ARTIFICIAL DREAMS

This book is a critique of Artificial Intelligence (AI) from the perspective of cognitive science – it seeks to examine what we have learned about human cognition from AI successes and failures. The book's goal is to separate those "AI dreams" that either have been or could be realized from those that are constructed through discourse and are unrealizable. AI research has advanced many areas that are intellectually compelling and holds great promise for advances in science, engineering, and practical systems. After the 1980s, however, the field has often struggled to deliver widely on these promises. This book breaks new ground by analyzing how some of the driving dreams of people practicing AI research become valued contributions, while others devolve into unrealized and unrealizable projects.

H. R. Ekbia is associate professor of information science and cognitive science at Indiana University, where he is also affiliated with the School of Informatics. Initially trained as an engineer, Ekbia switched his focus to study cognitive science in order to pursue a lifelong interest in the workings of the human mind. To get a deeper understanding of the questions that AI research and writing posed but hastily tackled, Ekbia in turn began to focus on the philosophy of science and science studies, through which he discovered novel ways of thinking about science, technology, and the human mind.

This broad intellectual background is well reflected in Ekbia's writings, which range over a diverse set of topics on humans, machines, and mediated interactions between the two. Ekbia has taught extensively in the areas of computer science, information science, cognitive science, and science and technology studies. He currently teaches human–computer interaction and social informatics at the School of Library and Information Science at Indiana University.

Artificial Dreams

The Quest for Non-Biological Intelligence

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To Doug and Mahin, for nurturing my dreams.

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Preface

The year MMVI marked the fiftieth anniversary of the Dartmouth Conference, where the term "Artificial Intelligence" was accepted as the official label of a new discipline that seemed to hold great promise in the pursuit of understanding the human mind. AI, as the nascent discipline came to be known in public and academic discourse, has accomplished a lot during this period, breaking new grounds and providing deep insights into our minds, our technologies, and the relationship between them. But AI also has failed tremendously, making false promises and often manifesting a kind of unbridled enthusiasm that is emblematic of Hollywood-style pecuniary projects. Like many others within and around AI, I am fascinated by those accomplishments and frustrated by these shortcomings. This book is a reflection on both. Currently, we witness a resurgence of interest in, and application of, AI in areas such as Artificial General Intelligence, Self-Aware Computing, video gaming, data mining, the Semantic Web, human-robot interaction, and so on. The revival makes a critical reassessment of the field a necessary task, which the current work has undertaken to achieve.

For me, this book is the outcome of a journey to pursue a lifelong interest in mind, cognition, and agency. I embarked on the study of Artificial Intelligence in order to understand not only the underlying technology but especially its implications for the way we understand ourselves. My dream was to build bridges between science, technology, and the humanities from the novel perspective of a discipline that cuts across disciplinary boundaries. This turned out to be an alluring, and at the same time revealing, dream. I would have liked to share the experience as much as I want to deliver the outcome, and I hope that the readers find enough material here to be able to reconstruct the journey in their mind. I am especially hopeful that those who have embarked on similar projects with the same degree of hope and

enthusiasm will be able to get a sense of the ensuing challenges that could be read between the lines.

This was by no means a lonely journey. Many mentors, colleagues, and friends guided, accompanied, and nourished me in different portions. First and foremost stands Douglas Hofstadter, whose influence on this work can be seen in different places and on different levels – from the instillation of the original dream through his writings and the cultivation of skepticism toward unfounded claims, to his insistence on simple and accessible prose. Most important, Doug's moral and deeply passionate support has always been an invaluable asset.

Brian Smith also has been a great source of inspiration in many ways, not the least of which is in his immensely human and caring spirit. Brian showed me how making trade-offs, which he highlights as a major finding of the twentieth-century science, could be artfully managed in thinking and theorizing – how to be playfully but seriously philosophical, how to be religiously human but atheistically religious, and how to be deeply committed but openly skeptical at the same time.

Many others have also contributed to the development of this work. Tom Gieryn, Lisa Lloyd, and the late Rob Kling were major sources of insights and ideas from science studies, philosophy of science, and social informatics. David Leake started me on the path to become a "real" AI person; Mike Gasser, Rob Goldstone, Bob Port, Linda Smith, Esther Thelen, James Townsend, and others in the cognitive science program at Indiana University provided different perspectives on human mind and cognition. My friends Ron Day, Josh Goldberg, Steve Hockema, and Jun Luo were sources of encouragement and intellectual challenge. Occasional discussions in the early years with Fargonauts Harry Foundalis, James Marshal, and John Rehling, together with the care and support of Helga Keller at CRCC (the Center for Research on Concepts and Cognition), and the moral and intellectual support that I have enjoyed in recent years at my current home, the School of Library and Information Science, especially from Dean Blaise Cronin, have multiplied my sense of belonging to Indiana University and Bloomington.

I owe special thanks to Thomas Roth-Berghofer and two anonymous reviewers for their close reading and very useful comments on the manuscript; to Kristin Centanni, Dean Barrett, and especially Jennifer Brosek for her tremendous help with the manuscript; and to Eric Schwartz, the editor of Cambridge University Press and his team – April Potenciano, Jessica Schwarz, and Ken Karpinski – for their persistent effort to bring this work to fruition. My students at The University of Redlands, Indiana University, and Ferdowsi University of Mashhad have, in various ways, been sources of challenge and

inspiration. Shahab Ghavami, a friend of yesteryears, deserves particular mention – he was the one who gave me a copy of Hofstadter's *Gödel, Escher, Bach* in the dark ages of the 1980s, when I was desperately looking for exciting ideas to overcome the social and psychological distress of the time. In the intervening years, from the cold and calm of Gothenburg, Sweden, he has continued to play his role as a provocative, though not always persistent, critic of my ruminations.

Last but not least is my family, who put up with the psychological and intellectual challenges of the years that led to the completion of this writing. This journey would have not materialized without the continuous, patient, and perceptive support of my wonderful wife, Mahin; our sons, Kaveh and Kia, who grew up with the idea of a mentally absent father; and our daughter, Taraneh, whose witty charm and natural intelligence reminds me of the elusive enormity of the AI project.

HRE
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