

# Contents

- 1 Elections and Voting Paradoxes ..... 1**
  - 1.1 Introduction..... 1
  - 1.2 The Case of More than Two Candidates..... 4
  - 1.3 Borda’s Paradox ..... 7
    - 1.3.1 Actual Occurrences of Various Forms of Borda’s Paradox..... 8
    - 1.3.2 Borda’s Solution to the Possibility of Borda’s Paradox ..... 9
    - 1.3.3 A Characterization of Borda Rule ..... 15
  - 1.4 Condorcet’s Paradox ..... 16
    - 1.4.1 A Characterization of PMR ..... 19
  - 1.5. Condorcet’s Other Paradox ..... 21
  - 1.6 The Paradox of Multiple Elections ..... 24
  - 1.7 The Vote Trading Paradox ..... 25
  - 1.8 The No Show Paradox..... 27
  - 1.9 Other Voting Paradoxes ..... 28
  - 1.10 Conclusion ..... 29
- 2 Condorcet’s Paradox..... 31**
  - 2.1 Introduction..... 31
  - 2.2 Riker’s Empirical Studies..... 33
  - 2.3 Other Empirical Studies ..... 37
  - 2.4 Monte-Carlo Simulation Studies..... 48
  - 2.5 Conditions that Prohibit Condorcet’s Paradox ..... 51
  - 2.6 Variations of Condorcet’s Paradox ..... 56
  - 2.7 Conclusion ..... 58
- 3 The Cases of Two and Three Candidates ..... 59**
  - 3.1 Introduction..... 59
  - 3.2 The Problem with Three Candidates..... 61
  - 3.3 Probabilities with Balanced Preferences..... 66
  - 3.4 Expected Balance for Voting Situations ..... 69
    - 3.4.1 A Fixed Number of Voters ..... 69
    - 3.4.2 A Variable Number of Voters ..... 75
  - 3.5 Expected Balance for Individual Preferences ..... 81
    - 3.5.1 Dual Culture Condition..... 83
    - 3.5.2 Impartial Culture Condition..... 88
  - 3.6 Uniform Culture Condition ..... 92

3.7 Other IC-IAC Connections .....	94
3.8 The Impact of Unbalanced Preferences .....	99
3.9 Other Representations .....	101
3.10 Conclusion .....	104
<b>4 The Case of More than Three Candidates .....</b>	<b>107</b>
4.1 Introduction .....	107
4.2 Representations for Four-Candidate Elections .....	107
4.2.1 A PMRW Exists with Four Candidates .....	107
4.2.2 PMR is Transitive with Four Candidates .....	113
4.2.3 Probabilities for Four Candidates with Large Electorates .....	116
4.3 More than Four Candidates .....	117
4.3.1 Complete Breakdown by PMR .....	117
4.3.2 General PMR Relationships for More than Four Candidates .....	120
4.3.3 Enumerated Values of $P_{PMRW}^S(m, n, IC)$ .....	125
4.3.4 PMRW Probability Representations with Small $m$ .....	126
4.3.5 PMRW Probability Representations with Small $n$ .....	130
4.3.6 Limiting Probabilities with More than Four Candidates .....	138
4.4 Other Related Results .....	139
4.4.1 Spatial Models .....	140
4.4.2 Supermajority Rules .....	141
4.4.3 Condorcet Committees .....	144
4.4.4 Linear Extension Majority Cycles .....	150
4.4.5 Geometric Models .....	151
4.5 Conclusion .....	152
<b>5 The Impact of Societal Factors .....</b>	<b>153</b>
5.1 Introduction .....	153
5.2 Population Specific Measures of Homogeneity .....	155
5.2.1 Non-Comparison Population Measures .....	156
5.2.2 Comparison Population Measures .....	159
5.3 Situation Specific Measures of Homogeneity .....	160
5.4 The Effectiveness of Measures of Social Homogeneity .....	165
5.5 Requiring More Coherence in Voters' Preferences .....	168
5.6 Voter Abstention .....	171
5.7 Degrees of Voter Indifference between Candidates .....	183
5.8 The Impact of Intransitive Voter Preferences .....	190
5.9 The Impact of Uncertainty .....	193
5.10 Conclusion .....	194
<b>6 The Impact of Coherent Preferences .....</b>	<b>195</b>
6.1 Introduction .....	195
6.2 Methods for Obtaining Representations .....	195
6.2.1 EUPIA .....	197
6.2.2 EUPIA2 .....	201

---

6.3 Proximity to Single-Troughed Preferences.....	212
6.4 The Impact of Polarizing Candidates.....	213
6.5 Limiting Distributions for Large Electorates.....	217
6.6 Cumulative Probabilities that a PMRW Exists.....	219
6.7 Proportions of Profiles with Specified Parameters.....	221
6.8 The Impact of an Overall Unifying Candidate .....	224
6.9 The Impact of Ward's Condition .....	226
6.10 Ehrhart Polynomials .....	228
6.11 Conclusion .....	228
<b>7 Individual Intransitivity .....</b>	<b>229</b>
7.1 Introduction.....	229
7.2 Algebraic and Probabilistic Choosers .....	230
7.3 May's Model.....	231
7.4 Probabilistic Chooser Models .....	234
7.5 Algebraic and Probabilistic Chooser Coincidence .....	235
7.6 Weak Maximal Alternatives.....	240
7.7 Attribute Independence - Discriminatory Power.....	244
7.8 The Impact of Single-Peakedness .....	256
7.9 Strict Maximal-Minimal Reversal.....	258
7.10 Other Related Representations .....	260
7.11 Conclusion .....	263
<b>References.....</b>	<b>265</b>
<b>Index.....</b>	<b>285</b>



<http://www.springer.com/978-3-540-33798-0>

Condorcet's Paradox

Gehrlein, W.V.

2006, XI, 292 p., Hardcover

ISBN: 978-3-540-33798-0