

Book announcements: *Multiagent Systems* and *Essentials of Game Theory*

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and

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Dear colleagues,

We're pleased, indeed relieved, to announce the roughly simultaneous publication of our two books. The first, which was six years in the making, is a general introduction to multiagent systems. In the spirit of the times it has deep coverage of game theory, but is not limited to it, and includes extensive material on distributed problem solving and logical approaches. It is intended to support an introductory yet rigorous course on multiagent systems (indeed, it can support several different such courses). We hope you enjoy it, sorry for the remaining typos and errors, and please give us feedback. Importantly, in the home page for the book (www.MASfoundations.org) we'll include a page with instructional resources, and we invite you to share whatever presentations, lecture notes, problems (with solutions...), software, or any other resource you find relevant to teaching from this book. Of course any contribution you make will remain attributed to you (you can decide whether this is a promise or a threat...).

The second book, excerpted from the first, is a crash course in game theory. We believe it's anyone's inalienable right to understand basic game theory in under 100 pages. And so in 88 pages we provide rigorous coverage of the basic material with which anyone interested in game theory should be familiar. This common denominator can then be extended to cover material relevant to specific disciplines. It's the sort of booklet we wish we'd had when first venturing into game theory. The same apologies (re: remaining mistakes) and invitation (to upload material; home page is www.GTessentials.org) apply here as for the first book.

Best regards,

Kevin and Yoav

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Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Founda- tions

Yoav Shoham, Stanford University
Kevin Leyton-Brown, University of British Columbia

Cambridge University Press, 2008, 533 pages

About the Book:

Multiagent systems consist of multiple autonomous entities having different information and/or diverging interests. This comprehensive introduction to the field offers a computer science perspective, but also draws on ideas from game theory, economics, operations research, logic, philosophy and linguistics. It will serve as a reference for researchers in each of these fields, and be used as a text for advanced undergraduate and graduate courses.

Emphasizing foundations, the authors offer a broad and rigorous treatment of their subject, with thorough presentations of distributed problem solving, non-cooperative game theory, multiagent communication and learning, social choice, mechanism design, auctions, coalitional game theory, and logical theories of knowledge, belief, and other aspects of rational agency. For each topic, basic concepts are introduced, examples are given, proofs of key results are offered, and algorithmic considerations are examined. An appendix covers background material in probability theory, classical logic, Markov decision processes, and mathematical programming.

Table of Contents:

- (1) Distributed Constraint Satisfaction
 - (2) Distributed Optimization
 - (3) Introduction to Noncooperative Game Theory: Games in Normal Form
 - (4) Computing Solution Concepts of Normal-Form Games
 - (5) Games with Sequential Actions: Reasoning and Computing with the Extensive Form
 - (6) Richer Representations: Beyond the Normal and Extensive Forms
 - (7) Learning and Teaching
 - (8) Communication
 - (9) Aggregating Preferences: Social Choice
 - (10) Protocols for Strategic Agents: Mechanism Design
 - (11) Protocols for Multiagent Resource Allocation: Auctions
 - (12) Teams of Selfish Agents: An Introduction to Coalitional Game Theory
 - (13) Logics of Knowledge and Belief
 - (14) Beyond Belief: Probability, Dynamics and Intention
- Appendices: Technical Background*
- A. Probability Theory
 - B. Linear and Integer Programming
 - C. Markov Decision Problems (MDPs)
 - D. Classical Logic
- Bibliography*
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Praise for *Multiagent Systems*:

This is by far the best text in the field of multiagent systems, one of the fastest-growing areas in computer science.

— *Stuart Russell, University of California at Berkeley*

Through excellent side-by-side presentation of the main approaches in computer science, game theory and economics, this pioneering textbook is a major advance towards the education of a better-equipped generation of computer scientists as well as social scientists.

— *Ehud Kalai, Northwestern University*

Written by two of the leading researchers in the area, this engaging and accessible book is unique in covering the diverse foundations of multiagent systems, including logic. Its extensive treatment of the interplay between computer science and game theory will define how the subject should be taught.

— *Joseph Halpern, Cornell University*

Multiagent Systems touches all aspects of multiagent systems—from artificial intelligence to algorithms to game theory, to logic, and beyond—and presents, for the first time, all this cutting-edge research in a textbook form. Written by leaders in this research area, this book is certain to become the textbook of choice for classes on multiagent systems.

— *Noam Nisan, Hebrew University*

The authors traverse several disciplines to bring together the most salient and useful technical principles for understanding multiagent systems. This text is the first to provide computer scientists with a comprehensive treatment of the mathematical machinery they need to analyze systems of autonomous agents, integrating their computational and strategic dimensions.

— *Michael Wellman, University of Michigan*

Essentials of Game Theory: A Concise Multidisciplinary Introduction

Kevin Leyton-Brown, University of British Columbia

Yoav Shoham, Stanford University

Morgan & Claypool Publishers, 2008, 88 pages

About the Book:

Game theory is the mathematical study of interaction among independent, self-interested agents. The audience for game theory has grown dramatically in recent years, and now spans disciplines as diverse as political science, biology, psychology, economics, linguistics, sociology, and computer science, among others. What has been missing is a relatively short introduction to the field covering the common basis that anyone with a professional interest in game theory is likely to require. Such a text would minimize notation, ruthlessly focus on essentials, and yet not sacrifice rigor. This book aims to fill this gap by providing a concise and accessible introduction to the field. It covers the main classes of games, their representations, and the main concepts used to analyze them.

The origin of Essentials of Game Theory is our much longer book, Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations, which covers diverse theories relevant to the broad area of Multiagent Systems within Artificial Intelligence and other areas of Computer Science. Multiagent Systems goes into much more detail about game theory than Essentials (e.g., it includes proofs and additional technical details, as well as broaching new topics such as computation of solution concepts, communication, learning, and compact representation of games). Multiagent Systems also extends beyond game theory to cover distributed problem solving, social choice, mechanism design, auction theory, and logics of knowledge and belief.

Table of Contents:

- (1) Games in Normal Form
 - (2) Analyzing Games: From Optimality to Equilibrium
 - (3) Further Solution Concepts for Normal-Form Games
 - (4) Games with Sequential Actions: The Perfect-information Extensive Form
 - (5) Generalizing the Extensive Form: Imperfect-Information Games
 - (6) Repeated and Stochastic Games
 - (7) Uncertainty about Payoffs: Bayesian Games
 - (8) Coalitional Game Theory
- History and References*
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Praise for *Essentials of Game Theory*:

This introduction is just what a growing multidisciplinary audience needs: it is concise, authoritative, up to date, and clear on the important conceptual issues.

— *Robert Stalnaker, MIT, Linguistics and Philosophy*

I wish I'd had a comprehensive, clear and rigorous introduction to the essentials of game theory in under one hundred pages when I was starting out.

— *David Parkes, Harvard University, Computer Science*

Beside being concise and rigorous, *Essentials of Game Theory* is also quite comprehensive. It includes the formulations used in most applications in engineering and the social sciences and illustrates the concepts with relevant examples.

— *Robert Wilson, Stanford University, Graduate School of Business*

Best short introduction to game theory I have seen! I wish it was available when I started being interested in the field!

— *Silvio Micali, MIT, Computer Science*

Although written by computer scientists, this book serves as a sophisticated introduction to the main concepts and results of game theory from which other scientists, including social scientists, can greatly benefit. In eighty pages, *Essentials of Game Theory* formally defines key concepts, illustrated with apt examples, in both cooperative and noncooperative game theory.

— *Steven Brams, New York University, Political Science*

This book will appeal to readers who do not necessarily hail from economics, and who want a quick grasp of the fascinating field of game theory. The main categories of games are introduced in a lucid way and the relevant concepts are clearly defined, with the underlying intuitions always provided.

— *Krzysztof Apt, University of Amsterdam, Institute for Logic, Language and Computation*

To a large extent, modern behavioral ecology and behavioral economics are studied in the framework of game theory. Students and faculty alike will find this concise, rigorous and clear introduction to the main ideas in game theory immensely valuable.

— *Marcus Feldman, Stanford University, Biology*

This unique book is today the best short technical introduction to game theory. Accessible to a broad audience, it will prove invaluable in artificial intelligence, more generally in computer science, and indeed beyond.

— *Moshe Tennenholtz, Technion, Industrial Engineering and Management*

Excerpted from a much-anticipated, cross-disciplinary book on multiagent systems, this terse, incisive and transparent book is the ideal introduction to the key concepts and methods of game theory for researchers in several fields, including artificial intelligence, networking, and algorithms.

— *Vijay Vazirani, Georgia Institute of Technology, Computer Science*

The authors admirably achieve their aim of providing a scientist or engineer with the essentials of game theory in a text that is rigorous, readable, and concise.

— *Frank Kelly, University of Cambridge, Statistical Laboratory*