What are the units of sound change?

Assignments

- What is /æ/-tensing? Due session 7
- Reading: Harrington et al (2000)

Language variation and change

- When we compare accents of English, we generally find systematic correspondences between the vowels in corresponding words

- For example, in just about every word where Southern British English uses a lower mid back rounded [ɔ], most US English accents use low back unrounded [ɑ].

	S. British English	US English
Thought	θɔt	θɑt
Lawn	lɔn	lɑn
saw	sɔ	sɑ
talk	tɔk	tɑk

- Hence the viability of Wells' lexical sets.

Regularity of sound change

- Correspondences may be more complex on the surface, e.g. due to patterns of allophonic variation, but the correspondences are generally predictable from phonological context.

    - E.g. S.Br.Eng [æ] corresponds to E. Massachusetts English [eæ] before nasals: [bæn]/[beæn], [æ] elsewhere: [bæt]/[bæt]

    - In this case correspondence is simple at the level of phonemes.

- These correspondences arise via sound change.

- Language change can change pronunciation of a sound in all the words where it occurs, or all the words where that sound occurs in a particular phonetic context.

The Neogrammarian Hypothesis

'The two most important principles of the "neogrammarian" movement are the following:

First, every sound change, inasmuch as it occurs mechanically, takes place according to laws that admit no exception. That is, the direction of the sound shift is always the same for all the members of a linguistic community except where a split into dialects occurs; and all words in which the sound subjected to the change appears in the same relationship are affected by the change without exception.'

    Osthoff & Brugmann (1878)

- Sound change is regular
- 'in the same relationship'?

The Neogrammarian Hypothesis

'When we speak of systematic effect of sound laws we can only mean that given the same sound change within the same dialect every individual case in which the same phonetic conditions are present will be handled the same. Therefore either wherever earlier the same sound stood, also in the later stages the same sound is found or, where a split into different sounds has taken place, then a specific cause – a cause of a purely phonetic nature like the effects of surrounding sounds, accent, syllabic position, etc. – should be provided to account for why in the one case this sound, in the other that one has come into being.'

Paul (1880), translated

- Sound change is regular
- and purely phonetically conditioned.

The Neogrammarian Hypothesis

- Is the Neogrammarian hypothesis correct?

- If so, why is sound change regular?

- And why is it phonetically conditioned? (Later).

- If it is not correct, then what kinds of irregular changes do we observe?

Lexical Diffusion

- Wang & Cheng (1977) proposes a model of sound change in which the results of a sound change can be regular, but sound change proceeds one word at a time.

  - So in a crucial sense the basic unit of sound change is the word.

- Sound changes are conditioned by phonetic context, but words succumb to the change one at a time.

- The force that motivates words to change generally (?) remains active until all of the applicable words undergo the change.

  - Resulting in a regular change

- But changes sometimes halt before all of the applicable words have undergone the change, resulting in irregular correspondences.

- We should also be able to observe irregular correspondences while a sound change is in progress – before it has spread through the entire lexicon.

Irregular correspondences

- Correspondents of Middle Chinese tone III in Chao-Zhou Chinese:

		Chao-Zhou	
		tone 2b	tone 3b
Middle Chinese initial	b	6	7
	v	1	3
	d	11	14
	dz	6	2
	z	3	3
	ḍ	3	4
	dẓ	1	3
	ẓ	3	5
	dj	2	1
	g	6	4
	γ	14	15
TOTAL		56	61

(Table adapted from Labov 1981, based on data originally from Cheng & Wang 1977)

- Correspondents of MC homonyms can display distinct tones in Chao-Zhou.

Units in sound change

- Labov's (1981) formulation of the issue:
  - 'In the evolution of sound systems, is the basic unit of change the word or the sound?'
- What does it mean to say that the unit of change is the sound (or the phoneme)?
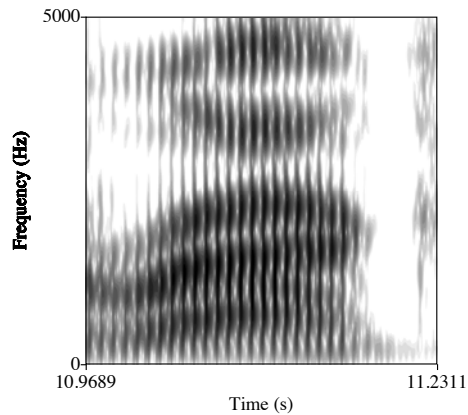
Units in sound change

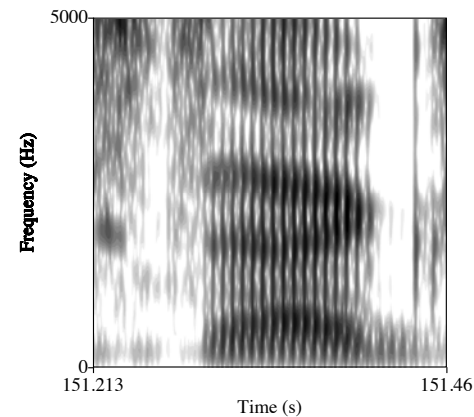- Phonemes don't have one pronunciation, e.g. /æ/, one speaker
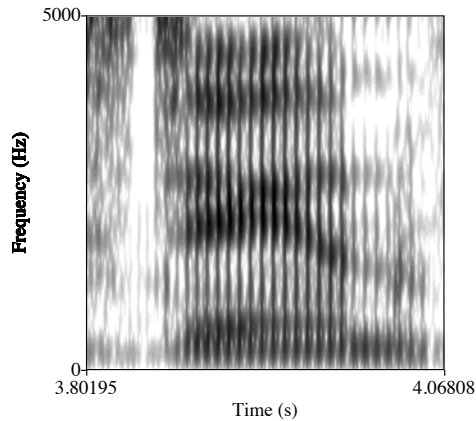

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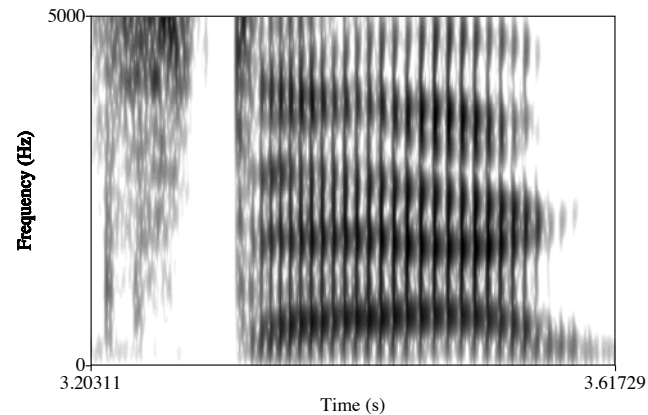

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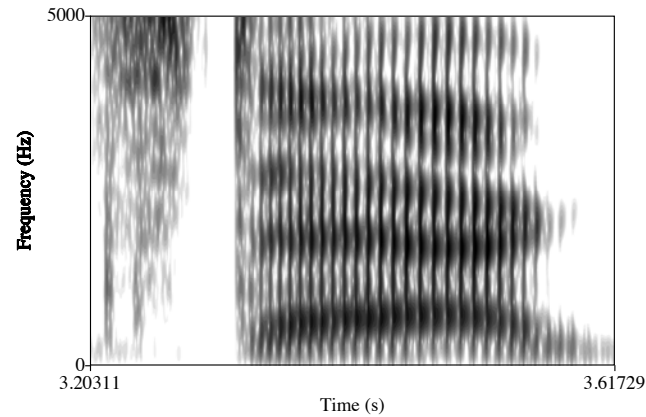
Units in sound change

- Phonemes don't have one pronunciation
  - Allophonic variation, e.g.
    - Vowels are nasalized [ɛ̃] before nasals, oral [ɛ] elsewhere
    - /æ/ is realized as [ẽæ̃] before nasals
  - Coarticulation - he influence of segmental context on the articulatory/acoustic realization of a target segment.
  - Rate of speech
  - Style shifting

Coarticulation

- Even where a phone would be given the same broad transcription there are subtle differences in realization depending on the segmental context.

- Transitions from preceding segment and to following segment.

- Assimilation to surrounding context.
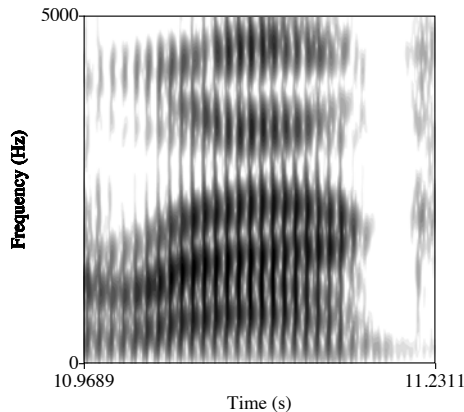
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Coarticulation

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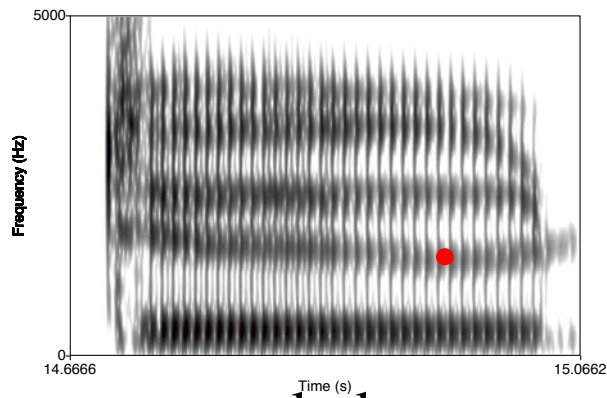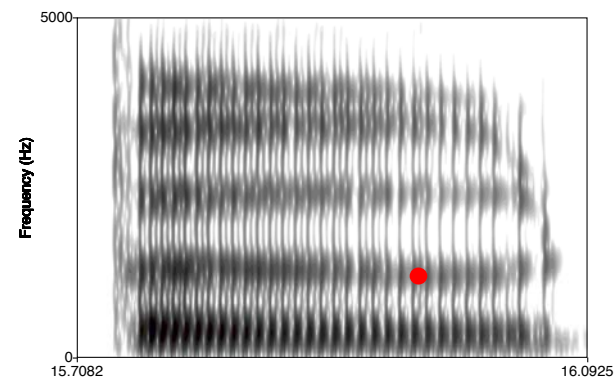- Assimilation to surrounding context.

dud

'dude'

bud

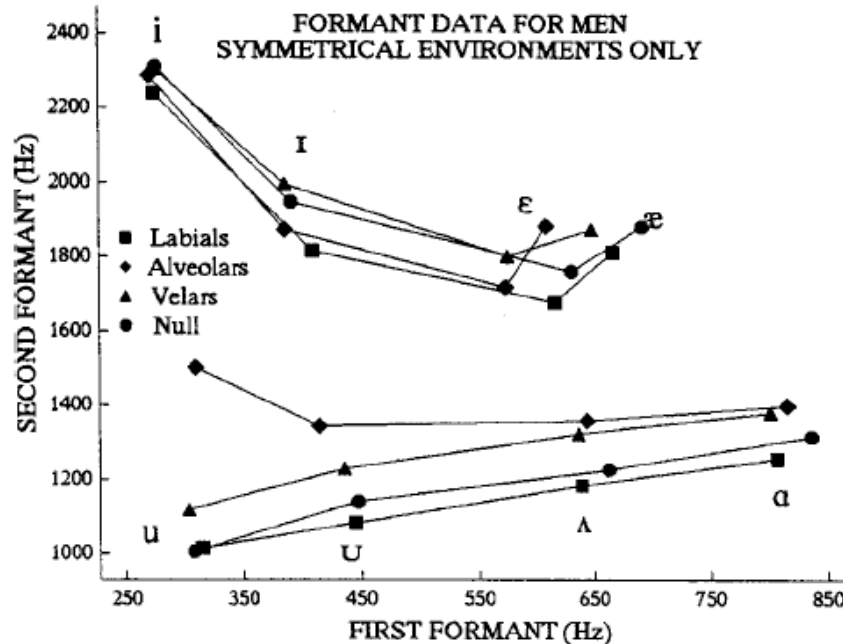'booed'

Coarticulation

- Assimilation to surrounding context.

Hillenbrand, Clark & Nearey 2001

- These coarticulatory effects tend be stronger where vowel duration is shorter, due to lower stress or increased speech rate (e.g. Lindblom 1963).

Coarticulation and speech rate

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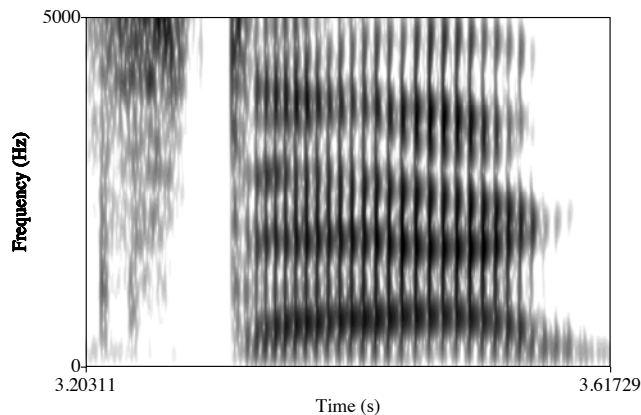
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Coarticulation

- Sound change can operate at the level of these more subtle contextual effects.
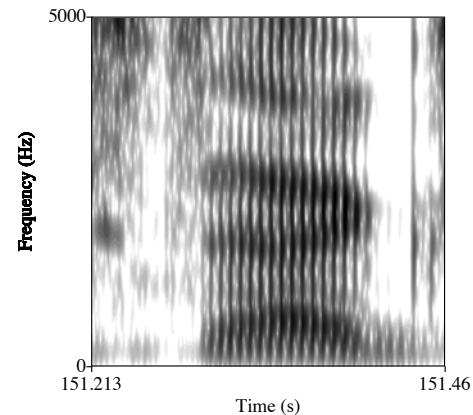
- E.g. diphthongization of the TRAP vowel (/æ/) in the Northern Cities applies in all contexts

- But the change has developed further in some contexts than in others (Labov 1981).

  - Advanced before nasals.

  - Slightly less advanced before voiceless fricatives.

  - Much less advanced preceding velar stops.

Figure 2.

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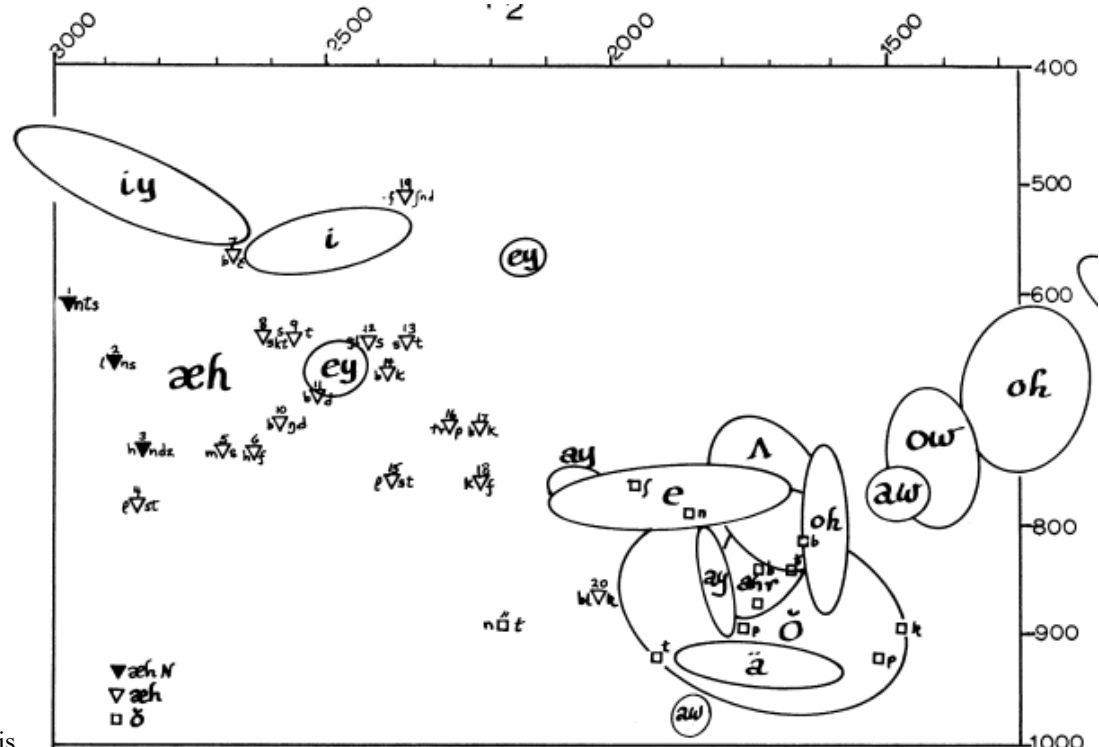
Speech style

- Speakers can speak more carefully or more casually
  - Assimilatory effects may be reduced in careful speech.
- Grammars include optional processes – e.g. final t/d deletion.
  - 'last' [læst]/[læs], 'find' [faɪnd]/[faɪn], etc
  - varying degrees of /æ/-tensing in N. Cities.
  - Sound change can introduce new pronunciations without necessarily eliminating old ones.
- One pronunciation may be regarded as more proper, or more appropriate for formal contexts
  - So pronunciation can vary as a function of context in this broad sense.

Units in sound change

- Speakers don't have one pronunciation for a phoneme.
- They have phonological and phonetic grammars that specify the realization of a phoneme according to many aspects of context (segmental, prosodic, rate, speech situation etc)
- So what changes in a regular sound change?

An exemplar-based model of sound change

An alternative conception of sound change:

- The pronunciation of a word is represented in the mental lexicon by a set of phonetically-detailed exemplars that the speaker has heard.

- Speaker's productions are based on these exemplars (e.g. a weighted average, or selection of a representative exemplar).

- Speakers sometimes innovate slight changes in the pronunciation of a word, due to phonetic factors (to be elucidated).

- When listeners hear a new pronunciation of a word, they add it to their store of exemplars where it can affect future productions of that word.

- What is the problem with this model?

Labov (1981)

- Labov (1981) proposes to test the Regularity Hypothesis against the lexical diffusion hypothesis by examining sound change in progress.

  - Can we observe words changing individually, or do all applicable words undergo change together?

  - Or do we see both patterns?

- Contextual and stylistic variability in pronunciation of phonemes complicates the process of testing for word-specific sound change:

  - We expect to see variation in pronunciation of 'the same' sound as a function of segmental context, prosodic context, etc.

  - Maybe even word frequency – low frequency words may be produced more carefully and/or associated with more formal contexts.

- Have to control for all of these factors to determine if a difference in pronunciation between words is due to word-specific change (or word-specific failure to change).

Are Homonyms Split?

- Labov (1981) uses homonyms and regression analysis to try to control for these factors.
  - Why does Labov turn to homonyms?
- Case study: GOOSE '/uw/' and GOAT '/ow/' fronting in Philadelphia.
  - The nuclei of /u/ and /oʊ/ are fronting (and/or unrounding in the case of /oʊ/ > /əʊ/) in open syllables.
    - Change in progress.
- Examine the effects of these changes on homonyms *two, too* and *know, no* (plus near-homonyms) based on a relatively large amount of data on one speaker, Carol Meyers.
  - Recorded over one day in a variety of contexts: at work, at a bridge game, during dinner at home.

Are Homonyms Split?

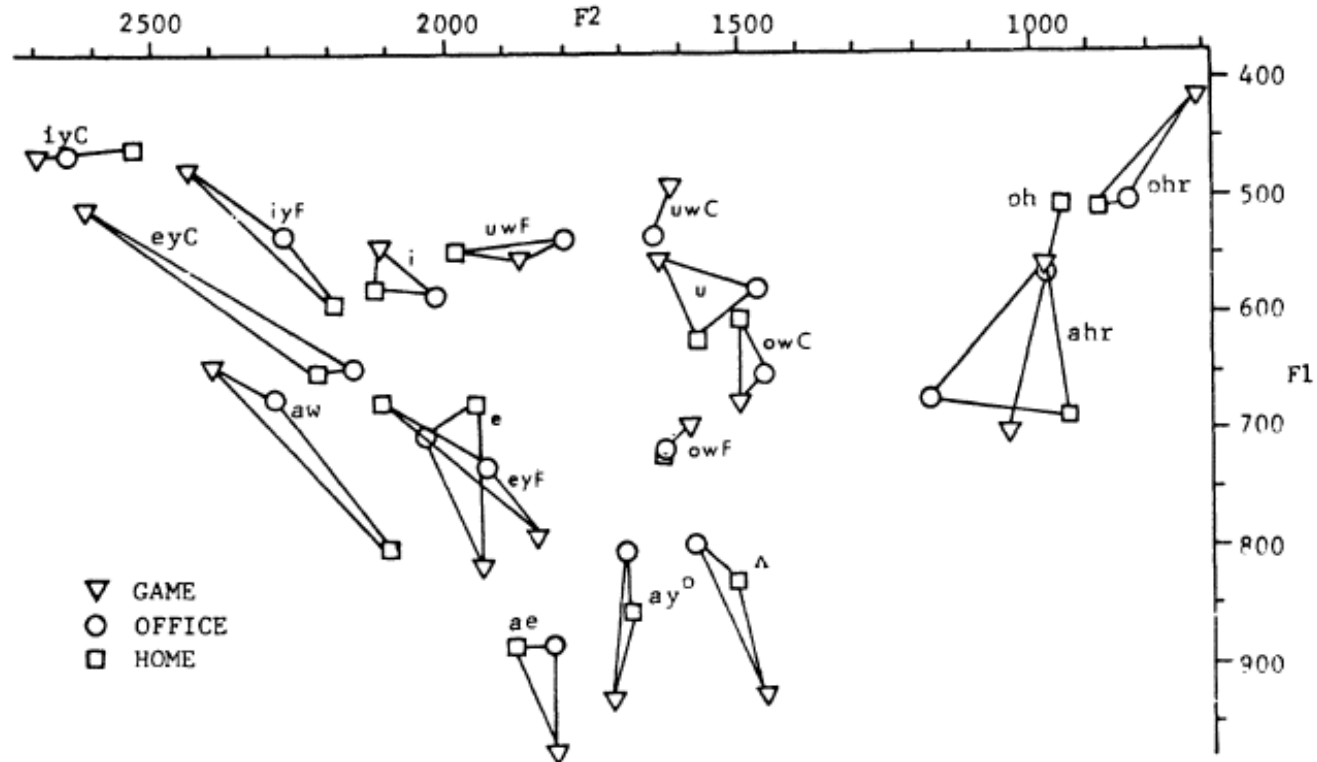- Measured fronting (/unrounding) in terms of F2 during the nucleus of the diphthongs

FIGURE 3.

Are Homonyms Split?

- Differences among means for homophones

		N	**F2 (mean)**
(uwF)	*two*	40	1743
	too	14	1682
	do	19	1743
	to	5	1842
	through	3	1879
(owF)	*know*	50	1574
	go	38	1548
	no	32	1573
	oh	16	1587
	okay	27	1554
	so	15	1585
	goes	6	1591
	though	5	1791
	show	4	1461
	lower	3	1509

(Table by MIT OCW, based on data from Labov 1981)

Regression model

- Model the F2 measurements in terms of a linear model

$$F2_V = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots$$

  – Where the x's specify properties of the vowels: duration, stress, setting in which they were spoken, etc.
    - Intended to control for systematic influences of context on the pronunciation of vowels.
    - Assumes these effects are linear and independent.
  – Include word identity as independent variable (*two* vs. *too*) to test for differences between words that cannot be accounted for by differences in context.

Regression model

	Coefficient	t
(uwF)		
Prosodic factors		
Fundamental frequency	---	
Duration [x 100 msec]	91	2.3[a]
Secondary stress	-96	2.0[a]
Word-final position	85	1.6
Social setting		
Office vs. game	-86	1.9[a]
Home vs. game	116	1.8
Lexical items		
two vs. *too*	---	
do vs. *too*	103	2.5
(owF)		
Prosodic factors		
Fundamental frequency	---	
Duration [x 100 msec]	---	
Secondary stress	-72	2.3[a]
Phrase-final position	-69	1.9
Social setting		
Office vs. game	47	1.5
Home vs. game	-74	1.9
Lexical item		
know vs. *no*		
go vs. *no*	---	
	-165	4.4[b]

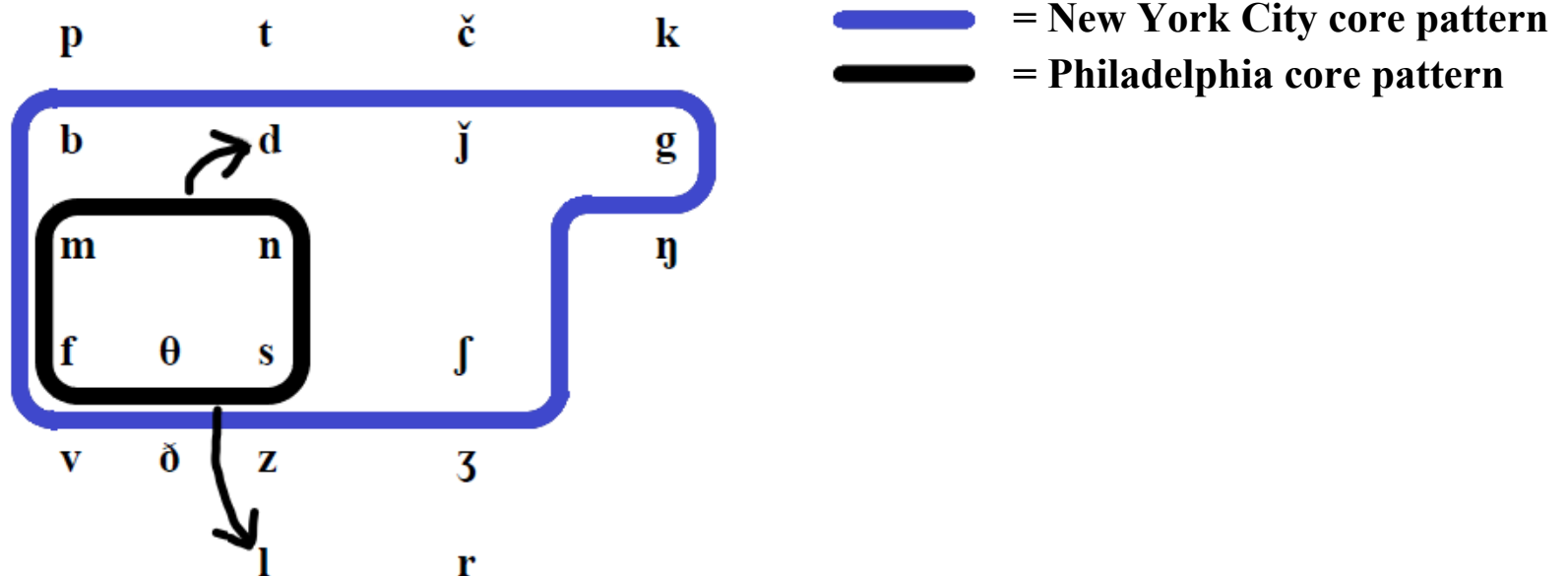- Labov's conclusion: No evidence for word-specific change here.

[a] $p < .05.$ [b] $p < .001.$

(Table by MIT OCW, based on data from Labov 1981.)

Lexical diffusion of æ-tensing in Philadelphia

- Dialects in the mid-Atlantic states have low front [æ] and 'tensed' [eæ].

- In general [eæ] is reported to occur only in syllables closed by the following consonants:

= New York City core pattern
= Philadelphia core pattern

(Diagram by MIT OCW, based on data from Labov 1981)

PhillyTawk: Overview of Mid-Atlantic English, Part 3

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Lexical diffusion of æ-tensing in Philadelphia

- But there is grammatical conditioning, e.g. no tense /æ/ in function words whose vowel can be reduced to [ə], e.g. *can* [kʰən, kʰæn], *[kʰeæn] (= the noun *can*).

- And there are lexical exceptions: *mad, bad, glad* have tensed vowels.

- In an ongoing development, some speakers have tensed [eæ] in some open syllables, preceding a nasal, e.g. *planet, damage, manage*.

- But tensing does not apply equally to all words containing this context – *planet* seems to lead (data from 1973, follow up in 1990: *planet* 95%, *camera* 0%)

  – lexical diffusion

-NV	N	% tense
planet	62	68
damage	31	35
manage	31	32
flannel	31	23
camera	31	19
family	31	19

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(Table by MIT OCW based on data from Labov 1981.)

What are the units of sound change

- Labov concludes that both regular sound change and change by lexical diffusion are possible.

- The two kinds of change are hypothesized to differ in other respects
  - Change by lexical diffusion involves phonetically abrupt shift from one phoneme to another.
  - Labov argues that /æ/, /eæ/ are distinct phonemes in Philadelphia English
    - *mad, bad, glad* vs. *sad, dad*
    - 'learned' words like *alas, wrath, Gath, adze* vary from speaker to speaker (Labov 1994:432)

- Differ in the possibility for grammatical conditioning?

- Implications for theories of sound change?