

## How 'general' is General Canadian? Vowel production in Winnipeg

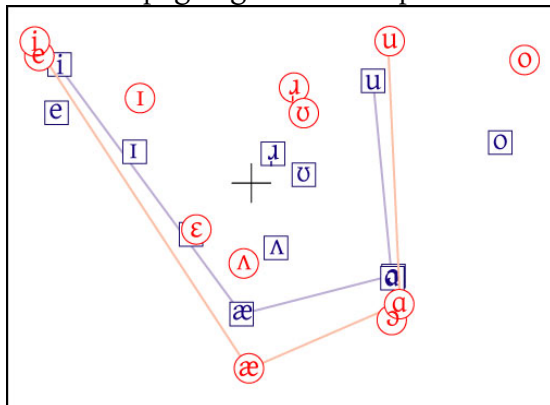
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1. Introduction
2. Overview
  - Goals of project
  - Method, speakers for present data
  - Dispersion of vowel centres in Winnipeg English sample, compared with
    - General American (Peterson & Barney, 1952)
    - Southern California (Hagiwara, 1995, 1997)
  - 'Acoustify' some markers in Canadian English
    - /ɑ-ɔ/ 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
    - /i, ɪ, e, ε, æ/
    - /u, ʊ, o, ɔ, ɑ/
    - /ʌ, ɹ/
  - 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)

6. Coarse Auto-normalization

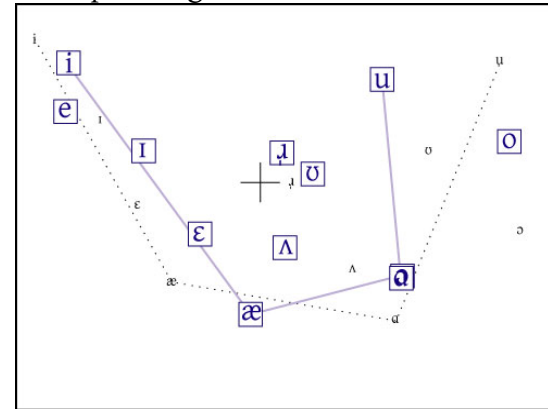
- Expresses each “frequency” as an auditory distance from a calculated neutral resonance frequency
  - Linear regression (frequencies by formant) for all plain vowels deriving slope and intercept
  - Calculate “neutral” resonances from regression for each speaker
  - Express vowel coordinates as auditory 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



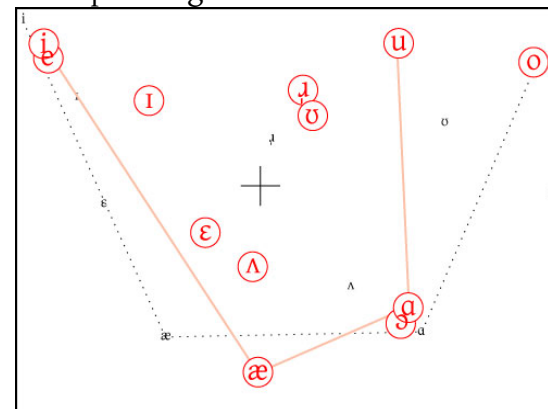
- Average F1 and F2 vowel dispersion in a Coarse-Autonormalized space (vowel midpoint only)
- Men (squares), Women (circles)
- Lines join point vowels only
- Crosshair indicates calculated neutral F1 and F2 frequencies

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

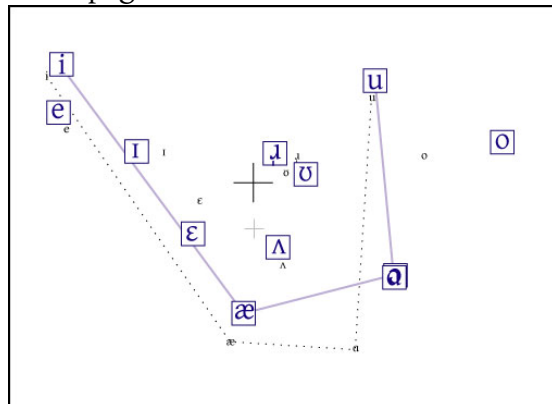


- Women only, as from (8)
- Compared with “General American” (as in 9)
- Small symbols, dotted line represent GA women

10. Compared with “General American”

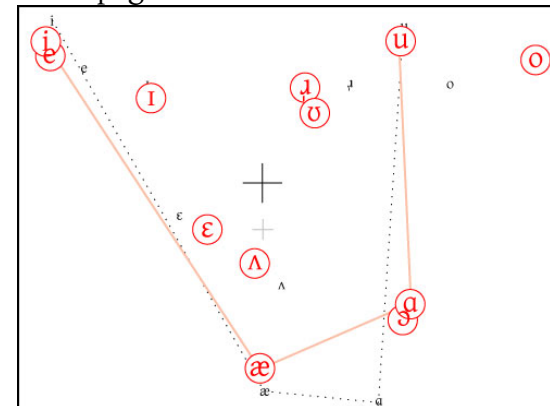
- The Winnipeg vowels exhibit advancement (centralization) of /u, ʊ, ʌ/ but not /o/
- Greater F2 difference between /i/ and /æ/
  - “Increased slope” of front vowel series
  - Additional retraction of /ɪ/ for women
- Roughly even distribution of front vowels in height dimension
- /ɑ-ɔ/ merger results 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

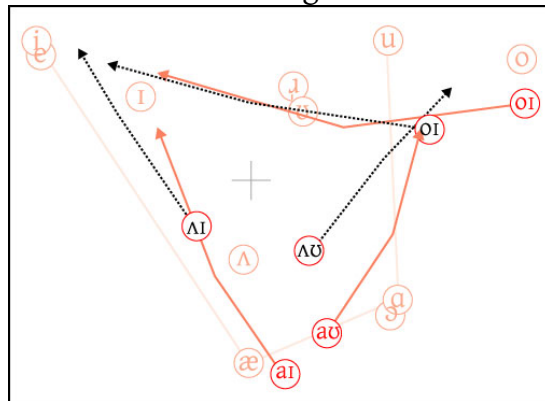


- Women’s data compared with Southern California data
- As in (15)

13. Compared with. Southern California

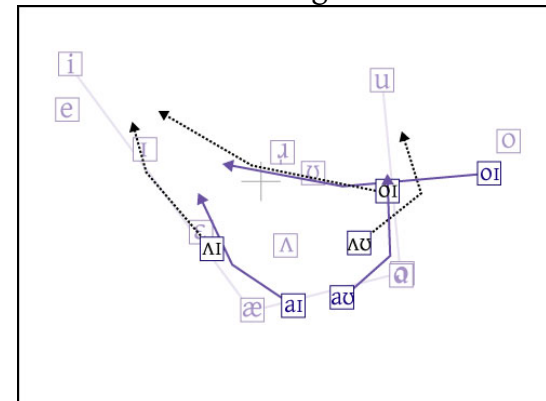
- Similarities in Southern California
  - Advancement of /u, ʊ, ʌ/
  - Increased slope in front vowel series
- Differences in Southern California
  - /o/ participates in unrounding and advancement along with /u, ʊ, ʌ/
  - Uneven height distribution in front vowels
  - Greater retraction of /ɪ, ε/ among 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 /Λ/
- 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

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

			i	ɪ	e	ɛ	æ	ɑ	ɔ	o	ʊ	u	ʌ	ɹ
Winnipeg	Men	F1	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	F1	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	F1	264	381	343	458	704	715	-	387	414	295	570	386
		F2	2337	1832	2234	1698	1597	1241	-	1078	1426	1199	1438	1400
	Women	F1	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 (Peterson & Barney, 1952)	Men	F1	270	390	-	530	660	730	570	-	440	300	640	490
		F2	2290	1990	-	1840	1720	1090	840	-	1020	870	1190	1350
	Women	F1	310	430	-	610	860	850	590	-	470	370	760	500
		F2	2790	2480	-	2330	2050	1220	920	-	1160	950	1400	1640
Northern Cities (Hillenbrand, Getty, Clark, & Wheeler, 1995)	Men	F1	342	427	476	580	588	768	652	497	469	378	632	474
		F2	2322	2036	2089	1799	1952	1333	997	910	122	997	1200	1379
	Women	F1	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