

Contents

1 What is Cognitive Economics?	1
<i>Paul Bourguine</i>	
1.1 Introduction	1
1.2 Forms of Individual Rationality	3
1.3 The Search for Collective Rationality	6
1.4 Towards Cognitive Economics	10
Part I: Conceptual and Theoretical Bases	13
2 Rational Choice under Uncertainty	15
<i>Mohammed Abdellaoui</i>	
2.1 Introduction	15
2.2 Expected Utility Theory	16
2.3 Violations of Expected Utility	23
2.4 Generalizations of Expected Utility	26
2.5 Concluding Remarks	29
References	30
3 General Equilibrium	33
<i>Alan Kirman</i>	
3.1 The Basic Model: an Exchange Economy	35
3.2 Walrasian Equilibrium	38
3.3 Proof of the Existence of Equilibrium in the Two Good Case.	40
3.4 Competitive Equilibrium and Pareto Optimality	41
3.5 Production in General Equilibrium	43
3.6 The Informational Requirements of the Competitive Mechanism ...	45
3.7 Uniqueness and Stability of Equilibrium	46
3.8 Towards More Realistic Models	48
3.9 Conclusion	52
References	52
4 The Principles of Game Theory	55
<i>Bernard Walliser</i>	
4.1 Introduction	55
4.2 Static Games without Uncertainty	57
4.3 Dynamic Games without Uncertainty	62
4.4 Static Games with Incomplete Information	68
4.5 Dynamic Games with Imperfect Information	73
References	78

5 Rationality and the Experimental Study of Reasoning	79
<i>Guy Politzer</i>	
5.1 Introduction	79
5.2 Studies of Reasoning in the Laboratory	79
5.3 An Assessment of Performance	84
5.4 Reassessing Results in the Judgment and Decision-making Domain	89
5.5 Two kinds of Rationality?	90
5.6 Conclusion	91
References	92
6 Supraclassical Inference without Probability	95
<i>David Makinson</i>	
6.1 First Path - Using Additional Background Assumptions	100
6.2 Second Path - Restricting the Set of Valuations	102
6.3 Third Path - Using Additional Rules	106
6.4 Conclusion	109
References	111
7 From Natural to Artificial Intelligence: Numerical Processing for Cognitive Tasks	113
<i>Frédéric Alexandre and Hervé Frezza-Buet</i>	
7.1 Introduction	113
7.2 General Presentation and Justification	115
7.3 The Evolution Analogy	116
7.4 Artificial Neural Networks	120
7.5 A Stochastic Behavioral Approach: Reinforcement Learning	124
References	128
8 An Introduction to Statistical Mechanics	131
<i>Mirta B. Gordon</i>	
8.1 Introduction	131
8.2 The Ising Model	132
8.3 Probabilities, Information and Entropy	137
8.4 Probability Laws in Statistical Physics	140
8.5 Fluctuations and Thermodynamic Limit	149
8.6 Systems out of Equilibrium	151
8.7 Numerical Simulations	152
8.8 Conclusion	154
References	155
9 Spontaneous Symmetry Breaking and the Transition to Disorder in Physics	157
<i>Serge Galam</i>	
9.1 Introduction	157
9.2 The Ising Model	159
9.3 Spontaneous Symmetry Breaking	159

9.4 Applying an External Field	162
9.5 Creating Local Disorder	163
9.6 What Happens in the Vicinity of the Critical Point?	165
9.7 Adding More Disorder	166
9.8 Conclusion	168
References	168

10 Co-Evolutionist Stochastic Dynamics: Emergence of Power

Laws	169
<i>Sorin Solomon, Peter Richmond, Ofer Biham and Ofer Malcai</i>	
10.1 Introduction	169
10.2 The Stochastic Lotka-Volterra-Eigen-Schuster (LVES) System	172
10.3 The Multiplicative Langevin Process	174
10.4 Analysis of the Stochastic LVES System	175
10.5 Discussion	176
References	178

Part II: Research Areas 181

11 Topics of Cognitive Economics 183

Bernard Walliser

11.1 Introduction	183
11.2 Reasoning Theory	185
11.3 Decision Theory	187
11.4 Game Theory	190
11.5 Economic Theory	193
11.6 Conclusions	195

12 What is a Collective Belief? 199

André Orléan

12.1 Introduction	199
12.2 Pure Coordination Games and Schelling Saliences	202
12.3 Situated Rationality and the Role of Contexts	205
12.4 The Autonomy of Group Beliefs	208
12.5 Conclusion	211
References	212

13 Conditional Statements and Directives 213

David Makinson

13.1 Conditional Propositions	213
13.2 Conditional Directives	222
13.3 Summary	225
13.4 Guide to Further Reading	225
References	226

14 Choice Axioms for a Positive Value of Information	229
<i>Jean-Marc Tallon and Jean-Christophe Vergnaud</i>	
14.1 Introduction	229
14.2 Decision Trees	231
14.3 Positive Value of Information, Consequentialism and the Sure Thing Principle	232
14.4 A Weaker Axiom on Dynamic Choices for a Positive Value of Information	239
14.5 Positive Value of Information without Probabilistic Beliefs	240
14.6 Concluding Remarks	242
References	242
15 Elements of Viability Theory for the Analysis of Dynamic Economics	245
<i>Jean-Pierre Aubin</i>	
15.1 Introduction	245
15.2 The Mathematical Framework	249
15.3 Characterization of Viability and/or Capturability	252
15.4 Selecting Viable Feedbacks	255
15.5 Restoring Viability	257
References	264
16 Stochastic Evolutionary Game Theory	267
<i>Richard Baron, Jacques Durieu, Hans Haller, Philippe Solal</i>	
16.1 Introduction	267
16.2 Models of Adaptive Learning in Games	267
16.3 Stochastic Stability	269
16.4 Application: Cournot Competition	275
References	278
17 The Evolutionary Analysis of Signal Games	281
<i>Jean-François Laslier</i>	
17.1 Introduction	281
17.2 A Sender-Receiver Game	282
17.3 A Cheap-talk Game	286
17.4 Conclusion	290
References	291
18 The Structure of Economic Interaction: Individual and Collective Rationality	293
<i>Alan Kirman</i>	
18.1 Introduction	293
18.2 Individual and Collective Rationality	294
18.3 Aggregate and Individual Behavior: An Example	294
18.4 Collective Rationality	298
18.5 Different Forms of Interaction	300

18.6	Herd Behavior in Financial Markets	301
18.7	Local Interaction	303
18.8	Networks	303
18.9	Misperception of the Interaction Structure	306
18.10	A Simple Duopoly Game	307
18.11	Conclusion	309
	References	310
19	Experimental Markets: Empirical Data for Theorists	313
	<i>Charles Noussair and Bernard Ruffieux</i>	
19.1	Introduction	313
19.2	Methodology: How is an Experimental Market Constructed?	315
19.3	The Principal Results from Service Markets	318
19.4	The Behavior of Asset Markets	320
19.5	The Dynamics of Learning in Strategic Interactions	324
19.6	Conclusion	327
	References	330
20	Social Interactions in Economic Theory: An Insight from Statistical Mechanics	335
	<i>Denis Phan, Mirta B. Gordon and Jean-Pierre Nadal</i>	
20.1	Introduction	335
20.2	Discrete Choice with Social Interactions (I): Individual strategic behavior and rational expectations	337
20.3	Discrete Choice with Social Interactions (II): Market price and adaptive expectations	344
20.4	Market Organisation with Search and Price Dispersion	350
20.5	Conclusion	353
	References	354
21	Adjustment and Social Choice	359
	<i>G�rard Weisbuch and Dietrich Stauffer</i>	
21.1	Introduction	359
21.2	The INCA Model	360
21.3	Simulation Results	362
21.4	Conclusions	368
	References	369
22	From Agent-based Computational Economics Towards Cognitive Economics	371
	<i>Denis Phan</i>	
22.1	Introduction	371
22.2	Multi-agent Systems and Agent-based Computational Economics	372
22.3	Basic Concepts of Multi-agent Systems with Network Interactions	375
22.4	Individual and Collective Learning and Dynamics in a Discrete choice model	384

22.5 Conclusion	393
References	394
23 Social Networks and Economic Dynamics	399
<i>Jean-Benoît Zimmermann</i>	
23.1 Introduction	399
23.2 Small Worlds in a Knowledge-based Economy	401
23.3 Influence Networks and Social Learning	406
23.4 Conclusion	414
References	415
24 Coalitions and Networks in Economic Analysis	417
<i>Francis Bloch</i>	
24.1 Introduction	417
24.2 Cooperative Solutions to Group and Network Formation	419
24.3 Noncooperative Models of Groups and Networks	421
24.4 Applications	423
References	426
Lexicon	426
25 Threshold Phenomena versus Killer Clusters in Bimodal Competition for Standards	429
<i>Serge Galam and Bastien Chopard</i>	
25.1 Introduction	429
25.2 The Model	430
25.3 Discussion	432
25.4 Finite Size Effects	435
25.5 Species Evolution	438
25.6 Conclusions	439
References	440
26 Cognitive Efficiency of Social Networks Providing Consumption Advice on Experience Goods	443
<i>Nicolas Curien, Gilbert Laffond, Jean Lainé and François Moreau</i>	
26.1 Introduction	443
26.2 The Model	444
26.3 Discussion	450
26.4 Conclusion	454
References	456
Appendix: convergence analysis	456
The Future of Cognitive Economics	463
<i>Jacques Lesourne</i>	
Index	473

Cognitive Economics

An Interdisciplinary Approach

Bourgine, P.; Nadal, J.-P. (Eds.)

2004, XIV, 479 p., Hardcover

ISBN: 978-3-540-40468-2