

The Probabilistic Mind:

Prospects for Bayesian
cognitive science

Edited by

Nick Chater

University College London
UK

and

Mike Oaksford

Birkbeck College London
UK

OXFORD
UNIVERSITY PRESS

Table of Contents

Part 1 Foundations

- 1 The probabilistic mind: prospects for a Bayesian cognitive science 3
Nick Chater & Mike Oaksford
- 2 A primer on probabilistic inference 33
Thomas L. Griffiths & Alan Yuille
- 3 Rational analyses, instrumentalism, and implementations 59
David Danks

Part 2 Inference and Argument

- 4 Framing effects and rationality 79
Shlomi Sher & Craig R. M. McKenzie
- 5 Probability logic and the *Modus Ponens*—*Modus Tollens* asymmetry in conditional inference 97
Mike Oaksford & Nick Chater
- 6 Inference from absence in language and thought 121
Ulrike Hahn & Mike Oaksford
- 7 Towards a rational theory of human information acquisition 143
Jonathan D. Nelson
- 8 Pseudocontingencies—A key paradigm for understanding adaptive cognition 165
Klaus Fiedler

Part 3 Judgement and Decision-Making

- 9 Bayesian brains and cognitive mechanisms: harmony or dissonance? 189
Henry Brighton & Gerd Gigerenzer
- 10 The game of life: how small samples render choice simpler 209
Ralph Hertwig & Timothy J. Pleskac
- 11 The *naïve* intuitive statistician: organism—environment relations from yet another angle 237
Patrik Hansson, Peter Juslin, & Anders Winman
- 12 A decision-by-sampling account of decision under risk 261
Neil Stewart & Keith Simpson

- 13 The neurodynamics of choice, value-based decisions, and preference reversal 277
Marius Usher, Anat Elhalal, & James L. McClelland

Part 4 **Categorization and Memory**

- 14 Categorization as nonparametric Bayesian density estimation 303
Thomas L. Griffiths, Adam N. Sanborn, Kevin R. Canini, & Daniel J. Navarro
- 15 Rational analysis as a link between human memory and information retrieval 329
Mark Steyvers & Thomas L. Griffiths
- 16 Causality in time: explaining away the future and the past 351
David E. Huber
- 17 Compositionality in rational analysis: grammar-based induction for concept learning 377
Noah D. Goodman, Joshua B. Tenenbaum, Thomas L. Griffiths, & Jacob Feldman

Part 5 **Learning about Contingency and Causality**

- 18 Through the looking glass: a dynamic lens model approach to multiple cue probability learning 409
Maarten Speekenbrink & David R. Shanks
- 19 Semi-rational models of conditioning: the case of trial order 431
Nathaniel D. Daw, Aaron C. Courville, & Peter Dayan
- 20 Causal learning in rats and humans: a minimal rational model 453
Michael R. Waldmann, Patricia W. Cheng, York Hagmayer, & Aaron P. Blaisdell
- 21 The value of rational analysis: an assessment of causal reasoning and learning 485
Steven Sloman & Philip M. Fernbach
- 22 The probabilistic mind: where next? 501
Nick Chater & Mike Oaksford
- Index 515