

Rational Decisions

Ken Binmore

**Princeton University Press
Princeton and Oxford**

Contents

Preface	ix
1 Revealed Preference	1
1.1 Rationality?	1
1.2 Modeling a Decision Problem	2
1.3 Reason Is the Slave of the Passions	3
1.4 Lessons from Aesop	5
1.5 Revealed Preference	7
1.6 Rationality and Evolution	12
1.7 Utility	14
1.8 Challenging Transitivity	17
1.9 Causal Utility Fallacy	19
1.10 Positive and Normative	22
2 Game Theory	25
2.1 Introduction	25
2.2 What Is a Game?	25
2.3 Paradox of Rationality?	26
2.4 Newcomb's Problem	30
2.5 Extensive Form of a Game	31
3 Risk	35
3.1 Risk and Uncertainty	35
3.2 Von Neumann and Morgenstern	36
3.3 The St Petersburg Paradox	37
3.4 Expected Utility Theory	39
3.5 Paradoxes from A to Z	43
3.6 Utility Scales	46
3.7 Attitudes to Risk	50
3.8 Unbounded Utility?	55
3.9 Positive Applications?	58
4 Utilitarianism	60
4.1 Revealed Preference in Social Choice	60
4.2 Traditional Approaches to Utilitarianism	63
4.3 Intensity of Preference	66
4.4 Interpersonal Comparison of Utility	67

5	Classical Probability	75
5.1	Origins	75
5.2	Measurable Sets	75
5.3	Kolmogorov's Axioms	79
5.4	Probability on the Natural Numbers	82
5.5	Conditional Probability	83
5.6	Upper and Lower Probabilities	88
6	Frequency	94
6.1	Interpreting Classical Probability	94
6.2	Randomizing Devices	96
6.3	Richard von Mises	100
6.4	Refining von Mises' Theory	104
6.5	Totally Muddling Boxes	113
7	Bayesian Decision Theory	116
7.1	Subjective Probability	116
7.2	Savage's Theory	117
7.3	Dutch Books	123
7.4	Bayesian Updating	126
7.5	Constructing Priors	129
7.6	Bayesian Reasoning in Games	134
8	Epistemology	137
8.1	Knowledge	137
8.2	Bayesian Epistemology	137
8.3	Information Sets	139
8.4	Knowledge in a Large World	145
8.5	Revealed Knowledge?	149
9	Large Worlds	154
9.1	Complete Ignorance	154
9.2	Extending Bayesian Decision Theory	163
9.3	Muddled Strategies in Game Theory	169
9.4	Conclusion	174
10	Mathematical Notes	175
10.1	Compatible Preferences	175
10.2	Hausdorff's Paradox of the Sphere	177
10.3	Conditioning on Zero-Probability Events	177
10.4	Applying the Hahn-Banach Theorem	179
10.5	Muddling Boxes	180
10.6	Solving a Functional Equation	181
10.7	Additivity	182
10.8	Muddled Equilibria in Game Theory	182
	References	189
	Index	197