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Info-Gap Decision Theory: Decisions Under Severe Uncertainty

Yakov Ben-Haim

2nd Edition, 2006

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Information-Gap Decision Theory presents a fresh approach to the age-old problem of deciding responsibly with deficient information. An info-gap is the disparity between what is known and what needs to be known in order to make a well-founded decision. This idea is developed into a quantitative tool for decision-making under severe and unstructured uncertainty. An info-gap has two facets: pernicious uncertainty threatens failure, while propitious uncertainty entails the opportunity for windfall success. Info-gap theory has decision functions for defending against failure and for facilitating windfall.

This book is essential for reliability analysis and strategic planning, and includes quantitative tools for decision support, risk assessment, option prioritizing, and trade-off analysis. Examples are presented from engineering analysis and design, project management, economic policy, financial risk assessment, biological conservation, medical decisions, behavioral science, bio-terror preparedness and more.

About the author: Yakov Ben-Haim originated the theory of info-gap models of uncertainty and has pioneered their application to engineering design and reliability analysis, fault diagnosis, project management, biological conservation, medical decision-making, economic analysis, and nuclear assay. Dr. Ben-Haim is a full professor in the Faculty of Mechanical Engineering at the Technion-Israel Institute of Technology, and holds the Yitzhak Moda'i Chair in Technology and Economics. He has been a visiting professor at universities in Europe, the United States, Canada, Korea and Japan.

Reviews from the 1st Edition

- “Professor Yakov Ben-Haim has written a landmark book. . . . His information-gap modeling approach to decision making under uncertainty constitutes a new and revolutionary approach for addressing tough decision problems when little information is available.”
Prof. Keith Hipel, Dept. of Systems Design Engineering, University of Waterloo, Canada.
- “The book is self-sufficient and unique and it is a must-read treatise for all students and professionals working in the area of structural safety and reliability and for those involved in decision-making processes accompanied by severe lack of information.”
Prof. Chris P. Pantelides, Dept. of Civil and Environmental Engineering, University of Utah, *ASCE Journal of Structural Engineering*, May 2002, p.688.
- “The book presents a distinctive new theory of decision making under severe uncertainty. . . . [T]his is a very comprehensive, focused and interesting book.”
Prof. Daniel Sipper, Dept. of Industrial Engineering, Tel Aviv University, *Interfaces*, Journal of the Institute For Operations Research and Management Sciences (INFORMS), May-June 2003, vol.33, #3, pp.85–86.

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- Ben-Haim has “written a book that is . . . ambitious in its aim, broad in its scope and profound in its philosophical grounding. . . . Yakov Ben-Haim’s impressive book convinces that investment of these precious resources in an info-gap model will yield valuable insights and improved decisions.”

Prof. Jim Hall, School of Civil Engineering and Geosciences, University of Newcastle-upon-Tyne, *International Journal of General Systems*, 32(2) (2003) 204–206.

- The book “is well worth the effort that is required to understand how to apply information gap theory to decision-making under severe uncertainty. I would certainly recommend this book for practising decision analysts or for use in a post-graduate course on decision theory.”

Dr. Lesley F. Wright, Liverpool John Moores University, *Journal of the Royal Statistical Society*, Series A (2004) vol.167, Part 1, pp.185–186.

Advance Reviews and Reviews of the 2nd Edition

- “I believe this book is of fundamental importance to all applied sciences.”

Prof. Mark Burgman, School of Botany, University of Melbourne, Australia.

- Ben-Haim’s “book is widely in demand by those in my field because of its revolutionary strategy implications.”

Clifford C. Dacso, MD, MBA, Distinguished Research Professor, University of Houston, John S. Dunn Sr. Research Chair in General Internal Medicine.

- “I have worked in R&D all my life and believe that the info-gap decision theory developed by Y. Ben-Haim has potential significant applications in the selection and management of R&D projects.”

Dr. Wendell Iverson, Founder and Principle Consultant, LeapFrog R&D.

- “I find the info-gap theory very suitable for the analysis of problems in conservation biology. It gets the important concepts across and info-gap formulations are in my opinion such that they can often really also be implemented.”

Dr. Atte Moilanen, Academy Research Fellow, University of Helsinki.

- “[T]he first edition is very popular in the field of uncertainty analysis and many researchers are reading the book.”

Prof. Izuru Takewaki, Dept. of Urban & Environmental Engineering, Kyoto University.

- “The book is very relevant for ecological modellers because the ultimate use of the models is to take decisions. This volume presents a new approach to the problem of deciding responsibly with deficient information. . . .

“The book is well written. . . . If you are interested in the problem of deciding responsibly with deficient information, I can strongly recommend the book.”

Sven Erik Jorgensen, Environmental Chemistry, Copenhagen University, Denmark.

Ecological Modelling, 2008, vol.211, p.249.