

# Contents

PREFACE . . . . .	ix
-------------------	----

## CHAPTER 1

### Introduction

1.1 The Historical and Current Development of Adaptive Theory . . . . .	1
1.2 Common Properties of Adaptive Processes . . . . .	8
References . . . . .	9

## CHAPTER 2

### The Mathematical Model

2.1 Introduction . . . . .	12
2.2 Discrete Processes. . . . .	12
2.3 Some Discrete Sequential Processes . . . . .	16
2.4 The Role of the Decision Maker . . . . .	20
2.5 The Optimal Type 2 (Adaptive) Process . . . . .	22
2.6 The Constrained, Optimal Type 2 (Adaptive) Process . . . . .	24
2.7 Causality and Markov Processes . . . . .	25
2.8 The Dynamic Programming Model . . . . .	28
References . . . . .	30

## CHAPTER 3

### The Primitive Adaptive Process

3.1 The Notion of Learning and Adaptation . . . . .	32
3.2 Some Hypothetical Experiments . . . . .	33
3.3 An Adaptive Process of the First Kind . . . . .	36
3.4 An Adaptive Process of the Second Kind . . . . .	39
3.5 Mixed Adaptive Processes of the First and Second Kind . . . . .	42
3.6 Summary . . . . .	47
References . . . . .	51

## CHAPTER 4

**Subjective Probability**

4.1	Introduction . . . . .	52
4.2	A Heuristic Example—The Three Investors . . . . .	53
4.3	Economic Environmental Processes . . . . .	60
4.4	A Digression on Statistical Estimators . . . . .	63
4.5	Multinomial Subjective Probabilities . . . . .	65
4.6	Properties of the Subjective Probability Vector . . . . .	68
	References . . . . .	69

## CHAPTER 5

**The Role of Entropy in Economic Processes**

5.1	The Concept of Entropy Time . . . . .	71
5.2	Entropy and Information . . . . .	73
5.3	The Entropy Paradox . . . . .	82
	References . . . . .	85

## CHAPTER 6

**Adaptive Economic Processes**

6.1	Introduction . . . . .	86
6.2	General Deterministic Dynamic Economic Process . . . . .	87
6.3	The Stochastic Dynamic Economic Process . . . . .	88
6.4	The Adaptive Stochastic Dynamic Economic Process . . . . .	89
6.5	Stochastic Growth Process . . . . .	91

## CHAPTER 7

**An Adaptive Investment Model**

7.1	The Objective Function . . . . .	95
7.2	An Example—The Three Investors Again . . . . .	96
7.3	An Investment Model with Full Liquidity . . . . .	104
7.4	An Adaptive Investment Process with Full Liquidity . . . . .	109
7.5	Consideration of the Special Constraint . . . . .	121
7.6	The Multivalued Payoff Adaptive Investment Process . . . . .	125
	References . . . . .	128

## CHAPTER 8

**Multiactivity Capital Allocation Processes**

8.1	Introduction . . . . .	129
8.2	The Adaptive Capital Allocation Process . . . . .	130
8.3	The Properties of the Adaptive Capital Allocation Process in the Limit . . . . .	139
	References . . . . .	142

## CHAPTER 9

**Economic State Space**

9.1	Introduction . . . . .	143
9.2	The Concept of an Economic State Space . . . . .	144
9.3	Statistical Equilibrium and Enlightenment . . . . .	146
9.4	The Subjective Entropy Trajectory . . . . .	149
9.5	The Dynamics of the Subjective Entropy Trajectory . . . . .	152
9.6	The Economic State Space Representation . . . . .	155
9.7	A Digression—A Likely Value for the Environmental Entropy . . . . .	162
	References . . . . .	168

## CHAPTER 10

**Interactions between Decision Makers in State Space**

10.1	Introduction . . . . .	169
10.2	The State Space Probability Function . . . . .	170
10.3	Stochastic Equilibrium in the Market . . . . .	177
10.4	Interperson Trading in the Investment Market . . . . .	183

## CHAPTER 11

**The Conclusions**

11.1	Individual Adaptive Behavior . . . . .	189
11.2	Collective Adaptive Behavior . . . . .	193

**Bibliography**

1.	General Background on Adaptive and Evolutionary Behavior . . . . .	197
2.	Sources on the Concept of Subjective Probability . . . . .	197
3.	Sources on the Mathematical Theory of Intelligence . . . . .	198

4. Dynamic Programming and Adaptive Control . . . . .	199
5. Sources on Investment Theory; mainly on Multi-Project Investment under Uncertainty . . . . .	200
6. Sources on Information Theory . . . . .	201
7. Sources on the Concept of Entropy and Entropy-Gradient . . . . .	202
8. Sources on Statistical Mechanics and Thermodynamics . . . . .	202
9. Sources on Certain Techniques Used in This Book . . . . .	202
SUBJECT INDEX . . . . .	205