

Heuristics, Probability and Causality

A Tribute to Judea Pearl

edited by

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Preface

This book is a collection of articles in honor of Judea Pearl written by close colleagues and former students. Its three main parts, heuristics, probabilistic reasoning, and causality, correspond to the titles of the three ground-breaking books authored by Judea, and are followed by a section of short reminiscences.

Judea Pearl was born in Tel Aviv and is a graduate of the Technion - Israel Institute of Technology. He came to the United States for postgraduate work in 1960. He received his Master's degree in physics from Rutgers University and his Ph.D. degree in electrical engineering from the Brooklyn Polytechnic Institute, both in 1965. Until 1969, he held research positions at RCA David Sarnoff Research Laboratories in Princeton, New Jersey and at Electronic Memories, Inc. at Hawthorne, California. In 1969 Pearl joined the UCLA faculty where he is currently an emeritus professor of computer science and director of the cognitive systems laboratory.

Judea started his research work in artificial intelligence (AI) in the mid-1970s, not long after joining UCLA. In the eyes of a hard scientist, AI must have been a fascinating but slippery scientific discipline then; a lot of AI was done through introspection and programming, building systems that could display some form of intelligence.

Since then, AI has changed a great deal. Arguably no one has played a larger role in that change than Judea. Judea Pearl's work made probability the prevailing language of modern AI and, perhaps more significantly, it placed the elaboration of crisp and meaningful models, and of effective computational mechanisms, at the center of AI research. This work is conveyed in the more than 300 scientific papers, and in his three landmark books *Heuristics* (1984), *Probabilistic Reasoning* (1988), and *Causality* (2000), where he deals with the basic questions concerning the acquisition, representation, and effective use of heuristic, probabilistic, and causal knowledge. He tackled these issues not as a philosopher or mathematician, but as an engineer and a cognitive scientist. His "burning question" was (and still is) how does the human mind "do it", and he set out to answer this question with an unusual combination of intuition, passion, intellectual honesty, and technical skill.

Judea is the recipient of numerous scientific awards. In 1996 he was selected by the UCLA Academic Senate as the 81st Faculty Research Lecturer to deliver an annual research lecture which presents the university's most distinguished scholars to the public. He received the 1999 IJCAI Research Excellence Award in Artificial Intelligence for "his fundamental work on heuristic search, reasoning under uncertainty, and causality", the 2001 London School of Economics Lakatos Award for the "best book in the philosophy of science", the 2004 ACM Allen Newell Award for "seminal contributions that extend to philosophy, psychology, medicine, statistics, econometrics, epidemiology and social science", and the 2008 Benjamin Franklin

Medal for “creating the first general algorithms for computing and reasoning with uncertain evidence”.

Judea has had more than 20 PhD students at UCLA, many of whom have become successful AI researchers on their own and many have contributed to this volume. Chronologically, they are: Antonio Leal (1976), Alan Chrolotte (1977), Ed Purcell (1978), Joseph Saleh (1980), Jin Kim (1983), Gerard Michon (1983), Rina Dechter (1985), Ingrid Zukerman (1986), Hector Geffner (1989), Dan Geiger (1990), Moises Goldszmidt (1992), Tom Verma (1990), Itay Meiri (1992), Rachel Ben-Eliyahu (1993), Sek-Wah Tan (1995), Alexander Balke (1995), Max Chickering (1996), Jin Tian (2002), Carlos Brito (2004), Blai Bonet (2004), Mark Hopkins (2005), Chen Avin (2006), and Ilya Shpitser (2008).

On a sadder note, Judea is the father of slain Wall Street Journal reporter Daniel Pearl and president of the Daniel Pearl Foundation, which he co-founded with his wife Ruth in April 2002 to continue Daniel’s life-work of dialogue and understanding and to address the root causes of his tragic death.

This book will be presented to Judea on March 12, 2010 at a special event at UCLA honoring his life and work, where many of the contributing authors to this book will speak. Two of the editors of this volume, Rina and Hector, are former students of Judea, and the third, Joe, is a close colleague and collaborator. The three of us would like to thank all the authors whose articles are included in this volume. Special thanks go to Adnan Darwiche and Rich Korf of the UCLA Computer Science Department, who helped to organize this event, and to Avi Dechter, Randy Hess, Nir Lipovetzky, Felix Elwert, and Jane Spurr, who helped in the production of the book.

Judea, on behalf of those present in the book, and the many of your students and colleagues who are not, we would like to express our most profound gratitude and admiration to you, as an advisor, a scientist, and a great human being. It has been a real privilege to know you, to benefit from your (truly enjoyable!) company, to watch you, and to learn from you. As students, we couldn’t have hoped for a better role model. As colleagues, we couldn’t have benefited more from your collaboration and leadership. We know that you don’t like compliments, but you are certainly the light in our candle!

Thank you Judea!!!

Rina, Hector, and Joe