MEASURES OF EDUCATION AND PARTICIPATION IN REGIONAL SOUND CHANGE

Kyle Gorman
Oregon Health & Science University

Hilary Prichard
University of Pennsylvania
LANGUAGE CHANGE IS STRATIFIED BY EDUCATION

• Language change is socially embedded

• Language change is class-stratified

• Educational goals and/or attainment are a component of (or index) social class, and thus language change is education-stratified as well (e.g., Bigham 2010, Eckert 1989, Gorman 2010, Prichard & Tamminga 2012, Wagner 2008)
The relationship between education & class is evolving

- The past century has seen huge increases in:
  - access to higher education (cf. HP later in this session)
  - diversity of institutions of higher education
  - average higher education
  - The relationship between socioeconomic status and education has evolved

<table>
<thead>
<tr>
<th></th>
<th>1970</th>
<th>2011 (estimate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; HS</td>
<td>47%</td>
<td>14%</td>
</tr>
<tr>
<td>HS</td>
<td>31%</td>
<td>28%</td>
</tr>
<tr>
<td>Some college</td>
<td>11%</td>
<td>29%</td>
</tr>
<tr>
<td>4-year college</td>
<td>6%</td>
<td>18%</td>
</tr>
<tr>
<td>Graduate degree</td>
<td>5%</td>
<td>11%</td>
</tr>
</tbody>
</table>

[Source: U.S. Census Bureau]
TWO WAYS TO OPERATIONALIZE AMOUNT OF HIGHER EDUCATION

• Ed-Years (Conn 2005, Labov 2001, Labov et al. 2013): years of formal education

• Ed-Index (Prichard & Tamminga 2012, Wagner 2012):
  1. No higher education
  2. Local college (Philadelphia Community College, career colleges)
  3. Regional college (Drexel University, Temple University)
  4. National college (University of Pennsylvania)
CASE STUDIES
DATA SET

• 282 white adult speakers (103 male, 122 female), born 1889-1994 from the:
  • the Philadelphia Neighborhood Corpus (PNC; Labov et al. 2013) retrospectively coded for education using fieldworker reports
  • the Influence of Higher Education on Local Phonology (IHELP) project

• Complete education data is available for 225 speakers

• Acoustic measurements were made using a revised FAVE pipeline:
  • manual word transcription aligned to the breath group
  • phoneme forced alignment (Yuan & Liberman 2008)
  • automated Bayesian formant measurement (Evanini et al. 2009)
FIRST STUDY: LOW-BACK VOWELS
LOW-BACK MERGER IS INCIPIENT IN THE MID-ATLANTIC REGION

• ME /ɔ/ (o) and /ɔː/ (oh) have merged in wide portions of North America, and merger is incipient in southern New England and NYC (Johnson 2012)

• Raised (oh) is a marker (or stereotype) in the Mid-Atlantic (e.g., SSENYC, Becker 2012)

• In Philadelphia, some younger speakers fail to produce a strong distinction (Labov et al. 2013), while still perceiving a distinction in minimal pair tasks
TWO DISTINCTIVE FEATURES OF PHILADELPHIA IN RETREAT

"Ed D." (born 1889)
"Michael" (born 1990)
PILLAI’S TRACE QUANTIFIES DEGREE OF DISTINCTION

• To quantify degree of distinction, we use multivariate analysis of variance (MANOVA) and Pillai’s trace

• This assumes multivariate normality and homoscedacity, but is robust to violations of these assumptions with at least 10 observations per (vowel) class (Tabachnick & Fidell 2007:251)

• For each speaker, we estimate tokens’ F1/F2 as a function of vowel class in the traditional Philadelphia system, and compute Pillai’s trace, the percentage of variance in vowel realization which is accounted for by vowel class (e.g., Hay et al. 2006)

• Well-correlated with Euclidean distance (Gorman & Johnson 2013)
ED-INDEX: (O)/(OH)
ED-YEARS: (O)/(OH)
MODEL COMPARISON
FAVORS ED-INDEX

- Two measures:
  - Parametric chi-square log-likelihood ratio test
  - Non-parametric rank correlation (Kendall’s $\tau_b$)
- Only Ed-Index is a significant predictor of (o)/(oh) distinction

<table>
<thead>
<tr>
<th></th>
<th>Ed-Index</th>
<th>Ed-Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X^2(3)$</td>
<td>0.576</td>
<td>0.014</td>
</tr>
<tr>
<td>$p(X^2)$</td>
<td>1.2e-06</td>
<td>.376</td>
</tr>
<tr>
<td>$\tau_b$</td>
<td>-0.146</td>
<td>-0.047</td>
</tr>
<tr>
<td>$p(\tau_b)$</td>
<td>.006</td>
<td>.339</td>
</tr>
</tbody>
</table>
SUMMARY

- Younger Philadelphians who attended a regional or national college have not preserved the traditional strong distinction between (o) and (oh) in production.

- Both parametric and non-parametric tests find that Ed-Index is a significant predictor of the distinction, and Ed-Years is not. Ed-Index is negatively correlated with a (o)/(oh) distinction.
SECOND STUDY: SPLIT SHORT-A
THE TRADITIONAL PHILADELPHIA SHORT-A SPLIT IS IN RETREAT

- ME /a:/ has undergone a complex split into tense (aeh) and lax (ae) phonemes in many English dialects (Cincinnati: Boberg & Strassel 2000; New Orleans: Labov 2007; New York: Trager 1930; RP: Wells 1982 I.203f.), including Philadelphia (Labov 1981)

- In Philadelphia, the tense variant [eə] receives negative social evaluation (Wagner 2008)

- Labov et al. (2013) report that some young Philadelphians have adopted the simpler “nasal system” of the northern Midlands and New England
AUTOMATED SHORT-A CODING

• Variable (excluded from analysis):
  • monosyllabic function words (Selkirk 1984:352f.)
  • following sC cluster (e.g., aspect, astro, casket)
  • lexically: Anne (Annie), began, can, planet
• Tense [æ] (aeh):
  • following /m, n, f, θ, s/ which is either:
    • tautosyllabic under max-onset syllabification
    • immediately followed by affixes -ing or -s, identified using the Porter (1980) stemmer
  • lexically: mad, bad (badminton), glad; basket (basketball), grandma, San(t)a, Tasker
• Lax [æ] (ae):
  • elsewhere, and lexically: ran, swam; alas, am, camera, Catherine, Catholic, exam, family, math

[Sources: Ferguson 1972, field notes]
TWO DISTINCTIVE FEATURES OF PHILADELPHIA IN RETREAT

"Ed D." (born 1889)

"Michael" (born 1990)
ED-INDEX: (AE)/(AEH)
ED-YEARS: (AE)/(AEH)
MODEL COMPARISON FAVORS ED-INDEX

- Both measures are significant predictors of the (ae)/(aeh) distinction
- Surprisingly, years of education is positively correlated with a greater short-a distinction

<table>
<thead>
<tr>
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<th>Ed-Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X^2(3)$</td>
<td>0.679</td>
<td>0.198</td>
</tr>
<tr>
<td>$p(X^2)$</td>
<td>1.1e-05</td>
<td>.005</td>
</tr>
<tr>
<td>$\tau_b$</td>
<td>-.097</td>
<td>.023</td>
</tr>
<tr>
<td>$p(\tau_b)$</td>
<td>.075</td>
<td>.617</td>
</tr>
</tbody>
</table>
SUMMARY

• The traditional Philadelphia split short-a system is eroding; national and regional college speakers are once again leading the reversal.

• Both parametric and non-parametric tests find that Ed-Index is a significant predictor of, and negatively correlated with, the traditional distinction.
CONCLUSIONS

• Two Philadelphia sound changes in progress are stratified by type of higher education, but are not well-correlated with years of education

• The evolution of higher education in 20th century America, in particular the increasing diversity of institutions of higher education, may have implications for the measurement of socioeconomic status in general

• Increased access to higher education may have ramifications for actuation of sound change as well (Prichard, this session)
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SELECTED REFERENCES


