



# The Phonological Aspect of Phonetic Change

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# Outline

## Introduction

### What is Phonetic Change?

- The Unit of Phonetic Change
- The Process of Phonetic Change
- The Role of Phonology
- Proposal

### Application of the Proposal

- The Unity Principle
- /eyC/ in Philadelphia

## Conclusion



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## What is the unit of phonetic change?

- I'll be assuming, following Labov (1981) that “sound change” is not monolithic.
- I'll be focusing on neogrammarian sound change, rather than other kinds of sound change.
- “Phonemes Change”



# What is the unit of phonetic change?

/æ/



## What is the unit of phonetic change?

/æ/

[  
-hi  
+low  
-back  
-peripheral  
]



## What is the unit of phonetic change?

/æ/

[  
-hi  
+low  
- back  
-peripheral  
]



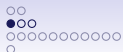
## What is changing in a phonetic change?

- hi → large F1
- +low → larger F1
- back → large F2
- peripheral → close to center



# What is changing in a phonetic change?

- hi → large F1
- +low → larger F1
- back → large F2
- peripheral → close to center



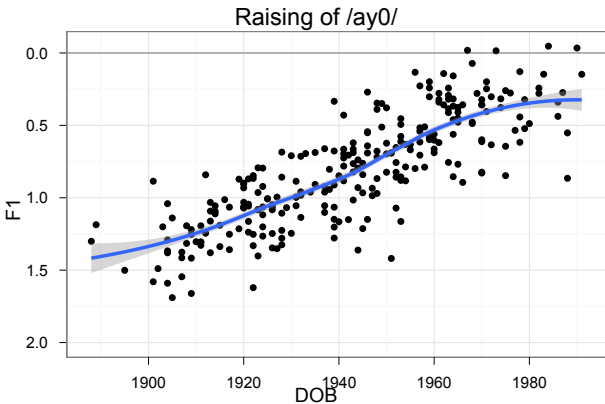
## What is changing in a phonetic change?

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## What is changing in a phonetic change?

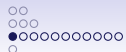
You're not going to get anywhere messing with the phonological representation.





# What is changing in a phonetic change?

- hi → large F1
- +low → larger F1
- back → large F2
- peripheral → close to center



## Is it worth talking about phonology?

/æ/

$$\left[ \begin{array}{c} -\text{hi} \\ +\text{low} \\ -\text{back} \\ -\text{peripheral} \end{array} \right]$$



## Is it worth talking about phonology?

// ε  
æ //

[ -hi  
-back  
-peripheral ]



## Is it worth talking about phonology?

/ i  
ε  
æ /

[ -back  
-peripheral ]



## Is it worth talking about phonology?

/ɛ/

[ -back  
-peripheral ] →

less large F2  
close to center

Boberg (2005)

Durian (2009)

Durian & Joseph (approx 15 minutes ago)



## Is it worth talking about phonology?

Is there a robust relationship between phonetic variation and change and phonological representation?

### Correlation Analysis

- Utilized the Philadelphia Neighborhood Corpus.
  - 272 speakers.
  - 654,820 vowel measurements.
  - 7730 vowel means
- For each pairwise comparison of vowels, I calculated the correlation of those vowel means across speakers



## Is it worth talking about phonology?

| Speaker   | F1   |      |
|-----------|------|------|
|           | æ    | ɛ    |
| JStevens  | 0.65 | 0.37 |
| NJulian   | 0.97 | 0.44 |
| GSalvi    | 0.89 | 0.39 |
| BDAddario | 1.03 | 0.39 |
| ...       |      |      |

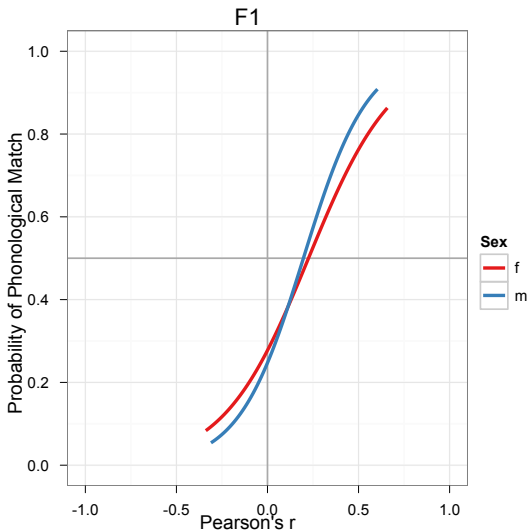


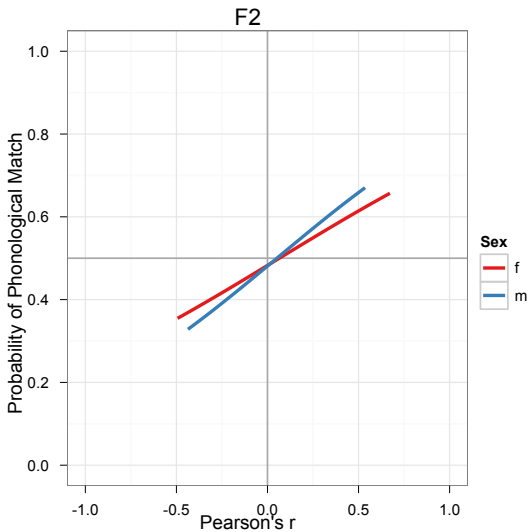
| Vowel 1 | F1      |  | cor  |
|---------|---------|--|------|
|         | Vowel 2 |  |      |
| æ       | ɛ       |  | 0.45 |
| æ       | a       |  | 0.18 |
|         | ...     |  |      |



## Is it worth talking about phonology?

|         |         | F1   |             |  |
|---------|---------|------|-------------|--|
| Vowel 1 | Vowel 2 | cor  | Same Height |  |
| æ       | ɛ       | 0.45 | 0           |  |
| æ       | a       | 0.18 | 1           |  |
| ...     |         |      |             |  |







## It is worth talking about phonology

Patterns in both parallel shifts and in phonetic variation across speakers appears to be relatable to phonological natural classes.



# Phonology-Phonetic Interface

Phonology

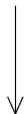
$uw \rightarrow [+back]/\_l$



Language Specific Implementation

$[+back] \rightarrow \text{small F2}$

Kingston & Diehl, 1994; Boersma & Hamann, 2008



Phonetic Alignment

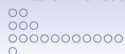
$t\tilde{u}:n$

Cohn, 1993; Zsiga, 2000



# Proposal

- At least at their outset, phonetic change is a change in the implementation of surface phonological representations.
- The units of phonetic change are the same as the units the Phonology-Phonetics interface can see.
  - Natural class (i.e. parallel shifts) = features
  - Single vowel shift = holistic surface representation



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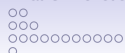
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# Unity Principle

- Diachronic Phonological Unity → Diachronic Phonetic Unity



# Unity Principle

- Diachronic Phonological Unity → Diachronic Phonetic Unity
- Diachronic Phonetic Disunity → Diachronic Phonological Disunity



# /eyC/ in Philadelphia

## Background

### Description

- The raising and peripheralization of /ey/ in non-word final position
  - *snake* sound similar to *sneak*.
- Identified as a new and vigorous change in Philadelphia (Labov, 2001).

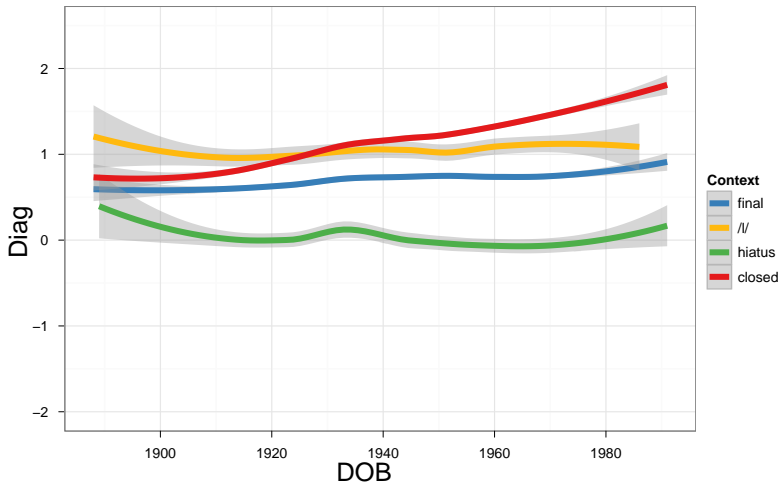
### PNC

This is the second most vigorous change in the corpus following the raising of /ay0/.



# /eyC/ in Philadelphia

## Contexts





# /eyC/ in Philadelphia

## Phonological analysis

### Unity Principle

- Pre-C  $\neq$  Final
- Pre-C  $\neq$  Pre-Hiatus
- Pre-C  $\neq$  Pre-//



# /eyC/ in Philadelphia

## Phonological analysis

### Unity Principle

- Pre-C  $\neq$  Final
- Pre-C  $\neq$  Pre-Hiatus
- Pre-C  $\neq$  Pre-//

### Phonological Analysis

- ey  $\rightarrow$  +peripheral / \_\_\_C/#

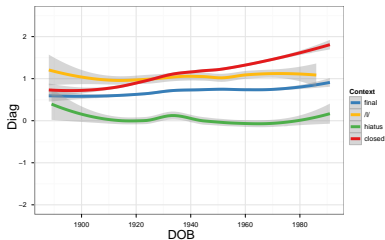


# /eyC/ in Philadelphia

## Change Analysis

### The Change

- $ey_{+periph}$  becomes more phonetically peripheral.
- $ey_{-periph}$  remains stable.



### Future Extension

If one of the non-participating environments were to become participating in the future, it would necessarily be a phonological change.



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- Phonetic change and phonetic variation can be related to phonological natural class behavior.
- It provides an explanatory account for parallel shifts.
- This also allows for a clear way to leverage diachronic phonetic data to phonological investigation.



# Thanks

## Special thanks to . . .

William Labov, Ingrid Rosenfelder, Gene Buckley, Mark Liberman, Meredith Tamminga, Ricardo Bermúdez-Otero, Andries Coetzee, the denizens of the Upenn Linglab, regular attendees of Splunch, Common Ground, and Thursday Thoughts seminars, and the audiences at NAPhC and MFM.

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