
Contents

Foreword to the first edition (2022)	ix
Foreword to the second edition	xiii
Authors	xvii
1 Introduction	1
1.1 The Singularity	1
1.2 Approach	3
1.3 Limits to the modelling of animate nature	7
1.4 The AI hype cycle	9
1.5 Why machines will not inherit the earth	11
1.6 How to read this book	18
I Properties of the Human Mind	21
2 The human mind	23
2.1 Basic characteristics of the human mind	23
2.2 The mind-body problem: Monism and its varieties	24
3 Human and machine intelligence	39
3.1 Capabilities and dispositions	39
3.2 Intelligence	43
3.3 AI and human intelligence	55
4 The nature of human language	70
4.1 Why conversation matters	70
4.2 Aspects of human language	71
5 The variance and complexity of human language	81
5.1 Conversations: An overview	81
5.2 Levels of language production and interpretation	83
5.3 Conversation contexts	83
5.4 Discourse economy: Implicit meaning	88
5.5 Conversation dynamics	91

5.6	Structural elements of conversation	93
5.7	How humans pass the Turing test	96
6	Social and ethical behaviour	98
6.1	Can we engineer social capabilities?	99
6.2	Intersubjectivity	100
6.3	Social norms	103
6.4	Moral norms	105
II	The Limits of Mathematical Models	119
7	Foundations: The status of physics	121
7.1	The character of physical laws	123
7.2	Knowledge in physics	125
7.3	Limitations of physics	128
7.4	Conclusions	138
8	Complex systems	140
8.1	Models	140
8.2	Computability	145
8.3	Systems	147
8.4	The scope of extended Newtonian mathematics	150
8.5	Complex systems	155
8.6	Examples of complex systems	171
9	Mathematical models of complex systems	176
9.1	Multivariate distributions	176
9.2	Deterministic and stochastic computable system models	178
9.3	Newtonian limits of stochastic models of complex systems	181
9.4	Descriptive and interpretative models of complex systems	186
9.5	Predictive models of complex systems	191
9.6	Naïve approaches to complex system modelling	193
9.7	Refined approaches	217
9.8	The future of complex system modelling	224
III	The Limits and Potential of AI	229
10	Why there will be no machine intelligence	231
10.1	Brain emulation and machine evolution	231
10.2	Intentions, drivenness, and the will	239
10.3	Consciousness	241
10.4	Philosophy of mind, computation, and AI	249
10.5	Objectifying intelligence and theoretical thinking	250
10.6	Practical intelligence, personal knowledge, know-how, and creativity	252

11 Why machines will not master human language	255
11.1 Language as a necessary condition for AGI	255
11.2 Why machine language production always falls short	257
11.3 AI conversation emulation	265
11.4 Mathematical models of human conversations	273
11.5 Why conversation machines are doomed to fail	283
12 Why machines will not master social interaction	286
12.1 No AI emulation of social behaviour	286
12.2 AI and legal norms	289
12.3 No machine emulation of morality	291
13 Transhumanism, simulation, and <i>Uploading</i>	299
13.1 What is transhumanism?	299
13.2 What is a mind?	301
13.3 Improving ourselves?	324
13.4 Virtual reality and simulation	330
13.5 Back to Bostrom	335
14 AI spring eternal	336
14.1 AI for non-complex systems	336
14.2 AI for complex systems	343
14.3 AI boundaries	347
14.4 How AI will change the world	350
Turbulence: Mathematical details	351
Glossary	353
References	365
Index	405