

# Contents

<b>Preface</b>	<b>7</b>
<b>0 Introduction</b>	<b>15</b>
MOON DUCHIN	
1 How (not) to spot a gerrymander . . . . .	17
2 The universe of possibilities . . . . .	25
3 Theory meets practice . . . . .	31
4 Adding things up . . . . .	38
5 Conclusion: What's next? . . . . .	41
<b>1 Explainer: Compactness, by the numbers</b>	<b>43</b>
MOON DUCHIN	
<b>I Political thought</b>	<b>51</b>
<b>2 Measuring partisan fairness</b>	<b>53</b>
MIRA BERNSTEIN AND OLIVIA WALCH	
1 Proportionality . . . . .	54
2 Partisan symmetry . . . . .	63
3 The efficiency gap . . . . .	71
4 Ensembles and outliers . . . . .	78
5 Conclusion: Debating fairness . . . . .	85
<b>3 Interviews: Concepts of representation</b>	<b>91</b>
MOON DUCHIN AND OLIVIA WALCH	
<b>4 Redistricting: Math, systems, or people?</b>	<b>101</b>
KEITH GÄDDIE	
1 Introduction . . . . .	101
2 A people problem . . . . .	102
3 A systems problem . . . . .	105
4 A math problem . . . . .	108
5 A systems problem, v.2 . . . . .	110

6	A people problem, v.2 . . . . .	111
<b>5</b>	<b>Political geography and representation</b>	<b>115</b>
	JONATHAN RODDEN AND THOMAS WEIGHILL	
1	Introduction . . . . .	115
2	Urban geography and partisan tilt . . . . .	119
3	Sampling at different scales . . . . .	123
4	Seats–votes plots . . . . .	129
5	East versus West . . . . .	132
6	Conclusion . . . . .	138
<b>II</b>	<b>Law</b>	<b>143</b>
<b>6</b>	<b>Explainer: A brief introduction to the VRA</b>	<b>145</b>
	ARUSHA GORDON AND DOUG SPENCER	
<b>7</b>	<b>Race and redistricting</b>	<b>151</b>
	ELLEN D. KATZ	
1	Introduction . . . . .	151
2	Into the thicket: The constitutional framework . . . . .	154
3	Elaboration: The statutory framework . . . . .	159
4	Uneasiness: Recasting frameworks in the 1990s . . . . .	163
5	Hostility: Race, redistricting, and the Roberts Court . . . . .	168
6	Conclusion: Future of the VRA . . . . .	174
<b>8</b>	<b>Law, computing and redistricting in the 1960s</b>	<b>177</b>
	ALMA STEINGART	
1	Against computers . . . . .	177
2	The apportionment revolution meets the computer revolution . . . . .	179
3	The widening gap between equality and fairness . . . . .	188
<b>9</b>	<b>The law of gerrymandering</b>	<b>193</b>
	GUY-URIEL CHARLES AND DOUGLAS M. SPENCER	
1	Backdrop . . . . .	193
2	Partisan vs. racial gerrymandering . . . . .	201
3	Constitutional provisions regulating partisanship . . . . .	203
4	Alternative approaches . . . . .	210
5	A call to action . . . . .	211
<b>III</b>	<b>Geography</b>	<b>213</b>
<b>10</b>	<b>Race, space, and the geography of representation</b>	<b>215</b>
	CHRISTOPHER S. FOWLER	
1	Introduction . . . . .	215

2	Population distribution: cause and effect . . . . .	216
3	Geography on multiple scales . . . . .	225
4	Concluding thoughts: Pay attention to race . . . . .	230
<b>11</b>	<b>The elusive geography of communities</b>	<b>235</b>
	<b>GARRETT DASH NELSON</b>	
1	Community as a principle of representation . . . . .	235
2	Are communities places or not? . . . . .	236
3	The functional logic of regional definition . . . . .	238
4	Geographic coherence . . . . .	242
<b>12</b>	<b>Explainer: Communities of interest</b>	<b>249</b>
	<b>HEATHER ROSENFELD AND MOON DUCHIN</b>	
<b>13</b>	<b>Geography as data</b>	<b>261</b>
	<b>LEE HACHADOORIAN AND RUTH BUCK</b>	
1	Introduction . . . . .	261
2	The Census and its products . . . . .	262
3	Election data and the precinct problem . . . . .	271
4	GIS: Shapes and attributes together . . . . .	273
5	Some specific challenges . . . . .	280
6	Conclusion: Technology cuts both ways . . . . .	283
<b>IV</b>	<b>Math and computer science</b>	<b>287</b>
<b>14</b>	<b>Three applications of entropy</b>	<b>289</b>
	<b>LARRY GUTH, ARI NIEH, AND THOMAS WEIGHILL</b>	
1	Introduction . . . . .	289
2	Application: Measuring segregation . . . . .	291
3	Application: Splitting counties . . . . .	294
4	Application: Distance between plans . . . . .	299
5	Conclusion: Math for democracy . . . . .	303
<b>15</b>	<b>Explainer: Measuring clustering and segregation</b>	<b>307</b>
	<b>MOON DUCHIN AND JAMES M. MURPHY</b>	
<b>16</b>	<b>Redistricting algorithms</b>	<b>317</b>
	<b>AMARIAH BECKER AND JUSTIN SOLOMON</b>	
1	Introduction . . . . .	317
2	Generating all plans: Enumeration . . . . .	321
3	Generating many plans: Sampling . . . . .	324
4	Seeking “best” plans: Optimization . . . . .	334
5	Conclusion: The future of redistricting algorithms . . . . .	348
<b>17</b>	<b>Random Walks</b>	<b>355</b>

**DARYL DEFORD AND MOON DUCHIN**

1	Overview: Not a solved problem . . . . .	355
2	Introduction to MCMC . . . . .	358
3	MCMC for redistricting . . . . .	373
4	Exploring with ensembles . . . . .	390
5	Conclusion: Still not a solved problem . . . . .	392

**V On the ground 397****18 Making maps 399****MEGAN GALL, KARIN MAC DONALD AND FRED MCBRIDE**

1	Introduction . . . . .	399
2	The raw materials of a map: Tools and data . . . . .	401
3	Drawing the maps . . . . .	406
4	Transparency and secrecy . . . . .	415
5	Recommendations . . . . .	418
6	Conclusion: Democracy takes work! . . . . .	420

**19 Interview: Drawing for the courts 423****MOON DUCHIN AND OLIVIA WALCH****20 Explainer: Ranked choice voting 429****THOMAS WEIGHILL AND MOON DUCHIN****21 Reform on the ground in Lowell, MA 437****IVAN ESPINOZA-MADRIGAL AND OREN SELLSTROM**

1	Introduction: The VRA as a tool . . . . .	437
2	At-large electoral systems: A prime target . . . . .	439
3	Lowell, Massachusetts: A case study . . . . .	440
4	Conclusion: A settlement in Lowell, and next steps . . . . .	448

**22 Explainer: Race vs. party 451****ARUSHA GORDON****23 The state of play in voting rights 455****KRISTEN CLARKE AND ARUSHA GORDON**

1	How we got here . . . . .	455
2	Where we're going . . . . .	461
3	Conclusion: Why it matters . . . . .	468