fənɑlədʒi

- How languages deploy sounds to create meaningful units.
- How these sounds vary depending on their environment.
- How the sound inventories of languages are structured.
- How linguists theorize the above.

[ðəskɛdʒuəl]

- Today:
  - The phoneme
  - Phonetic conditioning
  - How to do phonemic analysis
- Wednesday:
  - Maybe more phonemic analysis
  - Phonological rules
- Friday:
  - Distinctive features
  - Phonological systems

How do languages use sounds?

While the human vocal tract offers us an infinite variety of sounds, each language makes use of a small number of **distinctions**.

It isn't the sound quality itself that does the work in language, but the set of **oppositions** among sounds.

If two phones (speech sounds) can make a difference in meaning, they are separate **phonemes**.

These distinctions are not random, but form a structured **inventory**.

Minimal Pairs: English voiceless obstruents

[pɪn]
[tɪn]
[kɪn]
[fɪn]
[θɪn]
[sɪn]
[ʃɪn]
[tʃɪn]
[hɪnt]

Voicing

[pɪn]	[bɪn]
[tɪn]	[dɪn]
[kɪn]	
[fɪn]	
[ɵɪn]	
[sɪn]	[zɪn]
[ʃɪn]	
[tʃɪn]	[dʒɪn]
[hɪnt]	

Voicing

[pɪn]	[bɪn]
[tɪn]	[dɪn]
[kɪn]	[kʌt] [gʌt]
[fɪn]	[fæn] [væn]
[ɵɪn]	[ɵaj] [ðaj]
[sɪn]	[zɪn]
[ʃɪn]	[fɪʃn̩] [vɪʒn̩]
[tʃɪn]	[dʒɪn]
[hɪnt]	

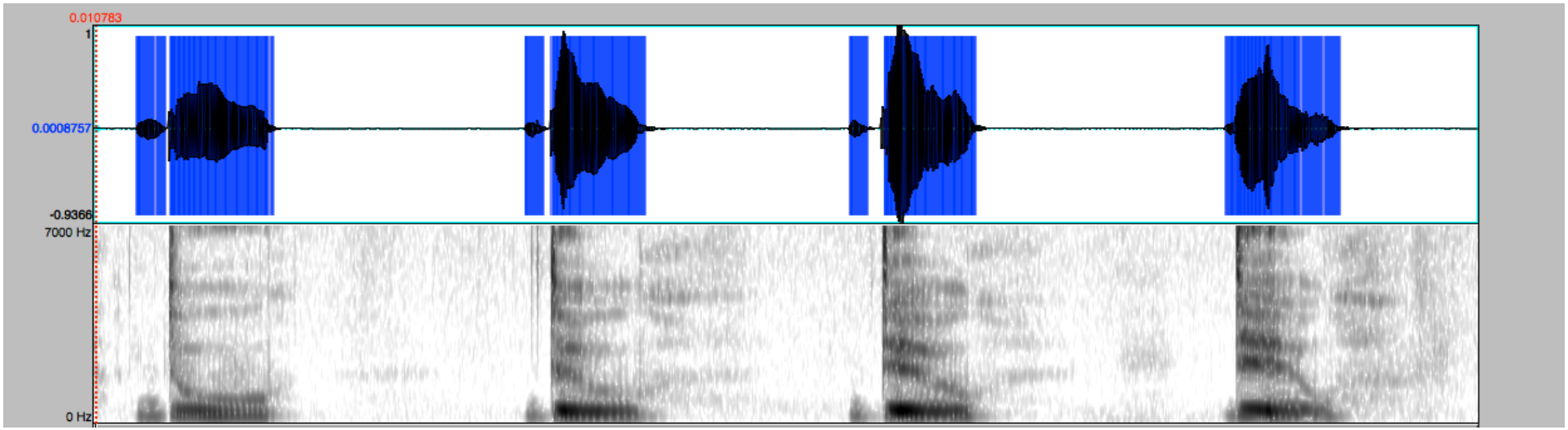
English consonant phonemes

p	t	k
b	d	g
f	s θ	ʃ h
v	z ð	ʒ
	tʃ	dʒ
m	n	ŋ
w	l r	j

English vowel phonemes

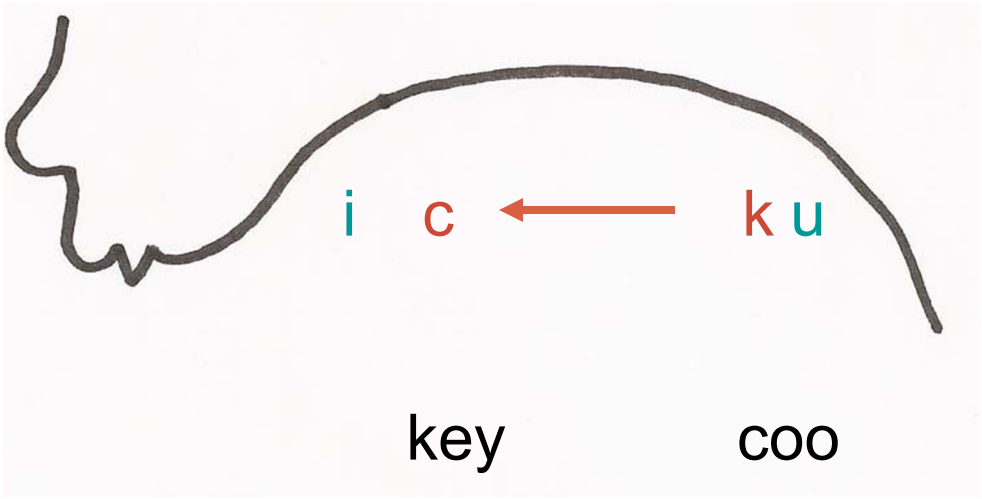
	front	mid	back
high	i		u
	ɪ		ʊ
mid	ej		ow
	ɛ	ʌ	ɔ
low	æ	a	
diphthongs	aw	aj	ɔj

Coarticulation: /u/-fronting



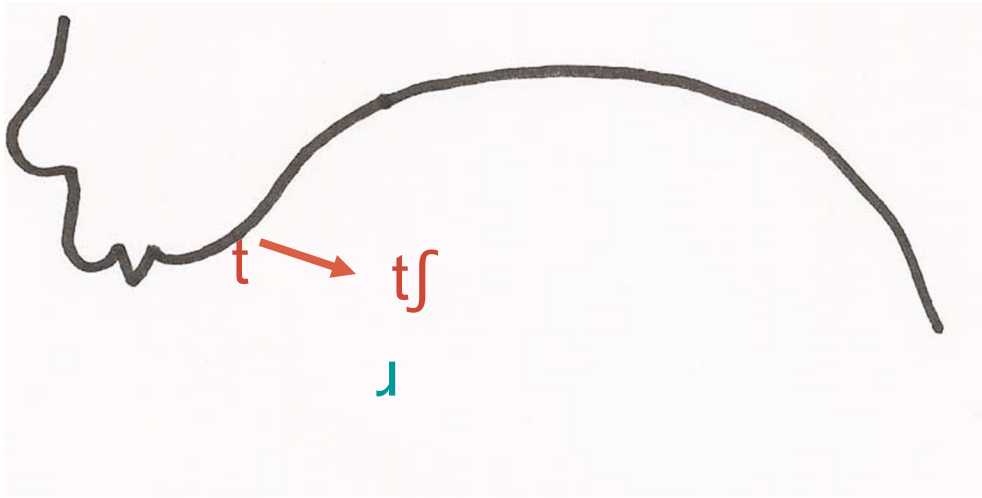
4 versions of *do*

A vowel can affect the preceding consonant as well.



When the English velar stop [k] is followed by the high front vowel [i], it moves forward in the mouth toward the palatal region, in anticipation of the vowel. It assimilates to the point of articulation of the vowel.

the [t] in *trip, trust*, *intractable backs and* opens gradually to become an alveopalatal affricate



tʃɹɪk tʃɹʌst ɪntʃɹæktəbl̩

in English, vowels become nasalized before a nasal consonant

pæt	pæ̃m	pæ̃n	pæ̃ŋ	pæ̃nɪk
kɑp	kɑ̃m	kɑ̃n	tɑ̃ŋ	kɑ̃nɚ
sɪt	sɪ̃mp̩l	sɪ̃n	sɪ̃ŋ	sɪ̃ŋɚ

… because the velum lowers early in anticipation of the following nasal consonant.

If we nasalize a vowel before a non-nasal consonant:

pæ̃t

kɑ̃p

sɪ̃t

It will sound weird, but it won’t affect the meaning of the word

(Maybe it just sounds American)

But if we do that in French

va	‘go’	vã	‘wind’
maʃ	‘mâche’	mãʒ	‘eat’

It changes the meaning

Vowel nasalization in distinctive in French, not in English

In English, nasalized and non-nasalized vowels

- Don’t form minimal pairs (can’t make a difference in meaning)
- Don’t occur in the same environment

Nasalized vowels occur only before nasal consonants.

Non-nasalized vowels never occur before nasal consonants. (unless a speaker is being very very careful)

Nasalized and non-nasalized vowels are in complementary distribution.

Nasalized and non-nasalized vowels are allophones of the same phonemes

In English, stops are aspirated in onset position, unless they're preceded by [s]

[pʰɔɹt]	[spˆɔɹt]
[tʰɑp]	[stˆɑp]
[kʰæt]	[skˆæt]

If we reverse them, it sounds weird but it doesn't affect the meaning.

This is because aspiration is not distinctive in English

[pʰ] and [pˆ] are allophones of the phoneme /p/

[th] and [tˆ] are allophones of the phoneme /t/

[kʰ] and [kˆ] are allophones of the phoneme /k/

But aspiration is distinctive in Hindi

(India: Indo-European ~180,000,000 speakers)

pal	'take care of'	p^hal	'knife blade'
tal	'beat'	t^hal	'plate'
ʈal	'postpone'	$ʈ^h$al	'wood shop'
tʃal	'turn'	$tʃ^h$al	'bark'
kal	'era'	k^hal	'skin'

These are all minimal pairs - words that differ by only one phone, and that have different meanings.

Aspirated and unaspirated stops contrast in Hindi.

They are separate phonemes

… and in Armenian

(Armenia: Indo-European ~3,500,000 speakers in Armenia, ~7,000,000 speakers total)

[kap]	‘bond’	[kap^{h}]	‘club’
[mut]	‘entrance’	[mut^{h}]	‘darkness’
[tak]	‘under’	[tak^{h}]	‘hot’

But not in Tojolabal

(Mexico: Mayan. ~36,000 spkrs, ~8,000 monolinguals)

[ć̀it$^{=}$am]	‘pig’	[ć̀at$^{=}$at^{h}]	‘kind of plant’
[makt$^{=}$on]	‘a patch’	[mut^{h}]	‘chicken’
[t$^{=}$inan]	‘upside down’	[ʔinat^{h}]	‘seed’

t$^{=}$ and t^{h} are in complementary distribution

They are allophones of the same phoneme

State the distribution

English

(UK, USA, and (ex)-colonies: Indo-European 508,000,000 speakers worldwide including 2nd lg spkrs)

English vowels are also long before voiced consonants and short before voiceless consonants

læp	læ:b
pæt	pæ:d
bæk	bæ:g

If we lengthen the vowel in lap, pat and back
or shorten it in lab, pad and bag ..

læ:p	læb
pæ:t	pæd
bæ:k	bæg

… it'll sound weird but it won't change the meaning (although we do use vowel length to perceive whether a following consonant is voiced or voiceless).

But in Danish, vowel length is phonemic
(Denmark: Indo-European 5,000,000 speakers)

vilə	‘wild’	vi:lə	‘rest’
menə	‘remind’	me:nə	‘mean’
lɛsə	‘load’	lɛ:sə	‘read’
mæsə	‘mass’	mæ:sə	‘mash’

and in Finnish

(Finland: Uralic. ~5,000,000 speakers)

il	‘day’	i:l	‘work’
seda	‘to count’	se:da	‘strong’
kul	‘oyster’	ku:l	‘tunnel’

Complementary distribution

Since allophones are conditioned by their environment, no two allophones of the same phoneme will occur in the same environment: their distributions will be complementary.

Phonemic analysis involves:

identifying sounds that are phonetically similar enough that they might be allophones of the same phoneme.

To determine their phonemic status:

- Look for minimal pairs.
- In the absence of minimal pairs, look to see if they occur in complementary environments.

Finnish

1. [kudot] ‘failures’
2. [kate] ‘cover’
3. [katot] ‘roofs’
4. [kade] ‘envious’
5. [madon] ‘of a worm’
6. [maton] ‘of a rug’
7. [ratas] ‘wheel’
8. [radon] ‘of a track’

Are [t] and [d] separate phonemes?

Swahili

(primarily East) Africa: Niger-Congo. 5,000,000 1st language speakers, 30,000,000 2nd language speakers.

1. [ŋgɔma] ‘drum’
2. [bɔma] ‘fort’
3. [ŋɔmbe] ‘cattle’
4. [bɔmba] ‘pipe’
5. [ɔmba] ‘pray’
6. [ɔna] ‘see’
7. [watoto] ‘children’
8. [ndoto] ‘dream’
9. [mboga] ‘vegetable’
10. [ndogo] ‘little’
11. [dʒogo] ‘rooster’
12. [ʃoka] ‘axe’

Do [ɔ] and [o] seem to be separate phonemes?

If you had a Swahili speaker with you, what would you look for to be sure?

Zulu

South Africa: Niger-Congo. ~9,000,000 speakers.

1. ɓɔna	'see'	13. iɓoni	'grasshopper'
2. ɓɔpha	'bind'	14. umondli	'guardian'
3. mɔsa	'despoil'	15. umosi	'one who roasts'
4. umɔna	'jealousy'	16. inoni	'fat'
5. imɔtɔ	'car'	17. udoli	'doll'
6. iqɔlɔ	'small of back'	18. umxoxi	'story-teller'
7. ixɔxɔ	'frog'	19. imomfu	'jersey cow'
8. isicɔcɔ	'head ring'	20. lolu	'this'
9. isithɔmbe	'picture'	21. isitofu	'stove'
10. indɔdana	'son'	22. nomuthi	'and the tree'
11. umfɔkazi	'strange man'	23. udodile	'you acted like a man'
12. ibokisi	'box'		

What is the distribution of [o] and [ɔ]?

[ɓ] is a voiced bilabial implosive stop. [c q x] are dental, alveolar and palatal clicks respectively.