How ‘general’ is General Canadian? Vowel production in Winnipeg

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1. Introduction

2. Overview
   • Goals of project
   • Method, speakers for present data
   • Dispersion of vowel centres in Winnipeg English sample, compared with
     ▪ General American (Peterson & Barney, 1952)
     ▪ Southern California (Hagiwara, 1995, 1997)
   • ‘Acoustify’ some markers in Canadian English
     ▪ /a–ə/ Merger (Wells, 1982)
     ▪ Canadian Raising (Chambers, 1973)
     ▪ /æ/ Retraction (Esling & Warkentyne, 1993)
     ▪ Canadian Shift (Clarke, Elms, & Youssef, 1995)

3. “Acoustic Survey” of Winnipeg Vowels
   • Part of ongoing study of English (and French) in and around Winnipeg, MB
   • Experimental study of vowel production to serve as ‘baselines’ for comparison with other studies, conditions
   • Generally following recommendations (Hagiwara, Hargus, Wright, & Sterling, 1999)
   • Explore Canadian English vowel acoustics
     ▪ Compare with other acoustic studies
     ▪ Quantify acoustic patterns in the data

4. Method (1) - speakers
   • 10 monolingual English speakers
   • 18-25 years old
   • Children of native anglophone Winnipeggers
   • Ethnoculturally diverse

5. Method (2) - materials
   • 15 vowel categories
   • Twelve monophthongs
     ▪ /ɪ, ɪ, e, æ/
     ▪ /ʊ, ʊ, ɔ, ɑ/
     ▪ /ʌ, ɹ̩/
   • Three diphthongs
     ▪ /aɪ/
     ▪ /aʊ/
     ▪ /ɔɪ/
   • /hVd/ and /hVt/ monosyllables (real world where possible, replaced as necessary)
   • Script
     ▪ Presented in the frame “say ___ once”
     ▪ Five repetitions
     ▪ Randomized
   • Measurements
     ▪ First four formant frequencies
     ▪ Three timepoints per vowel (25, 50, 75% of vowel duration)

http://www.umanitoba.ca/linguistics/robh/
6. **Coarse Auto-normalization**
   - Expresses each “frequency” as an auditory distance from a calculated neutral resonance frequency
     - Linear regression (frequencies by formant) for all plain vowels deriving slope and intercept
     - Calculate “neutral” resonances from regression for each speaker
     - Express vowel coordinates as auditory distance (in Bark) from calculated neutrals
   - Upper formants normalize for lower formants
   - Speakers normalize for themselves
   - Auditory distances represented and graphed as a traditional vowel space

7. **The Winnipeg English vowel space**
   - Average F1 and F2 vowel dispersion in a Coarse-Autonormalized space (vowel midpoint only)
   - Men (squares), Women (circles)
   - Lines join point vowels only
   - Crosshair indicates calculated neutral F1 and F2 frequencies

8. **Monophthongs – men**
   - Men only, as from (8)
   - Compared with “General American” (Peterson & Barney, 1952)
   - Small symbols, dotted line represent space for GA men

9. **Monophthongs – women**
   - Women only, as from (8)
   - Compared with “General American” (as in 9)
   - Small symbols, dotted line represent GA women
10. Compared with “General American”
   • The Winnipeg vowels exhibit advancement (centralization) of /u, ʊ, ʌ/ but not /o/.
   • Greater F2 difference between /i/ and /æ/.
   ▪ “Increased slope” of front vowel series
   ▪ Additional retraction of /i/ for women
   • Roughly even distribution of front vowels in height dimension
   • /ɑ–ɔ/ merger results in a round, low (or lower-mid), back vowel

11. Winnipeg and California – men
   • Men’s data compared with Southern California data
   • California data remeasured from previous work (Hagiwara, 1995, 1997) using current methods

12. Winnipeg and California – women
   • Women’s data compared with Southern California data
   • As in (15)

13. Compared with Southern California
   • Similarities in Southern California
   ▪ Advancement of /u, ʊ, ʌ/
   ▪ Increased slope in front vowel series
   • Differences in Southern California
   ▪ /o/ participates in unrounding and advancement along with /u, ʊ, ʌ/
   ▪ Uneven height distribution in front vowels
   ▪ Greater retraction of /i, ɛ/ among men
   ▪ Merged /ɑ–ɔ/ lower and unround
14. About Canadian Raising – women

- Women’s diphthongs compared to their monophthong space
- Solid lines indicate path of diphthong with following voiced consonant
- Dotted lines indicate path of diphthong with following voiceless consonant (raised, shortened)
- Symbols indicate average F1xF2 at 25% timepoint
- “Angle” indicates vowel midpoint
- Arrowhead indicates 75% timepoint

15. About Canadian Raising – men

- Men’s diphthongs compared to their monophthong space
- As in (16)

16. Acoustic character of Canadian Raising

- Nuclei seem to be close to [a], and raise to the height (but not centrality) of /ʌ/
- Whole diphthongs shift, not just the low nuclei
- Raising happens along the vector of movement
- Raising preserves the “path” of transition
- Raised diphthongs cover same auditory distance in less time
17. Conclusions
- Confirmation of overall similarity between Canadian and Californian English (with caveats)
- Canadian Shift is occurring in Winnipeg sample
  - Retraction rather than lowering
  - Chain shifting (inverse of Northern Cities motivated by low-back merger)?
  - Fronting of /ʌ/, but crowding of front non-peripheral space
- Canadian ‘Raising’
  - Shift of an entire trajectory
  - Not raising of low nuclei
  - Affects all diphthongs

18. The next step(s)
- Patterns in within-category (scatter around centres) and temporal variation
- Increased investigation of speaker and social variables
- Direct comparison with other languages and dialects within and beyond Canada
- Investigation of adjustments made in other registers/styles and phonological contexts

References
### Appendix: Average values in Hz at vowel midpoint as discussed above, compared with classic studies.

| Location                | Gender | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  | F1  | F2  |
|-------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| **Winnipeg**            | Men    | 293 | 420 | 364 | 560 | 704 | 637 | 635 | 411 | 459 | 313 | 584 | 425 |
|                         | F2     | 2207| 1899| 2227| 1694| 1519| 1121| 1115| 899 | 1340| 1328| 1770| 1598|
|                         | Women  | 392 | 479 | 412 | 712 | 996 | 856 | 891 | 419 | 500 | 387 | 778 | 461 |
|                         | F2     | 2765| 2197| 2742| 1956| 1752| 1294| 1310| 999 | 1580| 1328| 1770| 1598|
| **Southern California** | Men    | 264 | 381 | 343 | 458 | 704 | 715 | -   | 387 | 414 | 295 | 570 | 386 |
|                         | F2     | 2337| 1832| 2234| 1698| 1597| 1241| -   | 1078| 1426| 1199| 1438| 1400|
|                         | Women  | 345 | 442 | 420 | 683 | 1031| 1056| -   | 446 | 461 | 349 | 812 | 444 |
|                         | F2     | 2992| 2417| 2784| 2249| 1895| 1492| -   | 1299| 1771| 1425| 1830| 1585|
| **General American**    | Men    | 270 | 390 | -   | 530 | 660 | 730 | 570 | -   | 440 | 300 | 640 | 490 |
| (Peterson & Barney, 1952)|        |     |     |     |     |     |     |     |     |     |     |     |     |
|                         | F2     | 2290| 1990| -   | 1840| 1720| 1090| 840 | -   | 1020| 870 | 1190| 1350|
|                         | Women  | 310 | 430 | -   | 610 | 860 | 850 | 590 | -   | 470 | 370 | 760 | 500 |
|                         | F2     | 2790| 2480| -   | 2330| 2050| 1220| 920 | -   | 1160| 950 | 1400| 1640|
| **Northern Cities**     | Men    | 342 | 427 | 476 | 580 | 588 | 768 | 652 | 497 | 469 | 378 | 632 | 474 |
| (Hillenbrand, Getty, Clark, & Wheeler, 1995) |        |     |     |     |     |     |     |     |     |     |     |     |     |
|                         | F2     | 2322| 2036| 2089| 1799| 1952| 1333| 997 | 910 | 122 | 997 | 1200| 1379|
|                         | Women  | 437 | 483 | 536 | 731 | 669 | 936 | 781 | 555 | 519 | 459 | 763 | 523 |
|                         | F2     | 2761| 2365| 2530| 2058| 2349| 1551| 1136| 1035| 1225| 1105| 1426| 1588|