24.914

Geographical variation in the phonetics and phonology of English - Transcription

Readings and assignments

- Reading: Labov et al (1997) ‘A National Map of the Regional Dialects of American English’
- Assignment: Phonetic transcription exercise, due session 4

Geographical variation

- Languages are spoken differently in different geographical areas.
- Some examples

- We will survey variation in phonetics and phonology across dialects of English in the USA (and the UK).
- We will then explore explanations for properties of the observed patterns of variation based on theories about how sound change operates.
- First we need ways to describe and analyze the varieties that we find.
  - ➢ Phonetic transcription
  - ➢ Phonological analysis

Phonetic transcription

- A phonetic transcription system provides a useful means of recording speech.
- We will be using the International Phonetic Alphabet (IPA)
  - ‘The IPA is intended to be a set of symbols for representing all the possible sounds of the world’s languages.’ IPA (1990)
  - ‘There should be a separate letter for each distinctive sound’ *Aims and Principles* (1949)

Describing speech sounds

- In phonetic transcription and in phonological analysis, speech sounds are commonly described in terms of the way in which they are produced.
- Later we will see how to characterize some sounds in terms of measured acoustic properties.

Speech production system

- The speech production system comprises the lungs and the vocal tract.

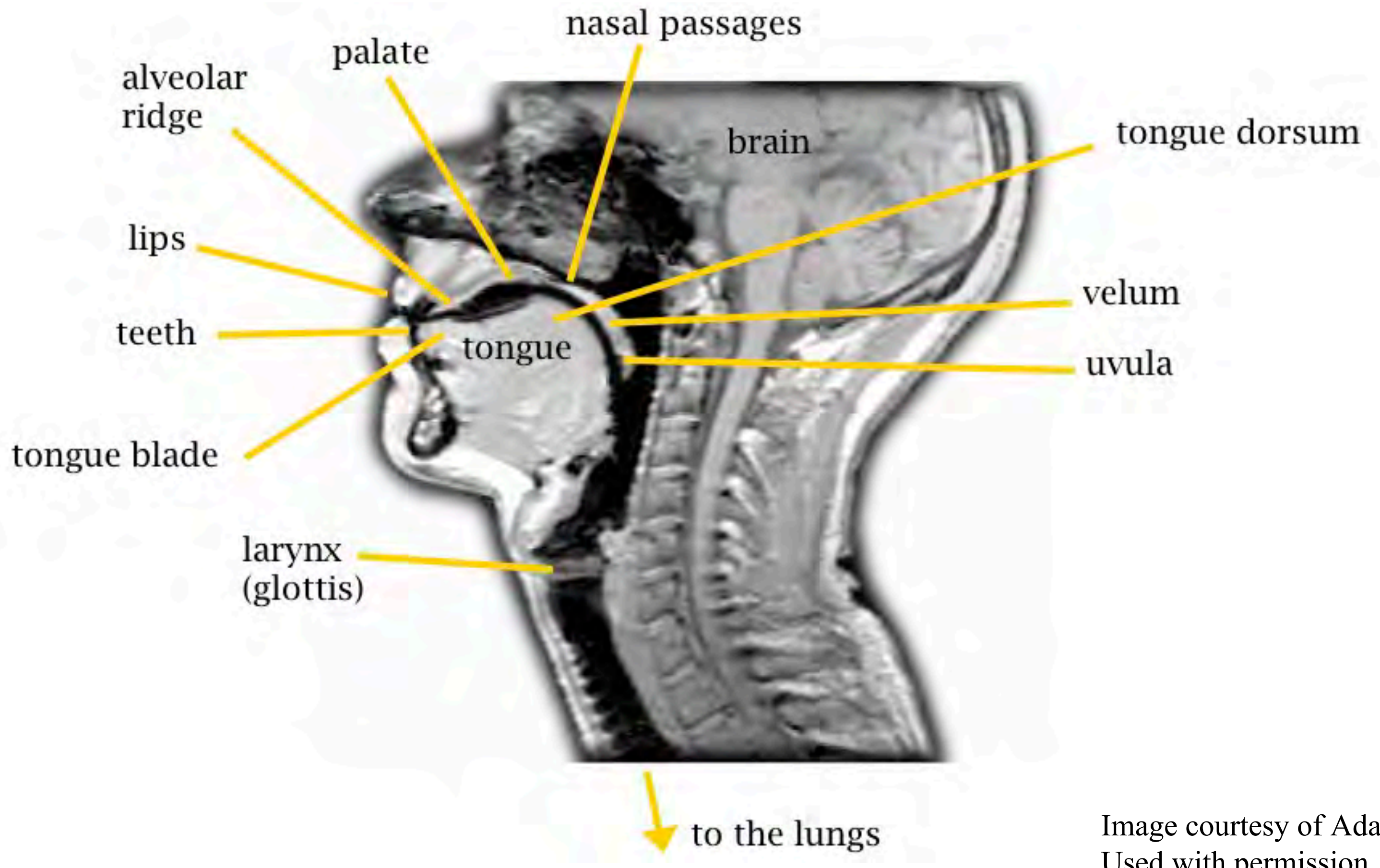
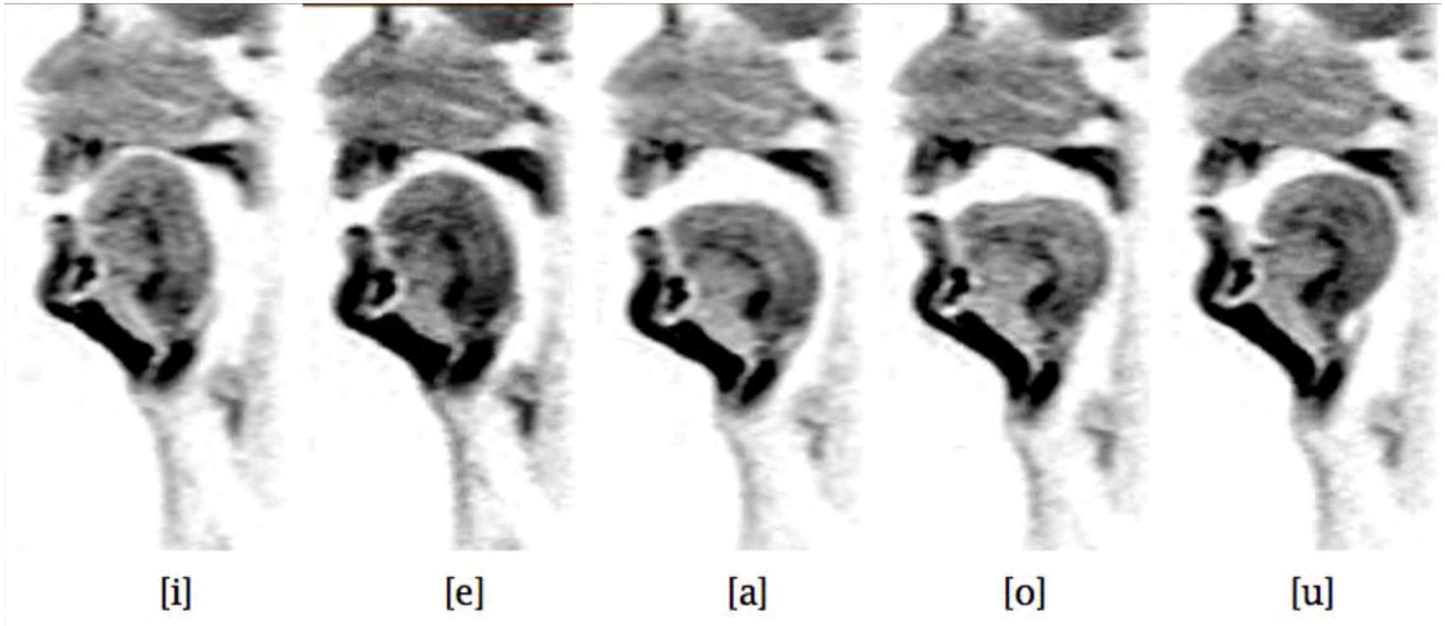


Image courtesy of Adam Albright. Used with permission.

Vowels

- Vowel sounds are usually voiced.
- They are all produced without any very narrow constriction of the vocal tract (not narrow enough to generate turbulent air flow).
- Vowel qualities are differentiated by the shape of the vocal tract, resulting from different positions of tongue and lips.




i
u
e
o
a

Describing vowels

Four parameters:

- Height (high-mid-low)
- Backness (front-central-back)

Position of the tongue body

- Lip rounding (rounded-unrounded)
- Tense-lax

- We will see that judgments of height and backness generally reflect acoustic properties of vowels more directly than tongue body position

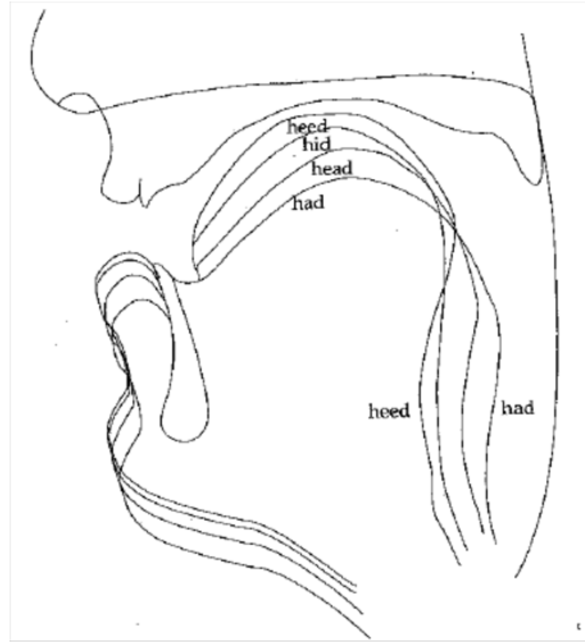
Vowel height

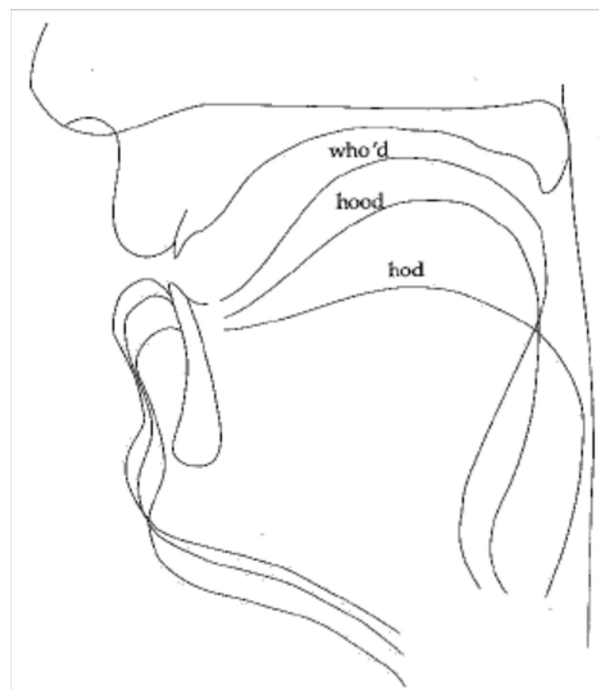
[i] *heed* high

[ɪ] *hid* high (lax)

[ɛ] *head* mid

[æ] *had* low





[u] *who'd* high

[ʊ] *hood* high (lax)

[ɑ] *hod* low or *odd*

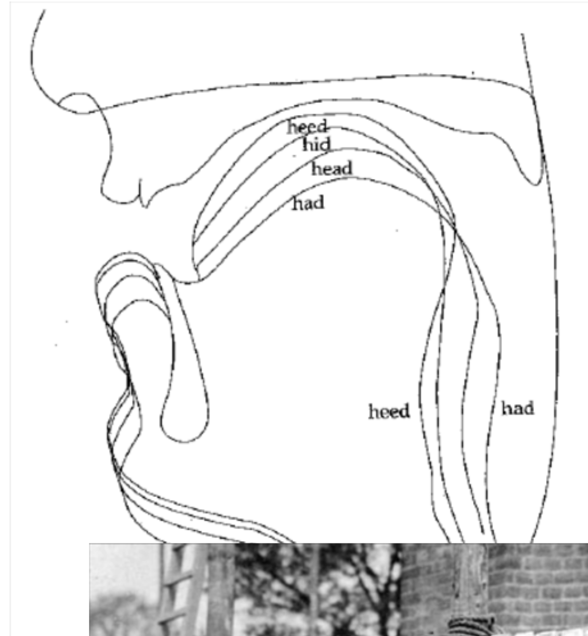
Vowel height

[i] *heed* high

[ɪ] *hid* high (lax)

[ɛ] *head* mid

[æ] *had* low



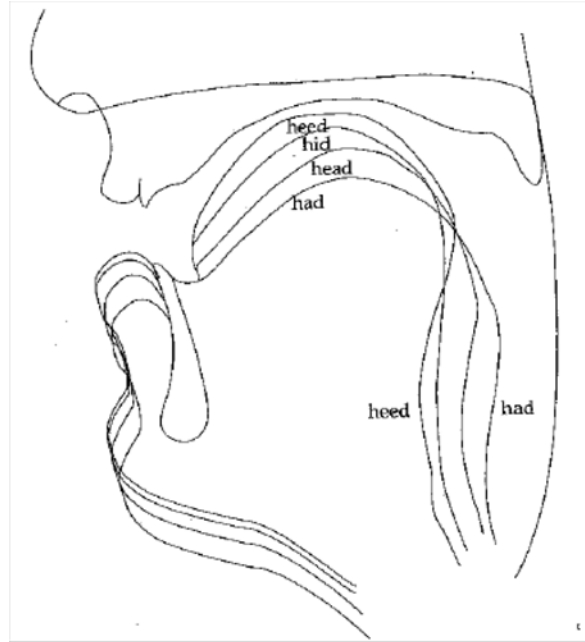
[u] *who'd* high

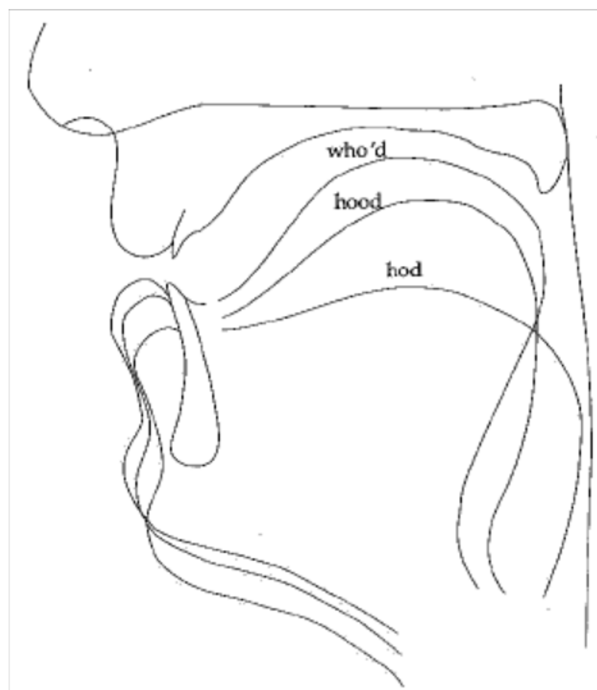
[ʊ] *hood* high (lax)

[ɑ] *hod* low or *odd*

Vowel rounding

[i]	*heed*	unrounded
[ɪ]	*hid*	
[ɛ]	*head*	
[æ]	*had*	
[ʌ]	*hut*	
[u]	*who'd*	rounded
[ʊ]	*hood*	
[ɑ]	*hod/ odd*	unrounded





American English vowels

- Some American English vowels

rounded

		Front	Central	Back
High	tense	i		u
	lax	ɪ		ʊ
Mid	higher	eɪ		oʊ
	lower	ɛ	ʌ	ɔ
Low		æ		ɑ

[i]	heat
[ɪ]	hit
[u]	hoot
[ʊ]	hood
[eɪ]	hate
[ɛ]	head
[ʌ]	hut
[oʊ]	hoe
[ɔ]	ought
[æ]	hat
[ɑ]	odd

Diphthongs:

[aɪ] ‘eye’, [aʊ] ‘how’, [ɔɪ] ‘boy’

Unstressed: [ə] ‘attack’

Diphthongs

- Diphthongs are vowels that change quality during the duration of the vowel.
- Transcribed with vowel symbols indicating starting and ending qualities, e.g. [aɪ] *hide.*
  - Some sources use glides to transcribe the offsets of English diphthongs [aj] ([aɪ]), [ej] ([eɪ]), [ow] ([oʊ])
  - [j] is similar to [i] and [w] is similar to [u]
- In the vowels [eɪ] (*rate*) [oʊ] (*wrote*), the nuclei are mid [e, o], while the offglides are high.
- The monophthongs [e, o] are found in many languages (e.g. Spanish, Italian, Scottish English, Minnesota Eng.).

Tense vs. Lax Vowels

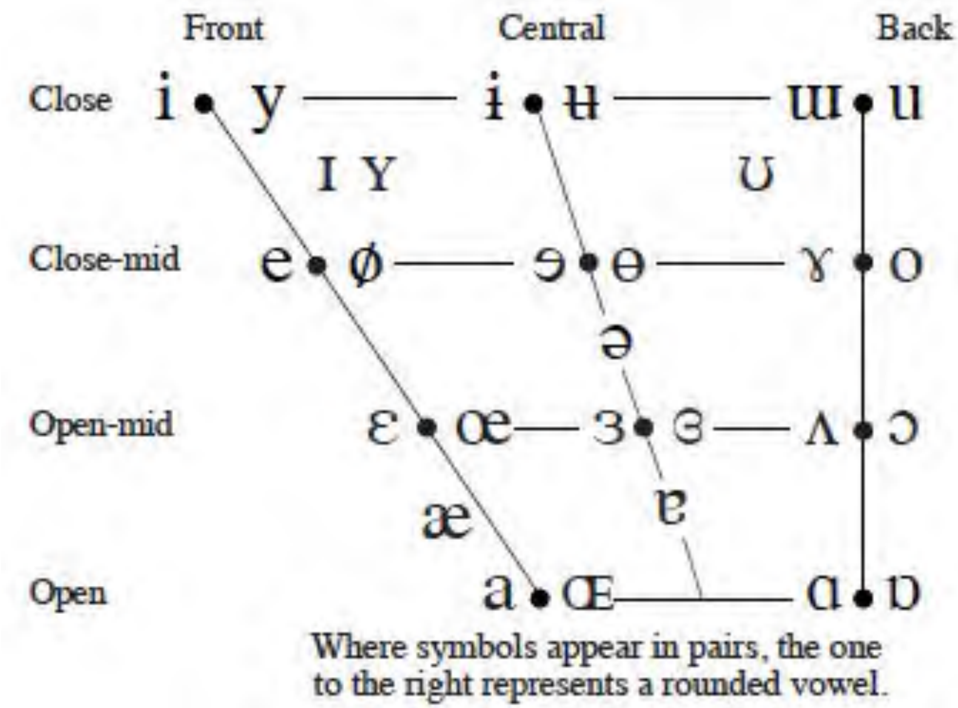
- Tense and lax vowels in English are distinguished more on phonological rather than phonetic grounds.
- Lax vowels cannot occur at the end of a word while tense vowels can.
  - [si] *see*, [seɪ] *say*, [su] *Sue*, [soʊ] *so*, [sɑ] *saw*
  - *[sɪ], *[sɛ], *[sʊ], *[sæ]
  - By this criterion [ɔ] is not lax since it can occur at the end of words: [sɔ] *saw*. But many feature systems analyze [oʊ]/[ɔ] as a tense-lax pair.
- Phonetically, tense vowels are longer than most of the lax vowels, and in tense-lax pairs like [i-ɪ], [u-ʊ], [eɪ-ɛ] the tense vowel is higher and more peripheral on the front-back dimension.
- [e, o] are higher (or close) mid and [ɛ, ɔ] are lower (or open) mid.

Schwa [ə]

- [ə] is usually said to be a mid central unrounded vowel, but that's not really how this symbols is used in the transcription of English.
- It is mainly used to transcribe short, unstressed vowels of contextually variable quality
  - *about* [əbawt], *pretend* [pɹətɛnd], *panda* [pændə]
- [ʌ] is a lax mid central unrounded vowel
  - *but* [bʌt], *sun* [sʌn]
- The vowel at the end of words like *panda* and *comma* can be similar to [ʌ], although conventionally transcribed with [ə], but in most other contexts [ə] is not only shorter than [ʌ], but often much higher.
  - *abut* [əbʌt]

More vowels

- The IPA distinguishes the following vowel symbols:



Notes:

- Close = high, Open = low
- The IPA says [a] is a low front vowel – we will call it central
- [ʌ] is officially a back vowel, but in transcription of English, it is conventionally used to transcribe a lower-mid central vowel (*hut*, *bud*)

More vowels

- In English, only back vowels are rounded [u, ʊ, oʊ, ɔ].
- It is common across languages for front vowels to be unrounded and for non-low back vowels to be rounded.
  - E.g. Spanish

i		u
e		o
	a	

- But some languages have front rounded vowels as well
  - High front rounded [y], e.g. French *une* [yn]
  - Mid front rounded [ø], e.g. French *bleu* [blø]
- Non-low back unrounded vowels occur as well, e.g. the ‘u’ of Tokyo Japanese is high back unrounded [ɯ]

Geographical distribution of the *cot-caught* merger.

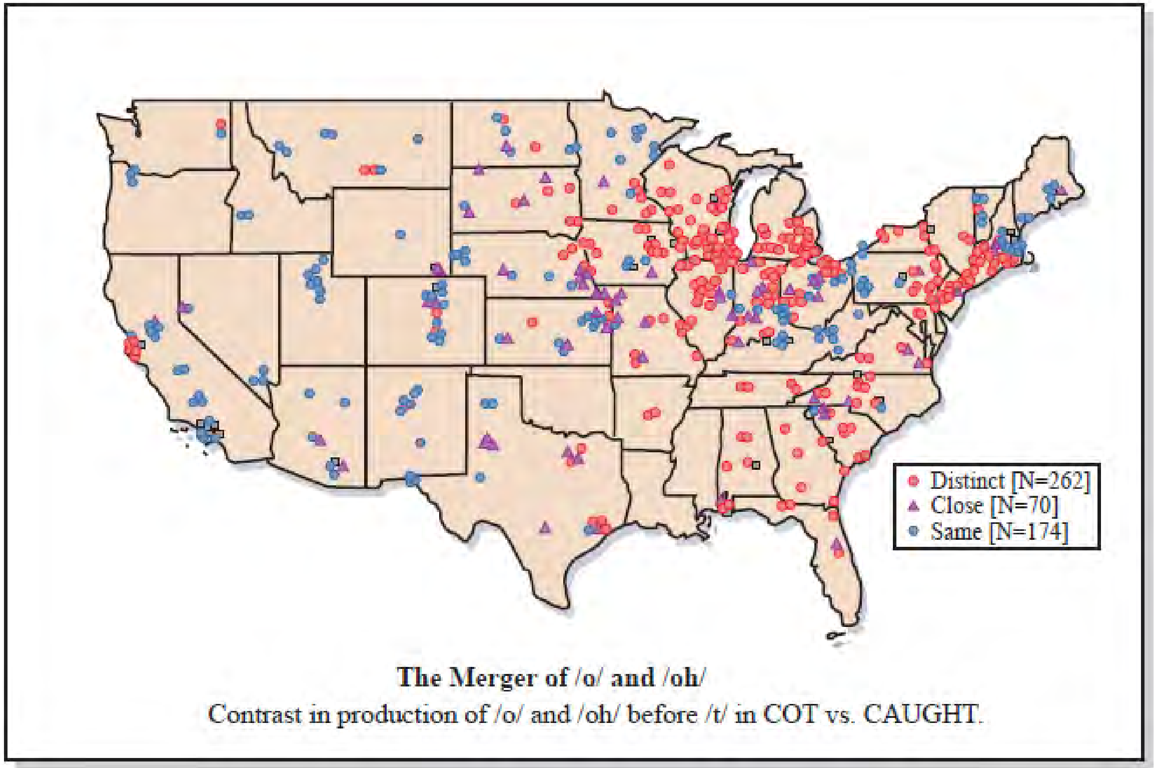


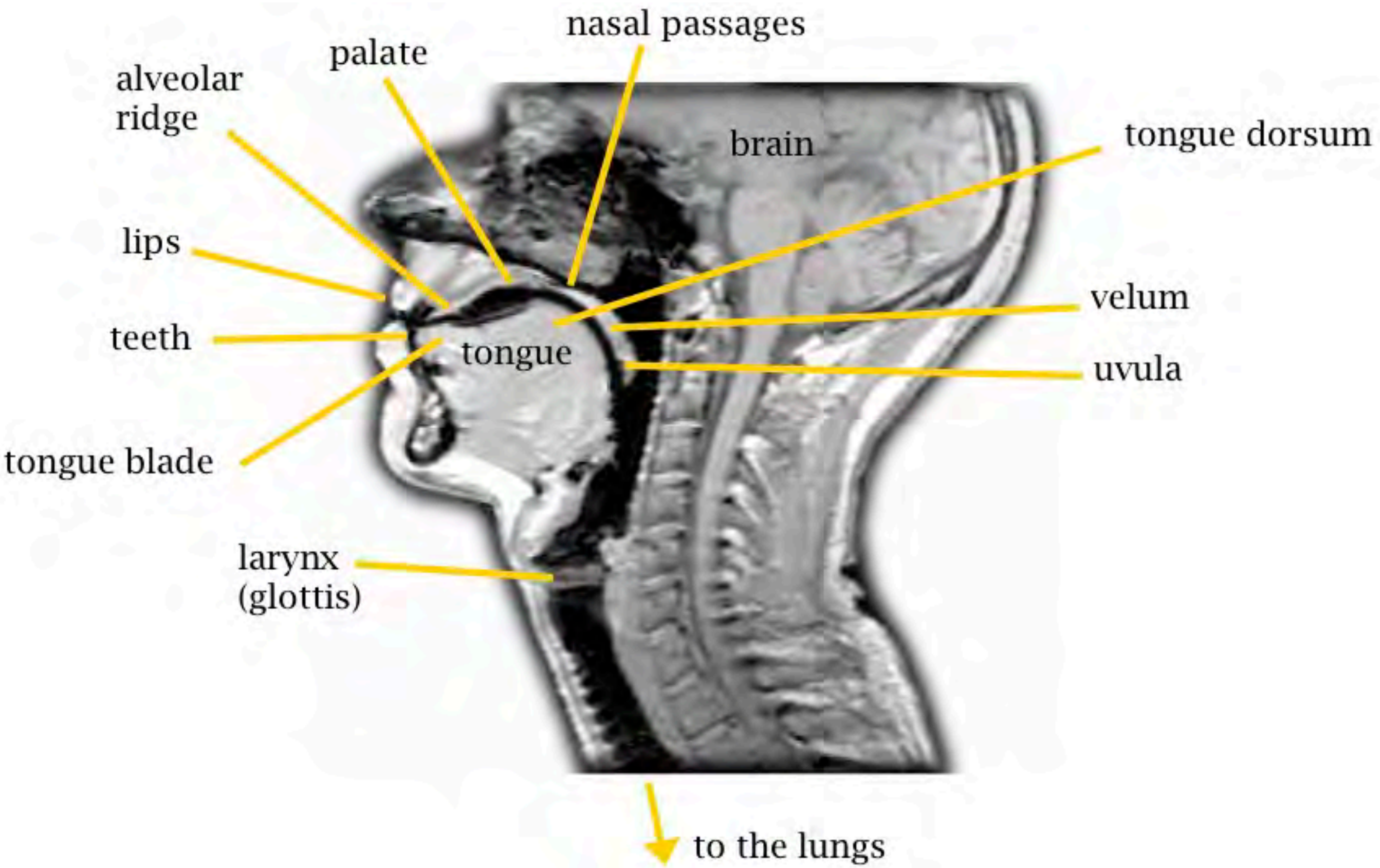
Figure by MIT OpenCourseWare. Adapted from the Linguistics Laboratory of the University of Pennsylvania.

Consonants

- Consonants differ from vowels in that they are produced with narrower constrictions of the vocal tract.
- Parameters for describing consonants:
  - Voicing: voiced or voiceless
  - Place of articulation: where the constriction is formed, and with what articulator.
  - Manner of articulation: how narrow the constriction is.
  - Oral/Nasal: whether the velum is lowered.
  - Lateral(/Central)

Place of articulation

- Specified in terms of the articulator that forms the consonant constriction and the location of the constriction.



English consonants

	bilabial	labio-dental	dental	alveolar	alveo-palatal	palatal	velar	glottal
stop	p b			t d			k g	
nasal	m			n			ŋ	
fricative		f v	t̪ d̪	s z	ʃ ʒ			h
affricate					tʃ dʒ			
liquid - lateral				ɹ l				
glide	w					j		

- It’s not clear where to put [ɹ] and [w] on the chart since [w] has two constrictions (labial and velar), and [ɹ] has various pronunciations.

More consonants

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k ɡ	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

- [ɾ] tap (a.k.a flap) – *butter*, *metal*, *medal*
- [ʔ] glottal stop

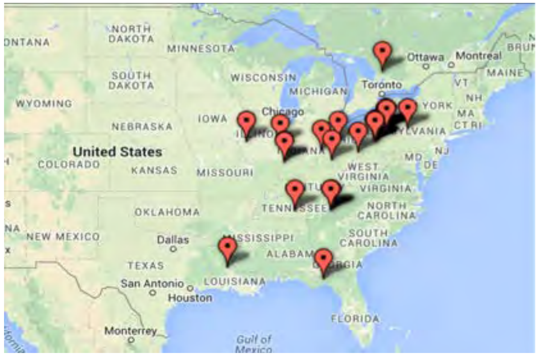
Geographical variation in English

- English is spoken differently in different parts of the USA, UK, etc.
- We will survey variation in phonetics and phonology across dialects of English in the USA (and the UK).
- We will then explore explanations for properties of the observed patterns of variation based on theories about how sound change operates.

Geographical variation in English

- We can observe geographical variation in all aspects of languages, but for now we are focusing on phonetics and phonology.
  - Accent variation
- Cf. Lexical variation

- Syntactic variation, e.g. ‘The car needs repaired’, ‘The house needs painted’



Geographical variation in English

- Dialects of English can differ in all aspects of phonetics and phonology
  - Contrastive sounds (‘phonemes’)
    - How many
    - Basic phonetic realization
  - Allophonic variation in the realization of these sounds.
    - Including phonetic details such as patterns of coarticulation.
  - Restrictions on the distribution of contrasts
    - E.g. positional neutralization of contrasts

Variation in inventory of vowel contrasts

- Accents of English differ in the number of contrasting low/lower-mid back vowels.
- Most British accents contrasts three lower back vowels, e.g. Standard Southern British English (a.k.a. Received Pronunciation) /ɑ, ɔ, ɒ/

  f.[k^hɑt] ‘cart’, [k^hɔt] ‘caught’, [k^hɒt] ‘cot’

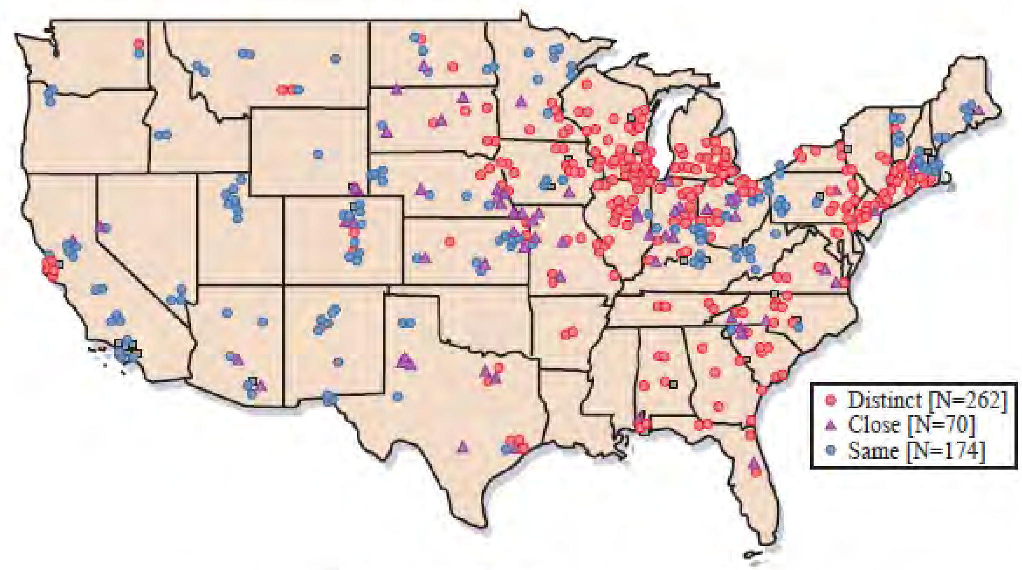
  g.[dɑn] ‘darn’, [dɔn] ‘dawn’, [dɒn] ‘Don’
- Some N. American accents contrast two lower back vowels, e.g. Inland North (Detroit, Chicago etc).
  - [k^hɑt]/[k^hat] ‘cot’, [k^hɔt] ‘caught’
  - [dɑn]/[dan] ‘Don’, [dɔn] ‘dawn’
- Buffalo Chicago Kenosha
  - Also a difference in the phonetic realization [ɑ] vs. [a]

Variation in inventory of vowel contrasts

- Others have only one lower back vowel, e.g. the West.
  - [kʰɑt] 'cot, caught', [dɑn] 'Don, dawn'
  - Los Angeles 'awful'
  - Los Angeles 'thought'

www.dialectsarchive.com/california-1

www.dialectsarchive.com/california-4



The Merger of /o/ and /oh/

Contrast in production of /o/ and /oh/ before /t/ in COT vs. CAUGHT.

Image by MIT OCW. Adapted from the Linguistics Laboratory of the University of Pennsylvania.

Variation in inventory of vowel contrasts

- What are the differences between the grammars of these varieties of English?

Quick review of phonology:

- Phonological grammars map all logically possible input representations onto well-formed output representations.
  - Accounts for phonotactic restrictions
    - e.g. if phonology always maps /ɒ/→ [ɑ] (and doesn't map any other sound onto [ɒ]), then words containing [ɒ] are ill-formed.
  - Accounts for alternations – the same morpheme can be mapped onto different pronunciations in different contexts.
    - E.g. /bɛt/ → [bɛt], /bɛt-ɪŋ/ → [bɛɾɪŋ]
- The mapping from input to output is specified by a ranked set of constraints (Optimality Theory)

Variation in inventory of vowel contrasts

- The mapping from input to output is specified by a ranked set of constraints (Optimality Theory)
- The output for a given input is the representation that best satisfies the set of constraints.
- There are two basic types of constraints:
  - Markedness constraints – penalize dispreferred output configurations
    - E.g. *[+low, +round] (violated by [ɒ])
  - Correspondence constraints (a.k.a. faithfulness constraints) – require the output to be similar to the input (ideally identical).
    - E.g. IDENT(round) – corresponding input and output segments must have the same [round] specifications.

Variation in inventory of vowel contrasts

- Conflict between constraints is resolved by reference to the constraint ranking: the higher-ranked constraint prevails.
  - E.g. *[+low, +round] >> IDENT(round)

	/kʰɒt/	*[+low,+round]	IDENT(round)
a.	kʰɒt	*!	
b.	☞ kʰɑt		*

	/kʰɑt/	*[+low,+round]	IDENT(round)
a.	kʰɒt	*!	
b.	☞ kʰɑt		

  - No contrast between [ɒ] and [ɑ]
  - in general only [ɑ] occurs.

Variation in inventory of vowel contrasts

- In general, a feature is contrastive in a context if faithfulness to that feature outranks all markedness constraints against a value of that feature occurring in that context.
- E.g. rounding contrast among low vowels [ɑ, ɒ], as in RP English:

IDENT(round) >> *[+low, +round]

	/kʰɒt/	IDENT(round)	*[+low,+round]
a.	☞ kʰɒt		*
b.	kʰɑt	*!	

	/kʰɑt/	IDENT(round)	*[+low,+round]
a.	kʰɒt	*!	*
b.	☞ kʰɑt		

- No contrast between [ɒ] and [ɑ], only [ɑ] occurs:

*[+low, +round] >> IDENT(round)

Variation in inventory of vowel contrasts

- Identifying the constraints that regulate vowel inventories is an interesting (and hard) problem (e.g. Flemming 2004).
- For now, we will adopt simplistic markedness constraints:
  - *[+low, +round] – *ɒ, ɶ
  - *[-high, -tense, +round] – *ɔ, ɒ
    - Note we are using [tense] to distinguish [o] from [ɔ] in spite of the conflict with the use of [-tense] to group the vowels that cannot occur word-finally in English.
- Constraint rankings for RP, Inland North and West?

Variation in the phonetic realization of equivalent vowels

- [ɑ] vs. [a] in words like *cot*, *Don*, *hot*, *lot*, *father*
- [u] vs. [ʉ] – e.g. Detroit AAVE vs. S. California
- [oʊ] vs. [əʊ] – e.g. Detroit AAVE vs. SSBrE
  - /oʊ/ ‘fronting’ is also a characteristic of the Philadelphia, Baltimore and some Southern accents.

- Phonological analysis?

Variation in the distribution of contrasts

- In many Southern and African-American Vernacular English (AAVE) accents, the contrast between /ɪ/ and /ɛ/ is neutralized to [ɪ] before nasals.
  - ‘pin-pen merger’

pit	pʰɪt	*pin*	pʰɪn	*him*	hɪm
pet	pʰɛt	*pen*	pʰɪn	*hem*	hɪm
Rick	ɹɪk	*many*	ˈmɪni	*length*	lɪŋkθ
wreck	ɹɛk	*mini*	ˈmɪni		

Pin-pen merger

- Geographical distribution of the *pin-pen* merger

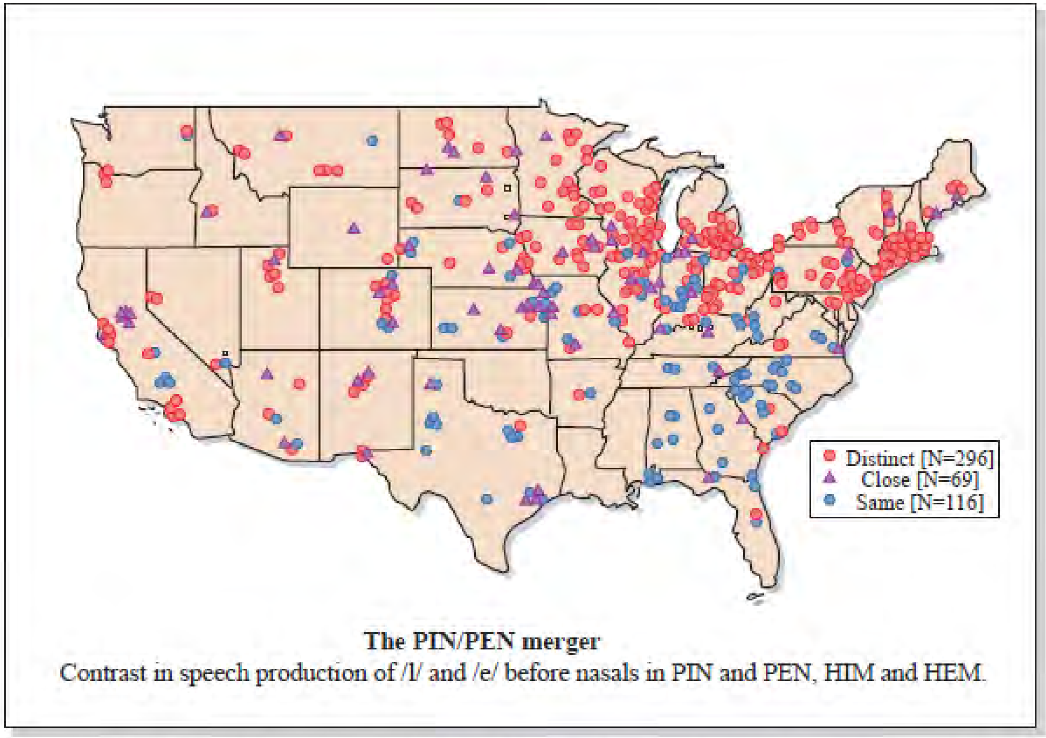


Figure by MIT OpenCourseWare. Adapted from the Linguistics Laboratory of the University of Pennsylvania.

Pin-pen merger

General recipe for phonological analysis of contextual neutralization:

- Context-sensitive markedness >> 'Faith' >> Context-free markedness
- A simplistic analysis of the *pin-pen* merger:
  - *ɛ[+nasal] >> IDENT(high) >> *ɛ
  - Contrast between [ɪ, ɛ] before non-nasals:

	/pʰɪt/	*ɛ[+nasal]	IDENT(high)	*ɛ
a.	☞ pʰɪt			
b.	pʰɛt		*!	*

	/pʰɛt/	*ɛ[+nasal]	IDENT(high)	*ɛ
a.	pʰɪt		*!	
b.	☞ pʰɛt			*

Pin-pen merger

- A simplistic analysis of the *pin-pen* merger:
  - *ɛ[+nasal] >> IDENT(high) >> *ɛ
  - Neutralization of [ɪ, ɛ] before nasals:

	/pʰɪn/	*ɛ[+nasal]	IDENT(high)	*ɛ
a.	☞ pʰɪn		*	
b.	pʰɛn	*!		*

	/pʰɛn/	*ɛ[+nasal]	IDENT(high)	*ɛ
a.	☞ pʰɪn			
b.	pʰɛn	*!	*	*

Patterns of distribution

- So far we have considered three patterns of distribution of a pair of sounds (or two sets of sounds):
  1. Contrast in all (relevant) contexts
     - e.g. RP [ɑ] vs. [ɒ]
  2. Positional neutralization – the sounds contrast in some contexts, but only one appears in other contexts.
     - e.g. *pin-pen* neutralization
  3. No contrast in any context – only one sound appears.
     - e.g. US [ɑ], *[ɒ]
- There is a variant of (3): No contrast, allophonic variation
  - One sounds appears in one context, the other appears elsewhere.
  - E.g. nasalized vowels before nasals, oral vowels elsewhere

Allophonic variation

- Allophonic variation can be derived from the following ranking schema:
- Context-sensitive markedness >> Context-free markedness >> ‘Faith’
- *ORALV-N >> *NASALV >> IDENT(nasal)
  - Only nasalized vowels preceding a nasal consonant

	/p^hεn/	*ORALV-N	*NASALV	IDENT(nasal)
a.	p^hεn	*!		
b.	☞ p^hε̃n		*	*

	/p^hε̃n/	*ORALV-N	*NASALV	IDENT(nasal)
a.	p^hεn	*!		*
b.	☞ p^hε̃n		*	

Allophonic variation

- Allophonic variation can be derived from the following ranking schema:
- Context-sensitive markedness >> Context-free markedness >> ‘Faith’
- *ORALV-N >> *NASALV >> IDENT(nasal)
  - Only oral vowels elsewhere

	/p^hɛt/	*ORALV-N	*NASALV	IDENT(nasal)
a.	☞ p^hɛt			
b.	p^hɛ̃t		*!	*

	/p^hɛ̃t/	*ORALV-N	*NASALV	IDENT(nasal)
a.	☞ p^hɛt			*
b.	p^hɛ̃t		*!	

Patterns of distribution

- These four patterns of distribution follow can all be derived from the possible rankings of three types of constraints:
- IDENT(F) >> MC-SENSITIVE >> MC-FREE — Contrast in all contexts
- IDENT(F) >> MC-FREE >> MC-SENSITIVE
- MC-FREE >> IDENT(F) >> MC-SENSITIVE — No contrast - only one sound appears
- MC-FREE >> MC-SENSITIVE >> IDENT(F)
- MC-SENSITIVE >> MC-FREE >> IDENT(F) — No contrast, allophonic variation
- MC-SENSITIVE >> IDENT(F) >> MC-FREE — Contextual neutralization