of real-time search and discovery techniques; methods of analyses of signature data from narrow bandwidth radars; and the collision hazard for satellites in geosynchronous orbit, stemming initially from the failure of TELSTAR 401. They also describe some unintended byproducts of this pioneering work, including the use of optical space surveillance techniques for near-Earth asteroid detection.

**Ramaswamy Sridharan** is a Senior Staff Member at MIT Lincoln Laboratory. **Antonio Pensa** is Assistant Director Emeritus at MIT Lincoln Laboratory.

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April | 7 x 9, 392 pp. | 220 color illus., 15 black & white illus.

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**MIT Lincoln Laboratory Series**



## Deep Learning

Ian Goodfellow, Yoshua Bengio, and Aaron Courville

Deep learning is a form of machine learning that enables computers to learn from experience and understand the world in terms of a hierarchy of concepts. Because the computer gathers knowledge from experience, there is no need for a human computer operator to formally specify all the knowledge that the computer needs. The hierarchy of concepts allows the computer to learn complicated concepts by building them out of simpler ones; a graph of these hierarchies would be many layers deep. This book introduces a broad range of topics in deep learning.

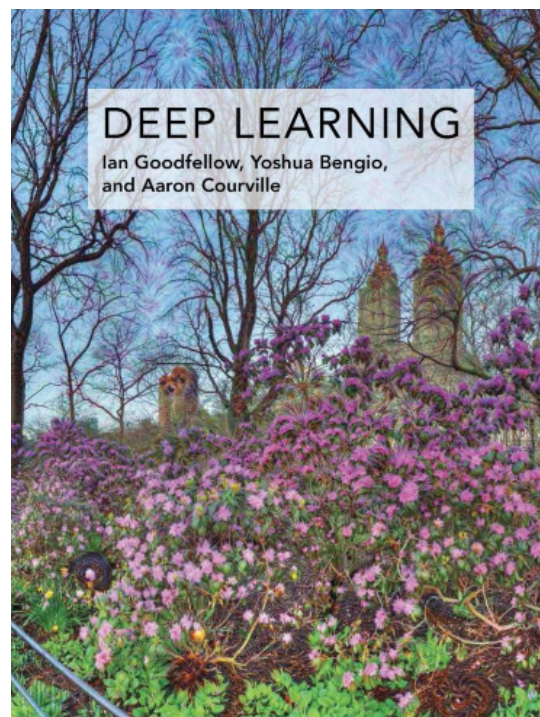
The text offers mathematical and conceptual background, covering relevant concepts in linear algebra, probability theory and information theory, numerical computation, and machine learning. It describes deep learning techniques used by practitioners in industry, including deep feedforward networks, regularization, optimization algorithms, convolutional networks, sequence modeling, and practical methodology; and it surveys such applications as natural language processing, speech recognition, computer vision, online recommendation systems, bioinformatics, and videogames. Finally, the book offers research perspectives, covering such theoretical topics as linear factor models, autoencoders, representation learning, structured probabilistic models, Monte Carlo methods, the partition function, approximate inference, and deep generative models.

*Deep Learning* can be used by undergraduate or graduate students planning careers in either industry or research, and by software engineers who want to begin using deep learning in their products or platforms. A website offers supplementary material for both readers and instructors.

**Ian Goodfellow** is Research Scientist at OpenAI. **Yoshua Bengio** is Professor of Computer Science at the Université de Montréal. **Aaron Courville** is Assistant Professor of Computer Science at the Université de Montréal.

*“Written by three experts in the field, *Deep Learning* is the only comprehensive book on the subject. It provides much-needed broad perspective and mathematical preliminaries for software engineers and students entering the field, and serves as a reference for authorities.”*

**—Elon Musk, co-chair of OpenAI; cofounder and CEO of Tesla and SpaceX**



**An introduction to a broad range of topics in deep learning, covering mathematical and conceptual background, deep learning techniques used in industry, and research perspectives.**

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