MEASURES OF EDUCATION AND PARTICIPATION IN REGIONAL SOUND CHANGE

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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

	1970	2011 (estimate)
< HS	47%	14%
HS	31%	28%
Some college	11%	29%
4-year college	6%	18%
Graduate degree	5%	11%

[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

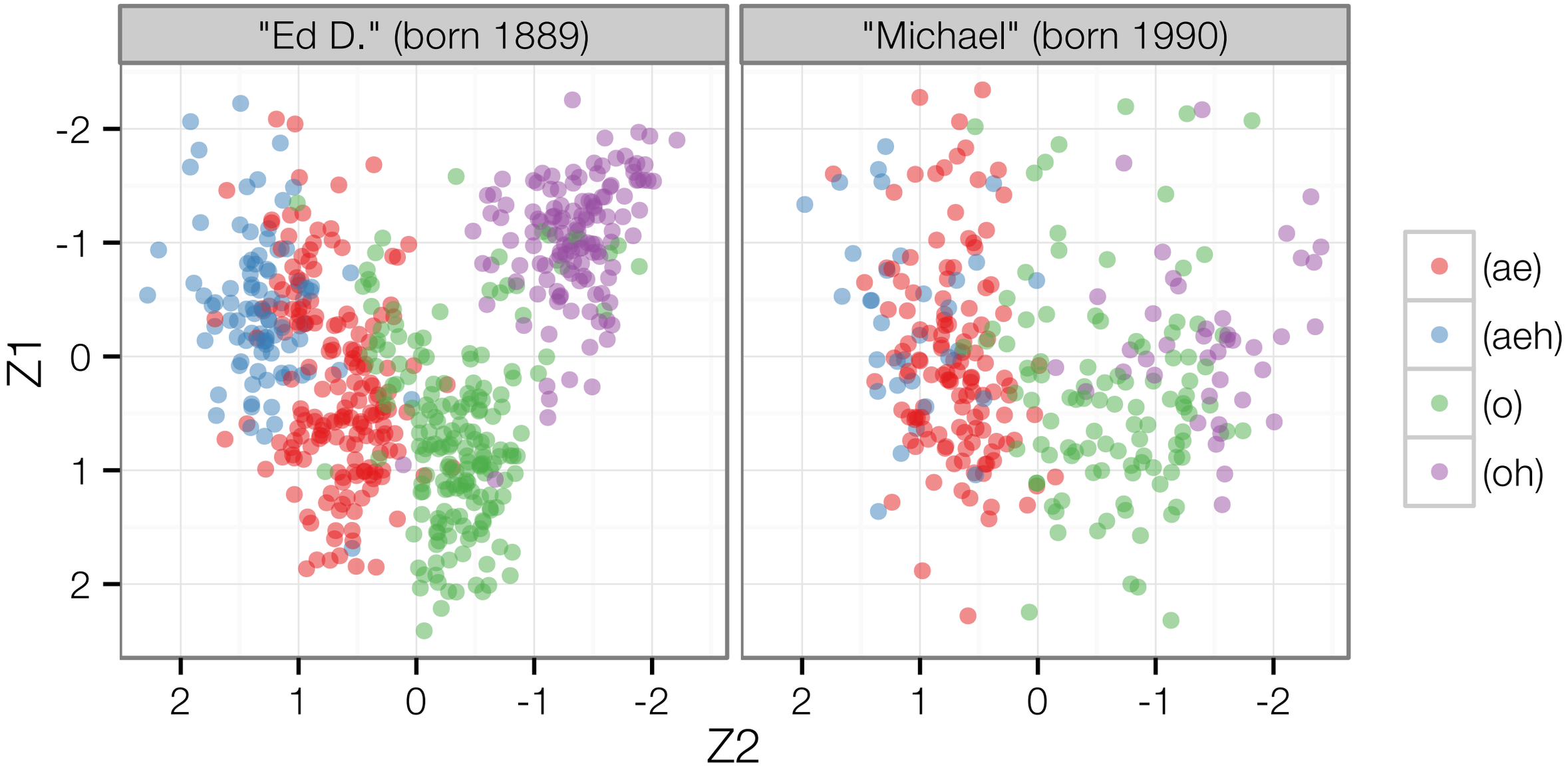
LOW-BACK MERGER IS INCIPIENT IN THE MID-ATLANTIC REGION

- 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



PILLAI'S TRACE QUANTIFIES DEGREE OF DISTINCTION

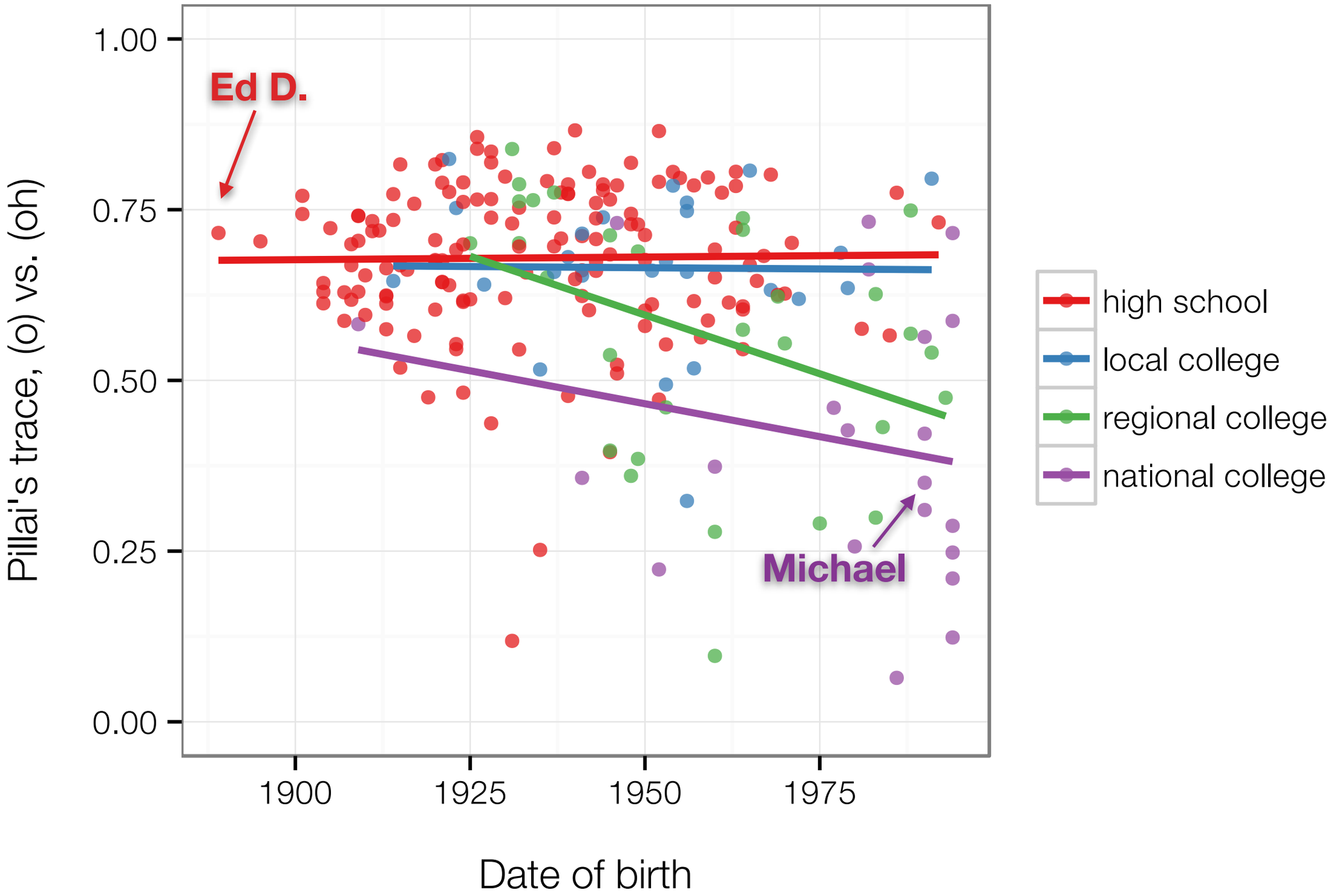
- To quantify degree of distinction, we use multivariate analysis of variance (MANOVA) and *Pillai's trace*

- 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)

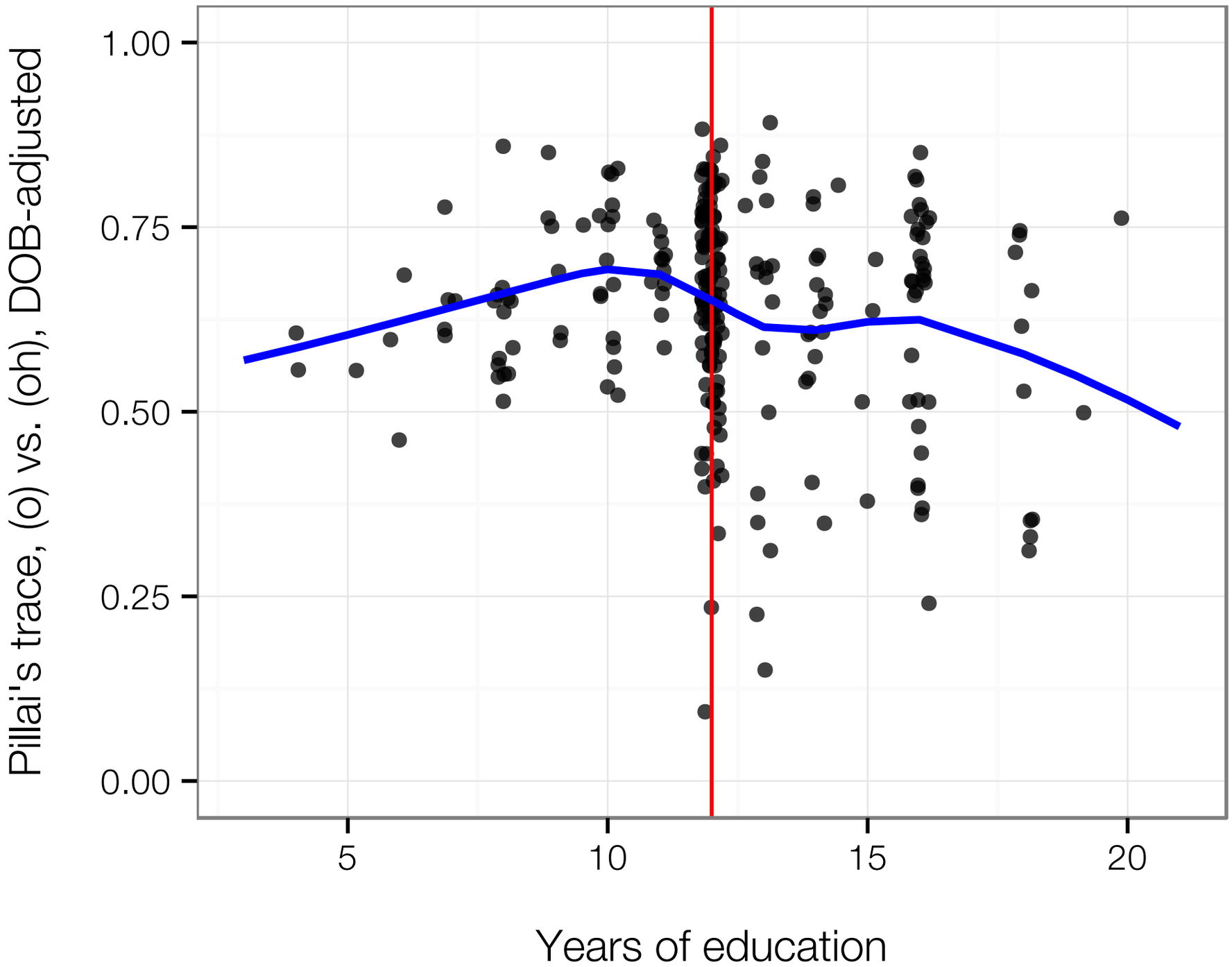
- For each speaker, we estimate tokens' F1/F2 as a function of vowel class in the traditional Philadelphia system, and compute *Pillai's trace,* the percentage of variance in vowel realization which is accounted for by vowel class (e.g., Hay et al. 2006)

- Well-correlated with Euclidean distance (Gorman & Johnson 2013)

ED-INDEX: (O)/(OH)


Pillai's trace, (o) vs. (oh)
1.00
0.75
0.50
0.25
0.00
1900
1925
1950
1975
Date of birth
Ed D.
Michael
high school
local college
regional college
national college

ED-YEARS: (O)/(OH)


1.00
0.75
0.50
0.25
0.00
Pillai's trace, (o) vs. (oh), DOB-adjusted
5
10
15
20
Years of education

MODEL COMPARISON FAVORS ED-INDEX

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

Ed-Index	Ed-Years
$X^2(3) = 0.576$	$X^2(1) = 0.014$
$p(X^2) = 1.2e\text{-}06$	$p(X^2) = .376$
$\tau_b = -.146$	$\tau_b = -.047$
$p(\tau_b) = .006$	$p(\tau_b) = .339$

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 /aː/ 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

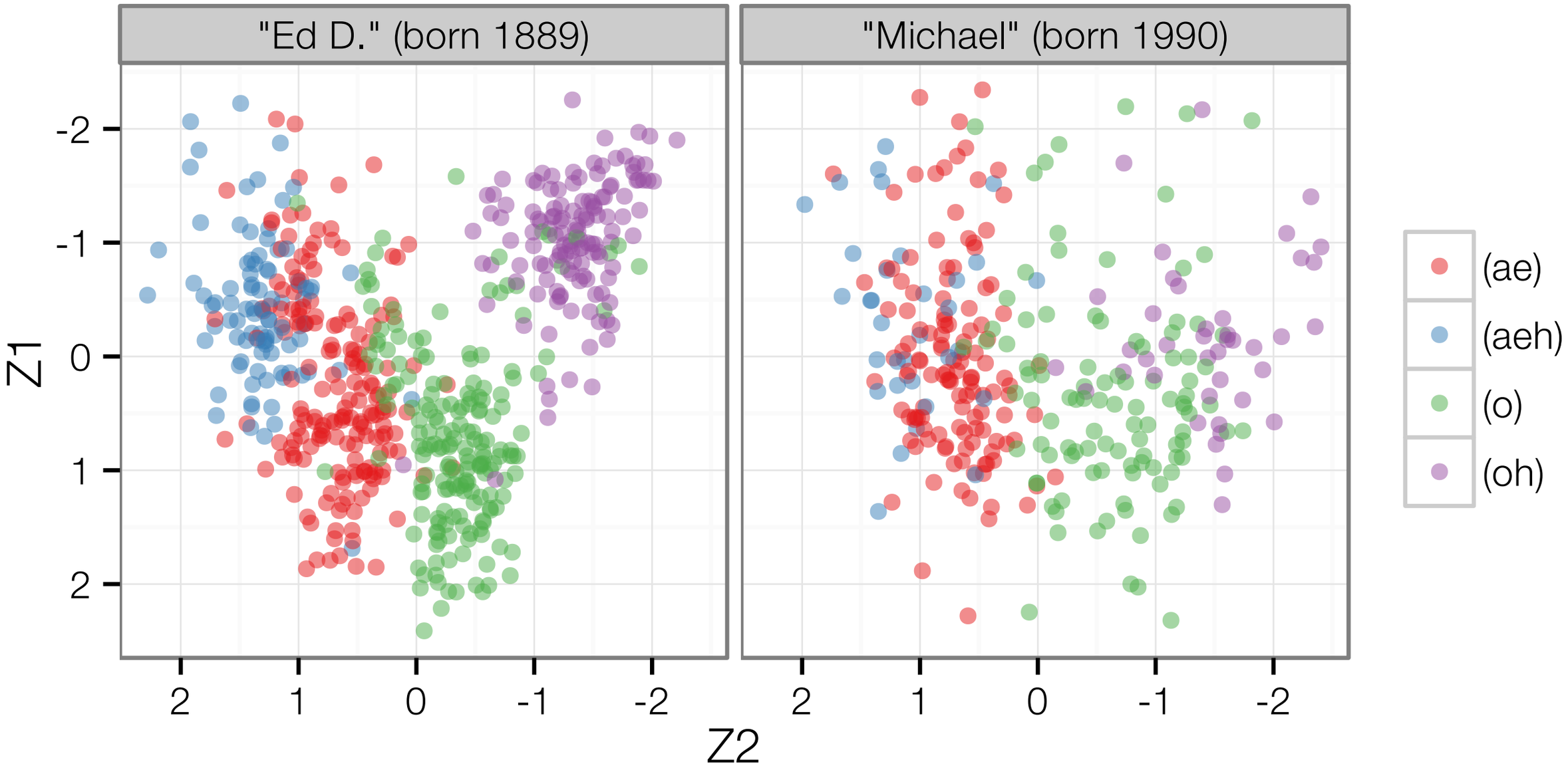
AUTOMATED SHORT-*A* CODING

- Variable (excluded from analysis):
    - monosyllabic function words (Selkirk 1984:352f.)
    - following *s*C cluster (e.g., *aspect*, *astro*, *casket*)
    - lexically: *Anne* (*Annie*), *began*, *can*, *planet*
- Tense [eə] (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*

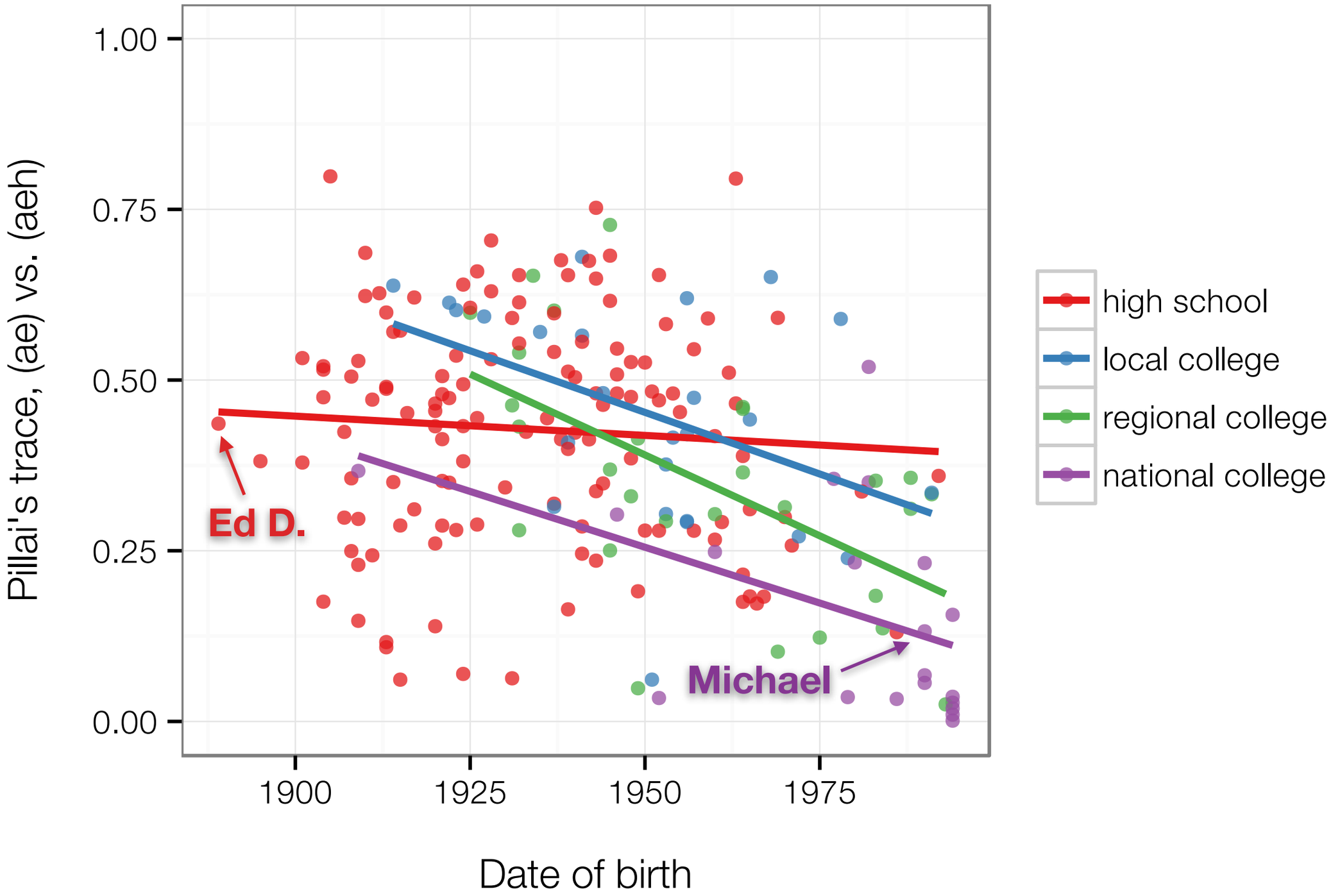
[Source: NYT]

[Sources: Ferguson 1972, field notes]

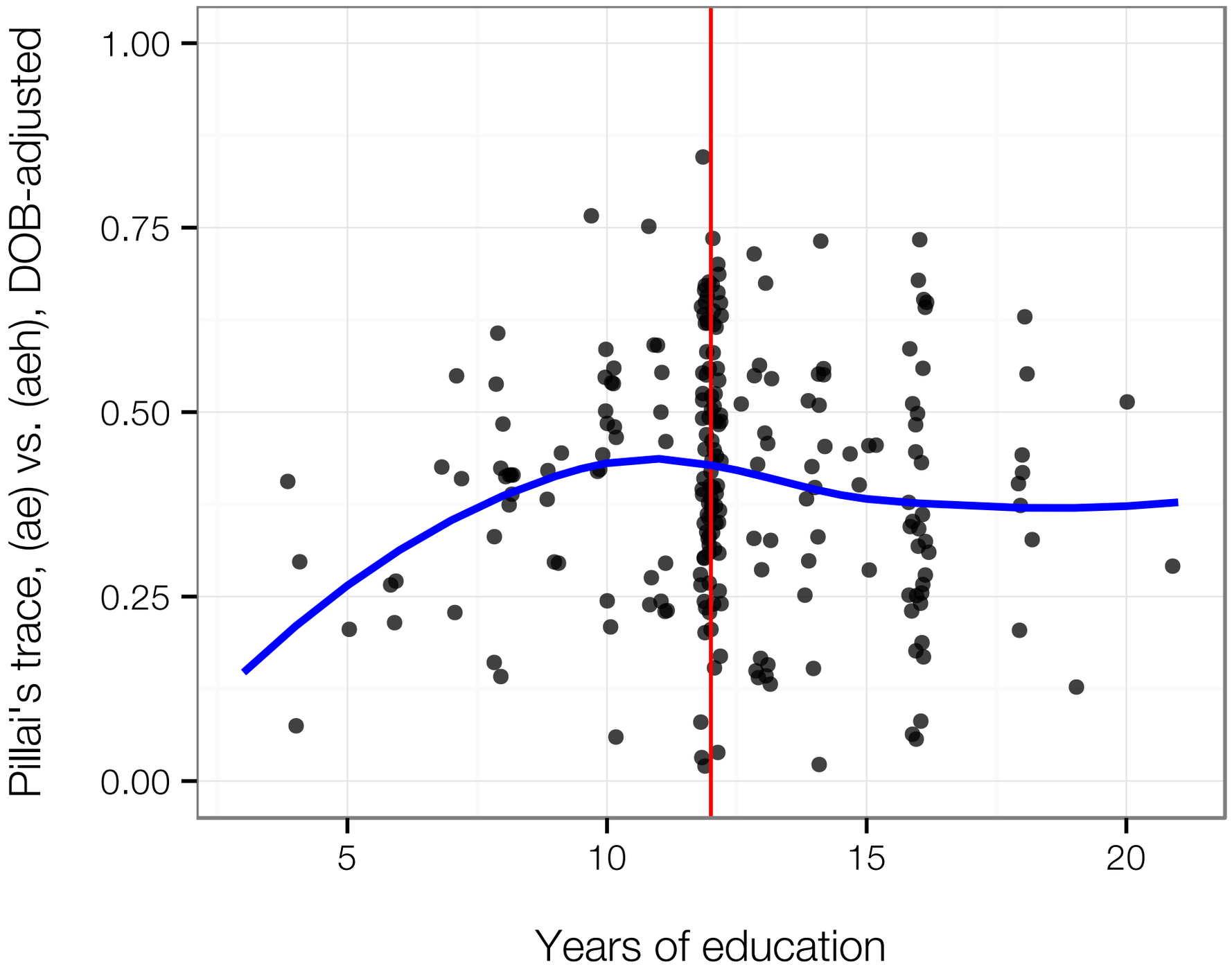
TWO DISTINCTIVE FEATURES OF PHILADELPHIA IN RETREAT



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

	Ed-Index	Ed-Years
	$X^2(3) = 0.679$	$X^2(1) = 0.198$
	$p(X^2) = 1.1e\text{-}05$	$p(X^2) = .005$
	$\tau_b = -.097$	$\tau_b = .023$
	$p(\tau_b) = .075$	$p(\tau_b) = .617$

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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