

# Contents

	iii
<b>Preface</b>	<b>v</b>
<b>1 Do We Get What We Expect?</b>	<b>1</b>
1.1 Decisions . . . . .	1
1.1.1 Decisions . . . . .	2
1.1.2 Surf, Snow, or Governor Jesse Ventura? . . . . .	2
1.1.3 Correct decisions . . . . .	4
1.1.4 Good information to confusion . . . . .	4
1.1.5 Bad outcomes . . . . .	7
1.2 What does an outcome mean? . . . . .	8
1.3 Which procedure? . . . . .	9
1.3.1 Milk, wine, or beer? . . . . .	10
1.3.2 Another election . . . . .	12
1.3.3 For a price, I will . . . . .	13
1.4 Engineering and manufacturing . . . . .	14
1.4.1 One source of inefficiency . . . . .	15
1.5 Economics and other topics . . . . .	17
1.5.1 Locating a new plant . . . . .	18
1.5.2 Law and other areas . . . . .	19
1.6 What goes wrong? . . . . .	19
<b>2 Arrow's Theorem</b>	<b>21</b>
2.1 Introduction . . . . .	21
2.1.1 But, does Arrow's Theorem really matter? . . . . .	24
2.1.2 The real culprit . . . . .	25
2.2 Choice Theory . . . . .	26
2.2.1 Is the plurality vote broke? . . . . .	27

2.2.2	What is wrong? . . . . .	28
2.2.3	Real world examples . . . . .	28
2.3	Shopping for cars — and election procedures . . . . .	30
2.3.1	A little game . . . . .	31
2.3.2	Garbage in, garbage out . . . . .	32
2.3.3	Transitive preferences and points along a line . . . . .	34
2.3.4	Procedures . . . . .	36
2.4	Arrow's Theorem . . . . .	42
2.4.1	Examples . . . . .	43
2.5	Consequences of Arrow's Theorem . . . . .	45
2.5.1	Comparisons with pairwise elections . . . . .	46
2.5.2	More general comparisons . . . . .	51
2.5.3	Don't expect compatibility . . . . .	52
2.5.4	Further Implications . . . . .	53
2.6	Sen's Theorem . . . . .	56
2.6.1	Three alternatives . . . . .	57
2.6.2	More alternatives . . . . .	58
2.6.3	Libertarians . . . . .	59
2.6.4	Prisoner's Dilemma . . . . .	63
2.6.5	Relationship between Sen and Arrow . . . . .	66
2.6.6	What else? . . . . .	67
<b>3</b>	<b>Explanations And Examples</b> . . . . .	<b>69</b>
3.1	Are all methods unfair? . . . . .	69
3.2	Sen's Theorem . . . . .	70
3.2.1	Lost information . . . . .	71
3.2.2	Loss of transitivity . . . . .	72
3.2.3	Costs of Minimal Liberalism . . . . .	74
3.2.4	More examples . . . . .	76
3.2.5	Salles' example . . . . .	77
3.2.6	Designing examples as complex as desired . . . . .	78
3.2.7	A converse . . . . .	79
3.2.8	Gibbard's cycles . . . . .	80
3.3	Arrow . . . . .	81
3.3.1	Too many parts . . . . .	81
3.3.2	A beer party and the free rider problem . . . . .	83
3.3.3	Pairwise vote . . . . .	84
3.3.4	Ranking disk . . . . .	87
3.3.5	Winning against unanimity . . . . .	93
3.3.6	How to win your way . . . . .	94

3.3.7	Arrow's dictator . . . . .	100
3.3.8	Avoiding Arrow's dictator . . . . .	101
<b>4</b>	<b>What Else Can Go Wrong?</b>	<b>103</b>
4.1	Some assembly required . . . . .	103
4.1.1	Expect the unexpected . . . . .	104
4.1.2	General approach . . . . .	105
4.2	Simpson's Paradox . . . . .	106
4.2.1	The paradox . . . . .	107
4.2.2	More relevant examples . . . . .	108
4.2.3	Lessons from Arrow's Theorem . . . . .	109
4.2.4	Simpson problems in sunny California . . . . .	110
4.2.5	Creating new examples . . . . .	112
4.2.6	Even more general behavior . . . . .	113
4.3	Gambling — and the financial market . . . . .	114
4.4	Law . . . . .	116
4.4.1	Genome mapping . . . . .	116
4.4.2	Legal cycles . . . . .	117
4.4.3	If the Catholic bishop would only get married . . . . .	119
4.5	Kindness through personal understanding . . . . .	120
4.6	Majorities and democracies . . . . .	123
4.6.1	Anscombe Paradox . . . . .	123
4.6.2	Ostrogorski concerns . . . . .	126
4.7	Learning how to cause trouble . . . . .	128
4.7.1	Apportionment of US Congress . . . . .	130
4.7.2	Causing problems . . . . .	132
4.7.3	Shifting populations . . . . .	134
4.7.4	Other apportionment methods . . . . .	135
4.8	Strategic Voting . . . . .	135
<b>5</b>	<b>More Perversities</b>	<b>139</b>
5.1	Economics: Supply and Demand . . . . .	140
5.1.1	Sonnenschein, Mantel, Debreu . . . . .	141
5.1.2	A misleading theory? . . . . .	142
5.1.3	Subeconomies . . . . .	143
5.2	Individual demand and consumer benefits . . . . .	144
5.3	Can excellence breed inefficiency? . . . . .	147
5.3.1	A simple decentralization model . . . . .	148
5.3.2	Inefficiency in engineering? . . . . .	148
5.4	Elections with triplets, or . . . . .	150

5.4.1	An Arrow-like Theorem . . . . .	151
5.4.2	Consequences for our elections . . . . .	154
5.4.3	Resolution? . . . . .	156
5.5	Still more examples . . . . .	156
<b>6</b>	<b>A Search For Resolutions</b>	<b>157</b>
6.1	Introduction . . . . .	157
6.1.1	Homogeneity . . . . .	158
6.1.2	Free rider . . . . .	159
6.1.3	Sen . . . . .	160
6.2	Altering assumptions . . . . .	161
6.2.1	From a new pope to an oligarchy . . . . .	161
6.2.2	Tinkering with other assumptions . . . . .	164
6.3	Profile restrictions . . . . .	165
6.3.1	Bad news . . . . .	166
6.3.2	Non-dictatorial procedures . . . . .	169
6.3.3	Black's Conditions . . . . .	173
6.4	Good news . . . . .	182
6.4.1	Trouble causing profiles . . . . .	182
6.4.2	New problems? . . . . .	183
6.5	Resolutions through new axioms . . . . .	187
6.5.1	Intensity of binary independence . . . . .	190
6.5.2	Other acceptable procedures . . . . .	192
6.6	What next? . . . . .	193
<b>7</b>	<b>From Sen To Prisoners and Prostitution</b>	<b>195</b>
7.1	Annoying others . . . . .	196
7.1.1	Source of the problem . . . . .	197
7.1.2	Negative vibes . . . . .	198
7.2	Thou shall not annoy others . . . . .	199
7.3	Return to the Prisoner's Dilemma . . . . .	200
7.3.1	Again and again and ... . . . .	201
7.3.2	Learning from prostitution and drug sales . . . . .	202
7.4	Summary . . . . .	203
<b>8</b>	<b>Glossary, Notes, and Technical Talk</b>	<b>205</b>
8.1	Glossary . . . . .	205
8.2	Notes . . . . .	208
8.3	Axioms . . . . .	213
8.3.1	The use and abuse of axioms . . . . .	213

8.3.2	More fundamental complaints . . . . .	214
8.4	A proof of Arrow's Theorem . . . . .	217
8.4.1	Geometry of rankings . . . . .	217
8.4.2	Moving about . . . . .	220
8.4.3	Societal changes . . . . .	222