2019

Prosodic and discourse function variations in lexical bundles in university lectures

Rania Hani F Mohammed
Iowa State University

Follow this and additional works at: https://lib.dr.iastate.edu/etd
Part of the Linguistics Commons

Recommended Citation
Mohammed, Rania Hani F, "Prosodic and discourse function variations in lexical bundles in university lectures" (2019). Graduate Theses and Dissertations. 17059.
https://lib.dr.iastate.edu/etd/17059

This Dissertation is brought to you for free and open access by the Iowa State University Capstones, Theses and Dissertations at Iowa State University Digital Repository. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
Prosodic and discourse function variations in lexical bundles in university lectures

by

Rania Mohammed

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

Major: Applied Linguistics and Technology

Program of Study Committee:
John Levis, Major Professor
Bethany Gray
Tammy Slater
Jo Mackiewicz
Horabail Venkatagiri

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this dissertation. The Graduate College will ensure this dissertation is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University
Ames, Iowa

2019

Copyright © Rania Mohammed, 2019. All rights reserved.
DEDICATION

To my loving parents and supportive husband
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>v</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xxvii</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>xxix</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xxx</td>
</tr>
<tr>
<td>CHAPTER 1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Lexical bundles</td>
<td>3</td>
</tr>
<tr>
<td>CHAPTER 2. LITERATURE REVIEW</td>
<td>8</td>
</tr>
<tr>
<td>2.1 Background on multi-word sequences</td>
<td>8</td>
</tr>
<tr>
<td>2.2 Multi-word sequences in academic spoken language</td>
<td>10</td>
</tr>
<tr>
<td>2.3 Categorization of discourse-organizing functions</td>
<td>12</td>
</tr>
<tr>
<td>2.4 Frequency-based approach</td>
<td>14</td>
</tr>
<tr>
<td>2.5 Communicative role of prosody</td>
<td>16</td>
</tr>
<tr>
<td>2.5.1 Prosody signaling of information structure</td>
<td>17</td>
</tr>
<tr>
<td>2.5.2 Grammatical categories and information structure</td>
<td>22</td>
</tr>
<tr>
<td>2.5.3 Pitch signaling pragmatic functions and information status</td>
<td>25</td>
</tr>
<tr>
<td>2.6 Prosodic features of multi-word sequences</td>
<td>26</td>
</tr>
<tr>
<td>2.7 Gap in research</td>
<td>32</td>
</tr>
<tr>
<td>CHAPTER 3. METHODOLOGY</td>
<td>35</td>
</tr>
<tr>
<td>3.1 Corpus</td>
<td>35</td>
</tr>
<tr>
<td>3.2 Lexical bundle identification and selection</td>
<td>38</td>
</tr>
<tr>
<td>3.3 Discourse function analysis</td>
<td>42</td>
</tr>
<tr>
<td>3.3.1 Coding guide</td>
<td>44</td>
</tr>
<tr>
<td>3.4 Prosodic analysis</td>
<td>50</td>
</tr>
<tr>
<td>CHAPTER 4. RESULTS</td>
<td>60</td>
</tr>
<tr>
<td>4.1 One of the most</td>
<td>61</td>
</tr>
<tr>
<td>4.2 One of the things</td>
<td>69</td>
</tr>
<tr>
<td>4.3 On the other hand</td>
<td>76</td>
</tr>
<tr>
<td>4.4 We’ll talk about</td>
<td>79</td>
</tr>
<tr>
<td>4.5 We’re talking about</td>
<td>82</td>
</tr>
<tr>
<td>4.6 As you can see</td>
<td>87</td>
</tr>
<tr>
<td>4.7 Lexical bundles with one discourse function</td>
<td>92</td>
</tr>
<tr>
<td>4.7.1 We’ve talked about</td>
<td>93</td>
</tr>
<tr>
<td>4.7.2 It turns out that</td>
<td>95</td>
</tr>
<tr>
<td>4.7.3 That is to say</td>
<td>97</td>
</tr>
<tr>
<td>4.8 Summary of Findings</td>
<td>99</td>
</tr>
</tbody>
</table>
CHAPTER 5. DISCUSSION .......................................................................................... 103
  5.1 Lexical bundles as subphrasal units ................................................................. 105
  5.2 Cohesion ........................................................................................................... 109
  5.3 Lexical bundles and the BCC study ................................................................. 114
  5.4 Lexical bundles and formulaic expressions ..................................................... 117
  5.5 Speech annotation tools .................................................................................. 119
  5.6 Teaching implications ...................................................................................... 120
  5.7 Further research and limitations .................................................................... 122

REFERENCES ............................................................................................................ 125

APPENDIX A. GLOSSARY OF TERMS ................................................................. 132

APPENDIX B. LEXICAL BUNDLES in YALE CORPUS ...................................... 133

APPENDIX C. CODING GUIDE ............................................................................. 135

APPENDIX D. PILOTED PROSODIC ANALYSIS .............................................. 144

APPENDIX E. TRANSCRIPTS OF LEXICAL BUNDLES AND PITCH
  CONTOURS ........................................................................................................... 149
    As You Can See ................................................................................................. 149
    It Turns Out That .............................................................................................. 188
    On the Other Hand .......................................................................................... 227
    One of the Most ............................................................................................... 273
    One of the Things ............................................................................................ 317
    That is to Say .................................................................................................... 359
    We'll Talk About .............................................................................................. 398
    We're Talking About ...................................................................................... 436
    We've Talked About ......................................................................................... 473
LIST OF FIGURES

Figure 2.1. Peak on first occurrence of the word tombs .................................................. 23
Figure 2.2. Leveled pitch contour on second occurrence of the word tombs ............... 24
Figure 3.1. Flowchart illustrating the criteria used to choose lexical bundles ................. 40
Figure 3.2. Pitch contour of *on the other hand* showing a peak generated by Praat ....... 52
Figure 3.3. Pitch listing for pitch contour of an occurrence of *on the other hand* ........ 53
Figure 3.4. Sketch of the original pitch contour showing a peak pattern for *on the other hand* ..................................................................................................... 53
Figure 3.5. Fall-rise pattern for the lexical bundle *as you can see* ................................. 54
Figure 3.6. Non-continuous pitch contour of an occurrence of *one of the things* ......... 55
Figure 3.7. Pitch contour of an occurrence of *one of the things* ................................... 55
Figure 3.8. Sketch of the original pitch contour showing a peak pattern for *one of the things* ...................................................................................................... 55
Figure 3.9. Peak pattern for *one of the things* signaling a new topic ......................... 57
Figure 3.10. Peak pattern for *one of the things* signaling background information ....... 57
Figure 4.1. Peak pattern for *one of the most* signaling introduction of topic .............. 63
Figure 4.2. Prosodic patterns for *one of the most* signaling importance .................... 63
Figure 4.3. Peak pattern for *one of the most* signaling expansion ............................. 65
Figure 4.4. Prosodic patterns for *one of the things* signaling introduction to a topic ..... 71
Figure 4.5. Prosodic patterns for *one of the things* signaling importance .................... 72
Figure 4.6. Prosodic patterns for *one of the things* signaling background information .............................................................................................................. 75
Figure 4.7. Prosodic patterns for *on the other hand* signaling major contrast ............. 77
Figure 4.8. Prosodic patterns for *on the other hand* signaling minor contrast ............. 79
Figure 4.9. Prosodic patterns for we’ll talk about signaling future topic introduction .... 81
Figure 4.10. Prosodic patterns for we’ll talk about signaling topic connection............ 82
Figure 4.11. Prosodic patterns for we’re talking about signaling elaboration............... 84
Figure 4.12. Prosodic patterns for we’re talking about signaling topic introduction .... 86
Figure 4.13. Peak pattern for as you can see signaling introducing a topic............... 89
Figure 4.14. Prosodic patterns for as you can see signaling general reference ............ 90
Figure 4.15. Peak pattern for as you can see signaling specific reference .................. 92
Figure 4.16. Prosodic patterns for we’ve talked about signaling topic introduction ...... 94
Figure 4.17. Prosodic patterns for it turns out that signaling expansion ...................... 96
Figure 4.18. Prosodic patterns for that is to say signaling expansion............................ 98
Figure 5.1. Lexical bundles as subphrasal units.......................................................... 107
Figure 5.2. Pitch contour of as you can see here showing prominence on here.......... 108
Figure 5.3. Schematic diagram of a lexical bundle operating at major and minor rhetorical junctures ..................................................................................... 113
Figure 5.4. Interacting continua of intactness and range of functions ...................... 116
Figure D.1. Schematic diagram of position of a lexical bundle within an intonation unit.............................................................................................................. 145
Figure D.2. Scatterplot of relative duration to discourse function for so there’s a ...... 147
Figure D.3. Scatterplot for relative and discourse function for one of the things ........ 147
Figure E.1 Fall-rise pitch contour pattern for as you can see .................................. 150
Figure E.2. Rise pitch contour pattern for as you can see ........................................ 151
Figure E.3. Peak pitch contour for as you can see.................................................... 152
Figure E.4. Rise pitch contour for as you can see .................................................... 152
Figure E.5. Rise pitch contour for as you can see .................................................... 153
Figure E.6. Fall pitch contour for as you can see .................................................... 153
Figure E.7. Peak pitch contour for *as you can see* .......................................................... 154
Figure E.8. Fall pitch contour for *as you can see* ............................................................. 155
Figure E.9. Peak pitch contour for *as you can see* ............................................................. 156
Figure E.10. Peak pitch contour for *as you can see* ........................................................... 157
Figure E.11. Fall-rise pitch contour for *as you can see* ....................................................... 157
Figure E.12. Fall pitch contour for *as you can see* ............................................................ 158
Figure E.13. Peak pitch contour for *as you can see* ............................................................ 159
Figure E.14. Fall pitch contour for *as you can see* ............................................................ 160
Figure E.15. Fall pitch contour for *as you can see* ............................................................ 160
Figure E.16. Peak pitch contour for *as you can see* ............................................................ 161
Figure E.17. Peak pitch contour for *as you can see* ............................................................ 162
Figure E.18. Fall pitch contour for *as you can see* ............................................................ 162
Figure E.19. Fall pitch contour for *as you can see* ............................................................ 163
Figure E.20. Fall pitch contour for *as you can see* ............................................................. 164
Figure E.21. Rise pitch contour for *as you can see* ............................................................. 164
Figure E.22. Peak pitch contour for *as you can see* ............................................................ 165
Figure E.23. Fall pitch contour for *as you can see* ............................................................. 166
Figure E.24. Fall-rise pitch contour for *as you can see* ....................................................... 167
Figure E.25. Peak pitch contour for *as you can see* ............................................................. 167
Figure E.26. Fall-rise pitch contour for *as you can see* ....................................................... 168
Figure E.27. Fall-rise pitch contour for *as you can see* ....................................................... 169
Figure E.28. Fall pitch contour for *as you can see* ............................................................. 170
Figure E.29. Peak pitch contour for *as you can see* ............................................................. 170
Figure E.30. Fall pitch contour for *as you can see* ............................................................. 171
Figure E.31. Peak pitch contour for *as you can see* .......................................................... 172
Figure E.32. Fall-rise pitch contour for *as you can see* ................................................... 172
Figure E.33. Fall pitch contour for *as you can see* .......................................................... 173
Figure E.34. Fall pitch contour for *as you can see* .......................................................... 174
Figure E.35. Fall-rise pitch contour for *as you can see* ................................................... 175
Figure E.36. Fall-rise pitch contour for *as you can see* ................................................... 175
Figure E.37. Peak pitch contour for *as you can see* .......................................................... 176
Figure E.38. Peak pitch contour for *as you can see* .......................................................... 177
Figure E.39. Fall-rise pitch contour for *as you can see* ................................................... 177
Figure E.40. Fall-rise pitch contour for *as you can see* ................................................... 178
Figure E.41. Fall pitch contour for *as you can see* .......................................................... 179
Figure E.42. Fall pitch contour for *as you can see* .......................................................... 179
Figure E.43. Fall pitch contour for *as you can see* .......................................................... 180
Figure E.44. Fall pitch contour for *as you can see* .......................................................... 181
Figure E.45. Peak pitch contour for *as you can see* .......................................................... 182
Figure E.46. Fall-rise pitch contour for *as you can see* ................................................... 183
Figure E.47. Peak pitch contour for *as you can see* .......................................................... 184
Figure E.48. Rise pitch contour for *as you can see* .......................................................... 185
Figure E.49. Fall pitch contour for *as you can see* .......................................................... 185
Figure E.50. Fall-rise pitch contour for *as you can see* ................................................... 186
Figure E.51. Peak pitch contour for *as you can see* .......................................................... 187
Figure E.52. Fall pitch contour for *as you can see* .......................................................... 187
Figure E.53. Peak pitch contour for *it turns out that* ...................................................... 188
Figure E.54. Peak pitch contour for *it turns out that* ...................................................... 189
Figure E.55. Peak pitch contour for it turns out that ..................................................... 190
Figure E.56. Peak pitch contour for it turns out that ..................................................... 191
Figure E.57. Peak pitch contour for it turns out that ..................................................... 191
Figure E.58. Peak pitch contour for it turns out that ..................................................... 192
Figure E.59. Peak pitch contour for it turns out that ..................................................... 193
Figure E.60. Peak pitch contour for it turns out that ..................................................... 194
Figure E.61. Peak pitch contour for it turns out that ..................................................... 195
Figure E.62. Peak pitch contour for it turns out that ..................................................... 196
Figure E.63. Peak pitch contour for it turns out that ..................................................... 197
Figure E.64. Peak pitch contour for it turns out that ..................................................... 198
Figure E.65. Peak pitch contour for it turns out that ..................................................... 199
Figure E.66. Peak pitch contour for it turns out that ..................................................... 199
Figure E.67. Peak pitch contour for it turns out that ..................................................... 200
Figure E.68. Peak pitch contour for it turns out that ..................................................... 201
Figure E.69. Peak pitch contour for it turns out that ..................................................... 202
Figure E.70. Peak pitch contour for it turns out that ..................................................... 202
Figure E.71. Peak pitch contour for it turns out that ..................................................... 203
Figure E.72. Peak pitch contour for it turns out that ..................................................... 204
Figure E.73. Peak pitch contour for it turns out that ..................................................... 205
Figure E.74. Peak pitch contour for it turns out that ..................................................... 206
Figure E.75. Peak pitch contour for it turns out that ..................................................... 207
Figure E.76. Peak pitch contour for it turns out that ..................................................... 208
Figure E.77. Peak pitch contour for it turns out that ..................................................... 208
Figure E.78. Peak pitch contour for it turns out that ..................................................... 209
Figure E.79. Peak pitch contour for *it turns out that* ..................................................... 210
Figure E.80. Peak pitch contour for *it turns out that* ..................................................... 211
Figure E.81. Peak pitch contour for *it turns out that* ..................................................... 211
Figure E.82. Peak pitch contour for *it turns out that* ..................................................... 212
Figure E.83. Peak pitch contour for *it turns out that* ..................................................... 213
Figure E.84. Peak pitch contour for *it turns out that* ..................................................... 214
Figure E.85. Peak pitch contour for *it turns out that* ..................................................... 215
Figure E.86. Peak pitch contour for *it turns out that* ..................................................... 216
Figure E.87. Peak pitch contour for *it turns out that* ..................................................... 216
Figure E.88. Peak pitch contour for *it turns out that* ..................................................... 217
Figure E.89. Peak pitch contour for *it turns out that* ..................................................... 218
Figure E.90. Peak pitch contour for *it turns out that* ..................................................... 218
Figure E.91. Peak pitch contour for *it turns out that* ..................................................... 219
Figure E.92. Peak pitch contour for *it turns out that* ..................................................... 220
Figure E.93. Peak pitch contour for *it turns out that* ..................................................... 221
Figure E.94. Peak pitch contour for *it turns out that* ..................................................... 222
Figure E.95. Peak pitch contour for *it turns out that* ..................................................... 223
Figure E.96. Peak pitch contour for *it turns out that* ..................................................... 223
Figure E.97. Peak pitch contour for *it turns out that* ..................................................... 224
Figure E.98. Peak pitch contour for *it turns out that* ..................................................... 225
Figure E.99. Peak pitch contour for *it turns out that* ..................................................... 226
Figure E.100. Peak pitch contour for *it turns out that* ................................................... 226
Figure E.101. Peak pitch contour for *it turns out that* ..................................................... 227
Figure E.102. Fall pitch contour for *on the other hand* .................................................... 228
Figure E.103. Peak pitch contour for on the other hand................................................ 229

Figure E.104. Fall pitch contour for on the other hand .................................................. 230

Figure E.105. Peak pitch contour for on the other hand................................................ 231

Figure E.106. Fall-rise pitch contour for on the other hand......................................... 232

Figure E.107. Peak pitch contour for on the other hand................................................ 233

Figure E.108. Peak pitch contour for on the other hand................................................ 234

Figure E.109. Peak pitch contour for on the other hand................................................ 235

Figure E.110. Peak pitch contour for on the other hand.............................................. 236

Figure E.111. Peak pitch contour for on the other hand................................................ 237

Figure E.112. Peak pitch contour for on the other hand................................................ 237

Figure E.113. Fall pitch contour for on the other hand.................................................. 238

Figure E.114. Peak pitch contour for on the other hand................................................ 239

Figure E.115. Fall pitch contour for on the other hand.................................................. 240

Figure E.116. Peak pitch contour for on the other hand................................................ 240

Figure E.117. Fall-rise pitch contour for on the other hand......................................... 241

Figure E.118. Peak pitch contour for on the other hand................................................ 242

Figure E.119. Peak pitch contour for on the other hand................................................ 243

Figure E.120. Peak pitch contour for on the other hand................................................ 244

Figure E.121. Peak pitch contour for on the other hand................................................ 244

Figure E.122. Peak pitch contour for on the other hand................................................ 246

Figure E.123. Peak pitch contour for on the other hand................................................ 246

Figure E.124. Peak pitch contour for on the other hand................................................ 247

Figure E.125. Peak pitch contour for on the other hand................................................ 248

Figure E.126. Peak pitch contour for on the other hand................................................ 249
Figure E.127. Peak pitch contour for on the other hand................................................. 250
Figure E.128. Peak pitch contour for on the other hand................................................. 251
Figure E.129. Fall-rise pitch contour for on the other hand............................................. 252
Figure E.130. Fall pitch contour for on the other hand................................................... 253
Figure E.131. Peak pitch contour for on the other hand.................................................. 254
Figure E.132. Peak pitch contour for on the other hand.................................................. 254
Figure E.133. Fall-rise pitch contour for on the other hand............................................. 255
Figure E.134. Fall pitch contour for on the other hand................................................... 256
Figure E.135. Peak pitch contour for on the other hand.................................................. 257
Figure E.136. Peak pitch contour for on the other hand.................................................. 257
Figure E.137. Fall pitch contour for on the other hand................................................... 258
Figure E.138. Fall pitch contour for on the other hand................................................... 259
Figure E.139. Peak pitch contour for on the other hand.................................................. 260
Figure E.140. Peak pitch contour for on the other hand.................................................. 261
Figure E.141. Peak pitch contour for on the other hand.................................................. 261
Figure E.142. Fall-rise pitch contour for on the other hand............................................. 262
Figure E.143. Peak pitch contour for on the other hand.................................................. 263
Figure E.144. Peak pitch contour for on the other hand.................................................. 264
Figure E.145. Peak pitch contour for on the other hand.................................................. 265
Figure E.146. Peak pitch contour for on the other hand.................................................. 266
Figure E.147. Peak pitch contour for on the other hand.................................................. 267
Figure E.148. Peak pitch contour for on the other hand.................................................. 267
Figure E.149. Peak pitch contour for on the other hand.................................................. 268
Figure E.150. Peak pitch contour for on the other hand.................................................. 269
Figure E.151. Peak pitch contour for on the other hand................................. 270
Figure E.152. Peak pitch contour for on the other hand................................. 271
Figure E.153. Peak pitch contour for on the other hand................................. 272
Figure E.154. Peak pitch contour for on the other hand................................. 272
Figure E.155. Peak pitch contour for one of the most.................................... 273
Figure E.156. Fall pitch contour for one of the most...................................... 275
Figure E.157. Peak pitch contour for one of the most.................................... 275
Figure E.158. Peak pitch contour for one of the most.................................... 276
Figure E.159. Peak pitch contour for one of the most.................................... 277
Figure E.160. Fall pitch contour for one of the most...................................... 277
Figure E.161. Peak pitch contour for one of the most.................................... 278
Figure E.162. Peak pitch contour for one of the most.................................... 279
Figure E.163. Peak pitch contour for one of the most.................................... 280
Figure E.164. Peak pitch contour for one of the most.................................... 281
Figure E.165. Peak pitch contour for one of the most.................................... 282
Figure E.166. Peak pitch contour for one of the most.................................... 283
Figure E.167. Fall-rise pitch contour for one of the most.............................. 283
Figure E.168. Peak pitch contour for one of the most.................................... 285
Figure E.169. Peak pitch contour for one of the most.................................... 285
Figure E.170. Peak pitch contour for one of the most.................................... 286
Figure E.171. Peak pitch contour for one of the most.................................... 287
Figure E.172. Peak pitch contour for one of the most.................................... 288
Figure E.173. Fall pitch contour for one of the most..................................... 289
Figure E.174. Peak pitch contour for one of the most.................................... 290
Figure E.175. Fall pitch contour for one of the most .................................................. 290

Figure E.176. Peak pitch contour for one of the most .................................................. 291

Figure E.177. Peak pitch contour for one of the most .................................................. 292

Figure E.178. Fall pitch contour for one of the most .................................................. 293

Figure E.179. Peak pitch contour for one of the most .................................................. 293

Figure E.180. Peak pitch contour for one of the most .................................................. 294

Figure E.181. Peak pitch contour for one of the most .................................................. 295

Figure E.182. Peak pitch contour for one of the most .................................................. 296

Figure E.183. Peak pitch contour for one of the most .................................................. 297

Figure E.184. Peak pitch contour for one of the most .................................................. 298

Figure E.185. Peak pitch contour for one of the most .................................................. 298

Figure E.186. Fall pitch contour for one of the most .................................................. 299

Figure E.187. Peak pitch contour for one of the most .................................................. 300

Figure E.188. Peak pitch contour for one of the most .................................................. 301

Figure E.189. Fall pitch contour for one of the most .................................................. 302

Figure E.190. Peak pitch contour for one of the most .................................................. 303

Figure E.191. Fall pitch contour for one of the most .................................................. 304

Figure E.192. Fall pitch contour for one of the most .................................................. 305

Figure E.193. Fall pitch contour for one of the most .................................................. 305

Figure E.194. Rise pitch contour for one of the most .................................................... 306

Figure E.195. Fall-rise pitch contour for one of the most ............................................. 307

Figure E.196. Peak pitch contour for one of the most .................................................. 308

Figure E.197. Fall pitch contour for one of the most .................................................. 309

Figure E.198. Fall-rise pitch contour for one of the most ............................................. 310
Figure E.199. Fall pitch contour for *one of the most* .......................................................... 311
Figure E.200. Peak pitch contour for *one of the most* .......................................................... 311
Figure E.201. Peak pitch contour for *one of the most* .......................................................... 312
Figure E.202. Fall pitch contour for *one of the most* .......................................................... 312
Figure E.203. Fall pitch contour for *one of the most* .......................................................... 313
Figure E.204. Fall pitch contour for *one of the most* .......................................................... 314
Figure E.205. Fall pitch contour for *one of the most* .......................................................... 315
Figure E.206. Peak pitch contour for *one of the most* .......................................................... 316
Figure E.207. Peak pitch contour for *one of the most* .......................................................... 317
Figure E.208. Fall-level pitch contour for *one of the things* .................................................. 318
Figure E.209. Peak pitch contour for *one of the things* ....................................................... 319
Figure E.210. Peak pitch contour for *one of the things* ....................................................... 319
Figure E.211. Peak pitch contour for *one of the things* ....................................................... 320
Figure E.212. Fall pitch contour for *one of the things* ....................................................... 321
Figure E.213. Peak pitch contour for *one of the things* ....................................................... 322
Figure E.214. Peak pitch contour for *one of the things* ....................................................... 323
Figure E.215. Peak pitch contour for *one of the things* ....................................................... 324
Figure E.216. Fall pitch contour for *one of the things* ....................................................... 324
Figure E.217. Peak pitch contour for *one of the things* ....................................................... 325
Figure E.218. Peak pitch contour for *one of the things* ....................................................... 326
Figure E.219. Fall pitch contour for *one of the things* ....................................................... 327
Figure E.220. Peak pitch contour for *one of the things* ....................................................... 327
Figure E.221. Peak pitch contour for *one of the things* ....................................................... 328
Figure E.222. Peak pitch contour for *one of the things* ....................................................... 329
Figure E.223. Peak pitch contour for one of the things ................................................. 330
Figure E.224. Peak pitch contour for one of the things ................................................. 330
Figure E.225. Peak pitch contour for one of the things ................................................. 331
Figure E.226. Peak pitch contour for one of the things ................................................. 332
Figure E.227. Peak pitch contour for one of the things ................................................. 332
Figure E.228. Peak pitch contour for one of the things ................................................. 333
Figure E.229. Peak pitch contour for one of the things ................................................. 334
Figure E.230. Rise pitch contour for one of the things .................................................. 334
Figure E.231. Fall pitch contour for one of the things ................................................... 335
Figure E.232. Peak pitch contour for one of the things ................................................. 336
Figure E.233. Peak pitch contour for one of the things ................................................. 337
Figure E.234. Peak pitch contour for one of the things ................................................. 338
Figure E.235. Rise pitch contour for one of the things .................................................. 339
Figure E.236. Peak pitch contour for one of the things ................................................. 339
Figure E.237. Peak pitch contour for one of the things ................................................. 340
Figure E.238. Peak pitch contour for one of the things ................................................. 341
Figure E.239. Peak pitch contour for one of the things ................................................. 342
Figure E.240. Peak pitch contour for one of the things ................................................. 343
Figure E.241. Peak pitch contour for one of the things ................................................. 343
Figure E.242. Fall-level pitch contour for one of the things .......................................... 344
Figure E.243. Peak pitch contour for one of the things ................................................. 345
Figure E.244. Peak pitch contour for one of the things ................................................. 345
Figure E.245. Peak pitch contour for one of the things ................................................. 346
Figure E.246. Fall pitch contour for one of the things ................................................... 347
Figure E.247. Peak pitch contour for *one of the things* ................................................. 348
Figure E.248. Peak pitch contour for *one of the things* ................................................. 349
Figure E.249. Peak pitch contour for *one of the things* ................................................. 350
Figure E.250. Peak pitch contour for *one of the things* ................................................. 350
Figure E.251. Peak pitch contour for *one of the things* ................................................. 351
Figure E.252. Peak pitch contour for *one of the things* ................................................. 352
Figure E.253. Fall-level pitch contour for *one of the things* ........................................... 353
Figure E.254. Peak pitch contour for *one of the things* ................................................. 354
Figure E.255. Peak pitch contour for *one of the things* ................................................. 354
Figure E.256. Peak pitch contour for *one of the things* ................................................. 355
Figure E.257. Peak pitch contour for *one of the things* ................................................. 356
Figure E.258. Peak pitch contour for *one of the things* ................................................. 357
Figure E.259. Peak pitch contour for *one of the things* ................................................. 357
Figure E.260. Peak pitch contour for *one of the things* ................................................. 358
Figure E.261. Peak pitch contour for *that is to say* ....................................................... 359
Figure E.262. Peak pitch contour for *that is to say* ....................................................... 360
Figure E.263. Peak pitch contour for *that is to say* ....................................................... 361
Figure E.264. Peak pitch contour for *that is to say* ....................................................... 361
Figure E.265. Peak pitch contour for *that is to say* ....................................................... 362
Figure E.266. Peak pitch contour for *that is to say* ....................................................... 363
Figure E.267. Peak pitch contour for *that is to say* ....................................................... 364
Figure E.268. Fall pitch contour for *that is to say* ....................................................... 364
Figure E.269. Fall pitch contour for *that is to say* ....................................................... 365
Figure E.270. Fall-rise pitch contour for *that is to say* ................................................... 366
Figure E.271. Fall pitch contour for *that is to say* ................................................................. 367
Figure E.272. Fall-rise pitch contour for *that is to say* .......................................................... 368
Figure E.273. Fall-rise pitch contour for *that is to say* .......................................................... 369
Figure E.274. Peak pitch contour for *that is to say* ............................................................... 370
Figure E.275. Peak pitch contour for *that is to say* ............................................................... 371
Figure E.276. Peak pitch contour for *that is to say* ............................................................... 371
Figure E.277. Peak pitch contour for *that is to say* ............................................................... 372
Figure E.278. Peak pitch contour for *that is to say* ............................................................... 373
Figure E.279. Fall pitch contour for *that is to say* ............................................................... 374
Figure E.280. Peak pitch contour for *that is to say* ............................................................... 374
Figure E.281. Fall-rise pitch contour for *that is to say* .......................................................... 375
Figure E.282. Level pitch contour for *that is to say* ............................................................... 376
Figure E.283. Fall pitch contour for *that is to say* ............................................................... 376
Figure E.284. Peak pitch contour for *that is to say* ............................................................... 377
Figure E.285. Level pitch contour for *that is to say* ............................................................... 378
Figure E.286. Peak pitch contour for *that is to say* ............................................................... 378
Figure E.287. Fall pitch contour for *that is to say* ............................................................... 379
Figure E.288. Level pitch contour for *that is to say* ............................................................... 380
Figure E.289. Fall pitch contour for *that is to say* ............................................................... 380
Figure E.290. Fall-rise pitch contour for *that is to say* .......................................................... 381
Figure E.291. Level pitch contour for *that is to say* ............................................................... 382
Figure E.292. Peak pitch contour for *that is to say* ............................................................... 382
Figure E.293. Fall-rise pitch contour for *that is to say* .......................................................... 383
Figure E.294. Level pitch contour for *that is to say* ............................................................... 384
Figure E.295. Peak pitch contour for *that is to say*.................................................. 385
Figure E.296. Peak pitch contour for *that is to say*.................................................. 385
Figure E.297. Peak pitch contour for *that is to say*.................................................. 386
Figure E.298. Level pitch contour for *that is to say* .................................................. 387
Figure E.299. Peak pitch contour for *that is to say*.................................................. 388
Figure E.300. Peak pitch contour for *that is to say*.................................................. 388
Figure E.301. Fall pitch contour for *that is to say*..................................................... 389
Figure E.302. Fall pitch contour for *that is to say*..................................................... 390
Figure E.303. Peak pitch contour for *that is to say*.................................................. 390
Figure E.304. Peak pitch contour for *that is to say*.................................................. 391
Figure E.305. Peak pitch contour for *that is to say*.................................................. 392
Figure E.306. Peak pitch contour for *that is to say*.................................................. 392
Figure E.307. Fall-rise pitch contour for *that is to say*............................................. 393
Figure E.308. Fall pitch contour for *that is to say*..................................................... 394
Figure E.309. Fall pitch contour for *that is to say*..................................................... 394
Figure E.310. Peak pitch contour for *that is to say*.................................................. 395
Figure E.311. Peak pitch contour for *that is to say*.................................................. 396
Figure E.312. Level pitch contour for *that is to say*.................................................. 397
Figure E.313. Peak pitch contour for *that is to say*.................................................. 397
Figure E.314. Peak pitch contour for *we’ll talk about*............................................. 398
Figure E.315. Peak pitch contour for *we’ll talk about*............................................. 399
Figure E.316. Fall pitch contour for *we’ll talk about*.............................................. 399
Figure E.317. Peak pitch contour for *we’ll talk about*............................................. 400
Figure E.318. Peak pitch contour for *we’ll talk about*............................................. 401
Figure E.319. Peak pitch contour for we’ll talk about ................................................... 402
Figure E.320. Peak pitch contour for we’ll talk about ................................................... 402
Figure E.321. Fall pitch contour for we’ll talk about ..................................................... 403
Figure E.322. Peak pitch contour for we’ll talk about ................................................... 403
Figure E.323. Peak pitch contour for we’ll talk about ................................................... 404
Figure E.324. Peak pitch contour for we’ll talk about ................................................... 405
Figure E.325. Peak pitch contour for we’ll talk about ................................................... 405
Figure E.326. Peak pitch contour for we’ll talk about ................................................... 406
Figure E.327. Fall pitch contour for we’ll talk about ..................................................... 407
Figure E.328. Level pitch contour for we’ll talk about .................................................. 407
Figure E.329. Fall pitch contour for we’ll talk about ..................................................... 408
Figure E.330. Peak pitch contour for we’ll talk about ................................................... 408
Figure E.331. Peak pitch contour for we’ll talk about ................................................... 409
Figure E.332. Fall pitch contour for we’ll talk about ..................................................... 410
Figure E.333. Fall pitch contour for we’ll talk about ..................................................... 411
Figure E.334. Peak pitch contour for we’ll talk about ................................................... 412
Figure E.335. Peak pitch contour for we’ll talk about ................................................... 413
Figure E.336. Level pitch contour for we’ll talk about .................................................. 414
Figure E.337. Peak pitch contour for we’ll talk about ................................................... 414
Figure E.338. Fall pitch contour for we’ll talk about ..................................................... 415
Figure E.339. Peak pitch contour for we’ll talk about ................................................... 415
Figure E.340. Peak pitch contour for we’ll talk about ................................................... 416
Figure E.341. Fall pitch contour for we’ll talk about ..................................................... 417
Figure E.342. Peak pitch contour for we’ll talk about ................................................... 417
Figure E.343. Peak pitch contour for we’ll talk about ................................. 418
Figure E.344. Peak pitch contour for we’ll talk about ................................. 419
Figure E.345. Peak pitch contour for we’ll talk about ................................. 419
Figure E.346. Fall pitch contour for we’ll talk about ................................. 420
Figure E.347. Fall pitch contour for we’ll talk about ................................. 421
Figure E.348. Fall pitch contour for we’ll talk about ................................. 422
Figure E.349. Fall pitch contour for we’ll talk about ................................. 423
Figure E.350. Fall pitch contour for we’ll talk about ................................. 423
Figure E.351. Peak pitch contour for we’ll talk about ................................. 424
Figure E.352. Level pitch contour for we’ll talk about ................................. 425
Figure E.353. Peak pitch contour for we’ll talk about ................................. 425
Figure E.354. Peak pitch contour for we’ll talk about ................................. 426
Figure E.355. Peak pitch contour for we’ll talk about ................................. 427
Figure E.356. Peak pitch contour for we’ll talk about ................................. 427
Figure E.357. Peak pitch contour for we’ll talk about ................................. 428
Figure E.358. Fall pitch contour for we’ll talk about ................................. 429
Figure E.359. Peak pitch contour for we’ll talk about ................................. 430
Figure E.360. Peak pitch contour for we’ll talk about ................................. 430
Figure E.361. Peak pitch contour for we’ll talk about ................................. 431
Figure E.362. Peak pitch contour for we’ll talk about ................................. 432
Figure E.363. Peak pitch contour for we’ll talk about ................................. 433
Figure E.364. Peak pitch contour for we’ll talk about ................................. 433
Figure E.365. Peak pitch contour for we’ll talk about ................................. 434
Figure E.366. Level pitch contour for we’ll talk about ................................. 435
Figure E.367. Rise pitch contour for we’ll talk about ........................................... 436
Figure E.368. Peak pitch contour for we’re talking about.......................................... 436
Figure E.369. Peak pitch contour for we’re talking about.......................................... 437
Figure E.370. Peak pitch contour for we’re talking about.......................................... 438
Figure E.371. Fall pitch contour for we’re talking about.......................................... 438
Figure E.372. Level pitch contour for we’re talking about.......................................... 439
Figure E.373. Fall pitch contour for we’re talking about.......................................... 440
Figure E.374. Peak pitch contour for we’re talking about.......................................... 440
Figure E.375. Peak pitch contour for we’re talking about.......................................... 441
Figure E.376. Peak pitch contour for we’re talking about.......................................... 442
Figure E.377. Peak pitch contour for we’re talking about.......................................... 443
Figure E.378. Peak pitch contour for we’re talking about.......................................... 443
Figure E.379. Level pitch contour for we’re talking about.......................................... 444
Figure E.380. Peak pitch contour for we’re talking about.......................................... 445
Figure E.381. Peak pitch contour for we’re talking about.......................................... 446
Figure E.382. Peak pitch contour for we’re talking about.......................................... 447
Figure E.383. Peak pitch contour for we’re talking about.......................................... 447
Figure E.384. Peak pitch contour for we’re talking about.......................................... 448
Figure E.385. Peak pitch contour for we’re talking about.......................................... 449
Figure E.386. Peak pitch contour for we’re talking about.......................................... 449
Figure E.387. Peak pitch contour for we’re talking about.......................................... 450
Figure E.388. Peak pitch contour for we’re talking about.......................................... 451
Figure E.389. Peak pitch contour for we’re talking about.......................................... 452
Figure E.390. Peak pitch contour for we’re talking about.......................................... 453
Figure E.391. Fall pitch contour for we’re talking about .............................................. 454
Figure E.392. Fall-rise pitch contour for we’re talking about .............................................. 454
Figure E.393. Fall pitch contour for we’re talking about .............................................. 455
Figure E.394. Peak pitch contour for we’re talking about .............................................. 456
Figure E.395. Peak pitch contour for we’re talking about .............................................. 456
Figure E.396. Peak pitch contour for we’re talking about .............................................. 457
Figure E.397. Fall pitch contour for we’re talking about .............................................. 458
Figure E.398. Peak pitch contour for we’re talking about .............................................. 458
Figure E.399. Fall pitch contour for we’re talking about .............................................. 459
Figure E.400. Fall pitch contour for we’re talking about .............................................. 459
Figure E.401. Fall pitch contour for we’re talking about .............................................. 460
Figure E.402. Peak pitch contour for we’re talking about .............................................. 461
Figure E.403. Peak pitch contour for we’re talking about .............................................. 461
Figure E.404. Peak pitch contour for we’re talking about .............................................. 462
Figure E.405. Fall pitch contour for we’re talking about .............................................. 462
Figure E.406. Peak pitch contour for we’re talking about .............................................. 463
Figure E.407. Peak pitch contour for we’re talking about .............................................. 463
Figure E.408. Peak pitch contour for we’re talking about .............................................. 464
Figure E.409. Fall-rise pitch contour for we’re talking about .............................................. 465
Figure E.410. Fall pitch contour for we’re talking about .............................................. 466
Figure E.411. Peak pitch contour for we’re talking about .............................................. 466
Figure E.412. Peak pitch contour for we’re talking about .............................................. 467
Figure E.413. Peak pitch contour for we’re talking about .............................................. 468
Figure E.414. Peak pitch contour for we’re talking about .............................................. 469
Figure E.415. Level pitch contour for we’re talking about ........................................... 469
Figure E.416. Peak pitch contour for we’re talking about ............................................ 470
Figure E.417. Peak pitch contour for we’re talking about ............................................. 471
Figure E.418. Peak pitch contour for we’re talking about ............................................. 471
Figure E.419. Peak pitch contour for we’re talking about ............................................. 472
Figure E.420. Peak pitch contour for we’re talking about ............................................. 473
Figure E.421. Peak pitch contour for we’ve talked about .............................................. 473
Figure E.422. Peak pitch contour for we’ve talked about .............................................. 474
Figure E.423. Fall pitch contour for we’ve talked about .................................................. 474
Figure E.424. Fall pitch contour for we’ve talked about .................................................. 475
Figure E.425. Peak pitch contour for we’ve talked about .............................................. 476
Figure E.426. Peak pitch contour for we’ve talked about .............................................. 476
Figure E.427. Fall pitch contour for we’ve talked about .................................................. 477
Figure E.428. Peak pitch contour for we’ve talked about .............................................. 478
Figure E.429. Peak pitch contour for we’ve talked about .............................................. 478
Figure E.430. Peak pitch contour for we’ve talked about .............................................. 479
Figure E.431. Peak pitch contour for we’ve talked about .............................................. 480
Figure E.432. Peak pitch contour for we’ve talked about .............................................. 481
Figure E.433. Rise pitch contour for we’ve talked about .................................................. 481
Figure E.434. Fall pitch contour for we’ve talked about .................................................. 482
Figure E.435. Peak pitch contour for we’ve talked about .............................................. 483
Figure E.436. Peak pitch contour for we’ve talked about .............................................. 483
Figure E.437. Peak pitch contour for we’ve talked about .............................................. 484
Figure E.438. Peak pitch contour for we’ve talked about .............................................. 485
Figure E.439. Peak pitch contour for we’ve talked about ................................................. 485
Figure E.440. Fall-rise pitch contour for we’ve talked about ................................................. 486
Figure E.441. Fall pitch contour for we’ve talked about ........................................................ 486
Figure E.442. Peak pitch contour for we’ve talked about ....................................................... 487
Figure E.443. Peak pitch contour for we’ve talked about ....................................................... 488
Figure E.444. Fall pitch contour for we’ve talked about ........................................................ 488
Figure E.445. Fall pitch contour for we’ve talked about ........................................................ 489
Figure E.446. Rise pitch contour for we’ve talked about ....................................................... 490
Figure E.447. Peak pitch contour for we’ve talked about ....................................................... 490
Figure E.448. Fall pitch contour for we’ve talked about ....................................................... 491
Figure E.449. Peak pitch contour for we’ve talked about ....................................................... 492
Figure E.450. Peak pitch contour for we’ve talked about ....................................................... 493
Figure E.451. Fall pitch contour for we’ve talked about ....................................................... 493
Figure E.452. Peak pitch contour for we’ve talked about ....................................................... 494
Figure E.453. Fall-rise pitch contour for we’ve talked about .................................................... 495
Figure E.454. Fall pitch contour for we’ve talked about ....................................................... 495
Figure E.455. Peak pitch contour for we’ve talked about ....................................................... 496
Figure E.456. Peak pitch contour for we’ve talked about ....................................................... 497
Figure E.457. Peak pitch contour for we’ve talked about ....................................................... 498
Figure E.458. Peak pitch contour for we’ve talked about ....................................................... 498
Figure E.459. Peak pitch contour for we’ve talked about ....................................................... 499
Figure E.460. Fall pitch contour for we’ve talked about ....................................................... 500
Figure E.461. Peak pitch contour for we’ve talked about ....................................................... 500
Figure E.462. Peak pitch contour for we’ve talked about ....................................................... 501
Figure E.463. Fall pitch contour for we’ve talked about ............................................ 502
Figure E.464. Peak pitch contour for we’ve talked about ............................................ 502
Figure E.465. Fall pitch contour for we’ve talked about ............................................ 503
Figure E.466. Peak pitch contour for we’ve talked about ............................................ 504
Figure E.467. Fall pitch contour for we’ve talked about ............................................ 504
Figure E.468. Peak pitch contour for we’ve talked about ............................................ 505
Figure E.469. Peak pitch contour for we’ve talked about ............................................ 505
Figure E.470. Fall pitch contour for we’ve talked about ............................................ 506
Figure E.471. Peak pitch contour for we’ve talked about ............................................ 506
LIST OF TABLES

Table 2.1. Linguistic devices in academic discourse that rhetorically organize speech ........................................................................................................... 12

Table 2.2. Discourse functions in Biber, Conrad, and Cortes (2004) and the equivalent functions in this study ................................................................. 16

Table 2.3. Summary of studies on communicative role of prosody ...................................................... 27

Table 2.4. Summary of Dehé and Wichmann’s (2010) findings ................................................. 31

Table 2.5. Summary of studies on prosody and prosodic features of multi-word sequences ................................................................. 34

Table 3.1. Yale corpus composition ................................................................................. 38

Table 3.2. Frequency of lexical bundles and sample analyzed ................................................. 42

Table 3.3. Discourse functions for lexical bundles examined in this study ................................. 45

Table 3.4. Prosodic features examined ............................................................................. 51

Table 3.5. Cross tabulation of results for one of the things ................................................... 56

Table 4.1. Prosodic and discourse function variations for one of the most ................................ 61

Table 4.2. Prosodic and discourse function variations for one of the things ...................... 70

Table 4.3. Prosodic and discourse function variations for on the other hand ..................... 76

Table 4.4. Prosodic and discourse function variations for we’ll talk about ...................... 80

Table 4.5. Prosodic and discourse function variations for we’re talking about ............... 83

Table 4.6. Prosodic and discourse function variations for as you can see ..................... 88

Table 4.7. Prosodic variation of we’ve talked about and its position within the intonation unit ........................................................................................................... 93

Table 4.8. Prosodic features that differentiated the discourse functions for each lexical bundle ..................................................................................................... 100

Table 4.9. Summary of common prosodic pattern for each discourse function .............. 101
Table 5.1. Discourse organization within university lectures ........................................ 114

Table A.1. Glossary of terms .......................................................................................... 132

Table B.1. List of lexical bundles in the Yale corpus .................................................... 133

Table B.2. Continuation of list of lexical bundles in the Yale corpus ......................... 134

Table E.1. Abbreviations of courses and their names .................................................... 149
ACKNOWLEDGMENTS

I would like to thank my committee chair, John Levis, for all the support and motivation he gave me throughout the process of this dissertation. Exploring this new area of research could not have been possible without him. His faith in me and unfailing support through my difficult times helped me during my PhD journey. Also, I would like to thank my committee members, Bethany Gray, Tammy Slater, Jo Mackiewicz, and Horabail Venkatagiri, for their valuable feedback in my preliminary exam that helped enhance this research. Additionally, I would like to thank Eitten Koffi for his helpful feedback on my research during my presentation at the PSLLT 2018 conference.

Special thanks to my parents whom have instilled in me the value of education and taught me to work hard to achieve the best. Also, I could not have pursued my graduate studies without my supportive and loving husband. He has always been by my side in my best and worst times reminding me always that I can do it. The love and support of family have made this journey easier. I would also like to thank my friends, colleagues, the department faculty and staff for making my time at Iowa State University a wonderful experience.
ABSTRACT

Multiword sequences are important components of language because they are building blocks that can be used to create long stretches of discourse. They are word combinations that have particular importance because of their co-occurrence and function in discourse that suggest that they are stored and retrieved from memory as a whole rather than as separate word units. The functions that they perform in discourse can vary according to register. In spoken academic discourse, one of the essential functions of multi-word sequences is a discourse organizing function that include introducing a topic and elaborating on an existing topic. These varied discourse functions have two main roles in the information structure of discourse: as a major rhetorical organizer or a minor rhetorical organizer (Chaudron & Richards, 1986). However, studies that have examined the discourse-organizing role of spoken linguistic devices, including multi-word sequences, either have examined limited data or have analyzed them from written transcripts only, overlooking an important aspect of speech, i.e., prosody, that has an important communicative role.

This study focuses on one type of multi-word sequence, lexical bundles, which are frequently used recurrent word combinations that are identified computationally in a corpus to understand how their prosodic variations are linked to their discourse function(s). Lexical bundles in spoken academic discourse have been found to have a discourse-organizing function through analyzing spoken text from orthographic transcription. However, what remains to be explored is their prosodic features that have the potential to specify specific discourse-organizing functions more precisely. Therefore,
This study focuses on understanding the relationship between the prosodic variation(s) and discourse function(s) of frequently occurring lexical bundles in a corpus.

This study used a corpus-driven framework to analyze the prosodic and discourse function variations of lexical bundles in a spoken academic corpus compiled from YALE open courses. The discourse function of the lexical bundles was analyzed using transcripts and audio files to find emerging patterns in their rhetorical function in information structure. In other words, lexical bundles were classified according to the relationship to preceding and following discourse, i.e., whether it introduced a new topic or expanded, contrasted, or emphasized specific details related to the main topic. Prosodic analysis involved examining pitch movement and prominence within the lexical bundle. Then, the emerging prosodic patterns and their corresponding discourse functions were cross-tabulated to understand the relationship between them.

Findings indicate that some lexical bundles had multiple prosodic variations related to discourse function variations while others had minimal prosodic variation related to one discourse function. The discourse functions were categorized as having a major rhetorical organization role (introducing the main topic for discussion, connecting topics, major contrast) or a minor rhetorical organization role (expanding on a topic through specific details, providing background information, exemplification, or rephrasing, contrasting ideas, emphasizing important information). The variation in discourse function and prosody of lexical bundles in university lectures may indicate that some lexical bundles are more formulaic than others.
CHAPTER 1. INTRODUCTION

Multi-word sequences are part of everyday language. They are word strings that occur together forming a particular pattern that may be perceived as word chunks, which have been suggested as being stored and retrieved from memory as one unit (Ellis, 1996). Therefore, they are an efficient means by which we store units of language above the word level. Also, not all multi-word sequences are used equally in spoken and written language; certain multi-word sequences are more acceptable in certain contexts than others. For example, it is more common to find the prepositional verb phrase be associated with in academic prose than to hear it in conversation while is more common to hear the expression you know what I mean in conversation but not find it in academic prose (Biber, Johansson, Leech, Conrad, & Finegan, 1999). Moreover, within a specific register, certain word combinations are more acceptable than others, such as large number being more common than great number in academic prose (Biber, Conrad, & Reppen, 1998). Therefore, certain patterns of multi-word sequences characterize specific registers or contexts of language use where some patterns are common in specific written registers while yet others are more common in specific spoken registers. In other words, using unconventional patterns may be perceived as odd and might pose difficulty in processing for both native and nonnative speakers (Conklin & Schmitt, 2008). Therefore, language of a specific register seems to be constituents of certain patterns of multi-word sequences rather than a combination of random individual words.

Understanding the discourse functions of multi-word sequences in specific contexts is important for knowing the goal of the text. One important context where multi-word sequences have a key role in comprehension is spoken academic registers.
such as university lectures. There are a number of discourse functions performed by multi-word sequences including discourse organization (Biber et al., 2004). Discourse organization is how a spoken text is organized in a logical progression in order to understand how ideas are connected to each other so that the listener understands, for instance, when a new topic is signaled versus how specific details that elaborate on the main topic are signaled. One way this is achieved is through cues provided by multi-word sequences that guide the listener to expect particular information. For example, *I’m going to talk about* can introduce a new topic, “Okay, today we’re going to talk about cell communication. And *going to talk about* - so the general concepts that we talked about last time and talk about how they apply in two physiological systems, the nervous system first and then the immune system.” <BENG100Feb2008_lec8>. Therefore, multi-word sequences can act as discourse-signaling cues or function in recall of information and comprehension (Chaudron & Richards, 1986; Flowerdew & Tauroza, 1995; Jung, 2003a, 2003b).

What constitutes a multi-word sequence is controversial. Studies of multi-word sequences either adopt the view that they are prefabricated word chunks or follow a frequency-driven approach such as the one used in this study. The first perspective, that language is composed of fixed multi-word units, examines multi-word sequences such as *you know what I mean* as grammatically complete and with an apparent meaning. In the second perspective, language includes recurrent multi-word sequences known as lexical bundles such as *if you look at*, that is a highly frequent sequence in a classroom teaching sub-corpus (Biber et al., 2004) which may be grammatically complete but seems to be part of a larger phrase. Although studies have different views on what constitutes a multi-
word sequence which affects their methodologies, they all agree that multi-word sequences have important discourse functions that are key components in understanding a text.

Researching multi-word sequences in spoken language corpora has been limited. Moreover, few studies have examined the prosody of multi-word sequences. So far, studies on the prosody of multi-word sequences have looked at phonological coherence and prominence placement, i.e., how intact a multi-word sequence is in its intonation unit and how pitch is used within a multi-word sequence (Lin, 2013; Lin & Aldolphs, 2009).

Some of the research that focused on multi-word sequences in spoken language is research on spoken lexical bundles in academic language. This type of research has the advantage of examining the distribution of lexical bundles across various registers of academic language (textbooks, conversation, classroom teaching, and academic prose) to examine the most common discourse functions of lexical bundles in each register. In other words, this type of research examines frequently occurring multi-word sequences in a large data set thus providing better generalization across a specific register of language. However, the lexical bundles in the spoken register have been studied from one angle using transcripts only, neglecting an important component of spoken speech: its prosody. Prosody is one of the key features in speech because it is one of the essential ways that speakers convey meaning in introducing a topic, emphasizing important information, or backgrounding less important information.

### 1.1 Lexical bundles

Lexical bundles, a term coined by Biber et al. (1999), are recurrent expressions that occur at least ten times per million in at least five different texts in a corpus. They are distinct from other multi-word expressions. Biber et al. (1999) provide a description of
how lexical bundles are different from more commonly known multi-word expressions such as idioms and collocations. Idioms are fixed expressions in which meaning cannot be deciphered using the meaning of their constituents. An example of an idiom is *kick the bucket* which means “die” and so none of the words in the idiom can be used to predict its meaning. However, idioms such as *kick the bucket* are not frequently occurring in natural speech but can be found in fiction (Biber et al., 2004). In fact, *kick the bucket* occurred only five times per million in fiction and are rarely found in face-to-face conversation (Biber et al, 1999, p.1026). Collocations, on the other hand, are words that are closely associated with each other due to their frequent co-occurrence such as *little boy, little dog* but not *little size* since the latter is not a commonly encountered word association. In contrast to idioms, collocations are not fixed expressions. An extension of the concept of collocations is lexical bundles. These are longer expressions that tend to frequently occur together. Common lexical bundle in conversation are *I don’t know what* or *in the case of the*. Hence, different lexical bundles characterize different registers, e.g., conversations versus academic spoken language. Another feature of lexical bundles is that since they are statistical associations that can be identified computationally. These can be grammatically complete or incomplete lexical bundles such as *on the other hand* versus *want to talk about* (Biber et al., 2004). In other words, they may have a stand-alone meaning or may form syntactic bridges between different stretches of discourse.

The focus of this study is examining lexical bundles in the register of academic lectures. The register of academic lectures was chosen because it has important implications for teaching English for specific purposes. Speaking language learning materials targeted to teach lecture organization to international teaching assistants, for
instance, would benefit from understanding how discourse-organizing cues are realized syntactically and prosodically in authentic speech. Lexical bundles can vary in length. However, most research uses four-word lexical bundles since they are more manageable than two-word and three-word lexical bundles are usually incorporated in four-word lexical bundles. Five-word and six-word lexical bundles that are usually phrasal in nature, such as *at the end of the day*, are less common and incorporate four-word lexical bundles. For example, the four-word lexical bundle *at the end of* is included in the six-word lexical bundle *at the end of the day*. In fact, the lexical bundle *at the end of* is like a template frame that can be used to form other longer lexical bundles to produce *at the end of it* and *at the end of the day*.

Previous studies have examined linguistic units of variable length with a discourse-organizing function. Some studies have focused on the importance of discourse-organizing units for student comprehension and recall (e.g., Jung, 2003a; 2003b) while others have examined prosodic features of one or two-word linguistic units to understand which features help discriminate between different functions (Dehé & Wichmann, 2010; Hirschberg & Litman, 1987). In such studies, a limited amount of data is typically used and the discourse-organizing units examined are not necessarily frequently occurring in their data. In contrast, other studies have employed large-scale lexico-grammatical analyses of multi-word sequences in large corpora to understand how they function differently in registers of academic language (e.g., Biber et al., 2004). These studies have the benefit of examining a large amount of data on frequently occurring multi-word sequences that are likely to be repeatedly encountered in academic speech and writing. Only a limited number of studies have considered the role of prosody...
in multi-word sequences. These studies have focused on analyzing the prosodic patterns of a limited number of multi-word sequences without finding how those prosodic variations are linked to the communicative role they have in discourse (Lin, 2013; Lin & Aldophs, 2009). Given the gap in the literature, research was needed to understand how the prosodic features of lexical bundles are related to their discourse function in a specific register, in this study, academic lectures.

The methodology used in this research is a corpus-driven framework, an inductive process analyzing linguistic structures that emerge from a corpus (Biber, 2010) to analyze lexical bundles from two angles, via written transcripts and prosodic analysis, to understand the role of prosody in signaling meaning. Specifically, the discourse functions of frequently occurring four-word lexical bundles in a compiled academic lectures corpus were analyzed from transcripts and audio files. For prosodic analysis of lexical bundles, pitch movement and prominence were analyzed from pitch contours generated from Praat (Boersma, Paul & Weenink, David, 2019), a software program that analyzes the acoustic properties of sound files. Trends found through cross-tabulated frequency counts of both discourse function and prosodic analysis were used to understand how the discourse functions of lexical bundles were related to their prosodic features. Then, differences in peak height, pitch range and in few cases duration, prominence, and position were also examined to find how these prosodic features differentiated across the discourse function for each lexical bundle.

This study hypothesizes that some lexical bundles will have prosodic features that are related to varied discourse functions while others will have relatively fixed prosodic patterns and discourse functions. This would suggest that lexical bundles vary in their
function and form with some performing different functions that are manifested in their prosodic variation while other lexical bundles are relatively invariable in their discourse function and prosody. Therefore, this study will shed light on the role of prosodic features in discriminating between lexical bundles that have a variety of functions versus those that are relatively fixed.

This dissertation consists of five chapters. Chapter 1 had introduced background about the research that motivates this study. Chapter 2 provides a detailed review of the relevant literature about the significance of multi-word sequences in academic spoken language, the communicative role of prosody, and the prosodic features of multi-word sequences. Also, the gap in the literature on current methods of examining discourse functions of lexical bundles is identified and the research question this study aims to answer is stated. Then, Chapter 3 describes the corpus developed, the criteria for choosing lexical bundles, and the methodology used to analyze the discourse functions and prosodic features of lexical bundles. Chapter 4 provides findings for the research question for each of the lexical bundles. Finally, Chapter 5 discusses the implication of findings in light of the literature reviewed on multi-word sequences and prosody. The limitations of the study and directions for future research are also presented.
CHAPTER 2. LITERATURE REVIEW

This chapter reviews the literature on multi-word sequences in academic language, their importance, the key role of prosody in spoken language, and prosodic features of multi-word sequences. The research on multi-word sequences shows that studies vary in the terminology and methodology used to describe and identify multi-word sequences. Then a description of the framework used in the study and the type of multi-word sequences investigated, namely lexical bundles, are provided. Next, research on the role of prosody in speech and the potential effect of prosody to create different meaning is reviewed. The limited research on prosodic features of multi-word sequences studied so far is discussed. The gap in the literature about how prosody contributes to meaning in lexical bundles is identified and, finally, the research question is stated.

2.1 Background on multi-word sequences

In past research, there has been little consensus on the terminology used to describe multi-word sequences. Some of these terms include prefabricated patterns (Hakuta 1974), idiomatic expressions (Titone & Connine, 1999), multi-word expressions (Strik, Hulsbosch, & Cucchiarini, 2010), lexical phrases (Nattinger & DeCarrico, 1992), lexicalized sentence stem (Pawley & Syder, 1983), formulaic sequences (Wray, 2002), recurrent word-combinations (Altenberg, 1998) and lexical bundles (Biber et al., 1999). This varied terminology used to refer to multi-word sequences might be due to the different perspectives researchers have adopted to characterize them. There have been two main methods used to identify multi-word sequences. Research that identifies multi-word sequences according to their structural completeness usually use terms such as prefabricated patterns, idiomatic expressions, lexical phrases, lexicalized sentence stem,
or formulaic expressions (Hakuta, 1974; Titone & Connine, 1999; Nattinger & DeCarrico, 1992; Pawley & Syder, 1983, Simpson-Vlach & Ellis, 2010). These structurally complete phrases include lexical phrases such as \textit{this paper intends/is designed to X} (Nattinger & DeCarrico, 1992) or more idiomatic expressions such as \textit{kick the bucket}. This type of multi-word sequence is usually identified manually according to what the researchers believe are fixed/semi-fixed phrases. In contrast, studies that use a frequency-based approach regardless of their perceptual saliency (i.e., grammatical completeness) prefer terms such as recurrent word combinations and lexical bundles (e.g., Altenberg, 1998; Biber et al., 1999; Nesi & Basturkmen, 2006). This type of multi-word sequence may or may not be grammatically complete since they are identified computationally regardless of researcher’s belief of what is perceived to be a multi-word sequence. Such combinations include multi-word sequences such as \textit{as you know} (Altenberg, 1998) and \textit{has to do with} (Biber et al., 2004). This study employs a frequency-based approach to study \textit{lexical bundles} and the term multi-word sequence is used as an umbrella term.

Despite differences in terminology and methodology, most researchers have studied the discourse function of multi-word sequences in written and spoken language using written transcripts. In other words, multi-word sequences in spoken and written language have been studied from the written text only. Studying these two different modes of language delivery, i.e., written and spoken language, in similar fashion does not account for the fact that that spoken language is different from written language. One important difference between the two modes is that the prosody of spoken language has the potential to create multiple functions for the same lexico-grammatical sequence.
Discourse function means using a linguistic feature to convey a specific meaning in the information structure of discourse. Information structure refers to how new and given information are organized within discourse. New information is information that has not been mentioned previously within a context, in contrast to given information that has occurred previously. Discourse refers instances of language use that are influences and can be interpreted using linguistic situational social psychological and pragmatic factors (Biber et al., 1999). Therefore, the discourse function of multi-word sequences in spoken discourse could be affected by their prosody, an important component of speech needs to be considered when analyzing discourse function in spoken corpora which was neglected by earlier studies.

2.2 Multi-word sequences in academic spoken language

Multi-word sequences contribute to the information structure of discourse, such as introducing new topics and elaborating on existing topics, signaling logical relationships (causal or temporal), and conveying speaker attitude (Biber et al., 2004; Tyler, 1994). Multi-word sequences can also create a hierarchal structure in discourse that foregrounds and backgrounds information, creating a contrast between main ideas and supporting details and differentiating between previously stated information and information stated for the first time using syntactic constructions along with discourse structuring cues (Tyler, Jefferies, & Davies, 1988). In other words, the discourse functions of some multi-word sequences help inform the listener about the relative importance of information by rhetorically organizing speech, thus allowing listeners to make logical relationships between various propositions in discourse. An example of a multi-word linguistic sequence is the lexical phrase ‘Let me talk about X and then we’ll go to Y’ (DeCarrico & Nattinger, 1988) that has the discourse function of signaling the beginning of a new topic.
However, studying lexical phrases such as these might involve a biased decision on what is a discourse-organizing multi-word sequence. In other words, the researcher analyzed a sample lecture and believed that *Let me talk about X and then we’ll go to Y* is a discourse organizing phrase that is likely to be encountered in many university lectures. Therefore, the analysis that focuses on prefabricated word chunks involved a subjective decision of the researcher manually identification of phrases thought to have a discourse organizing function. In contrast, *lexical bundles* are examined in this study by being extracted automatically according to co-occurrence and frequency using corpus tools.

The importance of multi-word sequences lies in the role they perform in discourse. A number of studies have suggested that they have an essential role in student recall and comprehension. Findings suggest that students who listened to lectures with discourse-organizing devices such as multi-word sequences understood and recalled more information than those who listened to the lecture that lack these devices (Chaudron & Richards, 1986; Flowerdew & Tauroza, 1995; Jung, 2003a, 2003b). This might be due to the cohesive role that these discourse-organizing devices play in spoken discourse (Tyler, 1994; Tyler & Bro, 1992; Nesi & Basturkmen, 2006), allowing listeners to infer relationships between ideas.

A number of terms that have been used to refer to the discourse-organizing function of multi-word sequences (Table 2.1). These terms include *lexical phrases* (DeCarrico & Nattinger, 1988), *macro-organizers* and *micro-organizers* (DeCarrico & Nattinger, 1988), *discourse/organizational markers* (Chaudron & Richards, 1986), *organization markers* (Jung, 2003a) *discourse signaling cues* (Jung, 2003b), and...
discourse organizing lexical bundles (Biber, Conrad, & Cortes, 2004; Nesi & Basturkmen, 2006).

Table 2.1. Linguistic devices in academic discourse that rhetorically organize speech

<table>
<thead>
<tr>
<th>Study</th>
<th>Terminology used</th>
<th>Example of discourse organizing devices</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chaudron and Richards (1986)</td>
<td>macro-markers and micromarkers</td>
<td>What I’m going to talk about today is something</td>
<td>macro-marker</td>
</tr>
<tr>
<td>DeCarrico and Nattinger (1988)</td>
<td>lexical phrases</td>
<td>Let me talk about X and then we’ll go to Y</td>
<td>topic marker</td>
</tr>
<tr>
<td>Jung (2003a)</td>
<td>organization marker</td>
<td>My point is that…</td>
<td>pointers</td>
</tr>
<tr>
<td>Jung (2003b)</td>
<td>discourse signaling cues</td>
<td>Let’s talk about norms and values for just a minute</td>
<td>topic marker</td>
</tr>
<tr>
<td>Biber et al., (2004); Nesi and Basturkmen, (2006)</td>
<td>discourse organizing bundles</td>
<td>If you look at</td>
<td>topic introduction/focus</td>
</tr>
</tbody>
</table>

This study uses the term discourse-organizing lexical bundles. Despite the varied terminology used to refer to discourse-organizing function of multi-word sequences, all these studies agree that these multi-word sequences signal how information in the lecture is organized and thus may serve as important signposts to the listener.

2.3 Categorization of discourse-organizing functions

Multi-word sequences in academic lectures may serve discourse-organizing functions. Discourse organization refers to how discourse is organized in a logical manner so that listeners can interpret incoming information. Thus, multi-word sequences contribute to the information structure of discourse by acting as metadiscourse markers that signal major and minor propositions. This discourse-organizing function of multi-word sequences facilitates the interpretation of information for the listener by marking how the various propositions within a context are related to one another.

There have been studies that provide a categorization of discourse organizers according to the level of organization they perform in discourse differentiating between
discourse organizers that signal major propositions and minor propositions (Chaudron & Richards, 1986; Jung 2003a, 2003b; Wichmann, 2000). In these studies, macro-markers signal major important transition points such as *what I’m going to talk about* while micro-markers such as conjunctions (e.g., *because*) signal intersentential connections. A more detailed categorization of discourse organizers is offered by Jung (2003a). In her study, macromarkers include:

- meta-statements (e.g., *I’m going to talk briefly about more complex norms and rituals*),
- defining words (e.g., *What I mean by universal norms is norms that all societies have in common*)
- pointers (e.g., *My point is that in ritual, the steps must be there, and must be there in a certain order*)
- exemplifiers (e.g., *Let me give you an example of a norm in different cultures*)
- concluding remarks (e.g., *That’s all we’ll talk about today*).

However, Jung (2003a) does not give a clear description of what she regards as micromarkers, only mentioning the examples *ok, and, then, and so*. Other studies do not attempt to categorize discourse organizers according to the level of organization they perform in discourse but rather lists their functions (Tyler, Jefferies, & Davies 1988; Tyler at al. 1988). These functions include discourse organizers that signal:

- contrast (e.g., *however* and *but*)
- new topics (e.g., *now* and *next*)
- digression (e.g., *anyway*)
• conclusions (e.g., so)
• topic shifts (e.g., let’s turn to the next point)
• clarification (e.g., that)

Overall, a number of studies differentiate between discourse functions of discourse organizers categorizing them according to whether they signal major versus minor transition points in lectures while others do not attempt to make such categorization. However, the limited number of studies that categorize discourse organizers into major and minor discourse organizing function are based on limited data and so these categories are less likely to be generalizable across a particular register, i.e., academic lectures. Therefore, existing studies that classify discourse organizers according to their rhetorical role may not be representative of how they are used across other lectures due to their limited data.

2.4 Frequency-based approach

Given the limitation of previous studies in their small data set, this study uses a frequency-based approach that examines discourse-organizing multi-word sequences, namely lexical bundles, in a large data set, i.e., a large corpus that consists of 140 university lectures compiled from Yale open courses. It uses a corpus driven framework and the broad discourse-organizing categorization used in Biber et al. (2004) (hereafter BCC study), a comprehensive study that examines lexical bundles in spoken academic language, to identify the discourse organizing functions of lexical bundles. The reason for using this study is that it is the only study found that examines the various functions of lexical bundles that could be generalizable to the register it is examining due to consistent rigor methodology and large data set it used. Their study used a sub-corpus of a larger
corpus, the TOEFL 2000 Spoken and Written Academic Language Corpus (T2K-SWAL). The T2K-SWAL corpus consists of a range of spoken and written registers encountered by university students in the US such as classroom teaching, office hours, study groups, and textbooks. The sub-corpus used in their study compares variation across two registers; classroom teaching and textbooks. A difference for this study is that it focuses on lexical bundles in a spoken register; i.e., university lectures.

In their T2K-SWAL sub-corpus, lexical bundles that functioned as discourse organizers, referential expressions, and stance expressions were highly frequent; the highly frequent lexical bundles occurred 40-99 times per million while the least frequent occurred 10-19 times per million. Specifically, discourse organizing lexical bundles were more frequent in classroom teaching compared to conversation. Lexical bundles with discourse organizing functions signaled the rhetorical structure of speech by making logical connections between prior and coming discourse with two main discourse functions: they signaled the introduction of a topic such as want to talk about, or they elaborated on a proposition stated such as has to do with. Referential expressions identify an entity by singling out an important attribute such as one of the most. Stance expressions such as I don’t know if expressed the truth value of a proposition. Therefore, in the BCC study, a broad categorization is provided for discourse-organizing lexical bundles. However, it does not examine the prosody of the lexical bundles and their role in signaling specific discourse-organizing functions. Table 2.2 provides the broad discourse functions used in the BCC study and how it relates to the specific discourse-organizing functions and referential functions of lexical bundles in this study.
Table 2.2. Discourse functions in Biber, Conrad, and Cortes (2004) and the equivalent functions in this study

<table>
<thead>
<tr>
<th>Discourse functions in BCC study</th>
<th>Discourse functions used in present study</th>
<th>Level of hierarchy in information structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topic introduction/focus</td>
<td>- Introducing a main topic</td>
<td>Signals information at major rhetorical junctions</td>
</tr>
<tr>
<td></td>
<td>- Connecting two topics</td>
<td></td>
</tr>
<tr>
<td>Topic elaboration/clarification</td>
<td>- Contrast</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Emphasizing important information</td>
<td>Signals information at minor rhetorical junctions</td>
</tr>
<tr>
<td></td>
<td>- Providing background information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Elaborating a main topic</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Rephrasing</td>
<td></td>
</tr>
<tr>
<td>Referential expressions</td>
<td>- Providing general reference</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Providing specific reference</td>
<td></td>
</tr>
</tbody>
</table>

Overall, a number of studies that were reviewed identified a range of discourse functions that multi-word sequences perform in discourse such as contrasts, new topics, digression. These studies use different terminology (e.g., organization markers, discourse signaling cues, discourse-organizing lexical bundles) and methodology (focus on prefabricated word chunks verses frequency-based approach) to identify multi-word sequences. These studies that looked at the discourse functions of multi-word sequences in academic discourse have not considered prosodic features as a factor that can affect discourse function. A consideration of the communicative role of prosody that has been neglected in most studies that examine multi-word sequences may add to our understanding of specific functions of multi-word sequences, specifically lexical bundles, perform in discourse.

2.5 Communicative role of prosody

Although corpus studies have not commonly considered the role of prosody in signaling discourse function in multi-word sequences, research on prosody has long established its contribution to meaning. Studying prosody involves examining
suprasegmental features of language such as pitch, loudness, timing (which includes pauses), and voice quality that can be used strategically to build coherence by signaling the information structure of discourse (Pierrehumbert & Hirschberg, 1990; Wennerstrom, 1998; Wichmann, 2000). It can also be used to signal pragmatic functions such as politeness and power relationships (Cheng & Lam, 2011; Dehé & Wichmann, 2000; Wichmann, 2004). Of particular relevance to this study is pitch movement and prominence. Pitch movement refers to the upward or downward movement of pitch while prominence refers to words or syllables that receive focus within an intonation unit either through an excursion of pitch or lengthened duration. An intonation unit is a spoken phrase that is marked by finality cues such as pauses or lowering in pitch.

2.5.1 Prosody signaling of information structure

Prosody has a crucial role in signaling the information structure of discourse. Early research has suggested that prosody has a role in disambiguating between discourse and sentential uses of cue phrases, linguistic expressions such as okay, now, and anyway that have discourse-organizing functions. Their findings have shown that position and prominence help in differentiating between the different functions of cue phrases (Hirschberg & Litman, 1987; Hirschberg & Pierrehumbert, 1986; Litman & Hirschberg, 1990; Hirschberg, Litman, Pierrehumbert, & Ward, 1987). These intonational features (position and prominence) are associated with different functions that the cue phrases, such as now, performs in discourse where position and prominence indicated whether now was used as a cohesive device indicating information structure or a sentential non-cohesive function (Hirschberg & Litman, 1987). When now was used to indicate information structure, it either (1) alone in an intonation unit (or in combination with other cue phrases such as okay now) (2) occupied part of an intonation unit appearing in
initial position of the intonation unit and was non-prominent. However, when it was used for sentential uses, it was (1) occupied part of an intonation unit and was prominent. Example 2.1 shows how now could have a cohesive function by signaling topic return or, as in example 2.2, could have a non-cue non-cohesive function of a deictic to indicate a span of time in another context.

Example 2.1

Harry: Fred whatta you have to say about this IRA problem?
Fred: Ok. You see now unfortunately Harry as we alluded to earlier when there is a distribution from an IRA that is taxable … {discussion of caller’s beneficiary status}

Example 2.2

Fred: Yeah I think we’ll look that up and possibly uh after one of your breaks
Harry.
Harry: OK we’ll take one now. Just hang on Bill and we’ll be right back with you.

The position of discourse markers within an intonation unit has also been found to disambiguate the discourse versus propositional use of so in Cheng and Lam (2011) in the prosodic one-million word Hong Kong Corpus of Spoken English (HKCSE). The corpus consists of academic, business, conversation, and public sub-corpora. When used as a discourse marker, so usually occurred as in a separate intonation unit such as marking the beginning of a new conversation in, “So/ where are you from?/”. On the other hand, when used for propositional use it occurred as part of a bigger tone unit as in the “The two cells will divide into four/ and then eight/so on and so forth/”. This is also consistent with Lam (2008) who found that most occurrences of so that occurred in a
separate intonation unit in the Intercultural Corpus of Spoken English functioned as a discourse marker rather than expressing propositional content. Therefore, this suggests that the position of *so* within an intonation unit determines whether it is used to indicate information structure or not.

The role of pitch in signaling discourse function has also been researched independently from lexico-grammatical analysis. Generally, new topics start with a high pitch or a ‘paratone’, which is equivalent to marking a paragraph in writing (Brown, 1977). Paratones coincide with an introductory expression that is made prominent through an extra high pitch reset compared to other utterances within the paragraph (Brown & Yule, 1983). This increase of pitch at the beginning of a new topic is thought to be perceived as cues for discourse structure (Lehiste, 1975).

Paratones are also a phenomenon found in different contexts. This phenomenon of topic reset was observed by Wichmann (2000) in various registers of scripted speech such as news summaries, news reports, broadcast performances of short stories, and children’s oral reading, with pauses used as prosodic boundaries to indicate syntactic and topical breaks. For example, in the news summary, the beginning of the new news item started at a pitch of 250 Hz while all other sentence beginnings started at a lower pitch of 200 Hz.

Paratones are typical when a new topic starts with the topic itself rather than a discourse organizer. This high pitch onset indicating a new topic was found in Brown and Yule (1983), where the news did not start with the topic but rather with a meta-textual comment that is produced with a low pitch: “Now it’s one o’clock and this is… in the newsroom with the BBC news summary”. Following this meta-textual comment the
news item was marked with a high pitch onset. This shows that routine meta-textual comments, at least in news summaries, do not receive the same amount of focus or salience compared to the topic itself. Hence, routinized chunks of language, i.e., formulaic language, may not start with a high topic reset.

Similarly, Wichmann (2000) found that meta-textual comments in scripted speech were not usually prominent. However, she found that this was not the case in unscripted/unrehearsed speech where discourse-organizing devices that start new topics have a high pitch reset. Wichmann also suggested that all these discourse-organizing devices appearing in “initial position are syntactically detachable and have a forward or backward pointing deictic function” (p. 39). Therefore, it appears that discourse-organizing devices have different prosodic patterns in planned versus spontaneous speech. These different prosodic patterns in scripted versus unscripted speech might be because in scripted speech, the discourse-organizing devices have become formulaic and predictable to the extent that they do not need to receive focus. However, in spontaneous speech there is a higher cognitive load of planning speech in real-time and speakers need to make clear breaks through a high pitch reset to mark transition from one topic to another.

In addition to the prosodic indicator of pitch marking new topics, pitch can also be used to indicate the relative importance of information. Lexical items in English that are introduced for the first time, i.e., ‘new’, may be in focus of a phrase and are presented with a higher pitch compared to items that have been introduced before (given) which are usually presented at a lower pitch (Chafe, 1994; Ladd, 1980). In other words, “new” items are foregrounded by bringing them into focus to draw the listeners’ attention
compared to “given” items that are backgrounded. For example, in Levis, Muller Levis, and Slater (2012), native speaker TAs used pitch strategically to bring new information into focus and background given information. As shown in the example 2.4 from their study, the word *energy* is first introduced as new information and is put into focus (**bold** and **underlined**). Later in the lecture, when the word *energy* becomes given information, it is put in the background (**bold**) while other new items are brought into focus such as the case with *introduce* and *think* (**italics**).

Example 2.4

Alright / one of the things that that we / concentrate on in physics / and an important concept to us / is that of **energy** / and we’re going to try to take / a step back and try to *introduce energy* today, /when we *think of energy* one of the things that uhh / comes to mind / or comes to a lot of your minds / might be electricity /

In addition to heightened pitch marking new topics, important information could also be brought into focus through syllable lengthening. Prominent syllables usually have twice the duration of stressed syllables not in focus and may have a higher pitch than non-stressed syllables (Riesco-Bernier & Romero-Trillo, 2008). Therefore, pitch and syllable lengthening can be used to indicate new topics or signal information status (given vs. new information) and to focus on key information.
2.5.2 Grammatical categories and information structure

Few studies make a connection between models of intonation and grammar. In one model, prominence was found to disambiguate between the cohesive and non-cohesive functions of conjunctions and adverbials (Litman & Hirschberg, 1990). They extended Hirschberg and Litman’s (1987) prosodic model of discourse to 25 other single word cue phrases with a total of 211 tokens identified in a lecture produced by a single speaker. They noted that their model of discourse was in line with Halliday and Hasan’s (1976) findings that intonation plays a role in disambiguating cohesive and non-cohesive uses of conjunctions and adverbials. When used cohesively, conjunctions and adverbials tend to be non-prominent whereas if they were used non-cohesively, they would be prominent. Therefore, when cue phrases were used as a discourse organizer signaling information structure, they had a cohesive function. In contrast, to when they were used for sentential uses it had a non-cohesive function. Although Litman and Hirschberg’s model has shown how prosody plays a role in creating different functions for cue phrases, their findings may be idiosyncratic because they used data from a single speaker. Moreover, they examined single-word cue phrases, which might have different prosodic patterns compared to multi-word-sequences since prominence position might be affected by the length of the phrase.

Another useful model that explains how information is structured in discourse is Wennerstrom’s (1998) model of cohesion, which makes a connection between intonational model and lexico-grammatical categories. Specifically, Wennerstrom’s (1998) model draws on Pierrehumbert and Hirschberg’s (1990) intonational model and Halliday and Hasan’s (1976) categories of cohesion. Wennerstrom’s model assumes that intonation has a cohesive role that signals information structure in discourse. She uses an
adapted version of Pierrehumbert and Hirschberg’s (1990) intonation model to show how functions of pitch movement and prominence have equivalent categories in Halliday and Hasan’s (1976) categories of cohesion which are reference, substitution, reiteration, collocation, ellipsis, and conjunction. In Pierrehumbert and Hirschberg (1990), new information or contrasted items are usually presented with a high pitch while given information is usually presented with a relatively low pitch. The difference between new and given information can be seen in example 2.5. In this example, the speaker introduces *tombs* for the first time and so it is new information to the listener. This first introduction of the word *tombs* is brought into attention through a high peak making it prominent (Figure 2.1). The second time the word *tomb* is used, it becomes given information because it is accessible to the hearer and so it is produced with a lower pitch (Figure 2.2).

**Example 2.5**

Another thing that is interesting is that when you look at the burials of Greeks in the post-Mycenaeian period, in the Dark Ages, there’s nothing resembling those grand *tombs* and the wealth that’s buried in them for the dead. You find that the *tombs* of noblemen are very much the same one as the other.

“<CLCV205_Sept2007_lec3>.

![Figure 2.1. Peak on first occurrence of the word tombs](image)
Halliday and Hasan’s (1976) categories of cohesion that Wennerstrom uses to make a connection to Pierrehumbert and Hirschberg’s (1990) intonational model are reference, substitution, reiteration, collocation, and ellipsis. These categories (except ellipsis) are different ways to refer to another item mentioned in a text such as through demonstratives, synonymous substitutions, rephrasing, or lexical associations. Thus, a reader/listener can find cohesive ties between a demonstrative this and an earlier mention of what the demonstrative is referring to. Ellipsis is another category of cohesion but is different from the other categories because it includes instances where the referenced item is not mentioned, therefore missing, but its meaning can be interpreted from context.

In Wennerstrom’s model, reference, substitution, reiteration, and collocation categories usually do not receive prominence, unless they are used contrastively, since they express redundant information that is shared by the listeners and speaker. Therefore, in these categories, the shared information between the speaker and hearer is given and not new. [Since ellipsis refers to missing information from the text, it is regarded to have zero pitch.] Conjunctions (e.g., now, but, and as a result of that), on the other hand, play a different role in discourse. They have a discourse-organizing function by “linking chunks of texts together while at the same time indicating the semantic or logical connection between those chunks (additive, adversative, causative, or temporal)” (Wennerstrom, 1998). In Wennerstrom’s model of cohesion, conjunctions are usually prominent whether

Figure 2.2. Leveled pitch contour on second occurrence of the word tombs
they are used to link phrases, sentences, or topics together. Therefore, this might suggest that conjunctions have similar functions to discourse-organizing lexical bundles in the BCC study since both are used to create logical connections between various stretches of discourse. Specifically, the discourse-organizing lexical bundles in the BCC study have mainly two functions: introduce a topic and elaborate on an existing topic. Similarly, in Wennerstrom’s model, conjunctions such as *now* can be used to start a new topic while *as a result of that* expresses a causal relation, thus elaborating on an existing idea. Therefore, it could be expected that discourse-organizing lexical bundles would have prosodic patterns similar to conjunctions.

### 2.5.3 Pitch signaling pragmatic functions and information status

Final pitch movement can also be used to signal different pragmatic functions and information status. Wichmann (2004) studied how the intonation of “please” was used to indicate different discourse functions. Her major findings indicate that when *please* is spoken with a falling intonation it was used as a mitigated request which is used when the power relationships between the more powerful speaker and the hearer are asymmetrical. In contrast, when the power relationships were symmetrical, a *please* with a rising intonation was used. Wichmann explains that final falling tones usually signaled finality or end of a turn while a rising tone was used to signal openness and that the matter is negotiable. In addition to the role of falling pitch to signal dominance, final fall-rise and fall pitch movements signaled information status (Cheng & Lam, 2011). In the HKCSE prosodic corpus, final fall-rise pitch movements were shown to signal shared knowledge between the speaker and hearer as opposed to a falling pitch movement that signals new information not signaled by the speaker and hearer (Cheng & Lam, 2011). Using prominence strategically can also be used to indicate politeness where deaccenting
certain words (not making certain words prominent) in instances of disagreement can be used to assert convergence instead of divergence between speakers (Cheng & Lam, 2011). Therefore, pitch movement is an important indicator of attitude since when *please* was used with a falling intonation in asymmetrical power relationships, the speaker expected that the request was non-negotiable whereas in symmetrical power relationships the speaker uses a rising tone to lessen the imposition on the hearer. Also, a fall-rise versus a final fall pitch movement can indicate information status that can or cannot be shared knowledge by speaker and hearer. In addition to pitch movement, using prominence appropriately in instances of disagreement suggests that using prosody in conventional ways is an important factor for the success of communication in social contexts. Table 2.3 provides a summary of the studies reviewed and how pitch, position, and syllable lengthening have been linked to discourse function.

### 2.6 Prosodic features of multi-word sequences

Few studies have examined the prosody of multi-word sequences. Of those, some have looked at prominence and/or position of multi-word sequences (e.g., Aijmer, 1996; Lin & Aldolphs, 2009; Nekrasova, 2009; Schmitt, Grandage, & Aldolphs, 2004). The position of multi-word sequences within an intonation unit has been considered in terms of its phonological coherence in many studies because it serves as an indicator of their formulaicity. Formulaicity refers to the extent to which a phrase can be regarded as one holistic unit such as in formulaic sequences. The phonological coherence of multi-word sequences refers to their intactness so that they do not cross an intonation unit. Lin and Aldolphs (2009) examined 56 occurrences of the lexical bundle *I don’t know why* in a spoken sub-corpus of the Nottingham International Corpus of Learner English (NICLE-CHN) that consists of interview data from Chinese EFL learners (230,000 words).
Table 2.3. Summary of studies on communicative role of prosody

<table>
<thead>
<tr>
<th>Study</th>
<th>Prosodic features</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hirschberg, Litman, Pierrehumbert, and Ward (1987)</td>
<td>pitch</td>
<td>discourse function</td>
</tr>
<tr>
<td></td>
<td>phrasing (position) and accent</td>
<td>cue phrase information</td>
</tr>
<tr>
<td></td>
<td>tune</td>
<td>speaker intention</td>
</tr>
<tr>
<td></td>
<td>intonation and position of cue phrases that:</td>
<td>cohesice function</td>
</tr>
<tr>
<td></td>
<td>1. appear alone in a phrase or in combination with other cue phrases</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. deaccented in initial position</td>
<td></td>
</tr>
<tr>
<td>Hirschberg and Litman (1987)</td>
<td>intonation and position of cue phrases:</td>
<td>non-cohesive function</td>
</tr>
<tr>
<td></td>
<td>1. in initial position in a large phrase and produced with a high or a complex accent.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2. within a larger phrase but not in initial position</td>
<td></td>
</tr>
<tr>
<td>Halliday and Hasan (1976)</td>
<td>intonation of conjunctions and adverbials unaccented and reduced unless used contrastively.</td>
<td>cohesive function</td>
</tr>
<tr>
<td></td>
<td>intonation of conjunctions and adverbials unreduced and accented</td>
<td>non-cohesive function</td>
</tr>
<tr>
<td>Brown (1977); Brown and Yule (1983); Lehiste (1975); Wichmann (2000)</td>
<td>high pitch reset</td>
<td>marks the beginning of a new topic</td>
</tr>
<tr>
<td>Wichmann (2000)</td>
<td>meta-textual comment produced with a low pitch</td>
<td>discourse function</td>
</tr>
<tr>
<td>Chafe (1994), Ladd (1980), Levis, Muller Levis, and Slater (2012)</td>
<td>pitch</td>
<td>relative importance of new vs. given items</td>
</tr>
<tr>
<td>Wichmann (2004)</td>
<td>intonation of please</td>
<td>negotiable versus non-negotiable request</td>
</tr>
<tr>
<td>Riesco-Bernier and Romero-Trillo (2008)</td>
<td>syllable lengthening</td>
<td>important/key information</td>
</tr>
<tr>
<td>Cheng &amp; Lam (2011)</td>
<td>intonation unit</td>
<td>discourse function</td>
</tr>
<tr>
<td></td>
<td>prominence</td>
<td>pragmatic function</td>
</tr>
<tr>
<td></td>
<td>final pitch movement</td>
<td>information status and power relationships</td>
</tr>
</tbody>
</table>
Findings show that in most instances, *I don’t know why* occupied a full intonation unit (55%). Lin and Aldolphs (2009) concluded that phonological coherence might not be a strong indicator of formulaicity of *phraseological units*, given that only 55% of the units occupied a full intonation unit. However, the corpus size of this study was quite small. Also, the position of the multi-word sequence might not be the best way to evaluate its formalicity since multi-word sequences may occupy part of an intonation unit and still be formulaic. For example, the formulaic expression *made it plain* can occupy part of an intonation unit with a variable slot before the expression; (But she) *made it plain that* (Schmitt & Carter, 2004). Therefore, sub-phrasal units such as lexical bundles may be semi-fixed units that may occupy a full or part of intonation unit thus may serve as building blocks that make up a larger intonation unit.

Lin (2013) examined prominence and position within *formulaic expressions* in a prosodically annotated corpus, IBM/Lancaster Spoken English Corpus (SEC), consisting of 52,637 words. The corpus consists of speech collected from commentaries, magazine-style reporting, fiction, poetry, dialogue, propaganda, and miscellaneous texts. She identified formulaic expressions using the Wmatrix (Rayson, 2003; 2009) tool where the corpus first undergoes part of speech tagging and semantic tagging after which ‘meaningful formulaic expressions’ are extracted using predefined formulaic expression templates. Although Lin does not explain what the formulaic expression templates were, she explains that this tool does not rely on frequent co-occurrence of word sequences, which makes it suitable for small corpora such as the one used in her study. Therefore, the methodology used to generate formulaic expression using formulaic templates is unclear. Her findings indicate that most formulaic expressions occurred at the end of an
intonation unit or occupied the whole intonation unit. Moreover, 70% of formulaic expression occurring at the end or occupying a full intonation unit received prominence that was either on the first word in the expression regardless of word class (e.g. more or less), the degree word in the expression (e.g. to a certain extent), or the flexible slot in the expression (e.g., as far as X be concerned). She explains that this finding was expected given that the ‘positional bias inherent in English prosody’ favors the last content word. Her findings suggest that the distribution of prominence in formulaic expressions depends on their position in the intonation unit. In other words, prominence is likely to fall on the last content word in the intonation unit if the formulaic expression occupies a full intonation unit or occurs at the end of an intonation unit. However, it is difficult to generalize Lin’s results to other formulaic expressions since the formulaic expressions used in her study were of variable lengths; i.e., 3-5 words long. Also, Lin does not explain whether the length of formulaic expressions was related to prominence or whether longer expressions were more likely to receive prominence compared to shorter expressions. Also, Lin only discusses results for the largest group of formulaic expressions that occur at the end of or occupy the whole intonation unit and does not mention results for those expressions occurring at the beginning or middle of the intonation unit. However, she explains that for the remaining 30% of formulaic expressions that did not receive prominence, the lack of ‘pragmatic meaningfulness’ is thought be the reason behind the absence of prominence within the expression. Pragmatic meaningfulness refers to “meaningfulness of the expression(s) in their immediate speech context than their inherent (dictionary) meaning” (p. 578). Therefore, according to Lin (2013), the lack of prominence within a formulaic expression is often due to the loss of
propositional or literal meaning usually due to its high frequency usage among speakers. In order to address the limitation found in previous studies of examining multi-word sequences of different word lengths, this study examines prominence in lexical bundles of the same length (4-word lexical bundles).

Prominence and position also have important roles in signaling pragmatic functions of a particular grammatical class; i.e., epistemic parentheticals. Dehé and Wichmann (2010) found that prominence and position played an important role in semantic disambiguation in epistemic parentheticals (I think, I suppose, I believe, I guess, I hope, I suspect, I reckon, I understand, I imagine, I assume). Their analysis of the prosody of epistemic parentheticals in the spoken part of the British Component of the International Corpus of English (ICE-GB version 3.0; cf. Nelson, Wallis & Aarts 2002) revealed that epistemic parentheticals conveyed an array of meanings along a continuum from “propositional (sentential) meaning, through discourse meaning, to the status of verbal filler” (p.1) i.e., from being propositional to formulaic. When epistemic parentheticals expressed propositional meaning such as doubt and uncertainty, they occupied a whole intonation unit and were prominent, and when they were part of an intonation unit and lacked prominence they were used for “discoursal, interactional, and interpersonal purposes” (p. 24) such as politeness (Table 2.4). They were also used to indicate disfluency and hesitation when used with other disfluency markers when non-prominent, reflecting mental planning or used as a floor-holding device. Therefore, the presence of prominence was related to their propositional interpretation while the lack of prominence was related to their pragmatic or discourse marker function. Moreover, Dehé and Wichmann’s (2010) findings suggest that these clauses have undergone semantic
change and are becoming pragmatized, losing their transparent meaning and becoming more like discourse markers performing cohesive or interpersonal functions or even acting as verbal fillers. Hence some of these clauses were no longer subject to syntactic analysis but have become fixed expressions. In other words, multi-word sequences may be classified along the same continuum from being detachable to relatively fixed expressions. Moreover, consistent with previous studies where the presence versus lack of prominence is related to information status, the unstressed comment clauses were regarded as formulaic pragmatic markers while those with prominence indicated that the speaker literally expressed a belief or assumption.

**Table 2.4. Summary of Dehé and Wichmann’s (2010) findings**

<table>
<thead>
<tr>
<th>Prosodic feature</th>
<th>Discourse function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupies full intonation unit and prominence</td>
<td>Expression of speaker’s attitude such as genuine uncertainty.</td>
</tr>
<tr>
<td>Part of an intonation unit and non-prominent</td>
<td>Discoursal, interactional and interpersonal purposes such as politeness.</td>
</tr>
<tr>
<td>Filled pauses</td>
<td>Disfluency and hesitation reflecting mental planning or as a floor-holding device</td>
</tr>
</tbody>
</table>

Overall, the limited research on multi-word sequences indicates prominence and intonation play a role in determining discourse function. Table 2.5 offers a summary of findings on prosodic features of multi-word sequences in previous studies. Also, the presence of prominence in a full intonation unit was related to a literal interpretation of epistemic parentheticals while the lack of prominence was related to a formulaic interpretation (pragmatic function or a marker for disfluency or mental planning) (Dehé & Wichmann, 2010). However, studies on the prosodic features of multi-word sequences are hard to compare either due to differences in length of multi-word sequences, discourse function, method of identifying multi-word sequences, or variability in position within an intonation unit. In an attempt to address the issues found in earlier studies, this
study will examine lexical bundles of the same length identified solely on the basis of frequency. Moreover, pitch movement and prominence within the lexical bundle is examined to explore how prosody is associated with discourse functions.

2.7 Gap in research

Since how something is said is as important as what is said, a more thorough study that places prosody as central to the analysis of the discourse function of multi-word sequences is needed. Because most research on spoken multi-word sequences have neglected the study of the prosody of lexical bundles and the contribution of prosody to discourse function, this study examines the role of the prosody of lexical bundles in determining their discourse function. The lexical bundles that are examined in this study include those that have been suggested by Biber et al. (2004) to have a discourse-organizing role in academic speech as well as those that are specific to the compiled corpus used in this study from Yale open courses. Before examining how prosody contributes to determining discourse function, patterns in prominence and pitch movement are first examined for each lexical bundle in a corpus consisting of lectures to find out how these lexical bundles are realized in speech. Position was not examined for all lexical bundles because findings from a pilot study indicated that the position of the lexical bundles if you look at, going to talk about, has to do with, a little bit about was not related to its discourse function. In instances where occurrences of the lexical bundle did not follow the overwhelming prosodic pattern, the position of the lexical bundle within its intonation unit was examined for a possible reason for deviation from the trend. Then the discourse functions of lexical bundles are described through examination of transcripts and listening to audio. Finally, a frequency of prosodic patterns and discourse functions are cross-tabulated to find how these features are linked. This research aims to identify
prosodic features of lexical bundles that assist in determining their discourse function in speech that can add to the lexico-grammatical analysis.

This study addresses the following research question: How are the variations in prominence and pitch movement associated with the discourse function(s) each lexical bundle performs in the discourse? In other words, what are the specific discourse organizing functions for each lexical bundle beyond the general categorization described by the Biber, Conrad, and Cortes (2004) study; i.e., topic introduction/focus and topic elaboration/clarification. The end goal is to examine whether these discourse functions are linked to specific prosodic patterns.
<table>
<thead>
<tr>
<th>Study</th>
<th>Aspect examined</th>
<th>Multi-word sequence</th>
<th>Corpus</th>
<th>Key findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lin and Aldophs (2009)</td>
<td>position</td>
<td>“I don’t know why”</td>
<td>Nottingham International Corpus of Learner English</td>
<td>1. 55% of the formulaic expressions was considered phonologically coherent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2. phonological coherence might not be the best indicator of formality.</td>
</tr>
<tr>
<td>Bybee and Scheibman (1999)</td>
<td>reduction</td>
<td>vowel in “don’t”</td>
<td>-</td>
<td>phonological reduction caused by fast articulation</td>
</tr>
<tr>
<td>Bybee (2000, 2002)</td>
<td>reduction</td>
<td>t/d deletions in</td>
<td>-</td>
<td>phonological reduction allowing for fluent articulation</td>
</tr>
<tr>
<td>Bybee (2001)</td>
<td>reduction</td>
<td>word finals</td>
<td>-</td>
<td>phonological reduction caused by fast articulation</td>
</tr>
<tr>
<td>Lin (2013)</td>
<td>prominence and</td>
<td>most frequent and</td>
<td>IBM/ Lancaster Spoken English Corpus</td>
<td>1. Most FE occur at the end or occupy a whole intonation unit.</td>
</tr>
<tr>
<td></td>
<td>position</td>
<td>meaningful</td>
<td></td>
<td>2. 70% of FE receive nucleus either first word, degree word, or flexible slot.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>formulaic expressions (FE) (e.g., I must admit, thank you very much, are up to)</td>
<td></td>
<td>3. Lack of nucleus assignment in remaining 30% is thought to be the lack of pragmatic meaningfulness.</td>
</tr>
<tr>
<td>Dehé &amp; Wichmann (2010)</td>
<td>prominence and</td>
<td>epistemic</td>
<td>spoken part of the British Component of the International Corpus of English</td>
<td>expresses different discourse function from propositional to formulaic according to position and prominence.</td>
</tr>
<tr>
<td></td>
<td>position</td>
<td>parathenticals</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
CHAPTER 3. METHODOLOGY

This chapter describes the development of the corpus used in this study, criteria for choosing lexical bundles from the corpus, discourse function and prosodic analysis. The research goal was to understand whether the discourse functions of lexical bundles in a specific genre, i.e., academic lectures, are related to their prosodic patterns. In order to do this, lexical bundles were extracted from a corpus developed from academic lectures compiled from Yale open courses and analyzed in two ways. First, discourse functions of lexical bundles within their context were identified qualitatively. Then, pitch contours of lexical bundles generated from Praat were used to determine their prosodic patterns. Finally, the cross-tabulation of frequencies of discourse function and prosodic patterns, examination of peak height, pitch range, initial peak, and duration was used to shed light on how the function and form of lexical bundles were related.

3.1 Corpus

There are few publicly available academic spoken corpora. The Michigan Corpus of Academic Spoken English (MICASE) is one of the few online publicly available corpora, containing 1.7 million words collected from speech events in various academic settings such as classrooms, dissertation defenses, and advising sessions. However, there are no audio files available for the corpus that can be used for prosodic analysis. The best solution found was compiling a corpus using publicly available university academic lectures.

The corpus used in this study was developed using a collection of publicly available online lectures from Open Yale courses at http://oyc.yale.edu/courses. These are a selection of courses recorded at Yale College and are provided online to the public
for free. Each course includes a full set of lectures that includes transcripts, audio, and video files. Therefore, the availability of audio files and transcribed lectures eased the compilation of this corpus. However, the transcripts, which were available were in HTML format, were collected and changed to text file format so they could be used by Antconc (Anthony, 2018), a concordance program that was used to generate lexical bundles.

Corpus representativeness is an important aspect of corpus design. Representativeness refers to “the extent to which a sample includes the full range of variability in a population” (Biber, 1993, p. 243). This essential aspect of corpus design has been stressed by Biber (1993) and revived again by Egbert (forthcoming). According to Biber, representativeness can be achieved by including “(1) the range of text types in a language and (2) a range of linguistic distributions in a language” (p. 243). Therefore, in order to make generalizations about a population, the sample selected needs to first be representative of the target domain or population (Biber, 1993; Egbert, forthcoming; McEnery, Xiao, & Tono, 2006). The target population in this study is all academic university lectures that could be defined as all courses taken in the Humanities and Science disciplines. Unlike my pilot study that consisted an unbalanced corpus composed of 70 lectures mainly from the sciences, the corpus design in this study used a representative sample to include a range of texts from both disciplines. In order to choose a representative sample, a range of courses were chosen from both Humanities and Science disciplines in order to create a representative corpus of academic university lectures. By doing so, it enabled generalizations to be made about the target population (academic university lectures) (Biber, 1993). Therefore, fourteen courses were randomly
sampled from both disciplines. Seven courses were randomly selected from humanities (Classics, English, History, History of Arts, Political Science, Psychology, and Religious studies) and seven were randomly selected from science (Astronomy, Biomedical Engineering, two Chemistry courses, Ecology and Evolutionary Biology, Geology and Geophysics, Molecular, Cellular and Developmental Biology). The second aspect of corpus design regarding linguistic representativeness was difficult to ensure. However, an adequate number of lectures were chosen from each course that would allow ensure a large sample size. Therefore, the first ten consecutive lectures from each course were chosen for each course. The lectures were chosen sequentially to allow for logical flow of information and thus provide needed context for discourse analysis when analyzing the discourse function for each lexical bundle. In this way, the corpus was designed to be representative of humanities and science disciplines where an equal number of courses were chosen from both disciplines. Also, the average duration of all courses is almost 8 hours, which makes the corpus not only representative in terms of range of discipline but as well as in length of each course.

The Yale corpus used in this study is composed of 140 lectures with a word token count of 1,086,939 (Table 3.1). All lectures were given by male professors with the exception of the History of Arts course given by a female. Overall, the average number of words for each course was 77,666 words with the maximum number of 117,637 for the History of Arts course and a minimum number of 54,357 words for the Political Science course. The total duration for the lectures in this corpus is approximately 121 hours.
### Table 3.1. Yale corpus composition

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Course</th>
<th>Number of lectures</th>
<th>Number of words</th>
<th>Length of lectures (hh:mm:ss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humanities</td>
<td>Classics</td>
<td>10</td>
<td>91,890</td>
<td>11:06:23</td>
</tr>
<tr>
<td>Humanities</td>
<td>English</td>
<td>10</td>
<td>72,106</td>
<td>8:13:08</td>
</tr>
<tr>
<td>Humanities</td>
<td>History</td>
<td>10</td>
<td>67,970</td>
<td>7:46:08</td>
</tr>
<tr>
<td>Humanities</td>
<td>History of Arts</td>
<td>10</td>
<td>117,637</td>
<td>11:35:51</td>
</tr>
<tr>
<td>Humanities</td>
<td>Political Science</td>
<td>10</td>
<td>54,357</td>
<td>7:24:54</td>
</tr>
<tr>
<td>Humanities</td>
<td>Psychology</td>
<td>10</td>
<td>80,225</td>
<td>8:54:13</td>
</tr>
<tr>
<td>Humanities</td>
<td>Religious studies</td>
<td>10</td>
<td>83,559</td>
<td>7:44:09</td>
</tr>
<tr>
<td>Science</td>
<td>Astronomy</td>
<td>10</td>
<td>71,548</td>
<td>7:51:23</td>
</tr>
<tr>
<td>Science</td>
<td>Biomedical Engineering</td>
<td>10</td>
<td>72,613</td>
<td>7:54:06</td>
</tr>
<tr>
<td>Science</td>
<td>Chemistry A</td>
<td>10</td>
<td>72,522</td>
<td>8:07:33</td>
</tr>
<tr>
<td>Science</td>
<td>Chemistry B</td>
<td>10</td>
<td>71,433</td>
<td>8:07:45</td>
</tr>
<tr>
<td>Science</td>
<td>Ecology and Evolutionary Biology</td>
<td>10</td>
<td>66,626</td>
<td>7:41:27</td>
</tr>
<tr>
<td>Science</td>
<td>Geology and Geophysics</td>
<td>10</td>
<td>61,788</td>
<td>7:34:42</td>
</tr>
<tr>
<td>Science</td>
<td>Molecular, Cellular and Developmental Biology</td>
<td>10</td>
<td>103,055</td>
<td>11:35:13</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>140</td>
<td>1,086,939</td>
<td>121:26:55</td>
</tr>
</tbody>
</table>

After identification of courses to include in the corpus, the transcripts and audio files were collected. The transcripts of the lectures were changed from HTML format to text file format in order to be used in Antconc. After the collection of text files, audio files corresponding to the lectures were downloaded. Finally, after the extraction of lexical bundles with Antconc (see section 3.2), the audio segments were extracted using Audacity (Audacity, 2017).

#### 3.2 Lexical bundle identification and selection

After corpus compilation and extraction of lexical bundles, the next step was lexical bundle identification and selection. Highly frequent four-word lexical bundles, i.e., those occurring least 40 times per million and in at least 20 lectures, were generated from the Yale corpus using AntConc. The cut-off point of 40 times per million was based
on Biber et al. (2004), which argued for lexical bundles occurring at least 40 times per million to be highly frequent. The number of lexical bundles identified that occurred 40 times per million in a range of 20 lectures were 136 lexical bundles (Appendix A).

Certain criteria were used to choose lexical bundles from the list identified to limit the scope of investigation. First, lexical bundles with a discourse-organizing function were selected. Their discourse organizing function was determined using criteria from Biber et al. (2004). In their study, a discourse-organizing function was defined as bundles that “reflect relationships between prior and coming discourse” (p. 384). The discourse-organizing functions in their study are topic introduction and topic elaboration/clarification. Therefore, a sample was chosen from the occurrences of each lexical bundle. Then, the linguistic context (usually 3–5 sentences before and after the lexical bundle) was used to determine if the lexical bundle had a discourse-organizing function. After choosing lexical bundles with a discourse-organizing function, prosodic considerations were taken into account. Lexical bundles that are less likely to show prosodic variation were eliminated. In other words, since prosodic analysis is a time-consuming and intensive process, choosing lexical bundles with a likelihood to exhibit prosodic variation that could be associated with discourse function were chosen. Therefore, grammatically complete lexical bundles were chosen because these lexical bundles would likely occupy a full intonation unit and so would likely display phrasal aspects of prosody including variations in prominence. In other words, a lexical bundle that were part of a full intonation unit was likely to be a fully grammatical phrase, and thus would follow normal prosodic patterns. Such lexical bundles include you can see the, which is grammatically incomplete requiring a noun after the. Therefore, as you can
see, a closely similar lexical bundle, was chosen instead due to its grammatical completeness, increasing the likelihood of prominence variation. Then, lexical bundles that did not have a content word were eliminated since they would be less likely to receive prominence and hence would probably not display prosodic variation. Therefore, lexical bundles, for instance, containing semi-modal verbs (e.g., we’re going to) were eliminated. Lexical bundles were further limited by eliminating lexical bundles with contractions such as I’ll show you. This type of lexical bundles were eliminated because they had a lower chance of having prosodic variation since had reduced forms. Also, findings from the pilot study suggested that reduced forms had minimal prosodic variations. A flow chart in Figure 3.1 shows the criteria used to choose lexical bundles.

**Figure 3.1.** Flowchart illustrating the criteria used to choose lexical bundles

There were certain exceptions to the criteria set. These included the lexical bundles we’ve talked about, we’re talking about, and we’ll talk about, all of which had
contractions. They were chosen because it was hypothesized that they might demonstrate different prosodic patterns due to similarity in meaning but difference in tense.

After choosing lexical bundles for analysis, certain occurrences for each lexical bundle were eliminated for prosodic considerations. Lexical bundles that were part of hesitations, digressions, or did not demonstrate phonological coherence crossing an intonation unit, such as a pause occurring between *out* and *that* in *it turns out that* were eliminated. This was because in such instances *that* started a new intonation unit, which was beyond the scope of examination. An intonation unit was defined as a spoken phrase that is marked by finality cues such as pauses or lowering in pitch. For example, there is a pause between *it turns out* and *that* where the latter belongs to the next intonation unit, “Now,/it turns out/that there are some other methods for identifying planets around other stars.” In a digression, the speaker begins an explanation using *one of the most* but then decides not to continue, “But the idea was to give one the sense that this was a very expensive wall. And we’ll see *one of the most*--well I’ll hold that until later, that thought until later.”

To make the analysis feasible given the labor-intensive processes of prosodic annotation, the number of instances examined for each lexical bundle was limited to the maximum number of occurrences of one of the lexical bundles, *on the other hand*. In other words, *on the other hand* had the maximum occurrence of 56 times, three of which were eliminated because they did not fit the criteria outlined earlier. Therefore, the same number of occurrences, 53 instances, were analyzed for almost all other lexical bundles in order to have a consistent number across all lexical bundles. However, during analysis, some occurrences from the lexical bundles *it turns out that* and *we’ve talked about* had to
be further excluded due to them being phonologically incoherent, i.e., part of the lexical bundle started a new intonation unit. Therefore, the sample examined for these lexical bundles (49 and 51 instances respectively) were less than the cut-off value that had been set. Table 3.2 shows the total number of lexical bundles and the number that were examined. The frequency provided is the raw frequency in order to reflect the real number of instances examined. In other words, if the normalized frequency for on the other hand would have been used which would be 52 ((56/1,086,939)*1,000,000), it would be less than the actual number examined.

Table 3.2. Frequency of lexical bundles and sample analyzed

<table>
<thead>
<tr>
<th>Lexical bundle</th>
<th>Raw frequency</th>
<th>Normalized frequency (per one million words)</th>
<th>Sample analyzed</th>
</tr>
</thead>
<tbody>
<tr>
<td>on the other hand</td>
<td>56</td>
<td>52</td>
<td>53</td>
</tr>
<tr>
<td>as you can see</td>
<td>139</td>
<td>128</td>
<td>53</td>
</tr>
<tr>
<td>one of the most</td>
<td>74</td>
<td>68</td>
<td>53</td>
</tr>
<tr>
<td>one of the things</td>
<td>106</td>
<td>98</td>
<td>53</td>
</tr>
<tr>
<td>we’re talking about</td>
<td>109</td>
<td>100</td>
<td>53</td>
</tr>
<tr>
<td>we’ll talk about</td>
<td>172</td>
<td>158</td>
<td>53</td>
</tr>
<tr>
<td>that is to say</td>
<td>86</td>
<td>79</td>
<td>53</td>
</tr>
<tr>
<td>it turns out that</td>
<td>89</td>
<td>82</td>
<td>49</td>
</tr>
<tr>
<td>we’ve talked about</td>
<td>57</td>
<td>52</td>
<td>51</td>
</tr>
<tr>
<td>Total</td>
<td>888</td>
<td>817</td>
<td>471</td>
</tr>
</tbody>
</table>

3.3 Discourse function analysis

The corpus was manually edited to include time tags before each lexical bundle to assist audio segmentation. Time tags before lexical bundles in the text files were added by listening to the audio and identifying the time the lexical bundle was said. The first benefit of adding time tags was to enable the creation of audio segments of the lexical bundle within its surrounding context. Second, it made locating subsequent instances of the lexical bundle in the same lecture more efficient because it acts as a signpost to earlier tagged data. After time tags were added, the linguistic contexts of the lexical bundles
were manually extracted from the text files along with their audio clips using Audacity. The length of context was chosen according to the sufficiency of information needed before and after the lexical bundle (usually 3-5 sentences before and/or after the bundle) to understand how the lexical bundle functioned within that specific context. For instance, in example 3.1, in order to understand how one of the things functions, one needs background information about the situation the lecturer is talking about such as marriage in Africa. Slashes are used to separate intonation boundaries.

Example 3.1

How did this change and who was arrayed against this? People, women especially, were not happy with the situation. Young men of course wanted to get married, couldn’t until they were old, and we’ve talked about that situation in Africa where the bride price is very high, the old men control the bride price, they don’t allow the young men to get married until there’s almost a revolution. This is an aside, but with respect to the bride price, we hear a lot about older men marrying or having sex with younger women. In the West it’s one of the things we sort of complain about, about other cultures that this great disparity in age--an older man with a younger woman. <MCDB150_Spring2009_lec9>

The lecturer first talks about the injustice caused by old men marrying young women. Then he provides a side comment related to the topic of discussion: that this topic of old men marrying young women is unacceptable in the West. This side comment is introduced by one of the things. This context is needed before the lexical bundle to know how the information before the lexical bundle is related to the information after it. Context is also needed after the lexical bundle in order to understand the message the
lecturer is attempting to deliver. Hence, the length of context extracted before and after the lexical bundle was sufficient to help the reader understand the intended message without needing to go back to the original transcript.

3.3.1 Coding guide

A coding guide for the discourse functions of lexical bundles was developed to code all occurrences of each lexical bundle. Some lexical bundles had more than one function while others had only one function. A random sample was selected and rated by a second rater. The sample included 20% of the occurrences from each category of discourse function for each lexical bundle. Therefore, the random sample included all functions performed for each lexical bundle. The inter-rater agreement for Cohen Kappa was moderate (0.62). Due to the moderate reliability, the coding guide was adjusted to include broader categories of discourse function instead of specific discourse functions (Table 3.3). For example, the discourse functions for one of the most previously included providing background information, rephrasing, elaboration, and exemplification as four separate functions but was later combined to expansion. The reason for combining these categories into one broad category is that these categories were the most problematic to the second rater that often resulted in disagreement. Also, these fine categories have a common characteristic which is they are means through which a main topic is expanded. Therefore, using broad categories of discourse function might have resulted in a better inter-rater agreement if a third rater had coded the discourse functions after modifying the coding guide. The detailed coding guide is in Appendix B.
Table 3.3. Discourse functions for lexical bundles examined in this study

<table>
<thead>
<tr>
<th>Discourse function</th>
<th>Lexical bundle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introducing a current past or future topic</td>
<td>as you can see, one of the most, one of the things, we’re talking about, we’ll talk about, and we’ve talked about</td>
</tr>
<tr>
<td>Topic connector</td>
<td>we’ll talk about</td>
</tr>
<tr>
<td>Major contrast</td>
<td>on the other hand</td>
</tr>
<tr>
<td>Minor contrast</td>
<td>on the other hand</td>
</tr>
<tr>
<td>Expansion</td>
<td>one of the most</td>
</tr>
<tr>
<td>Providing background information</td>
<td>one of the things</td>
</tr>
<tr>
<td>Elaboration</td>
<td>we’re talking about, it turns out that, and that is to say</td>
</tr>
<tr>
<td>Specific reference</td>
<td>as you can see</td>
</tr>
<tr>
<td>General reference</td>
<td>as you can see</td>
</tr>
<tr>
<td>Emphasizing important information</td>
<td>one of the most and one of the things</td>
</tr>
</tbody>
</table>

Overall, the lexical bundles examined had ten discourse functions. This first discourse function was calling attention to specific details. When calling attention for specific details a specific description about an entity in a picture in a presentation slide, for example, either followed or preceded the lexical bundle. In example 3.2, the speaker is explaining the specific details, before as you can see, of how columns and arches are designed in a display presented in the classroom.

Example 3.2

“… and it’s the first time we’ve seen this today--of arches with columns interspersed, columns placed, engaged or attached into the wall, in between these arcades, as you can see here.” <HSAR252_Spring2009_lec3>.

On the other hand, when calling attention to a general description of an entity such as a location of a place, the description either followed or preceded the lexical bundle. In example 3.3, there is no specific description of an entity but rather a general description of the location of a place, i.e., Herculaneum being northeast of Pompei, that is provided before as you can see.
Example 3.3

“Herculaneum is to the northeast of Pompei, closer to Naples than Pompei is as you can see.” <HSAR252_Spring2009_lec6>.

Another discourse function was introducing a topic where the topic for discussion is introduced after the lexical bundle. This topic could be for current or future discussion or a topic discussed in the past. This topic is the main idea that is elaborated on through specific details later in the discourse. In example 3.4, the speaker states a main topic that is introduced by one of the things which is that Jesus, as stated in Mathew, is a teacher. He then elaborates on this main topic explaining what and how Jesus teaches.

Example 3.4

“So one of the things that Jesus is, also in Matthew, is a teacher. Mark had told us in his Gospel that Jesus was a great teacher, and people said, Wow, he’s a great teacher, He teaches not like the scribes and the Pharisees. He teaches as one with authority. Mark didn’t really tell us much of what Jesus taught.”<RLST152_Spring2009_lec7>.

Expansion refers to the addition of information that serves the purpose of clarification. The expansion of information can be in a number of ways such as through providing specific details, or background information, or rephrasing of information. In example 3.5, the main topic is that Athenian soil is barren and then the speaker provides background information after one of the most about Athens explaining that this type of soil makes this area of Athenians unappealing to visit.
Example 3.5

“But very much of the Athenian soil is mountainous and pretty close to barren, so that you don’t have a lot of rich soil. This is not one of the most admirable places to come.” <CLCV205_Sept2007_lec10.txt>.

A sub-function of expansion is providing background information. In this discourse function necessary background information is provided after the lexical bundle to help students understand previous information. In example 3.6, the speaker takes about someone who liked to live in peasant style Russian wooden houses that are found in the outskirts of Moscow. He then finds a need to provide a background about such houses explaining after one of the things that in the twentieth century, peasants lived in the outskirts of Moscow in wooden houses.

Example 3.6

“When he was lodged, he liked living in your basic Russian, wooden, peasant house, such as you could find on the outskirts of Moscow. One of the things that’s very true about Moscow, right into the twentieth century, is that you had all sorts of peasants living on the edge of Moscow living in these wooden houses.” <HIST202_Fall2008_lec4>.

Another sub-function of expansion is elaboration which is the explanation of a previous proposition where the addition of information serves the purpose of clarification. In this example 3.7, that is to say is used to clarify what “do not provide for their own support” means which refers to “they don’t produce food”.
Example 3.7

“But there is a difference and the critical difference is that a city contains a number of people who do not provide for their own support. That is to say, they don’t produce food.” <CLCV205_Sept2007_lec2.txt>

Emphasizing important information refers to when the lexical bundle is used to focus on the importance of a proposition. The important information follows the lexical bundle is usually recognized by emphasis provided through prominence with the bundle. In example 3.8, the speaker is emphasizing the importance of a specific passage by explaining that is it is a popular passage that requires special attention and so they will read the speech of Areopagitica.

Example 3.8

“Because this is one of the most famous passages in the treatise, and it’s not one that we actually looked at for Mammon himself, I’m going to ask you to turn to Areopagitica.” <ENGL220_Fall2007_lec10.txt>

Major contrast refers introducing a main difference after the lexical bundle. In example 3.9, the speaker is contrasting insulin with steroid hormones where the speaker finds a big difference between the two since insulin cannot penetrate cell membranes and so interacts with receptors on cells in contrast to steroid hormones that are cell permeable. The indication of major contrast is evident in the prosodic features of one the other hand, namely a relatively high peak.
Example 3.9

Well, insulin is a protein, it’s produced by cells in the pancreas, it circulates in your blood. It can’t enter cells because it’s too big and it’s too water soluble so it can’t go through cell membranes. So, it interacts with receptors called insulin receptors that are on cells that are sensitive to insulin. Steroid hormones, on the other hand, molecules like testosterone and estrogen, progesterone, the sex steroids that determine sexual characteristics and are important for reproductive function are molecules that are all derived from a similar source. Many of them are derived from cholesterol and they’re hydrophobic, which means they can penetrate through cell membranes. So, it doesn’t need to bind to a receptor on the surface of the cell in order to work because the molecule can actually enter the cell directly. <BENG100Feb2008_lec7>.

Minor contrast refers to when a minor difference is introduced after the lexical bundle. In example 3.10, the speaker is contrasting a minor proposition in a discussion which is the motion of an orbit to explain what the observer will see in each case. The indication of minor contrast is evident in the prosodic features of one the other hand, namely a relatively low peak.

Example 3.10

Let me explain what I mean by that, we’ll come back to this later. If the orbit’s going this way, then it never comes towards you or goes away from you--it’s always going sideways. If, on the other hand, the orbit’s going this way, then first it comes towards you, then it goes away from you. And if it’s somewhere in
between, you only see part of the motion of the orbit in terms of radial velocity.

\text{<ASTR160Jan2007_lec4>}.  

Finally, topic connector refers to creating a connection between two related topics in discourse. In example 3.11, the speaker is introducing two topics, correlation energy and strain energy, after \textit{we’ll talk about} and is then making a connection between them which is that we have little knowledge of both of these terms.

Example 3.11

\textit{We’ll talk about}, in Lecture 11, about correlation energy, and we’ll talk in Lecture 32 about strain energy, and you’ll see that both of these are just words that are used to hide our ignorance. \text{<CHEM125ASep2008_lec1.txt>}.  

Overall, some of the discourse functions appeared in more than one lexical bundle while others were specific to a particular bundle.

3.4 Prosodic analysis

The prosodic analysis used in this study consisted of finding patterns using sketches of pitch contours generated from Praat. This methodology for prosodic analysis was a result of piloting different methodologies to identify prosodic features across different types of lexical bundles (Appendix C). After numerous piloting of prosodic features to find prosodic features of lexical bundles that can differentiate between their discourse functions, useful measures of prosodic features were identified in the development of prosodic analysis (Table 3.4). Some of these prosodic features (peak height, pitch range, and initial pitch) were examined using sketches of the pitch contour.
Table 3.4. Prosodic features examined

<table>
<thead>
<tr>
<th>Prosodic feature</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak height</td>
<td>The apex point of the peak within the sketch of the pitch contour of the lexical bundle</td>
</tr>
<tr>
<td>Pitch range</td>
<td>The difference between initial and mid/peak point of the pitch contour</td>
</tr>
<tr>
<td>Initial pitch</td>
<td>The initial point of the pitch contour</td>
</tr>
<tr>
<td>Position within intonation unit</td>
<td>The position of the lexical bundle within the intonation unit</td>
</tr>
<tr>
<td>Duration</td>
<td>The time length of the lexical bundle</td>
</tr>
</tbody>
</table>

The prosodic analysis involved, first, generating sketches of pitch contours of the lexical bundle. The sketches of the pitch contours were based on the original pitch contour generated by Praat. This smoothing technique had the benefit of abstracting prosodic pattern that differentiated between the discourse functions of the lexical bundle. In the piloting stage, it was found that the abstraction of prosodic patterns that could differentiate between the discourse functions of the lexical bundle was difficult using the original pitch contour generated from Praat. Therefore, to overcome this problem, a basic pattern using three pitch points from the original pitch contour was used to create a sketch. Additionally, the sketch of the pitch contour helped identify overall patterns for each lexical bundle, which could then be consistently compared across all lexical bundles.

To generate the original pitch contour, segmented audio clips created from the larger lecture were imported into Praat and then generated through the draw pitch contour option to generate a diagram such as in Figure 3.2.
Figure 3.2. Pitch contour of *on the other hand* showing a peak generated by Praat

Sketches of the pitch contour were created using three pitch points from the original pitch contour: the initial pitch, medial/peak pitch, and the final pitch. To find these three points in the pitch contour, the *pitch listing* option was chosen to generate all the pitch frequencies and then the initial, medial/maximum, and final pitch was chosen. For example, the pitch listing for the pitch contour in Figure 3.2 is shown in Figure 3.3 where the initial, maximum, and final pitch is shown. These three points were then entered in Microsoft Excel to generate the sketch of the original pitch contour (Figure 3.4). Only three points were chosen because the goal was to create a basic pattern for pitch movement that could differentiate across the discourse functions of the lexical bundle. Creating a sketch of a pitch contour by adding more than three basic points would not necessarily add meaningful information that is needed in this type of prosodic analysis.
The pitch movement patterns that emerged from the sketch of the pitch contour were peak, fall, rise, fall-rise, and level (includes rise-level and fall-level). The peak pattern represented the increase of pitch from initial until the highest point in the lexical bundle, i.e., the peak, and then the declination of pitch until the final pitch. The fall pattern represented the declining pitch from initial to final pitch while the rise pattern represented the increasing pitch from initial to final pitch. The level pattern referred to minimal pitch movement from initial, medial, to final pitch. Unlike previous studies (e.g., Pierrehumbert & Hirschberg, 1990), the fall-rise pattern in this study refers to an initial fall on the lexical bundle followed by a rise. Specifically, this is when the initial pitch starts high and then falls in medial position before rising again, as in Figure 3.5.
However, in Pierrehumbert and Hirschberg (1990) a fall-rise pattern refers to stress placement on the last stressed syllable. Similarly, in Brazil’s model (1997), a fall-rise pattern refers to the final pitch movement in a phrase. In contrast, in this study it refers to pitch movement across a four-word lexical bundle. In addition to pitch movement, prominence placement was determined through an range of pitch, or in a few instances, syllable-lengthening.

**Figure 3.5.** Fall-rise pattern for the lexical bundle *as you can see*

Some lexical bundles did not have a continuous pitch contour such as in Figure 3.6. In such instances, the pitch contour of *one of the things* seem to be divided into two parts. The reason is that voiceless sounds do not show a tracing in the pitch contour. In these instances, similar to the pitch contour, the pitch listing was non-continuous either as shown by areas of *undefined* where Praat could not detect a pitch movement. Also, as shown in Figure 3.6, there was no peak in the pitch contour. In such instances where the pitch contour was non-continuous and there was no peak, the areas that listed as undefined (Figure 3.7) were deleted as if the pitch contour were to be continuous. Then the initial, medial (rather than peak), and final pitch points were chosen to create a sketch of the pitch contour (Figure 3.8).
Figure 3.6. Non-continuous pitch contour of an occurrence of *one of the things*

<table>
<thead>
<tr>
<th>Time</th>
<th>F0_Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.645547</td>
<td>166.256941</td>
</tr>
<tr>
<td>20.653047</td>
<td>168.748360</td>
</tr>
<tr>
<td>20.660547</td>
<td>172.364083</td>
</tr>
<tr>
<td>20.848547</td>
<td>145.270453</td>
</tr>
<tr>
<td>20.848047</td>
<td>144.465568</td>
</tr>
<tr>
<td>20.855547</td>
<td>145.224610</td>
</tr>
<tr>
<td>20.863047</td>
<td>147.793547</td>
</tr>
<tr>
<td>20.870547</td>
<td>150.068934</td>
</tr>
<tr>
<td>20.900547</td>
<td>127.751918</td>
</tr>
<tr>
<td>20.915547</td>
<td>121.464997</td>
</tr>
<tr>
<td>--undefined--</td>
<td>--undefined--</td>
</tr>
<tr>
<td>--undefined--</td>
<td>--undefined--</td>
</tr>
<tr>
<td>--undefined--</td>
<td>--undefined--</td>
</tr>
<tr>
<td>--undefined--</td>
<td>--undefined--</td>
</tr>
<tr>
<td>21.140047</td>
<td>189.330714</td>
</tr>
<tr>
<td>21.155547</td>
<td>189.825655</td>
</tr>
<tr>
<td>21.163047</td>
<td>189.938799</td>
</tr>
</tbody>
</table>

**Initial pitch**

**Medial pitch**

**Final pitch**

Figure 3.7. Pitch contour of an occurrence of *one of the things*

Figure 3.8. Sketch of the original pitch contour showing a peak pattern for *one of the things*
Using cross-tabulation, frequency counts for each prosodic pattern and corresponding discourse function were recorded in Microsoft Excel for analysis. To answer the research question, the cross-tabulated frequencies were examined to understand the relationship between the prosodic variation(s) and the discourse function(s) of each lexical bundle. A high frequency for a specific discourse function and prosodic feature would suggest that a specific prosodic feature is usually associated with a specific discourse function. For example, Table 3.3 shows that *one of the things* had discourse functions of introducing a topic and providing background information. The fall, fall-level, rise-level patterns were typical of providing background information but not when introducing a topic. Although cross-tabulation results show that both discourse functions were signaled by peaks, the sketches of the pitch contour (Figures 3.9 and 3.10) show that the peaks are of different heights where introducing a topic was signaled by a higher peak than when background information was provided. Therefore, cross-tabulation results show an overall picture of the different patterns that characterize each discourse function but it does not specify peak height, pitch range, and initial pitch that can be found from examining specific points in the sketches of the pitch contour.

**Table 3.5. Cross tabulation of results for *one of the things***

<table>
<thead>
<tr>
<th>Discourse function</th>
<th>Pitch contour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introducing a topic</td>
<td>Peak</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Providing background information</td>
<td>Peak</td>
<td>6</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>2</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Fall-level</td>
<td>2</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Rise-level</td>
<td>1</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11</td>
<td>100%</td>
</tr>
</tbody>
</table>
The discourse functions were differentiated from each other by peak height, pitch range, prominence, and initial pitch. Peak height is highest point in peak pattern. For example, the peak heights in *one of the things* shown in Figure 3.9 and 3.10 shows that introducing a topic is usually signaled by peaks that reaches a height of at least 200 Hz whereas when providing background information, the peak height is lower than 200 Hz. In addition to peak height, pitch range was another important prosodic feature that differentiated the discourse functions of lexical bundles. Pitch range refers to the increase of pitch from initial to mid or peak point. A wide pitch range in a peak pattern means that the difference between initial pitch and peak point is wide. For example, when a topic is introduced by *one of the most* is usually signaled by a wide pitch range (69 – 137 Hz) compared to when expanding a topic (4 – 33 Hz). Specifically, in one instance, the pitch
range was 69 Hz in the peak pattern that increased from an initial point 143 Hz to peak point 212 Hz. On the other hand, when expanding on information a lower pitch range is used in the peak pattern. In one instance, the pitch increased by 7 Hz only from the initial to peak point. Therefore, the pitch range is wider when introducing a topic in contrast to when expanding on information for one of the most. Pitch range also includes the steepness of fall which refers to the rapid or slow declination of pitch from the initial to mid or final point in the fall or fall-rise pattern.

The discourse functions of a lexical bundle were also differentiated by prominence placement. For example, when important information was emphasized by a low peak pattern in one of the most, a prominent word usually followed the lexical bundle. On the other hand, when expansion of information was signaled by the same prosodic pattern, i.e., a low peak, there was usually no prominent word after the lexical bundle. Therefore, prominence placement after the lexical bundle may differentiate the discourse functions for a lexical bundle.

In addition to peak height, pitch range and prominence, discourse functions were signaled by differences in initial pitch. For example, in the lexical bundle one of the things, both important information and background information were signaled by low peaks. However, the low peak patterns in both discourse functions were different from each other by their initial pitch. When low peaks signaled important information, the initial pitch was high (120 – 141 Hz) whereas when providing background information it was usually lower (98 – 119 Hz). In other words, what differentiates the low peak patterns when emphasizing important information from providing background information is the initial pitch.
In few instances, position and duration differentiated between the discourse functions of the lexical bundle. For example, topic introduction in *one of the most* was usually signaled by a high peak. In these instances, *one of the most* is in initial position of the intonation unit. However, there was an instance of a low peak signaling topic introduction. This could have been due to medial position of *one of the most* in the intonation unit. Also, major contrast was usually signaled by *on the other hand* through high peaks while minor contrast was signaled by lower peaks. However, minor contrast was also signaled in few instances by high peaks. In these instances, the duration of *on the other hand* was lower than when major contrast was signaled by high peaks.

Overall, there were no perfect associations between discourse function and prosodic pattern. In other words, the findings presented suggest trends of lexical bundles to perform a specific discourse function using a specific prosodic feature but not a 1:1 relationship.
CHAPTER 4. RESULTS

This chapter presents findings related to the research question of how prosodic variations of lexical bundles were associated with their discourse function. The research question sought to find out whether there was a link between the discourse function(s) of lexical bundles and their prosodic variation(s). Findings from this study suggest that the lexical bundles showed two general patterns: those whose prosodic variations were related to different discourse functions, and those that had minimal prosodic variation and a single discourse function. Therefore, to answer the research question, some lexical bundles showed varied prosodic and discourse function variations while others did not. The lexical bundles that tended to have multiple prosodic variations linked to their discourse functions were *one of the most*, *one of the things*, *on the other hand*, *we’ll talk about*, *we’re talking about*, and *as you can see*. In contrast, lexical bundles that had minimal prosodic variations and a single discourse function were *we’ve talked about*, *it turns out that*, and *that is to say*.

The results are arranged by, first, lexical bundles that show multiple prosodic variation that are associated with discourse function followed by lexical bundles with minimal prosodic variation and one discourse function. For each lexical bundle, the discourse function(s) and prosodic variations are explained along with their corresponding pitch contour. Then the relationship between the prosodic features and discourse functions is provided. Also, examples are given for each discourse function to exemplify how the discourse functions were realized in the corpus. Finally, a summary of the results is provided that gives an overall description of prosodic and discourse function patterns for all lexical bundles. Transcript excerpts for all occurrences of the lexical
bundles examined, their prosodic pattern, and discourse function are provided in Appendix D.

4.1 One of the most

*One of the most* had three discourse functions that were linked to prosodic variations. It was usually used as a discourse organizer introducing a new topic, emphasizing important information, or expanding on a topic. There were four prosodic variations to the pitch contour of *one of the most* that were related to its discourse function: peak, fall-rise, fall, and level. Table 4.1 provides a summary of the frequency distribution of prosodic variation across the discourse functions of *one of the most*.

**Table 4.1.** Prosodic and discourse function variations for *one of the most*

<table>
<thead>
<tr>
<th>Discourse function</th>
<th>Pitch contour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introducing a topic</td>
<td>Peak</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td>Emphasizing important info</td>
<td>Peak</td>
<td>22</td>
<td>76%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>7</td>
<td>24%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>29</td>
<td>100%</td>
</tr>
<tr>
<td>Expanding a topic</td>
<td>Peak</td>
<td>8</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td>Fall-rise</td>
<td>3</td>
<td>14%</td>
</tr>
<tr>
<td></td>
<td>Rise</td>
<td>1</td>
<td>5%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>9</td>
<td>43%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>21</td>
<td>100%</td>
</tr>
</tbody>
</table>

Introducing a topic and emphasizing important information were usually signaled by peaks that were usually more than 160 Hz compared to lower the peaks (less than 160 Hz) when expansion of information was provided. Also, pitch ranges are higher when introducing information (69–137 Hz) and emphasizing important information (33 –143 Hz) than when expanding on a topic (4–33 Hz). However, emphasizing important information was signaled by low peak and fall patterns and narrow pitch ranges (3 – 30 Hz). In such instances, there was usually a high peak following *one of the most*. This
pattern (i.e., a low peak on *one of the most* followed by a prominent word) was usually not present when expanding a topic was signaled. Therefore, introducing a topic and emphasizing important information was signaled by high peaks and wide pitch ranges compared to lower peaks and narrow pitch ranges when expanding a topic. Also, emphasizing important information is different from expanding a topic in the low peaks and narrow pitch ranges where *one of the most* was followed by a prominent word when emphasizing important information but not when expanding a topic.

The instances in which *one of the most* introduced a topic, a high peak (212–295 Hz) was usually used (Figure 4.1). In such instances, *one of the most* was usually in an initial position within an intonation unit. In one instance, however, a lower peak (154 Hz) was used which might be due to medial position of *one of the most* in the intonation unit. When a new topic was introduced, the main topic was stated after *one of the most*, which was elaborated upon later in the discussion of the lecture. In Example 4.1, the lecturer starts a new idea after *one of the most* stating that Attica was not an agriculturally rich area. Then, he expanded on this main idea by explaining some exceptions.

Example 4.1

Now, Attica was not *one of the most* desirable, certainly agriculturally rich areas in Greece. It was relatively speaking rather barren. Now, there are of course great exceptions; the central valley so to speak, of Attica has the richest soil and in the ancient world it was able to grow the very best grain, including wheat. But very much of the Athenian soil is mountainous and pretty close to barren, so that you don’t have a lot of rich soil.
When emphasizing important information, usually a peak that can be high or low was used with few instances of a fall pitch contour being used (Figure 4.2). Important information was usually signaled by a low or high peak or a fall. When a low peak or a fall was used, there was usually a high peak that followed one of the most. In other words, importance was usually signaled by a high peak that either lay within the lexical bundle or the first noun/adjective that followed it.
Important information referred to specific details that elaborate on a main topic. These specific important details are new information and thus given extra focus by the instructor through prominence or a falling pitch that calls for students’ attention. In fact, falling pitch was used to present new information that is not shared between the speaker and hearer (Pickering, 2001). In Example 4.2, the lecturer first explains that the poetic form is a pastoral elegy. He then states after *one of the most* that a pastoral elegy is a “stylized and self-consciously artificial of all of the poetic genres” where he emphasizes on the word *stylized* to bring it to focus. Hence, *one of the most* was used here to introduce important information that is relevant to the topic being discussed, in this case the characteristics of a pastoral elegy.

**Example 4.2**

So let us begin our examination of this question with the consideration of the poem’s form. Now the most distinguishing feature of Milton’s elegy is the fact that it’s a pastoral elegy. It engages the ancient art of pastoral poetry initiated and made famous by the great Greek poet Theocritus, which was later imitated by Moscus and then finally by the Roman poet Virgil in his celebrated pastoral eclogues. You can see on the handout those poems by those classical authors that Milton’s Lycidas is most indebted to. The pastoral elegy is clearly *one of the most* stylized and most self-consciously artificial of all of the poetic genres. The poet of a pastoral elegy usually represents himself as a shepherd, a shepherd mourning the death of a fellow shepherd, and he often explains that the death of his shepherd friend is exerting a magical effect on the entire natural world.

<ENGL220_Fall2007_lec6.txt>
When providing an expansion of information, either a low peak, fall-rise, rise, or fall was used (Figures 4.3). Expansion of information through providing background information, exemplification, or rephrasing was signaled by a low peak, fall-rise, rise, or fall patterns. In contrast to when important information was emphasized, there was usually no prominent word after *one of the most* when an expansion of information is provided. The only exceptions were three instances where there was prominence after *one of the most* on the adjective, for example, “one of the most BEAUTIFUL parts of the world”, or due to default placement of prominence on the last stressed word in the intonation unit, “/one of the most interesting BOOKS/”.

**Figure 4.3.** Peak pattern for *one of the most* signaling expansion
Expansion of information and important information are both specific information that elaborate on a main topic. However, they are different in how the speaker perceives this specific information; if the information is perceived as not having particular importance to the topic being discussed and thus not brought into focus, it was classified as expansion of information. When expansion of information was signaled, either background information about people, places, or books, or an example to better clarify preceding information, was provided. In Example 4.3, the instructor tells the students the name of the reading that is assigned which is “Review of Verbal Behavior” written by Chomsky. He then provides a brief background about the author explaining that he is “one of the most prominent intellectuals alive.” Thus, the name of the assigned article is the main topic and background about the author is secondary information that is introduced after one of the most.

Example 4.3

Finally, the other reading you’re going to do for this part — section of the course is Chomsky’s classic article, his “Review of Verbal Behavior.” Chomsky is one of the most prominent intellectuals alive. He’s still a professor at MIT, still publishes on language and thought, among other matters. <PSYC110_Spring2007_lec4.txt>

In addition to providing background information, one of the most was used to provide an example, as in Example 4.4. The lecturer is talking about how the Homeric poems can tell us about the Mycenean period. He then provides an example after one of the most related to the differences in burial techniques used in Mycenae and Greece. Thus, one of the most is used here to provide an example to the topic of how Homeric poems could be historically informational tools.
Example 4.4

Now, the differences between what we find in the Homeric poems are also very illuminating, differences between that and what we know happened after the fall of the Mycenaean world. For instance, *one of the most* striking things that you find in cultures, anthropologists and archaeologists live off this, is what they do with dead bodies. Now, in Mycenae, it’s obvious; they bury them in the ground as most of us do. The graves in the circle, the shaft graves, and then the beehive tombs for the big shots, and even outside in the countryside, we find graves which have bones of people in them. But we know that the Greeks in Homer don’t do that. The Greeks in Homer incinerate the bodies of the dead.

*One of the most* was also used to introduce rephrased information. In Example 4.5, the lecturer is talking about contact lenses as an example of a safe plastic product produced by the help of Biomedical Engineering. He questions why people feel that contact lenses are safe to come in contact with their eyes. He then provides a rephrasing of his question after *one of the most* explaining again why people have confidence to put contact lenses in *one of the most* important organs of their body. Hence, *one of the most* is used here to rephrase an explanation.

Example 4.5

These are examples of Biomedical Engineering of the future that expand on what we currently use, which involves to no small extent, technology like this. I would guess that probably 30% to 50% of you do this everyday, you put a piece of plastic, a synthetic piece of plastic into your eye to improve your vision. Contact
lens technology has changed dramatically from the time that I was born to the time that you were born, and the contact lenses you use today are much different than the ones that would have been used 30 years ago. This is Biomedical Engineering as well. Engineers who are developing new materials, materials that can be, if you think about it, there’s not very many things that you would want to put in your eye and that you would feel comfortable putting into your eye, so this is a very safe, a very inert material. What gives it those properties? What makes it so safe that it can be put in one of the most sensitive places in your body, in contact with your eye? Why do you have confidence putting it in contact with one of the most important organs of your body? Because you trust biomedical engineers to have done a good job in designing these things and we’ll talk about how biomaterials are designed and tested, and what makes a material, the properties of a material that you could use as a contact lens, what are the properties that it needs to have. <BENG100Jan2008_lec1.txt>

Overall, when *one of the most* was used to introduce a topic, it simply stated the main topic of the discussion that is elaborated upon later in the discourse. When information was emphasized, the lexical bundle was used as an importance marker to emphasize information that is important to the topic being discussed and thus needs additional focus. On the other hand, when expanding on a topic, additional information was provided to contextualize the proposition being discussed. This expansion of information may be in the form of providing background information on, for example, a prominent figure in the field or a particular historic period. An expansion of a topic can also be provided in the form of exemplification or rephrasing. Therefore, when
introducing new information that is central to the discussion due to it being the main
topic of discussion or relatively important information, a high pitch range was usually
used. In contrast, when a relatively less important information is presented, a lower pitch
range is used. One of the most was classified in the BCC study as a referential bundle that
is specifically used to provide focus on the noun phrase following the lexical bundle as
particularly important. In the BCC study, identification/focus bundles could also have a
discourse-organizing function by emphasizing important information, summarizing a
main point, or introducing the main point of a discussion.

4.2 One of the things

The lexical bundle one of the things had three main discourse functions: it usually
introduced new information, emphasized important information, and provided
background information. Introducing a topic and emphasizing important information. At
least 226 Hz and 169 Hz respectively. Also, introducing information and emphasizing
information were usually signaled by wide pitch ranges in the peak pattern, 72–130 Hz
and 46 –189 Hz respectively. In contrast, providing background information that are
usually characterized by low peaks (maximum 161 Hz) and narrow pitch ranges in the
peak pattern (7–37 Hz). In instances where important information is signaled by a
relatively low peak, the initial pitch was relatively high (120 –141 Hz) compared to the
low peak patterns when background information is signaled (98–129 Hz). In addition, the
initial pitch is usually higher in the fall, fall-level, and rise pattern when emphasizing
important information (more than 120 Hz) compared to providing background
information. In the BCC study, one of the things can have a referential function by
focusing on the following noun phrase as important and a discourse-organizing function
by introducing a topic. Table 4.2 provides a summary of the frequency distribution of prosodic variation across the discourse functions of one of the things.

Table 4.2. Prosodic and discourse function variations for one of the things

<table>
<thead>
<tr>
<th>Discourse function</th>
<th>Pitch contour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introducing a topic</td>
<td>Peak</td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5</td>
<td>100%</td>
</tr>
<tr>
<td>Emphasizing important information</td>
<td>Peak</td>
<td>31</td>
<td>86%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>3</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Fall-level</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td></td>
<td>Rise</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>36</td>
<td>100%</td>
</tr>
<tr>
<td>Providing background information</td>
<td>Peak</td>
<td>6</td>
<td>55%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>2</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Fall-level</td>
<td>2</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Rise-level</td>
<td>1</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>11</td>
<td>100%</td>
</tr>
</tbody>
</table>

When introducing a topic, a high peak is used (Figure 4.4). One of the things can also introduce new information, which is the main topic of discussion as in example 4.9.

In this example, the speaker first mentions that he will continue the topic that he started last week but with more details. Then he starts the topic of discussion, which is the processing of the vaccine by certain body cells, after one of the things.

Example 4.9

So, let me go back to what we talked about last week and illustrate that a little bit more closely. So one of the things that happens is that certain cells within your body process the vaccine or the antigen and we talked about that.

<BENG100Feb2008_lec10_1>
Figure 4.4. Prosodic patterns for *one of the things* signaling introduction to a topic

When emphasizing important information, *one of the things* is usually brought into focus through a high peak, high fall (with one instance of fall-level), or a rise thus calling for a listener’s attention (Figure 4.5). In instances where important information is signaled by a relatively low peak, the initial pitch was relatively high (120–141 Hz) compared to the low peak patterns when background information is signaled (98–119 Hz). In other words, what differentiates the low peak patterns when emphasizing important information from providing background information is the initial pitch. When low peaks signaled important information, the initial pitch was higher than when providing background information. In the instance of a fall-level pattern signaling importance, the lack of prominence within *one of the things* might be due to prominence following the lexical bundle as shown in Example 4.8. In this example, the instructor is telling the students explicitly to mark a particular section as important.

Example 4.8

There’s an advanced sense of state and of organization. And that also is *one of the things* to put in NEON. <HIST202_Fall2008_lec4>
Emphasizing important information could be in the form of specific details or a summary. The instructor can emphasize important details such as in Example 4.6 where he emphasizes an important point about stars. In this example, the instructor is talking about how some stars are heavier than the sun and will eventually collapse when they no longer have fuel. He then reminds them of an important piece of information that he had mentioned briefly in a previous encounter that stars lose mass with time.

Example 4.6

And the key thing here is that there are lots of stars with mass more than 3 times the mass of the Sun. We don’t see them as black holes because they’re still in hydrostatic equilibrium. But eventually, they’re going to run out of nuclear fuel, and they’re going to collapse. Now, in fact, during the course of the star’s life, *one of the things* I glossed over is stars tend to lose mass as they live.

<ASTR160Feb2007_lec8>
One of the things was also used to provide a summary. This summary was regarded as important information because it brings implicit information that may go unnoticed by the students into focus by making it explicit. In Example 4.7, the instructor is comparing the tombs of Greeks in the post-Mycenaean period to those in the Mycenaean period. He first provides a description about the tombs in the post-Mycenaean period. Then he ends the description with a conclusion that summarizes important information after one of the things saying that the tombs of Greeks in the post-Mycenaean period is not similar to those in the Mycenaean period.

Example 4.7

Another thing that is interesting is that when you look at the burials of Greeks in the post-Mycenaean period, in the Dark Ages, there’s nothing resembling those grand tombs and the wealth that’s buried in them for the dead. You find that the tombs of noblemen are very much the same one as the other. You’re struck by the equality from the standpoint of riches of the dead nobility. No great distinction and no great riches either. You’re dealing with a poorer world and a world that doesn’t have this kind of outstanding monarchy. So, one of the things I think we learn is that the Homeric world of the kings, the role of the kings, the wealth of the kings, the power of the kings, the place of the kings is not taken from the Mycenaean period. <CLCV205_Sept2007_lec3>

When one of the things provided background information, a low peak pattern was usually used with few instances of low fall, fall-level, and low rise patterns (Figure 4.6). In eExample 4.10, the instructor is talking about the geographic location of Athens. Then,
he talks about who is considered an Athenian explaining that people far away from the city were considered Athenians because they lived in the region in Attica. He then provides background information after one of the things about the unification of villages and towns within Attica to become one polis. This background information can be considered as secondary information that clarifies the main idea which is who is considered an Athenian.

Example 4.10

Athens, I hope you’ll remember from your maps, is located in the southeastern portion of the Greek peninsula. It sticks out there into the Aegean Sea. Its geography — it’s about 1,000 square miles is Attica. I think we talked about it already. The city is Athens; the region in which they live is Attica; the people are Athenians and that’s an important point I think I made too, which is everybody who is a citizen who lives in Attica is an Athenian, no matter if he lives sixty-five or seventy miles away from the city. He’s still an Athenian. One of the things they achieved early was the unification of that whole region and they made it one polis, although that certainly doesn’t mean that there are no independent villages and towns in the polis of Athens, because they certainly are.
Figure 4.6. Prosodic patterns for one of the things signaling background information

Overall, one of the things was used to introduce a topic, emphasize information, and provide background information. Introducing a topic and emphasizing information were signaled through higher peaks and wider pitch ranges than when providing background information was signaled. Also, initial pitch was higher in low peak, fall, fall-level, and rise patterns when emphasizing important information than when providing background information.
4.3 On the other hand

The lexical bundle *on the other hand* has a clear, stand-alone contrastive meaning, and findings suggest a subtle difference between two contrastive functions; that is, it signals a major and minor contrast. In instances where *on the other hand* signaled a major contrast, the speaker made a sharp contrast between different propositions that was evident through the prosody. Higher peaks were characteristic of major contrast versus minor contrast. This could be because the speaker wanted to draw special attention to the difference between these two propositions that could be left unnoticed by the students or that the difference between the two propositions was unexpected and so the speaker drew attention through emphasis placed on the lexical bundle. However, when a minor contrast was signaled, the contrast made between the two propositions was expected. *On the other hand* is categorized in the BCC study as a discourse-organizing lexical bundle that functions as a topic elaboration/clarification that is used for “explicit comparison and contrast” (Biber et al., p. 393). Table 4.3 provides a summary of the frequency distribution of prosodic variation across the discourse functions of *on the other hand*.

<table>
<thead>
<tr>
<th>Discourse function</th>
<th>Pitch contour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major contrast</td>
<td>Peak</td>
<td>30</td>
<td>97%</td>
</tr>
<tr>
<td></td>
<td>Fall-rise</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>31</td>
<td>100%</td>
</tr>
<tr>
<td>Minor contrast</td>
<td>Peak</td>
<td>10</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>Fall-rise</td>
<td>4</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>8</td>
<td>36%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>22</td>
<td>99%*</td>
</tr>
</tbody>
</table>

*Percentages do not add up to 100% due to rounding up of decimals

When contrasting two major propositions, a high peak or, less commonly, a fall-rise pattern was used (Figure 4.7). When a high peak signaled a major contrast, the peak
was at least 223 Hz. In the single instance of a falling pitch contour, the lexical bundle, which is usually in an initial utterance position, was in a non-initial position and contrasted with the noun preceding *on the other hand*. Therefore, contrast had been already signaled by the content noun that preceded the lexical bundle, and using a peak to signal contrast on *on the other hand* would have been redundant.

Figure 4.7. Prosodic patterns for *on the other hand* signaling major contrast

When a minor contrast was signaled, usually a low or high peak, fall-rise, or fall pattern was used (Figure 4.8). When minor contrasts were signaled by high peaks, they were usually shorter in duration than those that signaled major contrast. Specifically, the average duration of *on the other hand* when minor contrast was signaled was 0.69 seconds (standard deviation =0.1) versus 0.81 seconds when major contrast was signaled. Therefore, there is a duration difference between the high peaks that signal minor versus major contrast. In one occurrence (example 4.11), however, minor contrast was signaled
by a high peak. This could be due to the instructor wanting to bring the obvious information into focus. In Example 4.11, the instructor is explaining the issue of using distance as a unit of measurement. Then he contrasts it with the “obvious” which is the size of the screen has not changed. Therefore, the instructor might have produced on the other hand with a high peak in order to emphasize the illogicalness of the idea.

Example 4.11

But if you go closer to your eye, it’s only about an inch across. If you’re at arm’s length it’s maybe six, eight inches where I’m standing here. And if you try it at the back of the class, you’ll get a different answer from what I just got. So, distance is a problematical thing. And so--But on the other hand, obviously, the size of the screen hasn’t changed depending on where my arms were or whether I’m standing at the back of the room or the front of the room. So, something has to be measurable there, but it isn’t distance. What it is, is angle.

Also, there was a difference between the fall-rise pattern when minor contrast versus major contrast was signaled. When a minor contrast was signaled, the initial pitch was usually lower than when a major contrast was signaled; 112 versus 148 Hz respectively. In one instance when minor contrast was signaled, the initial pitch was 199 Hz. This might have been due to the effect of a preceding contrasted word that had a high peak.
Overall, *on the other hand* was used to signal major and minor contrast. Major contrast was usually signaled by higher peaks compared to minor contrast. Also, fall patterns was characteristic of minor contrast.

### 4.4 We’ll talk about

*We’ll talk about* had two discourse functions: it either introduced a topic for future discussion or connected two topics, one of which would be discussed in the future. When introducing a future topic, usually a narrow pitch range in the peak pattern (1–57 Hz) with lower peaks (98–177 Hz) was used in comparison with when *we’ll talk about* connected two topics where usually higher pitch ranges (48–92 Hz) and higher peaks (193–238 Hz) was used. Also, a fall and level pattern characterized introducing a topic function that is not present when connecting two topics. *We’ll talk about* was not
discussed in the BCC study. Table 4.4 provides a summary of the frequency distribution of prosodic variation across the discourse functions of *we’ll talk about*.

**Table 4.4. Prosodic and discourse function variations for *we’ll talk about***

<table>
<thead>
<tr>
<th>Discourse function</th>
<th>Pitch contour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introducing a future topic</td>
<td>Peak</td>
<td>26</td>
<td>59%</td>
</tr>
<tr>
<td></td>
<td>Level</td>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>14</td>
<td>32%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>44</td>
<td>100%</td>
</tr>
<tr>
<td>Topic connector</td>
<td>Peak</td>
<td>8</td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td>Rise</td>
<td>1</td>
<td>11%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>9</td>
<td>100%</td>
</tr>
</tbody>
</table>

When the lexical bundle introduced a future topic, it had three prosodic patterns; a peak, level, or a fall pattern (Figure 4.9). Most occurrences that introduced a future topic had a low peak that lay between 98–177 Hz and a narrow pitch range (1–57 Hz). Also, in the fall and level patterns, there seemed to be little pitch movement with no prominence. Therefore, when a future topic was usually signaled, *we’ll talk about* was produced with a low peak and narrow pitch range. In Example 4.12, the speaker was talking about obesity and heart disease. He then gave a brief explanation that people in the past thought they were dying of old age when in reality the real cause was heart disease. He then says that he will discuss the topic in more detail later saying “we’ll talk about that.”

**Example 4.12**

Obesity or generally our diets are different than they were in 1665. We eat different kinds of things and many people think that that’s what has contributed to much more heart disease. But it could also be that it wasn’t as easily diagnosed then. So people were dying of old age and that was really heart disease that was killing them they just didn’t know, so it’s multi-factorial and *we’ll talk about* that.

<BENG100Feb2008_lec1>
In contrast, when we’ll talk about connected two topics, a higher peak was usually used that was higher than 193 Hz with one instance produced in a rising pattern (Figures 4.10). Therefore, the peak height and pitch range seemed to indicate whether we’ll talk about signaled a topic or connected two topics. This pattern is similar to the discourse function of now where it was non-prominent when it started a new topic but was prominent (possibly through a high peak) when it connected information (Hirschberg & Litman, 1987). When we’ll talk about connected two topics, such as in Example 4.13, the instructor drew a connection between the topics, at least one of which was a topic to be discussed in the future. In this example, the speaker made a connection between the topics “correlation energy” and “strain energy”, explaining that the definition of these terms is not as clear as they are thought to be.
Example 4.13

So here’s some quotes from The Instauratio Magna. "That wisdom which we have derived principally from the Greeks" (no offense, okay?) "is but like the boyhood of knowledge, and has the characteristic property of boys: it can talk but it cannot generate;" "...it is but a device for exempting ignorance from ignominy." That means it’s a way of hiding your ignorance, and we’ll see examples of that. We’ll *talk about*, in Lecture 11, about correlation energy, and we’ll talk in Lecture 32 about strain energy, and you’ll see that both of these are just words that are used to hide our ignorance. <CHEM125ASept2008_lec1.txt>

![Figure 4.10. Prosodic patterns for we’ll talk about signaling topic connection](image)

Overall, *we’ll talk about* was used to introduce a topic in the future and connect two topics. Higher peaks and wider pitch ranges were usually used when connecting two topics than when introducing a topic in the future.

4.5 We’re talking about

*We’re talking about* had two discourse functions: elaborating on a topic or introducing a topic. There were generally four prosodic variations to the pitch contour of *we’re talking about* that are related to its discourse function (Table 4.5); peak, fall, fall-rise, or level. Introducing a topic was usually signaled by high peaks (167–260 Hz).
When elaborating on a topic, the prosodic pattern of *we’re talking about* was linked to whether there was anaphoric or cataphoric reference to the information being elaborated on. Generally, anaphoric reference was characterized by low peaks (129–161 Hz) and lower pitch range in the peak pattern (4–10 Hz) compared to cataphoric reference that usually had higher peaks (135–261 Hz) a higher pitch range (18–51 Hz). Although cataphoric elaboration and introducing a topic were both signaled by high peaks there was difference in the pitch range too; the pitch range was usually wider when a topic is introduced (53–61 Hz). Therefore, pitch range was widest when introducing a topic followed by cataphoric elaboration and then anaphoric elaboration. *We’re talking about* was not mentioned in the BCC study but would likely fall under topic introduction/focus category that functioned as discourse organizers, since it was similar to the lexical bundle *going to talk about* that falls under the same category.

Table 4.5. Prosodic and discourse function variations for *we’re talking about*

<table>
<thead>
<tr>
<th>Discourse functions</th>
<th>Pitch contour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elaboration</td>
<td>Peak</td>
<td>32</td>
<td>71%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>8</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>Fall-rise</td>
<td>2</td>
<td>4%</td>
</tr>
<tr>
<td></td>
<td>Level</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>45</td>
<td>100%</td>
</tr>
<tr>
<td>Introducing a topic</td>
<td>Peak</td>
<td>6</td>
<td>75%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>2</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>8</td>
<td>100%</td>
</tr>
</tbody>
</table>

When elaborating on a topic, the pitch contour for *we’re talking about* could be a high or low peak, fall, fall-rise, or level (Figure 4.11). When there is an anaphoric reference to the proposition being elaborated usually a low peak, low fall, fall-rise, or level was used. However, when there is a cataphoric reference to the proposition, usually a relatively high peak or a high fall was used. Generally, anaphoric reference was
characterized by low peaks (129–161 Hz) and lower pitch range in the peak pattern (4–10 Hz) compared to cataphoric reference that usually had higher peaks (135–261 Hz) a higher pitch range (18–51 Hz).

Figure 4.11. Prosodic patterns for we’re talking about signaling elaboration

When there is an anaphoric reference to the proposition being elaborated as in Example 4.14, the instructor was referring to a chemical reaction which is mentioned before we’re talking about therefore, there is a backward reference to the proposition.
Example 4.14

Isopropyl is ever so much slower. The isobutyl is faster again. t-butyl is very slow. In fact, you don’t know how slow it is. It’s got to be slower than that. Because something else happens other than the reaction we’re talking about. So all you know is it can’t be any faster than that. And neopentyl is really, really slow. Now, do these make sense? Let’s look at it in two ways.

<CHEM125B_Spring2011_lec7.txt>

However, when there is a cataphoric reference to the proposition, as in Example 4.15, the instructor refers to a proposition mentioned after we’re talking about. In this example, the instructor is explaining that gene expression refers to a number of process, “transcription, RNA processing, translation to make the protein.” Therefore, he explains after we’re talking about what is intended by gene expression.

Example 4.15

How do cells in your brain know which proteins they ought to be making, and how do cells in the pancreas know which proteins they ought to be making? They do that because they can control the expression of genes. Gene expression, for us, will mean the same thing as production of a particular protein. When a gene gets expressed, that means its protein is produced. When we talk about gene expression then we’re talking about this whole sequence of events I just described: transcription, RNA processing, translation to make the protein.

<BENG100Jan2008_lec3.txt>
When introducing a topic, there was usually a high peak or on *we’re talking about* or a fall (Figure 4.12). The instances of high peak when the topic was introduced are different from cataphoric elaboration on information in the pitch range that was higher when introducing a topic.

![Figure 4.12. Prosodic patterns for *we’re talking about* signaling topic introduction](image)

When a topic was introduced, the instructor started the discussion with a main topic of discussion after *we’re talking about* as in Example 4.16 where the main topic is exoplanets.

**Example 4.16**

Okay, so as I pointed out last time, we’re talking about "exoplanets" – planets around other stars. And the problem with exoplanets is you can’t see them directly. So, you can’t see the exoplanets directly as blobs of light in the sky and so what do you do? <ASTR160Jan2007_lec3.txt>

In cases where a topic is introduced with a falling pitch contour, the topic is a sub-topic of a larger topic as in Example 4.17. The main topic in this example is the cardiovascular system and the sub-topic that is introduced after *we’re talking about* is the heart.
Example 4.17

So we’ll come back to this in our example in the cardiovascular system when *we’re talking about* the heart and we’ll talk about how to measure the collective group of action potentials using EKG’s. You’ll actually get to measure EKG’s on each other during section the week we talk about that.

*<BENG100Feb2008_lec8.txt>*

Overall, *we’re talking about* was used to elaborate on a topic and introduce a topic. Elaborating on a topic was signaled by higher peaks and wider pitch ranges in cases of cataphoric reference compared to lower peaks and narrower pitch ranges in instances of anaphoric reference. Also, introducing a topic was signaled by wider pitch ranges than cataphoric elaboration.

4.6 *As you can see*

*As you can see* was most commonly used as a visual cue to direct attention to an illustration portrayed in a picture such as in a textbook or presentation slides of a lecture. There are two types of reference function *as you can see* performs: specific reference and general reference. In most of the cases, it called for attention to specific details while at other times it called for attention to a general description depicted in a picture displayed on presentation slides, for example. Although it is mainly used as a referential expression, in a few cases, *as you can see* is used to introduce the title of the lecture, thus introducing the topic. There were generally four variations to the pitch contour of *as you can see* that were related to its discourse function; peak, fall-rise, fall, and rise. Introducing a topic is signaled by a high peak that is at least almost 250 Hz whereas general and specific reference have a lower peak height with the range 183–235 Hz. General and specific
reference were different from each other in the pitch range of the fall-rise pattern and the rising pattern that is characteristic of general reference only. In the fall-rise pattern in general reference the pitch range usually falls 30 Hz and rises 90–95 Hz. In contrast, in the fall-rise pattern in specific reference the pitch range usually falls 12–30 Hz and rises 21–34 Hz. However, there were some overlapping prosodic patterns between general and specific reference which might be due to closeness in meaning between the two functions. *As you can see* was not discussed in the BCC study but would likely fall in the referential expression category since it is similar to the lexical bundle *as shown in figure*, mainly used to identify an entity such as a figure in a textbook or slide. Table 4.6 provides a summary of the frequency distribution of prosodic variation across the discourse functions of *as you can see*.

**Table 4.6.** Prosodic and discourse function variations for *as you can see*.

<table>
<thead>
<tr>
<th>Discourse function</th>
<th>Pitch contour</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific reference</td>
<td>Peak</td>
<td>10</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Fall-rise</td>
<td>7</td>
<td>21%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>16</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
<td><strong>99%</strong></td>
</tr>
<tr>
<td>General reference</td>
<td>Peak</td>
<td>4</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>Rise</td>
<td>4</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>Fall-rise</td>
<td>5</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td>Fall</td>
<td>4</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>17</strong></td>
<td><strong>101%</strong></td>
</tr>
<tr>
<td>Introducing a topic</td>
<td>Peak</td>
<td>3</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>3</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*Percentages may not add up to 100% due to decimal rounding up.

Introducing a topic was signaled by a peak that are at least almost 250 Hz (Figure 4.13) where *as you can see* was used to introduce students to the title of the topic of the lecture (Example 4.20).
Example 4.20

Good morning. *As you can see* from today’s lecture title, we’re going to be talking about painting palaces and villas in the first century A.D.

*<HSAR252_Spring2009_lec7>*

![Figure 4.13. Peak pattern for *as you can see* signaling introducing a topic](image)

General reference was signaled by peak, fall-rise, and fall patterns (Figure 4.14). This discourse function was characterized by the rising pattern and the steepness of the fall in the fall-rise pattern, i.e., a wide pitch range in the fall-rise pattern. Nevertheless, there are some overlapping patterns in the peak, fall, and fall-rise patterns between general reference and specific reference. This might be that there are subtle differences between the discourse functions of general and specific reference and so there is minimal difference in their prosodic variation.

When general reference was signaled by *as you can see*, there were no specific detailed descriptions but rather a general description of position or directing attention to an entity. In Example 4.19, students’ attention is directed to the location of Herculaneum.

Example 4.19

Herculaneum is to the northeast of Pompei, closer to Naples than Pompei is *as you can see*. *<HSAR252_Spring2009_lec6>*
Figure 4.14. Prosodic patterns for *as you can see* signaling general reference
Although there were some overlapping features between specific reference from general reference, there were some prosodic features that differentiated both discourse functions. When specific reference was signaled by a fall-rise pattern, there was usually a slight fall in pitch (12–30 Hz) before rising again (21–34 Hz). In contrast, in the fall-rise pattern by the female voice when general reference was signaled, the pitch usually fell 30 Hz and rose again to at least 90 Hz. There was no fall-rise pattern by male voices in the specific reference function and so it was difficult to make comparisons to a similar pattern by male voices in the general reference function. Therefore, the two discourse functions were different from each other in the fall-rise pattern and the rising pattern that is characteristic of general reference only.

When *as you can see* signaled specific reference, students’ attention was directed to specific information such as in Example 4.18. In this example, there is a description of specific details of the different positioning of arches and columns followed by *as you can see* that directs students’ attention to these details in a picture.

Example 4.18

And we can see that what we have here is a very important combination--and it’s the first time we’ve seen this today--of arches with columns interspersed, columns placed, engaged or attached into the wall, in between these arcades, *as you can see* here. <HSAR252_Spring2009_lec3>
Overall, *as you can see* was mainly used as a referential expression to refer to general and specific information. Less commonly, it was used to introduce a topic. Introducing a topic was signaled by the highest peak in comparison to general and specific reference. Although general and specific reference were signaled by some overlapping prosodic patterns due to subtle differences in discourse function, they are different in the range of pitch in the fall-rise pattern and the rise pattern that is characteristic of general reference.

### 4.7 Lexical bundles with one discourse function

The lexical bundles *that is to say*, *it turns out that*, and *we’ve talked about* had minimal prosodic variation and one discourse function. In other words, their single discourse function was not differentiated in their prosodic features. These lexical bundles were not discussed in the BCC study. The reason that these lexical bundles did not have
prosodic variations related to multiple discourse functions could be that their meaning is relatively fixed irrespective of their prosodic features when compared to other lexical bundles that have prosodic variations related to their discourse function.

4.7.1 We’ve talked about

*We’ve talked about* had a discourse function of introducing a topic that was discussed in the past. The lexical bundle had four prosodic patterns; a peak, fall, level, or rise pitch contour (Figures 4.16). Usually, when *we’ve talked about* appeared in initial utterance position it had a high peak or high fall. In some instances, the lexical bundle was in initial utterance position usually had a pitch range of 23–77 Hz. In contrast, in middle-utterance position, the pitch range was usually 4–18 Hz. Therefore, in most instances of *we’ve talked about* that is in utterance-initial position, the pitch range is wide compared to when in non-initial position where the pitch range is narrower. However, when *we’ve talked about* is in final utterance position, there were mixed patterns; there were high peaks, high fall and rising patterns as well as low peak and low fall patterns (Table 4.7).

<table>
<thead>
<tr>
<th>Position</th>
<th>Prosodic variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial position</td>
<td>Low peak</td>
</tr>
<tr>
<td>Medial position</td>
<td>Low peak, low fall, or level pitch contour</td>
</tr>
<tr>
<td>Final position</td>
<td>High and low peaks, high and low fall, and rising pitch contour</td>
</tr>
</tbody>
</table>
Figure 4.16. Prosodic patterns for *we’ve talked about* signaling topic introduction
We’ve talked about referred to a topic that had been discussed in the past as in Example 4.21 where the speaker talks about examples of body organ systems. He then refers to the digestive system which has been a topic that was discussed in the past.

Example 4.21

The respiratory system, for example, the renal system, the digestive system, these are examples - three examples of organ systems that contact the external environment. We’ve talked about the interesting way in which the digestive system contacts the external environment. Depending on what you call external and internal environment, this path that I’m tracing here, deep within your digestive system, is really directly connected to the outside world through both ends. <BENG100Feb2008_lec7_1.txt>

Overall, we’ve talked about introduced a topic discussed in the past that was signaled by wide range of pitch movements in initial position of an utterance compared to narrower pitch movements in non-initial position.

4.7.2 It turns out that

It turns out that had a discourse function of expanding on a topic that was mainly signaled by a peak pattern (Figures 4.17). However, there were few instances of fall and rise patterns that were due to the position of the lexical bundle. Most of the peak patterns were high peaks, i.e., above 150 Hz. In the two instances of a low peak, the pitch range increase from initial to the peak is fairly wide: an increase of at least 44 Hz. Therefore, for most instances, it turns out that is made prominent either through a high peak or a wide pitch range calling for students’ attention to the information following the lexical bundle. In the fall pattern, the low fall instance that starts at 158 Hz falling to 130...
Hz might have been due to prominence on the word before the lexical bundle. Although it is a low fall, the pitch range is wide (28 Hz) compared to the high fall instance that starts at 194 Hz but with a narrower pitch range (11 Hz). Therefore, in the fall pattern, prominence is realized either through a high initial pitch (194 Hz) or a wide pitch range (28 Hz). In the rise pattern, there could have been a late peak causing a rise rather than the typical peak pattern of *it turns out that*.

**Figure 4.17.** Prosodic patterns for *it turns out that* signaling expansion

*It turns out that* introduced a ‘discovery statement’ that elaborated on a preceding proposition. In other words, the lexical bundle introduced a result or a discovery as in Example 4.22. In this example, the speaker was talking about the advantage of giving oral vaccine to children. Then, using *it turns out that*, he introduced a statement of discovery that the immunity gained from an oral vaccine given to children is spread to other children living in the same place.
Example 4.22

In fact, another advantage of the oral vaccine is that you give it to children. They take it, the vaccine itself, the virus, reproduces in their gut and they can actually spread it to other children in the same way that they spread the disease where you’ve got children that are maybe at school or at childcare. Have you ever looked at children in the playground? They’re all over each other sometimes and they can spread saliva or other fluids. *It turns out that* if you give one child in a home the oral vaccine, you often have a protective effect in other children in the home as well because it spreads from one individual to another. That’s another advantage of the oral polio vaccine.

Overall, *it turns out that* signaled expansion of information by providing a discovery statement mostly by high peaks and few instances of fall that is characterized by a high initial pitch or a wide pitch range while the rise pattern could have been governed by the position of the lexical bundle.

4.7.3 That is to say

*That is to say* was used for expansion of information that was signaled by a peak, level, fall-rise, and fall patterns (Figure 4.18). Most of the peak patterns were low peaks. Also, the pitch movement in the fall-rise and fall were minimal. Therefore, most instances of *that is to say* have narrow pitch ranges (1–28 Hz). *That is to say* provided clarification to the proposition that preceded it as in Example 4.23. In this example, *that is to say* is was used to elaborate on a previous term, *regime*, through an explanation of its definition.
Example 4.23

What is it that political science studies and what is its relation to the other disciplines? The core of political science, at least according to Aristotle and to this degree I’m very much an Aristotelian, what distinguishes it from all other studies is the concept of the regime, of the politea. The regime, for him, is not one branch of human activity among others, it is the fundamental principle or ordering principle that makes all the others even possible. This is why Aristotle does not regard the study of politics as one social science among others. It is rather what he calls the master science that determines the rank and place of all the others within the polity. His study of the regime, that is to say the underlying constitutional principles that govern each order is what distinguishes Aristotle from the other social scientists. <PLSC114_Oct2006_lec9.txt>

Figure 4.18. Prosodic patterns for that is to say signaling expansion
Overall, expansion of information was signaled by that is to say by peak, level, fall-rise, and fall patterns with narrow pitch ranges.

4.8 Summary of Findings

Overall, to answer the research question, findings showed that six out of nine lexical bundles had multiple prosodic variations associated with varied discourse functions (one of the most, one of the things, on the other hand, we’ll talk about, we’re talking about, and as you can see). The other three lexical bundles were found to have minimal prosodic variations related to one discourse function (we’ve talked about, it turns out that, and that is to say). Table 4.8 shows the different prosodic patterns that differentiated across discourse functions for lexical bundles. The important prosodic features that differentiated the discourse functions for each lexical bundle were peak height, pitch range, initial pitch, duration, position within intonation unit, and prominence following the lexical bundle. Generally, introducing a topic, connecting topics, emphasizing important information, contrasting major propositions, cataphoric elaboration were usually signaled by high peaks and wide pitch ranges for most lexical bundles. In contrast, expanding of information and minor contrasts were usually signaled by lower peaks and narrow pitch ranges. However, there were some lexical bundles with different patterns. Introducing a topic was usually signaled by narrow pitch ranges in comparison to connecting two topics for we’ll talk about. Also, emphasizing important information was sometimes signaled by low peaks and narrow pitch ranges in one of the most and one of the things. In such instance, either there was prominence following the lexical bundle in the case of one of the most or the initial pitch was high in the case of one of the things. In comparison to peak height and pitch range that were key prosodic features differentiating across discourse functions of most lexical bundles (6 out of 9),
duration and position were less impactful factors differentiating across the discourse functions of *on the other hand* and across the different peak patterns of the same discourse function for *we’ve talked about* respectively.

**Table 4.8.** Prosodic features that differentiated the discourse functions for each lexical bundle

<table>
<thead>
<tr>
<th>Prosodic feature</th>
<th>Lexical bundle</th>
<th>Discourse function</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Peak height</strong></td>
<td><em>one of the most and one of the things</em></td>
<td>Introducing a topic and emphasizing important information was signaled by high peaks compared to lower peaks when expanding a topic or simply providing background information.</td>
</tr>
<tr>
<td></td>
<td><em>on the other hand</em></td>
<td>Major contrast had higher peaks than minor contrast</td>
</tr>
<tr>
<td></td>
<td><em>we’ll talk about</em></td>
<td>Lower peaks signal introducing a topic while higher peaks signal connection between topics.</td>
</tr>
<tr>
<td></td>
<td><em>we’re talking about</em></td>
<td>Cataphoric elaboration and introducing a topic were both signaled by high peaks compared to lower peaks when signaling anaphoric reference</td>
</tr>
<tr>
<td></td>
<td><em>as you can see</em></td>
<td>Introducing a topic is signaled by a high peak whereas general and specific reference have a lower peak height.</td>
</tr>
<tr>
<td><strong>Pitch range</strong></td>
<td><em>one of the most and one of the things</em></td>
<td>Introducing a topic and emphasizing a topic was signaled by high pitch ranges compared to expanding a topic or simply providing background information that was signaled by low pitch ranges.</td>
</tr>
<tr>
<td></td>
<td><em>we’ll talk about</em></td>
<td>Narrow pitch ranges signal introducing a topic while wider pitch ranges signal connection between topics</td>
</tr>
<tr>
<td></td>
<td><em>we’re talking about</em></td>
<td>Pitch range is widest when introducing a topic followed by cataphoric elaboration and then anaphoric elaboration</td>
</tr>
<tr>
<td></td>
<td><em>as you can see</em></td>
<td>General reference is signaled by a wider pitch range in the fall-rise pattern compared to specific reference.</td>
</tr>
<tr>
<td><strong>Prominence</strong></td>
<td><em>one of the most</em></td>
<td>Emphasizing a topic was also sometimes signaled by low peaks and narrow pitch ranges but was followed by a prominent word. This pattern was not present when expanding a topic.</td>
</tr>
<tr>
<td><strong>Initial pitch</strong></td>
<td><em>one of the things</em></td>
<td>In instances where important information is signaled by a relatively low peak, the initial pitch was relatively high compared to the low peak patterns when background information is signaled. Also, the initial pitch is usually higher in the fall, fall-level, and rise pattern when emphasizing important information compared to providing background information.</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td><em>on the other hand</em></td>
<td>Duration was lower in minor contrast in high peak patterns compared to similar pattern in major contrast.</td>
</tr>
<tr>
<td><strong>Position</strong></td>
<td><em>we’ve talked about</em></td>
<td>In most instances of <em>we’ve talked about</em> that is utterance-initial position, the pitch range is wide compared when in non-initial position where the pitch range is narrower.</td>
</tr>
</tbody>
</table>
Findings indicate that the discourse functions of lexical bundles can be classified into two main categories according to their role in signaling information structure within the lecture (Table 4.9). Introducing a topic, connecting topics, and contrasting major propositions signaled a major rhetorical organization role in the lecture while expanding on information (such as addition of specific details or providing background information or emphasizing specific information) and contrasting minor propositions signaled a minor rhetorical organization role. Also, for each discourse function there is a most common pitch contour pattern as shown in Table 4.9. These patterns are further differentiated from each other in other aspects which are peak height, pitch range, prominence, initial peak, duration, and position within an utterance.

Table 4.9. Summary of common prosodic pattern for each discourse function

<table>
<thead>
<tr>
<th>Lexical bundle</th>
<th>Discourse function</th>
<th>Rhetorical organization</th>
<th>Common pitch contour pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the most</td>
<td>Introducing a topic</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>Emphasizing important information</td>
<td>Minor</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>Expanding of information</td>
<td>Minor</td>
<td>Peak and fall</td>
</tr>
<tr>
<td>One of the things</td>
<td>Introduce a topic</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>Emphasizing important information</td>
<td>Minor</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>Providing background information</td>
<td>Minor</td>
<td>Peak</td>
</tr>
<tr>
<td>On the other hand</td>
<td>Major contrast</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>Minor contrast</td>
<td>Minor</td>
<td>Peak</td>
</tr>
<tr>
<td>We’ll talk about</td>
<td>Introduce a topic</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>Connecting topics</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td>We’re talking about</td>
<td>Introduce a topic</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>Elaborating on a topic</td>
<td>Minor</td>
<td>Peak</td>
</tr>
<tr>
<td>As you can see</td>
<td>Introducing a topic</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td></td>
<td>General reference</td>
<td>Minor</td>
<td>Peak and rise</td>
</tr>
<tr>
<td></td>
<td>Specific reference</td>
<td>Minor</td>
<td>Fall</td>
</tr>
<tr>
<td>We’ve talked about</td>
<td>Introducing a topic</td>
<td>Major</td>
<td>Peak</td>
</tr>
<tr>
<td>It turns out that</td>
<td>Expanding of information</td>
<td>Minor</td>
<td>Peak</td>
</tr>
<tr>
<td>That is to say</td>
<td>Expanding of information</td>
<td>Minor</td>
<td>Peak</td>
</tr>
</tbody>
</table>
Therefore, as suggested by Biber et al. (2004), lexical bundles could have more than one discourse function. This study shed light on the specific discourse functions of highly frequent lexical bundles in academic lectures and how these functions are related to their prosodic variation, namely pitch height, pitch range, prominence, initial pitch, duration, and position within an utterance. Prosody could thus be an important indicator for determining the discourse functions of lexical bundles.
CHAPTER 5. DISCUSSION

The discourse functions of spoken lexical bundles in academic lectures have typically been studied using written transcripts alone, leaving prosody a relatively untouched consideration. This gap motivated this investigation of the prosodic variation of spoken lexical bundles through the analysis of pitch as a marker for prominence and pitch movement, and how variation in prosody is related to the discourse function(s) of lexical bundles. The research question for this study investigated how prominence and pitch movement are associated with the discourse function(s) lexical bundles perform in the discourse. Findings from this study showed that the prosodic variations of most lexical bundles were associated with varied discourse function. This indicates that prosody had a clear communicative role linked to the range of discourse functions that various lexical bundles perform. Thus, these findings indicate that prosody should be considered when describing the function of spoken lexical bundles.

Findings from this study have implications in research and teaching. For research, a new intonation model could be developed for discourse-organizing lexical bundles that may be accented and deaccented according to major and minor rhetorical organization functions rather than new and given information division only proposed by earlier studies. Specifically, the prosody of lexical bundles often helped create cohesive ties across major rhetorical junctures as well as minor junctures. These cohesive relationships linked to prosody help the listener understand how to interpret incoming speech in relation to what has preceded it.

Previous studies have not looked at prosodic measures for sub-phrasal units that occupy part of an intonation unit similar to most of the lexical bundles examined in this
research. After numerous piloting strategies, findings from this study suggest that peak height, pitch range, prominence, initial pitch, and duration differentiated between the discourse functions of lexical bundles as sub-phrasal units. This implies that there may be an additional level of prosodic analysis for sub-phrases that fall between a continuum of word level and a full phrase level of prosodic analysis.

Another implication for research is developing a framework for the categorization of lexical bundles along two interacting continua according to the level of intactness (phonological coherence) and the range of functions it performs. Findings indicate that lexical bundles demonstrated a tendency from being multi-functional with narrow to wide range of discourse functions, to being mono-functional with mainly one discourse function. Also, lexical bundles tended to be contained within one intonation unit with few instances excluded from analysis due to lack of phonological coherence to lexical bundles that had numerous instances excluded from analysis to their tendency to cross an intonation unit. Therefore, the prosodic analysis of lexical bundles helped to shed light on the potential classification depending on their range of discourse function and prosodic features. This classification could be validated through analyzing more lexical bundles with other functions.

Findings from this study could also inform speech annotation tools that could use prosodic information of lexical bundles to divide speech topically and detect clause boundaries. Also, prosodic information could be used to detect the discourse function of lexical bundles at different rhetorical junctures. Therefore, speech annotation tools could benefit from using prosodic information of lexical bundles related to peak height, pitch range, initial pitch, and duration to detect syntax and semantic information with a text.
This research can also inform teaching practices by helping international teaching assistants, for instance, create comprehensible and coherent speech. Understanding pitch variations that is used to signal major and minor transitions in discourse may help guide the listener as to whether the speaker wishes to introduce a topic, elaborate on a previous topic, or mark relative importance.

Overall, this section discusses research and teaching issues suggested by findings of this research. It first discusses the prosodic analysis of lexical bundles as subphrasal units and how does it relate to existing practices of prosodic analysis at word and phrasal level. Then, it discusses the cohesive role of lexical bundles in light of an existing intonation model of cohesion. The third section considers how lexical bundles can be viewed across two interacting continua of graded prosodic and discourse function variations. The fourth section discusses how speech annotation tools can benefit from findings of this research. The fifth section suggests how this research can be useful to teaching lecture organization to non-native speakers of English. Finally, concluding comments are discussed about limitations and how to further this research.

5.1 Lexical bundles as subphrasal units

Lexical bundles examined in this study displayed different prosodic patterns from multi-word sequences in previous studies. Previous studies that have examined the prosody of multi-word sequences looked at phonological coherence and prominence. The four-word multi-word sequence *I don’t know why* was found to occupy a full intonation unit almost half of the time (Lin & Aldolphs, 2009) in comparison to most of the four-word lexical bundles in this study that did not occupy a full intonation unit but were rather part of a larger intonation unit.
Lexical bundles in this study were sub-phrasal units occupying part of an intonation unit, and their prosodic features were distinct from phrases occupying a full intonation unit. Phrasal prosody usually looks at whole intonation units. Therefore, studying lexical bundles as sub-phrasal units necessitated modifying phrasal definitions of prosody. Specifically, a framework that is usually used to study full phrases as the basic unit of an utterance, i.e., an intonation unit, was used to examine lexical bundles that did not always match the full intonation units. In other words, in English, each utterance is divided into intonation unit(s) where each unit is separated by cues such as pauses, final lengthening, or pitch discontinuity (Levis & Wichmann, 2015). Each intonation unit usually starts with a high pitch that declines towards the end of the unit, and it includes at least one prominent item in the intonation unit. Therefore, intonation units are the basic unit of measurement when studying prosody at the phrase level.

Lexical bundles in this study were primarily sub-phrasal, i.e., they occupied part of the intonation unit. Therefore, a phrasal measurement of prosody was adapted for studying lexical bundles as sub-phrasal units. These sub-phrasal units seemed to have a distinct prosody that neither matched descriptions of word-level or phrase level prosody. Word-level prosody includes lexical stress such as stress on the word *emphasIZE* where the focus is placed on the last syllable of the word, and may or may not include pitch prominence. Phrasal prosody includes adding pitch prominence on the important/contrasting/last word of the phrase. However, prosodic patterns in lexical bundles did not fully follow either of these two prosodic domains. Therefore, this study proposes that lexical bundles may represent a third category of prosodic patterns that operate at a sub-phrasal unit that is also above the level of the word (Figure 5.1). At this
sub-phrasal level, lexical bundles do not necessarily receive focus/prominence on the important/contrasting/last word of the phrase. However, there is usually one fixed word that either receives focus/prominence or not. This fixed word is *one in one of the most* and *one of the things, other in on the other hand, see in as you can see, turns in it turns out that, talking in we’re talking about, we’ll talk about, and we’ve talked about*. The presence or lack of focus is associated with peak height, pitch range, initial pitch, and duration where a relatively high peak, wide pitch range, high initial pitch or long duration is usually realized as prominence placed on a particular word within the lexical bundle. For multi-functional lexical bundles, the presence or lack of focus is usually associated with distinct discourse functions whereas for mono-functional lexical bundles, the presence or lack of focus is usually associated with position within the intonation unit.

**Figure 5.1.** Lexical bundles as subphrasal units

Although the lexical bundles examined were sub-phrasal, they sometimes showed similar patterns to phrasal units, i.e., a phrase occupying a full intonation unit. Lexical bundles that showed prosodic variation typically had at least one prominent word in the
bundle, which is similar to phrases occupying full intonation units. However, applying phrasal intonation categories to sub-phrasal units was also problematic. For example, the word *here* frequently occurred with the lexical bundle *as you can see* where the complete phrase *as you can see here* occupied a full intonation unit. In some of these instances, *here* was prominent, rather than *see*, in *as you can see* given that English does not favor prominence on adverbs unless it fulfills a specific function (Figure 5.2). Since prominence is sometimes governed by what the speaker believes to be important at the event of occurrence (Allerton & Cruttenden, 1979), this change in prominence from *see* to *here* may be linked to another discourse function such as added emphasis for the sake of importance. Hence, being restricted to a four-word lexical bundle allowed for a uniform examination of lexical bundles of the same length but may have missed discourse functions of the overall pitch contour pattern of the complete intonation unit.

Figure 5.2. Pitch contour of *as you can see here* showing prominence on *here*
Overall, this study identified prosodic measures (peak height, pitch range, initial pitch, and duration) that could be used to measure pitch movement and prominence within frequently co-occurring multi-word sequence sub-phrases (lexical bundles) which has not been discussed in previous studies. Findings from this study suggest that lexical bundles as sub-phrasal units have distinct prosodic patterns from full phrases indicating a new level of prosodic analysis beyond a word level but less than a phrase level.

5.2 Cohesion

Lexical bundles in this study had a cohesive role that can be identified by means of concepts described in Wennerstrom’s (1998) intonation model of cohesion. In her model, new or contrastive information are accented while given information is deaccented. However, lexical bundles that introduced new information, such as *we’ll talk about*, were not necessarily accented when they introduced a topic in contrast to when it connected two topics. Also, new information could be deaccented such as when expanding a topic through the addition of specific details by *one of the most*. This suggests that an expanded model of cohesion may be needed for discourse-organizing lexical bundles that describes how cohesion is achieved by lexical bundles within the information structure of discourse through variations in peak height, pitch range, initial pitch, and duration. This proposed model is based on the discourse-organizing lexical bundles in university lectures but may inform discourse-organizing function in other registers such as news reports or public presentations such as Ted talks.

Wennerstrom’s (1998) intonation model assumes that English intonation has a cohesive role signaling information structure in discourse. She makes a connection between Halliday and Hasan’s (1976) categories of cohesion (reference, lexical cohesion, conjunctions, substitution, and ellipsis) and intonation, showing, for instance, how
personal pronouns used referentially are usually deaccented in contrast to conjunctions starting new topics, which usually have an exceptionally high pitch, called a paratone. In other words, shared/given information between the speaker and the listener (which corresponds to Halliday and Hasan (1976) categories of reference, substitution, and lexical cohesion) is usually deaccented. On the other hand, when the speaker is providing new information that is not assumed to be known to the hearer, a prosodic accent, i.e., prominence, is used. This cohesive role of intonation is also observed in the prosodic variation of lexical bundles that signal information structure but is different from the new and given information division proposed by Wennerstrom. When a major proposition is introduced, whether at topic beginnings or contrastively, lexical bundles usually received prominence. Also, lexical bundles included prominent syllables when signaling important information. However, when an expansion of information was provided, lexical bundles did not usually receive prominence. This expanded information could be regarded as new information in Wennerstrom’s terms in cases where it elaborates on a main topic but is not accented, as would be expected by her model.

Wennerstrom’s model shows the potential of intonation in creating cohesion, but the categories of cohesion borrowed from Halliday and Hasan (1976) do not seem to overlap with the categories of cohesion used for lexical bundles. In other words, the categories of cohesion of Halliday and Hasan were not equivalent to the discourse function of lexical bundles examined in this study. Specifically, the reference category in Halliday and Hasan includes features such as pronouns (e.g., she) and demonstratives (e.g., this). These are usually deaccented unless used contrastively. However, referential lexical bundles in this study could be deaccented or accented depending on whether they
referred to specific information, general information, or whether they introduced a topic as the case with the lexical bundle as you can see. Therefore, items signaling reference in Halliday and Hasan are usually deaccented unless used contrastively. However, referential expressions are accented when they have a discourse-organizing function and are relatively deaccented when used for a referential function.

Moreover, items in the lexical cohesion category manifested through reiteration and collocative relationships are usually deaccented in Wennerstrom’s model. Specifically, lexical cohesion is achieved by lexical items that are associated with each other through ways including reiteration and collocation. Reiteration refers to the reinstatement of information while collocation is when words that occur together share semantic features such as boys and girls that are both considered children but of opposite sex. In comparison, lexical bundles were deaccented through expansion of information where a main topic is expanded usually through the addition of details rather than through lexical cohesion, i.e., the restatement of information or collocation relationships. In few cases, some of the lexical bundles in this study had a discourse function similar to the category of reiteration but not collocation. Specifically, when introducing rephrased information such as the case with one of the most and that is to say, the lexical bundle was usually deaccented similar to when information was reiterated in Halliday and Hasan. However, lexical bundles did not introduce collocative relationships and so this category did not have an equivalent function in this study. The function of expansion of information is not present in Halliday and Hasan’s category of lexical cohesion. In other words, lexical cohesion in lexical bundles are similar to Halliday and Hasan’s in the
reiteration subcategory but not in the collocation subcategory. Also, expansion of information is not accounted for in Halliday and Hasan’s category of lexical cohesion.

On the other hand, lexical bundles sometimes behaved like conjunctions cohesively. For example, *but* is semantically similar to *on the other hand* when they function contrastively. Halliday and Hasan’s categories of ellipsis and substitution do not have a discourse function equivalent in lexical bundles. Therefore, Halliday and Hasan’s categories of cohesion do not sufficiently align with the discourse functions of lexical bundles (with the exception of the conjunction category and reiteration sub-category), necessitating a discourse organization framework that is prosodically oriented and that accounts for the role of prosody to signal discourse-organizing functions.

An intonation model of cohesion that explains how discourse organizers help structure information within discourse in different registers is needed. Findings from this study shed light on how one type of discourse organizers, i.e., discourse-organizing lexical bundles, have prosodic variations linked to their discourse function which creates cohesive ties within the information structure of lectures. The discourse-organizing role of lexical bundles for this study was divided into major and minor rhetorical functions depending on their prosodic variations (Figure 5.3).
A major rhetorical function is when a main topic is introduced that frames the discussion, a connection is made between various topics, or contrasting two main ideas. Another level of discourse organization was a minor rhetorical function, which is the addition of specific details that expand on a main topic of discussion. This function could be achieved through addition of specific details that can have a cataphoric or anaphoric elaboration on a topic. Also, minor rhetorical functions included rephrasing of information, providing background information, emphasizing important information, and minor ideas.

Prosodically, and within a major rhetorical function, introducing a topic and connecting topics may differ from each other in terms of pitch range, with a wider pitch range used when connecting topics. Similar to major rhetorical functions, minor
rhetorical functions were realized prosodically through narrow and wide pitch ranges. Narrow pitch ranges were usually realized when providing background information, rephrasing of information, anaphoric elaboration, and minor contrasts. In contrast, wider pitch ranges were used when emphasizing important information, cataphoric elaboration, major contrast, and through special elaboration on a topic such as through discovery statements. Therefore, each level of discourse organization with major and minor rhetorical functions was characterized by both narrow and wide pitch ranges (Table 5.1).

Table 5.1. Discourse organization within university lectures

<table>
<thead>
<tr>
<th>Level of discourse organization</th>
<th>Discourse function</th>
<th>Pitch range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major rhetorical function</td>
<td>Topic introduction</td>
<td>Wide or narrow</td>
</tr>
<tr>
<td></td>
<td>Connecting topics</td>
<td>Wide pitch range</td>
</tr>
<tr>
<td></td>
<td>Minor contrast</td>
<td>Wide pitch range</td>
</tr>
<tr>
<td>Minor rhetorical function</td>
<td>Anaphoric elaboration</td>
<td>Narrow pitch range</td>
</tr>
<tr>
<td></td>
<td>Cataphoric elaboration</td>
<td>Wide pitch range</td>
</tr>
<tr>
<td></td>
<td>Special elaboration</td>
<td>Wide pitch range</td>
</tr>
<tr>
<td></td>
<td>Rephrasing of information</td>
<td>Narrow pitch range</td>
</tr>
<tr>
<td></td>
<td>Providing background information</td>
<td>Narrow pitch range</td>
</tr>
<tr>
<td></td>
<td>Emphasizing important information</td>
<td>Wide pitch range</td>
</tr>
<tr>
<td></td>
<td>Minor contrast</td>
<td>Narrow pitch range</td>
</tr>
</tbody>
</table>

Overall, lexical bundles operate at different levels in the hierarchy of discourse structure. They may indicate a major rhetorical function by introducing a main proposition in discourse, or they may fulfill a minor rhetorical function by elaborating on previously stated information. When used for major rhetorical functions, such as in one of the most, a high peak or wide pitch range was usually used; a minor rhetorical function was usually signaled by a lower peak or a narrow pitch range.

5.3 Lexical bundles and the BCC study

Some lexical bundles in this study were similar to those examined in the BCC study (one of the things, one of the most) while others were unique to the YALE corpus.
(as you can see, on the other hand, we’ll talk about, we’ve talked about, that is to say, and it turns out that). In Biber et al. (2004), one of the things and one of the most were classified as referential expressions that identify or focus on the noun phrase that follows the lexical bundle. In that study, identification/focus referential expressions could also have a discourse-organizing function such as introducing a topic for discussion, “One of the things they stress in parenting is to be consistent and particularly with parents um some parents are inconsistent between siblings” (p. 394). In other words, one of the things was usually used to identify an entity but at other times it signaled discourse structure indicating the beginning of a new topic, which in the previous example is parenting and consistency. Although identification/focus bundles could also function as discourse-organizing bundles in the BCC study, this study shows how these two functions are reflected in their prosody. Specifically, when the pitch range for the lexical bundle one of the things is narrow, it usually functions as elaboration, but when it was used for emphasizing important information or introducing a topic, the pitch range was wide.

However, not all lexical bundles in this study displayed prosodic variation, instead having a fixed discourse function and a fixed prosodic pattern. This may indicate that the functions of lexical bundles are better explained along two interacting continua (Figure 5.4). The horizontal continuum includes lexical bundles that range from being detachable (it turns out that), usually intact (one of the things, one of the most) to always intact (that is to say, we’ve talked about, we’ll talk about, we’re talking about, on the other hand, as you can see). Detachable lexical bundles have the potential to have a break where 37% instances of it turns out that were eliminated due to a break between it turns
out and that in comparison to no breaks for most of the remaining lexical bundles. For example, there were few instances of that is to say where there was a pause between that is and to say. The vertical continua include lexical bundles with a limited range to a wide range of discourse functions. The limited range lexical bundles range from having a 1:1 mapping between prosodic variation and discourse function, mostly closely related functions (on the other hand, as you can see) to distinctly varied discourse functions (one of the most, one of the things). Closely related lexical bundles operate at the same rhetorical organization level where the variation in meaning is minimal. Specifically, most instances of as you can see are used referentially to refer to general versus specific information. Also, one the other hand is always used as a discourse organizer to contrast major or minor information.

**Figure 5.4.** Interacting continua of intactness and range of functions

Other lexical bundles, such as one of the most, were used for a variety of functions from signaling expansion on previous information to emphasizing important
information and introducing topics. Similarly, *one of the things* was used for a variety of functions providing background information, emphasizing important information, and introducing topics. Therefore, these two interacting continua include lexical bundles that are intact and limited in range of discourse function, intact with a wide range of discourse functions, detachable with limited range discourse functions, and detachable with wide range of discourse functions. Most of the lexical bundles fall into two categories: those intact and limited in range of discourse function and those detachable with wide range of discourse function. The lexical bundles that had no variation in prosody or function with a higher possibility of staying intact could be regarded as more formulaic (e.g., *that is to say*) in contrast to those that showed no variation in prosody or function but have less potential to remain intact (*it turns out that*). Also, lexical bundles that have limited prosodic variation and functions could be viewed as more formulaic than others that show a wider variety of prosodic variation and form.

Future analysis of spoken lexical bundles may examine lexical bundles with other functions such as imprecision bundles (e.g., *or something like that*) or quantity specification bundles (e.g., *a little bit more*) (Biber et al., 2004) to see if they vary in function and prosodic in ways that are similar to the lexical bundles in this study. Also, examining the same lexical bundle across different registers such as conversation versus lectures versus news broadcasts, for instance, may provide insight to whether there are similar patterns in range of functions and prosodic intactness.

### 5.4 Lexical bundles and formulaic expressions

Lexical bundles often demonstrated patterns different from formulaic expressions. Formulaic expressions have been found to occur mainly at the end of an intonation unit or occupy a whole unit where the first word, degree word, or the flexible word in a
recurrent word sequence (e.g., *as far as X is concerned*) was usually prominent (Lin, 2013). Although lexical bundles are not formulaic expressions, they are similar in that both are multi-word sequences. In this study, most of the lexical bundles did not occupy a whole intonation unit except on the other hand. Also, formulaic expressions that did not receive prominence were classified as losing pragmatic meaning (Lin, 2013). However, this is not the case in epistemic parentheticals (e.g., *I believe*), where position in an intonation unit and absence of prominence indicates that they are used for a pragmatic function such as politeness or as verbal fillers rather than for their literal meaning of uncertainty or personal opinion (Dehé & Wichmann, 2010). When used literally to express speaker attitude, they usually occupied a full intonation unit and were prominent. Examples a to c below from Dehé and Wichmann (2010) illustrate the prosodic variations of epistemic parenthetical *I think* and *I suppose* and their relation to their meaning in discourse. In example (a), the speaker expresses genuine opinion and *think* is prominent occupying a full intonation unit (separated by slashes). In (b), *I think* is used as a mitigator and is non-prominent, occupying part of an intonation unit. In (c), *I suppose* expresses hesitation and is similar to the prosody in (b) only different from it occurring with another hesitant marker *uhm* emphasizing its use as a verbal filler.

a) I mean it’s basically Alexander Technique /I think/ (ICE-GB: s1a-045#32) that based on it a lot <,> and the movements <,> the straight back (ICE-GB: s1a-045 #33)

b) /The voters I think/ just have an opportunity to stick two fingers up to whoever seems to be on top at the moment (ICE-GB: s1b-029#92)

c) There’s no point in /uhm <,>I suppose/ undertaking experiments if people
can’t read them ... (ICE-GB: s1a-059#286)

In other cases, lexical bundles seemed to have distinct patterns from formulaic expressions and epistemic parentheticals. When they were produced with a high pitch and were prominent, they usually indicated a major transition in discourse such as introducing a topic, signaling importance, and contrasting major ideas. When signaling a minor transition such by expanding a topic through providing background information or specific details, they were usually produced with a low pitch and are non-prominent. This is different from another discourse-organizing cue, now, that tended to be prominent when used as a deictic, thus used non-cohesively, compared to its non-prominent cohesive use when used to start a new proposition (Hirschberg & Litman, 1987).

Although some lexical bundles demonstrated prosodic variation linked to discourse function, others did not. This may indicate that some lexical bundles have a rather fixed function and prosody and might be more formulaic in comparison to those lexical bundles that show variation in prosody and function. This is somewhat similar to Dehé and Wichmann (2010) where epistemic parentheticals demonstrated different discourse functions along a continuum from being literal to being more grammaticalized, i.e., formulaic, with a tendency to be used as a filler rather for their genuine meaning. Similarly, lexical bundles demonstrated a tendency from being multi-functional to being mono-functional. Therefore, this might indicate that prosody is crucial to understanding the multi-functional lexical bundles but is less important to monofunctional bundles that show little variation.

5.5 Speech annotation tools

Understanding how the prosodic features of lexical bundles contribute to discourse function could impact speech annotation tools. Speech annotation tools can use
prosodic information such as peak height, pitch range, initial pitch, and duration to inform their lexical-prosodic models, divide speech topically, and detect clause boundaries. Automatic speech annotation tools may also benefit from research on the prosody of lexical bundles and how prosody is related to their discourse functions they perform. For example, knowing which lexical items are likely to receive prominence may benefit lexical-prosodic models used in automatic speech recognition programs (Ananthakrishnan & Narayanan, 2008). Specifically, lexical prosodic may use information on which words are likely to receive prominence within the lexical bundle and where intonation boundaries are likely to fall given that some lexical bundles are likely to be more intact that others. Another implication from findings on the prosody of lexical bundles and their discourse functions can be developing a speech annotator program that can divide speech topically, i.e., annotating discourse function of speech such as the start of a new topic, by using information on prosodic features of lexical bundles. This type of information is needed in long duration recordings of spontaneous speech where topic detection is an issue (Barras, Geoffrois, Wu, & Liberman, 2001). Also, the availability of prosodic information can be used to detect clause boundaries in syntactically unambiguous word sequences where it is difficult to detect a clause boundary, especially in spontaneous speech (Batliner, Kompe, Kießling, Mast, Niemann, & Nöth, 1998). Therefore, knowledge of the prosodic features of lexical bundles can be used to predict where clausal boundaries are likely to occur.

5.6 Teaching implications

As discourse-organizing cues, the prosody of lexical bundles may have an important contribution to comprehensible and coherent speech. Comprehensible speech refers to understanding the meaning of a word or utterance (Smith & Nelson, 1985). The
discourse function of discourse organizing lexical bundles in this study were differentiated mainly by peak height and pitch range. Therefore, it may be more important to help student vary their range of pitch rather than making specific pitch movements such as fall-rise, rise, or peak since the former is what differentiated the discourse functions of lexical bundles but rarely the type of pitch movement. Previous studies have found that one of the reasons for incoherent speech is the lack of discourse-organizing devices that act as contextualization cues creating logical and prominence relationships between ideas forming a hierarchal discourse structure (Tyler, 1992a; 1992b; 1994). These devices can signal the beginning of topics at major rhetorical structures (DeCarrico & Nattinger, 1988) or create causal or temporal relationships between two propositions at minor junctures (Tyler, 1994). Also, prosody has been shown to create cohesive ties at major and minor rhetorical junctures that helps create coherent and comprehensible speech (Muller Levis, Levis, & Slater, 2012; Wennerstrom, 1998; Wichmann, 2000). Therefore, the unexpected use of pitch at major and minor transitions in discourse may provide misguiding cues to the listener as to whether the speaker wishes to introduce a topic, elaborate on a previous topic, or mark relative importance. For example, a narrow pitch range at the beginning of topics, rather than a high pitch, can be a reason for incoherent and incomprehensible speech (Levis Muller, Levis, & Slater, 2012). In addition to the incorrect use of pitch at topic boundaries, incomprehensibility may be due to wrong placement of stress may affect student recall of content information (Hahn, 2004). On the other hand, there are no studies that examine the prosody of lexical bundles as discourse organizing devices and how their prosody contributes to their cohesive role in discourse.
This study sheds light on how prosodic variation across major propositions and between minor propositions in academic lectures contributes to spoken coherence, which suggests that the cohesive functions of spoken lexical bundles in academic lectures can be better understood when considering their prosody. Given that some lexical bundles show prosodic variation according to their discourse functions, future studies can examine the perception of students to nonnative prosodic patterns of discourse-organizing lexical bundles and whether it affects comprehension and recall of information. International teaching assistants are one target group that can benefit from instruction on how to deliver comprehensible and coherent lectures. Learning how to vary pitch according to the type of information being presented, i.e., whether they are introducing a topic in a lecture, emphasizing important information, or presenting background information, is crucial. Equally important is knowing what discourse-organizing cues to use depending on the purpose of the message. In other words, if the instructor is introducing a topic for current discussion, it is expected to use an appropriate discourse-organizing bundle, such as we’re talking about rather than we’ll talk about, to match the purpose of the message. Therefore, using appropriate discourse-organizing phrases with conventional prosodic patterns is key to successful lecture delivery.

5.7 Further research and limitations

This research sheds light on the importance of examining prosody of discourse-organizing lexical bundles to gain a deeper understanding of how prosody contributes to their discourse function. The discourse-organizing functions of lexical bundles as subphrasal units were found to be differentiated from each other according to pitch height, pitch range, initial pitch, and duration. Also, this study proposed a rudimentary intonation model for discourse-organizing lexical bundles that categorizes lexical bundles
according to the range of discourse functions and phonological coherence. It also suggested another classification for the cohesive role of discourse-organizing lexical bundles signaling major and minor rhetorical functions rather than new and given information. Future research can investigate whether the prosodic measures used in this study helps differentiate across other lexical bundles. Also, future studies can test whether the range of discourse functions and phonological coherence and major versus minor rhetorical organization classification proposed in this study can be used for other lexical bundles. In addition, further research could examine the prosodic variation of different discourse-organizing lexical bundles across registers to develop an intonation examine how discourse-organizing lexical bundles are perceived by students and whether they affect comprehension and recall of content information. Also, studies could develop instructional materials used to teach students about discourse organization in lectures relative to their authentic use in lectures. Particularly, such studies could evaluate whether language-learning materials use authentic examples of discourse organizers that students are likely to encounter. For instance, researchers can examine whether listening materials incorporate discourse organizers with prosodic patterns that are similar to those likely to be heard in university lectures.

On the other hand, there were certain limitations to this research. Future research could aim for a more balanced corpus between female and male lecturers which would allow for a better representation of prosodic patterns in different types of voices. Also, this research can be furthered by examining more data. Specifically, more instances per lexical bundle could potentially be used with a predication model, such as logistic regression, to understand the significance of association between discourse function and
prosody. Also, the selection of lexical bundles could be expanded to include other types of functions. Given the evidence that prosody and discourse functions are often connected, the number of courses used in the corpus could be increased to include a wider selection of courses within Humanities and Science disciplines. In addition, the prosodic features examined in this study were limited to pitch movement and prominence. Future research can examine more prosodic features such as loudness that may be related to the discourse function of lexical bundles. Finally, although a labor-intensive process, a prosodically annotated corpus would provide a larger scope of analysis beyond the lexical bundle. This would provide a better insight into how the prosodic features of lexical bundles are realized within a full utterance.

As a conclusion, the prosodic features and discourse functions of lexical bundles examined in this study showed how discourse organization is dual-faceted, where prosodic aspects of language are needed to understand the rhetorical organization of information in university lectures. The findings from this research could be advanced to have applications in theoretical models of intonation, language learning, and speech annotation tools.
REFERENCES


Biber, D. 2010. Corpus-based and Corpus-driven analyses of Language Variation and Use. In B. Heine and H. Narrog (Eds.), *The Oxford Handbook of Linguistic Analysis*, (pp. 159-192.) Oxford University Press.


Egbert, J. (forthcoming). Corpus design and representativeness. In T. Sardinha and M. V. Pinto (Eds.), Multi-dimensional analysis: Research methods and current issues (pp. 27-42). London: Bloomsbury Academic


## APPENDIX A. GLOSSARY OF TERMS

### Table A.1. Glossary of terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-word sequences</td>
<td>word strings that occur together forming a particular pattern</td>
</tr>
<tr>
<td>Discourse</td>
<td>Instances of language use that are influences and can be interpreted using linguistic situational social psychological and pragmatic factors (Biber et al., 1999)</td>
</tr>
<tr>
<td>Register</td>
<td>It refers to the varieties of language such as conversation, fiction, and academic prose (Biber et al., 1999)</td>
</tr>
<tr>
<td>Co-occurrence</td>
<td>Occurring together with a particular frequency</td>
</tr>
<tr>
<td>Discourse-organizing $\Omega$-function</td>
<td>The logical organization of information in discourse organized so that the listener/reader understands how ideas are connected to each other such as when a new topic is signaled versus how specific details that elaborate on the main topic are signaled</td>
</tr>
<tr>
<td>Information structure</td>
<td>refers to how new and given information are organized within discourse. New information is information that has not been mentioned previously within a context, in contrast to given information that has occurred previously.</td>
</tr>
<tr>
<td>Prosody</td>
<td>suprasegmental features of language such as pitch, loudness, timing (which includes pauses), and voice quality</td>
</tr>
<tr>
<td>Prominence</td>
<td>to pitch accents on words or syllables that receive focus within an intonation unit.</td>
</tr>
<tr>
<td>Prosodic variation</td>
<td>The change in prosodic features such as change of pitch or loudness</td>
</tr>
<tr>
<td>Pitch</td>
<td>The upward or downward movement of pitch</td>
</tr>
<tr>
<td>Intonation unit</td>
<td>a spoken phrase that is marked by finality cues such as pauses or lowering in pitch</td>
</tr>
<tr>
<td>Lexical bundle</td>
<td>a term coined by Biber et al. (1999), are recurrent expressions that occur at least ten times per million in at least 5 different texts in a corpus.</td>
</tr>
<tr>
<td>Topic introduction</td>
<td>It refers to the discourse function of introducing a topic for discussion in a lecture</td>
</tr>
<tr>
<td>Major rhetorical role</td>
<td>It refers to a major transition in discourse such as introducing a topic.</td>
</tr>
<tr>
<td>Minor rhetorical role</td>
<td>It refers to a minor transition in discourse such as exemplification.</td>
</tr>
<tr>
<td>Exemplification</td>
<td>It refers to providing an example to illustrate an idea.</td>
</tr>
<tr>
<td>Formulaic language</td>
<td>Routinized chunks of language</td>
</tr>
</tbody>
</table>
APPENDIX B. LEXICAL BUNDLES in YALE CORPUS

The following is the list of lexical bundles extracted from the Yale corpus which occurred 40 times per million in a range of 20 lectures.

Table B.1. List of lexical bundles in the Yale corpus

<table>
<thead>
<tr>
<th>#</th>
<th>Frequency</th>
<th>Range</th>
<th>Lexical bundles</th>
<th>#</th>
<th>Frequency</th>
<th>Range</th>
<th>Lexical bundles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>559</td>
<td>102</td>
<td>we’re going to</td>
<td>34</td>
<td>78</td>
<td>45</td>
<td>you look at the</td>
</tr>
<tr>
<td>2</td>
<td>405</td>
<td>108</td>
<td>I’m going to</td>
<td>35</td>
<td>77</td>
<td>48</td>
<td>a little bit of</td>
</tr>
<tr>
<td>3</td>
<td>187</td>
<td>84</td>
<td>you’re going to</td>
<td>36</td>
<td>77</td>
<td>44</td>
<td>if you have a</td>
</tr>
<tr>
<td>4</td>
<td>183</td>
<td>48</td>
<td>you can see that</td>
<td>37</td>
<td>76</td>
<td>57</td>
<td>it’s not a</td>
</tr>
<tr>
<td>5</td>
<td>172</td>
<td>63</td>
<td>we’ll talk about</td>
<td>38</td>
<td>75</td>
<td>48</td>
<td>it’s a very</td>
</tr>
<tr>
<td>6</td>
<td>170</td>
<td>59</td>
<td>it’s going to</td>
<td>39</td>
<td>74</td>
<td>48</td>
<td>and we’re going</td>
</tr>
<tr>
<td>7</td>
<td>166</td>
<td>38</td>
<td>and you can see</td>
<td>40</td>
<td>74</td>
<td>50</td>
<td>one of the most</td>
</tr>
<tr>
<td>8</td>
<td>160</td>
<td>57</td>
<td>s going to be</td>
<td>41</td>
<td>74</td>
<td>46</td>
<td>s a lot of</td>
</tr>
<tr>
<td>9</td>
<td>149</td>
<td>69</td>
<td>is going to be</td>
<td>42</td>
<td>74</td>
<td>50</td>
<td>we don’t have</td>
</tr>
<tr>
<td>10</td>
<td>143</td>
<td>65</td>
<td>going to talk about</td>
<td>43</td>
<td>73</td>
<td>49</td>
<td>of the things that</td>
</tr>
<tr>
<td>11</td>
<td>142</td>
<td>37</td>
<td>you can see the</td>
<td>44</td>
<td>71</td>
<td>50</td>
<td>so there’s a</td>
</tr>
<tr>
<td>12</td>
<td>139</td>
<td>23</td>
<td>as you can see</td>
<td>45</td>
<td>71</td>
<td>21</td>
<td>the way in which</td>
</tr>
<tr>
<td>13</td>
<td>124</td>
<td>68</td>
<td>I don’t know</td>
<td>46</td>
<td>71</td>
<td>40</td>
<td>we don’t know</td>
</tr>
<tr>
<td>14</td>
<td>123</td>
<td>60</td>
<td>if you look at</td>
<td>47</td>
<td>71</td>
<td>16</td>
<td>you can see here</td>
</tr>
<tr>
<td>15</td>
<td>117</td>
<td>60</td>
<td>the end of the</td>
<td>48</td>
<td>70</td>
<td>52</td>
<td>the rest of the</td>
</tr>
<tr>
<td>16</td>
<td>116</td>
<td>67</td>
<td>you don’t have</td>
<td>49</td>
<td>69</td>
<td>34</td>
<td>and so on and</td>
</tr>
<tr>
<td>17</td>
<td>109</td>
<td>58</td>
<td>we’re talking about</td>
<td>50</td>
<td>69</td>
<td>47</td>
<td>and this is the</td>
</tr>
<tr>
<td>18</td>
<td>106</td>
<td>56</td>
<td>one of the things</td>
<td>51</td>
<td>68</td>
<td>46</td>
<td>or something like that</td>
</tr>
<tr>
<td>19</td>
<td>106</td>
<td>50</td>
<td>re going to talk</td>
<td>52</td>
<td>68</td>
<td>43</td>
<td>re going to be</td>
</tr>
<tr>
<td>20</td>
<td>102</td>
<td>66</td>
<td>if you want to</td>
<td>53</td>
<td>68</td>
<td>48</td>
<td>to do with the</td>
</tr>
<tr>
<td>21</td>
<td>99</td>
<td>57</td>
<td>at the same time</td>
<td>54</td>
<td>67</td>
<td>43</td>
<td>I think it’s</td>
</tr>
<tr>
<td>22</td>
<td>99</td>
<td>40</td>
<td>in the case of</td>
<td>55</td>
<td>67</td>
<td>45</td>
<td>re going to have</td>
</tr>
<tr>
<td>23</td>
<td>98</td>
<td>59</td>
<td>at the end of</td>
<td>56</td>
<td>66</td>
<td>50</td>
<td>and that’s the</td>
</tr>
<tr>
<td>24</td>
<td>93</td>
<td>41</td>
<td>that’s going to</td>
<td>57</td>
<td>66</td>
<td>33</td>
<td>and we’ll talk</td>
</tr>
<tr>
<td>25</td>
<td>91</td>
<td>65</td>
<td>is one of the</td>
<td>58</td>
<td>64</td>
<td>47</td>
<td>and there’s a</td>
</tr>
<tr>
<td>26</td>
<td>89</td>
<td>62</td>
<td>don’t have to</td>
<td>59</td>
<td>64</td>
<td>46</td>
<td>but it’s not</td>
</tr>
<tr>
<td>27</td>
<td>89</td>
<td>50</td>
<td>it turns out that</td>
<td>60</td>
<td>64</td>
<td>5</td>
<td>the house of the</td>
</tr>
<tr>
<td>28</td>
<td>86</td>
<td>34</td>
<td>that is to say</td>
<td>61</td>
<td>63</td>
<td>47</td>
<td>a little bit about</td>
</tr>
<tr>
<td>29</td>
<td>86</td>
<td>54</td>
<td>to be able to</td>
<td>62</td>
<td>63</td>
<td>39</td>
<td>has to do with</td>
</tr>
<tr>
<td>30</td>
<td>82</td>
<td>48</td>
<td>what’s going to</td>
<td>63</td>
<td>63</td>
<td>37</td>
<td>I want you to</td>
</tr>
<tr>
<td>31</td>
<td>79</td>
<td>38</td>
<td>let’s look at</td>
<td>64</td>
<td>63</td>
<td>43</td>
<td>if you don’t</td>
</tr>
<tr>
<td>32</td>
<td>79</td>
<td>46</td>
<td>there’s a lot</td>
<td>65</td>
<td>62</td>
<td>44</td>
<td>so it’s a</td>
</tr>
<tr>
<td>33</td>
<td>78</td>
<td>16</td>
<td>the mass of the</td>
<td>66</td>
<td>62</td>
<td>48</td>
<td>so that’s the</td>
</tr>
</tbody>
</table>
Table B.2. Continuation of list of lexical bundles in the Yale corpus

<table>
<thead>
<tr>
<th>#</th>
<th>Frequency</th>
<th>Range</th>
<th>Lexical bundles</th>
<th>#</th>
<th>Frequency</th>
<th>Range</th>
<th>Lexical bundles</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>62</td>
<td>46</td>
<td>this is one of</td>
<td>102</td>
<td>46</td>
<td>23</td>
<td>can see that the</td>
</tr>
<tr>
<td>68</td>
<td>61</td>
<td>39</td>
<td>in the middle of</td>
<td>103</td>
<td>46</td>
<td>35</td>
<td>re going to do</td>
</tr>
<tr>
<td>69</td>
<td>61</td>
<td>42</td>
<td>so this is a</td>
<td>104</td>
<td>46</td>
<td>30</td>
<td>so i m going</td>
</tr>
<tr>
<td>70</td>
<td>58</td>
<td>47</td>
<td>but it’s a</td>
<td>105</td>
<td>46</td>
<td>36</td>
<td>so it’s not</td>
</tr>
<tr>
<td>71</td>
<td>58</td>
<td>41</td>
<td>that there’s a</td>
<td>106</td>
<td>46</td>
<td>33</td>
<td>the fact that the</td>
</tr>
<tr>
<td>72</td>
<td>58</td>
<td>24</td>
<td>you can see it</td>
<td>107</td>
<td>46</td>
<td>22</td>
<td>the surface of the</td>
</tr>
<tr>
<td>73</td>
<td>57</td>
<td>43</td>
<td>and that’s what</td>
<td>108</td>
<td>45</td>
<td>31</td>
<td>at the beginning of</td>
</tr>
<tr>
<td>74</td>
<td>57</td>
<td>38</td>
<td>so that’s a</td>
<td>109</td>
<td>45</td>
<td>23</td>
<td>re going to see</td>
</tr>
<tr>
<td>75</td>
<td>57</td>
<td>40</td>
<td>that’s what we</td>
<td>110</td>
<td>45</td>
<td>37</td>
<td>this is a very</td>
</tr>
<tr>
<td>76</td>
<td>57</td>
<td>29</td>
<td>the center of the</td>
<td>111</td>
<td>45</td>
<td>30</td>
<td>what’s going to</td>
</tr>
<tr>
<td>77</td>
<td>57</td>
<td>33</td>
<td>we’ve talked about</td>
<td>112</td>
<td>45</td>
<td>32</td>
<td>when we get to</td>
</tr>
<tr>
<td>78</td>
<td>56</td>
<td>36</td>
<td>are going to be</td>
<td>113</td>
<td>44</td>
<td>31</td>
<td>a lot of the</td>
</tr>
<tr>
<td>79</td>
<td>56</td>
<td>34</td>
<td>on the other hand</td>
<td>114</td>
<td>43</td>
<td>33</td>
<td>i m not going</td>
</tr>
<tr>
<td>80</td>
<td>55</td>
<td>43</td>
<td>and it’s a</td>
<td>115</td>
<td>43</td>
<td>22</td>
<td>in the form of</td>
</tr>
<tr>
<td>81</td>
<td>55</td>
<td>44</td>
<td>s one of the</td>
<td>116</td>
<td>43</td>
<td>25</td>
<td>s going to happen</td>
</tr>
<tr>
<td>82</td>
<td>55</td>
<td>32</td>
<td>so we’re going</td>
<td>117</td>
<td>43</td>
<td>9</td>
<td>you can also see</td>
</tr>
<tr>
<td>83</td>
<td>54</td>
<td>32</td>
<td>i ll show you</td>
<td>118</td>
<td>42</td>
<td>30</td>
<td>if you re going</td>
</tr>
<tr>
<td>84</td>
<td>54</td>
<td>28</td>
<td>in the nineteenth century</td>
<td>119</td>
<td>42</td>
<td>33</td>
<td>m not going to</td>
</tr>
<tr>
<td>85</td>
<td>53</td>
<td>38</td>
<td>don’t want to</td>
<td>120</td>
<td>42</td>
<td>31</td>
<td>s a little bit</td>
</tr>
<tr>
<td>86</td>
<td>53</td>
<td>39</td>
<td>re not going to</td>
<td>121</td>
<td>42</td>
<td>32</td>
<td>that this is a</td>
</tr>
<tr>
<td>87</td>
<td>52</td>
<td>31</td>
<td>if we look at</td>
<td>122</td>
<td>42</td>
<td>28</td>
<td>they re going to</td>
</tr>
<tr>
<td>88</td>
<td>52</td>
<td>33</td>
<td>it has to be</td>
<td>123</td>
<td>42</td>
<td>19</td>
<td>want to show you</td>
</tr>
<tr>
<td>89</td>
<td>52</td>
<td>38</td>
<td>the middle of the</td>
<td>124</td>
<td>41</td>
<td>19</td>
<td>going to look at</td>
</tr>
<tr>
<td>90</td>
<td>51</td>
<td>41</td>
<td>and this is a</td>
<td>125</td>
<td>41</td>
<td>21</td>
<td>i want to show</td>
</tr>
<tr>
<td>91</td>
<td>51</td>
<td>26</td>
<td>how many of you</td>
<td>126</td>
<td>41</td>
<td>22</td>
<td>it’s as if</td>
</tr>
<tr>
<td>92</td>
<td>51</td>
<td>6</td>
<td>style roman wall painting</td>
<td>127</td>
<td>41</td>
<td>35</td>
<td>it’s not the</td>
</tr>
<tr>
<td>93</td>
<td>50</td>
<td>29</td>
<td>ll talk about that</td>
<td>128</td>
<td>41</td>
<td>21</td>
<td>re going to look</td>
</tr>
<tr>
<td>94</td>
<td>48</td>
<td>37</td>
<td>a little bit more</td>
<td>129</td>
<td>41</td>
<td>32</td>
<td>so this is the</td>
</tr>
<tr>
<td>95</td>
<td>48</td>
<td>38</td>
<td>and i m going</td>
<td>130</td>
<td>41</td>
<td>32</td>
<td>so you have to</td>
</tr>
<tr>
<td>96</td>
<td>48</td>
<td>29</td>
<td>and i want to</td>
<td>131</td>
<td>41</td>
<td>37</td>
<td>that s not the</td>
</tr>
<tr>
<td>97</td>
<td>48</td>
<td>36</td>
<td>i don’t think</td>
<td>132</td>
<td>41</td>
<td>30</td>
<td>you ve got to</td>
</tr>
<tr>
<td>98</td>
<td>48</td>
<td>26</td>
<td>over and over again</td>
<td>133</td>
<td>40</td>
<td>26</td>
<td>i ll talk about</td>
</tr>
<tr>
<td>99</td>
<td>47</td>
<td>27</td>
<td>in the course of</td>
<td>134</td>
<td>40</td>
<td>25</td>
<td>is a kind of</td>
</tr>
<tr>
<td>100</td>
<td>47</td>
<td>33</td>
<td>m going to talk</td>
<td>135</td>
<td>40</td>
<td>27</td>
<td>the beginning of the</td>
</tr>
<tr>
<td>101</td>
<td>47</td>
<td>30</td>
<td>turns out to be</td>
<td>136</td>
<td>40</td>
<td>32</td>
<td>what we’re going</td>
</tr>
</tbody>
</table>
APPENDIX C. CODING GUIDE

The following is the detailed coding guide used to code the discourse functions of the lexical bundles examined in this study.

*As you can see* had three functions:

- Calling attention to specific details. When calling attention for specific details a description of specific details about an entity in a picture in a presentation slide, for example, either followed or preceded the lexical bundle. For example, “… and it’s the first time we’ve seen this today--of arches with columns interspersed, columns placed, engaged or attached into the wall, in between these arcades, *as you can see* here.” <HSAR252_Spring2009_lec3>. In this example, the speaker is explaining the specific details of how columns and arches are designed in a display presented in the classroom.

- Calling attention to general details. When calling attention for a general description of an entity such as a location of a place, the description either followed or preceded the lexical bundle. For example, “Herculaneum is to the northeast of Pompei, closer to Naples than Pompei is *as you can see.*” <HSAR252_Spring2009_lec6>. In this example, there is no specific description of an entity but rather a general description of the location of a place, i.e., Herculaneum being northeast of Pompei.

- Introducing a topic. The topic for discussion is introduced after the lexical bundle. This topic is the main idea that is elaborated on through specific details later in the discourse. For example, “As you can see from today’s lecture title, we’re going to be talking about painting palaces and villas in the first century A.D..”
The topic introduced in this example is painting palaces and villas which is the discussion topic for the lecture.

*One of the most* had three discourse functions.

- **Expansion.** This function refers to the addition of information that serves the purpose of clarification. The expansion of information can be in a number of ways such as expansion through providing specific details, or providing background information. For example, “But very much of the Athenian soil is mountainous and pretty close to barren, so that you don’t have a lot of rich soil. This is not *one of the most* admirable places to come.” <CLCV205_Sept2007_lec10.txt>. In this example, the main topic is that Athenian soil is barren and then the speaker provides background about Athens explaining that this type of soil makes this area of Athenians unappealing to visit.

- **Introducing a topic.** The topic for discussion is introduced after the lexical bundle. This topic is the main idea that is elaborated on through specific details later in the discourse. For example, “Now, *one of the most* important moments of the French Revolution — and this is also worth remembering, and you can read about it — is the civil constitution of the French clergy. The revolutionaries get the very good idea that you’re broke. We already know that. The monarchy is just flat broke, so where are you going to get the money? Who has money? Well, nobles who leave France have money, because they have a lot of property, particularly in areas like Brittany and in Burgundy and in Ile-de-France, around Paris. But the church has enormous amounts of money, enormous amounts of land. What they do is they essentially nationalize the church, the details you can get, and they force people to take an oath to the French Revolution, to the nation.” <HIST202_Fall2008_lec6.txt>. In this example, the main
topic is “civil constitution of the French clergy” which is being introduced by one of the most. This main idea is elaborated upon later where details are given about how the revolutionaries managed to find funding through French nobles and the church.

- Emphasizing important information. The lexical bundle is used to emphasize on the importance of a proposition. The important information follows one of the most and is usually recognized by emphasis provided through prominence on one. For example, “Because this is one of the most famous passages in the treatise, and it’s not one that we actually looked at for Mammon himself, I’m going to ask you to turn to Areopagitica.” <ENGL220_Fall2007_lec10.txt>. In this example, the speaker is emphasizing the importance of a specific passage by explaining that is it’s a popular passage that requires special attention and so they will read the whole speech of Areopagitica.

One of the things had three discourse functions.

- Providing background information. Necessary background information is provided after the lexical bundle to help students understand previous information. For example, “When he was lodged, he liked living in your basic Russian, wooden, peasant house, such as you could find on the outskirts of Moscow. One of the things that’s very true about Moscow, right into the twentieth century, is that you had all sorts of peasants living on the edge of Moscow living in these wooden houses.” <HIST202_Fall2008_lec4>. The speaker takes about someone who liked to live in peasant style Russian wooden houses that are found in the outskirts of Moscow. He then finds a need to provide a background about such houses explaining that in the twentieth century, peasants lived in the outskirts of Moscow in wooden houses.
Introducing a topic. The topic for discussion is introduced after the lexical bundle. This topic is the main idea that is elaborated on through specific details later in the discourse. For example, “So *one of the things* that Jesus is, also in Matthew, is a teacher. Mark had told us in his Gospel that Jesus was a great teacher, and people said, Wow, he’s a great teacher, He teaches not like the scribes and the Pharisees. He teaches as one with authority. Mark didn’t really tell us much of what Jesus taught.”<RLST152_Spring2009_lec7>. In this example, the speaker states a main proposition that is introduced by *one of the things* which is that Jesus, as stated in Mathew, is a teacher. He then elaborates on this main proposition explaining what and how Jesus teaches.

Emphasizing important information. The lexical bundle is used to emphasize on the importance of a proposition. The important information follows *one of the things* and is usually recognized by emphasis provided through prominence through prominence on *one*. For example, “So this particular example of a plasmid has several regions. Now, in your book, there’s an example of plasmid where I’ve given you the exact sequence of nucleotides that makes up the whole double stranded DNA molecule. I just give you one of those, right, because you could write down the other one because you know the other complimentary sequence from base pairing? But *one of the things* about these plasmids that makes them very useful is that their entire base pair sequences is known. So you know everywhere on this picture you could write down exactly what the sequence of nucleotides are that make up this vector.”<BENG100Jan2008_lec4>. In this example, the instructor is talking about sequencing of nucleotides in plasmids. He uses *one of the things* to emphasize the uniqueness of a
special type of plasmid. This signaling of importance is realized through prosody (prominence of one) rather than through text itself.

*On the other hand* had two discourse functions.

- Major contrast. A main difference is introduced after the lexical bundle. For example, “Well, insulin is a protein, it’s produced by cells in the pancreas, it circulates in your blood. It can’t enter cells because it’s too big and it’s too water soluble so it can’t go through cell membranes. So, it interacts with receptors called insulin receptors that are on cells that are sensitive to insulin. Steroid hormones, *on the other hand*, molecules like testosterone and estrogen, progesterone, the sex steroids that determine sexual characteristics and are important for reproductive function are molecules that are all derived from a similar source. Many of them are derived from cholesterol and they’re hydrophobic, which means they can penetrate through cell membranes. So, it doesn’t need to bind to a receptor on the surface of the cell in order to work because the molecule can actually enter the cell directly.” <BENG100Feb2008_lec7>. In this example, the speaker is contrasting insulin with steroid hormones where the speaker finds a big difference between the two since insulin cannot penetrate cell membranes and so interacts with receptors on cells in contrast to steroid hormones that are cell permeable. The indication of major contrast is evident in the prosodic features of *one the other hand*, namely a relatively high peak.

- Minor contrast. A minor difference is introduced after the lexical bundle. For example, “Let me explain what I mean by that, we’ll come back to this later. If the orbit’s going this way, then it never comes towards you or goes away from you--it’s always going sideways. If, *on the other hand*, the orbit’s going this way, then first it
comes towards you, then it goes away from you. And if it’s somewhere in between, you only see part of the motion of the orbit in terms of radial velocity.”

<ASTR160Jan2007_lec4>. In this example, the speaker is contrasting a minor proposition in a discussion which is the motion of an orbit to explain what the observer will see in each case. The indication of minor contrast is evident in the prosodic features of *one the other hand*, namely a relatively low peak.

*We’re talking about* had two discourse functions.

- Elaboration. An explanation of a previous proposition through the addition of specific details where the addition of information serves the purpose of clarification. This is different from expansion of information in that elaboration is one of the ways to provide expansion of information. For example, “And the heat storage will be not the whole Earth, because it takes too long for heat to conduct in and out of a whole Earth—millions, if not hundreds of millions of years. So really the system *we’re talking about* is just the skin of the Earth, the first few meters.” <GG140_Fall2011_lec6.txt>. In this example, the instructor is talking about heat storage on Earth does not refer to the whole Earth. He then further elaborates after *we’re talking about* that what he is referring to is heat conduction on the skin of the Earth rather than the whole Earth. Therefore, the instructor uses *we’re talking about* to clarify previous information.

- Introducing a topic. The topic for discussion is introduced after the lexical bundle. This topic is the main idea that is elaborated on through specific details later in the discourse. For example, “Okay, so as I pointed out last time, *we’re talking about* "exoplanets" – planets around other stars. And the problem with exoplanets is you can’t see them directly. So, you can’t see the exoplanets directly as blobs of light in
the sky and so what do you do?” <ASTR160Jan2007_lec3.txt>. In this example, the instructor is stating the topic of discussion at the beginning of a lecture, hence the main proposition that is elaborated upon later.

We’ll talk about had two discourse functions.

- Topic connector. The lexical bundle creates a connection between two related propositions in discourse. For example, “We’ll talk about, in Lecture 11, about correlation energy, and we’ll talk in Lecture 32 about strain energy, and you’ll see that both of these are just words that are used to hide our ignorance.” <CHEM125ASept2008_lec1.txt>. In this example, the speaker is introducing two topics, correlation energy and strain energy, after we’ll talk about and is then making a connection between them which is that we have little knowledge of both of these terms.

- Introducing a future topic: The topic for discussion is introduced after the lexical bundle. This topic is the main idea that is elaborated on through specific details later in the discourse. For example, “You can see, in fact, the great Temple of Jupiter, the Capitolium of Pompeii, which we’ll talk about today, literally collapsing.” <HSAR252_Spring2009_lec4.txt. In this example, the instructor is introducing a topic, the Capitolium of Pompeii, that will be the focus of discussion in a later time of the lecture.

That is to say had one discourse function:

- Elaboration. An explanation of a previous proposition where the addition of information serves the purpose of clarification. For example, “But there is a difference and the critical difference is that a city contains a number of people who do
not provide for their own support. *That is to say*, they don’t produce food.”

*<CLCV205_Sept2007_lec2.txt>*. In this example, *that is to say* is used to clarify what “do not provide for their own support” means which refers to “they don’t produce food”.

*It turns out that* had one function:

- Elaboration. An explanation of a previous proposition through the addition of specific details where the addition of information serves the purpose of clarification. For example, “The civil authorities controlled what was left of the land, the kings and so forth, and *it turns out that* the serfs on the civil land had somewhat better conditions, somewhat more rights than on church lands.” *<MCDB150_Spring2009_lec6>*. In this example, the instructor is explaining the authoritative conditions at a specific period of time in history. He uses *it turns out that* to add more specific information to what has preceded which is that a specific class of people had more rights on civil land than church land.

*We’ve talked about* had one function:

- Introducing a past topic. The topic for discussion is introduced after the lexical bundle. This topic is the main idea that is elaborated on through specific details later in the discourse. For example, “Cell communication and immunology is what we’re going to - is the topic for this week. I don’t need to say too much probably about why cells need to communicate with each other but this is a schematic version. One way to draw sort of a schematic diagram of the operation of the human body where it shows separated organ systems and tries to show them in context. The respiratory system, for example, the renal system, the digestive system, these are examples - three
examples of organ systems that contact the external environment. *We’ve talked about*
the interesting way in which the digestive system contacts the external environment.
Depending on what you call external and internal environment, this path that I’m
tracing here, deep within your digestive system, is really directly connected to the
outside world through both ends.” <BENG100Feb2008_lec7.txt>. In this example,
the speaker uses *we’ve talked about* to introduce a topic that has been discussed in the
past.
APPENDIX D. PILOTED PROSODIC ANALYSIS

The piloted prosodic analysis attempted to find quantitative variables to measure prosody that could discriminate between the discourse functions of the lexical bundles. The quantitative variables that were piloted were relative duration and relative pitch. These variables were used as a means to find a common factor that could reflect prominence within the lexical bundle that is either achieved through syllable lengthening or heightened pitch.

The first measure used to quantify prominence was through calculating relative duration. This was done by dividing the duration per syllable of the lexical bundle by duration per syllable of the rest of the intonation unit as in Equation 1.

Equation 1. \[ \text{Relative Duration} = \frac{\text{Duration per syllable of LB}}{\text{Duration per syllable of rest of IU}} \]

First, the intonation unit that consists the lexical bundle was divided into two parts, the lexical bundle and what occurs after the lexical bundle until the end of the intonation unit (Figure 1). Using PRAAT, the duration of the lexical bundle (LB) was measured followed by the duration of the rest of the intonation unit (IU). Since duration could be affected by the number of syllables, the duration per syllable was calculated for the lexical bundle and the part occurring after the lexical bundle. This was done by dividing the duration of each section, i.e., the lexical bundle and the section occurring after the lexical bundle, by the number of syllables. Finally, to calculate relative duration, the duration per syllable of the lexical bundle was divided by the duration per syllable for the remaining of the intonation unit following the lexical bundle. For example, for the lexical bundle \textit{so there’s a} that was used in the pilot study, it was part of the intonation...
unit *so there’s a loss of potential*. To measure the duration per syllable of *so there’s a*, the duration of the lexical bundle, 0.42, is divided by the number of its syllables, 3, which equals to 0.14. Then, the duration per syllable for the rest of the intonation unit, i.e., *a loss of potential*, was calculated. To measure that, the duration of *a loss of potential* was divided by its number of syllables (2.33/5) which equaled 0.466. Finally, a ratio between the duration per syllable of the lexical bundle to the rest of the intonation unit was calculated by dividing the two durations which equaled to 0.3. In other words, the lexical bundle occupied 30% of the intonation unit. This procedure was used with different kinds of lexical bundles; i.e., those that did not contain content words such as *so there’s a* as well as those with content word such as *one of the things*.

**Figure D.1.** Schematic diagram of position of a lexical bundle within an intonation unit

Another method used to quantify prominence was calculating relative pitch. This was done by dividing the maximum pitch within the lexical bundle by the average pitch of the remaining of the intonation unit as in Equation 2.

**Equation 2.** Relative pitch $= \frac{\text{Maximum pitch within LB}}{\text{Average pitch of remaining of IU}}$

To find maximum pitch within the lexical bundle using PRAAT, the lexical bundle was selected from the longer audio and “get maximum pitch” was chosen from the pitch menu. Then, to find average pitch of the remaining section of the intonation
unit, the remaining section of the intonation unit was selected and “get pitch” was chosen from the pitch menu. Finally, to calculate relative pitch, the maximum pitch within the lexical bundle was divided by the average pitch of the remaining section of the intonation unit. For example, for the lexical bundle *one of the things* in the intonation unit “because *one of the things* about this equation is D1”, the maximum pitch of the lexical bundle within the lexical bundle is 256 Hz. The average pitch for the remaining section of the intonation unit, i.e., “about this equation is D1”, is 171. Therefore, relative pitch is $256/171$ which is 1.5. In other words, the lexical bundle is more prominent than the remaining part of the intonation unit.

After calculating relative duration and relative pitch, scatter plots were used, as preliminary analysis before proceeding to a regression model, to know if these variables potentially discriminated the different discourse functions. Scatter plots were plotted using relative duration as an independent variable and discourse functions as dependent variables. For example, *so there’s a* that had three discourse functions; drawing a conclusion, directive, and paraphrasing (Figure 2). As shown in the scatterplot, most of data points overlap indicating that all functions approximately have relative durations of the same length. This suggests that relative duration is not a discriminating variable across the different discourse functions. Scatter plots were also plotted using relative pitch as independent variable and discourse functions as a dependent variable. For example, *one of the things* had 9 discourse functions (Figure 3). As shown in the scatterplot, most of data points overlap indicating that all functions approximately have relative pitch of the same length. This suggests that relative pitch is not a discriminating variable across the different discourse functions.
Figure D.2. Scatterplot of relative duration to discourse function for so there’s a

Figure D.3. Scatterplot for relative and discourse function for one of the things
The problems that arises from using relative duration and relative pitch as measures for prominence might be that prominence could have been signaled by duration within the lexical bundle but by pitch within the remaining of the intonation unit. In other words, there is more than one variable at play that contribute to prominence. Therefore, these equations do not account for the multiple potential ways to signal prominence. Also, the duration per syllable or the average pitch of the remaining of the intonation unit as a denominator is problematic because the lexical bundle can occur at the end of the intonation unit leaving the denominator as zero as in the example “The use of that word revolution / is one of the things / that pushed the word revolution to its current meaning”. In addition, a common feature of spontaneous speech is filled pauses which causes a break in the intonation unit such as “That’s also very weird in terms of our theories of planetary formation because /uh / one of the things that /uh / our theories were designed to explain/ was the fact that all the major planets in our own Solar System have orbits that are close to circular.” In this example, there is one word in the intonation unit that has the lexical bundle because there is a filled pause “uh” which breaks the remaining of the intonation unit “our theories were designed to explain”. In other words, instead of “one of the things that our theories were designed to explain” where there is no filled pause in the middle of the intonation unit, a filled pause “uh” caused a separation in the intonation unit. Therefore, not all intonation units that contained a lexical bundle are produced consistently. This could have been the reason why relative pitch was not a good measurement for prominence.
APPENDIX E. TRANSCRIPTS OF LEXICAL BUNDLES AND PITCH CONTOURS

This Appendix consists of transcripts excerpts that include lexical bundles within their context. Also, the pitch contours generated by Praat follow each transcript excerpt and the discourse function of the lexical bundle. Each transcript excerpt start with the text file it was obtained from (i.e., the lecture). The text file name consists the course name, course number, month, and number of lecture. For example, in the file name ASTR160Jan2007_lec3, ASTR refers to Astronomy, 160 refers to the course number, Jan 2007 refers to the month, and lec3 refers to the lecture number. The abbreviations of courses and their names are in Table E.1.

<table>
<thead>
<tr>
<th>Course abbreviation</th>
<th>Course name</th>
<th>Course abbreviation</th>
<th>Course name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTR160</td>
<td>Astronomy 160</td>
<td>GG140</td>
<td>Geology and Geophysics</td>
</tr>
<tr>
<td>BENG100</td>
<td>Biomedical Engineering</td>
<td>HIST202</td>
<td>History</td>
</tr>
<tr>
<td>CHEM125A</td>
<td>Chemistry A</td>
<td>HSAR252</td>
<td>History of Arts</td>
</tr>
<tr>
<td>CHEM125B</td>
<td>Chemistry B</td>
<td>MCBD150</td>
<td>Molecular, Cellular and Developmental Biology</td>
</tr>
<tr>
<td>CLCV205</td>
<td>Classics 205</td>
<td>PLSC114</td>
<td>Political Science</td>
</tr>
<tr>
<td>EEB122</td>
<td>Ecology and Evolutionary Biology</td>
<td>PSYC110</td>
<td>Psychology</td>
</tr>
<tr>
<td>ENGL220</td>
<td>English</td>
<td>RLST152</td>
<td>Religious studies</td>
</tr>
</tbody>
</table>

As You Can See

<ASTR160Jan2007_lec3.txt> Now, Pluto wasn’t aligned properly to take part in this. This is--these are pictures of Pluto. This is a picture of Pluto from the ground. Here it is from the space telescope. As you can see, it’s got a moon. This is kind of all we know about Pluto at the moment.
Figure E.1 Fall-rise pitch contour pattern for *as you can see*

Discourse function: General reference

Prosodic pattern: Fall-rise

<CHEM125ASep2008_lec5.txt> Okay, so here’s light that comes in and out at a certain angle from the first one; three electrons worth of scattering from that, the ones that were on that plane — okay? — and four from the second plane. Now are the three and the four in-phase with one another? What condition would have to apply in order for those to be in-phase with one another? They have different path lengths, but if the paths differ by an integral number of wavelengths, then they’ll be in-phase with one another and reinforce. Okay? So there’s the path difference in red. If that happens to be — suppose the wavelength of the light, and the angle of the scattering — which also determines that path difference, *as you can see* — suppose that the wavelength and the angle are such that that happens to be one wavelength? Okay, so those are in-phase with one another; all seven will be scattering together. Right?
Aristotle and Plato, both sort of theoreticians of the polis each had an idea what’s the right size for the perfect polis. Aristotle said the right size is a place where all of the citizens, by which he meant the male adult citizens, could come to a central place and hear a speaker and that number comes out to be about 5,000 male adults. Plato, being a mathematician, as Aristotle was not, decided that the perfect polis would have 5,040 citizens. Why 5,040, you may ask; do we have any mathematicians among us who will give me a quick answer to that? Tell me does it mean the same thing as it has the greatest number of numbers that go into it equally? That’s the answer I heard. Is that all right? Okay, enough of this mathematical falderal. As you can see I don’t understand it.
Figure E.3. Peak pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Peak

<ENGL220_Fall2007_lec1.txt> Now *as you can see* from the handout, Milton is discussed in a very different manner a year later in a work published by Mary Astell in 1700 and in an even more remarkably feminist cry for the liberation of women from what she describes and characterizes as domestic oppression.

Figure E.4. Rise pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Rise
When in 1645 Milton finally publishes that first volume of poetry, the first poem that he places in this volume is the Nativity Ode, our poem today. And under this title, "On the Morning of Christ’s Nativity," appears -- as you can see from your text -- appears the subtitle, "composed 1629."

**Figure E.5.** Rise pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Rise

<HSAR252_Spring2009_lec1_1.txt> Every Roman city had its McDonald’s, or its Wendy’s, or its Burger King, and I show one of those to you here. It’s called a thermopolium, as you can see down below; thermopolium.

**Figure E.6.** Fall pitch contour for *as you can see*
Discourse function: General reference
Prosodic pattern: Fall

Trajan was the emperor who extended the borders of the Empire to their furthest reaches, and the monument is a testament to what his accomplishments were militarily. And the famous Column of Trajan, which still stands and is in magnificent condition, as you can see here, is a monument that is wrapped with a spiral frieze that purports to describe, from bottom to top, all of the exploits, all of the military exploits of Trajan’s two military campaigns in Dacia.

Figure E.7. Peak pitch contour for as you can see

Discourse function: Specific reference
Prosodic pattern: Peak

This is a plan of Pompeii as it looked, just at the moment that Vesuvius erupted. So in August of 79 A.D. this was the way Pompeii was at that particular time. You can see it’s not really a rectangle; it’s kind of elongated, sort of like an oval, kind of an oval, an irregular oval. But it has the sense; I think it has the sense. It shows you that again even though the Romans were thinking to try to create their cities in a very regular way, it didn’t always work out exactly that way, depending
on the terrain and so on and so forth. But this is a rough--it’s sort of an irregular rectangle, as you can see here.

Figure E.8. Fall pitch contour for as you can see

Discourse function: General reference

Prosodic pattern: Fall

I mentioned at the beginning we’ll spend a fair amount of time -- we’ll spend a few lectures on Roman painting. And the reason that I do that is because it’s absolutely gorgeous and it’s fascinating. But it also allows us to get a better understanding of interior decoration among the Romans, how they decorated their walls. But also, because as you can see from this one example, from Boscoreale, now in the Metropolitan Museum, the famous Met Cubiculum, which is decorated with Second Style Roman wall painting, that these paintings often depict buildings. They are architectural paintings, and they are very important in that regard because we see -- we often see -- experimentation in painting before we see it in architecture. And so there are going to be some things, for example, this broken triangular pediment, that we’re going to see first in painting and then in built architecture. So painting -- extremely important for us.
Figure E.9. Peak pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Peak

<HSAR252_Spring2009_lec2_1.txt> Now it’s very hard--there are no huts that look like this in Rome still today that I can show you to give you a better sense of what these would’ve looked like in antiquity. But I’m sure you, like I, have seen huts like this on your travels around the world. And one example I can show you--and would that we were all down there right now. This is a view of a small village in the Maya Riviera, near Cancun, where one sees, if you take the bus or a car from Maya to Chichen Itza, which I hope some of you have had a chance to do. If you haven’t, it’s a great trip. And you can see all along the road huts that look very much like the huts of Romulus’ village, made out of wood and then with thatched roofs, *as you can see* here. So this is the best I can do in terms of conjuring up for you Romulus’ village.
**Figure E.10.** Peak pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Peak

<HSAR252_Spring2009_lec2_2.txt> The most important part, of course, is the arch, the stone arch. It’s a masonry arch, *as you can see*. It’s not the earliest arch in Roman architecture, but it’s one of the earliest.

**Figure E.11.** Fall-rise pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall-rise

<HSAR252_Spring2009_lec2_3.txt> There are no columns. There are no columns. It’s not a peripteral colonnade. It’s not a pseudo-peripteral because it doesn’t
have--but what is this? They look sort of like flat columns. They’re what are called pilasters, p-i-l-a-s-t-e-r-s, pilasters, which are essentially flat columns. So it does have some articulation--you can see them up there--there is articulation, but it’s been flattened out still further. So once again an Etruscan plan with some nod to Greece, in the sense that there’s a recognition -- we’ve got to have something that goes around here. But, they don’t want to take it out, they don’t want to use an actual column, and they flatten it out, *as you can see* so well here.

![Figure E.12. Fall pitch contour for *as you can see*](hsar252_02_011509_3)

**Figure E.12.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec3_1.txt> What was a barrel vault? A barrel vault was a vault that was again made out of concrete, placed on a wall, and then the vault was shaped like the side of a barrel, *as you can see* here, which is why it’s called a barrel vault -- shaped like the side of a barrel, resting on walls down below.
Figure E.13. Peak pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Peak

<HSAR252_Spring2009_lec3_2.txt> What’s significant about this building is that it looks forward to things that we’re going to see later on develop in Roman architecture. Primarily I showed you in the introductory lecture a glimpse of the Markets of Trajan in Rome, and I remind you here of the great market hall of the Markets of Trajan, which is even more sophisticated in its use of concrete, because it has ribbed vaults, *as you can see*. But this experimentation that we’re going to see in the early second century A.D. in
Rome would not have been possible without the experimentation in concrete that took place in this very early stage in the second century and in the first century B.C.

**Figure E.14.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec3_3.txt> The podium is extremely well preserved, *as you can see*, and extremely impressive. It’s an extraordinary place to go.

**Figure E.15.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall
And we can see that what we have here is a very important combination--and it’s the first time we’ve seen this today--of arches with columns interspersed, columns placed, engaged or attached into the wall, in between these arcades, as you can see here.

Figure E.16. Peak pitch contour for as you can see

Discourse function: Specific

Prosodic pattern: Peak

The construction is concrete. The facing is a combination of stone--look at the blocks, the ashlar blocks, and the voussoirs above the arches, and opus incertum work for the walls, as you can see here. But the scheme of columns in between arcades: extremely important. This is setting in place the kind of scheme that we’re going to see used for buildings like the Colosseum in Rome -- so extremely important.
**Figure E.17.** Peak pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Peak

<HSAR252_Spring2009_lec3_6.txt> How did the Romans achieve this? They created, *as you can see* here, a series—or they converted the hillside into a series of man-made terraces.

**Figure E.18.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec3_7.txt> I show you on the left-hand side of the screen an Etruscan tomb that dates to 600 B.C. So, very early in time, 600 B.C., an
Etruscan tomb at a place called—it’s not on your Monument List—but at a place called Quinto Fiorentino, Q-u-i-n-t-o, new word, F-i-o-r-e-n-t-i-n-o. Quinto Fiorentino, an Etruscan territory. And what the architects have done here is to try to create a round tomb, and they’ve used stone, as you can see (1), and they have laid those stones. They’ve cut and quarried the stones as usual. They’ve tried to cut them in the shapes that they need in order to make this work. And they’ve piled them, one on top of the other, row after row after row, until they’ve gotten -- it started out okay at the bottom, but as they get further and further on to the top and it gets rounder and rounder, and converges at the apex, they start to have trouble, as you can see (2).

Figure E.19. Fall pitch contour for as you can see

Discourse function (1): Specific reference

Prosodic pattern: Fall
Figure E.20. Fall pitch contour for *as you can see*

Discourse function (2): Specific reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec3_9.txt> Here you can see these wedge-shaped sections of seats called the cuneus, that both Greek theaters and also Roman theaters had. Both of them have stage buildings, although the stage building is more prominent in the Roman context. But the most important distinction is the one I’ve already drawn, and that is, *as you can see* at Epidaurus, the Greeks build their theaters on hilltops; you can see the trees and part of the hill very clearly here.

Figure E.21. Rise pitch contour for *as you can see*

Discourse function: General reference
Prosodic pattern: Rise

I think it’s important to compare the exterior of the Amphitheater of Pompeii, which is extremely well preserved, *as you can see* here, with the experiment at the much earlier Sanctuary of Fortuna Primigenia at Palestrina, where we also saw this use of concrete faced with opus incertum work.

![Peak pitch contour for as you can see](hasar252_04_012209_1_copy)

**Figure E.22.** Peak pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Peak

Then over here we see the Music Hall. It’s a smaller version of the Theater, but it’s designed in exactly the same way, with a semi-circular orchestra, the semi-circular cavea, the division into cunei, *as you can see* here, a small and much less elaborate scena in the front.
Figure E.23. Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec4_3.txt> And I made this point before, but I’ll make it quickly again, that while Roman theaters, like the Theater at Pompeii, are based on Greek prototypes, there are some differences. The two theaters--this is the Greek Theater at Epidaurus in the mid-fourth century B.C. They both have the stone seats; they both have--which is called the cavea--they both have these wedge-shaped sections of seats; they both have a stage building, although the Greek one is much simpler. But the major differences between the two is that the Greek theater has a circular orchestra, whereas the Roman theater has a--and this is the Theater of Pompeii--has a semicircular orchestra. And the other major difference, the most significant one, is the Greeks built their theaters on hillsides, *as you can see* at Epidaurus. The Romans built their theaters--and this is the case in Pompeii--on a hill made out of concrete.
Figure E.24. Fall-rise pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Fall-rise

<HSAR252_Spring2009_lec5_1_copy.txt> I want to begin with the image that you see now on the screen, which is a building--and we’re talking about the one at the left, front left--a building that is on one of Pompeii’s main thoroughfares, the Via dell’Abbondanza, the Street of Abundance. And the building in question is relatively well preserved, and what is significant about it for us right now is the fact that it is two-storied, *as you can see* here.

Figure E.25. Peak pitch contour for *as you can see*

Discourse function: Specific reference
Now this particular house--oh I did want to say though, despite those changes, the house is still very enclosed and very plain and stark from the outside. This is a restored view of what we believe the outside looked like. So geometrically ordered, cubic, as you can see. Just one entranceway, possibly a few small windows, possibly not. And then you can see the compluvium and the peristyle court.

![Figure E.26. Fall-rise pitch contour for as you can see](hsar252_05_012709_1)

Discourse function: Specific reference

Prosodic pattern: Fall-rise

This is a view of that exedra, that Alexander exedra that I mentioned to you before, that opens off the first peristyle, with two columns on bases here. Note the red at the bottom, white at the top. Two pilasters painted red, as you can see. And you can see the tourists standing there, gazing down. They’re gazing down at a copy.
Figure E.27. Fall-rise pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall-rise

<HSAR252_Spring2009_lec5_2.txt> Now I also wanted to show you--that’s not the only mosaic in Pompeii. It’s the greatest, by far, and it’s without question--and I think everyone who studies this stuff would agree with me, that it’s the finest surviving mosaic in the history of ancient Greek and Roman art. But there are plenty of other mosaics preserved, including at Pompeii, and I want to show you just one. It’s mentioned underneath the Alexander mosaic, on your Monument List, because it’s so beloved; it’s even more beloved by most tourists to the site than the Alexander mosaic, which after all you can’t see on the site, you have to see it in Naples, at least the original. But this is the so-called Cave Canem Mosaic, and it belongs to the House of the Tragic Poet, a house that was put up between 62 and 79 A.D. And you see what’s meant to be a very ferocious dog with his teeth bared. This one is done much more simply, in only three colors; mainly black and white--tesserae or small stones; t-e-s-s-e-r-a-e, that’s what these small stones are called, the tesserae--black and white, basically black on white. But you can see that there’s one touch of red, the collar of the dog. And the dog is chained, *as you can see,*
just like that poor plaster cast of the dog that we saw last time, he’s chained. But he’s meant to look very ferocious.

**Figure E.28.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec5_3.txt> Good morning. *As you can see*, the title of today’s lecture is "Lifestyles of the Rich and Famous: Houses and Villas at Pompeii."

**Figure E.29.** Peak pitch contour for *as you can see*

Discourse function: Introducing a topic

Prosodic pattern: Peak
I just want to close, just very briefly, with this last house, or this mosaic fountain from this last house. It’s the so-called House of the Large Fountain, so-called because of this extraordinary fountain that was found there and still exists. Dates to between the earthquake the eruption of Vesuvius, 62 to 79 A.D. It’s very well preserved. You see it here on the right-hand side of the screen. It shows you that mosaics could be applied to any kind of surface by these very talented artists, in this case applied to a curved surface, as you can see very well here, once again using multi-colored tesserae, as we saw in the Alexander mosaic.

Figure E.30. Fall pitch contour for as you can see

Discourse function: Specific reference
Prosodic pattern: Fall

I want to turn now to what is surely the most important surviving house at the city of Pompeii, and this is the famous House of the Faun. If you’re in Pompeii and you only have time to see two houses, you go to the House of the Vettii and the House of the Faun. The House of the Faun, as you can see from your Monument List, dates to the second century B.C., for the most part, and we see a view, part of Pompeii over here, with a series of houses marked in yellow.
Figure E.31. Peak pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Peak

<HSAR252_Spring2009_lec5_1.txt> Look also at the fact that there’s a barrel vault. This is actually a wooden vault, rather than a concrete vault here in this room. But very nicely done, and the walls are extensively painted. They are weathered today, but they give you a very good sense of what would have been the original appearance of this room. And, as I mentioned, we’ll talk in detail about Roman wall painting, especially because, *as you can see*, it does depict architecture. We’ll begin that conversation on Thursday and continue into next week.

Figure E.32. Fall-rise pitch contour for *as you can see*
To turn to the city itself, I show you now a plan of Herculaneum, or at least the excavated part of Herculaneum, that gives you some sense of what is there. And I’ve already mentioned that we simply won’t see any big amphitheater in plan, or any major forum complex, and so on and so forth. We simply don’t have that evidence in the excavated part. But what you do see is comparable to the residential area of Pompeii. You can see a series of major thoroughfares crossing with one another. We can’t be sure, since we don’t have the whole city, which is the main cardo and which is the main decumanus of the city, but they are certainly laid out at a quite regular pattern, with shops and houses interspersed with one another, as you can see extremely well here.

![Figure E.33. Fall pitch contour for as you can see](hsar252_06_012909_1)

**Figure E.33.** Fall pitch contour for *as you can see*

Note the kiosk here, and then note this other entrance; I’m going to show you both of those in detail. This is a little gazebo. *As you can*
see, it rests on piers. It was obviously a very pleasant place to sit, with marble furniture, and to have a glass of wine out here, looking out over the sea.

**Figure E.34.** Fall pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec6_2.txt> And Herculaneum was very close--I’ll show you a restored view that makes this clear in a moment--Herculaneum was very close to the sea. And these two houses were probably among the two most expensive houses in Herculaneum, because they had the best views of the sea. They were very high up, above the sea wall, and they looked right out at the sea. So the way they’ve designed this: very large triclinium, to benefit from being able to see both the peristyle and views out over the sea, even while you were dining. There seems to have been a colonnade over here--so views through columns, out to the sea--and then these two rooms at D. These are, *as you can see* here, the diaetae; d-i-a-e-t-a-e, singular; d-i-a-e-t-a-e, plural.
Just to remind you of the location of Herculaneum, which is usually called the sister city of Pompeii, because of that locale. We see it on the map here. Pompeii is down in this location. Herculaneum is to the northeast of Pompeii, closer to Naples than Pompeii is, as you can see. And note also the city of Boscoreale, Boscoreale, which is located between, almost equidistant -- a little bit closer to Pompeii than Herculaneum -- but in between the two.
Prosodic pattern: Fall-rise

<HSAR252_Spring2009_lec6_1.txt> Good morning. As you can see from the title of today’s lecture, "Habitats at Herculaneum and Early Roman Interior Decoration,"

![Graph showing peak pitch contour for as you can see](hsar252_06_012909_1)

**Figure E.37.** Peak pitch contour for as you can see

Discourse function: Introducing a topic

Prosodic pattern: Peak

<HSAR252_Spring2009_lec6.txt> We are looking down the side of that house, and we see again that is built up in stucco, so it’s still a kind of stucco relief. But if you look at the paintings on the walls, and on the back wall, the side wall or the back wall--and I’ll show you a better view here--you will see that although we are dealing with something that looks like a First Style wall--it’s very flat, it’s divided into architectural zones: the socle, the orthostats, the isodomic courses here--that is all done entirely in paint, as you can see. It’s not built up as a relief. The only relief here that we see is the relief that is used for the heraldic griffins, up in the uppermost part.
**Figure E.38.** Peak pitch contour for *as you can see*

Discourse function: Specific function

Prosodic pattern: Peak

<HSAR252_Spring2009_lec6.txt> Here are a couple more views, just to show you quickly. If you go and visit Herculaneum, you can still see those sea walls there, made out of concrete *as you can see*. They’re well worth taking a look at.

**Figure E.39.** Fall-rise pitch contour for *as you can see*

Discourse function: General function

Prosodic pattern: Fall-rise
The Villa at Boscotrecase also has a Black Room, so called because the main color there, the main background color there is, *as you can see*, black.

**Figure E.40.** Fall-rise pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall-rise

These again are so interesting in detail. If you blow this up to the size that we see it here, you will see that this is that black background in between the red panels that we were looking at before. You can see all kinds of strange things going on here in detail. A female figure, semi-naked. She’s clashing her cymbals. She’s dancing here, and she is supporting, on her head--she’s oblivious to the fact that she’s supporting on her head -- the base of one of these colonnettes; *as you can see* here, pays no heed whatsoever that she’s serving as a support for the colonnettes.
**Figure E.41.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall

< HSAR252_Spring2009_lec7_2.txt> You can see the decoration in the friezes. You can see some of the figural decoration: the capitals and so on and so forth. But it is lost in this--it is lost in something of a haze, *as you can see* here. So it’s a very good example of Fourth Style Roman wall painting.

**Figure E.42.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall
It partakes of Third Style in that you can see that the main parts of the wall are flat, with a panel, a mythological panel picture that is surrounded by a frame -- so just to make absolutely sure that the viewer understands that what they are looking at here is a panel picture that hangs on a flat wall, not a window into something that lies beyond. But we see in this central zone the reintroduction of architecture, substantial architecture, where you can really make out the columns and the pediments, but not full buildings, fragments of buildings: fragments of buildings that are represented in very illogical space, as you can see here. Again, substantial elements like this, with the supporting the columns, supporting the lintel with the coffered ceiling, represented in perspective.

**Figure E.43.** Fall pitch contour for as you can see

Discourse function: Specific reference

Prosodic pattern: Fall

Yes, but it’s more like atmospheric perspective? No? Disagree? Atmospheric perspective, so that again what’s in the foreground is the outlines are firm; what’s in the background is very, very fuzzy, and gets fuzzier and fuzzier. Let me show you a detail of this. If you blow it up, you can see--try to count--I don’t know if you’re counting at all--but if you try to count the zones of space
here, you’d go berserk. Clearly they are trying to conjure up space, something that perhaps recedes, but it seems to be done by means of atmospheric perspective, where the objects in the foreground are represented with the firmest outlines, and those in the background with the fuzziest outlines, *as you can see* here. If you blow it up, you can see that the details are incredible.

**Figure E.44.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall

<HSAR252_Spring2009_lec7_4.txt> Good morning everyone. *As you can see* from today’s lecture title, we’re going to be talking about painting palaces and villas in the first century A.D.
Discourse function: Introducing a topic

Prosodic pattern: Peak

<HSAR252_Spring2009_lec7.txt> We can see that there are architectural members, although again they look, from a distance, like white stripes on a black wall. But if we get up close to them--and I’ll show you even some closer views in a moment--we will see that we are dealing with very, very, very, very attenuated colonnettes, with capitals at the top. And notice--and this has been true throughout--they decorate these columns also, all up and down, all along the way, with floral motifs and so on and so forth; which also underscores their function as a decorative motif, rather than an actual column. The column supports, the colonnettes support what looks like a very simple pediment. It’s just slightly peaked, as you can see up there. But there is one--this painting is interesting because if you look carefully at the frieze, at the uppermost part of the columns, or colonnettes, you will see that there is some hint of space there.
Figure E.46. Fall-rise pitch contour for as you can see

Discourse function: Specific reference

Prosodic pattern: Fall-rise

< HSAR252_Spring2009_lec8_1.txt> This is the first one that I want to show you, an absolutely fetching portrait of a young woman from Pompeii, that dates to around the middle of the first century A.D., that is, 45 to 50 A.D. And we see it here, and it’s an incredible painted portrait by clearly once again a very talented artist who’s done an extraordinary job of capturing this woman. It’s a very appealing portrait. We see her, she’s a quite attractive young woman, with wide, sort of hazel colored eyes, sharp, straight brows, straight nose, sort of Cupid’s lips. As you can see down below, the hair is magnificently rendered. You can see that she has a bevy of corkscrew curls.
Figure E.47. Peak pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Peak

<HSAR252_Spring2009_lec8_1.txt> And I also show you here the rest of that particular side of the room. We’re going to look at all the figures in order, but I just wanted you to get a sense of the rest of the wall as it unfurls -- this left wall as you first come into the room. And I wanted to point out, using this image, that again about how sophisticated this particular artist was, because he takes into consideration, as I mentioned before, the corners of the room, and they become part of the narrative. *As you can see* here, there’s an empty space, but the story line, as we’ll see, continues across the corner, and the figures over here interact with the figures on the other side of the bend in the wall, in again a very, very sophisticated and interesting way, and we’ll follow that through.
Figure E.48. Rise pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Rise

<HSAR252_Spring2009_lec8_2.txt> This woman has her--she’s not really looking as you--well she isn’t looking at what she’s doing, *as you can see*. She’s doesn’t seem to be watching the purification, but rather is looking at this fellow over here, and given what he looks like, I guess that’s not surprising. Her glance is caught by him. Now who is he?

Figure E.49. Fall pitch contour for *as you can see*

Discourse function: General reference

Prosodic pattern: Fall
With regard to the scene of the satyrs, you can see that--the Silenus and the satyrs--the Silenus is seated on some kind of marble block, as you can see here. He looks very similar to the one that we saw before. An older man with those animal ears, as you can see, one of the satyrs holds a mask.

Figure E.50. Fall-rise pitch contour for as you can see

Discourse function: Specific reference

Prosodic pattern: Fall-rise

As we look down on the Mausoleum of Augustus, in this aerial view, we see the general plan of it. We see that there was a central burial chamber; that there was a hollow drum, and around that hollow drum--and all of this is made of concrete construction--around that hollow drum a series of concentric rings, a series of concentric rings, as you can see them here, again made out of concrete.
Discourse function: Specific reference

Prosodic pattern: Peak

<HSAR252_Spring2009_lec10_3.txt> The tomb, *as you can see* here, was a three-storied structure, very eccentric in its appearance. The ground line today is much lower than the modern ground line. So you have to go right up to the monument. You can look down at the first story. So you’re only seeing a part of the first story here.

**Figure E.52.** Fall pitch contour for *as you can see*

Discourse function: Specific reference

Prosodic pattern: Fall
It Turns Out That

So then Newton’s laws get elaborated on for several centuries. By the end of the nineteenth century things are starting to come apart a little bit. There are now problems that show up with Newtonian physics. It’s been a big success on the whole but there are now problems. And in the early twentieth century what happens is two new laws of physics are invented. These are the given the names quantum mechanics and general relativity. And the situation with these is they don’t overturn Newton’s laws, they extend them. *It turns out that* in the kinds of situations that Newton was looking at, both quantum mechanics and general relativity, reduced down to Newton’s law. So, you have a situation where here are Newton’s laws, Ns Laws, of which Kepler’s laws are a tiny subset. And then general relativity; I’m drawing a kind of Venn diagram here, is here, relativity, occupying Newton’s laws but that’s some other stuff.

![figure](astr160_01_011607_1.png)

**Figure E.53.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak
And now, the ugly specter of trigonometry rears its head. Because that’s what trigonometry is. It’s a way of turning angles into distances and vice versa. And you may remember constructions that look vaguely like this; let’s put some labels on it. Here’s distance 1, here’s distance 2, here’s distance 3. And this is the definition of sine, the sine of $\alpha$ is equal to the opposite over the hypotenuse, so that’s $D_2$ over $D_3$. And now--so that’s how you do it. Now, I promised you on Tuesday that the sine was going to cancel out, and so it is. Here’s how. If you use small angles *it turns out that* the sine of $\alpha$ is equal to $\alpha$, if $\alpha$ is expressed in radians, which is a particular kind of measure of angles. And so for small angles, first of all, the hypotenuse and the longer side are the same length more or less. So, you’ve got a situation like this where $D_2$ over $D_1$ is equal to $\alpha$.

![Figure E.54. Peak pitch contour for *it turns out that*](image)

**Figure E.54.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

Now, one of the interesting things about Mars is you can see features that look like this. And this looks very much like river deltas. You know, you see these little tributaries coming into a big river, this kind of looks like Louisiana, or
something like that. And so, people are pretty much convinced that there was once running water on Mars. And that’s important, because it is thought that the existence of life as we know it is dependent on the existence of liquid water. For a long time, people thought that there was no liquid water. Now, on Mars-- *it turns out that* the particular temperature and atmospheric pressure that exists on Mars means that water goes from the solid state, from ice and sublimes, directly into the gaseous state, much like carbon dioxide does here.

![Figure E.55. Peak pitch contour for *it turns out that*](astr160_03_012307_1)

**Figure E.55.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<ASTR160Feb2007_lec6> Let’s see, so--but, in retrospect, it was clear that this wasn’t going to give you the thing you thought because of two factors. First, in--why? So, first factor: in clusters, the stars are really close together. Stars--they sometimes collide or more often have near collisions. And when a star comes cruising into your planetary system, the star has a lot of gravity. It’s going to completely wreck the orbits of the planets because you’re going to have the gravity of a second star. And *it turns out that* what this does is it liberates the planets. And so, it will disrupt planetary orbits.
That’s why a handful of iron is heavier than an equivalent sized handful of snow, or something like that. So, if you know the density, you can tell something about the composition of the planet. And it turns out that the Hot Jupiters, in the few cases we now have--it’s not just one case, it’s several cases--Hot Jupiters have low density. They really are ice balls.

Figure E.56. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<ASTR160Feb2007_lec6> Rocks have higher density--much higher density.

Figure E.57. Peak pitch contour for *it turns out that*

Discourse function: Expansion
Prosodic pattern: Peak

<ASTR160Feb2007_lec8> Einstein famously discovers all this great stuff, and then the second half of his life is completely useless, scientifically, because he becomes convinced that his gut is telling him that quantum mechanics is wrong. This famous remark, "God does not play dice with the universe"--but it turns out that isn’t true.

![Figure E.58. Peak pitch contour for it turns out that](astr160_08_021307_2)

Discourse function: Expansion

Prosodic pattern: Peak

<ASTR160Feb2007_lec9> It turns out that this rather grandiose statement, that the event horizon constitutes an edge of the Universe, has a mathematical meaning as well. The great physicist Stephen Hawking--you may have heard about him. He’s the guy in the wheelchair. His --shorthand--his--one of his great discoveries was to demonstrate that the mathematics of the event horizon is actually very similar to the mathematics of another edge of the Universe--namely The Big Bang, which is the start of the Universe in time. And so, it turns out that this statement that this constitutes an edge of the Universe is not just a philosophical statement having to do with defining the Universe as something
we might eventually, possibly, know something about, or be influenced by, but also has a mathematical meaning, as well.

![Figure E.59. Peak pitch contour for *it turns out that*](astr160_09_021507_2)

**Figure E.59.** Peak pitch contour for *it turns out that*

- Discourse function: Expansion
- Prosodic pattern: Peak

<BENG100Jan2008_lec1> This is an airplane, what does that have to do with Biomedical Engineering? Well you could stretch it and say that an example of engineering to improve human health is getting them from one place to another, but that would be more of a stretch than I’m going to make. But *it turns out that* technologies like airplanes, which were developed in the last century, have become integral parts of medicine. For example, you all know that the only treatment for some diseases is to get an organ transplant: a kidney transplant, or a liver transplant is the only life extending intervention that can be done for some kinds of diseases. Transplants require donors, and the donor organ is usually not at the same physical location that the recipient is, and so jets like this one have become very important in connecting donors to recipients.
Figure E.60. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<BENG100Jan2008_lec3> If I then put it back into its original condition, lower the heat say, temperature back to body temperature and reduce the pH down to seven again, the molecules will re-nature. They will reform their natural structure, and for DNA that means forming double helixes. But they will do that in a very particular way, in that only strands that exactly match will be able to reform their native structure. A blue strand here will never re-nature with a red strand because their sequences don’t match exactly, but a complementary blue strand will always rematch with its partner. Now this is the basis of a physical chemistry process called hybridization. *It turns out that* this is how we can identify specific DNA sequences and how we can do things like DNA fingerprinting, how we can clone molecules, DNA molecules from one organism to another, rely very heavily on this principle of re-naturation and hybridization.
Figure E.61. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<BENG100Jan2008_lec3> Here’s another picture of it here, showing it in a little bit more detail, that you have lots of DNA in each of the cells in your body but you’re not using all that DNA at any one time. Every cell in your body is only using a fraction of the DNA that’s available to it. Cells in your pancreas, for example, are making the protein insulin. They’re making that because you need this protein insulin, it’s a hormone, and it’s important for sugar metabolism in your body. Those cells in your pancreas are making insulin. That means the gene that encodes insulin, the sequence of base pairs that encode insulin. I’ll talk about what that means, encoding insulin means in a minute, but there’s a gene that tells your body what insulin looks like and that gets transcribed but only in those cells that make insulin. It gets converted into a protein, insulin, only in those cells that are able to make the RNA that are able to express the protein. Well, *it turns out that* proteins are essential in driving this process too. In order to have DNA you have to make DNA and your cells are continually making DNA inside your body,
through a process of DNA synthesis and that synthesis is occurring because of the presence of an enzyme, a protein called DNA polymerase.

**Figure E.62. Peak pitch contour for *it turns out that***

Discourse function: Expansion

Prosodic pattern: Peak

*<BENG100Jan2008_lec3> All those things have to happen in an orderly fashion, in enough quantity in order for a particular cell to make a protein. To make insulin, for example, your cells of your pancreas have to be transcribing that gene, it has to be processed, has to be translated into the protein insulin. But that’s not all, that protein insulin is made in the form of a long polypeptide that not - that’s not always the final version of the protein. In fact, for insulin, it’s not the final version of the protein that comes out of translation. There are more steps that have to happen correctly in order for that insulin to become active. Those steps are called post-translational modifications. It’s a long word that just means other chemistry that happens on the molecule after translation. *It turns out that* the kinds of post-translational modifications that human cells are able to do are very complicated. You can do many post-translational modifications;*
your cells are capable of doing many post-translational modifications. Bacteria, or simple organisms, are not always capable of that.

**Figure E.63.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<BSG100Jan2008_lec3> How is gene expression controlled? It can be controlled in a variety of ways. The most basic control is by controlling when transcription happens. When transcription happens and *it turns out that* there’s a whole biology associated with this, including molecules that are floating around inside your cells called transcription factors, and their job-- they are molecules that are (that know) about particular genes and what some of the sequences and are able to turn on those genes inside cells, to make them transcribe.
Figure E.64. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<BENG100Jan2008_lec4> Now, what are the challenges there? You’ve got to be able to make this stuff and you’ve got to be able to make it in large quantities and we’ll talk about how to make nucleic acids in large quantities a little bit later in the lecture. You’ve also got to get it into the cell. Ands *it turns out that* getting large molecules like this, particularly large charged molecules like nucleic acids, inside of cells is not so easy. We’ll talk about that a little bit later as well. In fact, we’ll talk about that concept throughout the course because one of the big challenges of making these sort of new biological therapies work in people to treat diseases is getting the right molecules into the right cells, at the right period of time.
Figure E.65. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

*<BENG100Jan2008_lec4>* A newer version of this that works in a similar way but a different way is called RNA interference, and *it turns out that* this is a natural mechanism that cells have. It’s a mechanism that they have evolved in order to prevent foreign genes from entering a cell and being expressed. You have mechanisms inside your natural mechanisms inside your cell that allow the cells to degrade unwanted RNA sequences.

Figure E.66. Peak pitch contour for *it turns out that*

Discourse function: Expansion
An alternate way is to go to the cell that’s making the protein that you want. If it’s making the protein you want, it must be producing messenger RNA with that gene on it. That messenger RNA that’s being used has already gone through the RNA splicing mechanism and so the introns have already been removed. If I could isolate that messenger RNA - messenger RNA is just a copy of the DNA from which it came - so if I could do the process of reverse transcription, that is instead of transcription which goes from DNA to RNA, if I could go backwards from RNA to DNA, I could recover a DNA version of the gene that I’m interested in. *It turns out that* we can do that now because we have an enzyme called reverse transcriptase, which is able to take single stranded messenger RNA and make DNA out of it. Now you’ve heard about reverse transcriptase someplace before, right? Anybody heard of reverse transcriptase?

![Figure E.67. Peak pitch contour for *it turns out that*](image)

**Figure E.67.** Peak pitch contour for *it turns out that*
Another example of using this technique is to produce therapeutic proteins from cloned DNA and I’m going to describe this one. It’ll probably be the last example I have time for and so I’ll go through the rest of them quickly in the next lecture. But here, for example, the idea is to make many copies of a protein for use as a pharmaceutical. Here’s an example where we’d like to make insulin, or having the insulin gene would be useful, but if we could take the insulin gene and make many copies of the insulin protein that would be a very useful thing. It turns out that there’s lots of proteins that have value as therapeutics and there’s a list of them here and some of them you’ll recognize. Erythropoietin, commonly called Epo and its function is to treat anemia because it stimulates blood cell production.

**Figure E.68.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

There’s a lot of interest in obtaining stem cells from the blood of the umbilical cord on birth. *It turns out that* blood within the umbilical cord is also a rich source of stem cells and again specific to a particular patient. There are services now, we don’t know yet how to get those stem cells out of cord blood and how
to use them for therapies, but it’s reasonable to think that we might know about this in 30 years.

**Figure E.69.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<BFENG100Feb2008_lec7> Take a step way back and think about what’s the basic mechanism by which cells receive signals. And *it turns out that* cells receive signals or information from the rest of the body in a variety of ways, but there’s one way in particular that’s a very useful way for thinking about how cells receive most information. It’s shown schematically on this diagram here.

**Figure E.70.** Peak pitch contour for *it turns out that*
Discourse function: Expansion
Prosodic pattern: Peak

<BENG100Feb2008_lec8> Well, what happens when the signal gets to the end of the axon? How do cells pass the signal from themselves to the next cell? In the heart *it turns out that* the cells of the heart are electrically coupled together, so if an action potential moves down this cell it directly moves into the next cell. So, there’s a continuum of electrical connection in the heart that allows an action potential to sweep across the surface of the heart and for the heart to beat in a coordinated fashion.

![Figure E.71. Peak pitch contour for *it turns out that*](image)

**Figure E.71.** Peak pitch contour for *it turns out that*

Discourse function: Expansion
Prosodic pattern: Peak

<BENG100Feb2008_lec9> Now, you know, because we talked about cell culture already, that a great--that we talked about last week, manufacturing of cells. We talked about two weeks ago, that if you had a population of cells, you could grow those population of cells and you could make, if they adapted the culture properly, you could make an infinite number of cells from one starting solution. Well, if you knew a cell that could serve as a host for a virus, you could use this process of cell culture to make large
quantities of virus, right? You just grow up cells until you’ve got a lot of cells. You infect
them with the virus, and you let the cells, in culture, produce the virus. Well, it turns out
that we could not identify, at least at that point, a cell culture that would serve as a host
for vaccinia. So cell culture production wasn’t an option.

**Figure E.72.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

*In fact, another advantage of the oral vaccine is that you give it to children. They take it, the vaccine itself, the virus, reproduces in their gut and they can actually spread it to other children in the same way that they spread the disease where you’ve got children that are maybe at school or at childcare. Have you ever looked at children in the playground? They’re all over each other sometimes and they can spread saliva or other fluids. It turns out that if you give one child in a home the oral vaccine, you often have a protective effect in other children in the home as well because it spreads from one individual to another. That’s another advantage of the oral polio vaccine.*
Figure E.73. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<BRG100Feb2008_lec10> It turns out in the case of Hepatitis B, the way the lifecycle proceeds—the cells make too much of the protein and not all of it gets assembled into the virus. So, if you look in the blood of patients that are infected with Hepatitis B you find a lot of Hepatitis B surface subunits, proteins without the nucleic acid circulating in their blood. What if I collect that blood from patients that are already infected with Hepatitis B, purify the Hepatitis B protein, and inject that back into people? That would be a subunit vaccine because I’m purifying a subunit of the virus that could be injected and hopefully induce an immune response. *It turns out that* that works. Any potential problems with that approach?
Figure E.74. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

*I also talked last time about smallpox and the perceived need to produce more smallpox vaccine in the event that smallpox is used as a weapon in 2002. So shortly after 9/11 the Government made a contract to a company called Acambis to make four hundred million doses of smallpox for $343 million dollars. So, this is not cheap, right? The problem is you’ve got to make hundreds of millions of doses sometimes in order to have an effect on progress of the disease. So, even if the cost is small, $10 a dose, it quickly amounts to a large amount of money. There were some problems with that deal and I just give you one news report on that, but you can follow it if you’re interested. In spite of that fact, *it turns out that* vaccines are one of the best uses of our money in terms of extending the lives of population. This is old data now, from 1995, but I don’t think it’s changed very much. It asks the question, ‘how much do different public health interventions cost per life saved?’ So, we have a mandatory seatbelt law here. That means that you have to have seatbelts in all your cars; that means people pay more for cars because they have seatbelts. You have to enforce the law and all*
the costs that goes along with that. In terms of lives saved by that measure, it’s estimated that it cost about $69 per life saved, so that’s a reasonable cost to spend. For something like Measles, Mumps, and Rubella immunization which costs what I showed you before, you can save so many lives that way that the cost of distributing and producing the vaccine is actually less than the value of the lives that are saved. So, it saves money, you’re saving money by doing it, not that it’s not costing you.

**Figure E.75.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<CHEM125ASep2008_lec1> So this is two of the pages from Newton’s correspondence of the letter that he wrote in response, and you can see that Pepys certainly got more than he had bargained for. "So to compute this I set down the following progressions of numbers." So you can go through all this and you get complicated quotients here, and *it turns out that* A has 31,031 chances out of 46,656, or 0.6651 chance of winning, and B has this, which is 0.6187; A wins.
Figure E.76. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

Okay, so there now is, in a two-dimensional graph that you can draw on a piece of paper, is something that gives you this information. Okay, but this required that we choose $R_{12} = R_{23}$, in order to make this simplification. The guys who did the calculations said if we don’t make $R_{12}$ equal to $R_{23}$, then *it turns out that* all the structures are still higher in energy. So these are the lowest energy structures, although they can’t plot them on a piece of paper.

Figure E.77. Peak pitch contour for *it turns out that*
Okay, so there’s the scattering from these things and we can — now so let’s try to understand it. So this was the slide with randomly positioned but oriented benzenes. It turns out that random positioning generates the same diffraction as a single pattern but gives it more intensity. If we’d just put one hexagon there you wouldn’t have seen enough from it.

Figure E.78. Peak pitch contour for *it turns out that*

And if you fiddle around — and that’s what I want you to do, because this the way I think it gets into your head is by guessing numbers and saying "where should I make the next guess?" and so on. After you’ve done this a certain number of times — but enough times that it really gets into your bones and your brain — after you’ve done it enough times, then you can use the function that says "Solve" and it will do that guessing game for you. But do it yourself at the beginning. Okay, and *it turns*
out that after you’ve done that, you get 20.74 da-da-da-da-da, like a lot of decimal points, decimal positions, and you get that one, just right.

**Figure E.79.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

Now here are two enantiomers, an R and an S configuration of this funny molecule that’s a little bit related to amino acids. Now it has what are called lpha-hydrogens--those are hydrogens attached to a carbon adjacent to a carbonyl group. So *it turns out that* a base can pull off that hydrogen, leaving an anion on that carbon, which then is stabilized by $\pi^*$ of the carbonyl. So it’s easy to pull off that H and put it back on again.
Now when you go from a tetrahedral carbon, the starting material, you pull off an H and get a radical, which is trigonal. You go from sp\textsuperscript{3} to sp\textsuperscript{2} bonds. And the sp\textsuperscript{2} bonds, as we saw last semester, overlap better and give stronger bonds. That’s fine. That’ll be true, they’ll be stronger if they’re bonded to hydrogen; they’ll be stronger if they’re bonded to carbon. But it turns out that carbon-carbon bonds are more sensitive to the hybridization than carbon-H is.
Prosodic pattern: Peak

<CHEM125B_Spring2011_lec8> What could we do to get the right configuration if we did an inversion? Use a different starting material. And *it turns out that* mannose, which has this OH axial, pointing up, is readily available. It’s a different sugar. And if you did substitution on that, you’d get the equatorial thing that you wanted. So that’s no problem.

![Figure E.82. Peak pitch contour for *it turns out that*](image)

**Figure E.82.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<CHEM125B_Spring2011_lec9> Now, if you try to make the things on the outside more willing to give up their electrons, that is higher HOMOs to make stronger bonds, and make it O– rather than CH3O. So we have the minus charge raising those HOMOs. Then indeed, it forms a bond, but not two bonds. It’s unsymmetrical. One of them is a reasonable bond. The other one is just a non-bonded interaction. In fact *it turns out that* this is a salt. It’s an anion. So there’s a positive cation nearby, a potassium, which makes it a little bit unsymmetrical.
Figure E.83. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<CHEM125B_Spring2011-lec10> So it says hot acid caused elimination of the t-butyl group, so you have to be carried out at room temperature, you don’t want to warm it. So fine, do it at room temperature. So this is what Jo-David set out to do, the synthesis starts with this compound, weirdly enough, and you have to react it with a Grignard reagent here, which puts the t-butyl group on the nitrogen, and then you’re going to break that bond, put oxygen on there, H2 on there, and you’re going to have the product you want. That’s the idea, that’s the synthetic scheme. So in the first place, *it turns out that* t-butyl Grignard is not the easiest reagent to make, especially in the summer when it’s humid. So it was hard for Jo-David to do this, but finally he got this stuff to add there, and got the stuff that needed to be hydrolyzed, and then he tried to do it.
**Figure E.84.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<CLCV205_Sept2007_lec3> Well, the Greeks had no concept of natural rights, or of rights that human beings were given by the gods. That is a very important difference that was, you had to act in such a way as to make life possible and decent, and for the Greeks that always meant being part of a decent community, the polis. But the modern world, to get back to that, to this Enlightenment world, individualism and a key aspect to that is hedonism. That is to say, it is legitimate and proper to search for pleasure, for each individual to attempt to please himself however he can. And *it turns out that* if you could take it to our own day, there are no limits pretty much to what he can do to gain pleasure.
Figure E.85. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Rise

<CLCV205_Sep2007_lec10> Another way the Athenian people were divided involved names of classes of people and we’ll come back to that in another context, but one class, the highest class in the aristocratic state were the eupatrids, it means the well-born, the well-sired and *it turns out that* in the early polis, no surprise, they dominated the best farmland, they had the chief jobs in religion, they were the government, because as early as we can tell that there was a regime after the legendary kings are gone, the number one governmental organization, you might call it, is the council of the Areopagus; gets its name from the place where it meets.
Now because the bigger populations have more mutations, *it turns out that* their size exactly compensates for the longer fixation times. So if you’re just counting how many get fixed--it doesn’t matter whether you’re in a small population or a big one--the same number of mutations are getting fixed in both cases.

**Figure E.86.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

*<EEB122Jan2009_lec4>*

**Figure E.87.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Fall
If you think this kind of stuff is nice, you can go and look on the Web, on these sorts of websites. Antonia works on butterfly wing patterns. Gunter works on the tetrapod limb, and with Vinny Lynch he has recently been looking into the origin of the mammalian female reproductive tract. So they have been comparing things like duckbilled platypuses and spiny echidnas—which are mammals that lay eggs—with kangaroos and eutherians—which are mice and lions and things like us—and discovering where it is that the mammalian female reproductive tract actually came from. *It turns out that* the HOX genes are involved in that, and that it’s another one of these stories of gene duplication making the development of new structures possible.

![Graph](eb122_08_013009_2)

**Figure E.88.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

So now let’s consider this molecular weight effect, the heavy gases versus the lighter gases. For mercury, *it turns out that* both would be lost. I’m going to put two arrows here, and I’m going to label one L and one H. L for the light gases, like hydrogen, and H for the heavy gases like nitrogen, for example. Mercury would lose them both, because it’s a pretty small planet and it’s quite hot.
I mentioned already though that we didn’t think anyone--we thought that all those who lived in Herculaneum had escaped from Vesuvius, but it turns out that was not in fact the case.

The other purpose of course is to acquire females. I’ve been going on and on about how rare an egg is, and so you’d think that’s
the obvious reason, but then you watch them go and they kill the females, even the females in estrus, so that doesn’t make a lot of sense. Although in the Japanese group, sometimes the females do transfer. The story there is quite interesting, because as you know, small groups of individuals, if they interbreed, if the group was sealed, if the males are sealed and they stay together in this one community like forever, generation after generation--if the females also stayed there, it would be an inbreeding group. Inbreeding gives big genetic problems, so all species have to have some mechanism of gene flow, and they have to get genes in from the outside and/or send their genes out. *It turns out that* in chimpanzees the females have access to other troops and they go out and have intercourse when they’re away. Exactly how this is done because the males watch them when they come into estrus--they must disappear before coming into estrus and have it out there. It’s not really known, but now they can do the genetics and again something like half of the babies are born with fathers that are not from the troop where they are resident, and very often the adolescent females will just transfer troops altogether.

**Figure E.91.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak
The civil authorities controlled what was left of the land, the kings and so forth, and it turns out that the serfs on the civil land had somewhat better conditions, somewhat more rights than on church lands. On church lands they were really the lowest of the low, but on civil lands they had somewhat better situations, but they were still deep in poverty.

**Figure E.92.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

And one theme we’re going to return to is — this is half the brain. This is, in fact, the left half of the brain. On the other half, the right half, everything’s duplicated with some slight and subtle differences. What’s really weird — One really weird finding about these lobes is that they include topological maps. They include maps of your body. There is a cartoon which actually illustrates a classic experiment by some physiologists who for some reason had a dog’s brain opened up and started shocking different parts of the brain. You could do brain surgery while fully conscious because the brain itself has no sense organs to it. And it turns out that the dog — When they zapped part of its brain, its leg would kick up. And it took Dr. Penfield at
McGill University to do the same thing with people. So, they were doing some brain surgery. He had a little electrical thing just on — I don’t know how he thought to do this. He started zapping it and "boom." The person — Parts of their body would move. More than that, when he zapped other parts of the brain, people would claim to see colors. And he zapped other parts of the brain; people would claim to hear sounds; and other parts of the brain, people would claim to experience touch. And through his research and other research, it was found that there are maps in the brain of the body. There is a map in the motor part of the brain, the motor cortex, of the sort up on the left and the sensory cortex of the sort that you could see on the right and if you — and you could tell what’s what by opening up the brain and shocking different parts and those parts would correspond to the parts of the body shown in the diagram there.

Figure E.93. Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<PSYC110_Spring2007_lec4> Finally, I talked about phobias and I’ll return to phobias later on in this course. But the claim that people have formed their phobias through classical conditioning is almost always wrong. Instead, *it turns out that* there are
certain phobias that we’re specially evolved to have. So, both humans and chimpanzees, for instance, are particularly prone to develop fears of snakes. And when we talk about the emotions later on in the course we’ll talk about this in more detail.

**Figure E.94.** Peak pitch contour for *it turns out that*

*Discourse function: Expansion*
*Prosodic pattern: Peak*

<PSYC110_Spring2007_lec6> One of the real surprising findings in my field over the last ten/twenty years has been that the acquisition of sign languages has turned out to be almost exactly the same; in fact, as far as we know, exactly the same as the acquisition of spoken languages. It didn’t have to be that way. It could have been just as reasonable to expect that there’d be an advantage for speech over sign. That sign languages may be full-blown languages but they just take — they’re just harder to learn because the brain and the body have adapted for speech. *It turns out that* (1) this just isn’t the case. *It turns out that* (2) sign and — the developmental milestones of sign languages and the developmental milestones of spoken languages are precisely the same.
Figure E.95. Peak pitch contour for *it turns out that*

Discourse function (1): Expansion

Prosodic pattern (1): Peak

Figure E.96. Peak pitch contour for *it turns out that*

Discourse function (2): Expansion

Prosodic pattern (2): Peak

<PSYC110_Spring2007_lec6> Then the — Then there’s the bad news. Around seven years of age going up through puberty, the ability to learn language starts to go away. The best work on this has been done by Elissa Newport and Sam Supalla who have studied people who have been in the United States for many, many years – 30, 40 years – and seeing how well they have come to speak English. And it turns out the big
determinant of how well you speak English as an immigrant isn’t how smart you are. It’s not how many family members you have when you’re here. It’s not your motivation. It’s how old you were when you started. **It turns out that** if you start learning a language – a second language is where most of the work’s been done – within the first few years of life you’re fine. You’ll speak like a native. But then it starts getting worse and worse.

![Graph](psyc110_06_02607.png)

**Figure E.97.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<PSYC110_Spring2007_lec8> Retrieval cues bring things back but it’s a little bit more complicated than that. There’s a more general relationship between encoding and retrieval called the "compatibility principle." And what this means is you’re much better to remember something in the context in which you have learned it. And this is also known as "context-dependent memory" and "state-dependent memory." It’s illustrated by one of the strangest experiments in the history of psychology where they had people on a boat and then they had them scuba dive underwater. And they taught them things either on the boat or underwater with things that they held up. And then they tested them later.
And *it turns out that* you’ll remember it better if you’re tested on it in the context in which you learned it. And it might be because then the retrieval cues help bring it back.

**Figure E.98.** Peak pitch contour for *it turns out that*

Discourse function: Expansion

Prosodic pattern: Peak

<PSYC110_Spring2007_lec11> And so, there’s certain themes we’re going to explore here. The first is this, that emotions are basically mechanisms that set goals and priorities and we’re going to talk a lot about — in this class and the next class about universals. We’re also going to talk about culture. *It turns out that* cultures, different cultures, including differences between America and Japan and the American South and the American North, have somewhat different emotional triggers and emotional baselines to respond to.
So, you have two sorts of smiles: A real happiness smile or a Duchenne smile — called also known as the Duchenne smile, and then a Pan Am smile, or greeting smile. And you’ll use each of those smiles at different points in your day and in your life. *It turns out that* these different smiles have real psychological validity. They seem to sort of reflect deep differences in your mood and emotions and thoughts.

Discourse function: Expansion

Prosodic pattern: Peak

*Figure E.99. Peak pitch contour for* *it turns out that*

*Figure E.100. Peak pitch contour for* *it turns out that*

Discourse function: Expansion
Prosodic pattern: Peak

<PSYC110_Spring2007_lec11> Finally, studies have been done of college yearbook photos looking at people thirty years later. And it turns out that there’s a correlation, a reliable relationship between how happy somebody is now and back thirty years ago in their yearbook photo — what sort of smile they’re giving.

![Figure E.101. Peak pitch contour for it turns out that](psyc110_11_022107_3)

Discourse function: Expansion

Prosodic pattern: Peak

**On the Other Hand**

<ASTR160Jan2007_lec2> So, this has implications for working in groups. Working in groups is strongly encouraged. Please do that. It’s a very good thing, make friends with the other people in the class, work together, talk to each other, start early, and make use of each other’s intelligence. However, at the same time, we want to make sure that you actually do things. So, we want the work you hand in to be your own. This sounds contradictory. On the one hand, I’m tell you to work in groups; on the other hand, I’m telling you, you have to hand in your own work. What does that mean? So, as is written down on the classes server, the way we try and work this is when you are actually
writing down the thing you’re going to hand in, do that alone. So, if you work in a group, figure out what you’re doing, get everything all set up, then split up and write down the answer.

Figure E.102. Fall pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Fall

<ASTR160Jan2007_lec2> But if you go closer to your eye, it’s only about an inch across. If you’re at arm’s length it’s maybe six, eight inches where I’m standing here. And if you try it at the back of the class, you’ll get a different answer from what I just got. So, distance is a problematical thing. And so--But on the other hand, obviously, the size of the screen hasn’t changed depending on where my arms were or whether I’m standing at the back of the room or the front of the room. So, something has to be measurable there, but it isn’t distance. What it is, is angle.
Figure E.103. Peak pitch contour for *on the other hand*

Discourse function: Minor contrast

Prosodic pattern: Peak

<ASTR160Jan2007_lec4> Let me explain what I mean by that, we’ll come back to this later. If the orbit’s going this way, then it never comes towards you or goes away from you—it’s always going sideways. If, *on the other hand*, the orbit’s going this way, then first it comes towards you, then it goes away from you. And if it’s somewhere in between, you only see part of the motion of the orbit in terms of radial velocity. So, this amplitude is V if the orbit is edge-on. If not, V is going to be more than that, because you’re only seeing part of the motion. That’s a detail we’ll come back to later. So, this is what you expect to see if there’s a planet going around the star, and if you have enough sensitivity in your measurements of the Doppler Shift to be able to actually see that motion.
Okay. The subject is special relativity. And right at the end of last class, I had written down this factor, $\gamma$. And $\gamma$ is the key thing, which tells you how relativistic you are. $\gamma = 1 \over \sqrt{1 - (V^2 / c^2)}$. And we talked about this factor a little bit. If $V / c$ is equal to zero or approaches zero, then $\gamma$, obviously, is 1. And when $\gamma$ is 1, that’s the Newtonian case--then, everything is just like Newton’s law said. Okay. On the other hand, as $V / c$ goes to 1--that is to say, as the velocity approaches the speed of light, this $\gamma$ factor goes to infinity, because 1 minus 1 in the denominator--that’s zero in the denominator, so the thing has to go to infinity. And then, all these bizarre relativistic effects start taking place.

**Figure E.104.** Fall pitch contour for *on the other hand*

Discourse function: Minor contrast

Prosodic pattern: Fall
**Figure E.105.** Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<BRG100Feb2008_lec7> Well, insulin is a protein, it’s produced by cells in the pancreas, it circulates in your blood. It can’t enter cells because it’s too big and it’s too water soluble so it can’t go through cell membranes. So, it interacts with receptors called insulin receptors that are on cells that are sensitive to insulin. Steroid hormones, *on the other hand*, molecules like testosterone and estrogen, progesterone, the sex steroids that determine sexual characteristics and are important for reproductive function are molecules that are all derived from a similar source. Many of them are derived from cholesterol and they’re hydrophobic, which means they can penetrate through cell membranes.
Figure E.106. Fall-rise pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Fall-rise

But let’s try to understand different radicals. So we’re going to look at the bonding of H to methyl, ethyl, isopropyl and t-butyl. And the first thing you notice about this is that they’re all almost the same. As we went down the halogens it varied by 60 kilocalories per mole. But as we go across these different methyl, ethyl, isopropyl, t-butyls, they’re all 100 kilocalories per mole, plus or minus 5. We’re going to look next lecture at this in some more detail and see if we can understand why they vary at all. But they don’t vary very much. *On the other hand,* some hydrocarbon radicals have substantially different ones, like vinyl and allyl, phenyl and benzyl.
Figure E.107. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

But notice that the HOMOs and LUMOs that it might interact with are \( \pi \) and \( \pi^* \). And there’s no special stabilization because they’re perpendicular to one another, they’re orthogonal, there’s no overlap. So there’s no reason that having this double bond should make that radical unusually stable. And notice that, it, in fact, is hard to break as if this were unstable. But it’s neither stable or unstable, it’s just what it is. *On the other hand*, if we look at the starting material where we have this C-H bond, notice that as compared to these others, which are 100 plus or minus 5, that this one is made from an sp2 carbon, right? So very good overlap. So in this case, it’s that the bond is unusual. The bond is unusually strong; the radical is nothing special. It’s very hard to break.
Figure E.108. Peak pitch contour for on the other hand

Discourse function: Major contrast

Prosodic pattern: Peak

Now. So this is a little schizophrenic on the part of the singly occupied orbital. Does it move up or down? The answer is “No.” One of them pushes it down, the other pushes it up, it stays the same place it started. But the others go up and down, the ones that came from the π and the π*. So you get net stabilization due to this pair of electrons going down. So we have this special “allylic,” it’s called, stabilization from mixing the SOMO with the π and π* orbitals adjacent to one another. So this radical is unusually stable. On the other hand, in the starting material, the bond was just a regular old sp3 C-H bond, nothing special there. So as compared to here, where the starting material was unusually strong, here the product is unusually stable.
Figure E.109. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

So there’s the product we want to go to where a hydrogen has been transferred from the right to the left. And one way to do it, the way we’ve been talking about, is to go by way of three separate atoms. Which means we go up there, way up in energy, very slow, and once we get there then zing, we go down. But it’s very hard to get up to this plateau. *On the other hand*, as we knew from the marble, the way it actually works is to transfer a hydrogen between two rather than to break a bond first and then make a bond. So make it as you break it that way and that’s going to be much faster. So this kind of displacement reaction is the way we want to do it—to make a new bond as we break the old one.
Figure E.110. Peak pitch contour for on the other hand

Discourse function: Major contrast

Prosodic pattern: Peak

So this first step then, even though it’s a two-step reaction, the first step is the one whose rate makes a difference. If you double the rate of the first step then you’ll double the overall rate of the reaction, because the second step doesn’t make any difference. So that’s called the rate-limiting step. On the other hand, suppose that that first reaction is fast and the second one is slow. So you have a rapid pre-equilibrium formed between these two--again, not very much of the intermediate. But it reaches an equilibrium concentration compared to this, or almost, and then slowly it goes to product.
Figure E.111. Peak pitch contour for on the other hand

Discourse function: Major contrast

Prosodic pattern: Peak

So the intrinsic C-C bond strength corrected for strain is practically insensitive to the substitution of the radicals. But if you have C-H bonds they are, indeed, weakened by alkylation of the carbon, but no one understands it. And on the other hand, if you have chlorines--chlorine or bromine, they go the other way. And again, nobody understands it. No one I know at least understands this, but the textbooks seem to be wrong.

Figure E.112. Peak pitch contour for on the other hand

Discourse function: Major contrast
Prosodic pattern: Peak

There is no definition of goodness for this modern approach, no definition of happiness. Each individual decides for himself what is good, what is happy. What it really does is to evade the question that I’m talking about. Is this all okay? If we’re all going to die then does it really mean that we should just do the best we can at anybody’s expense while we’re alive? Is that a satisfactory outcome? Will we indeed be happier, better off while we’re alive? If we do that, the Greeks would have said, "That is stupid and absurd to think for ten seconds you’ll realize that’s no good."

Now, the Greeks on the other hand had a powerful belief in the dominance of chance. They accepted, again, what is a very modern idea now, that in fact there is no divine force or divine forces who oversee what happens to mankind on earth. But, rather, things happen simply in a random way according to no particular rule and that’s the way it is.

Figure E.113. Fall pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Fall

We know the legend says that Achilles was told before he came that if he did not go to Troy and fight in that war, because his mother was
a goddess, he had partial divinity in him, he would be immortal. He would never die. But, on the other hand, he would not be great and famous. His memory would not be carried forward into the future. If he went to Troy, he would die, but his memory as the greatest of the Achaeans would be immortal forever.

Figure E.114. Peak pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Peak

<CLCV205_Sept2007_lec4> I think people have, in different ways, found in Russo, the root both of a Nietzschean nihilism and of Marx, and I think there is powerful reason to do so, because you can go in either one of those directions once you start making this kind of assumption. For the Greeks, on the other hand as I’ve said, political society was essential for living any kind of a good life.
Discourse function: Minor contrast

Prosodic pattern: Fall

<CLCV205_Sept2007_lec4> So these are examples of what happens in Greek ethics later on, if you are guilty of this characteristic. *On the other hand*, when he, even Oedipus himself, when he understands and he relents, and in a sense he apologizes for what he’s done, but more importantly, he ceases, of course, to be powerful and to act in that way, wisdom comes to him. He understands that, he has acted immoderately. That is the critical concept. Moderation is this wonderfully great important thing for the Greeks.

Discourse function: Major contrast
Prosodic pattern: Peak

<CLCV205_Sept2007_lec4> Let me read you something, as we move to the fullest claims that will be made for the role of the polis. Aristotle in his Politics says this: "as man is the best of the animals when perfected, so he is the worst of all when he is divided away from the law and justice." But he tells us, human justice can be found only in the polis, because he says, man is by nature a politicon zoon, an animal of the polis, and as I told you, a man who is without a polis by nature is above or below the category of man. It’s because man alone has the faculty of speech and the ability to distinguish good from bad, and right from wrong. In addition, since he is born with weapons for the use of wisdom and virtue, he may use them for the opposite ends. Therefore, when he is without virtue, man is the most savage of animals. Justice on the other hand, is an element of the polis. The administration of justice, which means deciding what is just, is the regulation of the partnership which is the polis.

Figure E.117. Fall-rise pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Fall-rise
That is, you’ve got a very key point; there was very little military training. *On the other hand*, you don’t need very much. Think about it, what are the skills? What are the technicalities? If I’m the general and so I say — what do I say? Charge! Now we’re engaging each other, what do I say? Fight harder men! Now we’re in trouble and I say, don’t run away! There are no techniques, there are no maneuvers, there are no — you can’t do anything and so they didn’t practice very much, except one stunning exception, the Spartans.

![Figure E.118. Peak pitch contour for *on the other hand*](image)

Discourse function: Major contrast

Prosodic pattern: Peak

The question is would the defeated army — would the winning army kill all the defeated guys who were still on the battlefield at the time? It would vary. They could capture them. There’s a reason to capture them. You could demand ransom for them. So, there would be some inclination to capture men rather than to kill them. *On the other hand*, guys who were engaged in a fight of the kind we must imagine get very angry; these guys killed a buddy next to you. So, there would have been
a certain amount of just furious killing going on, but I don’t think that would have been the way you planned the game.

Figure E.119. Peak pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Peak

Now, what’s that all about? Well, it shows you one of the main — many conflicts that exist in the Spartan system. On the one hand, you have to do that because you need children to perpetuate Spartans, but also to provide soldiers. So, you have to have that much normality in the system. On the other hand, you want to resist as much as you can, building a family in the traditional sense because loyalty to the family might be in conflict with the loyalty to the polis.
Figure E.120. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<CLCV205_Sept2007_lec9> I was going to say the Spartan man when he reaches 20, the guys that were there between the ages of 20 and 30, are allowed to marry, but they are not allowed to live with their wives. They continue to live in the barracks. Talk about strange and peculiar arrangements. *On the other hand*, of course, they had a natural desire to visit their wives, which they could do if they weren’t caught. So, you had to sneak away to be with your wife, but if you were caught you were punished.

Figure E.121. Peak pitch contour for *on the other hand*
What are the qualities that are supposed to be produced by this system? Discipline, first and foremost. Every aspect of your life is governed by the laws and the customs of the community. You better conform; there is nothing else for you. Self reliance, strangely enough, because all of these encouragements to theft and discouragements to getting caught have to do with building the ability to do things like that. Social cohesion. Who can imagine a system more constructed to bring about such a goal? Loyalty to one another, whatever group we’re talking about, but of course beyond that loyalty to the community at large is implicit in all of that. Obedience to your superiors. Physical and moral endurance. Courage, and another quality that is important, and again, something that appealed very powerfully to other Greeks, uniformity. You are all just like one another, you go through exactly the same experiences; there’s no distinction among you. On the other hand, and this is another one of the interesting contradictions about Spartan system. Every one of those boys and the young men, and the older men is in competition for honor. Every one of them wants to be recognized by himself, by his peers, and by his superiors as having been better than the others, the best, if possible.
Figure E.122. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<CLCV205_Sept2007_lec9> Again, think. I mean, what is happening to all the normal feelings about people have for one another and the central role that family plays in almost every society you can think of. *On the other hand,* we should not imagine that women had a role in Spartan society that was anything equal to the men. Like in every other part of the Greek world, the women were excluded from political life entirely, and yet — there’s all this conflicting stuff. Let me tell you the next thing I want to tell you about.

Figure E.123. Peak pitch contour for *on the other hand*
So, you must think of them, not as distinguished people who have some clout in their own person, but ordinary people who only achieve what clout they’re going to have by virtue of being chosen as ephors. They’re only there for a year. Now, the kings are there for life and the gerousia is there for life, and I suppose the assembly is there for life, but the ephors are only going to be ephors for a year and only once in their life. These are not politically powerful people. I think the idea was to sort of have a representation of the ordinary Spartan to carry on the functions that I have talked about. On the other hand, they were given the responsibility of seeing that the kings were in line and they had various techniques or various policies and processes which had them make judgments as to whether the kings were doing anything wrong, and if they did, they could make that point. They could go to Delphi and ask the god, if they were right in thinking something was wrong, and if they came back the kings would be put on trial.

Figure E.124. Peak pitch contour for on the other hand
Now, Attica was not one of the most desirable, certainly agriculturally rich areas in Greece. It was relatively speaking rather barren. Now, there are of course great exceptions; the central valley so to speak, of Attica has the richest soil and in the ancient world it was able to grow the very best grain, including wheat. But very much of the Athenian soil is mountainous and pretty close to barren, so that you don’t have a lot of rich soil. This is not one of the most admirable places to come. *On the other hand*, it has certain advantages that the Athenians used well to achieve wealth and power and greatness. First of all, it has one splendid harbor; up in the northwestern part of Attica is Piraeus.

**Figure E.125.** Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

Another natural resource of great value and great blessing to those of us who can still see the remains of the Athenian experience is the
marble that comes from Mount Penteli. The Greeks call it now Pendel, and Pentelikon is what the ancient Greeks called it. In the northeastern portion of the Attica Peninsula and it produce — you can still go see it wonderful, beautiful fine grain, white marble and that’s the stuff that the Parthenon and all the other buildings, temples, on the Acropolis and around Attica was made of and that enabled the Athenians to build those temples as few cities could, because there it was sitting in their territory, not a source of the kind of tremendous expense it would be for other states that would have to buy it and bring it in. Now, on the other hand, Athens was able as I told you — let’s start in the early days to grow wheat and other grains, but more to the point, it was very good for olive trees and for grapevines, so as we will see when the Athenians begin to exploit all of their land, not just the bottom land that works for grain, but also the less desirable land and produced wine and olive oil, that was a source of agricultural wealth that would play an important part in their history.

![Figure E.126. Peak pitch contour for on the other hand](ckv205_30_100007_3)

**Figure E.126.** Peak pitch contour for *on the other hand*

**Discourse function:** Major contrast

**Prosodic pattern:** Peak
So, the Athenians claimed that they were, in a certain sense, the purest of the pure Greeks and they went to great lengths. One of their stories claims they were, as the Greek word goes autochthonous, that is, they were sprang from their own soil. In fact, they said they were in Attica before the creation of the moon. Guess you don’t have to believe that, but on the other hand, it’s their picture; we were always here, the original indigenous people.

Figure E.127. Peak pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Peak
Discourse function: Minor contrast

Prosodic pattern: Peak

<EEB122Jan2009_lec10> If you want to get rid of a conflict, make the interest of the competing elements symmetric. You can do this in a host pathogen relationship by shifting the transmission from horizontal to vertical. That will reduce their virulence. Because, if you think about it, then the pathogen can only get into the next generation if its host survives. If it’s a vertically transmitted parasite, that means it’s transmitted from parent to offspring. So the parent has to survive, to have a baby, so that the pathogen can make it. So it’s not in the pathogen’s interests to kill the parent. A horizontally transmitted pathogen, on the other hand, can have actually quite a high level of virulence; and that is where all the major diseases are, they’re all horizontally transmitted pathogens.
Discourse function: Minor contrast

Prosodic pattern: Fall-rise

<ENGL220_Fall2007_lec3> Instead of joining the ministry, Milton instead returns home and he stays at home without any means of supporting himself for six years. So with the financial support of his father Milton stays at home and reads. He studies. And it’s in these years after his graduation from college that Milton embarks upon what is essentially a systematic study of all available knowledge. He commands a mastery of just about the entire canon of Western literary and historical learning. He prepares himself for what his father is still imagining will be the priesthood but for what Milton is probably imagining will be his future career as a great English poet. It’s little wonder that one of the subjects of his meditations during this period is the problem of vocation -- the twin problem of what it is one is actually doing on the one hand, and what it is on the other hand that the father has called one to do.
Discourse function: Minor contrast

Prosodic pattern: Fall

This is a kind of meta-literary allegorization that I’ll be performing here: you could also think of Milton the poet as being stuck at this same juncture. He’s stuck between two meanings of chastity -- chastity as absolute virginity, and chastity as the moderate and beseeming sexuality sanctioned within marriage. He’s also stuck between two models of speech with which we have become quite familiar by this point. On the one hand, he wants to wait before he talks. He wants to keep anticipating producing the great speech, which is exactly what the Lady has been doing; but on the other hand Milton’s possessed of a competing desire to speak and to speak now -- to publish, to succeed, to consummate his talents.
We’ve looked before at Milton’s Reason of Church Government. That’s the political treatise written in 1642. We’ve seen Milton’s account there of how he had attempted to reconcile, on the one hand, his obligation to become a minister and his desire, on the other hand, to become a poet.
Licensing differs from censorship in some important ways. Indulge me in making this important distinction. We know what censorship is. Censorship is the banning of books that have been published and that have been deemed by the state authorities to be dangerous or harmful in some way. Censorship would involve the burning of books, the prohibition of any further editions of those books, or perhaps even a punishment -- by imprisonment, say -- of the author, or maybe the printer or the publisher of the books. That’s censorship, utterly straightforward. Licensing, on the other hand, is an action that precedes censorship. According to the 1643 Licensing Order against which Milton is directing this treatise, Areopagitica, a book has to be sent to the licensing office for approval before it can be published. The licensing agent reads the book and determines whether or not to print it at all or license it to appear in print.

**Figure E.133.** Fall-rise pitch contour for *on the other hand*

Discourse function: Minor contrast

Prosodic pattern: Fall-rise

And the two numbers I have here, the ocean crust--when you’re over the ocean and then go down to the bottom and find out how deep that rocky crust layer is, it’s typically five to ten kilometers. Continental crust, on the other
hand. If you went to the center the United States and measured how deep that rocky crust is there, it’s deeper. It can be 30 to 50 kilometers deep. And then beneath that, you get into the mantle, and of course, you go down all the way, eventually, to the center of the Earth, which is-- the radius of the Earth is 6,370 kilometers.

**Figure E.134.** Fall pitch contour for *on the other hand*

Discourse function: Minor contrast

Prosodic pattern: Fall

<GG140_Fall2011_lec6> So this is very schematic. I haven’t meant to be quantitative on this. The point is that most of the Sun’s radiation falls in a part of the spectrum for which the Earth’s atmosphere is transparent. When this percent absorption is low, that means the atmosphere is transparent. *On the other hand*, when the Earth tries to radiate back out to space, because it’s cooler, it radiates at a longer wavelength. That wavelength tends to fall in a region where there’s a lot of atmospheric absorption.
Figure E.135. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<HSAR252_Spring2009_lec8> It’s a wonderful--let me also show you a detail of the young satyr drinking out of the cup, and you can see how gifted again this particular artist is. I don’t think this artist always gets the hands right. He tries. They’re sometimes a little bit awkward, but *on the other hand* he really has made an effort to show the way in which hands and fingers grip something, both from the bottom and also from the top.

Figure E.136. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak
The females, when they have a young, are usually fairly isolated, not necessarily, not all the time, but mostly they’re by themselves with their young. It’s a very stable group that always stays together. As I told you last time, the mother is never out of either touch, or sight, or hearing of their young for five or more--five to ten years. The males, on the other hand, wander around also but they bond together. They travel together and they are very often in parties, and they go around searching for food and patrolling the borders of the territory.

Figure E.137. Fall pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Fall

Now let’s talk about the other side, births and there surprisingly, humans are drastically different from chimpanzees. How do we know this? Chimpanzees were never very successful demographically. At their peak there may have been two million chimpanzees. A very small Chinese city is two million individuals, and now because of the rise of humans they’re taking over their territory, the guess is they’ve been reduced to about 100,000; 5% of their peak population. They are restricted to central Africa; they have never spread beyond central Africa. Humans, on the other
hand as you know, number in the billions; we’ve spread to the farthest corners of the earth from the ice cap around the North Pole to the hottest desert and jungle. There are tens of thousands of times as many people, humans, as there are chimpanzees, and humans have become absolutely dominant basically everywhere on earth.

**Figure E.138.** Fall pitch contour for *on the other hand*

Discourse function: Minor contrast

Prosodic pattern: Fall

<MCDB150_Spring2009_lec5> Now you read this in your reading and you may again throw it off as just one of these cultural practices of primitive people, and that’s not the way you should approach this class. You should—*on the other hand* ask how does such a practice arise? What are its roots? How does it help their culture to survive? The theory being that most of the things that people are doing have some role in helping them in a difficult world.
Figure E.139. Peak pitch contour for on the other hand

Discourse function: Minor contrast

Prosodic pattern: Peak

<PLSC114_Sept2006_lec3> Let me just quote one other passage briefly from the second speech that he gives to the jury after his conviction. "It is hardest of all to persuade you, to persuade some of you about this," he says, about his way of life. "For if I say that this is to disobey the god and because of this it is impossible to keep quiet, you will not be persuaded by me on the grounds that I am being ironic. And on the other hand," he says, "if I say that this even happens to be a very great good for a human being that is to make speeches every day about virtue and that the unexamined life is not worth living for a human being, you will still less be persuaded by me."
Figure E.140. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<PLSC114_Sept2006_lec3> The Apology is a speech given before a large and largely anonymous audience of over 500 persons, the Assembly, the Court. We see Socrates addressing, the only time in any platonic dialogue, an audience of this size. The Crito, *on the other hand*, is a conversation between Socrates and a single individual, only one person.

Figure E.141. Peak pitch contour for *on the other hand*

Discourse function: Minor contrast

Prosodic pattern: Peak
Think of Alexander the Great later on, and in fact, in one of my favorite passages in the book, which you will read for next time, I cannot resist quoting already a passage from Book VII, and near the end of the book, Book VII, chapter 7, where Aristotle writes as follows. He writes, "The nations in cold locations, particularly in Europe, are filled with spiritedness." There is that platonic word again, thumos, are filled with thumos, "but lacking in discursive thought," lacking in the deliberative element in other words. Hence, they remain free because they’re thumotic, but they lack political governance. "Those in Asia, on the other hand," he writes, thinking probably here of Persia, places like Egypt and Persia, "have souls endowed with discursive thought but lack spiritedness, lack thumos, hence they remain ruled and enslaved."

**Figure E.142.** Fall-rise pitch contour for *on the other hand*

Discourse function: Minor contrast

Prosodic pattern: Fall-rise

The discussion I skipped was the discussion of why we would have an unconscious at all. So, I was talking about the scientifically respectable ideas of Freud and I want to talk about some new ideas about why there could
be an unconscious. Now, the reason why I skipped it is I’m not sure this is the best way
to look at the question. As we will learn throughout the course, by far the vast majority of
what our brains do, the vast majority of what our minds do, is unconscious and we’re
unaware of it. So the right question to ask may not be, "Why are some things
unconscious?" but rather, why is this tiny subset of mental life — why is this conscious?
On the other hand, these claims about the utility of unconsciousness, I think, are
provocative and interesting. So I just wanted to quickly share them with you.

**Figure E.143.** Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<PSYC110_Spring2007_lec4> As far as I know, Skinner and Skinnerian
psychologists were never directly involved in the creation of prisons. *On the other hand*,
the psychological theory of behaviorism has had a huge impact and I think a lot of
people’s ways of thinking about criminal justice and criminal law has been shaped by
behaviorist principles. So for instance, institutions like mental institutions and some
prisons have installed token economies where there’s rewards for good behavior, often
poker chips of a sort. And then you could cash them in for other things. And, to some extent, these have been shaped by an adherence to behaviorist principles.

Figure E.144. Peak pitch contour for on the other hand

Discourse function: Major contrast

Prosodic pattern: Peak

<PSYC110_Spring2007_lec5> Other studies, some of them — Well, here’s another study by Rene Baillargeon looking at the same thing in a different way. You show the baby, say a six-month-old, a stage with a block on it. Then a screen rises and obscures the block. Now, if the babies expect the block to still be there, they should think the block should stop the screen. On the other hand, if out of sight out of mind, they should expect the screen to keep going. So, what you do is you set up a couple of displays, one where the block is stopped, the other one where you take this away with a trap door and it keeps going.
Figure E.145. Peak pitch contour for on the other hand

Discourse function: Major contrast

Prosodic pattern: Peak

<PSYC110_Spring2007_lec5> It’s an interesting question. The question is, "How do you think about the severity of autism with regard to developmental stages?" And sort of surprisingly, autism can’t really be thought of in that way. So, it’s not like an adult with autism is like a three-year-old or a two-year-old. In some ways, somebody with autism isn’t like any child at all, any normally developing child at all. So, it’s not really a developmental delay in the way that it might make sense to think about certain forms of retardation. On the other hand, when we think about how severe autism is we do look at things like how much language does the person have, and in that sense, it is related to development.
Figure E.146. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

Finally, there is syntax. So, English is what’s known as a subject-verb-object language. That means if you want to convey the idea that Bill hit John, you would say, "Bill hit John." But not all languages work that way. In fact, the majority of languages, more languages, are actually subject-object-verb languages. So, you would say, if you wanted to convey that Bill was the hitter and John was hit, "Bill John hit." All of this has to be learned. And all of this has to be learned through exposure to language users. *On the other hand*, there is considerable evidence that the development of these language skills, in some way, is similar to growth in the way that Chomsky suggests. So, here are some basic facts about language development. One is something which I had mentioned before. All normal children learn language. There can be specific impairments of language. Now, again, we spoke about them before when talking about the brain. Some of these impairments could be due to trauma, the aphasias.
Figure E.147. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<PSYC110_Spring2007_lec7> You might also point out correctly that chimps are our nearest evolutionary relatives, which is right, so you — one would expect on the face of it — it’s not unreasonable to expect us to share a lot of abilities with them. *On the other hand*, we split from them a long time ago and plainly humans are different from chimps. And there was five million years either way and that’s more than enough time for a language capacity to evolve.

Figure E.148. Peak pitch contour for *on the other hand*
There is the study of reading which is, in many ways, different from the study of a language. Remember when Darwin described language as an instinct. He carefully distinguished it from other things that don’t come natural to us including reading. And in fact, reading is difficult. Reading is a cultural invention, not every human has it. And unlike language, reading is acquired with tremendous difficulty over many years. On the other hand, reading plainly intersects with language. It’s a new way of conveying language, moving out from speech to writing. And the psychology and neuroscience of reading is thus very interesting.

Figure E.149. Peak pitch contour for on the other hand

Finally, a very hot issue is that of the relationship between language and thought and I’m actually — A few years ago I taught an entire seminar called "Language and Thought" devoted to precisely this question. And it’s a cool question and it could break up into two very general questions. One is, "Is language
necessary for abstract thought?" And one way to answer that question is to look at creatures without language like babies and chimpanzees and see how smart they are. It might be that they’re not — that they’re very smart, in which case it would suggest you don’t need language for abstract thought. On the other hand, it might be that they have certain cognitive limitations, which would suggest that language is essential for abstract thought.

**Figure E.150.** Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<PSYC110_Spring2007_lec8> Now, this raises the question "seven plus or minus two" what? And the answer seems to be what George Miller calls "chunks." And a chunk is a basic memory unit, something you think of as a single, individual entity. So, suppose you see the string of letters "L, A, M, A, I, S, O, N." If you don’t know — If you can’t form these into words and you have to remember them, these are eight chunks. You have to just pick them up separately. On the other hand, if you break them up into four words you could just remember it as four chunks. And if you break it up into two words in French, "la maison," "the house," it could just be one or two. How much you know
depends — affects how much you memorize — how much you could store in memory because it affects what counts as a basic unit of memory.

**Figure E.151.** Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

<PSYC110_Spring2007_lec10> I like this for a few reasons. First, I like the backward reference to William James and utility. Second, it is a gorgeous combination of some things that are actually reasonably rational and total bull crap. And — but what evolutionary biology will give us is the tools to distinguish between the two. On the face of it immediately, the ability to read maps, the claim that that has a biological — that differences in that ability have a biological root is crazy. *On the other hand*, the claim that one — that males may develop a trait not because it’s advantageous but to attract females is less crazy. The telepathic stuff is really crazy but — ;So, I’m not at this point — We’re going to devote a lecture to sex. I do not, at this point, want to make any claims one way or another. But what I want to suggest is that from a biological point of view we could say sensible and intelligent things about what differences should exist and what shouldn’t.
Figure E.152. Peak pitch contour for *on the other hand*

Discourse function: Major contrast

Prosodic pattern: Peak

Base rates are very difficult to think about and I want to give you an example of this. And the example will be on the slides for when you print them out — print it out because you might want to work through it yourself. But I’ll give this to you quickly. There’s a disease that hits one in a thousand people, a pretty common disease. There’s a test for the disease and if you have it, it’s going to tell you you have it. It tests for a certain thing in your blood and "boom," if the thing is in your blood the test will go "boom." If you have it, it will tell you you have it. It doesn’t miss. *On the other hand*, it’s not perfect. It has a false positive rate of five percent. So, if you don’t have the disease, five percent of the time the test will say you have it.
Small animals make distress calls. They chirp, they mew, they bleat or they cry. The governing of a distress call is actually an extremely delicate high-wire act for any young organism from an evolutionary point of view. It has to on the one hand be annoying enough to actually generate help, to get people to help you, to feed you, to pick you up, to take you and put them next to you. On the other hand, it can’t be so annoying that the people around you kill you [laughter] and so it’s complicated.
Although, it is interesting—you know the movie Contact? So, this is based on Carl Sagan’s novel of the same name. And, one of the things that happens late in this—this is the first use, I think, in science fiction, of the concept of a worm hole, where you fall into a black hole and you fall out again somewhere totally different in space and time. And there’s an interesting story about this—that what happened, supposedly, was that Sagan, when he was writing his novel, got to the point in the novel and he needed something to happen for plot reasons, in order to move the plot forward. And he—Sagan himself was not an expert in relativity, so he called up one of his friends, who was a guy named Kip Thorne, *one of the most* famous general relativity people. He said, look, here’s what has to happen in my novel. Give me some science jargon so that—that will make this work.

*Figure E.155.* Peak pitch contour for *one of the most*
These are examples of Biomedical Engineering of the future that expand on what we currently use, which involves to no small extent, technology like this. I would guess that probably 30% to 50% of you do this everyday, you put a piece of plastic, a synthetic piece of plastic into your eye to improve your vision. Contact lens technology has changed dramatically from the time that I was born to the time that you were born, and the contact lenses you use today are much different than the ones that would have been used 30 years ago. This is Biomedical Engineering as well. Engineers who are developing new materials, materials that can be, if you think about it, there’s not very many things that you would want to put in your eye and that you would feel comfortable putting into your eye, so this is a very safe, a very inert material. What gives it those properties? What makes it so safe that it can be put in one of the most sensitive places in your body, in contact with your eye? Why do you have confidence putting it in contact with one of the most important organs of your body? Because you trust biomedical engineers to have done a good job in designing these things and we’ll talk about how biomaterials are designed and tested, and what makes a material, the properties of a material that you could use as a contact lens, what are the properties that it needs to have.
Figure E.156. Fall pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Fall

Well, it was not very hard for me to draw this red blood cell here, it’s just an oval, and one reason I draw it like an oval, is that that’s basically what it looks like if you look at it. And *one of the most* obvious things about a red blood cell is it doesn’t have nucleus, it has no nucleus.

Figure E.157. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak
So, that’s the innate response. We’re not really going to say much about that here, there’s a little bit about in the book. If you go onto study immunology you’ll learn that. This is one of the most important and rapidly evolving areas of the study of immunology. In fact, the people who have been most important in understanding how the innate immune system works are people here at Yale.

![Graph](beng100_08_020708)

**Figure E.158.** Peak pitch contour for one of the most

Discourse function: Importance

Prosodic pattern: Peak

I want to end with this picture. So this is the cover of the New England Journal of Medicine, one of the most famous and influential medical journals in the world. And this is from April of 2002. And I talked about eradicating smallpox in 1977, right when officially the last case was reported, and it was certified to be eradicated shortly after that.
Figure E.159. Peak pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Peak

<CODE>Why would *one of the most* prominent and influential medical journals in the world be publishing a review article about how to manage cases of smallpox when there had not been any cases of smallpox for 25 years?</CODE>

Figure E.160. Fall pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Fall

<CODE>Okay, so let’s talk about the example of smallpox, which is one of the world’s great successes in the battle against infectious diseases. Just</CODE>
to say a little bit about smallpox, because unlike chickenpox, which if you haven’t had, you’ve probably seen a case of it. None of us have seen a case of smallpox, it hasn’t existed in the world for many decades now. But smallpox was, at one time, one of the most frightening diseases on the planet. It’s a devastating, frequently fatal infectious disease. If smallpox occurred in your community, about 30 percent of the people that acquire the disease would die from it; the other 70 percent could be disabled or permanently disfigured as a result of the disease.

**Figure E.161.** Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

< BENG100Jan2008_lec9.txt> I don’t have to say too much about why vaccines are important. You know about this, and this is a slide that I showed you. The graph is something I showed you on the first day of class, that over the last hundred years in particular, but what’s shown on this slide is over the last 300 years. Life expectancy for humans has increased dramatically. And one of the reasons that’s most responsible for that is that humans aren’t dying at as young an age from infectious diseases as they did three or four hundred years ago. And there are many reasons for this, our success in
eliminating infectious diseases as causes in the developed world. And you know what those reasons are. One is that doctors started washing their hands in between when they saw patients. That had a remarkable effect on reducing transmission of infectious diseases, in doctor’s offices and hospitals. Another is that we learned a lot of things about engineering of public systems, like water supplies. Separating our water supply from sewage and learning how to do wastewater treatment was a really important part of reducing infectious diseases. But vaccines, and particularly in the last hundred years, vaccines have been one of the most important elements in our progress. And so what this slide just reminds you of how much progress we’ve made.

Figure E.162. Peak pitch contour for one of the most

Discourse function: Importance
Prosodic pattern: Peak

<BENG100Feb2008_lec10.txt> Now, I recognize--well you should recognize that this is a very simplified view of a highly complex network of interactions that takes place. If you go on to study more about immunology, which I know most of you will, you will recognize that I’m--this is just the simplest level of one of the most complex systems
within our body. It has to be complex, because we’re asking the immune system to be able to respond to every potential foreign pathogen that we come into contact with.

Figure E.163. Peak pitch contour for one of the most

Discourse function: Importance

Prosodic pattern: Peak

Now, the legacy from the Mycenaeans to Greek civilization later is very limited. But what there is, is very important and no part of it is more important than the Homeric poems themselves. But if we look at the society that emerges, this Dark Age society that emerges from the ancient world of Mycenae, what you have is a rare human experience. The creation almost of a clean slate, even more so I would argue than the disruption that it came after the fall of Rome, because there’s one big difference. The fall of Rome did not destroy one of the most important tenacious and significant aspects of the old culture, the Roman Catholic Church, which remained and became the central fact for the new culture. There’s nothing like that in the Mycenaean world.
Figure E.164. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

Now, the differences between what we find in the Homeric poems are also very illuminating, differences between that and what we know happened after the fall of the Mycenaean world. For instance, *one of the most* striking things that you find in cultures, anthropologists and archaeologists live off this, is what they do with dead bodies. Now, in Mycenae, it’s obvious; they bury them in the ground as most of us do. The graves in the circle, the shaft graves, and then the beehive tombs for the big shots, and even outside in the countryside, we find graves which have bones of people in them. But we know that the Greeks in Homer don’t do that. The Greeks in Homer incinerate the bodies of the dead.
Figure E.165. Peak pitch contour for *one of the most*

- Discourse function: Expansion
- Prosodic pattern: Peak

Now, Attica was not *one of the most* (1) desirable, certainly agriculturally rich areas in Greece. It was relatively speaking rather barren. Now, there are of course great exceptions; the central valley so to speak, of Attica has the richest soil and in the ancient world it was able to grow the very best grain, including wheat. But very much of the Athenian soil is mountainous and pretty close to barren, so that you don’t have a lot of rich soil. This is not *one of the most* (2) admirable places to come. On the other hand, it has certain advantages that the Athenians used well to achieve wealth and power and greatness.
Figure E.166. Peak pitch contour for *one of the most*

Discourse function (1): Introduce a topic

Prosodic pattern (1): Peak

Figure E.167. Fall-rise pitch contour for *one of the most*

Discourse function (2): Expansion

Prosodic pattern (2): Fall-rise

<CLCV205_Sept2007_lec10.txt> I would say much of the time, most of the time, people did what the Spartans wanted them to do. But we have many occasions in which states refused to do so and even get in the way of the Spartans. Now, I think the Spartans very often when they had to do something called a meeting of the Spartan Alliance, consulted their allies, but it’s not necessary true that they took a vote as to what the allies
thought; sometimes they did. I think sometimes they didn’t; it all depended on the situation. If you want your allies to come and fight with you it’s better to have them to do so willingly than under orders, and so that will explain, in my opinion, some of the reasons for calling it a Peloponnesian League meeting, not necessarily that they were required to do so. But I’ve given you a mixed and rather vague picture, and I think that’s the real picture. I think you can’t be very sure, either because this evidence doesn’t allow us to be sure how the league was supposed to work and how it really did work, but I also think nobody could tell in advance how it was going to work, whatever the understood constitution was. After all, *one of the most* important things that is involved in membership in the league, is that when the Spartans say, I want you to come and fight with me for these purposes, you come and you bring your army to do it, but we have a period in Thucydides’ account of the Peloponnesian War in which important states like Corinth and Thebes, among others, simply say "no." And when the Spartans say, why aren’t you doing what you’re supposed to do, they come up with a very nice cock-and-bull story supported by theoretically religious motives why they can’t do what they’re supposed to do and the Spartans have to put up with it; there’s nothing they can do about it.
Figure E.168. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

<EEB122Jan2009_lec1.txt> So at an age not very much greater, or perhaps even a bit younger than some of you, Darwin sets off. He’s 22 years old. He wants to know how species form. He has set himself that goal. So he’s ambitious. He’s set a clear goal. The goal is to solve *one of the most* pressing problems that biology has at that time: where do species come from?

Figure E.169. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak
The more frequent something becomes, the more it’s subject to very strong negative selection, and the less frequent it becomes, the more it’s protected from being selected, because things that are rare aren’t very good resources; things that are common are great resources. And so what happens is that you get what is now recognized as a classical oscillation of virulence and resistance between the host and the pathogen. *One of the most* interesting things about a human immune system is that the MHC or HLA genes that mediate this kind of resistance against pathogens have some of the highest genetic diversity of any genes anywhere. It looks like variants, rare variants, have been selected again and again and again. So every time something becomes frequent, it becomes useless and another rare one is selected, and eventually a huge supply of variation builds up in the population. So this principle really has had quite a role to play in the selection of the vertebrate immune system.

![Graph](image-url)

Figure E.170. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

There’s another example from nature that’s pretty well studied, and that’s worms living in snails and ducks in a beautiful lake on the South
Island of New Zealand, and the people who get to go study this stuff go to one of the most beautiful parts of the world, where they then put on wet suits and dive into freezing cold water.

Figure E.171. Peak pitch contour for one of the most

Discourse function: Expansion

Prosodic pattern: Peak

Now if this connection between evolutionary conflicts of interests and mental disease is ever actually established, it’s going to be one of the most remarkable connections that I know of. It was completely unexpected. Nobody ever thought that an alternative explanation for autism and schizophrenia would ever come out of kin selection and parent-offspring conflict. Okay? Certainly that was completely unsuspected in the ‘60s, ‘70s, ‘80s and ‘90s.
Now Woolf doesn’t try to explain exactly how it is that Milton is shutting out the view, and she doesn’t try to explain what the view would look like if it weren’t shut out. But in citing the power of what she claims to be this Puritan bogey, Virginia Woolf really suddenly reveals, I think, how difficult it is even for her to shut out entirely the real—or it might just be the bogus—power of John Milton. At the very moment that Woolf advises women readers to look past Milton’s bogey, she finds herself in the peculiar position of echoing the poetry of John Milton. This is, I think, an unbelievable thing to have happen at one of the formative moments of twentieth-century feminism. She’s alluding here, I think, to one of the most famous passages in Paradise Lost in which Milton is asserting nothing other than his poetic power.
But it seemed to a lot of followers of Calvin that it was a matter -- and you can imagine why -- it was a matter of some urgency and a matter of some importance to know whether one had actually been elected by God for salvation. We need some proof of our salvation simply to get up in the morning actually, when you think about it, and the only proof for so many of Milton’s contemporaries seemed to lay in the degree of visible success that they seemed to have enjoyed. And so then, much as now, one of the most obvious signs of success was, of course, financial. The means by which we could discern whether God had called on us to join the elect was by discerning the profitability of our vocation -- vocation in the secular sense of employment -- and so you can probably see something like the strangely perverse logic that could begin to attach itself to the puritan belief in God’s predestination of all human beings either to salvation or damnation.
Figure E.174. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

<ENGL220_Fall2007_lec3.txt> Because the servant had not been willing to spend the only talent that he had been given, the master instructs him to give his one and only talent to the man who now has ten. And the master concludes with an imperative that is surely *one of the most* terrifying utterances in the entire Bible: Cast therefore that unprofitable servant into utter darkness. There shall be weeping and gnashing of teeth.

Figure E.175. Fall pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Fall
And when we return to our native Olympus and the everlasting ages of immutable eternity are established, we [and he means "we poets"] shall walk, crowned with gold, through the temples of the skies and with the harp’s soft accompaniment we shall sing sweet songs to which the stars shall echo and the vault of heaven from pole to pole. Unbelievable. Now Milton – and he’s being serious here, and we are given every rhetorical cue possible that Milton is being serious – has conjured one of the most extraordinary rewards conceivable for a poet.

Figure E.176. Peak pitch contour for one of the most

Discourse function: Importance

Prosodic pattern: Peak

So let us begin our examination of this question with the consideration of the poem’s form. Now the most distinguishing feature of Milton’s elegy is the fact that it’s a pastoral elegy. It engages the ancient art of pastoral poetry initiated and made famous by the great Greek poet Theocritus, which was later imitated by Moscus and then finally by the Roman poet Virgil in his celebrated pastoral eclogues. You can see on the handout those poems by those classical authors that Milton’s Lycidas is most indebted to. The pastoral elegy is clearly one of the most
stylized and most self-consciously artificial of all of the poetic genres. The poet of a
pastoral elegy usually represents himself as a shepherd, a shepherd mourning the death of
a fellow shepherd, and he often explains that the death of his shepherd friend is exerting a
magical effect on the entire natural world.

Figure E.177. Peak pitch contour for one of the most

Discourse function: Importance

Prosodic pattern: Peak

<ENGL220_Fall2007_lec6.txt> Another way into this problem: let’s look at the
comments that Dr. Johnson made about Milton’s Lycidas in the eighteenth century. This
is reading from the packet assigned for today, and I’m going to ask you to do what you
can to get through the biography of Milton in the packet, as well as the notes on Milton’s
poetry that we have from Dr. Samuel Johnson. Make sure you all have done that by the
midterm. Okay. Famously, Dr. Johnson couldn’t bear this poem, Lycidas -- Dr. Johnson,
the greatest of all literary critics of the eighteenth century. Because Milton’s poem is
probably considered to be the most important elegy written in any language by any poet,
Johnson’s assessment of it has become famous for being one of the most wrong-headed
evaluations ever made of a work of literature by a great literary critic -- but inspired
wrong-headedness, which is what I take Dr. Johnson to be guilty of, is invaluable. And so I want to quote Dr. Johnson here, and this is on the handout.

**Figure E.178.** Fall pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Fall

<ENGL220_Fall2007_lec7.txt> I want to draw your attention to line 186. This is the line that begins the poem’s final verse paragraph and it has to be *one of the most* amazing moments in all of English literature. "Thus sang" — these five words: "Thus sang the uncouth swain."

**Figure E.179.** Peak pitch contour for *one of the most*

Discourse function: Importance
Prosodic pattern: Peak

<ENGL220_Fall2007_lec8.txt> It’s fairly easy to see that, at least in this case, Milton’s rhetoric and his imagery begin to undo, begin to unravel, the logic of the argument. It’s a process of undoing and undermining that really eats away at the argument, we could argue, throughout the entirety of Areopagitica. I’m willing to bet that some of you had noted in your reading last night, or whenever you did your reading, perhaps you actually underlined the sentence that we’ve just looked like. You underlined it perhaps because you were convinced that this was Milton’s wonderful and liberatory, progressive celebration of the absolute inviolability of the written word. If you did that, on some level, I think, you were absolutely right, even though you were utterly misconstruing the logic of the [laughs] argument. One of the most remarkable things about this text is that it’s invariably the soaring, libertarian rhetoric that we end up noting, that we end up remembering, and that sticks with us.

Figure E.180. Peak pitch contour for one of the most

Discourse function: Importance

Prosodic pattern: Peak
<ENGL220_Fall2007_lec8.txt> I'll stop there. With this utterly original fable about the fragmentation of what we think of as religious truth, Milton goes out of his way -- this is remarkable. He’s actually enacting, and he’s enacting it rhetorically, the fragmentation of religious culture in seventeenth-century England. One of the most intriguing aspects of this amazing passage is the fact that the fragmentation that Milton is describing, and on some level even enacting, is something that he seems to be celebrating here.

![Figure E.181. Peak pitch contour for one of the most](engl220_08_100107_2)

**Figure E.181.** Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

<ENGL220_Fall2007_lec10.txt> Traditionally in Renaissance literature, the muses -- and this will be familiar to many of you -- the muses are thought to be the daughters of Memory, and the nine muses up on Mount Helicon -- that’s where the muses are believed to have lived -- are the offspring of the goddess of memory, whose name in the Greek is Mnemosyne. Mnemosyne, whose name is spelled with some difficulty, is spelled on the lower part of your handout. Now, there’s an important reason for this genealogy, the idea that the muses are the daughter of Mnemosyne, the goddess of
memory. In the Renaissance, the most potent source of poetic inspiration was often believed to be the poet’s own memory, the degree to which the poet could call up, just out of sheer recall, literary topoi or commonplaces stored in his or her memory from a lifetime of reading. Milton himself, and this seems to be true, is said to have had one of the most capacious, one of the largest memories in English letters. This is the effect that we get, I think, from reading Milton -- is this notion that he seems to have had one of the largest memories imaginable and that he’s remembered just about everything he’s ever read.

![Figure E.182. Peak pitch contour for one of the most](image)

**Figure E.182.** Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

Now you also may remember that we have already run into Spenser’s Mammon before this point, before Paradise Lost. Mammon had surfaced -- I’m testing your memories here -- in the text of Areopagitica. Because this is *one of the most* famous passages in the treatise, and it’s not one that we actually looked at for Mammon himself, I’m going to ask you to turn to Areopagitica. This is page 728 in the Hughes, the right-hand column.
So, between 1650 and 1750, and this is right out of what you’re reading, the rulers of continental Europe, of the biggest states, extended their power. And, so, there were two aspects of this. One is they extend their ability to extract resources out of their own populations; and, second, they work to increase their dynastic holdings at the expense of their neighbors munching smaller states, or by marriages, or by wars against their big rivals. I mean one of the most interesting examples of that is the Thirty Years’ War, which starts before this course and ends before this course or with the beginning of this course, 1618-1648, which I’m going to come back to a little bit in a while — they say while it begins as a religious war between Protestants and Catholics, it ends up being a dynamic struggle between two Catholic powers consolidating their authority over their own peoples, and expanding their dynastic domains, thus Austria and France. That’s an important point, because it tells you what really is the big picture that is going to emerge.
Figure E.184. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

<HIST202_Fall2008_lec2.txt> But if you think of Spain, if you’re hitchhiking through Spain or something like that, or through the south of France, or Eurail passes, and if you go to a town like Avila in Spain. Avila is *one of the most* fantastic fortified towns in Europe. Or, if you go to Nimes in the south of France, you’ll see boulevards that people race motorcycles around all the time and they keep you up all night. There are no walls there anymore, because the king had them knocked down.

Figure E.185. Peak pitch contour for *one of the most*

Discourse function: Expansion
Prosodic pattern: Peak

This is the weighing house. Here, this is very classic. I’m not a professor of architecture, but it’s obvious this is northern European architecture that you can see in northern France, cities like Arras and other places, or Charleville-Mézières in the Ardennes. It’s one of the most fabulous plazas anywhere. Or in the Place des Vosges, which is by far the most beautiful plaza in Paris, you have this kind of architecture. But this is the weighing house there.

Figure E.186. Fall pitch contour for one of the most

Discourse function: Expansion

Prosodic pattern: Fall

And so if you look up further along the Loire River where you had this sort of economic change in the eighteenth century, people accepted this new lead. They were willing to ditch the idea of the monarch. It wasn’t that they all read Rousseau instead of the Bible before they went to bed, but these were big-time changes that reflected the way things had evolved. Let me give you some more examples. Now, one of the most important moments of the French Revolution — and this is also worth remembering, and you can read about it — is the civil constitution of the
French clergy. Because the revolutionaries get the very good idea that you’re broke. We already know that. The monarchy is just flat broke, so where are you going to get the money? Who has money?

**Figure E.187.** Peak pitch contour for *one of the most*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<HIST202_Fall2008_lec8.txt> Today I want to talk about the Industrial Revolution from a variety of aspects. Everything on the board I put on our website, so don’t worry about copying it down. It’s all pretty obvious. Doing the Industrial Revolution across the century is no easy task, but we will do it and do the reading. Let me just say that the way people look at what used to be called Industrial Revolution, and I guess some people still call it that, has changed dramatically. Through the 1950s and into the 1960s, the idea of the Industrial Revolution was that it was the work of some genius inventors who created machines used primarily in the textile industry — but also in mining — that eliminated blocks to assembly line production. Then everybody was crowded into factories and the new brave world opened up. In fact, *one of the most* interesting books and great classics that is still in print was written by an economic
historian at Harvard who’s still around called David Landes. It’s a good book called The Unbound Prometheus, which was basically that.

Figure E.188. Peak pitch contour for one of the most

Discourse function: Expansion

Prosodic pattern: Peak

<HSAR252_Spring2009_lec5.txt> So now I want to show you some examples of houses that conform to the Hellenized domus type, this being the first one. It’s one of the most famous houses in Pompeii, and if you’re going there anytime soon and are making a list of must-sees, this is one of those must-sees, in Pompeii, the House of the Vettii. We think it belongs, although we’re not absolutely sure, to the Vettius brothers, to the Vettius brothers in Pompeii. And it dates, as the Monument List indicates, to the second century B.C. and later.
Figure E.189. Fall pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Fall

Mark Antony, who not only rose to power after Caesar’s assassination, but rose in the life and times of Cleopatra. They had entered into—well there’s some rumors that this happened, or began much earlier in time. But at any rate, Mark Antony takes up with Cleopatra and he joins her in Egypt and he spends a good deal of his time in the eastern part of the Empire with his paramour. Octavian very smartly realized Antony is distracted. "This is a perfect time for me to try once again to gain the supreme power that I want. I don’t want to be part of a threesome, I want to rule Rome completely, myself." And he defeats Antony and Cleopatra at *one of the most* famous battles of all time, the Battle of Actium, a naval battle which took place off the northwestern coast of Greece, in 31 B.C. After that very famous battle, Antony and Cleopatra commit suicide and Octavian becomes the sole emperor of this newly emerging super power, and he is appointed as Augustus, which meant that he had a special kind of majesty, in the year 27 B.C.
Figure E.190. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

<HSAR252_Spring2009_lec10.txt> Another view of the back of the Pyramid of Cestius, the Mausoleum of Cestius, which again shows us how well preserved it is. You can see the Aurelian Walls, you can see the gate that we looked at before, and you can also see that the back is actually in a modern cemetery. This is the so-called Protestant Cemetery, and if you are in Rome and have time, this is *one of the most* interesting places to visit. It’s again a bit off the beaten track. Not that many tourists go there, but those that do are rewarded, because it’s a cemetery where many expatriates were buried -- people who flocked to Rome because they loved it. Authors, scholars, poets, painters came to Rome, ended up spending the rest of their lives there--coming from all different countries around the world--spending the rest of their lives there, dying there, and eventually being buried in the so-called Protestant Cemetery.
Figure E.191. Fall pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Fall

<HSAR252_Spring2009_lec10.txt> And we see here a model of this aqueduct, the later gate here, and the Tomb of Eurysaces. And this shows you very well the way in which these two streets, the Labicana and the Praenestina, came into Rome at this point, converged exactly on the façade of this tomb. And this--it is clear that Eurysaces--and I’ll tell you how he did this in a moment--had enough money that he was able to buy what was certainly *one of the most* choice pieces of real estate, outside the walls of Rome, one in which everyone who came into Rome from either of those two thoroughfares would see the façade of this tomb. This is a man who wanted to be remembered for posterity. It’s another example of how tombs were used for the purposes of retaining memory over time.
Figure E.192. Fall pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Fall

You all know Yale has a center for study of the Cambodian genocide, where now one group of people, the Cambodians, sort of split into two and the slaughter was terrible. How many of you have seen the movie *The Killing Fields*? How many of you know about the Cambodian genocide? Again, most of you, but not all of you; it's *one of the most* recent, most horrific kinds of killing.

Figure E.193. Fall pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Fall
You have this tremendous death rate of children and then it continues at a fairly high but decreasing death rate, and then finally there’s very few people left. This is not the curve which showed you the percentage of death in age thing, but how many people are still surviving? At any point in--by age 15 here, this dotted line, only about 40% of people are still alive, 60% have died before age 15. This again is women, so a lot of these deaths in this middle period, by the time--this is the reproductive years, these dotted lines is 15 to 45 or so, I think 50 in this case, which is the years in which women can reproduce and most of the death in females in this period is childbirth itself. In a developing population, in a pre-medical population, childbirth itself is one of the most dangerous things in these years and the death rates are very high from childbirth itself, so a lot of that is female--is childbirth.

**Figure E.194.** Rise pitch contour for one of the most

Discourse function: Expansion

Prosodic pattern: Rise

In this case the adaptation is to an under-population and I’m going to show you--well just to give you an idea of how densely populated Africa is or isn’t, here are some European--some non-African places.
Netherlands is *one of the most* crowded in the world; 1,011 people per square mile. Japan: 870, but that’s--in terms of arable land Japan is mostly mountains. They just have very small areas where people can land, so to compare the Netherlands are all flat, people can live everywhere.

![Graph](mcdb150_05_012709_1)

**Figure E.195. Fall-rise pitch contour for *one of the most***

Discourse function: Expansion

Prosodic pattern: Fall-rise

<MCDB150_Spring2009_lec8.txt> You all know Edward Gibbon? Gibbon wrote, The Decline and Fall of the Roman Empire, *one of the most* famous intellectuals of that time. Right after that he wrote, "In the civilized world the most numerous class is condemned to ignorance and poverty."
Figure E.196. Peak pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Peak

<PLSC114_Sep2006_lec1.txt> The Republic is a book about the regime and all later political philosophy is a series of footnotes to Plato, and that means that it must provide a series of variations, so to speak, on Plato’s conception of the best regime. But what is a regime? Broadly speaking, a regime indicates a form of government, whether it is ruled by the one, a few, the many, or as more common, some mixture, a combination of these three ruling powers. The regime is defined in the first instance by how people are governed and how public offices are distributed by election, by birth, by lot, by outstanding personal qualities and achievements, and what constitutes a people’s rights and responsibilities. The regime again refers above all to a form of government. The political world does not present itself as simply an infinite variety of different shapes. It is structured and ordered into a few basic regime types. In this, I take it to be *one of the most* important propositions and insights of political science.
Figure E.197. Fall pitch contour for one of the most

Discourse function: Importance

Prosodic pattern: Fall

<PLSC114_Sept2006_lec4_1.txt> Let’s talk a little bit about the participants in this dialogue. It is a dialogue. It has a fairly large number of characters, although only a relatively few number of them speak in the book. Yet, it’s something very important, as we would want to know in any play or novel or movie. We want to note something about the particular people who inhabit this dinner party that Socrates and Glaucon have been promised. Who are they and what do they represent? There is Cephalus, who we will see very quickly, the father of Polemarchus and whose home they are attending. The venerable paterfamilias, the venerable father of the family. Polemarchus, his son, a solid patriot who defends not only his father’s honor, but that of his friends and fellow citizens. We will also see Thrasymachus, a cynical intellectual who rivals Socrates as an educator of future leaders and statesmen. Of course, it is the exchange between Socrates and Thrasymachus that is one of the most famous moments of the book.
Discourse function: Expansion

Prosodic pattern: Fall-rise

A famous professor at a distant university was said to have begun his lectures on the Republic by saying, "Now we will consider Plato, the fascist." This was, in fact, the view popularized by one of the most influential books about Plato written in the last century, a book written by a Viennese émigré by the name of Karl Popper, who in the very early 1950s, right at the height of the Cold War and of course the end of the conclusion of the Second World War, wrote a book called The Open Society and Its Enemies. He wanted to know what were the causes or who was responsible for the experiences of totalitarianism, both in Stalin’s Russia and in Hitler’s Germany. In the course of this inquiry, he concluded that not only Hegel and Marx were important in that particular genealogy, but this went back to Plato as well, Plato principally. Plato, who Popper accuses in a passionate, albeit not very well written book, accuses Plato of being the first to establish a kind of totalitarian dictatorship. Is that true?
Figure E.199. Fall pitch contour for *one of the most*

Discourse function: Expansion

Prosodic pattern: Fall

<PSYC110_Spring2007_lec3.txt> He’s *one of the most* famous scholars ever but he’s not known for any single discovery. Instead, he’s known for the development of an encompassing theory of mind, one that he developed over the span of many decades.

Figure E.200. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

<PSYC110_Spring2007_lec4.txt> Finally, the other reading you’re going to do for this part — section of the course is Chomsky’s classic article, his "Review of Verbal
Behavior." Chomsky is one of the most (1) prominent intellectuals alive. He’s still a professor at MIT, still publishes on language and thought, among other matters. And the excerpt you’re going to read is from his "Review of Verbal Behavior." And this is one of the most (2) influential intellectual documents ever written in psychology because it took the entire discipline of behaviorism and, more than everything else, more than any other event, could be said to have destroyed it or ended it as a dominant intellectual endeavor.

**Figure E.201.** Peak pitch contour for one of the most

Discourse function (1): Expansion

Prosodic pattern (1): Peak

**Figure E.202.** Fall pitch contour for one of the most

Discourse function (2): Importance
Prosodic pattern (2): Fall

<RLST152_Spring2009_lec3.txt> But those basic structures are part of any kind of Greek city in the Ancient World. And what Alexander and his successors did was they took that basic Greek structure, and they transplanted it all over the Eastern Mediterranean, whether they were in Egypt or Syria or Asia Minor or anyplace else. Which is why you can travel right now to Turkey or Syria or Israel or Jordan or Egypt, and you can see excavations of towns, and it’s remarkable how they all look so much alike, because they’re all inspired by this originally Greek model of the city. So that’s one of the most important things about Alexander and his successors is they Hellenized the entire eastern Mediterranean, and that meant every major city would have a certain commonality to it. It would have a certain koine to it; that is, a Greek overlay, over what may be also be there, the original indigenous kind of cultures and languages.

Figure E.203. Fall pitch contour for one of the most

Discourse function: Importance

Prosodic pattern: Fall

<RLST152_Spring2009_lec6.txt> What did Mark want to do with this text? Who did he want to do it with? What kind of historical context do we imagine? First we see--
immediately we see a bunch of problems with this text. There’s first the problem—one of the most famous problems of the Messianic secret. This is when over and over again in Mark, and it happens sometimes in the other Gospels, but it’s—it happens more in Mark then a lot of other places.

Figure E.204. Fall pitch contour for one of the most

Discourse function: Expansion

Prosodic pattern: Fall

<RLST152_Spring2009_lec7.txt> All these things make Matthew look very familiar even to people who may not know much about Christianity because this is stuff that you see in our culture over again. Matthew, therefore, is at the same time unfamiliar to people if they start reading it carefully because it’s the most Jewish of the Christian Gospels that are in the canon, that is. There are some other Gospels from the ancient period that are even more Jewish than Matthew, but they didn’t make it into the New Testament. It’s the most Jewish, and yet it’s also at the same time, one of the most universal of the Gospels because you precisely have an ending with Jesus commanding the apostles to make disciples of all nations, that is all the Gentiles too.
One of the themes of the course, maybe the main theme of the course is the diversities of early Christianity. In fact, a lot of scholars like to talk about not "Christianity" in the first one hundred years but "Christianities." This is one of the themes also of Bart Ehrman’s textbook, so you should have picked up on this. There’s lot of different kinds of Christianity and we’re going to talk about those kinds. Today, we get to one of the most interesting differences to most people, because most modern people are not at all familiar with the Gospel of Thomas. The Gospel of Thomas is not in our canon for several reasons, but we can talk about that at some point at the end of the lecture if you want to know.
Discourse function: Introduce a topic

Prosodic pattern: Peak

<RLST152_Spring2009_lec10.txt> Luke and Acts looks like a historical document and this is what fools people. Do you remember back earlier in the beginning of the semester where we compared the first two chapters of Paul’s letter to the Galatians with the way Paul is presented as being in and out of Jerusalem, and how many times he went to Jerusalem, what happened in Jerusalem, what happened in Damascus, and I asked you to compare those two accounts. Some of you thought, well I believe the Acts account because Paul clearly has an ax to grind in Galatians, he’s clearly trying to make a point of his independence from the Jerusalem church. The book of Acts just looks more like a history; it looks more like a historical account. Well by now you know that, yes, even though it looks like a historical account, especially by ancient historiographical standards, it’s not a historical account in anything like the modern sense. So, one of the most important things to realize, these texts you’re reading are creative texts, they’re put together for purposes, not one of them is coming to you without some kind of ax to grind,
without some kind of tendency, without some kind of theological or ethical or political statement to make.

Figure E.207. Peak pitch contour for *one of the most*

Discourse function: Importance

Prosodic pattern: Peak

**One of the Things**

<ASTR160Jan2007_lec1> Some things about this course. This is a course for non-scientists. That portion of the enrollment policies is not a suggestion. I really don’t want science majors in this class. If you are a science major, I’m going to notice because that’s *one of the things* that appears on the class list; what your major is. So, don’t take the course if you’re a science major.
Figure E.208. Fall-level pitch contour for *one of the things*

Discourse function: Provide background information

Prosodic pattern: Fall-level

<ASTR160Jan2007_lec1_3> Copernicus, as you probably recall, decides that the geocentric model is wrong, things ought to be heliocentric; the Sun in the middle. So, you put the Sun in the middle and everything, including the Earth, goes in circles around the Sun. This was revolutionary, and in fact, the title of the book he published was *De Revolutionibus Orbium Coelestium*, which means "of the revolutions" in the sense of "revolving of the celestial spheres." The use of that word revolution is *one of the things* that pushed the word revolution to its current meaning, meaning overthrowing authority in some ways. Originally, it just meant to revolve but this was so revolutionary that people started to use the word in the other way.
Let me remind you what we had started to talk about. The class is organized into three fairly specific topics. The first of which is extrasolar planets. Planets around stars other than the Sun. Exoplanets, so-called. That’s our topic. *One of the things* that I pointed out last time is that, surprisingly enough, very—until ten years ago none of these were known.
So, you are guaranteed that there’s going to be a bunch of light from the star right on top of where you’re looking for your planet. And in fact, it’s going to get worse, because *one of the things* about this equation is $D_1$; the distance to the star. We did this for Sirius. Sirius is one of the closest stars; it’s 3 parsecs away. Most--the center of the galaxy is 8,000 parsecs away.

![Figure E.211. Peak pitch contour for *one of the things*](astr160_02_011807_2)

**Figure E.211.** Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

And this explains the orbits, because since these large objects have been created by running a lot of small objects together, the ellipticity of any of the elliptical part of the orbit of any of these things tend to cancel out. Because one of these objects will be elliptical in one direction; another will be elliptical in another direction. If you put them all together they’ll--that orbit will tend to be circular. Similarly, some of the objects will be going up out of the plane of the Solar System, some will be going down, but you’ll run them together and they’ll all end up with kind of similar circular co-planar orbits. So makes approximately--that’s the approximate sign [~]--
circular, co-planar orbit. So, that’s good because that’s one of the things we’re trying to explain.

**Figure E.212.** Fall pitch contour for one of the things

Discourse function: Provide background information

Prosodic pattern: Fall

<ASTR160Jan2007_lec5> I would say that you could answer that particular question in this case, in both directions, perfectly well. If you want to make a case that it’s a scientific issue, you say, "Look, classification is very important to science." I made that point in class on--a week ago, and that, you know--you’ve got to have your classifications right in order to understand what’s going on. And what has happened? Here is--new data has come in, which has thrown the old classifications into question. Although, it should be noted that there wasn’t officially a definition of "planet" that goes back to antiquity. And one of the things they were trying to do was to create one.
Figure E.213. Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak

<ASTR160Feb2007_lec6> Oddly, in many cases, they turn out to have highly elliptical orbits, in some cases. Not the Hot Jupiters, not the ones that are close in. Those all are more or less circular. But some of these longer ones have highly elliptical orbits. That’s also very weird in terms of our theories of planetary formation because one of the things that our theories were designed to explain was the fact that all the major planets in our own Solar System have orbits that are close to circular. It does a very good job of explaining that and then, naturally enough, has trouble explaining the ones we see that are in highly elliptical orbits.
Figure E.214. Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

You also don’t expect there to be any planets for an entirely different reason, which is, *one of the things* that had been discovered as they were piling up all these Hot Jupiters found by the Doppler Shift method, is that stars are more likely to have planets--have planets--if they have high amounts of heavy elements--heavy elements. Now, let me explain that. Most stars--stars are mostly hydrogen and helium. Astronomers do chemistry in a very peculiar way. We have--we consider there are three kinds of things in the universe. There’s hydrogen, there’s helium, and there’s metal. Chemists--everything else is a metal. If don’t care if it’s oxygen, carbon, whatever. The chemists get really uncomfortable with this. But, you know, it’s like the supposed primitive tribes. I’m not sure these--this actually exists, but the linguists say there are tribes in the world where they count one, two and many.
And the key thing here is that there are lots of stars with mass more than 3 times the mass of the Sun. We don’t see them as black holes because they’re still in hydrostatic equilibrium. But eventually, they’re going to run out of nuclear fuel, and they’re going to collapse. Now, in fact, during the course of the star’s life, one of the things I glossed over is stars tend to lose mass as they live.
Okay, so I--last time, I defined a black hole. This is simply something where the escape velocity is faster than the speed of light. Or, alternatively, and this is--amounts to the exact same thing, the radius of the object is less than the Schwarzschild radius, which is defined for an object of any given mass. And this isn’t particularly extraordinary or interesting, as long as the speed of light isn’t particularly extraordinary or interesting. And one of the things that happens when you start talking about relativity is that it turns out the speed of light is a very important quantity.

Figure E.217. Peak pitch contour for one of the things

Discourse function: Importance
Prosodic pattern: Peak

Although, it is interesting--you know the movie Contact? So, this is based on Carl Sagan’s novel of the same name. And, one of the things that happens late in this--this is the first use, I think, in science fiction, of the concept of a worm hole, where you fall into a black hole and you fall out again somewhere totally different in space and time.
Figure E.218. Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak

<ASTR160Feb2007_lec9> Ah, excellent question. Could you orbit--could you get yourself into a stable orbit inside an event horizon? If everything were in--worked the way Newtonian mechanics says it works, you could. But, it turns out, there are relativistic corrections. There is something called the smallest circular--smallest--the Innermost Circular Stable Orbit. IC--ISCO, Innermost Stable Circular Orbit. That’s important, because that actually can be observed in various ways, and we’ll talk about this in two weeks’ time. The Innermost Stable Circular Orbit turns out to be outside the event horizon. But, you’re right, if you were only using Newtonian calculations, there would be that square root of 2, and you could imagine being in a circular orbit inside the event horizon. But that’s one of the things that is different about the relativistic calculation. It turns out that for non-rotating black holes the Innermost Stable Circular Orbit is three times the Schwarzschild radius.
If you actually saw something disappearing? Yeah, and in fact there is--there is indirect evidence that there’s material falling through--that in some systems there is material currently falling through the event horizon of black holes. And, in fact, that’s one of the things that is a current topic of active research, is, can you demonstrate that?

**Figure E.219.** Fall pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Fall

*<ASTR160Feb2007_lec9_4>*

If you actually saw something disappearing? Yeah, and in fact there is--there is indirect evidence that there’s material falling through--that in some systems there is material currently falling through the event horizon of black holes. And, in fact, that’s one of the things that is a current topic of active research, is, can you demonstrate that?

**Figure E.220.** Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak
So this particular example of a plasmid has several regions. Now, in your book, there’s an example of plasmid where I’ve given you the exact sequence of nucleotides that makes up the whole double stranded DNA molecule. I just give you one of those, right, because you could write down the other one because you know the other complimentary sequence from base pairing? But one of the things about these plasmids that makes them very useful is that their entire base pair sequences is known. So you know everywhere on this picture you could write down exactly what the sequence of nucleotides are that make up this vector.

![Graph](beng100_04_012408_1)

**Figure E.221.** Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

Let’s take an example of estrogen, for example. A small molecule gets produced by cells in one part of the body, circulates in the blood, estrogen enters cells, and sometimes that estrogen is able to penetrate deep within the cell, even into the nucleus. The receptor for estrogen is a special molecule called a DNA binding factor. Estrogen can combine with this receptor to form a new sort of unit which interacts with DNA. When this bound receptor interacts with DNA it could, for example,
turn on expression of a target gene. So one of the things that estrogen does when cells are exposed to estrogen is that certain genes get turned on that weren’t turned on in the estrogen-free state. It leads to expression of new genes, production of new proteins, and a change in a behavior of the cell.

Figure E.222. Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak

If you could look inside a pre-synaptic axon terminal, you would find one of the characteristics is that it’s loaded with these vesicles and they’re just sitting there waiting to receive an action potential so that they can immediately dump their contents. And so one of the things you know about the nervous system is its fast. I decided to move, I can move right away. So, in order to have fast transmission you do that by transmitting electrical signals; that happens pretty quickly. You turn on your lamp, it happens pretty fast because current can flow very quickly through wire or through a charged - a solution of ions. So, that process happens fast but you also need this neurotransmitter release and activation to happen fast so that you can have rapid activity.
**Figure E.223.** Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

<BEONG100Feb2008_lec8_2> And MHC1 is a word- MHC stands for major histocompatibility complex and it’s *one of the things* that distinguishes my cells from your cells, from your parents cells, from your roommates cells. Each one of our cells - *one of the things* that distinguishes them is the kind of MHC molecules that all of my cells make.

**Figure E.224.** Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak
So, let me go back to what we talked about last week and illustrate that a little bit more closely. So one of the things that happens is that certain cells within your body process the vaccine or the antigen and we talked about that.

![Peak pitch contour for one of the things](image)

**Figure E.225.** Peak pitch contour for one of the things

Discourse function: Introduce a topic

Prosodic pattern: Peak

This is Sir William Crookes. He was a Fellow of the Royal Society, and FTS. In 1861 he discovered the element thallium. He also developed the cathode ray tube, which he’s holding there, which became the x-ray tube, and he invented the Cooke’s radiometer. I bet every one of you has seen a Cooke’s radiometer. Do you know? There’s a picture of a Cooke’s radiometer, to measure the intensity of light by how fast it spins. You’ve seen these things you buy in novelty stores that sit there and spin in the light. Okay? From 1913 to 1916 he was President of the Royal Society, the same thing that was founded back by Boyle — remember? — and Robert Hooke and those guys. In 1898 he was President of the British Association for the Advancement of Science, and he was also, in that year, President of the Society for Psychical Research. And FTS is Fellow of the Theosophical Society. In his presidential
lecture to the British Association for the Advancement of Science, one of the things he said was, "Telepathic research does not yet enlist the interest of the majority of my scientific brethren."

**Figure E.226.** Peak pitch contour for one of the things

Discourse function: Provide background information

Prosodic pattern: Peak

There are all sorts of interesting things about Annie Besant. But one of the things we’re interested in is that she could see atoms.

**Figure E.227.** Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak
And again, you see it’s not monotonic—it goes up and down. So there must be two things involved. What are the two things? One of the things is how big the van der Walls radius of the atom is, which clearly gets bigger as you go fluorine, chlorine, bromine, iodine. But why does the effect on axial versus equatorial go up and down. Why doesn’t it just go up?

![Image](attachment:image.png)

**Figure E.228.** Peak pitch contour for *one of the things*

Discourse function: Introduce a topic

Prosodic pattern: Peak

Another thing that is interesting is that when you look at the burials of Greeks in the post-Mycenaean period, in the Dark Ages, there’s nothing resembling those grand tombs and the wealth that’s buried in them for the dead. You find that the tombs of noblemen are very much the same one as the other. You’re struck by the equality from the standpoint of riches of the dead nobility. No great distinction and no great riches either. You’re dealing with a poorer world and a world that doesn’t have this kind of outstanding monarchy. So, *one of the things* I think we learn is that the Homeric world of the kings, the role of the kings, the wealth of the kings, the power of the kings, the place of the kings is not taken from the Mycenaean period.
Figure E.229. Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak

<CLCV205_Sept2007_lec5> So, marginal land is brought into play with hard work and ingenuity, and this is one of the things that Hanson emphasizes that is so helpful. You got to be a farmer to understand these things — not everything that you try works.

Figure E.230. Rise pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Rise
The word in Greek is othismos, and if that was successful as it might be, it could knock down the lines of the front guys and get the other side running. There’s ancient evidence, there’s an ancient source for that, that says that’s what happened and that’s one of the things that we have to deal with. The critics of this point of view would say that’s impossible and inconceivable.

**Figure E.231.** Fall pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Fall

Now, another thing is that while these tyrannies last, it is typical that they should accomplish very significant things that most anybody would agree were positive contributions to the life of the community they ruled. You find economic prosperity is one of the things that is characteristic of these regimes.
Figure E.232. Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

So the Cypselid tyranny is a very successful one and we know something about it. The colonization movement, which the Corinthians had already started, but it really took a real hold in the time of the Cypselus, and so Corinth is colonizing quite vigorously in the time of the Cypselid tyranny, mostly, out in the west, that sort of empty territory from a Greek point of view, and so you will see Corinthian colonies stretching out along the shore, the north shore of the Gulf of Corinth, and north shore is less Greek and more barbaric than the south shore which is the Peloponnesus. Then if you go to the end of Greece as far west as you go, and make a right turn and head up into the Adriatic region — I’m sorry, the Ionian Sea and beyond that the Adriatic. Corinthian colonies are right along in there and they suggest, and I think they’re supported by other archaeological evidence, that commerce was *one of the things* that was very important for Cypselus and Corinth is booming from a commercial economic point of view in the years of the Cypselid tyrants. None of that is surprising, all of this is very characteristic of this phase of Greek tyranny that we’re talking about.
Figure E.233. Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

<CLCV205_Sept2007_lec9> What is established in this constitutional ultimate reform is to make Sparta like no other state in the Greek world, and then perhaps — well, like hardly any other state in all of history, and to make it the subject of attention and interest, and of usual admiration, although not always, throughout the millennia. You will find when people know about the Greeks and they know about Sparta, I’m talking about of course in the West, philosophers and others are struck just as Plato and Aristotle were by certain things about the Spartan way of life that make them take it seriously and admire it. Rousseau was a great admirer of Sparta for a variety of reasons. But *one of the things* that I don’t want you to lose sight of is that Sparta becomes a slave holding state like no other Greek state. Now, there was slavery all over the ancient world.
Figure E.234. Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak

<CLCV205_Sept2007_lec10> Athens, I hope you’ll remember from your maps, is located in the southeastern portion of the Greek peninsula. It sticks out there into the Aegean Sea. Its geography — it’s about 1,000 square miles is Attica. I think we talked about it already. The city is Athens; the region in which they live is Attica; the people are Athenians and that’s an important point I think I made too, which is everybody who is a citizen who lives in Attica is an Athenian, no matter if he lives sixty five or seventy miles away from the city. He’s still an Athenian. One of the things they achieved early was the unification of that whole region and they made it one polis, although that certainly doesn’t mean that there are no independent villages and towns in the polis of Athens, because they certainly are.
<CLCV205_Sept2007_lec10> These noblemen would typically have held a lot of land and have been well to do, have had all the powers I’ve described, and were looked up to and were listened to. They would have led the military units into battle when that was necessary and we know that one of the things that they did was to serve as the source of justice in the state. If there was a quarrel between a couple of guys, they would bring it to a court.
Prosodic pattern: Peak

In Milton’s case this investment in power paid off. Milton would eventually come to feel so comfortable with the mantle of power that he was able to do much more than simply rewrite the first books of the Bible (which is of course one of the things that he accomplished in Paradise Lost, and that is itself no mean undertaking).

Figure E.237. Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak

Now I spoke last time about the familiar sense of hesitation, that apology with which Milton had opened the elegy. We hear in the 1637 Lycidas those same cries of unripeness and under-preparation that we had heard in the 1631 sonnet, "How soon hath Time, the subtle thief of youth." When Milton opens Lycidas with that phrase, "Yet once more," one of the things that he’s telling the reader is that yet once more he’ll be making the same argument for unreadiness; the same argument for nervous anticipation that he’d made a number of times before.
Figure E.238. Peak pitch contour for *one of the things*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<ENGL220_Fall2007_lec7> Now I think you may be rather happy to hear that this is the last time -- I’m pretty sure that this is the last time -- that we will have to discuss, at least at any length, Milton’s worries about his unreadiness and his un-preparation. It’s safe to say that Lycidas is one of the last poetic works of Milton’s that’s really consumed with his problem, the problem of fruitless anticipation. In some ways I think that that’s because the poem Lycidas seems in some ways to solve the problem of Milton’s waiting, this problem that he has of needing to wait. And so *one of the things* that needs to be explored here is why this poem is the last poem that Milton is not prepared to write.
You’ll remember that I mentioned several minutes ago that Milton appears -- literary historians, I think, have rightly seen the Milton who had written Lycidas as a different figure than the poet before having written Lycidas. Milton seems to have accomplished something in writing Lycidas, almost as if he accomplishes it over the course of this very poem; and one of the things that he’s accomplished is his ability to see himself as someone who has accomplished something. He’s just written this poem. And instead of this continual anticipation of writing something great, Milton’s able to look back and find closure in something already written.
When we consider the degree of Milton’s anxieties about his own attachment to classical learning, I think we can see the significance of Mammon’s actions here. The image of men, and it’s a grotesque image, of men rifling the bowels of their mother earth for treasures better hid -- this is a disgusting and terrifying image of a lot of things. But one of the things, I think, that it’s an image of is the practice of literary excavation.
Prosodic pattern: Peak

There’s an advanced sense of state and of organization. That also is one of the things to put in neon.

Figure E.242. Fall-level pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Fall-level

When he was lodged, he liked living in your basic Russian, wooden, peasant house, such as you could find on the outskirts of Moscow. One of the things that’s very true about Moscow, right into the twentieth century, is that you had all sorts of peasants living on the edge of Moscow living in these wooden houses. He liked that. He said he slept well in these wooden houses and that probably is because of his very unhappy childhood listening to relatives shouting at each other and plotting to kill each other in the big house.
Figure E.243. Peak pitch contour for *one of the things*

Discourse function: Provide background information

Prosodic pattern: Peak

<HIST202_Fall2008_lec8> I want to turn to something that complements that. That is a discussion of industrial discipline. One thing as workers learn to strike, going on to strike for better working conditions, for more money, for better hours, shorter hours, et cetera, et cetera, one has to imagine what the world looked like for them. What did they think about things that were happening to them? And *one of the things* that had happened to them was this sort of nineteenth-century end stage of the Industrial Revolution, that is, factory production.

Figure E.244. Peak pitch contour for *one of the things*
Why are the columns chopped up? You mean almost all in the same place? These things were often pieced, and so sometimes that can happen. And it’s actually one of the—you raise a very interesting issue, because one of the things that archaeologists are beginning to speculate, only recently about—and you see this in some of the most recent literature—is here we say, and I said it today, that this city was preserved exactly as it was in 79. And yet when you look at what it looks like, it’s actually in a pretty ruinous state. So that could mean two things. One, that they didn’t make all that much progress in that seventeen years, that they worked very hard but that the damage had been so significant that they were not able to bring these things back as much as they had hoped to.

![Graph]

**Figure E.245.** Peak pitch contour for *one of the things*

What makes this particular house interesting, and the reason that I show it to you, is it’s a good illustration of what happens when over time
you remodel, and also over time, when other property becomes available nearby. And we can tell from this plan that what happened here is that the core of the house was added to, as property on either side, additional property, became available, and this owner purchased that property and added it. And the plan becomes much more irregular obviously, because of that. An addition over here, an addition over here; some of that sense of axiality and symmetry is lost when you start to add to either side horizontally. But there are lots of houses like this, and it’s one of the things one needs to keep in mind as one visits the city and as one looks at each of these incredible structures.

![Graph](hsar252_05_012709_1)

**Figure E.246.** Fall pitch contour for one of the things

Discourse function: Provide background information

Prosodic pattern: Fall

<MCDB150_Spring2009_lec2_1> In these friend relations you mostly see it as a grooming thing. Males and females spend a lot of time with each other grooming, and what is grooming? Chimps, like all kinds of other animals are infested with parasites, which can carry diseases and be very dangerous, so they have to get rid of them. So one chimp will sit there and the other chimp will come by and spread the fur very carefully and then if there’s an insect--it’s good for the person from whom they take the insect
because that insect is no longer going to parasitize them—and it’s good for them, they get a little bit of protein. They spend hours and hours doing this. Males to males, males and females with each other, and females to females; everybody does it with everyone else, and one of the things that the observers do is count how much time each individual spends grooming the other.

Figure E.247. Peak pitch contour for one of the things

Discourse function: Provide background information

Prosodic pattern: Peak

Jane Goodall had one of her workers follow an adult male for 50 days—never out of sight, and one of the things they noticed, did he ever go looking for food? In this 50 days, never did he try to hunt food. He would just sort of wander through the jungle, and every so often his foot would step on a rotting fruit and squish, and he would notice it and look up and there’s a tree full of fruit, and climb up and eat and maybe call over some others.
Figure E.248. Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

<NMCDB150_Spring2009_lec6.txt> Nuclear family is--very, very simple things define a nuclear family. How frequently does he eat his main meal--does a man eat his main meal with his wife? This gets studied. How often he eats his main meal with his children? These are things that we take just absolutely for granted. How frequently does his wife go with him when he visits friends? How frequently does his wife go with him when he visits relatives? How much of his free time does he spend with his wife and children? The studies of this over the years, there’s a good study in Kenya for instance, and the answer to all these are "rarely". There’s a very low degree of nucleation of the families. Again, this is changing and families are becoming more and more nucleated and *one of the things* that’s studied is the percentage of people in marriages that are considered nuclear. The last statistic that I saw was 21%--only about one-fifth of families were what we would call nuclear families. Just that idea of a tight-knit family, exclusive in many ways, is just not a common sort of thing.
Discourse function: Provide background information

Prosodic pattern: Peak

<MCDB150_Spring2009_lec7> Going back to this, here’s all these problems, and what did people do about some of these things? An idea of disease comes from the Greeks and probably farther back then the Greeks, that the body is controlled by four humors, fluids that run around the body, something like the Chi of Oriental thought. And these four humorous must be in balance. When you got sick the problem was that the humors got out of balance. So one of the things you did was get bled. That was a standard procedure; let the blood flow because that gets rid of the evil humors.

Figure E.250. Peak pitch contour for one of the things
So there was no question in anyone’s mind that a big and growing population was just a wonderful sort of thing. What they didn’t realize is one of the things that I’m trying to get across in this class, that that system works for a situation where you have no limitation on land or resources. It’s like I’ve been--I was describing for Africa where the population was small and land was large, then population is--can be a benefit in the way just described. The reality, for Europe especially, was different.

**Figure E.251.** Peak pitch contour for one of the things

When sexuality itself since--a lot of problems with sexuality at that time. You’ve been reading some stuff about it, and one of the things is that men, aside from the childbirth aspect of it that women were of course always worried that if they had sex they would get pregnant and often they didn’t--usually they did not want to get pregnant, but also the men were not very skilled.
Figure E.252. Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

<MCDB150_Spring2009_lec9> How did this change and who was arrayed against this? People, women especially, were not happy with the situation. Young men of course wanted to get married, couldn’t until they were old, and we’ve talked about that situation in Africa where the bride price is very high, the old men control the bride price, they don’t allow the young men to get married until there’s almost a revolution. This is an aside, but with respect to the bride price, we hear a lot about older men marrying or having sex with younger women. In the West it’s *one of the things* we sort of complain about, about other cultures that this great disparity in age--an older man with a younger woman.
**Figure E.253.** Fall-level pitch contour for *one of the things*

Discourse function: Provide background information

Prosodic pattern: Fall-level

And this is the big theme of what one might call "the control of the passions." This is the theme of every great moralist from Spinoza to Kant to Freud. How do we control the passions? And it is certainly a large theme of Plato’s theory of justice in the Republic. Every great moral philosopher has a strategy for helping us submit our passions to some kind of control, to some kind of supervening moral power. And again, recall this is the theme raised at the beginning of Book II by Adeimantus, who puts forward an idea of self-control, or what he calls self-guardianship as his goal. How can we protect ourselves from the passion for injustice? And *one of the things* Socrates emphasizes is that the most powerful of those passions, the most powerful passion is that Socratic passion that he calls thumos, or what our translator has as spiritedness.
Figure E.254. Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak

<PSYC110_Spring2007_lec6> What do we know about the time course of language? Well, early on children start off and they prefer the melody of their own language. These studies were done in France with four-day-old babies. And what they did was they used a sucking method. Remember, there’s a limited number of things babies can do. *One of the things* they can do is suck, and these babies would suck on a pacifier to hear French.

Figure E.255. Peak pitch contour for *one of the things*

Discourse function: Provide background information
Prosodic pattern: Peak

<RLST152_Spring2009_lec6> It’s not a mystery to you, the reader, that’s part of the fun of the Gospel--Mark and John both play with this. They let you, the reader in on certain kinds of jokes and puzzles that the people in this story don’t get. That’s one of the things that Mark is doing is letting you in on some things, but still it’s very difficult for us to figure out this whole Messianic secret thing and this lack of understanding, even though we’ve known the secret.

![Figure E.256. Peak pitch contour for one of the things](rlst152_06_012809_1)

Discourse function: Importance

Prosodic pattern: Peak

<RLST152_Spring2009_lec7> Most Christians are taught, and most people just under the influence of Christianity have the idea that what Christianity is, is the supercession of Judaism. The thing that makes Jews and Christians alike, they both worship the same God. One of the things that make them different is not only the worship by Christians of Jesus, but also the neglect by Christians of the Jewish law. Christians can eat shellfish, bacon, and pork; don’t have to keep the Sabbath.
Figure E.257. Peak pitch contour for one of the things

Discourse function: Importance

Prosodic pattern: Peak

<RLST152_Spring2009_lec7> Another important theme of Matthew--I’m giving you several different major themes in Matthew because I’m going to ask in a moment, why are these things here? What is Matthew trying to do with these different things altogether? For example, why is Jesus the law giver and still Jewish and teaches the acceptance of the Jewish law, and yet this universalistic message at the end of the Gospel of going to all nations. Another thing that exegesis is, is finding problems in the text and then using the text itself to try to find answers to those problems. That’s what exegesis does. Why I’m setting up some of themes of Matthew, because these are going to be the problems that then I, as the wonderful scholar and exegete that I am, am going to swoop in with my angels on the clouds of heaven at the end of the lecture and give you answers to all the problems of Matthew, and then you’ll do that with your exegesis papers later? So one of the things that Jesus is, also in Matthew, is a teacher. Mark had told us in his Gospel that Jesus was a great teacher…
<RLST152_Spring2009_lec8> Now when Thomas came to his companions they asked him, "What did Jesus say to you?" Thomas said to them, "If I say to you [plural] one of the things that he said to me, you will take stones and stone me, and fire will come out of the stones and burn you up.

Figure E.258. Peak pitch contour for one of the things

Discourse function: Introduce a topic
Prosodic pattern: Peak

Figure E.259. Peak pitch contour for one of the things

Discourse function: Importance
Prosodic pattern: Peak
He’s talking about something new happening here, this is people not just speaking to Aramaic speaking Jews or to Greek speaking Jews, they’re actually speaking to non-Jews. This is the first time you get this indication in the book of Acts, that the movement has now spread out from Jerusalem, and it’s also being spread to Greeks, ethnic Greeks. And I think by "Greeks" he just means Gentiles, not just Greeks ethnically but anybody who wasn’t a Jew is what he mainly means here. What’s interesting is that this is kind of out of place. One of the things I’m arguing is that unlike this translation I just read, which might lead you to believe that the author is telling us this is the first time they spoke to Greek speaking Jews, I think that the original text must have meant that, this is the first time that these people are speaking to actual non-Jews. Now it’s not the first time, though, that people in Acts have spoken to non-Jews, right?

![Figure E.260. Peak pitch contour for one of the things](image)

**Figure E.260.** Peak pitch contour for *one of the things*

Discourse function: Importance

Prosodic pattern: Peak
That is to Say

There’s another feature that these topics have in common, and that is that they can be understood in some detail without particularly sophisticated mathematics. Now, let me pause here and say some things about math. Astronomy is a mathematical topic. There will be math in this course, there ought to be math in any astronomy course or it isn’t really an astronomy course, it’s just a slide show. Now, the math in this course has been kept at a deliberately low level. That is to say, the kind of math we’ll be doing is stuff you did in ninth and tenth grade. Introductory high school algebra, high school geometry, I think we take the sine of an angle a couple of times, but it’s the one case it cancels out almost immediately, so don’t let that scare you.

Figure E.261. Peak pitch contour for that is to say

Discourse function: Elaboration

Prosodic pattern: Peak

So, what I’m going to do is I’m going to talk about only the inner terrestrial planets. You’ll recall that these are small, rocky things in relatively short orbit, and contrast them with the outer planets, the Jovian, the Jupiter-like planets, which are large and have not only rocks, but also lots of ice and gas. And these
things are in wider orbit, but the orbits of both of these are, basically, more or less circular. Not precisely circular, they’re actually elliptical, but quite close, and they’re all in the same plane. *That is to say*, they’re all going around the same way. There’s nothing that’s going this way instead of this way. So, they’re circular and co-planar. And let’s try for an explanation of those particular features.

![Figure E.262. Peak pitch contour for *that is to say*](astr160_04_012507_1)

**Figure E.262.** Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<ASTR160Feb2007_lec9.txt> Is the Universe finite? Yes. It’s got to--in fact, you know it has to be finite, because the sky is dark at night. Let me explain that. If the Universe were infinite and had stars distributed at random throughout the Universe, then any direction you looked at, you’d eventually see the surface of a star. You could do this in a calculus kind of way by integrating over the total light of the Universe. And so, it can’t be infinite in extent, and filled with stars--the same as stars like the Sun, or any kind of star, really, that is distributed evenly. So, one of several things must be the case. Either the Universe is inhomogeneous--*that is to say* (1), we live in a very special place where there are stars--after a while there are no stars anymore. Or, it has to be finite in extent. It
only goes out a certain distance and stops. Or, it has to be finite in time. *That is to say* (2), it began a certain number of years ago, and didn’t exist before that.

![Graph](astr160_09_021507_2)

**Figure E.263.** Peak pitch contour for *that is to say*

Discourse function (1): Elaboration

Prosodic pattern: Peak

![Graph](astr160_09_021507_1)

**Figure E.264.** Peak pitch contour for *that is to say*

Discourse function (2): Elaboration

Prosodic pattern: Peak

<ASTR160Feb2007_lec10.txt> Okay. On the other hand, as V over c goes to 1--- *that is to say*, as the velocity approaches the speed of light, this γ factor goes to infinity,
because 1 minus 1 in the denominator—that’s zero in the denominator, so the thing has to go to infinity. And then, all these bizarre relativistic effects start taking place.

**Figure E.265.** Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<CHEM125ASept2008_lec10.txt> Okay, this is what we talked about last time, that if you make the table up, the formulas, in ρ, instead of in r, then you could use it for any hydrogen-like atom, because the distance scale gets multiplied by the nuclear charge; *that is to say*, if you have a given ρ — that’s a given size of the function we’re talking about — a given ρ, then you have that value at shorter r, if you have a higher Z; a tradeoff between Z and r.
Figure E.266. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<CLCV205_Sept2007_lec1.txt> Now, I’m going to ask you this question. Why are you here? *That is to say*, why should you, we, all of us, want to study these ancient Greeks? I think it’s reasonable for people who are considering the study of a particular subject in a college course to ask why they should. What is it about? What is it about the Greeks between the years that I mentioned to you that deserves the attention of people in the twenty-first century? I think the answer is to be found, or at least one answer — the truth is there are many answers — in that they are just terribly interesting, but that’s very much of a — what’s the word I want, the opposite of objective — subjective observation by me. So I would say, a less subjective one is that I believe that it comes from their position, *that is to say*, the position of the Greeks are at the most significant starting point of Western Civilization, which is the culture that most powerfully shapes not only the West but most of the world today.
Now, I’m going to ask you this question. Why are you here? *That is to say*, why should you, we, all of us, want to study these ancient Greeks? I think it’s reasonable for people who are considering the study of a particular subject in a college course to ask why they should.

**Figure E.267.** Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<CLCV205_Sep2007_lec1.txt> Now, I’m going to ask you this question. Why are you here? *That is to say*, why should you, we, all of us, want to study these ancient Greeks? I think it’s reasonable for people who are considering the study of a particular subject in a college course to ask why they should.

**Figure E.268.** Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall
Well, we begin our story with the emergence of the Bronze Age in the Aegean Sea area. That appears to have taken place about 3000 B.C. I think these days they date it down about another century to about 2900. Precision is impossible; don’t worry about that. And what we find, the first example of a Bronze Age — and I use the word civilization now for the first time, because before the Bronze Age — there is nothing that we would define as civilization. Civilization involves the establishment of permanent dwelling areas that we call cities, as opposed to villages. Agricultural villages will have existed all over the place in the late Stone Age, in the Neolithic Period, as it is known. But there is a difference and the critical difference is that a city contains a number of people who do not provide for their own support. That is to say, they don’t produce food. They need to acquire it from somebody else. Instead, they do various things like govern and are priests, and are bureaucrats, and are engaged in other non-productive activities that depend upon others to feed them. That’s the narrowest definition of cities.

Figure E.269. Fall pitch contour for that is to say

Discourse function: Elaboration

Prosodic pattern: Fall
Well, the first thing that Schliemann found when he dug at Mycenae was this remarkable circle of graves, which were shafts dug straight down into the soil, and they are referred to, to this day, technically as shaft graves, and then in other places not very far from that main hill, they found even more remarkable burials, what we call beehive tombs. Just imagine a huge beehive, in which let’s say, the center of the inside of that might be as much as fifty feet high or more, and these were built of extraordinarily huge, heavy stones and very well worked too. Here’s the marvelous thing. The reason he had to uncover it was that beehive tombs, like everything else, were buried. This wasn’t just the results of centuries of neglect, it is clear that they were built in order to be buried. That is to say, it was some kind of a big religious thing going on here, where the king — it was obviously a royal thing because the cost of it was so enormous; nobody else could afford a tomb of that kind. So, here was a royal tomb closed forever and yet built at a fantastic expense and enormous kind of labor.

**Figure E.270.** Fall-rise pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall-rise
But I think we need to take a hard look at what we can do, and I thought it would be worthwhile reading a sentence from each of the introductory paragraphs that we provide for you in the problem to show you the range of opinion that is pretty representative of what scholars think or have thought on the subject. Moses Finley says, "If, then, the world of Odysseus is to be placed in time as everything we know from the comparative study of heroic poetry says it must, the most likely centuries seem to be the tenth and the ninth, that is to say what we call the Dark Ages."

Figure E.271. Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall

Well, the Greeks had no concept of natural rights, or of rights that human beings were given by the gods. That is a very important difference that was, you had to act in such a way as to make life possible and decent, and for the Greeks that always meant being part of a decent community, the polis. But the modern world, to get back to that, to this Enlightenment world, individualism and a key aspect to that is hedonism. *That is to say,* it is legitimate and proper to search for pleasure, for each individual to attempt to please himself however he can.
Figure E.272. Fall-rise pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall-rise

*<CLCV205_Sept2007_lec4.txt>* The Greek view, moreover, presupposes that man lives in society. He is not a creature off by himself. By definition, he necessarily lives in society. He is conceivable to the Greeks only in a society. The Iliad, which is about a war, immediately is a kind of an artificial society put together for the purpose of defeating the Trojans and taking their city. As I’ve suggested to you, the values that are the most important are community values. *That is to say*, the reward of good behavior is the admiration and the honor that a hero gets, and the most serious punishment he can suffer is to be shamed in front of that community.
Figure E.273. Fall-rise pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall-rise

<CLCV205_Sept2007_lec4.txt> In the Odyssey, you remember Odysseus finds himself on the island of the Cyclops, those one-eyed monsters, and what is it about them that make them so monstrous, so inhuman from the perspective of the Homeric heroes? Here’s the line that Homer writes, they live without — the Greek word is nomoi, which we would translate as laws, but before they become laws they are the customary norms of society, in other words, civilization. They live without nomoi and they wreck not of one another, *that is to say*, each family lives by itself. They have nothing to do with each other, they do not have a community, and they do not have a society. So, they are, of course, sort of prehistoric monsters as far as the Greeks are concerned.
Figure E.274. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

*<CLCV205_Sept2007_lec9.txt>* But the Spartans do things their own way, and their women engage in dancing and athletics, and in competition and they did so in the nude, just as the boys did, and so they were not shut away from the boys all the time in the way that Greek girls were kept away from the boys. I don’t mean to say they were allowed to mingle socially, but *that is to say*, if the boys were exercising here the girls might be exercising there, someplace else. They would not be kept so far apart from one another, and again, think about all this — all of the things that normal human desires think, how that would get exciting and this kind of stuff that I’ve been describing and yet they would never have a crack at them until they got to be 20 years old.
Figure E.275. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<CLCV205_Sept2007_lec9.txt> Well, not only is this date not widely believed, hardly any scholar would take that seriously, and then people do argue about when would the changes have taken place, and if there was a Lycurgus, when he would have introduced these laws. A skeptic of nineteenth-century historian put it this way, he said, Lycurgus was not a man he was only a god. *That is to say*, he was somebody invented by the Spartans as somebody who put together this.

Figure E.276. Peak pitch contour for *that is to say*

Discourse function: Elaboration
Now, the debate continues to exist as to just what that alliance was really like. Were the Spartans free to do anything that they liked in foreign affairs or did they need to have the approval of their allies before going to war? I’m talking now about a constitutional question rather than reality question. Scholars bat it around both ways; my prejudices are that the leagues’ constitution, whatever it may have been, was less important than reality. *That is to say,* not all states in the Spartan Alliance were equal. Some were large and numerous, and strong militarily. Some were also wealth, and some were at some distance from Sparta. Others were small, weak, poor, and close to Sparta.

**Figure E.277.** Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<ENGL220_Fall2007_lec8.txt> So look at page 728 in the Hughes. This is the left-hand column: Good and evil we know in the field of this world grow up together almost inseparably; and the knowledge of good is so involved and interwoven with the knowledge of evil, and in so many cunning resemblances hardly to be discerned, that
those confused seeds which were imposed on Psyche as an incessant labour to cull out and sort asunder, were not more intermixed. It was from out the rind of one apple tasted, that the knowledge of good and evil, as two twins cleaving together, leaped forth into the world. And perhaps this is that doom which Adam fell into of knowing good and evil, \textit{that is to say}, of knowing good by evil.

\textbf{Figure E.278.} Peak pitch contour for \textit{that is to say}

Discourse function: Elaboration

Prosodic pattern: Peak

<GG140_Fall2011_lec1.txt> And the blue curve is what was predicted for the tides based on the moon and the sun. Right? The moon and the sun produce--their gravitational pull produces a tide in the ocean. Here in New Haven and most places around the world, it’s a semi-diurnal tide, \textit{that is to say} it’s a twice a day tide, two high tides and two low tides. And that’s what you see in the blue curve.
Figure E.279. Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall

<GG140_Fall2011_lec3.txt> So for example, if the pressure in this room--let’s call it $P_{Total}$ for the moment--is about 1,013 millibars--or *that is to say* 1,013 with two more decimal places [101,300] Pascals--part of that is due to the nitrogen molecules. That’s the partial pressure of the nitrogen. Part of it’s due to the oxygen molecules. Part of it’s due to the argon. There’s also some water vapor in this room. Water vapor is contributing something to that total pressure. So when you’re measuring pressure in a gas, you’re measuring the sum of all the pressures of the components within that gas.

Figure E.280. Peak pitch contour for *that is to say*
Discourse function: Elaboration

Prosodic pattern: Peak

<GG140_Fall2011_lec6.txt> So yeah, the greenhouse effect. So the planet has an atmosphere. I’ve neglected the atmosphere here. What the atmosphere does on our planet and others is that when the radiation is emitted from the Earth’s surface, instead of letting all of that escape, it stops some of it, it absorbs it, and sends some of it back to Earth again. It’s as if that object is not able to radiate with its full black body potential. Something’s holding that heat in, and it’s the greenhouse gases in the atmosphere. So obviously, we’re going to be coming back to this time and time again in the course. But this important discrepancy is largely due to our neglect of the atmosphere, *that is to say* our neglect of the greenhouse effect.

![Figure E.281. Fall-rise pitch contour for *that is to say*](gg140_06_091211_1)

**Figure E.281.** Fall-rise pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall-rise

<GG140_Fall2011_lec7.txt> So the Earth would be receiving heat from the Sun but not radiating it. So the amount of heat stored in the Earth would be increasing. *That is to say*, its temperature would be increasing with time, getting hotter and hotter each day
that went by, receiving more heat from the Sun, not radiating it to space. Well, of course, as soon as it develops some temperature, it’s going to start to radiate.

**Figure E.282.** Level pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Level

<GG140_Fall2011_lec7.txt> So P times A has units of force. So remember, pressure is a force per unit area. So when I multiply it times an area, I’ll get something with units of force—*that is to say*, Newtons in the SI system.

**Figure E.283.** Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall
But there is a corollary to this insight. The regime is always something particular. It stands in a relation of opposition to other regime types, and as a consequence the possibility of conflict, of tension, and war is built in to the very structure of politics. Regimes are necessarily partisan, *that is to say* they instill certain loyalties and passions in the same way that one may feel partisanship to the New York Yankees or the Boston Red Sox, or to Yale over all rival colleges and institutions, right?

**Figure E.284.** Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

A regime, as I’ve said, constitutes a people’s way of life, what they believe makes their life worth living, or to put it again slightly differently, what a people stand for. Although we are most familiar with the character of a modern democratic regime such as ours, the study of political philosophy is in many ways a kind of immersion into what we might call today comparative politics; *that is to say* it opens up to us the variety of regimes, each with its own distinctive set of claims or principles, each vying and potentially in conflict with all the others, okay?
Figure E.285. Level pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Level

*<PLSC114_Sept2006_lec3.txt>* Should Socrates be tolerated, would a good society tolerate Socrates? This is the question raised by this dialogue in the Crito as well. How far should freedom of speech and *that is to say* speech that borders on, even verges into, civic impiety, how far should such speech be tolerated?

Figure E.286. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak
Crito is named for a friend and disciple of Socrates who at the outset of the dialogue is sitting as a watchful guardian over his mentor. He urges Socrates to allow him to help him escape. The jailers have been bribed and escape would be made easy but rather than trying to convince Crito directly, Socrates creates a dialogue; actually, you might say a dialogue within the larger dialogue, a dialogue between himself and the laws of Athens where he puts forward the case against escape, *that is to say* the case against disobedience to the law and the argument could be summarized as follows.

![Figure E.287. Fall pitch contour for *that is to say*](plsc114_03_091806_1)

**Figure E.287.** Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall

The Apology and the Crito represent a tension, they represent even a conflict between two more or less permanent and irreconcilable moral codes. The one represented by Socrates regards reason, *that is to say*, the sovereign reason of the individual as the highest possible authority.
Figure E.288. Level pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Level

<PLSC114_Seqpt2006_lec4.txt> The action of the dialogue begins at the Piraeus, the port city of Athens, somewhere around the year 411, during what was called the Peace of Nicias, *that is to say*, the peace that endured a kind of respite, truce that was established during the fighting between Sparta and Athens.

Figure E.289. Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall
Cephalus, we learn, has spent his life in the acquisitive arts. *That is to say*, he’s a businessman.

**Figure E.290.** Fall-rise pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall-rise

Justice, we might say, is a kind of loyalty, it is a kind of loyalty that we feel to members of a family, to members of our team, to fellow students of a residential college, and the kind of loyalty we feel to a place like Yale as opposed to all other places. *That is to say*, Polemarchus understands justice as a kind of patriotic sentiment that citizens of one city or one polis feel for one another in opposition to all other places.
Every polity of which we know is based upon a distinction between the rulers and the ruled. Justice consists of the rules, *that is to say*, that are made by and for the benefits of the ruling class. Justice is nothing more or less right than what benefits the rulers, the rulers who determine the laws of justice.
Well, how to respond? And again, Socrates challenges Thrasymachus with a variation of the argument that he used against Polemarchus. That is to say "Do we ever make mistakes?" That is to say, it is not self-evident, or it is not always intuitively obvious what our interests are.

![Figure E.293. Fall-rise pitch contour for that is to say](image)

**Figure E.293.** Fall-rise pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall-rise

And certainly the brothers, we find out, are not slouches. They are not slouches at all. Although it is easy to remember that later in the dialogue most of their contribution seems to be of the form of "Yes Socrates, no Socrates," they seem to be rather passive interlocutors. Their early challenges to Socrates show them to be potential philosophers. That is to say the kind of persons who might one day rule the city.
Nothing is said here about the education of farmers, artisans, merchants, laborers, the economic class. Maybe, to speak bluntly, Socrates just doesn’t care that much about them. It’s okay what they listen too. Nor has anything really been said up to this point about the education of the philosopher. His interest here is in the creation of a tight, and highly disciplined cadre of young warriors who will protect the city much as watchdogs protect their own home. *That is to say,* recalling Polemarchus, those who are good to friends and bark and growl at strangers. Such individuals will subordinate their own desires and pleasures to the group, and live a life by a strict code of honor.
Figure E.295. Peak pitch contour for that is to say

Discourse function: Elaboration

Prosodic pattern: Peak

<PLSC114_Sept2006_lec6.txt> Consider the following remarkable proposal at 468c, "and I add to the laws of war," Socrates writes, "that as long as they, the guardians, are on campaign, no one whom he wants to kiss should be permitted to refuse. So that if a man happens to love someone, either male of female, he would be more eager to win the rewards of valor." That is to say as a reward for bravery, exhibited bravery, the hero should be allowed to kiss anyone they like while they are on patrol, male or female.

Figure E.296. Peak pitch contour for that is to say

Discourse function: Elaboration
But however that may be, Plato believes he has found in the formula of one man, one job, a certain foundation for political justice. *That is to say*, the three parts of the cities, workers, auxiliaries, guardians, each of them all work together and each by minding their own business, that is doing their own job, out of this a certain kind of peace and harmony will prevail.

*Figure E.297.* Peak pitch contour for *that is to say*

So how can it be the case if at all, that you could have a just city, *that is to say* a city where everyone is performing their own task, they’re following the division of labor, and yet very few of those members will have, so to speak, platonically just souls, that is to say, souls dominated by a kind of self-control or self-guardianship?
**Figure E.298.** Level pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Level

<PLSC114_Oct2006_lec7.txt> It follows, in one sense, that when Aristotle says that man is by nature a political animal and the city is by nature, the city can never be a universal state. It can never be something that incorporates all of humankind. It can never be a kind of cosmopolis, a world state or even a league of states or nations. The universal state will never allow for or does not allow for the kind of self-perfection that a small, self-governing polis will have. The city, as Aristotle understands, will always exist in a world with other cities or other states, based on different principles that might be hostile to one’s own. *That is to say* not even the best city on Aristotle’s account can afford to be without a foreign policy.
Figure E.299. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<PLSC114_Oct2006_lec7.txt> We are political animals, he says, because participation in the life of the city is necessary for the achievement of human excellence, for the achievement of our well-being. A person who is without a city, he says, who is a polis--without a city--must either be a beast or a god. *That is to say*, below humanity or above it.

Figure E.300. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak
<PLSC114_Oct2006_lec7.txt> But there is a second sense for him and, in some ways, a more important sense in which he says the polis is by nature. It is natural. The city is natural in that it allows human beings to achieve and perfect what he calls their telos. *That is to say* their end, their purpose. We are political animals, he says, because participation in the life of the city is necessary for the achievement of human excellence, for the achievement of our well-being.

![Figure E.301. Fall pitch contour for *that is to say*](image)

**Figure E.301.** Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall

<PLSC114_Oct2006_lec7.txt> Yet, at the same time, Aristotle seems to regard education as the preserve of the few. The kind of discipline and self-restraint necessary for an educated mind appears, for him, to be unequally divided among human beings. It follows, I think, that the regime according to nature, *that is to say* the best regime, would be what we might think of as an aristocracy of the educated, an aristocracy of education and training, an aristocratic republic of some sort where an educated elite governs for the good of all.
Discourse function: Elaboration
Prosodic pattern: Fall

Political friendships, he tells us, are not the kind of thing that require us to forego our own individual identities in a way that one might find in passionate relations of love, right? Rather, they presuppose relations, *that is to say* political relations, not between lovers or even best friends of some kind, but between civic partners who may in fact be intensely rivalrous and competitive with one another for positions of political office and honor.

**Figure E.302.** Fall pitch contour for *that is to say*

Discourse function: Elaboration
Prosodic pattern: Fall

<PLSC114_Oct2006_lec8.txt> Political friendships, he tells us, are not the kind of thing that require us to forego our own individual identities in a way that one might find in passionate relations of love, right? Rather, they presuppose relations, *that is to say* political relations, not between lovers or even best friends of some kind, but between civic partners who may in fact be intensely rivalrous and competitive with one another for positions of political office and honor.

**Figure E.303.** Peak pitch contour for *that is to say*

Discourse function: Elaboration
Prosodic pattern: Peak

<PLSC114_Oct2006_lec8.txt> The good citizen, he tells, us is still relative to the regime. *That is to say*, the good citizen of the democracy would not necessarily be the same person, or the same kind of person as the good citizen of a monarchy or an aristocracy.

Figure E.304. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

<PLSC114_Oct2006_lec8.txt> He rejects the idea that the city is defined simply by a group of people who inhabit a common territory, the same space as it were. The identity of a polis he writes is not constituted by its walls. *That is to say*, it is not constituted by geography alone, and similarly, he rejects the idea that a regime can be understood as a defensive alliance against invasion by others.
The point he’s trying to make is there are several kinds of regimes and therefore several kinds of citizenship appropriate to them. Each regime is constituted by its matter, *that is to say* (1), by its citizen body as we’ve been talking about, but also now by its form, by its formal structures. *That is to say* (2) every regime will also be a set of institutions and formal structures that give shape to its citizens.
Prosodic pattern: Peak

Figure E.307. Fall-rise pitch contour for *that is to say*

Discourse function (2): Elaboration

Prosodic pattern: Fall-rise

<PLSC114_Oct2006_lec8.txt> Interestingly, we find Aristotle defending democracy on the grounds that it may contain collectively greater wisdom than a regime ruled by the one or the few. In Book III, chapter 11, for example, he writes, "For because they are many," *that is to say* the citizen body, the ruling body of the democracy, "each can have a part of virtue and prudence and on their uniting together, and on their joining together he says, "the multitude with its many feet and hands and having many senses becomes," he writes, "like a single human being, and so also with respect to character and mind."
Figure E.308. Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall

<PLSC114_Oct2006_lec8.txt> He makes a similar point in Book III, chapter 15, in describing the process of democratic deliberation as a superior means of arriving at decisions. He compares it to a potluck dinner; any one of them, he says, *that is to say* any one of the citizens, taken singly is perhaps inferior in comparison to the best.

Figure E.309. Fall pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Fall
There is, obviously, much in the American regime that Aristotle would have found admirable, even though it does not conform to his idea of the best regime, which is the subject of the last two books of the Politics, Book VII and VIII. Aristotle is very sketchy here about the structure, the institutional structure, the make-up of the best regime, acknowledging the best regime is one where the best men rule. *That is to say,* it is a kind of aristocracy or an aristocratic republic. I want to talk about this regime a little bit now, what Aristotle understands to be the requirements or the fulfillments, the necessities, of this aristocratic republic.

**Figure E.310.** Peak pitch contour for *that is to say*

- Discourse function: Elaboration
- Prosodic pattern: Peak

What is it that political science studies and what is its relation to the other disciplines? The core of political science, at least according to Aristotle and to this degree I’m very much an Aristotelian, what distinguishes it from all other studies is the concept of the regime, of the politea. The regime, for him, is not one branch of human activity among others, it is the fundamental principle or ordering principle that makes all the others even possible. This is why Aristotle does not regard the
study of politics as one social science among others. It is rather what he calls the master science that determines the rank and place of all the others within the polity. His study of the regime, *that is to say* the underlying constitutional principles that govern each order is what distinguishes Aristotle from the other social scientists.

![Figure E.311. Peak pitch contour for *that is to say*](image)

**Figure E.311.** Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak

*<PLSC114_Oct2006_lec10.txt>* Machiavelli was a revolutionary. In the preface to his largest book, the Discourses on Livy, he compares himself to Christopher Columbus for his discovery of what he calls "new modes and orders." What Columbus had done for geography, Machiavelli claims he will do for politics. *That is to say*, discover an entirely new continent, a new world, so to speak, the new world of Machiavelli.
Figure E.312. Level pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Level

<PLSC114_Oct2006_lec10.txt> But Machiavelli was not an ordinary Florentine. He grew up under the rule of the Medici. *That is to say*, the first family of Florence, and lived to see them deposed by a Dominican friar by the name of Savonarola.

Figure E.313. Peak pitch contour for *that is to say*

Discourse function: Elaboration

Prosodic pattern: Peak
We’ll Talk About

So how is this done? What is going on here? It seems clear that one of the two things must be true. Either this thing isn’t a planet and there’s some other explanation for this attractive bunch of data here, or something has gone seriously wrong in our understanding of how planets form. And stay tuned, we’ll talk about that next time.

Figure E.314. Peak pitch contour for we’ll talk about

Discourse function: Introduce a topic

Prosodic pattern: Peak

One of the potential ways the Universe could evolve--the Universe is expanding right now. Again, this is now in the third part of the course, we’ll talk about this. The Universe is expanding, but it’s got a lot of matter in it. So, in principle, it could stop expanding and collapse.
Figure E.315. Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<\/BENG100Feb2008\_lec1\_1> Obesity or generally our diets are different than they were in 1665. We eat different kinds of things and many people think that that’s what has contributed to much more heart disease. But it could also be that it wasn’t as easily diagnosed then. So people were dying of old age and that was really heart disease that was killing them they just didn’t know, so it’s multi-factorial and *we’ll talk about* that.

Figure E.316. Fall pitch contour for *we’ll talk about*

Discourse function: Introduce a topic
And that study is Systems Physiology and that’s an important subdivision of Biomedical Engineering. We’ll talk about instrumentation a little bit and I’ve mentioned this, things like the EKG machine and the heart/lung machine are instruments that are designed to either keep patients alive or to allow you—wasn’t what I thought—or allow you to monitor their function over time. We’ll talk about imaging which I mentioned, biomechanics or the study of humans as mechanical objects. We’ll talk about a field which is growing now called biomolecular engineering and that is the design of biomaterials or new materials that can be implanted in the body, it’s new ways of drug delivery.

**Figure E.317.** Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

We’ll start with Week 2 talking about Genetic Engineering; what’s DNA, how can it be manipulated, how is our ability to manipulate DNA led to things like gene therapy which can now be in people. And so we’ll talk about that and that’s what Chapter 3 is about.
This is an example of an artificial hip. We’ve learned a lot about the mechanics of how humans work as organisms over the last 100 years or so, how we work as sort of physical objects that have to obey the laws of physics that you know about. We live in a gravitational field and that it affects our day to day life, and if you have hip pain or a hip that’s diseased in some way, and you can’t stand up against that gravitational field in the same way, that severely limits what you can do in the world. So biomedical engineers have been working for many years on how to design replacement parts for joints like the hip: the artificial hip is the most well developed of those. We’ll talk about (1) this in some detail. You can imagine that there are many requirements that a device like this has to meet in order for it to be a good artificial hip and we’ll talk about (2) those and how the design of these has changed over the years and what we can expect in the future.
Figure E.319. Peak pitch contour for *we’ll talk about*

Discourse function (1): Introduce a topic

Prosodic pattern (1): Peak

Figure E.320. Peak pitch contour for *we’ll talk about*

Discourse function (2): Introduce a topic

Prosodic pattern (2): Peak

*<BENG100Jan2008_lec1.txt>* Lastly, up here, is a picture of a much smaller device, this is actually an artificial heart valve that is made of plastics and metal and can replace the valve inside your heart. Valvular disease is not uncommon in the world; *we’ll talk about* (1) that a little bit. We’ll talk about how your normal valves function inside your heart and how your heart couldn’t work in the way that it did if it didn’t have valves
that were doing a very complex operation many, many times a day. And then we’ll talk about how you can build something to replace a complicated small part in the body like that.

**Figure E.321.** Fall pitch contour for we’ll talk about

- **Discourse function (1): Introduce a topic**
- **Prosodic pattern (1): Fall**

**Figure E.322.** Peak pitch contour for we’ll talk about

- **Discourse function (2): Introduce a topic**
- **Prosodic pattern (2): Peak**

<BENG100Feb2008_lec1_4.txt> Now, I’ve highlighted three of these in blue here, imaging, mechanics, and biomolecular engineering because if you go on to study
Biomedical Engineering here at Yale anyway, these are the things that you might pick to emphasize on. These are the things that we do best and where we have advanced course work available in these three categories and so I’m going to emphasize these three but *we’ll talk about* all of these subjects as we go through the course.

**Figure E.323.** Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

So I’m going to call that chips implanted in the brain to control prosthetics, but I’m going to make it a little bit more general and call a brain-machine interface. So it’s some way of interfacing activity in your brain with the outside world, and *we’ll talk about* this as we go along, but there’s lots of reasons to think that we’re going to have this in the not too distant future.
The same problem is with organ transplantation is that the recipient has to be matched to the donor and so that’s a problem. That’s a big problem and so can you protect these cells that you give to the recipient from attack by the recipient’s immune system? That’s one challenge and we’ll talk about ways to think about engineering approaches to solve that problem.

Figure E.325. Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak
<BENG100Jan2008_lec2.txt> We’re going to spend the first few weeks of the course talking about first DNA and genes. *We’ll talk about* how they work and we’ll go over that quickly because I know most of you know something about how DNA - what DNA is and how it works. Then we’ll talk about engineering of DNA and why this has been such - not only a rapidly growing and advancing area but one that’s so important for Biomedical Engineering.

![Figure E.326. Peak pitch contour for we’ll talk about](image)

**Figure E.326.** Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<BR>

<BENG100Feb2008_lec4> And there are molecules in cells that give the DNA the signal that it’s time to transcribe and express a gene, those are called transcription factors, *we’ll talk about* them a bit later.
Figure E.327. Fall pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Fall

*But this process of using a biological event like resistance to Ampicillin in order to pick out the cell population that you’re interested in is called selection. If we grew these cells on a plate loaded with Ampicillin and we could select cells that have Ampicillin resistance, and this process of selection and cell culture is very important and *we’ll talk about* it more next week.*

Figure E.328. Level pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Level
The respiratory system plays an important role in maintaining our internal environment at the proper level of oxygen, by bringing the right amount in. You regulate your breathing rate in order to accomplish that and we’ll talk about this in a couple of weeks.

Figure E.329. Fall pitch contour for we’ll talk about

Discourse function: Introduce a topic
Prosodic pattern: Fall

There are some organ systems that are totally internal. The circulatory system which we’ll talk about in a couple of weeks, the heart, the blood vessels, and the blood work together to form a totally internal function.

Figure E.330. Peak pitch contour for we’ll talk about
Discourse function: Introduce a topic

Prosodic pattern: Peak

Pieces of your own cells are antigens as well. They’re just antigens that belong to you and so you don’t normally mount an immune response to antigens that are part of you. We’ll talk about how that happens a little bit as we go through here.

Figure E.331. Peak pitch contour for we’ll talk about

Discourse function: Introduce a topic

Prosodic pattern: Peak

The other part of the adaptive immune system is the cell mediated immune system and this is an immune where - that doesn’t involve antibodies but involves cells that are activated in response to a foreign antigen and that utilize cellular means to get rid of it. Usually the cellular means that they get rid of is that instead of an antibody being produced, you activate a population of cells that will specifically go and hunt down the foreign antigen, or more commonly, cells that contain the foreign antigen. Now, why do you need a cell mediated immune response if you have an antibody response? We’ll talk about that in a few minutes.
Discourse function: Introduce a topic
Prosodic pattern: Fall

Okay, this week we’re going to continue in our discussion about the immune system. But talk about sort of engineering the immune system, how to produce immunity in individuals. And we’re going to do that by talking about some examples, some historical examples, in the sort of technology and vaccine development. And what I hope to do over the course of this lecture and the lecture on Thursday, is complete what’s described on this outline slide here. First, using a couple of examples that have turned out to be very important, one is the example of smallpox, and the second is the example of polio. Talk about how vaccines were developed in these particular situations, and how the development of the biology is coupled with delivering this through populations, and how these sort of intricately woven together. It’s not enough to understand the biology of how to create a vaccine, if you can’t make enough of the vaccine or deliver it to people in ways that it’s useful. And so we’ll talk about how that happened in the--using the examples of smallpox and polio. And that will bring us to
a general discussion of sort of the tools that are available now for vaccine development, which *we’ll talk about* on Thursday.

![Fall pitch contour for we’ll talk about](image)

**Figure E.333.** Fall pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Fall

Okay, so let’s talk about the example of smallpox, which is one of the world’s great successes in the battle against infectious diseases. Just to say a little bit about smallpox, because unlike chickenpox, which if you haven’t had, you’ve probably seen a case of it. None of us have seen a case of smallpox, it hasn’t existed in the world for many decades now. But smallpox was, at one time, one of the most frightening diseases on the planet. It’s a devastating, frequently fatal infectious disease. If smallpox occurred in your community, about 30 percent of the people that acquire the disease would die from it; the other 70 percent could be disabled or permanently disfigured as a result of the disease. It’s an infectious disease; it is spread by--through the air. So, it first infects you because you breathe in some of the infectious agent. Smallpox is a virus called variola, it’s a virus that contains DNA. The name of the
virus is variola. It’s part of a family of viruses, and *we’ll talk about* at least one other member of that family of viruses as we go through here.

**Figure E.334.** Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<CHM125ASEpt2008_lec1.txt> So here’s some quotes from The Instauratio Magna. "That wisdom which we have derived principally from the Greeks" (no offense, okay?) "is but like the boyhood of knowledge, and has the characteristic property of boys: it can talk but it cannot generate;" "…it is but a device for exempting ignorance from ignominy." That means it’s a way of hiding your ignorance, and we’ll see examples of that. *We’ll talk about*, in Lecture 11, about correlation energy, and we’ll talk in Lecture 32 about strain energy, and you’ll see that both of these are just words that are used to hide our ignorance.
**Figure E.335.** Peak pitch contour for *we’ll talk about*

Discourse function: Topic connector

Prosodic pattern: Peak

<CHEM125ASept2008_lec3.txt> Now how do you know this? How do you know it’s just one nuclear geometry with an intermediate bond distance? The only way you know is by experiment or by some really fancy calculation that you have to believe. A lot of people would believe experiments before calculations; some are the other way around. But there’s evidence from a technique called electron paramagnetic resonance, or EPR, that shows that indeed this is one species, a single minimum. If you have an extra electron on it and you have a carboxylate anion, then again it’s just one species, a single minimum. And there’s evidence of that from infrared spectroscopy that *we’ll talk about* next semester.
Figure E.336. Level pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Level

<CHEM125ASept2008_lec3_2.txt> So you put a proton — you define the molecular surface — and that is a little bit of a problem but *we’ll talk about* that later, where the molecular surface is — but then you put a proton at a point on it; and we talked about this before, for ammonium chloride. You put a proton on and you find — or no, it was the BNH6 we talked about the surface potential. Here’s the same thing for O3.

Figure E.337. Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak
Okay, so here’s benzene and its resonance. These were structures that were first early proposed; we’ll talk about that later on.

Figure E.338. Fall pitch contour for we’ll talk about

Discourse function: Introduce a topic
Prosodic pattern: Fall

Ah, there are three oxygen helices wrapped around the sodium and the carbon. And they wrote: "Note that this triangular arrangement of O3 has just been deduced by Bragg from his X-ray analysis of Calcite."

We’ll talk about Bragg and what he was doing next time. But they have experimental evidence that supports what they’re reporting, independent experimental evidence.

Figure E.339. Peak pitch contour for we’ll talk about
Okay, so here’s benzene and its resonance. These were structures that were first early proposed; we’ll talk about that later on.

And that summer these smart guys, who were hanging around Zurich at that time, theoretical physicists, the young guys went out on an excursion, on the lake of Zurich, and they made up doggerel rhymes for fun about different things that were going on, and the one that was made up by Bloch and Erich Hückel, whom we’ll talk about next semester, was about $\Psi$. 
Figure E.341. Fall pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Fall

<CHEM125B_Spring2011_lec1.txt> And finally we’ll talk about some complex synthesis. We’ll be talking about synthetic ideas all through this, of both unnatural and natural products.

Figure E.342. Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<CHEM125B_Spring2011_lec8.txt> The same is true in the anion. These are calculations of isolated materials, so gas phase. If you have OH– come in and displace
OH—, that one quantum mechanics also says is transition state. But neither reaction is practical in the laboratory. So the question is, what does experiment say? Can you do X-ray studies and actually see whether there might be a stable pentavalent--maybe very transiently stable, very weakly stabilized, but might that pentavalent compound be stable? So that’s what we’ll talk about with the X-ray material next time.

Figure E.343. Peak pitch contour for we’ll talk about

Discourse function: Introduce a topic

Prosodic pattern: Peak

This was taken just as the front part of the cyclone was coming into Southern New England. And you see this nice heavy rain shield out here. The eye of the storm is probably about here. It wasn’t a very well developed eye. But the center of it was probably about here. And the backside was fairly dry, surprisingly dry. We’ll talk about that later on. Some people think that it was transitioning away from a tropical cyclone to a different type of a storm at this point. But that’s getting ahead of the story.
Figure E.344. Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

*<GG140_Fall2011_lec6.txt>* The loss is going to be the infrared radiation to space. *We’ll talk about* the laws that govern that today. And the heat storage will be not the whole Earth, because it takes too long for heat to conduct in and out of a whole Earth—millions, if not hundreds of millions of years. So really the system we’re talking about is just the skin of the Earth, the first few meters. In the ocean, the first five kilometers or so.

Figure E.345. Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic
Prosodic pattern: Peak

<HSAR252_Spring2009_lec1.txt> Just so that you get a sense of what some of these look like in actuality, this is the basilica or the law court, which is part of the Forum of Pompeii. And we see that tribunal that I mentioned before, a two-story tribunal from which the judge would try the cases. The building isn’t as well preserved as we’d like, although there’s quite a bit there. What is there allows us to create this kind of reconstruction drawing where we can get a very good sense of what this building actually looked like in antiquity. You see the tribunal over there. You see that there are double stories with columns on either side. You see these colossal columns along the aisle. But most importantly, unlike the forum, which was open to the sky, this is roofed, and it had a flat roof with what’s called a coffered ceiling—*we’ll talk about* that later in the term—but then a sloping roof from the outside. And basilicas were always roofed; that’s what distinguishes them from a lot of other Roman buildings.

![Figure E.346. Fall pitch contour for *we’ll talk about*](image)

Discourse function: Introduce a topic

Prosodic pattern: Fall
You can see, in fact, the great Temple of Jupiter, the Capitolium of Pompeii, which we’ll talk about today, literally collapsing.

Figure E.347. Fall pitch contour for we’ll talk about

Discourse function: Introduce a topic

Prosodic pattern: Fall

We have talked about Third Style Roman wall painting in Campania. We have talked about the fact that a lot of it seems to be connected in some way to members of the imperial household. And we see the same also in Rome, and it’s to Rome that I would now like to turn, and specifically to the Golden House or the Domus Aurea of the emperor Nero. I show you a view of the famous octagonal room of Nero’s Domus Aurea. It is one of the greatest rooms in Roman architecture. It’s an octagonal room that has a large oculus. It is made out of concrete. It has radiating alcoves, and it is in a sense a grandiose version of the frigidarium that we saw in the Stabian and Forum Baths at Pompeii. It is part of a very major architectural revolution under Nero. It is extremely important. We’ll talk about it in great detail, vis-à-vis the architecture, in a later lecture.
Figure E.348. Fall pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Fall

<HSAR252_Spring2009_lec10.txt> And while this is on the screen, you can also see that while the tomb was essentially a cylindrical drum, resembling the cylindrical drum of the Mausoleum of Augustus, it was placed--it was given some height by being placed on a podium--the kind of podium that we saw at the sanctuaries, or the podium that we saw at the Villa of the Mysteries--to raise it up. It’s not as big as those, but it’s sizable, and it raises this round tomb up a little bit, so that it can be more readily seen as people make their way along the Via Appia. The Mausoleum of Augustus does not have a similar podium. So that’s a unique, a different feature that is added to this particular structure. You can also see there’s an inscription on the front, and *we’ll talk about* that in a moment, and then there are crenellations at the top.
Figure E.349. Fall pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Fall

<HSAR252_Spring2009_lec10.txt> But here it is, a Roman tomb, in the form of a pyramid. Now when it was first put up, it was put up outside the Servian Walls of the city, because all—as we’ve talked about the fact that by Roman law the necropolis or city of the dead needed to be located outside the walls of the city. But as the city grew, and as there was a need for a new wall—and this happened in the third century A.D., and *we’ll talk about* it way at the end of this semester—the Romans ended up building a new wall, the famous Aurelian Walls.

Figure E.350. Fall pitch contour for *we’ll talk about*
Discourse function: Introduce a topic

Prosodic pattern: Fall

<MCDB150_Spring2009_lec2.txt> The purpose of all this fighting for status is of course to gain access to females. There’s some degree of food, and *we’ll talk about* whether food is a real scarce item for them or not, it’s usually not a scarce item, but access to females--I think I mentioned this last time is dependent on the status of males.

![Figure E.351. Peak pitch contour for *we’ll talk about*](image)

**Figure E.351.** Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<MCDB150_Spring2009_lec4.txt> Another issue is exogamy, that just like chimpanzees, it’s again in most animals, it’s the males that disperse, but in chimps and humans it’s the females that disperse. The females leave the community at birth, to go live with the man’s family, and so she’s under the control then, in many cultures basically a slave to the son’s family, and the reproductive rules are then set by the son’s family and she has no choice in this and *we’ll talk about* that extra--this out marrying--remember with chimpanzees they were hostile to the neighbors around us, human societies are that same way.
**Figure E.352.** Level pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Level

<MCDB150_Spring2009_lec4.txt> If a woman has sexual intercourse it takes an average of five cycles to get pregnant. When we talk about abortion *we’ll talk about* why that is, but if a woman’s having normal sex trying to get pregnant, the average is five months before she actually does get pregnant and we’ll see where that comes from.

**Figure E.353.** Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak
Now I’m going to show you the next country to the south which is Mali. I’m sorry Niger, because Mali is also there, but Niger is—when you go south you cross the Sahara Desert and you’re in Sub-Sahara and Africa. Now look at its fertility, this is even a little bit later in time, and look at its fertility rate, it hasn’t budged at all. It’s again, eight—seven, eight children, middle, eight children, and it ends up here even more then it was in 1950s. It has not changed. The fertility rate has not responded to whatever it is about modern times and we’ll talk about it a lot what has caused fertility to go down.

Figure E.354. Peak pitch contour for we’ll talk about

Discourse function: Introduce a topic
Prosodic pattern: Peak

But I also have a weakness for the less common mental disorders that I think tell us something really interesting about mental life. So, when we talk about memory, for instance, we’ll talk about disorders in memory, including some disorders that keep you from forming new memories as well as disorders of amnesia where you forget the past.
Figure E.355. Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<PSYC110_Spring2007_lec4.txt> First, we know that it’s not true that everything is learned. There is considerable evidence for different forms of innate knowledge and innate desires and we’ll look — and *we’ll talk about* it in detail when we look at case studies like language learning, the development of sexual preference, the developing understanding of material objects.

Figure E.356. Peak pitch contour for *we’ll talk about*

Discourse function: Topic connector

Prosodic pattern: Peak
So, what they do now though, and we'll talk about this much later in the course when we talk about clinical psychology — but one cure for phobias does draw upon, in a more intelligent way, the behaviorist literature. So, the claim about a phobia is that there’s a bad association between, say dog and fear, or between airplanes or snakes and some bad response.

**Figure E.357.** Peak pitch contour for *we’ll talk about*

Discourse function: Topic connector

Prosodic pattern: Peak

There is a distinction between implicit and explicit, which *we’ll talk about* it in more detail. But explicit, crudely, is what you have conscious access to.
Discourse function: Introduce a topic

Prosodic pattern: Fall

<RLST152_Spring2009_lec1_1.txt> And what I am telling you is kind of contrary to the way I’m going to teach this course. I’m actually advertising against myself, and there’ll be fewer of you here next time, right? Contrary to the way I’ll teach this course, which is more on the history of the first century of these documents and what they meant in the first century, sometimes the most important thing about the Bible is its impact on the later history. And that’s something that *we’ll talk about* from time to time in the class, but it’s something you’d get more out of, for example, if you studied an art history class, or if you studied a literature class that talked about some of these issues in later European times.
**Figure E.359.** Peak pitch contour for *we’ll talk about*

Discourse function: Topic connector

Prosodic pattern: Peak

<RLST152_Spring2009_lec1.txt> Why did the Gospel of Judas not make it into the canon? *We’ll talk about* those issues next time.

**Figure E.360.** Peak pitch contour for *we’ll talk about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<RLST152_Spring2009_lec2.txt> In Christianity, though, it means the list of texts that are scripture and recognized as different from other things. We have to first, also, recognize that the early Christians, it seems like, from the very early period, at least
a lot of them, accepted Jewish scripture as their own. So for example, when the Apostle Paul says, "Scripture says," he’s not talking about the New Testament. He’s talking about Jewish scripture. So almost all the early Christians, they didn’t know—the people writing the New Testament didn’t know they were writing the New Testament. They just thought they were writing a gospel or a sermon or a letter or something like that. So when you see the term "scripture" in the New Testament, every time except, maybe, one time—and we’ll talk about this when we get to it—it refers to Jewish scripture that Christians accepted, followers of Jesus accepted, as their own.

Figure E.361. Peak pitch contour for we’ll talk about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<RLST152_Spring2009_lec2.txt> Now, notice that means that some people would say that they use that 367 date, when Bishop Athanasius sent around his Easter letter. And they say that’s when the Christian canon of the New Testament was set. Because it’s the earliest that we have. But that’s not really right. He was just bishop of one area. His letter was not binding on anybody else, except the churches in his Alexandrian diocese. So it didn’t set the canon. 367 is simply the time when we get the
earliest list that matches our list of twenty-seven books of the New Testament. But you can see when you look at all these different codices, different canon lists, from a century later in the 400s, two centuries later in the 500s, three centuries later in the 600s, you still get different lists. So it took a long time for the twenty books that we have to get settled on. And we’ll talk about how that actually happened, also, still.

Figure E.362. Peak pitch contour for we’ll talk about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<RLST152_Spring2009_lec2_3.txt> And what this class will do is talk about how did orthodox--what became orthodox Christianity--how did it become orthodox Christianity, rather than one of the other kinds of Christianity? And we’ll talk about that repeatedly. In the second century, though, it’s anachronistic to talk about orthodox Christianity versus heretical Christianity.
As we’ll talk about next week, one of the main themes of the Gospel of Luke and Acts is that good Jewish boys do good Jewish things.

<RLST152_Spring2009_lec9_1.txt> First, I said--he says, "as was his custom."

In 4:14-30 is Jesus’ first sermon, it’s very clear Luke wants to set this up as Jesus’ first sermon and we’ll talk about why later. Then you
have 4:31 to 8:56, the Galilean ministry proper. That is, this is Jesus going around
Galilee, healing people, preaching, teaching.

![Figure E.365. Peak pitch contour for we’ll talk about](image)

Discourse function: Introduce a topic

Prosodic pattern: Peak

Now notice, the writer here is telling you these are false accusations. Are they false accusations? Was he really preaching against the temple? Remember, Jesus is portrayed in some of the Gospels as himself having predicted that the temple would be destroyed. Does that mean that Jesus was preaching against the temple? Some Christian writers very quickly portray Jesus as teaching that his followers don’t have to keep the Jewish law. I don’t think that’s actually correct for the historical Jesus as we’ll talk about when we get to the historical Jesus. That’s clearly how some early Christian writers are portraying Jesus as teaching that, you followers of mine don’t have to keep the Jewish law.
Discourse function: Introduce a topic

Prosodic pattern: Level

<RLST152_Spring2009_lec10.txt> All of this is just to say we’re going to find this again, we can find it in John, we’re going to find it in other places. These early Christian texts, if you read them really, really carefully, not quickly, carefully, you’ll see amazing ways that it opens up whole windows into the very earliest period of Christianity that most modern people have no idea existed. The idea that there could be Christians who didn’t believe Jesus’ life was an atonement. The idea that there were Christians who believed every Christian should keep the Jewish law. The idea we’ve also seen that there could have been Christians who believed that the God who created the world was evil. These were all there. We’ll talk about another form of it next week. See you next week.
Okay, so as I pointed out last time, we’re talking about "exoplanets" – planets around other stars. And the problem with exoplanets is you can’t see them directly. So, you can’t see the exoplanets directly as blobs of light in the sky and so what do you do?
Prosodic pattern: Peak

<ASTR160Feb2007_lec7.txt> So, the first thing to say about this is, what do we mean by change in position? Change in position. What we’re talking about is an angle. We talked about this in a different context before. Here’s the observer. Here’s the star. And the star’s moving, it’s going to move up to here. And what we want is to draw this triangle, and we want an angle. And then D2 over here is the amount by which the star moves, D1 over here is the distance to the star. And we want the angular change in position, because that’s what we mean when we make a position measurement in space. Okay, so that’s the first thing is to understand what the answer ought to look like. It’s got to be some kind of angle.

Figure E.369. Peak pitch contour for we’re talking about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<BENG100Jan2008_lec3.txt> How do cells in your brain know which proteins they ought to be making, and how do cells in the pancreas know which proteins they ought to be making? They do that because they can control the expression of genes. Gene expression, for us, will mean the same thing as production of a particular protein. When a
gene gets expressed, that means its protein is produced. When we talk about gene expression then *we’re talking about* this whole sequence of events I just described: transcription, RNA processing, translation to make the protein.

**Figure E.370.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<FILE> So we’ll come back to this in our example in the cardiovascular system when *we’re talking about* the heart and we’ll talk about how to measure the collective group of action potentials using EKG’s. You’ll actually get to measure EKG’s on each other during section the week we talk about that.

**Figure E.371.** Fall pitch contour for *we’re talking about*
Discourse function: Introduce a topic
Prosodic pattern: Fall

<CHEM125B_Spring2011_lec1.txt> The same thing is true in the phenyl radical where, again, the C-H bond we’re talking about is attached to a double bonded carbon. Here it’s part of a benzene ring. But again, the unusual energy orbitals in the ring are perpendicular; they don’t overlap with the singly occupied orbital we’re talking about. Therefore, nothing special here. But again, it’s an sp2 carbon to hydrogen bond, and again, it’s unusually strong, 113 kilocalories per mole. So these are unusual because the starting material has an unusually strong bond.

Figure E.372. Level pitch contour for we’re talking about

Discourse function: Elaboration
Prosodic pattern: Level

<CHEM125B_Spring2011_lec2.txt> So now back to what we were talking about, the reaction we’re talking about, which is bond dissociation to generate free radicals. The reason we’re talking about that is try to figure out how you can predict rate constants from things we already know.
Figure E.373. Fall pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Fall

<CHEM125ASept2008_lec3.txt> Inverse-square, because now we’re not talking about the circumference of a circle, we’re talking about the area of a sphere as we go out. Right?

Figure E.374. Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak
So here’s the Schrödinger equation, $\hat{H}\Psi=E\Psi$, and we’re talking about the time-independent Schrödinger equation, so time is not a variable, and that means what we’re talking about is stationary states.

**Figure E.375.** Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak

Now how often does that happen? It turns out that the time to get from one well to the other, which I won’t be able to prove to you because it requires time-dependent quantum mechanics, and we’re talking about time-independent quantum mechanics, but let me just tell you that the answer is, if you know the energy difference between the blue and the red, that the rate of getting across is $5\times10^{-14}$ seconds, divided by whatever that energy is, expressed in kilocalories/mole.
Figure E.376. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

> It’s a function of the position. Position of what? The one particle *we’re talking about*. Okay? And the potential energy is also a function of the position. Okay, so the way we’re going to do this then is to guess an energy, let the computer trace out this curve, and see whether it’s okay. What will tell us whether it’s okay? How will we know if it’s okay? It’s got to be continuous. We’re not going to have a problem with that because the computer is tracing it out this way; it’s not going to be discontinuous. But the main thing is that it doesn’t diverge, that it doesn’t go to infinity. Okay, so let’s just guess twenty-one kcal/mole. Why not? Okay, now you can already tell me something about what the curve is going to look like. Notice that at those two distances, between these two distances, the total energy is higher than the potential energy. What’s the curve going to look like in that region? The kinetic energy is going to be positive, right? What will the curve look like? Pat?
**Figure E.377.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<CHEM125ASept2008_lec10.txt> You can do it by calculation, and you’d see much higher density. That’s what *we’re talking about* is theory, but where do you see it experimentally? Lucas?

**Figure E.378.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<CHEM125B_Spring2011_lec7.txt> Isopropyl is ever so much slower. The isobutyl is faster again. t-butyl is very slow. In fact, you don’t know how slow it is. It’s
got to be slower than that. Because something else happens other than the reaction we’re talking about. So all you know is it can’t be any faster than that. And neopentyl is really, really slow. Now, do these make sense? Let’s look at it in two ways.

![Figure E.379. Level pitch contour for we’re talking about](image)

**Figure E.379.** Level pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Level

<CLCV205_Sept2007_lec2.txt> What we find in the Minoan civilization — I mean the main place we can learn about this civilization was the city of Knossos, located on the northern shore of Crete where a great palace complex was discovered and is available. By the way it’s an absolutely beautiful site, a great tourist site; you can see quite a lot there. Anyway, when you examine that site and draw the conclusions that are inevitable from examining it, and, also I should have said, all of the Minoan settlements, you realize that they look and seem very much like older civilizations that have grown up in the Ancient Near East. The real sort of typical home of the kinds of things we were talking about is Mesopotamia, modern Iraq, the Tigress, Euphrates Valley, which spread out beyond Iraq and went up into Syria and neighboring places. It, too, was very similar to the civilization, but apparently a little bit newer in the Nile Valley in Egypt, about which
we know a great deal more than we know about the Minoans because, as you know, in the nineteenth century, scholars discovered how to read the languages that were written in Egypt and in Mesopotamia. So, they were able to develop something approaching history for the period we’re talking about.

![Figure E.380. Peak pitch contour for we’re talking about](image)

**Figure E.380.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<CLCV205_Sept2007_lec2.txt> Linear A is earlier and it is associated with and it is clearly the language used by the Minoan kings at Knossos and other places. Linear B resembles Linear A, but it is clearly different and later, and one reason we know that comes mostly from stratigraphy, but we can also tell because it’s a much simpler script, but by no means simple. These are not alphabets; these are syllabaries, every symbol represents a syllable; in other words, typically two letters rather than one. That’s a nice step over having loads, and loads, and loads of symbols representing lots of things which is true more of Linear A than Linear B, but it’s still — we’re talking about something approaching sixty symbols in a syllabary and when you think about how hard it is to learn
to read when you’re only using twenty-six symbols, and how few Americans do learn to read, which I keep reading in the paper — it’s not an easy thing.

![Pitch contour graph](image)

**Figure E.381.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<CLCV205_Sept2007_lec2.txt> Part of the story is that that old connection that the Mycenaean world had with the Mediterranean in general, most particularly, with the East stops, we don’t find in the excavations we make of Greek towns in the Dark Ages — we don’t find implements, jewels, goodies, anything from Egypt or Mesopotamia or anything like that. Nor by the way, do you find Greek things in those places. The Greeks are isolated during this period. Of course, everything I’m saying is somewhat exaggerated. I’m sure there must have been individual exceptions to everything, but *we’re talking about* the overwhelming reality.
Figure E.382. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<CLCV205_Sept2007_lec2.txt> So, here is where Jerry Pollitt’s analogy to the fall of Rome seems so very appealing. That is, more or less, what did happen in the Roman world and I don’t see anything that’s suggested it couldn’t happen in the Greek world at the time *we’re talking about.*

Figure E.383. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak
Also we know that the island in the middle of the Aegean Sea, called Thera, blew up in a most enormous kind of an explosion at some point back there in prehistoric days, and one theory is it was the explosion on Thera that caused so climatic trouble, that it can explain what went on here. The trouble is, you just don’t know when that explosion took place, and since there are several periods in this general area that we’re talking about now, in which something big happened, some great change takes place, it turns out different people want to have their explosion at different times.

![Figure E.384. Peak pitch contour for we’re talking about](image)

**Discourse function:** Elaboration

**Prosodic pattern:** Peak

The culture is marked by some of the following features. Let’s take Mycenae, which is maybe the best example of the whole culture. Certainly, it’s a perfect model for what we’re talking about.
Figure E.385. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

*<CLCV205_Sept2007_lec2.txt>* Hebrew is close to what’s going on there, but they don’t take the language. They borrow the characters from what had been already something quite close to an alphabet and had only a relatively small number. I forget the exact number of the ones in the Semitic alphabet, but *we’re talking about* roughly twenty-five. I mean, you’re into the ballgame for an alphabet such as ours.

Figure E.386. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak
Now, what about the Italian Riviera? That’s pretty nifty. Were the Greek colonies near Portofino where you could put in? No. And the reason was in the northern part of Italy, there were Etruscans, another powerful ancient people who control their own area and were not about to have anybody colonizing their territory. However, when you keep going south in Italy, past Rome, Roman tradition says the city was founded in 754 or 753? 753. So, everybody agrees about that. Certainly not before that. So, in the period we’re talking about there are no Romans that you have to worry about. So, south of Rome there is a tremendous colonizing of southern Italy.

Figure E.387. Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak

Finally, what are the consequences to the Greek experience of this phenomenon of this outburst of colonization? Several things come to mind. First of all, the Greeks now live in places where they never lived before and their presence has a real impact of a different degree in every place. I would say that typically their impact was greater in the west and the north than it was in the east and the south. The reason for that was that in the east and in south, the Greeks lived among people who
were more civilized than they, who were more advanced. They had very little to teach or to impose upon those people rather than vice versa. I think that I would imagine the Greeks sopping up all sorts of useful and interesting information from their neighbors in the east and the south and there’s no question about it. If you look at Greece in this period, I don’t know if I’ve used this term before, but some scholars refer to this general period *we’re talking about* as the Greek renaissance by analogy to the renaissance in Italy.

![Figure E.388. Peak pitch contour for *we’re talking about*](image)

**Figure E.388.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<CLCV205_Sept2007_lec8.txt> Public buildings are created by the tyrant for whatever use he needs, but he might be building courthouses, he might be building places for magistrates to stay, things like that. But also, he has a tendency to try to make them very attractive, very impressive, so that people will be impressed with him for having done so. You know the phenomenon; people like to have their name on a building. I’m told they will actually give you millions and millions of dollars to put their name on a building. I’m told there are places where they will even give you lots of money to put
their names on bathroom stalls, but only the tyrants in their day would have been rich enough to do the kind of thing we're talking about, including, and this is a very large thing I believe, temples. The Greeks had been building temples I'm sure for a long time, but essentially out of wood. But now with people having the kind of wealth that were being accumulated by these tyrants, they begin to build them of stone and where possible of very fine stone such as marble, and I think we have to imagine the construction of such a building in an old town like any one of the Greek city states had, it would have had at tremendous impact. This is something I'd like to pass on to you, when you think about the Greeks. Here's one of the places where they're so stunningly different from us that we need to make an imaginative leap to understand what's going on.

**Figure E.389.** Peak pitch contour for we're talking about

Discourse function: Elaboration

Prosodic pattern: Peak

But one of the things that I don’t want you to lose sight of is that Sparta becomes a slave holding state like no other Greek state. Now, there was slavery all over the ancient world. There was no society that we know of in the ancient world that was without slavery and Greece was no different, but in the period
we’re talking about there were not very many slaves among the Greek states as a whole, and there was certainly nothing like what the Spartans did.

![Figure E.390. Peak pitch contour for we’re talking about](image)

**Figure E.390.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

We’re talking about there were not very many slaves among the Greek states as a whole, and there was certainly nothing like what the Spartans did.

One other thing, I haven’t told you, my last thing I want to tell you about women — when a Spartan woman was a mother she — Pericles in this funeral oration ends the funeral oration and is saying, now as to the wives and mothers of these great men who have just died, just shut up and go home, because the highest thing that can be said about a woman is that she is never spoken of for good or for ill. This is democratic Athens *we’re talking about.*
Figure E.391. Fall pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Fall

<CLCV205_Sept2007_lec9.txt> But the other thing that’s striking is that in the period before the final, or I should say the major change in Spartan life, we discover poets, fragments of whose poems remain. There are two famous Spartan poets of this early period, Terpander and Alcman, and they wrote beautiful poetry of the same kind as the other Greeks. That will stop by the time we get to the period *we’re talking about*.

Figure E.392. Fall-rise pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Fall-rise
It’s an imprecise term because some of the members of the — let me say a better term for it would be the Spartan alliance, which is what pretty much the Greeks called it, because not everybody in the Peloponnese was a member of the Peloponnesian League and not every member of the league was in the Peloponnesus, but still we all will know what *we’re talking about* when we speak of the Peloponnesian League. I shall try to remember to speak of the Spartan alliance most of the time.

**Figure E.393.** Fall pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Fall

It hardly matters which of the stories you prefer or whether you choose both; *we’re talking about* the same people and that tells us the important fact, that this new class of independent family farmer has arrived in Athens, and as in other states is not satisfied with his position in the state, as his own importance to the state becomes greater and greater.
For the moment, what we’re talking about here I think though, is here’s the first sign that we see of trouble in paradise. Nice, calm, happy synoecisized Athens has got trouble right here in River City. I mean in Athens.

Figure E.395. Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak
So what we’re talking about today is a look into a very basic mechanism that is operating in all of life and is causing the accumulation of information.

**Figure E.396.** Peak pitch contour for we’re talking about

Discourse function: Introduce a topic

Prosodic pattern: Peak

So there are interesting implications of what we’re talking about today, and the outline basically is going to be how you can generate genomic conflict out of hierarchical selection. I’m going to make a strong point that the opportunities for conflict are much greater in sexual than in asexual species. Then I’ll mention that the uniparental transmission of cytoplasmic genomes is probably a method of conflict resolution. Then I’ll go on to talk about genomic imprinting and parent-offspring conflict in mammals.
Figure E.397. Fall pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Fall

<ENGL220_Fall2007_lec9.txt> Now Milton at the same time -- *we’re talking about* the 1640s -- had been contemplating writing a play.

Figure E.398. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<GG140_Fall2011_lec2.txt> Something interesting about this formula--notice that the mass of the object that *we’re talking about* does not enter into that formula. So this would apply for a molecule or for a rocket ship.
Figure E.399. Fall pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Fall

<GG140_Fall2011_lec6.txt> The loss is going to be the infrared radiation to space. We’ll talk about the laws that govern that today. And the heat storage will be not the whole Earth, because it takes too long for heat to conduct in and out of a whole Earth—millions, if not hundreds of millions of years. So really the system *we’re talking about* is just the skin of the Earth, the first few meters. In the ocean, the first five kilometers or so. The part that is responsive to the heat that’s being put in and taken out. So we will have a reservoir. We’ll have inputs, we’ll have outputs.

Figure E.400. Fall pitch contour for *we’re talking about*
Discourse function: Elaboration

Prosodic pattern: Fall

<GG140_Fall2011_lec6.txt> So the area we’re talking about here is $4\pi r^2$, and so the emitted radiation then is going to be $4\pi r^2 \sigma T^4$ using the Stefan-Boltzmann law.

Questions so far?

Figure E.401. Fall pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Fall

<GG140_Fall2011_lec7.txt> So we’ve learned a lot of lessons in last time’s lecture, but one of them is that, well, the greenhouse effect is our friend. In other words, it makes this planet habitable. Were it not for that, the temperature would be universally below the freezing point for water, and we wouldn’t have the kind of life that we have. Now, later in the course when we’re talking about global warming, we’ll come back to this subject and see maybe the greenhouse effect is increasing, which may not be a good thing. But on a broad-brush analysis, looking at the habitability of the planet, the greenhouse effect is great.
Figure E.402. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

<GG140_Fall2011_lec10.txt> So the higher the temperature, the more water vapor will evaporate, and the higher the water vapor partial pressure you will have in the chamber. Now here’s a curious thing. It actually doesn’t matter whether there’s air in the chamber above that liquid water or not, because this is a property of the water, not of the air. And I’ll often mistakenly say things like “the air is saturated.” That’s not quite right, because it’s the water vapor *we’re talking about*.

Figure E.403. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration
Prosodic pattern: Peak

<GG140_Fall2011_lec10.txt> We’re almost done, but I want to remind you that 

we’re talking about (1) clouds. We’re talking about (2) liquid and/or ice.

![Figure E.404. Peak pitch contour for we’re talking about](image)

**Discourse functions (1): Introduce a topic**

**Prosodic pattern (1): Peak**

![Figure E.405. Fall pitch contour for we’re talking about](image)

**Discourse function (2):**

**Prosodic pattern (2): Fall**

< HIST202_Fall2008_lec2.txt> So, when we’re talking about the growth of absolute rule, we’re talking about France, that is, the Sun King; Prussia, particularly
Frederick the Great about whom you can read; Russia, Peter the Great, about whom I will have something to say in a week or two, I don’t know when; Austria, aforementioned; and Sweden.

![Graph illustrating pitch contour](hist202_02_090808_1)

**Figure E.406. Peak pitch contour for we’re talking about**

Discourse function: Elaboration

Prosodic pattern: Peak

< HIST202_Fall2008_lec4.txt> He did not ever imagine the abandonment of the table of ranks, which set everybody in a hierarchy, not for a minute — we’re talking about the end of the end of the seventeenth and eighteenth century.

![Graph illustrating pitch contour](hist202_04_091508_1)

**Figure E.407. Peak pitch contour for we’re talking about**

Discourse function: Elaboration
Prosodic pattern: Peak

Language is one of the ways that people reveal their class. In the nineteenth century we’re talking about workers and how some workers, but not all, began to see themselves as proletarians.

Figure E.408. Peak pitch contour for we’re talking about

Discourse function: Elaboration

The other thing that happened, and this explains the rise of class consciousness, is that people who — suddenly the bottom drops out of their economic life — that’s a fairly appropriate analogy for today — who were artisans, who were craftsmen, become really the first, depending on where we’re talking about. It begins really about the turn of the century, that is, 1800 or slightly before, but mostly afterward, by 1830 in England and then follows in other countries in many, many places. Artisans and craftsmen are really the first to see themselves as a class apart.
Figure E.409. Fall-rise pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Fall-rise

We’ll see, under the Roman emperor Nerva [correction: Nero] there was a revolution, another kind of revolution of sorts, in Roman architecture, and we’ll talk about the reasons for that and so on later in the semester. But with that revolution came an interest in a new facing material, namely brick -- brick that was originally stuccoed over. And, in fact, the opus incertum work and the tufa stone that we’ve talked about already today tended to be stuccoed over as well. But by the second century we begin to see an appreciation for brick in its own right, the attractiveness of brick, and the Romans begin to use exposed brick as the facing for their buildings. And I show you one example. It’s a detail of a warehouse in the Roman port city of Ostia, that we’ll look at later in the term, with this exposed brick facing; very attractive, different colorations and so on and so forth. Just to alert you to the fact that again the kind of facing that we’re talking about today will not be the only facing that is used by the Romans over time.
I want to begin with the image that you see now on the screen, which is a building--and we're talking about the one at the left, front left--a building that is on one of Pompeii’s main thoroughfares, the Via dell’Abbondanza, the Via dell’Abbondanza, the Street of Abundance.

**Figure E.410.** Fall pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Fall

<HSAR252_Spring2009_lec5.txt> I want to begin with the image that you see now on the screen, which is a building--and we’re talking about the one at the left, front left--a building that is on one of Pompeii’s main thoroughfares, the Via dell’Abbondanza, the Via dell’Abbondanza, the Street of Abundance.

**Figure E.411.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak
And here are two views of the Temple of Mercury at Baia, as it looks today. Because of the oculus, there is often rain water. The drain no longer functions. So there’s often a lot of very unappealing green water that accumulates in the base of the Temple of Mercury. So the times that I’ve been there, every time I think I’ve been there, there’s been enough water in there that I haven’t been able to actually get pictures of the alcoves, which are covered by these inches and inches of water that are usually collected inside the Temple of Mercury. But you get a good sense, I think, of it here nonetheless, that we’re talking about a round domed structure, with an oculus, with some windows, with arcuated windows, windows with arcuations at the top, in the uppermost part, or toward the uppermost part of the dome, to add additional light into the system.

![Figure E.412](image.png)

**Figure E.412.** Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak

Of course this is true not only for trees but fish, which spew out--fish females--huge numbers, hundreds, tens of thousands, hundreds of thousands of eggs; or males of many, many species that spew out billions of sperms
that, in a sexual species, the way mammals are, two parents on average, two children. If two parents for a species average more than two children, the world fills up with squirrels or whatever animal we’re talking about. If they have less than two over a long run, they’ve gone extinct.

Figure E.413. Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak

You’ll read a really interesting article by John Caldwell which talks about a whole culture of reproduction. Again, Africa is a huge place, has many different cultures and we’re just talking Sub-Saharan Africa. North Africa is a different story; South Africa we have the European settlement, that’s another different story, but the bulk of Central Africa to some degree fits this. You have places where you don’t have bad soil, so in the tropics Java has volcanoes, volcanoes replenish soil. The mountain slopes of Kenya have good soil from--again from volcanic soil. The stories there are a little different. In general, we’re talking about those parts in Africa where it’s hard to stay alive, it’s hard to get a population going that we’re--that places traditionally under populated and just now with Western medicine are the population
rates coming up to where you might consider it crowded. A place like Nigeria now is certainly crowded.

Figure E.414. Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak

<MCDB150_Spring2009_lec6.txt> If you add up all the birthrate statistics, Sub-Saharan African has about twice the birth rate of North Africa. Again, it’s all Sunni Muslim we’re talking about, so religion is not the difference, but the something else about the southern culture which we’ve been talking about.

Figure E.415. Level pitch contour for we’re talking about

Discourse function: Elaboration
And so what happened during this period is that people—standard of living was going down, they managed to stay alive, they had to work harder and harder, the hours that they worked to get—to maintain themselves alive kept increasing and yet they didn’t make any progress. And so we’re talking about ballpark 100 years into the industrial revolution which we now—that’s what you learned in high school, the industrial revolution is such a wonderful thing and it improved incomes and the modern world during the industrial revolution. But in actual fact the data shows that’s really not the case, that for about 100 years the industrial revolution while making tremendous progress and total national economies are growing very big, the per capita income of all but the very upper classes doesn’t really grow.

Figure E.416. Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak

Now, so far, we’re talking about how babies respond to — We’re talking about our responses to babies. What about babies’ responses to us?
Figure E.417. Peak pitch contour for *we’re talking about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

So, take some standard examples from the linguistic study of English. And bear in mind the rules *we’re talking about* here are not rules you explicitly know. They’re automatic rules of the same sort we’re going to talk about in the context of visual perception in that they’re implicit and unconscious and not accessible to explicit understanding.

Figure E.418. Peak pitch contour for *we’re talking about*

Discourse function: Elaboration

Prosodic pattern: Peak
So for instance, immediately you read "The pig is eager to eat" versus "The pig is easy to eat" and in a fraction of a second you know there’s an important difference. "The pig is eager to eat" means the state of affairs that we’re talking about is when the pig does the eating. "The pig is easy to eat" is when the pig is being eaten.

**Figure E.419.** Peak pitch contour for we’re talking about

Discourse function: Elaboration

Prosodic pattern: Peak

First, then, we have to talk about Marcion. I think he’s on your handout, is that correct? Yes, Marcion, who died around 160. Marcion was this guy from Asia Minor, modern day Turkey, and just get used to that term. Because whenever we say, "Asia Minor," we’re talking about that section around the Mediterranean that now is called Turkey. But it was called Asia Minor, generally, in the Roman Imperial Period.
We’ve Talked About

<ASTR160Feb2007_lec10.txt> Okay. So, let me go on from here and talk about an intermediate case. We’ve talked about (1) V equals zero, we’ve talked about (2) V equals c. Let me talk about an intermediate case.
Figure E.422. Peak pitch contour for *we’ve talked about*

Discourse function (2): Introduce a topic

Prosodic pattern (2): Peak

*BENG100Feb2008_lec1.txt* Now, each week we have a section meeting, required section, they’re all - all the sections meet on Thursday afternoon and the idea of the section is to amplify on some subject *we’ve talked about* during the week.

Figure E.423. Fall pitch contour for *we’ve talked about*

Discourse function: Introduce function

Prosodic pattern: Fall
And this is one aspect of Biomedical Engineering, developing tools that allow you to understand how human’s function and what’s wrong when they have disease and so some of the things we’ve talked about have that category.

Figure E.424. Fall pitch contour for we’ve talked about

Discourse function: Introduce function

Prosodic pattern: Fall

And as time goes on, we’ve developed ever more complex machines to study people and we’ve talked about some of these already: EKG machines, so an example of an electrical device that can be used to monitor a very elaborate function deep inside your body, the beating of your heart and the rhythm of your heart.
Figure E.425. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<~BENG100Feb2008_lec7_1.txt~> The respiratory system, for example, the renal system, the digestive system, these are examples - three examples of organ systems that contact the external environment. We’ve talked about the interesting way in which the digestive system contacts the external environment. Depending on what you call external and internal environment, this path that I’m tracing here, deep within your digestive system, is really directly connected to the outside world through both ends.

Figure E.426. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic
Prosodic pattern: Peak

There are two general classes of molecules that are produced by the endocrine system. All of the molecules are called hormones, so a hormone is another name for a ligand that operates in this endocrine fashion. A hormone is just a ligand that operates in this endocrine fashion. Hormones can be proteins, endocrine hormones can be proteins, meaning they’re large molecules that are usually fairly water soluble, or they can be steroids. Steroids are small molecules - much smaller than proteins - smaller molecules that tend to be hydrophobic or lipid soluble. Example, protein hormones are insulin which we’ve talked about before and glucagon, and growth hormone which we haven’t talked about but that’s very important during periods of life like adolescence, for example, when rapid growth of your bones is occurring.

**Figure E.427.** Fall pitch contour for we’ve talked about

Discourse function: Introduce function

Prosodic pattern: Fall

This will lead us into a discussion of sort of bioengineering of the immune system, in particular, and we’re going to talk next week about vaccines. This will be the first real example where we’ve talked about the
physiology of an organ system together with engineering approaches to modulate that organ, and that will continue throughout the semester.

**Figure E.428.** Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<FILE> But of course when molecules get absorbed through the intestinal tract they become part of your internal environment. And *we’ve talked about* one the main concepts in physiology being homeostasis, that is ‘how do you maintain a constant internal environment?’

**Figure E.429.** Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic
Prosodic pattern: Peak

So take a step way back and think about what’s the basic mechanism by which cells receive signals. It turns out that cells receive signals or information from the rest of the body in a variety of ways, but there’s one way in particular that’s a very useful way for thinking about how cells receive most information. It’s shown schematically on this diagram here. On the side over here shows a cell membrane and so this is outside the cell above it, and this is inside the cell below, and this is the lipid bilayer that separates the outside of the cell from the inside of the cell.

I’ve already mentioned many times that the lipid bilayer, the cell membrane, isn’t just a lipid bilayer. That there are other molecules in the lipid bilayer and they’re important for cells getting information or getting molecules from outside. *We’ve talked about* one class of molecules, they’re transporters that move molecules from inside to outside, or outside to in, that wouldn’t ordinarily be transported through a cell membrane. Glucose is a great example of that and we’re going to come back to that a little bit later in the lecture. If a cell membrane was indeed just a lipid bilayer, then glucose could never enter the cell because it can’t permeate through cell membranes.

![Graph](image)

**Figure E.430.** Peak pitch contour for *we’ve talked about*
In the Sabin vaccine, or the oral polio vaccine, now you have a non-virulent virus. So, one that perhaps does not reproduce in such high numbers that you create an overwhelming infection, but one that still goes through its lifecycle but is limited in its effect. So that suggests, now, if you think about this even highly simplified lifecycle, suggests some other ways that we might use kind of modern technologies to engineer new vaccines. We’ve talked about getting lucky, finding a naturally occurring attenuated live vaccine as in the case of smallpox. We’ve talked about killing a virus by cross-linking it, for example, to make a substance that looks like a vaccine--looks like a virus but can’t replicate. We talked about attenuating in the laboratory, using cell culture techniques and what we know about mutating viruses.

Figure E.431. Peak pitch contour for we’ve talked about

Now the question is, why would you believe me, or believe a textbook, or believe a quantum mechanician, and not believe them?
Because they said they saw it too. Okay? Well it takes time. *We’ve talked about* this before, the basis for scientific belief: evidence, you always cross-examine an assertion; logic; and taste, but taste matures with experience and at the beginning you don’t know which people to believe and which not to believe.

**Figure E.432.** Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

< CHEM125ASep72008_lec7.txt> Okay, so we just glimpsed this at the end last time. This is a crystal structure of a complicated molecule that was performed by these same Swiss folks that *we’ve talked about*, and notice how very precise it is.

**Figure E.433.** Rise pitch contour for *we’ve talked about*
So first, spectroscopy for structure and also for studying dynamics of molecules and reactions: so ultraviolet-visible spectroscopy; electronic; IR spectroscopy--vibration, which we’ve talked about a good deal already; magnetic resonance imaging and nuclear magnetic resonance. Then on to aromatic substitution, and finally carbonyl chemistry and the concepts of oxidation and reduction.

Then we’ll have the third hour exam.

Figure E.434. Fall pitch contour for we’ve talked about

It won’t react here near the other positive charge. It’ll react out at the end. It’ll get a secondary hydrogen, not the primary one--we’ve talked about that already.
**Figure E.435.** Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<CHEM125B_Spring2011_lec5.txt> But one thing you can do with Spartan or other graphic programs is draw this electrostatic surface potential that *we’ve talked about* to see where on the surface a proton would be happy.

Discourse function: Introduce a topic

Prosodic pattern: Fall

**Figure E.436.** Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak
So this is much more acidic--4.8 versus 15.7. So it’s 11 powers of 10 stronger as an acid. Why? Is it because the bond is intrinsically stronger? They’re both OH [sigma]s bonds. The bonds are essentially the same. But the anions are different--and we’ve talked about this before. What is it that makes the anion that you’re going to make here unusually stable compared to H-O?

Figure E.437. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

The pKa of the corresponding acid here is –14. It’s called a super acid. Remember that the strongest that we’ve talked about so far, had a pKa of –11. This is a 1,000 times stronger than HI.
Figure E.438. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<CHEM125B_Spring2011_lec8.txt> Okay. Now one last topic, which I’ll just introduce here and then we’ll complete next time. We’ve talked about stereochemistry, rate law, and rate constant. But can you do actual structural work?

Figure E.439. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<CHEM125B_Spring2011_lec9.txt> Okay now we’ve got the groups up there on top where we want and the question is going to be--Well first, how do we get them there?
The thing in the middle started as an ester, right? But we want it to be a cation with a vacant p orbital in the middle. So what you do is react it with a molecule we’ve talked about before, Meerwein’s reagent, which is a way of giving methyl groups.

**Figure E.440.** Fall-rise pitch contour for we’ve talked about

Discourse function: Introduce a topic
Prosodic pattern: Fall-rise

Of course, the CH σ bond isn’t a very high HOMO, so it’s not drastically shifted, not 50/50. And we call that, the stabilization due to that HOMO-LUMO mixing, hyperconjugation, I think we’ve talked about that before.

**Figure E.441.** Fall pitch contour for we’ve talked about
And as we’ve talked about, the time it takes to come to a new steady state, the length of this transient period in this case would depend on the width of the tank.

Figure E.442. Peak pitch contour for we’ve talked about

Air entering that lower pressure region on the back of the aircraft will adiabatically expand and so on, and so on. And a cloud will form. It’s the same procedure we’ve talked about. Let’s take a look at what that looks like.
<HSAR252_Spring2009_lec3.txt> We’ll see, under the Roman emperor Nerva there was a revolution, another kind of revolution of sorts, in Roman architecture, and we’ll talk about the reasons for that and so on later in the semester. But with that revolution came an interest in a new facing material, namely brick -- brick that was originally stuccoed over. And, in fact, the opus incertum work and the tufa stone that we’ve talked about already today tended to be stuccoed over as well.

**Figure E.443.** Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

Figure E.444. Fall pitch contour for we’ve talked about

Discourse function: Introduce a topic
Prosodic pattern: Fall

<HSAR252_Spring2009_lec3.txt> If we look at this detail of the outside of the Theater of Marcellus, we will see that this building, made out of concrete, is, like the others we've talked about today, faced with some kind of stone.

Figure E.445. Fall pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Fall

<HSAR252_Spring2009_lec4_2.txt> I want to begin with a plan of the city of Pompeii, and you see it here. And the plan that I show you is a plan of the city as it was in A.D. 79. We see all of the buildings at that juncture. We see that the shape of the city is essentially an irregular rectangle, and we also can see very well that the city is surrounded by a wall, a protective wall, as were--so it was walled like all the other cities that we’ve talked about thus far this term.
Figure E.446. Rise pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Rise

< HSAR252_Spring2009_lec4_3.txt> The Samnite period in Pompeii lasted from the fourth through the third and even into the second centuries B.C., up to 80 B.C., because it was in 89 that Pompeii fell to Rome. We’ve talked about Rome colonizing this particular part of Italy -- not only the area right around it, but the area south of it -- and Pompeii fell to Rome in an important military campaign in 89 B.C.

Figure E.447. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak
What happened thereafter was the Samnites, who had built homes for themselves and public buildings that we’ll study here, the Samnites were essentially thrown out of their homes. Their property was confiscated, and that property was given instead to the Roman veterans. We’ve talked about the fact that that was the way the Romans operated. They paid back their veterans for loyal service by giving them land, and they usually gave them land of those that they had conquered.

**Figure E.448.** Fall pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Fall

So two important points: one, that these have two stories, and that adding a second story to a Roman building, or a Pompeian building in this instance, doesn’t occur until between the earthquake and the eruption of Vesuvius; and secondarily, this idea of the picture window. And we’ve talked about the importance for the Romans of vista and panorama, and they’re doing it here.
Figure E.449. Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

*<HSAR252_Spring2009_lec5_2.txt>* The most important point though that I can make about this villa, and something that speaks to the future, is the fact that we are beginning to see--*we’ve talked about* how enclosed and plain and severe the earlier exteriors of Roman houses were, even up through the Hellenized domus, except perhaps for the addition of a pilaster or a column here and there. Here we see something entirely new happening. We see that the architect has designed these elements that project out of the rectangle of the villa plan, and are curved; and you can see one over here, and most importantly one over here.
We're going to look at several houses in Herculaneum, and then we’re going to move from there to begin our discussion of early Roman interior decoration, namely the First and Second Styles of Roman wall painting. And what you’ll see makes them particularly relevant to what we’ve been discussing thus far this term is the fact that in both the First and Second Styles, architecture is depicted in these paintings, and we’re going to see some very interesting relationships between that and the built monuments that we’ve talked about thus far this semester.
Discourse function: Introduce a topic
Prosodic pattern: Fall

<HSAR252_Spring2009_lec6.txt> So once you get into the atrium, then you have to take an abrupt right in order to see the peristyle court. And the peristyle court is very, very large. *We've talked about* the fact that there was an increasing interest in the peristyle as a key component of a Roman house, and we see that very clearly here; in fact, the peristyle is really beginning to take pride of place away from the atrium.

![Figure E.452. Peak pitch contour for we've talked about](image)

Discourse function: Introduce a topic
Prosodic pattern: Peak

<HSAR252_Spring2009_lec7.txt> I want to show you lastly, and thought we could talk about this for a few minutes ourselves together, one last Fourth Style, or part of a Fourth Style Roman wall painting. It is a fragmentary wall that we attribute to the Fourth Style that came from Herculaneum, and dates also to this latest phase, sometime to 70 to 79. And it’s quite interesting, in view not only of what we’ve discussed today, but in everything *we've talked about* with regard to the four styles of Roman wall painting in the last week or so.
Figure E.453. Fall-rise pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Fall-rise

<HSAR252_Spring2009_lec9.txt> Here’s a view of the precinct wall as it looks from the outside of the forum today. There are some additions that were made in later times, Medieval-looking windows and the like, but for the most part it’s preserved as it was. You can see we’re dealing with ashlar blocks, made out of peperino stone, p-e-p-e-r-i-n-o. *We’ve talked about* peperino before. It’s a form of tufa, a stone that was used here with ashlar blocks, for the encircling precinct wall.

Figure E.454. Fall pitch contour for *we’ve talked about*

Discourse function: Introduce a topic
Prosodic pattern: Fall

<HSAR252_Spring2009_lec10.txt> It is a museum of casts, where you can go and see works of Roman art and architecture from not only Rome but from around the world, all in one place. Now they’re not originals, they’re casts, but it’d be a great place to study for the exam for this course, for example, because you can walk around and see so many of the buildings that we’ve talked about. And there are these wonderful models of many of them.

![Graph](image)

**Figure E.455.** Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<HSAR252_Spring2009_lec10.txt> But here it is, a Roman tomb, in the form of a pyramid. Now when it was first put up, it was put up outside the Servian Walls of the city, because all--as we’ve talked about the fact that by Roman law the necropolis or city of the dead needed to be located outside the walls of the city.
Figure E.456. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<HSAR252_Spring2009_lec10_2.txt> The Mausoleum of Augustus, like so many other monuments that we’ve been looking at this semester, survives in large part because it was re-used over the centuries in a wide variety of ways. You can see in this engraving that it was used at one point as a garden, a very nicely manicured garden, as you can see inside the remains, inside those concentric circles, a very nice garden. It was also used as a fortress at one point by the well-known Colonna family of Italy. It was used, believe it or not, as a bull ring--a little touch of Spain in the midst of Rome, as a bull ring--and it was used most recently as a music hall. It was a music hall before it was turned back into the Mausoleum of Augustus. So again, this very--a very similar saga to this building and to its post-antique history, as to so many others that we’ve talked about.
Figure E.457. Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<HSAR252_Spring2009_lec10_3.txt> So it is highly unlikely that this refers to a military encounter that she had. More likely it either refers to a military encounter of her father or her husband, or it may be a more generic reference to victory. *We’ve talked about* the fact that in the minds of the Romans, the victory in battle, victory in the hunt, often were conflated with victory over death. So it could be a more generic reference, but I would guess it may have something to do more specifically with the conquest of her husband or her father.

Figure E.458. Peak pitch contour for *we’ve talked about*
Discourse function: Introduce a topic
Prosodic pattern: Peak

<MCDB150_Spring2009_lec4.txt> In addition to limit births, there’s another thing which again is a population limitation issue, because we’ve talked about individual family limitation issues, trying to keep the kid alive. If the village is resource limited they may have mechanisms for keeping the whole population of the whole village down, and so in Africa especially, they have a thing called terminal abstinence.

![Figure E.459. Peak pitch contour for we’ve talked about](image)

Discourse function: Introduce a topic
Prosodic pattern: Peak

<MCDB150_Spring2009_lec5.txt> In this--the rest of this lecture, we’ll see how long it takes; we’re going to talk about under population of places. The examples are largely going to come from the tropics, and especially we’re going to talk about Africa, and that is because until recently the tropics have generally not had a dense population. They have been what you might call under-populated. People were scarce. Up to now we’ve been talking about--we talked about biological determinants of population size, of reproduction, we’ve talked about cultural determinants.
Figure E.460. Fall pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Fall

<MCDB150_Spring2009_lec8.txt> Now the standard belief about population at that time was that population is a wonderful thing. Jean-Jacques Rousseau who *we’ve talked about*, who was abandoning his own children by the car load to control his individual family’s—the number of children they had to cope with—in terms when he thought about the grand—the political system he said, "that government under which the citizens do most increase and multiply is infallibly the best.

Figure E.461. Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic
Prosodic pattern: Peak

<MCDB150_Spring2009_lec9_2.txt> How did this change and who was arrayed against this? People, women especially, were not happy with the situation. Young men of course wanted to get married, couldn’t until they were old, and we’ve talked about that situation in Africa where the bride price is very high, the old men control the bride price, they don’t allow the young men to get married until there’s almost a revolution.

Figure E.462. Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak

<MCDB150_Spring2009_lec9.txt> So, the point of this--series of stories is a big change in culture, that prior--every society has to control population in some way and we’ve talked about (1) the physical constraints, the disease and famines, we’ve talked about (2) the social controls like not being able to get married, but up until--in Europe up until very recently there was no individual control. Individuals themselves did not have the cultural freedom to make these kinds of decisions. Once married, procreation just keeps going one after the other until either someone dies or the woman becomes infertile.
Figure E.463. Fall pitch contour for *we’ve talked about*

Discourse function (1): Introduce a topic

Prosodic pattern (1): Fall

Figure E.464. Peak pitch contour for *we’ve talked about*

Discourse function (2): Introduce a topic

Prosodic pattern (2): Peak

<MCDB150_Spring2009_lec9.txt> So now *we’ve talked about* individuals sort of in a variety of ways how this happened to individuals and cultural things.
Figure E.465. Fall pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Fall

<MCDB150_Spring2009_lec9_5.txt> What about the romantic conception of marriage? When marriage changes like this it becomes less of an economic thing, less of a childbearing thing, you don’t need your wife to work, especially on the farm. What is the tie in between romantic conceptions that we all now have about marriage and love and all that and this whole demographic transition? So in almost every way you can think of modern culture, this is at the root of it, that this is a thing that you always have to consider as whatever you believe, however you’re leading your life, how much of it is due to these pioneers that we’ve talked about that started controlling their fertility as an individual decision rather than as a community decision?
Figure E.466. Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

<MCDB150_Spring2009_lec10.txt> Another thing is that in many, many countries there’s conflict between different groups, *we’ve talked about* Democratic, Republican in the United States. In Nigeria, in Sudan, there’s a huge conflict between the Muslim populations in the north and the Christian or Animist populations in the south.

Figure E.467. Fall pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Fall
We’ve talked about the physical world. What about the social world? What about the world of people?

**Figure E.468.** Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

We’ve talked about retrieval. Oh. Every class I’ve given somebody asks either in class or by e-mail what about déjà vu?

**Figure E.469.** Peak pitch contour for *we’ve talked about*

Discourse function: Introduce a topic

Prosodic pattern: Peak

Then you have from 13:1 you have the period called "after the Gentiles," this is after Gentiles have been brought into the church and
then the focus is going to be on the Gentile church for the rest of Acts. You get, for example, the first missionary journey of Paul, then you have the Jerusalem conference in chapter 15, which we’ve talked about already.

**Figure E.470.** Fall pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Fall

<RLST152_Spring2009_lec10.txt> This is the story of Stephen. *We’ve talked about* Stephen several times already, he’s supposedly the first Christian martyr.

**Figure E.471.** Peak pitch contour for we’ve talked about

Discourse function: Introduce a topic

Prosodic pattern: Peak