Contents

Preface	ix	:	2.3	Mental Models, Reasoning,							
Overviev	v of the Handbook xi			and Rationality 147							
Markus Knauff and Wolfgang Spohn				P. N. Johnson-Laird							
			2.4	Heuristics and Biases 159							
Psyc	hological and Philosophical Frameworks			Klaus Fiedler, Johannes Prager,							
of R	ationality—A Systematic Introduction 1			and Linda McCaughey							
Markus Knauff and Wolfgang Spohn		2.5		Dual-Process Theories of Deductive							
	1. Why Study Rationality? 1			Reasoning 173							
	2. Contours of the Concept of Rationality 3			Karl Christoph Klauer							
 3. Theoretical and Practical Rationality 10 4. Normative and Descriptive Theories of Rationality 18 		2.6		Logico-Computational Aspects of Rationality 185 Johan van Benthem, Fenrong Liu,							
							5. Individual and Social Rationality 26			and Sonja Smets	
							6. Rationality in a Process-Oriented and an			,	
	Output-Oriented Perspective 31	II Theoretical Rationality									
	7. Preconditions of Rationality 34										
	8. Frontiers of Rationality 44	Secti	on 3	B Deductive Reasoning							
	9. Conclusion and Open Issues 50	:	3.1	Propositional and First-Order							
	total and Karling to C. R. Mary Phys.			Logic 201							
I Orig	ins and Key Issues of Rationality			Florian Steinberger							
Section 1	l Origins of Rationality	:	3.2	Natural Logic 215							
-				David P. O'Brien							
1.1 Theories of Rationality and the			3.3 Psychological Theories of Syllogistic								
	Descriptive–Normative Divide: A Historical			Reasoning 225							
	Approach 71			Sangeet Khemlani							
1.0	Thomas Sturm										
1.2 The Rationality Debate in the Psychology		Section 4 Probabilistic Reasoning									
	of Reasoning: A Historical Review 87										
1.2	Jonathan St. B. T. Evans	4	4.1	Subjective Probability and Its							
1.3	Evolution of Rationality 101			Dynamics 239							
4.4	Gerhard Schurz			Alan Hájek and Julia Staffel							
1.4	Rationality and the Brain 115	•	4.2	Bayes Nets and Rationality 253							
	Vinod Goel			Stephan Hartmann							
		4	4.3	Evidential Relevance 265							
Section 2 Key Issues of Rationality				Arthur Merin							
2.1	Reasons and Rationality 129	•	4.4	Probability Logic 277							
	John Broome			Niki Pfeifer							
2.2	Practical and Theoretical Rationality 137	•	4.5	Bayesian Rationality in the Psychology							
	Ralph Wedgwood			of Reasoning 285							
	. 0			Nick Chater and Mike Oaksford							

Contents vi

	4.6	Probabilities and Conditionals 295	8.2 Standard Decision Theory 47	73
		Klaus Oberauer and Danielle Pessach	Martin Peterson	
	4.7	Representing Belief: Beyond Probability	8.3 Prospect Theory 485	
		and Logic 305	Andreas Glöckner	
		Didier Dubois and Henri Prade	8.4 Decision under Uncertainty	495
			Brian Hill	
Section 5 Belief Revision, Defeasible Reasoning,		Belief Revision, Defeasible Reasoning,	8.5 Bounded Rationality: A Vision	of Rational
and Argumentation Theory		Argumentation Theory	Choice in the Real World 505	5
	<i>-</i> 1	Describe and Friederick Leader 200	Ralph Hertwig and Anastasia K	Cozyreva
	5.1	Doxastic and Epistemic Logic 319	8.6 Reasoning, Rationality, and	
		Hans van Ditmarsch	Metacognition 517	
	5.2	Belief Revision 327	Valerie A. Thompson, Shira Eld	layam,
	<i>-</i> 2	Hans Rott	and Rakefet Ackerman	
	5.3	Ranking Theory 337		
		Gabriele Kern-Isberner, Niels	Section 9 Game Theory	
	E 4	Skovgaard-Olsen, and Wolfgang Spohn	0.1 Classical Carro Theorem 520	
	5.4	Defeasible Reasoning and Belief Revision	9.1 Classical Game Theory 529	-4
		in Psychology 347	Max Albert and Hartmut Klien	11
		Lupita Estefania Gazzo Castañeda and Markus Knauff	9.2 Epistemic Game Theory 543	
			Andrés Perea	
	5.5	Argumentation Theory 361 Ulrike Hahn and Peter Collins	9.3 Evolutionary Game Theory 5 J. McKenzie Alexander	553
	5.6		9.4 Rationality in Economics:	
	3.0	Reasoning and Argumentation 367 John Woods	Theory and Evidence 565	
		John Woods	Sanjit Dhami and Ali al-Nowai	hi
			Saffit Difami and All al-Nowal	.111
Sac	tion 6	Conditional and Counterfactual Peasoning		
Sec	tion 6	Conditional and Counterfactual Reasoning	Section 10 Aspects of Social Rationality	
Sec	tion 6 6.1	Conditional and Counterfactual Reasoning Conditional and Counterfactual Logic 381	Section 10 Aspects of Social Rationality	
Sec		Conditional and Counterfactual Logic 381 William B. Starr	10.1 Social Epistemology 579	
Sec		Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals	10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker	
Sec	6.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395	10.1 Social Epistemology 579Franz Dietrich and Kai Spieker10.2 Collective Rationality 591	
Sec	6.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 	
Sec	6.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker. 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication 	
Sec	6.1 6.2	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 	mann 601
Sec	6.16.26.3	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the 	mann 601
Sec	6.1 6.2	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 	mann 601
Sec	6.16.26.3	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker. 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 	mann 601
	6.16.26.36.4	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 	mann 601 Social
	6.16.26.36.4	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca 	mann 601 Social
	6.1 6.2 6.3 6.4	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 	mann 601 Social Gutwald,
	6.16.26.36.4	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma 	mann 601 Social Gutwald,
	6.16.26.36.4tion 77.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 	mann 601 Social Gutwald, ative Theory
	6.1 6.2 6.3 6.4	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma 	mann 601 Social Gutwald, ative Theory
	6.16.26.36.4tion 77.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal Cognition 439	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 Leda Cosmides and John Toob 	mann 601 Social Gutwald, ative Theory
	6.16.26.36.4tion 77.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal Cognition 439 Michael R. Waldmann	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 	mann 601 Social Gutwald, ative Theory
	6.1 6.2 6.3 6.4 tion 7 7.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal Cognition 439 Michael R. Waldmann Diagnostic Causal Reasoning 449	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker. 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 Leda Cosmides and John Toob Section 11 Deontic and Legal Reasoning 	mann 601 Social Gutwald, ative Theory
	6.1 6.2 6.3 6.4 tion 7 7.1	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal Cognition 439 Michael R. Waldmann	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker. 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 Leda Cosmides and John Toob Section 11 Deontic and Legal Reasoning 	mann 601 Social Gutwald, ative Theory
	6.1 6.2 6.3 6.4 tion 7 7.1 7.2	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal Cognition 439 Michael R. Waldmann Diagnostic Causal Reasoning 449	10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 Leda Cosmides and John Toob Section 11 Deontic and Legal Reasoning	mann 601 Social Gutwald, ative Theory
Sec	6.1 6.2 6.3 6.4 tion 7 7.1 7.2 7.3	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal Cognition 439 Michael R. Waldmann Diagnostic Causal Reasoning 449 Björn Meder and Ralf Mayrhofer	 10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker. 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 Leda Cosmides and John Toob Section 11 Deontic and Legal Reasoning 11.1 Deontic Logic 645 John Horty and Olivier Roy 	mann 601 Social Gutwald, ative Theory
Sec	6.1 6.2 6.3 6.4 tion 7 7.1 7.2 7.3	Conditional and Counterfactual Logic 381 William B. Starr The Suppositional Theory of Conditionals and Rationality 395 David E. Over and Nicole Cruz Conditional and Counterfactual Reasoning 405 Ruth M. J. Byrne and Orlando Espino Utility Conditionals 419 Jean-François Bonnefon Causal and Diagnostic Reasoning Causal and Counterfactual Inference 427 Judea Pearl The Rationality of Everyday Causal Cognition 439 Michael R. Waldmann Diagnostic Causal Reasoning 449 Björn Meder and Ralf Mayrhofer	10.1 Social Epistemology 579 Franz Dietrich and Kai Spieker 10.2 Collective Rationality 591 Hans Bernhard Schmid 10.3 Rationality in Communication Georg Meggle 10.4 Rational Choice Theory in the Sciences 611 Werner Raub 10.5 Structural Rationality 625 Julian Nida-Rümelin, Rebecca and Niina Zuber 10.6 Adaptationism: A Meta-Norma of Rationality 633 Leda Cosmides and John Toob Section 11 Deontic and Legal Reasoning 11.1 Deontic Logic 645 John Horty and Olivier Roy 11.2 Deontic Reasoning in Psychology	mann 601 Social Gutwald, ative Theory

Till Grüne-Yanoff

Contents vii

11.4	Logical Models	of Legal
	Argumentation	669
	Henry Prakken	

Section 12 Moral Thinking and Rationality

12.1 Rationality and Morality 681 Christoph Fehige and Ulla Wessels

12.2 Moral Reasons 693 Michael Smith

12.3 The Psychology and Rationality of Moral Judgment 701 Alex Wiegmann and Hanno Sauer

IV Facets of Rationality

Section 13 Visual and Spatial Reasoning

13.1 Logical Reasoning with Diagrams 715 Mateja Jamnik

13.2 Rational Reasoning about Spatial and Temporal Relations 725Marco Ragni

13.3 Visualization and Rationality 735 Markus Knauff

Section 14 Scientific Rationality

14.1 Scientific Rationality and Objectivity 747 Line Edslev Andersen and Hanne Andersen

14.2 Rationality and the Value-Freedom of Science 757
Anke Bueter

14.3 Rationality and the Public Understandingof Science 767Rainer Bromme and Lukas Gierth

Section 15 Individual Differences, Learning, and Improvement of Rational Thinking

15.1 The Development of Basic Human Rationality 779 Henry Markovits

15.2 Rationality and Intelligence 791 Keith E. Stanovich, Maggie E. Toplak, and Richard F. West

15.3 How to Improve Rational Thinking? 801 Stephanie de Oliveira and Richard Nisbett

Contributors 807 Name Index 811 Subject Index 843