Psych 56L/ Ling 51: Acquisition of Language

Lecture 6

Phonological Development I

Announcements

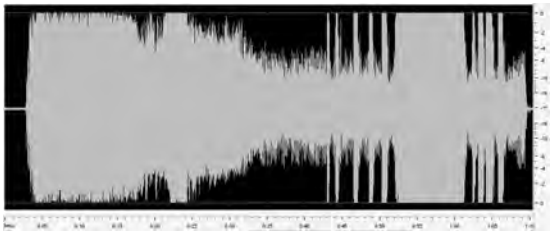
HW1 due at the end of class today

Review questions for phonological development available

HW2 available (not due till 2/23/12 – after midterm), but helpful for studying for the midterm

All kinds of useful sound charts available (including interactive ones, in case you forget what sound corresponds to what symbol).

Sounds of Language



Forget Spelling!

Sounds ≠ Spelling

Courtesy of http://www.spellingsociety.org/news/media/poems.php

Our Strange Lingo, by Lord Cromer (1902)

When the English tongue we speak.
Why is break not rhymed with freak?
Will you tell me why it's true
We say sew but likewise few?
And the maker of the verse,
Cannot rhyme his horse with worse?
Beard is not the same as heard
Cord is different from word.
Cow is cow but low is low
Shoe is never rhymed with foe.
Think of hose, dose, and lose
And think of goose and yet with choose
…

Courtesy of http://www.spellingsociety.org/news/media/poems.php

…
Think of comb, tomb and bomb,
Doll and roll or home and some.
Since pay is rhymed with say
Why not paid with said I pray?
Think of blood, food and good.
Mould is not pronounced like could.
Wherefore done, but gone and lone -
Is there any reason known?
To sum up all, it seems to me
Sound and letters don't agree.

One Sound - Many Characters

h**e**	e	s**ea**s	ea
bel**ie**ve	ie	am**oe**ba	oe
C**ae**sar	ae	k**ey**	ey
s**ee**	ee	mach**i**ne	i
p**eo**ple	eo	s**ei**ze	ei

International **P**honetic **A**lphabet: **[i]**

One Sound - Many Characters

t**oo**	oo	thr**ew**	ew
t**o**	o	l**ieu**	ieu
cl**ue**	ue	sh**oe**	oe
thr**ough**	ough	b**eau**tiful	eau

IPA: **[u]**

One Character - Many Sounds

d**a**me	e
d**a**d	æ
f**a**ther	ɑ
c**a**ll	ɔ , ɑ
vill**a**ge	ɪ , ə
m**a**ny	ɛ

One Sound - Multiple Letters

shoot	ʃ
ei**th**er	ð
character	k
d**ea**l	i
Thomas	t
physics	f
rou**gh**	f

One Letter - 0, 1, 2 Sounds

mnemonic
psychology
resi**g**n
g**h**ost **= no sound!**
i**s**land
whole
de**b**t

cute [**kj**uwt]

= 2 sounds!

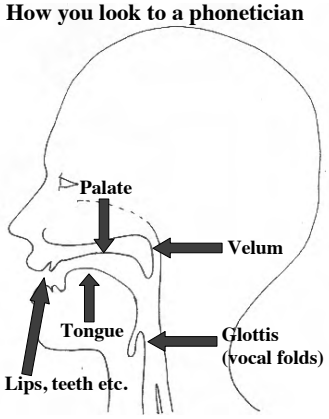
Differences across Languages

English: judge, juvenile, Jesus	**[ʤ]**
Spanish: jugar, Jesus	**[ẖ]**
German: Jugend, jubeln, Jesus	**[j]**
French: Jean, j'accuse, jambon	**[ʒ]**

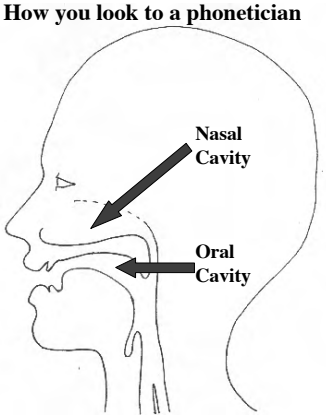
International
Phonetic Alphabet

Sounds: Speech Production

How you look to a phonetician



How you look to a phonetician



Major division: consonants vs vowels

Consonantal sounds: narrow or complete closure somewhere in the vocal tract.

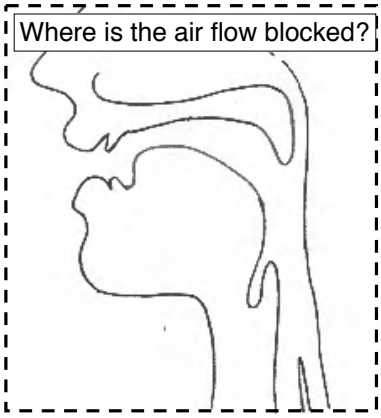
Vowels: very little obstruction in the vocal tract. Can form the basis of syllables (also possible for some consonants).

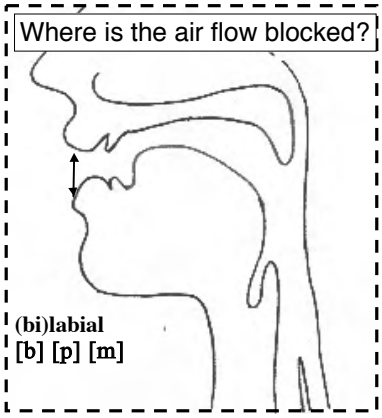
Describing Speech Sounds

Where/how is the air flowing? (manner of articulation)
nasal/oral, *stop*, *fricative, liquid, tap/flap* etc.

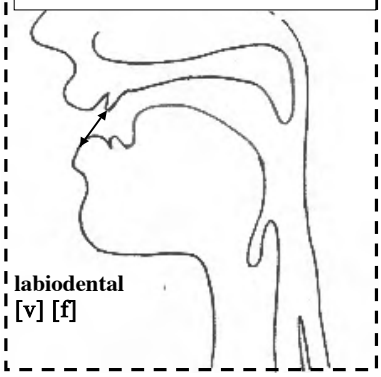
Where is the air-flow blocked? (place of articulation)
labial, alveolar, palatal, velar etc.

What are the vocal folds doing? (voicing)
voiced vs. *voiceless*



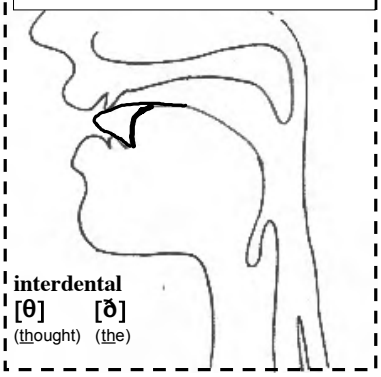


Where is the air flow blocked?



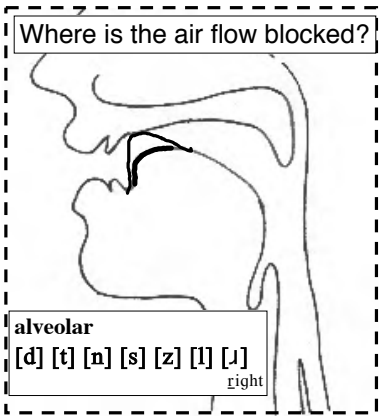
labiodental
[v] [f]

Where is the air flow blocked?



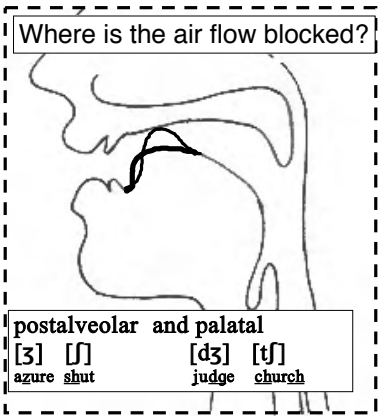
interdental
[θ] **[ð]**
(thought) (the)

Where is the air flow blocked?

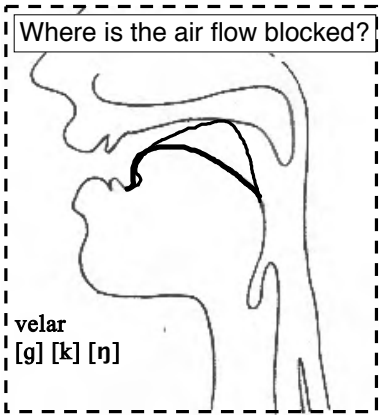


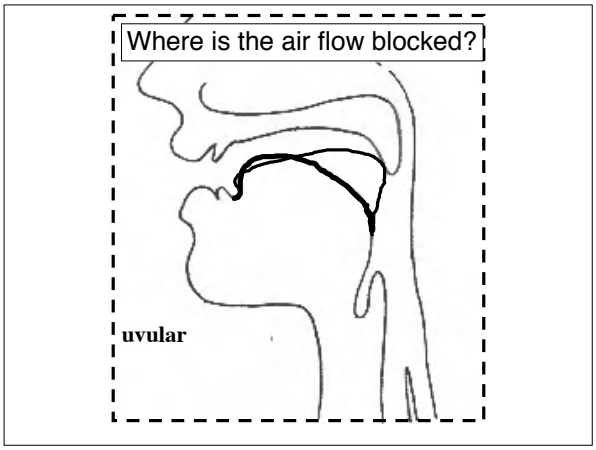
alveolar
[d] [t] [n] [s] [z] [l] [ɹ]
right

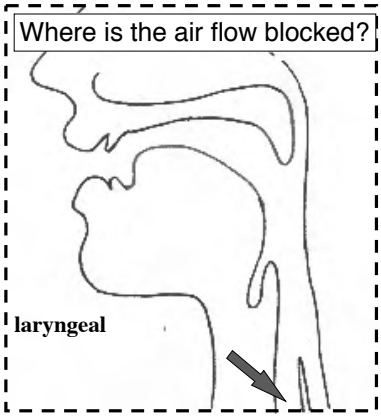
Where is the air flow blocked?



postalveolar and palatal
[ʒ] **[ʃ]** **[dʒ]** **[tʃ]**
azure shut judge church







Manner - How the Air is Flowing

Stops
[p] [t] [k] [b] [d] [g] [m] [n] [ŋ]

Fricatives
[f] [v] [θ] [ð] [s] [z] [ʃ] [ʒ]

Approximants/Glides
[w] [j] (Like in “water” and “you”)

Liquids
[ɹ] [l]

Tap/Flap
[ɾ] (Like in “water” and “butter”)

Fricatives & Affricates

Palatal sounds [ʒ] [ʃ] [dʒ] [tʃ]

Palatal Fricatives – [ʒ] [ʃ]
[note: according to IPA chart these are strictly 'post-alveolar']

Affricates - combination of stop + fricative - [dʒ] [tʃ] , as in *judge*, *church*

(ex: affricate in fast speech: "What should…?", "What did you do? = Whad ja do)

[t ʃ] [d ʒ]

Said fast, this sounds like "Whachould…?" or "Whajado?"

What are the vocal folds doing?

closed voiced

open voiceless

Voiced & Voiceless Consonants

Consonants either voiced or voiceless.
English pairs:

b p	v f	d t	
z s	ð θ	ʃ ʒ	tʃ dʒ

Describing Sounds

Features

Ways of *describing* sounds
e.g., [t] = voiceless, alveolar, stop

Stronger claim: features are the *smallest building blocks of language*, used to store sounds in the mind

Atoms of Speech

Roman Jakobson, 1896-1982

Features

Prediction: by combining a small number of atomic features, it should be possible to create a larger number of speech sounds

Goal: a set of universal features should make it possible to describe the speech sounds of all of the languages of the world

Different languages choose different feature combinations

	bi-labial	labio-dental	inter-dental	al-veolar	palatal	velar	glottal
oral stop	p b			t d		k g	ʔ
nasal stop	m			n		ŋ	
fricative		f v	θ ð	s z	ʃ ʒ		h
affricate					tʃ dʒ		
liquid				l ɹ			
glide					j	ʍ w	

	bi-labial	labio-dental	inter-dental	al-veolar	palatal	velar	glottal
oral stop	p b			t d		k g	ʔ
nasal stop	m			n	?		
fricative	?	v	θ ð	s z	ʃ ʒ	?	h
affricate					tʃ dʒ		
liquid				l ɹ	?		
glide					j	ʍ w	

	bi-labial	labio-dental	inter-dental	al-veolar	palatal	velar	glottal
oral stop	p b			t d		k g	▢
nasal stop	m			n	?		
fricative	ɸ β	f	θ ð	s z	ʃ ʒ	?	h
affricate					tʃ dʒ		
liquid				l ◪	?		
glide					j	ʍ w	

"Fuji"
"Cuba"

	bi-labial	labio-dental	inter-dental	al-veolar	palatal	velar	glottal
oral stop	p b			t d		k g	▢
nasal stop	m			n	ñ	ŋ	
fricative	ɸ β	f v				?	h
affricate					tʃ dʒ		
liquid				l ◪	?		
glide					j	ʍ w	

"año"

	bi-labial	labio-dental	inter-dental	al-veolar	palatal	velar	glottal
oral stop	p b			t d		k g	▢
nasal stop	m			n			
fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	χ ʁ	h
affricate					tʃ dʒ		
liquid				l ◪	?		
glide					j	ʍ w	

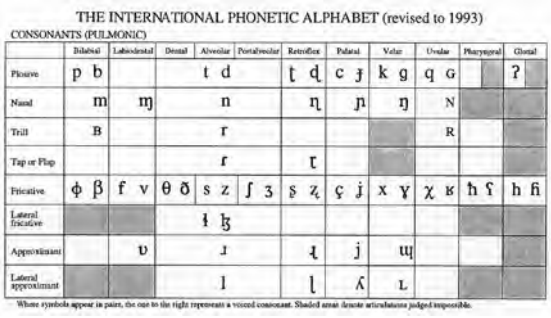
"Bach"
"agua"

	bi-labial	labio-dental	inter-dental	al-veolar	palatal	velar	glottal
oral stop	p b			t d		k g	▢
nasal stop	m			n	ñ	ŋ	
fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	χ ʁ	h
affricate					tʃ dʒ		
liquid				l ◪	ʎ		
glide						ʍ w	

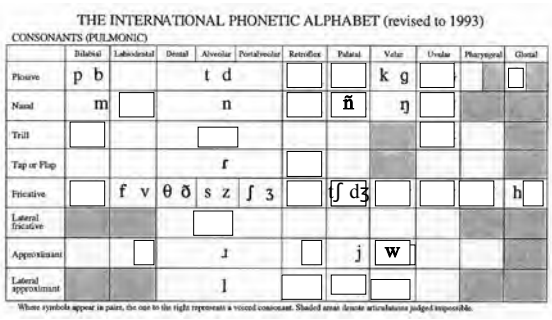
"caballo"

	bi-labial	labio-dental	inter-dental	al-veolar	palatal	velar	glottal
oral stop	p b			t d		k g	▢
nasal stop	m			n	ɲ	ŋ	
fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	χ ʁ	h
affricate					tʃ dʒ		
liquid				l ɹ	ʎ		
glide					j	ʍ w	

IPA full(er) chart

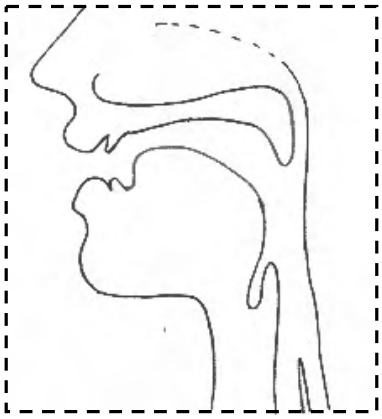


The parts we care about for this class

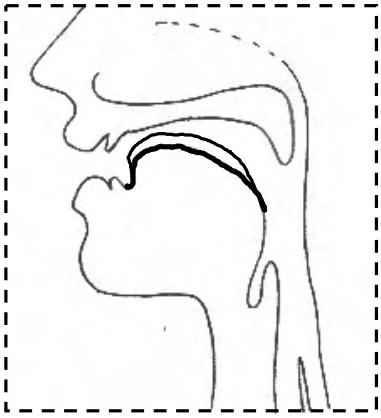


VOWELS

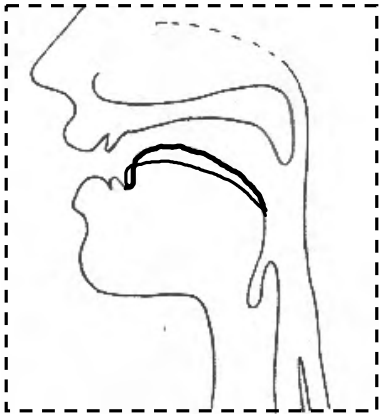
What can you do to alter the shape of your vocal tract?



[i]



[æ]



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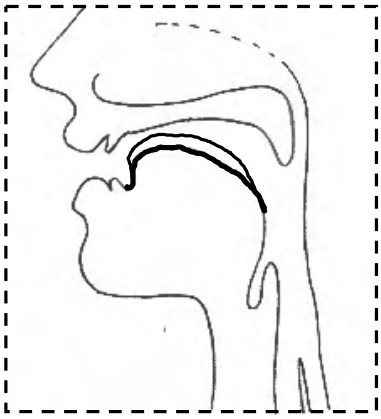
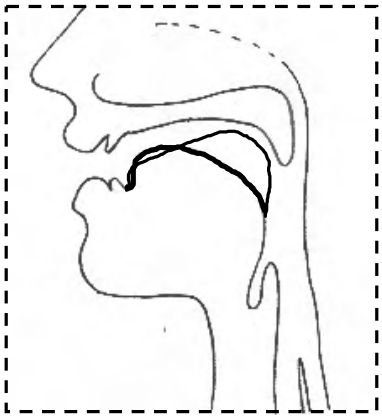


[u]

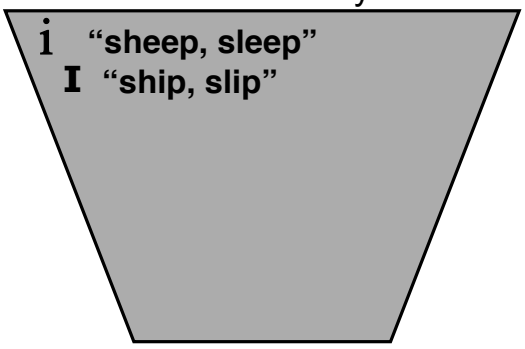


You can....

(1) Raise or lower your tongue
(2) Advance or retract your tongue
(3) Round or spread your lips
(4) Tense or not tense your mouth

So what vowels do you have?

i̇ **"sheep, sleep"**
I "ship, slip"



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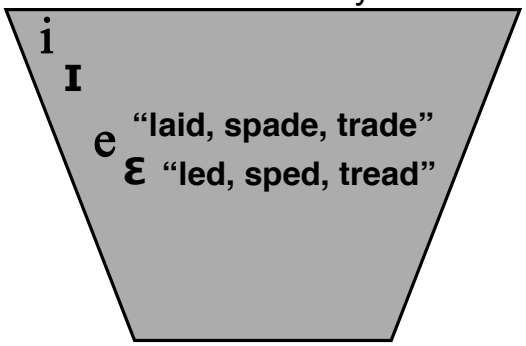

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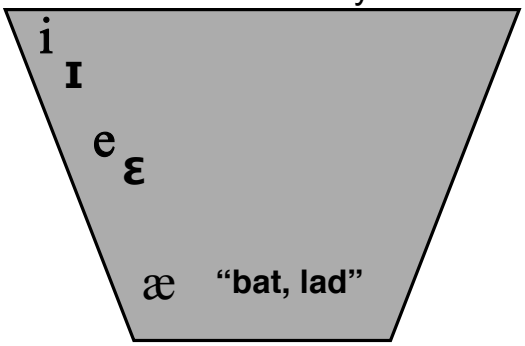

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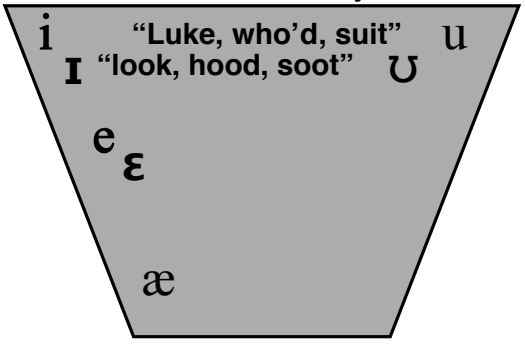

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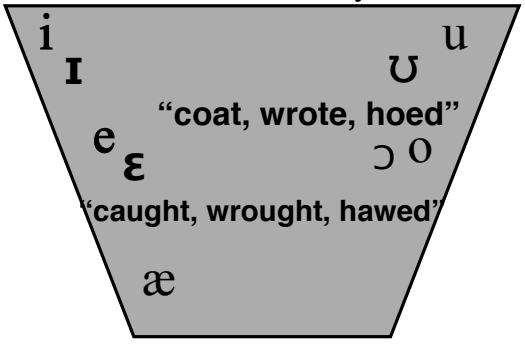

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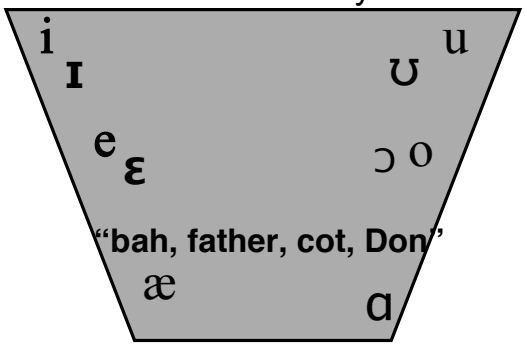

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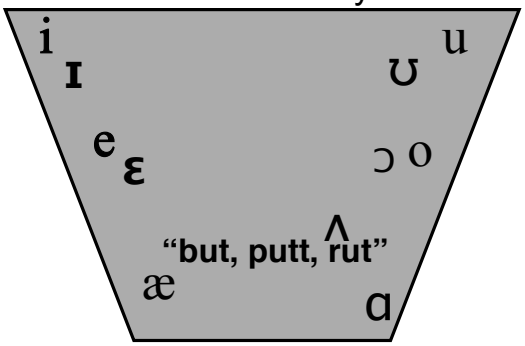

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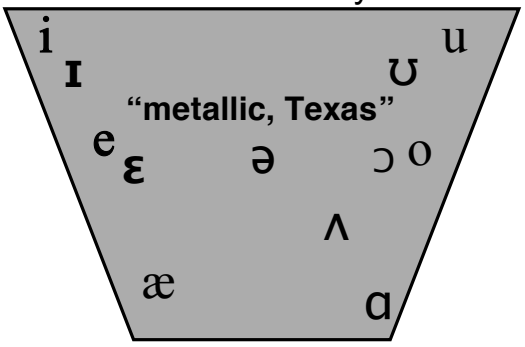
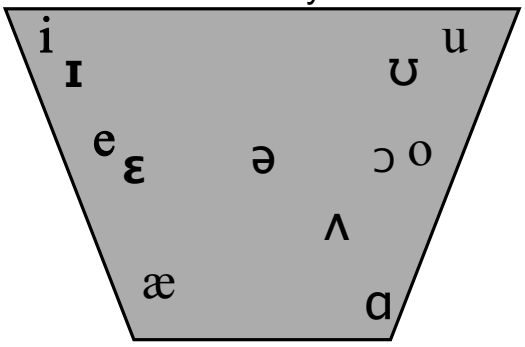
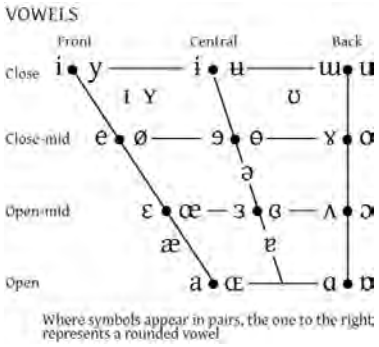


So here they are!



The full(er) vowel chart



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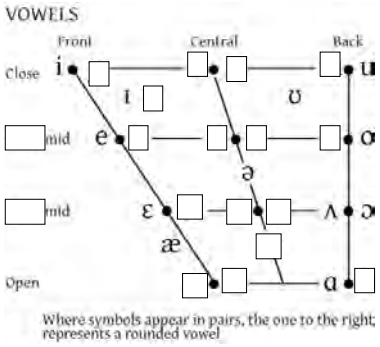


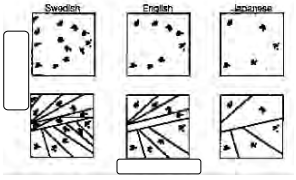
Cross-language Differences

Feature Combinations

- English: back vowels are rounded, others are not
- German/French has high, front, rounded vowel [y]
- Russian has high back unrounded vowel [ɯ]

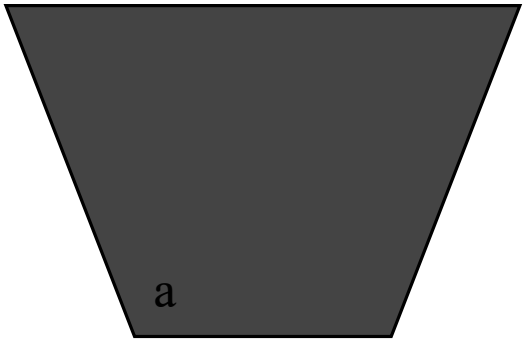
- Many languages don't make the tense/lax distinction found in English (ex: Spanish [i], rather than [i] and [ɪ])
- Many languages distinguish short and long vowels (unlike English), ex: Japanese [i] vs. [i:]

Cross-language Differences



Languages carve up the acoustic space in different ways. Children find these categories (called phonemes), based on the distributions of sounds they hear in their linguistic environment (using statistical learning).

Diphthongs: Two vowel-ish sounds together



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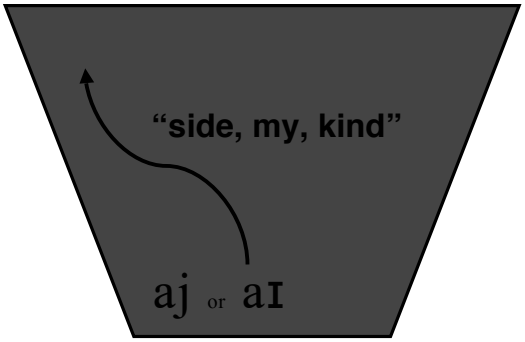

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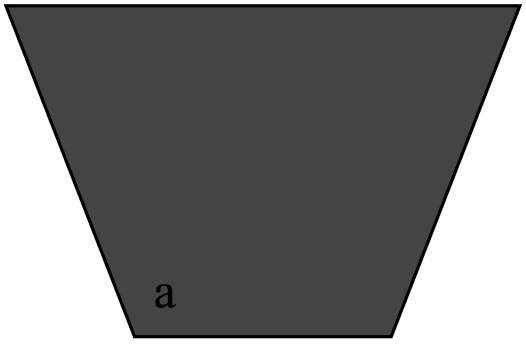

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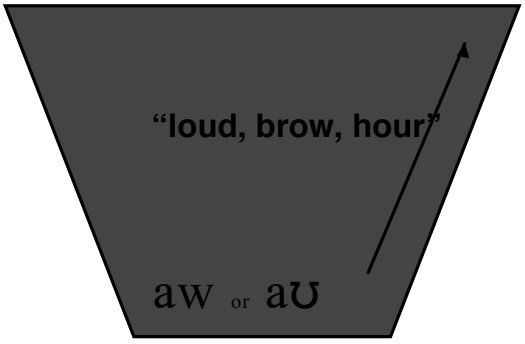

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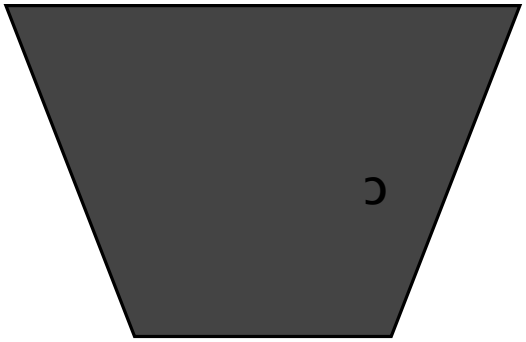

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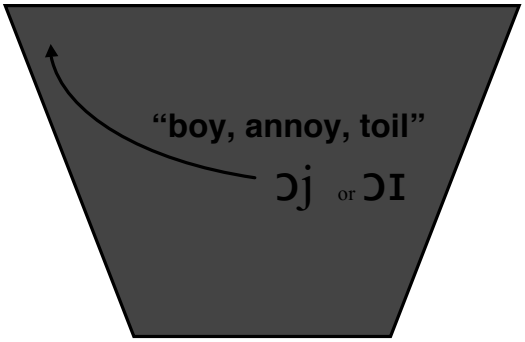

More details of American English pronunciation

http://en.wikipedia.org/wiki/General_American

Monophthongs	Front	Central	Back
Close			
Near-close			
Close-mid			
Mid			
Open-mid			
Near-Open			

Depending on one's analysis, people who merge the vowels of *hot* and *caught* to /ɑ/ either h
/ɹɑɪ/ and /ɹɑʊ/, but since all accents with *cot* and *caught* merged to /ɑ/ do have also unstress
in these cases, the [ɪ] before /ɹ/ can be analyzed as an allophone of /ɑ/. [ɾ] and [ɐ] are often
unstressed syllables. Since the occurrence of [ə] is mostly predictable, it need not be consid

Among speakers who distinguish between /ɑ/ and /ɔ/, the vowel of *cot* (usually transcribed /
closer to [ɔ].[22] Among *cot*-*caught* merged speakers, /ɑ/ usually remains a back vowel. [ɑ], a
/ɔ/, their retracted allophones for /ɑ/ may be identical to the lowered allophones of /ɔ/ among

The diphthongs of General American are shown in the next table:

Diphthongs	Offglide is a front vowel	Offglide is a back vowel
Opener component is unrounded		
Opener component is rounded		

Speech Production - Summary

Airflow set in vibration by vocal folds
Airflow modified by vocal tract

Consonants: narrowing or blocking of oral/nasal cavity

Vowels: shaping of oral cavity

Different languages choose different selections of these

Speech Perception

Speech production processes must be *undone* by the ear

Motions of articulators must be *reconstructed* from patterns of air vibration

Requires extremely precise hearing, possibly a system specialized for hearing speech

Substantially developed at birth

Questions?

You should be able to do question 1 on HW2, and up through question 2 on the phonological review questions.