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Hello, Everyone!

Review questions

- Give examples to show the following features that make human language different from animal communication system:
- 1. Arbitrariness
- 2. Productivity
- 3. Duality
- 4. Displacement
- 5. Cultural transmission

Who studies speech sounds?

- Phoneticians:
  - What distinctive sounds do particular languages have?
  - How are they produced?
- Phonologists:
  - What is the underlying theory of speech sound?
  - What explains how particular sounds vary in context?
- Acoustic phoneticians, speech engineers, speech pathologists, lexicographers, singers,…

How do we represent speech sounds?

- Regular orthography
- Special-purpose symbol sets
- Abstract sound classes based upon sound similarities
  - What sounds are *shared* by languages X and Y?
  - What sounds are unique to particular languages? Or at least rare?
  - E.g. for language identification

Limits of Orthography

- **A single letter may have many different acoustic realizations, e.g., in English**
  - o comb, tomb, bomb
  - oo blood, food, good
  - c court, center, cheese
  - s reason, surreal, shy
- **A single sound may have different orthographic correspondences**
  - [i] sea, see, scene, receive, thief
  - [s] cereal, same, miss
  - [u] true, few, choose, lieu, do
  - [ay] prime, buy, rhyme, lie
- **Orthography *not* a good choice**

Phonetic Symbol Sets

- International Phonetic Alphabet (IPA)
  - Single character for each sound
  - Represents all sounds of the world's languages
- ARPAbet, TIMIT, …
  - Multiple characters for sounds but ASCII
  - English specific, so new symbol sets for each new language to be represented

Questions

1. What's the phonic medium of language?

   The phonic medium of language refers to the limited range of sounds which are meaningful in human communication.

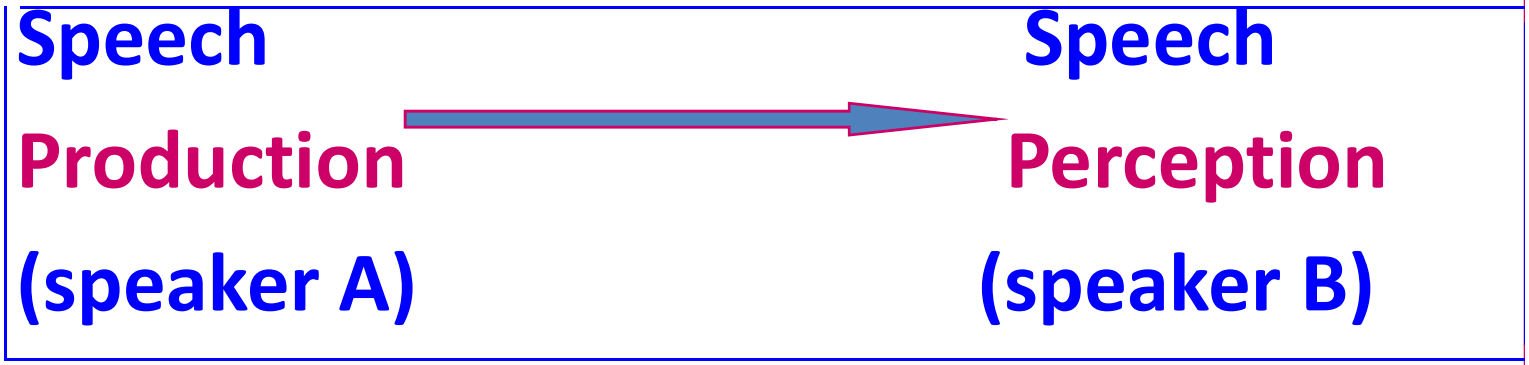
2. What are speech sounds?

   Speech sounds refers to the individual sounds which the phonic medium of language.

3. What's phonetics?

   Phonetics is a branch of linguistics that studies speech sounds with regard to their articulation, physical properties, and perception.

1. Branches of phonetics



A three-step process of speech sounds

Articulatory phonetics: the study of the production of speech sounds

Acoustic phonetics: the study of the physical properties of the sounds produced in speech

Auditory phonetics: the study of the perception of speech sounds

2.2.3 Orthographic representation of speech sounds

- **1. IPA (International Phonetic Alphabet):**
- **A standardized and internationally accepted system of phonetic transcription. The present one mainly derives from one developed in the 19202 by the British phonetician, Daniel Jones (1881-1967), revised in 1993, corrected (updated) in 1996.**

Phonology -

the study of sound systems of languages

Phoneme –

A phonological segment that can be phonetically predicted by a rule – /b/ in *bit* and /p/ in *pit.*

Phonetics

The Study of the way Humans make, Transmit, and Receive

2.3 from phonetics to phonology

- 2.3.1 coarticulation and phonetic transcription
- Sounds are influenced by their neighbors.
- Often they are produced together, this simultaneous articulation is called COARTICULATION.
- anticipatory coarticualtion
- coarticulation
- perseverative coarticulation
- NASALIZATION (鼻音化) is an example of anticipatory articulation.

IPA Symbol	ARPAbet Symbol	Word	IPA Transcription	ARPAbet Transcription
[p]	[p]	parsley	['parsli]	[p aa r s l iy]
[t]	[t]	tarragon	['tærəgɑn]	[t ae r ax g aa n]
[k]	[k]	catnip	['kætnɪp]	[k ae t n ix p]
[b]	[b]	bay	[beɪ]	[b ey]
[d]	[d]	dill	[dɪl]	[d ih l]
[g]	[g]	garlic	['gɑrlɪk]	[g aa r l ix k]
[m]	[m]	mint	[mɪnt]	[m ih n t]
[n]	[n]	nutmeg	['nʌtmɛg]	[n ah t m eh g]
[ŋ]	[ng]	ginseng	['dʒɪnsɪŋ]	[jh ih n s ix ng]
[f]	[f]	fennel	['fɛnl̩]	[f eh n el]
[v]	[v]	clove	[klouv]	[k l ow v]
[θ]	[th]	thistle	['θɪsl̩]	[th ih s el]
[ð]	[dh]	heather	['hɛðɚ]	[h eh dh axr]
[s]	[s]	sage	[seɪdʒ]	[s ey jh]
[z]	[z]	hazelnut	['heɪzl̩nʌt]	[h ey z el n ah t]
[ʃ]	[sh]	squash	[skwɑʃ]	[s k w a sh]
[ʒ]	[zh]	ambrosia	[æm'broʊʒə]	[ae m b r ow zh ax]
[tʃ]	[ch]	chicory	['tʃɪkɚi]	[ch ih k axr iy]
[dʒ]	[jh]	sage	[seɪdʒ]	[s ey jh]
[l]	[l]	licorice	['lɪkɚɨʃ]	[l ih k axr ix sh]
[w]	[w]	kiwi	['kiwi]	[k iy w iy]
[ɾ]	[r]	parsley	['pɑrsli]	[p aa r s l iy]
[j]	[y]	yew	[yu]	[y uw]
[h]	[h]	horseradish	['hɔrsrædɪʃ]	[h ao r s r ae d ih sh]
[ʔ]	[q]	uh-oh	[ʔʌʔoʊ]	[q ah q ow]
[ɾ]	[dx]	butter	['bʌɾɚ]	[b ah dx axr]
[ɾ̃]	[nx]	wintergreen	[wɪɾ̃ɚgrin]	[w ih nx axr g r i n]
[l̩]	[el]	thistle	['θɪsl̩]	[th ih s el]

IPA Symbol	ARPAbet Symbol	Word	IPA Transcription	ARPAbet Transcription
[i]	[iy]	lily	['lɪli]	[l ih l iy]
[ɪ]	[ih]	lily	['lɪli]	[l ih l iy]
[eɪ]	[ey]	daisy	['deɪzi]	[d ey z i]
[ɛ]	[eh]	poinsettia	[pɔɪn'sɛriə]	[p oy n s eh dx iy ax]
[æ]	[ae]	aster	['æstɚ]	[ae s t axr]
[ɑ]	[aa]	poppy	['papi]	[p aa p i]
[ɔ]	[ao]	orchid	['ɔrkɨd]	[ao r k ix d]
[ʊ]	[uh]	woodruff	['wʊdrʌf]	[w uh d r ah f]
[oʊ]	[ow]	lotus	['loʊɾəs]	[l ow dx ax s]
[u]	[uw]	tulip	['tulɨp]	[t uw l ix p]
[ʌ]	[uh]	buttercup	['bʌɾɚˌkʌp]	[b uh dx axr k uh p]
[ɝ]	[er]	bird	['bɝd]	[b er d]
[aɪ]	[ay]	iris	['aɪrɨs]	[ay r ix s]
[aʊ]	[aw]	sunflower	['sʌnflaʊɚ]	[s ah n f l aw axr]
[oɪ]	[oy]	poinsettia	[pɔɪn'sɛriə]	[p oy n s eh dx iy ax]
[ju]	[y uw]	feverfew	[fivɚfju]	[f iy v axr f y u]
[ə]	[ax]	woodruff	['wʊdrəf]	[w uh d r ax f]
[ɨ]	[ix]	tulip	['tulɨp]	[t uw l ix p]
[ɚ]	[axr]	heather	['hɛðɚ]	[h eh dh axr]
[ʉ]	[ux]	dude[1]	[dʉd]	[d ux d]

Figures 4.1 and 4.2:
Jurafsky & Martin (2000),
pages 94-95.

IPA consonants

CONSONANTS (PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap				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.

(Distributed by the International Phonetics Association.)

Sound Categories

- Phone: Basic speech sound
  - A minimal sound difference between two words (e.g. *t*oo, *z*oo)
  - Not every human sound is phonetic, e.g.
    - Sniffs, laughs, coughs,…
- Phoneme: Class of speech sounds
  - Phoneme may include several phones (e.g. the /t/ in butter, trip, tip, but)
- Allophone: set of phonetic variants of a phoneme (e.g. a flapped *t* is an allophone of /t/)

Articulatory Phonetics: How do people produce speech?

- General process:
  - Air expelled from lungs through windpipe (trachea) leaving via mouth (mostly) and nose (nasals) (e.g. [m], [n])
  - Air passing thru trachea goes thru 'voice box' (larynx), which contains vocal cords (vocal folds) – space between them is glottis
  - When vocal folds vibrate, we get voiced sounds (e.g. [v]); o.w. voiceless (e.g. [f])
- The articulatory organs

Classes of Sounds

- Consonants and vowels:
  - Consonants:
    - Restriction/blockage of air flow
    - Voiced or voiceless
  - Vowels:
    - Generally voiced, less restriction
  - Semivowels: [w], [y]

2.2.4.1 Classification of English consonants

- **1. In terms of manner of articulation:**
- **A. stops/plosives: [p][b][t][d][k][g]**
- **B. fricatives:[f, v, s, z, +, +, +, +, h]**
- **C. affricates: [+, +]**
- **D. liquids: lateral [l], retroflex [r]**
- **E. nasals: [m, n, ŋ]**
- **F. glides/semivowels: [w, j]**

Classification of English consonants

- **2. In term of place of articulation:**
- **A. bilabial: [p, b, m, w]**
- **B. labiodental: [f, v]**
- **C. dental: [θ, +]**
- **D. alveolar: [t, d, s, z, n, l, r]**
- **E. palatal: [+, +, +, +, j]**
- **F. velar: [k, g, ŋ]**
- **G. glottal: [h]**

Consonants: Place of Articulation

- What is the point of maximum restriction?
  - Labial: bilabial [b], [p]; labiodental [v], [f]
  - Dental: [θ], [ð] thief vs. them
  - Alveolar: [t], [d], [s], [z]
  - Palatal: [ʃ], [tʃ] shrimp vs. chimp
  - Velar: [k], [g]
  - Glottal: [?] glottal stop

Classification of English consonants

- **3. In terms of the state of the vocal cords:**
- **A. voiced: consonants produced when the vocal cords are closed, and the air-stream causes them to vibrate again each other.**
- **B. voiceless: consonants produced when vocal cords are apart, and air passes through easily.**

- Diacritics are used to record the variations of the same sound. This is called narrow transcription. It is put inside [ ]. Narrow transcription is used in phonetic transcription by phoneticians.
- Broad transcription uses only symbols to record a sound. It is put inside / /. It is used in phonemic transcription by phonologists.

2.3.2 phonemes

- phonological study concerns the sounds which can cause the change of meaning of a word or a phrase.
- Minimal pair is used to decide whether two sounds are two different sounds.
- Phonemes are sounds which distinguish meaning.
- A phoneme is a unit of explicit contrast.
- Languages differ in the selection of contrastive sounds.

- By convention, PHONEMIC TRANSCRIPTION are placed between slash lines (/ /) .

- Not all the phones in complementary distribution are considered to be allophones of the same phoneme. They must meet anther restriction, that is , they must be phonetically similar.
- Phonetic similarity means that the allophones of a phoneme must bear some phonetic resemblance.
- The allophones are both phonetically similar and in complementary distribution.

Phonetics

- The study of physical properties of sound
- Sounds may not be represented systematically by spelling.
- Examples?

Why not just spell?

- Sounds may not be represented systematically by spelling because...
- Same spelling for different sounds
- Combination of letters representing one sound,
- Some letters are silent

Phonetic Alphabet

- One symbol represents one sound
- Each speech sound has a distinct symbol
- Cross-linguistically applicable

2.2 consonants and vowels

- The difference between consonants and vowels
- Obstruction or not
- Obstruction, consonants; if not vowels.
- The description of consonants and that of vowels are done along the different lines.

2.2.1 consonants

- Consonants are described from three aspects: the manner and the place of articulation, and the vibration of vocal cords or not.

What does the manner of articulation mean?

IPA symbols for Transcription

[p]= pat

[b]= bat

[t]= tap

[d]=dam

[k]= car

[g]=guard

[f]= foot

[v]= van

[h]= hat

[m]=mull

[n]= null

[ŋ]= ring

IPA symbols for transcription

[s] = sap

[z] = zip

[θ] = think

[ð] = this

[ʃ]= shine

[ʒ] = vision

[ʧ]= touch

[ʤ]= judge

[ɹ]= ring

[l]= leaf

[j] = yes

[w]= with

IPA symbols for transcription

[i]=sh<u>ee</u>p

[ɪ]=sh<u>i</u>p

[ɛ]= <u>e</u>nd

[u]= b<u>oo</u>t

[ʊ]=p<u>u</u>t

[ɔ]= <u>o</u>pen

[æ]=<u>a</u>sh

[ɑ]= f<u>a</u>ther

[ə]=<u>a</u>bout

[ʌ]= b<u>u</u>t

- IPA

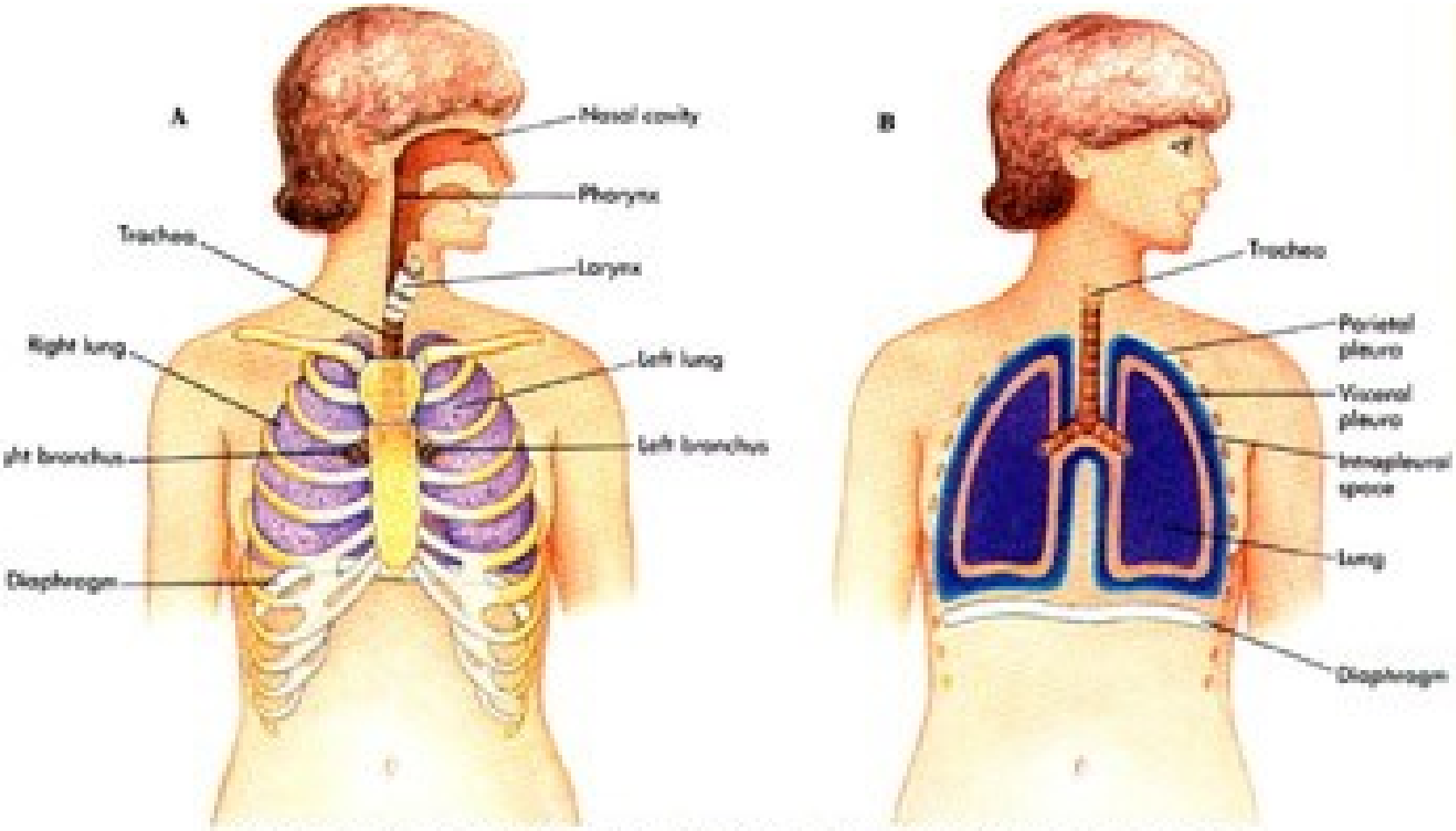
THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

CONSONANTS (PULMONIC) © 2005 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	B			r					R		
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			

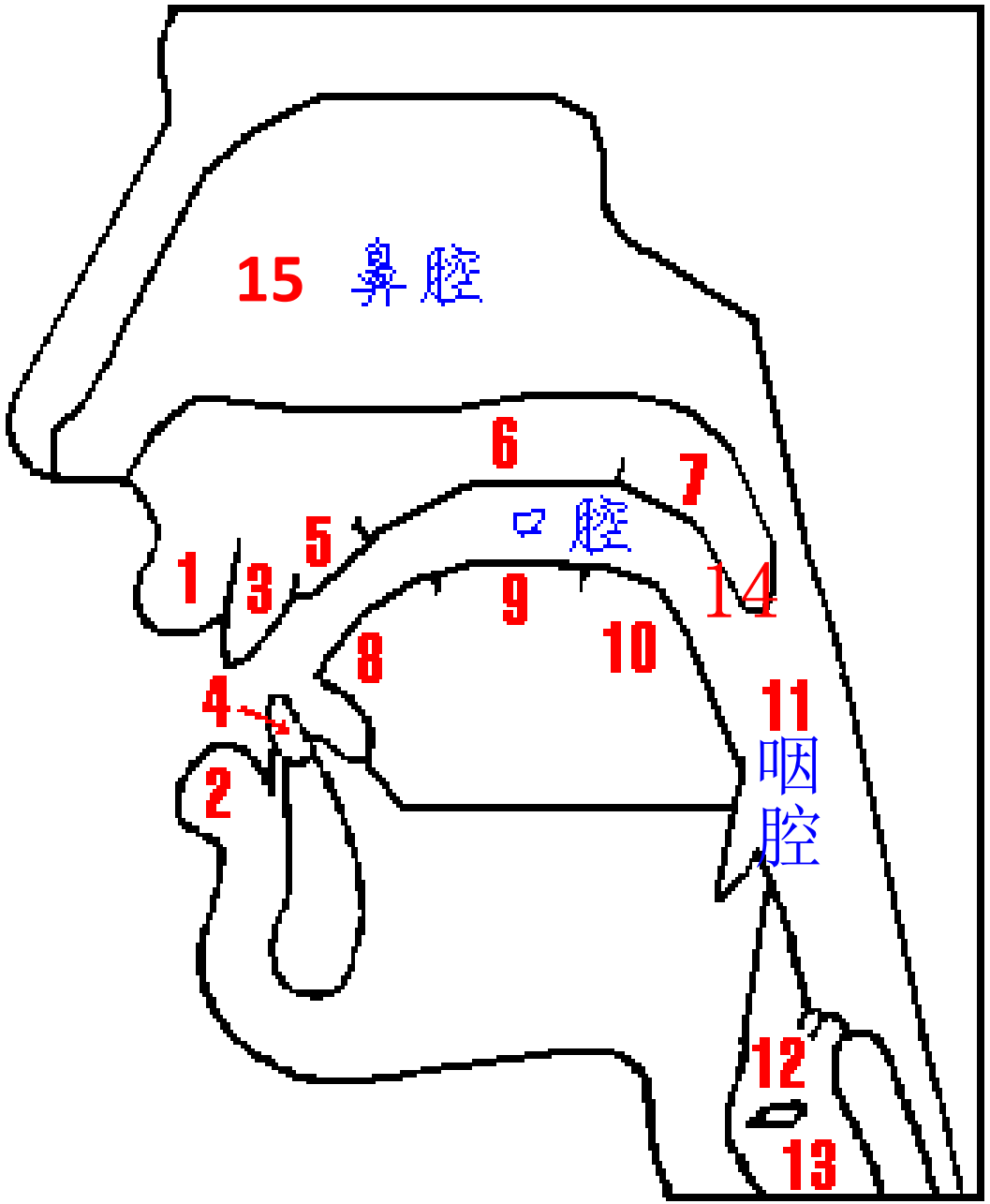
Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

1. The respiratory tract



A The anatomy of the thorax showing major airway components (pharynx, larynx, trachea, and left and right bronchi), the chest wall, and abdomen. The thoracic cavity is separated from the abdominal cavity by the diaphragm.
B The lungs are separated from each other and from the chest wall by the parietal and visceral pleura. The intrapleural space is exaggerated for clarity.

2. Organs of speech



A. The pharyngeal cavity:

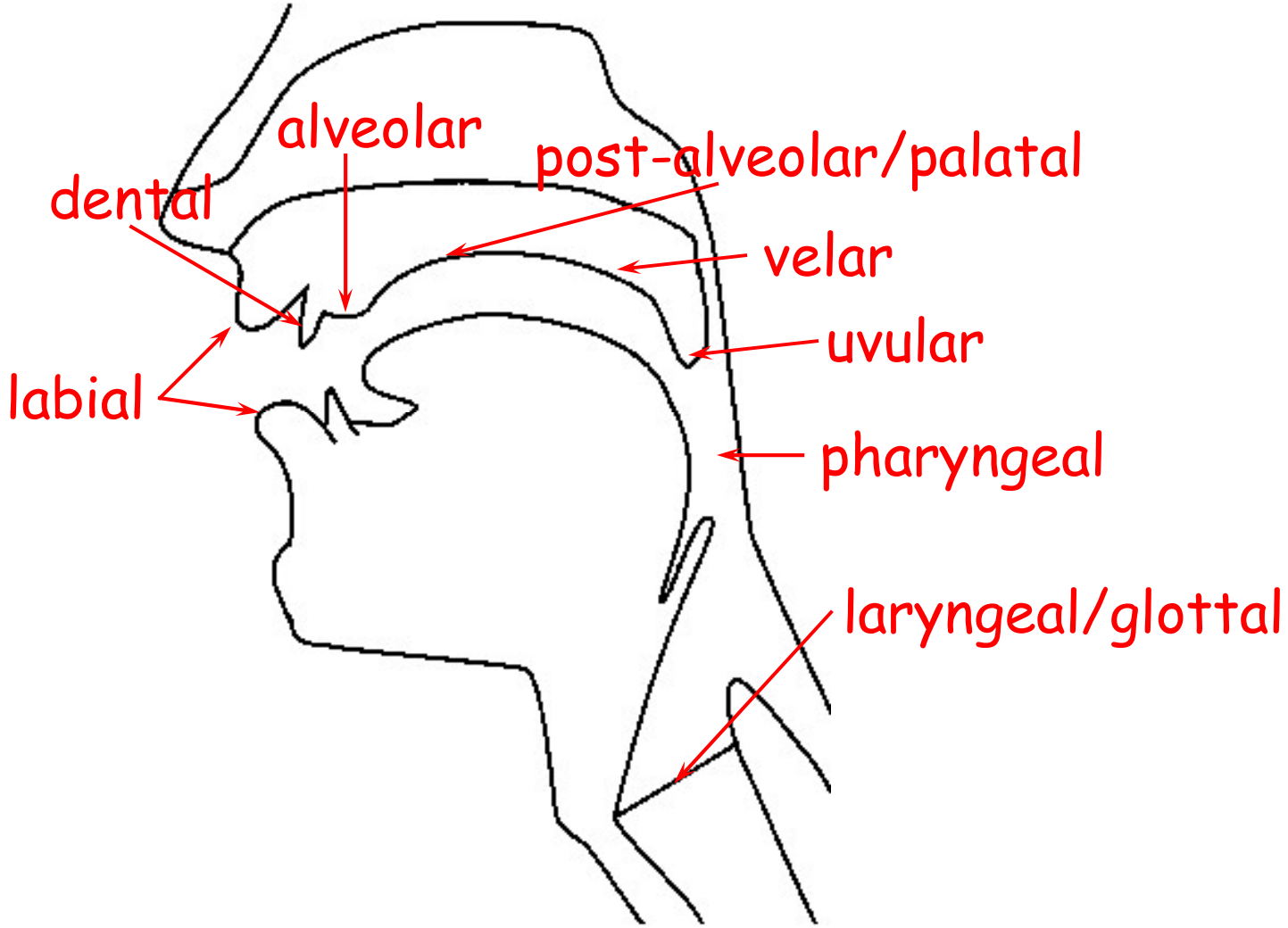
13 windpipe, 12 glottis/vocal cords, 11 pharyngeal cavity

B. The oral cavity:

1/2 lips, 3/4 teeth, 5 teeth ridge(alveolus), 6 hard palate,7 soft palate (velum), 14 uvula, 8 tip of tongue, 9 blade of tongue, 10 back of tongue

C. Nasal cavity: 15

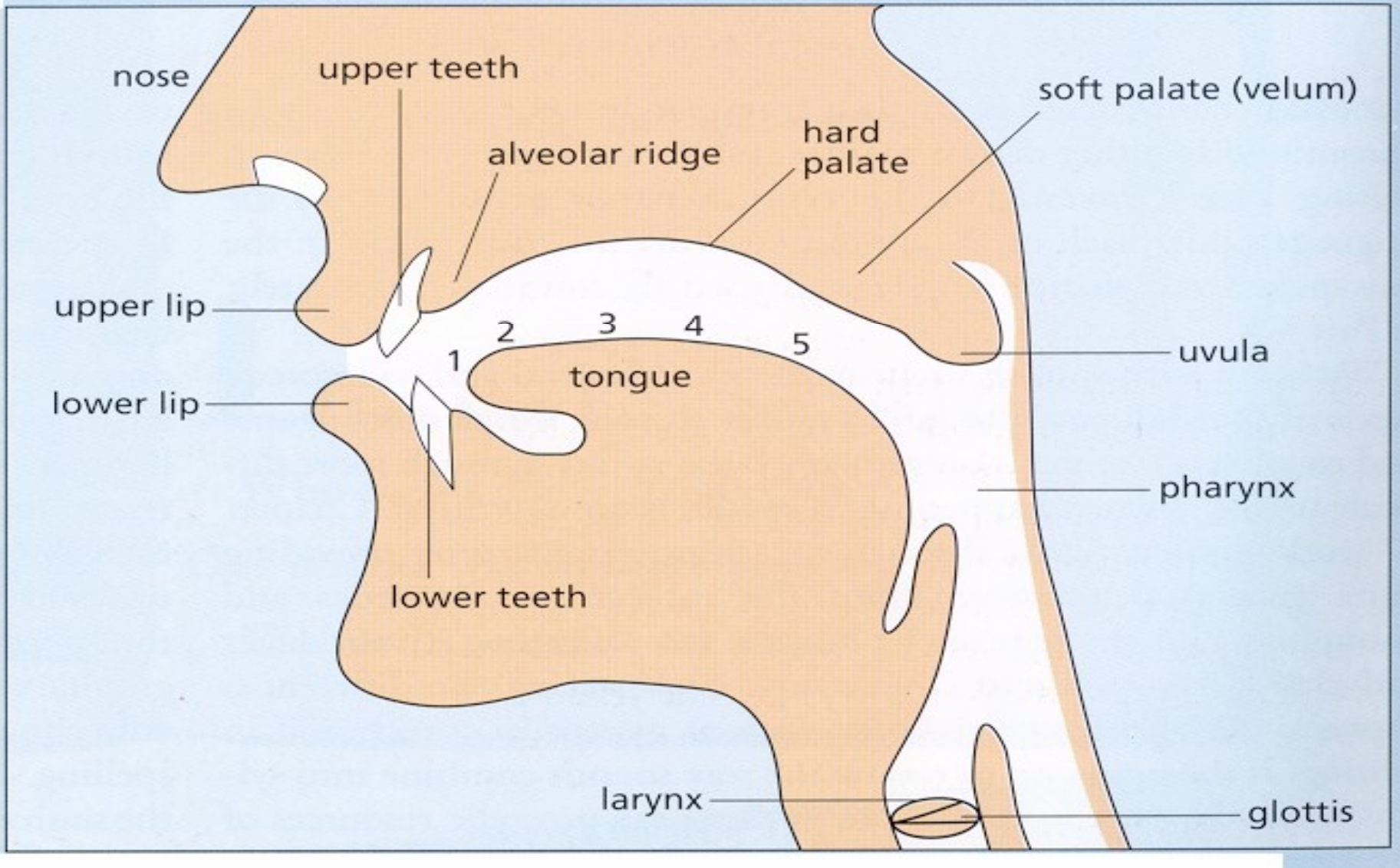
Places of articulation



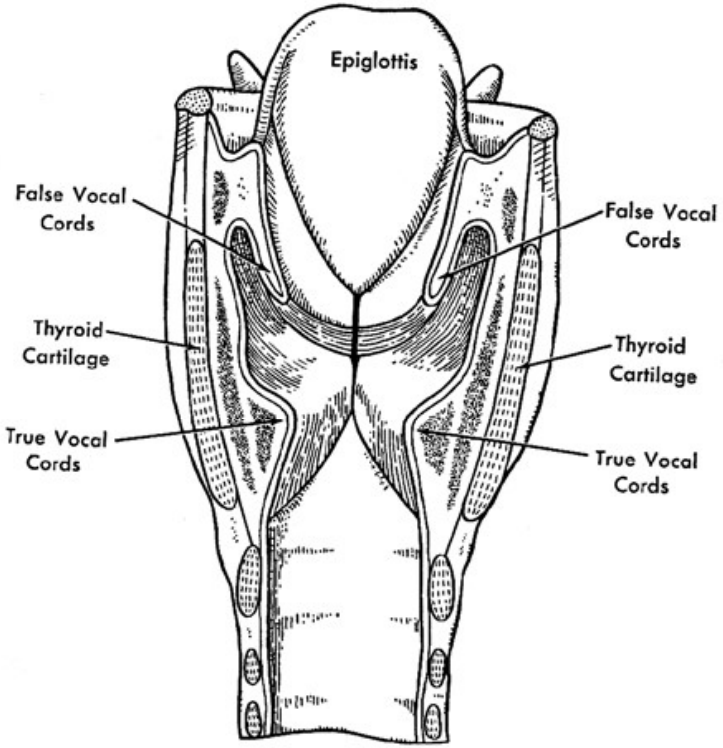
http://www.chass.utoronto.ca/~danhall/phonetics/sammy.html

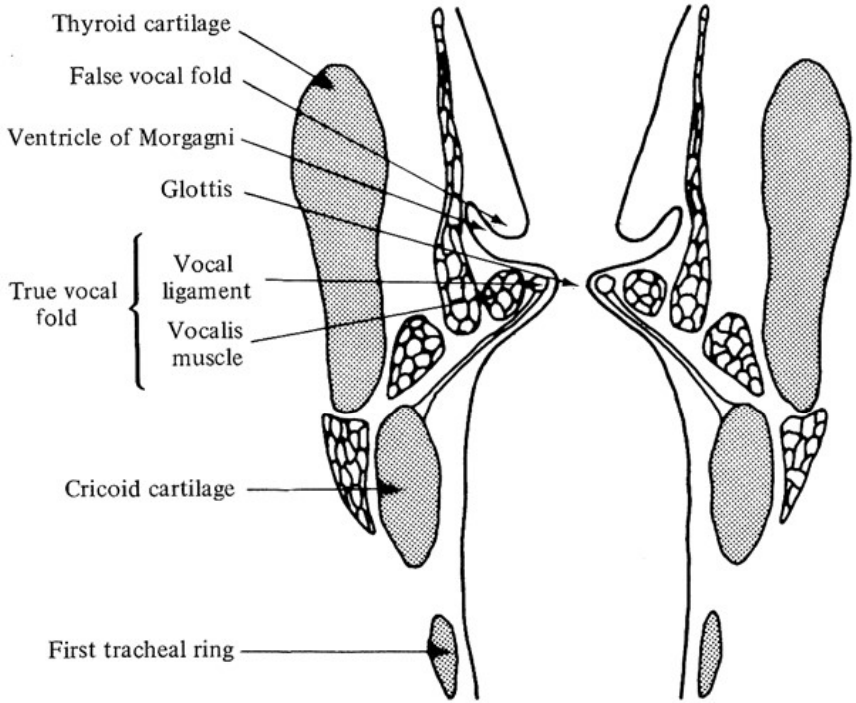
THE ORGANS OF ARTICULATION

The diagram shows the anatomical location of the vocal organs involved in the description of English vowels and consonants. It is not a complete representation of all the vocal organs – the lungs, for example, are not shown.



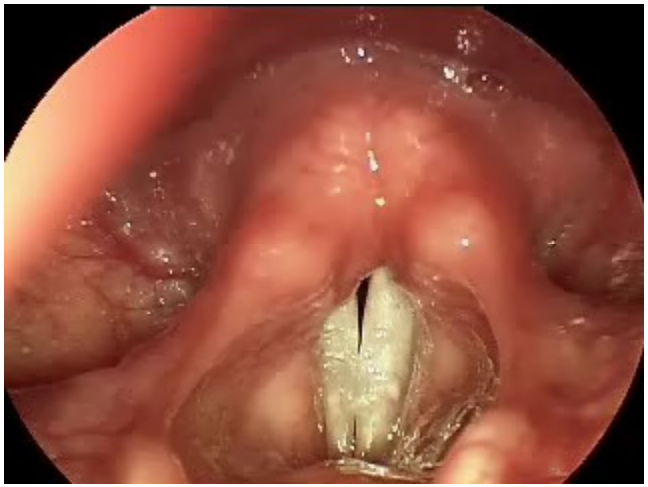
Larynx (cont'd)



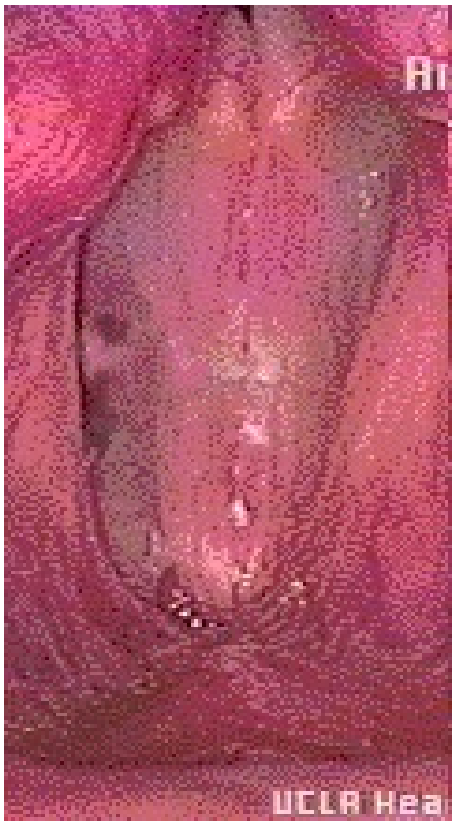


Larynx (cont'd)

Vocal fold vibration/voicing/phonation



Vocal fold vibration



[UCLA Phonetics Lab demo]

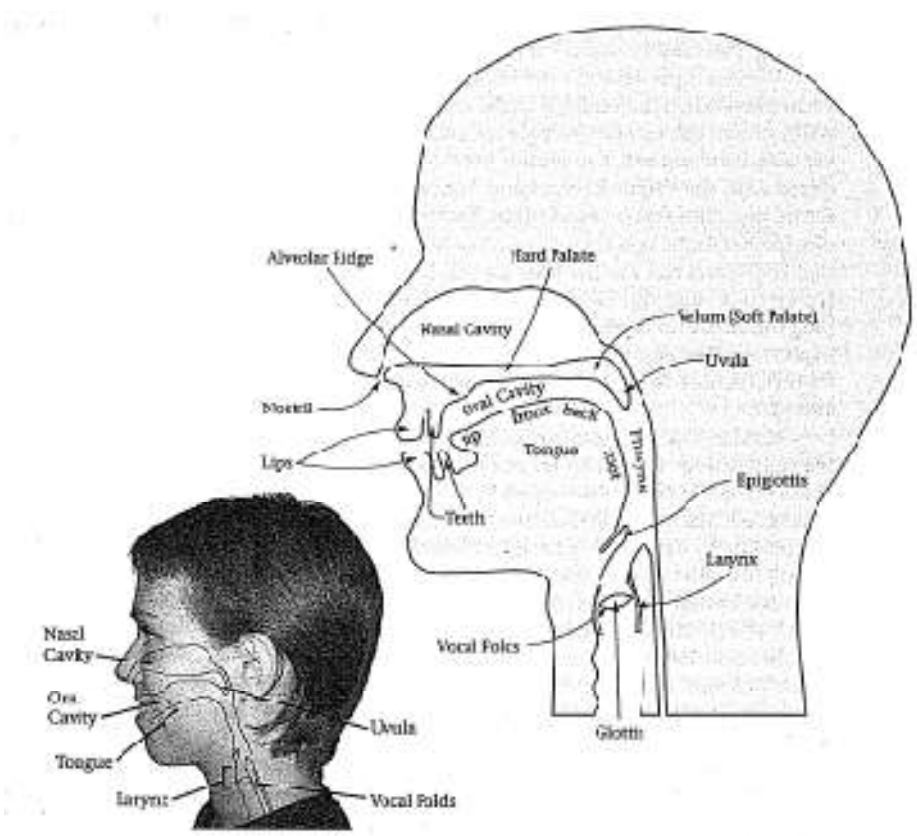
The manner of articulation

- (1) stop (or plosive)
- (2) nasal
- (3) fricative
- (4) approximant
- (5) lateral
- (6) trill
- (7) tap and flap
- (8) affricate

The place of articulation

- What does it mean?
- (1) bilabial
- (2) labiodental
- (3) dental
- (4) alveolar
- (5) postal veolar
- (6) retroflex
- (7) palatal
- (8) velar
- (9) uvular
- (10) pharyngeal
- (11) glottal

The Vocal Tract



Features of Consonants

- Voicing (state of the glottis)
- Place of articulation
- Manner of articulation
- Site for listening to the sounds of American English:

  http://www.uiowa.edu/~acadtech/phonetics/english/frameset.html

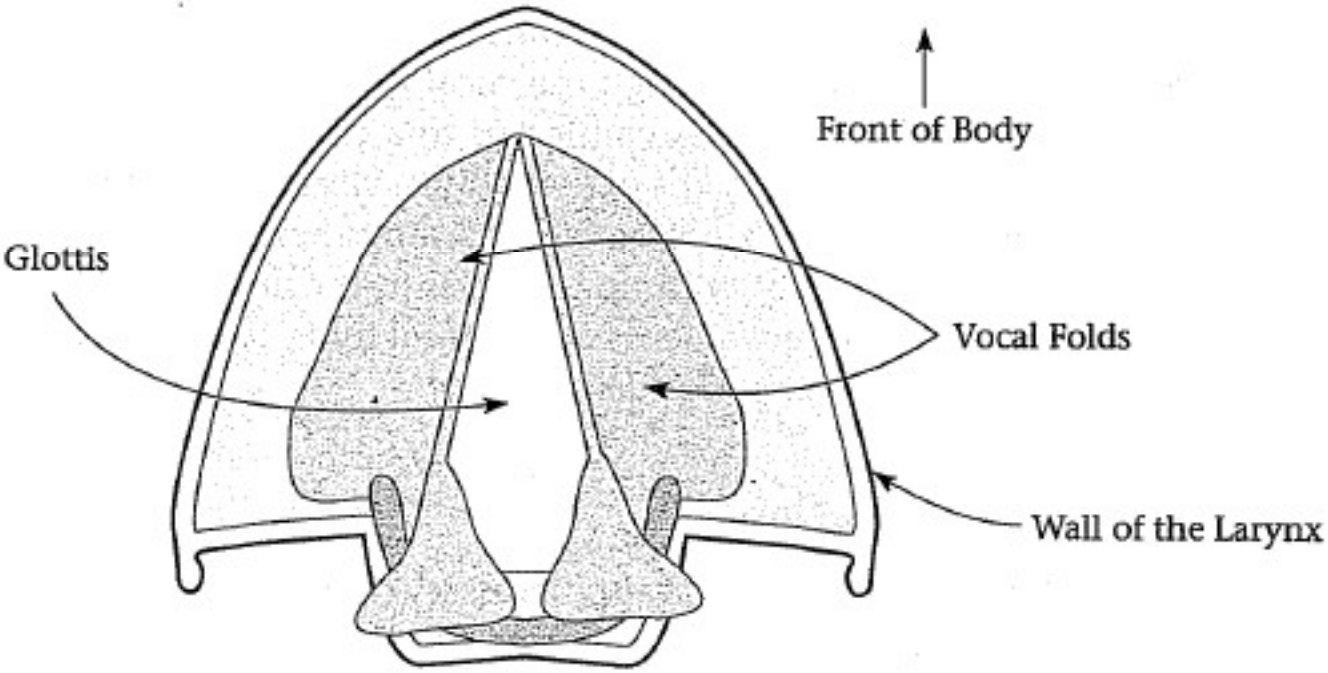
Phonetic features of consonants

- To describe phonetic features of consonants, list (a) voicing (b) place of articulation and (c) manner of articulation for consonants (3 features)

  e.g. [p] = Voiceless bilabial stop

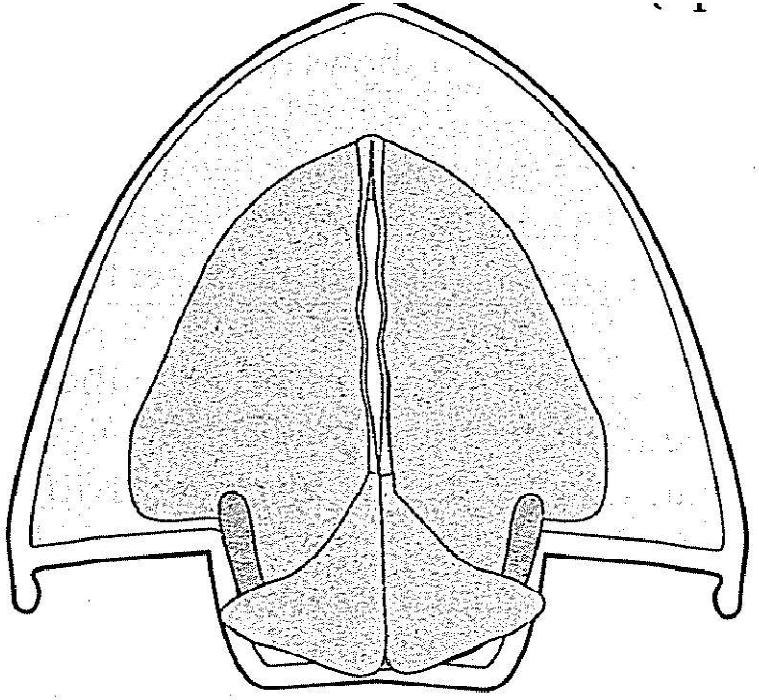
  [z] = Voiced alveolar fricative

Voicing



(a) Voiceless
(Open Vocal Folds)

Voicing



(b) Voiced
(Approximated Vocal Folds)

Place of Articulation

- Articulator: Organ a speaker employs to produce and distinguish certain speech sound (e.g. lips are active articulators and hard plate is a passive articulator)
- Place of articulation: Identifies the location of articulators

Place of Articulation

- Bilabial [p] [b] [m] [w]
- Labiodental [f] [v]
- Interdental [θ] [ð]
- Alveolar [t] [d] [n] [s] [z] [l] [ɹ]
- Palatal [ʃ] [ʒ] [ʧ] [ʤ] [j]
- Velar [k] [g] [ŋ]

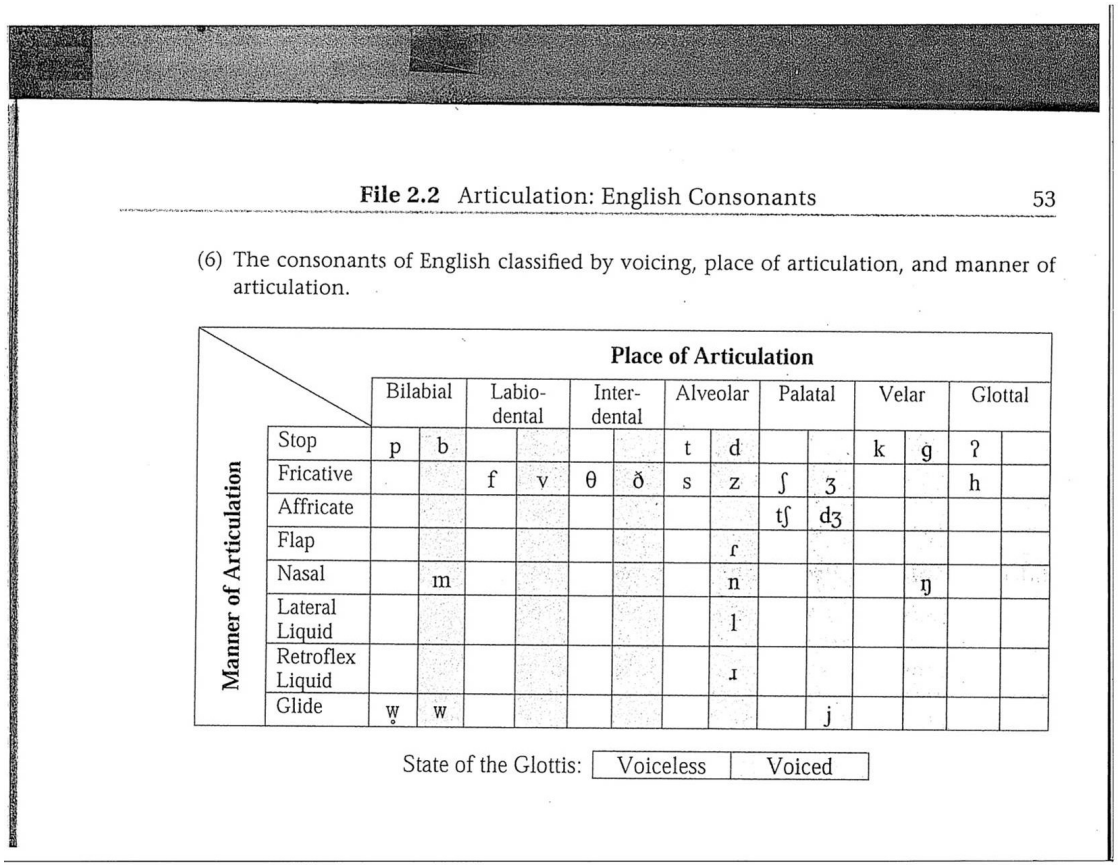
Manners of articulation

- Stops [p] [b] [t] [d] [k] [g]
- Fricatives [f] [v] [θ] [ð] [s] [z] [ʃ] [ʒ]
- Affricates [ʧ] [ʤ]
- Liquids [l] [ɹ]
- Glides [w] [j]

	PLACE OF ARTICULATION															
MANNER OF ARTICULATION		bilabial		labio-dental		inter-dental		alveolar		palatal		velar		glottal		
	stop	p	b					t	d			k	g	q		X
	fric.			f	v	th	dh	s	z	sh	zh			h		
	affric.									ch	jh					
	nasal		m						n				ng			X
	approx		w						l/r		y					X
	flap							dx					X			X

VOICING: voiceless | voiced

Consonant Chart for English



File 2.2 Articulation: English Consonants 53

(6) The consonants of English classified by voicing, place of articulation, and manner of articulation.

Manner of Articulation \ Place of Articulation	Bilabial		Labio-dental		Inter-dental		Alveolar		Palatal		Velar		Glottal	
Stop	p	b					t	d			k	g	ʔ	
Fricative			f	v	θ	ð	s	z	ʃ	ʒ			h	
Affricate									tʃ	dʒ				
Flap								ɾ						
Nasal		m						n				ŋ		
Lateral Liquid								l						
Retroflex Liquid								ɹ						
Glide	ʍ	w								j				

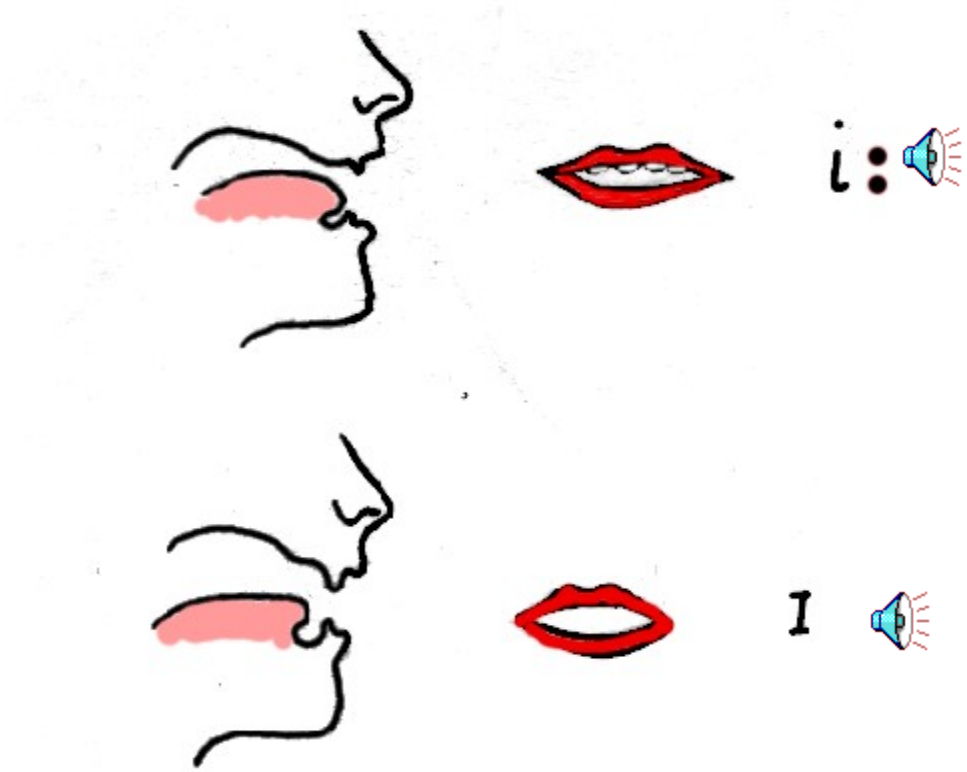
State of the Glottis: Voiceless | Voiced

Consonants: Manner of Articulation

- How is the airflow restricted?
  - Stop: [p],[t],[g],…
    - Airflow completely blocked (closure), then released (release)
    - Aka plosive
  - Nasal: air is released thru nose [m],[ng],…
  - Fricative: [s],[z], [f] air forced thru narrow channel
  - Affricates [tʃ] begin as stops and end as fricatives

– Approximant: [w],[y]
  - 2 articulators come close but don't restrict much
  - Between vowels and consonants
  - Lateral: [l]
– Tap or flap: [ ]

Pure vowels usually come in pairs consisting of long and short sounds

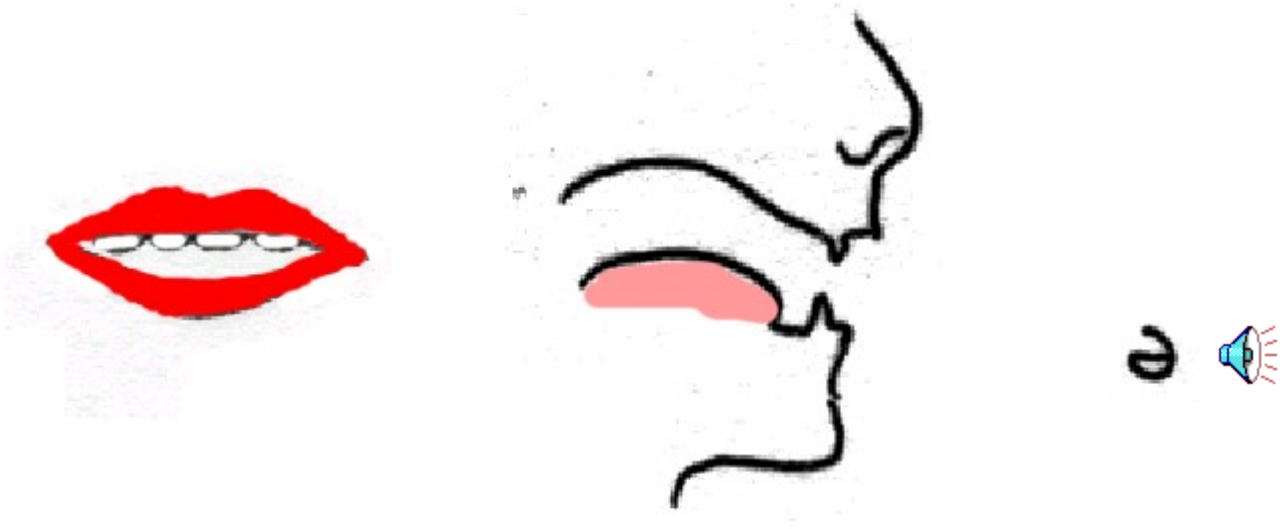


This is found in the word t***ea.*** The lips are **spread** and the sound is **long**

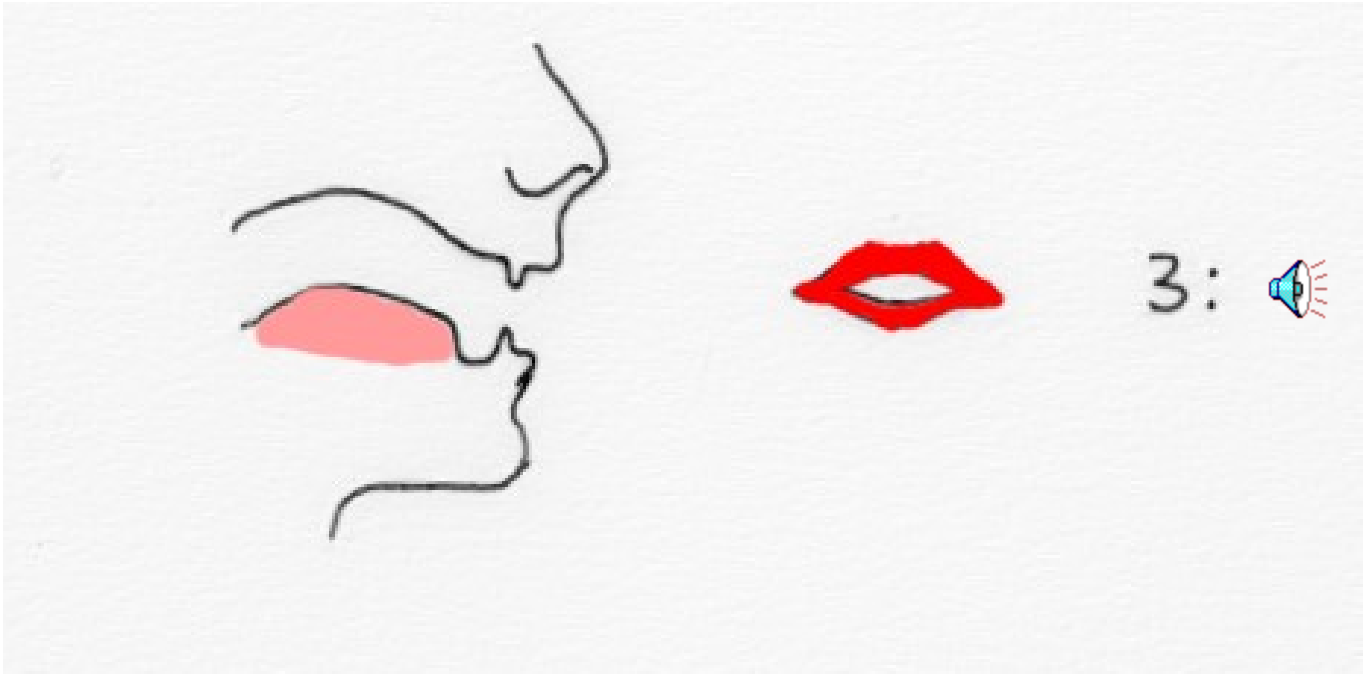
This is found in the word h***i***p. The lips are **slightly spread** and the sound is **short**

The tongue tip is raised slightly at the front towards the alveolar. In the longer sound the tongue is raised higher.

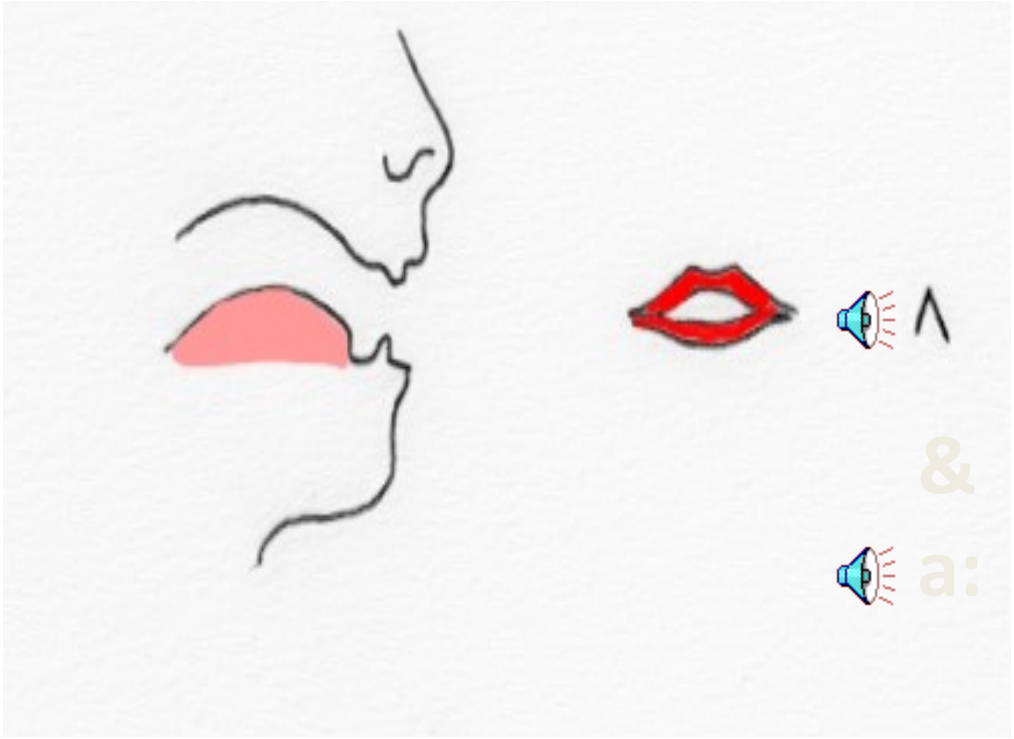
The most common sound in English – the Schwa



This sound is made by relaxing the mouth and keeping your lips in a **neutral** position and making a **short** sound. It is found in words like pap***er,*** ov***er, a***bout, and common in weak verbs in spoken English.



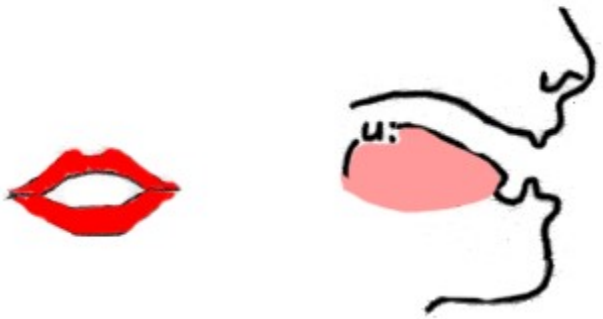
This sound is the **long** form of the schwa sound. It is found in words like th***ir***teen and b***ir***d. The mouth is relaxed and lips are **neutral.**



This is the short sound – ***u***p, c***u***t & b***u***tter

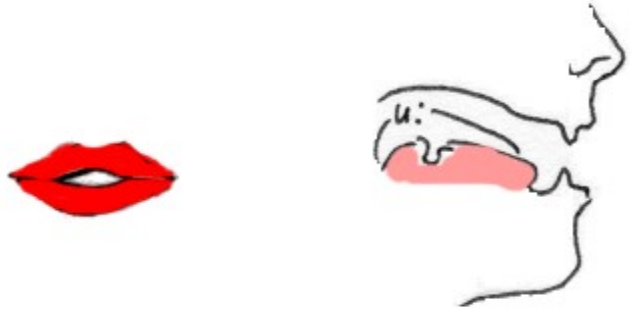
This is the **long** sound – c***ar,*** f***a***st & d***ar***k

The centre of the tongue is raised towards the soft plate, the lips are **neutral.**



u:

The **long** sound
– y***ou,*** t***oo*** & bl***ue***

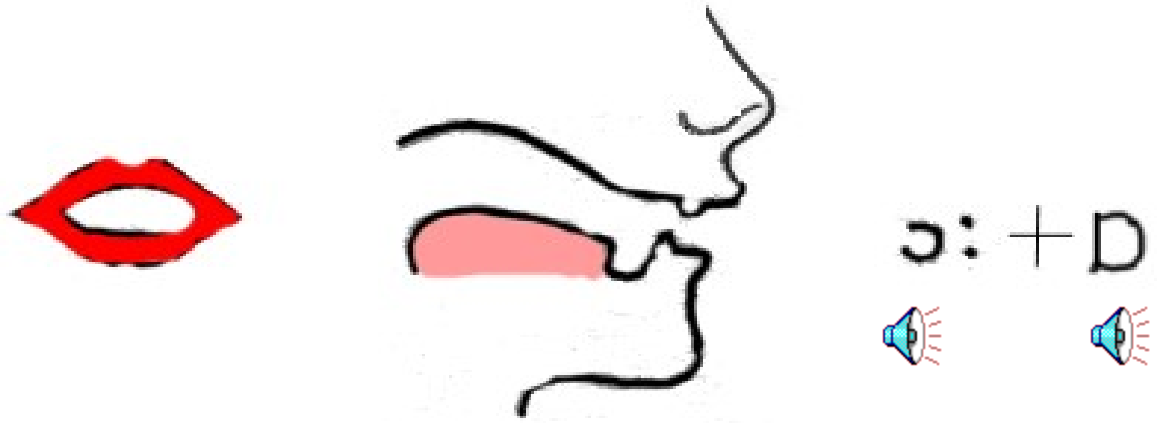


ʊ

The short sound –

G***ood,*** w***ou***ld & w***oo***l

The lips are **rounded** and the centre and back of the tongue is raised towards the soft plate. For the **longer** sound the tongue is raised higher and the lips are **more rounded.**

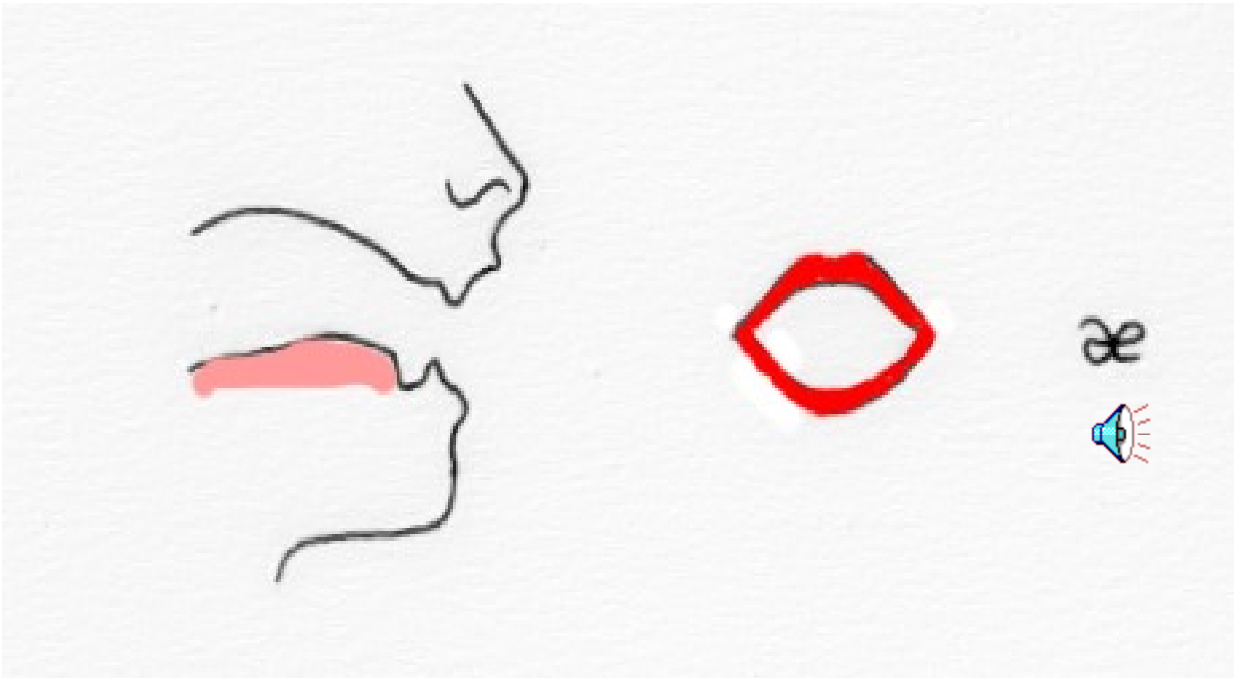


Made with **rounded** lips and tongue slightly raised at the back

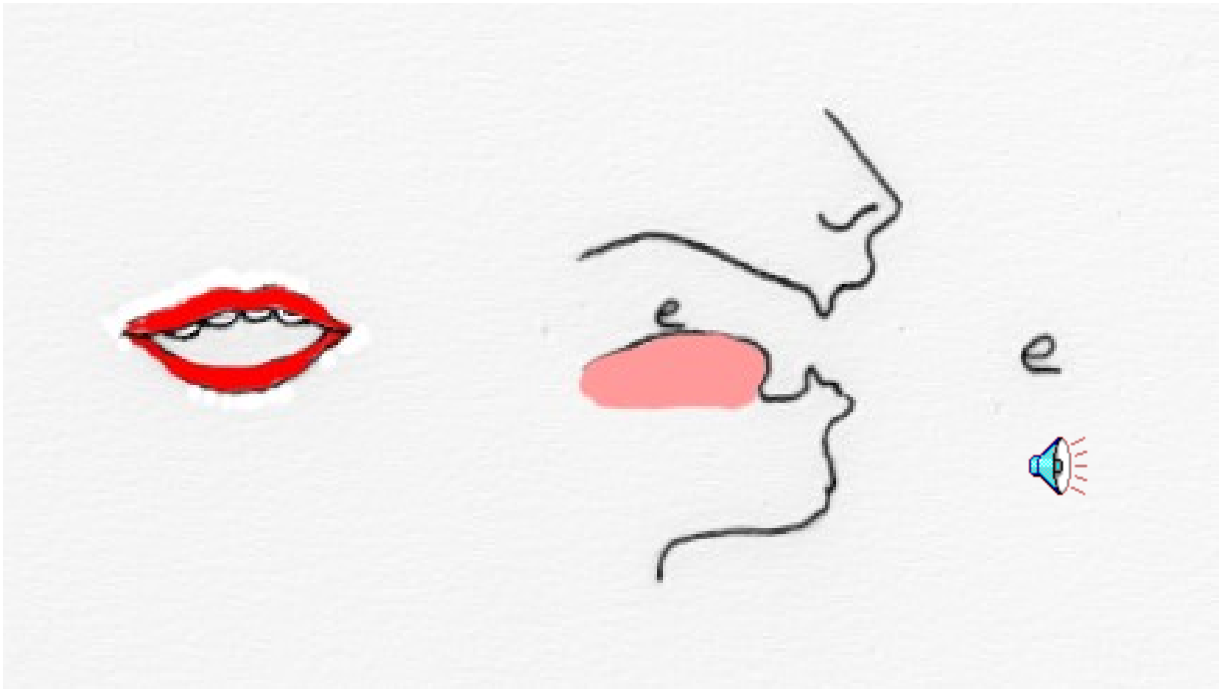
The **long** sound– d***oor,*** f***our*** & m***ore***

The **short** sound – h**o**t, cl**o**ck and wh**a**t.

Two of the vowels do not have long sounds



This sound is made with the mouth **spread** wide open. It is found in – c***a***t, m***a***n, ***a***pple & r***a***n



The sound of ‘e’ is found in – w**e**t, l**e**ft, wh**e**n & t**e**ll. Like the sound for ‘a’ it is a short sound that has no long version.

The vowel sounds we have just reviewed make up the rest of the diphthongs etc. that come next.

Consonants

The Articulation of sound based on received pronunciation

(R. P.)

(These sounds for reference only)

1) Plosives

Plosives are made by making a complete closure between some point and the vocal tract. Pressure builds up behind the closure which is released to create sound.

This group includes the sounds of **b, p, k, d, t** & **d.**

Closed mouth

b & p

These two sounds are plosives, they differ in the way the voice is used during the sound.

1) **P** is aspirated & voiceless– air leaving the mouth. It is a gentle sound.

2) **B** is a voiced sound and the air is restricted through the glottis

Both sounds are known as

Bilabial Plosives

k

g

The sounds **k** & **g** are made by raising the tongue at the back of the mouth to make a complete closure.

1) **k** is a voiceless sound

2) **g** is a voiced sound

These are known as

Velar Plosives

t

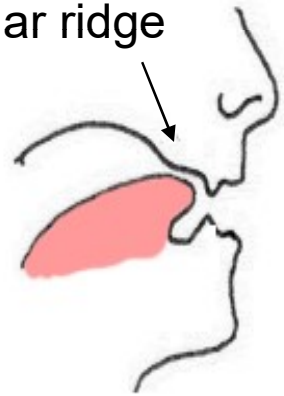
The sounds of ‘t & d’ are made by raising the tongue to touch the front of the alveolar ridge just behind the teeth.

1) ‘t’ is voiceless

2) ‘d’ is voiced

Notice how you can feel air when pronouncing the ‘t’, the ‘d’ sound has no air as it is voiced through the vocal cords.

Alveolar ridge



d

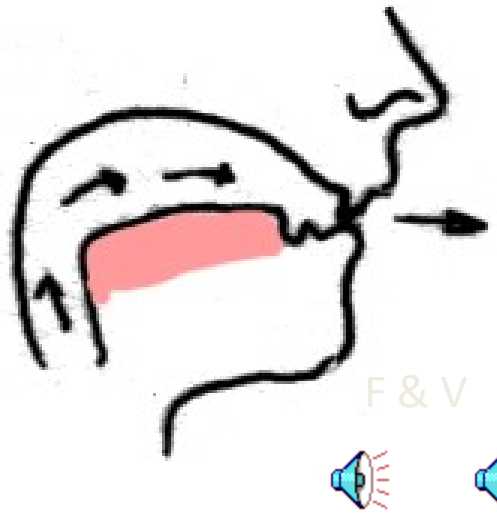
These are know as -

Alveolar Plosives

2) Fricatives

Fricatives are made by moving two vocal organs together to restrict the release of sound.

This group includes the sounds of *f, v, s, z,* and both *sh* & *th* sounds



1) The ‘f’ is voiceless – ***f***irst, ***ph***one & ***f***lat

2) The ‘v’ is voiced – ***v***ideo, lo***v***e & ha***v***e

The top front teeth are placed on the top of the bottom lip. The sound is squeezed through the small gaps

These sounds are known as

Labio-dental Fricatives

ð The voiced sound, found in ***th***e, ***th***ere & fea***ther***

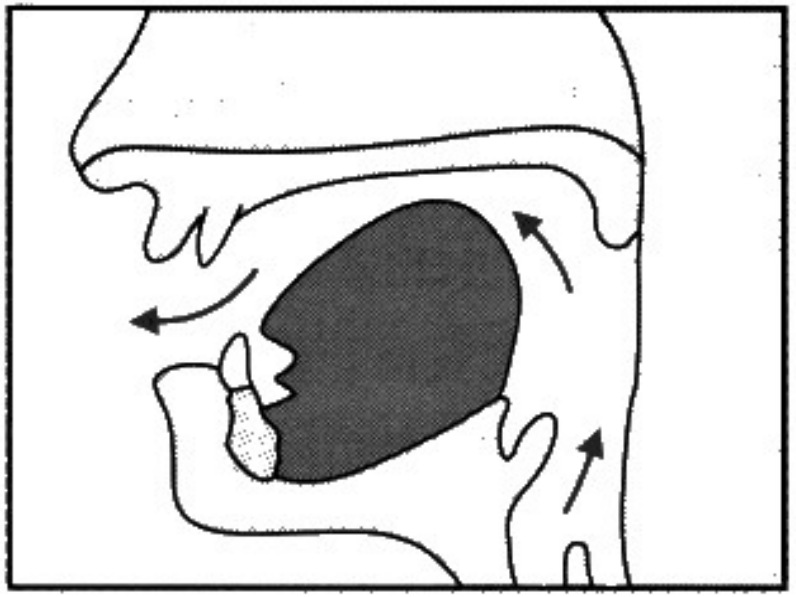
θ The voiceless sound found in ***th***ink, ***th***in & ***th***ought

The tongue touches the teeth, usually just behind the front teeth. Above is shown the way it can be practised by putting the tongue between the front teeth and touching the index finger. These are known as a

Dental fricatives

The sound ‘sh’ is made by raising the blade of the tongue to make light contact with the soft palate. The sound is squeezed through the gap making a ‘sh’ sound.

The voiceless sound can be found in ***sh***e, wa***sh, s***ure & ***ch****ampagne*

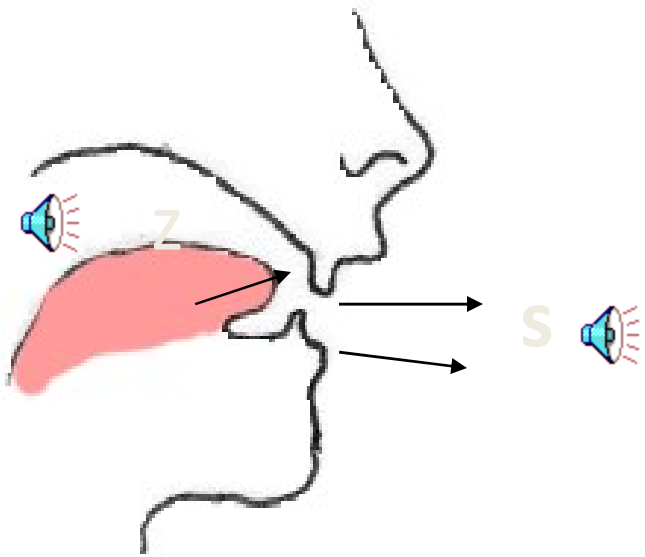


/ʃ, ʒ/

The voiced sound is found in televi**s**ion & revi**s**ion

These sounds are know as

Palato-alveolar Fricatives



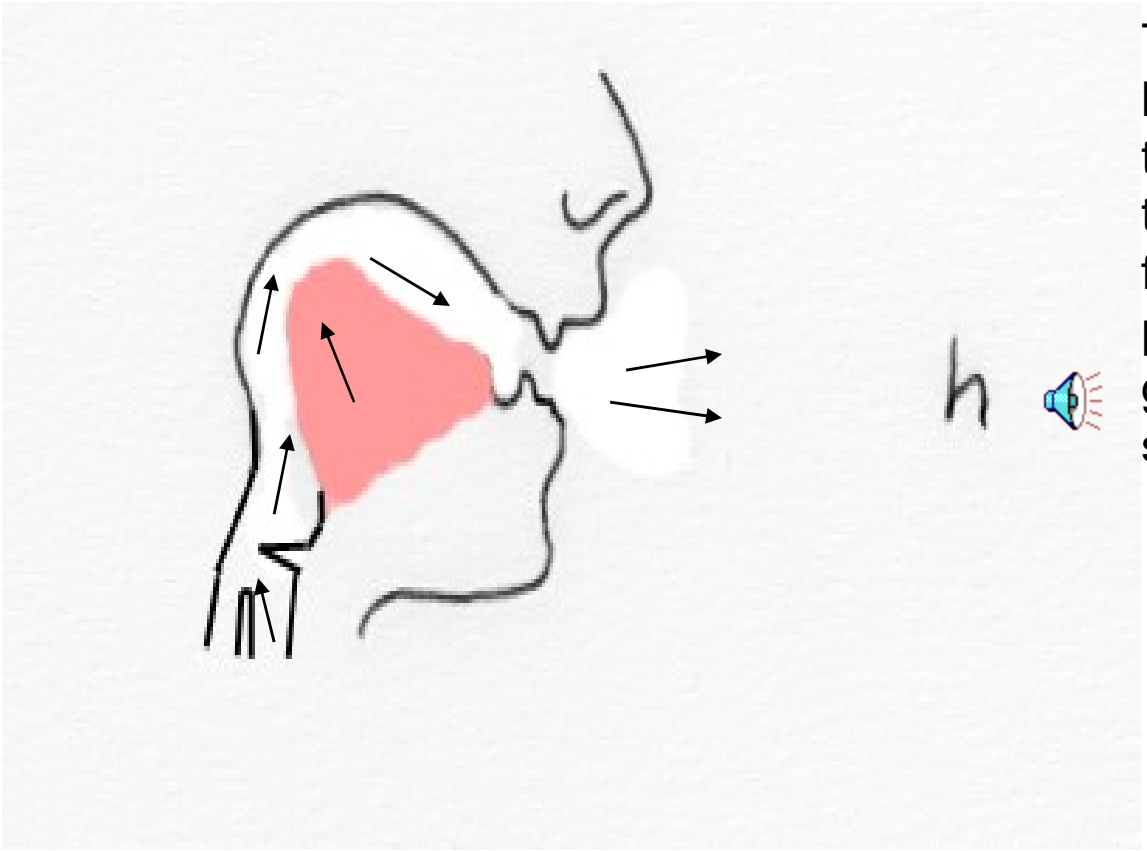
The tip of the tongue is moved towards the edge of the soft plate and the alveolar ridge. The sound is made by squeezing the sound through the gap.

'***s***' – ***s***ee, voi***ce*** & most words that begin with 's'

'***z***' – ***z***oo, ha***s,*** free***z***e, car***s*** and own***s.***

These sounds are known as

Alveolar Fricatives



This sound is created by raising the back of the tongue to lightly touch the soft plate, air from the lungs is pushed up past the glottis and through the small gap.

The sound is found in – ***h***otel, ***h***is, be***h***ind & ***h***ive

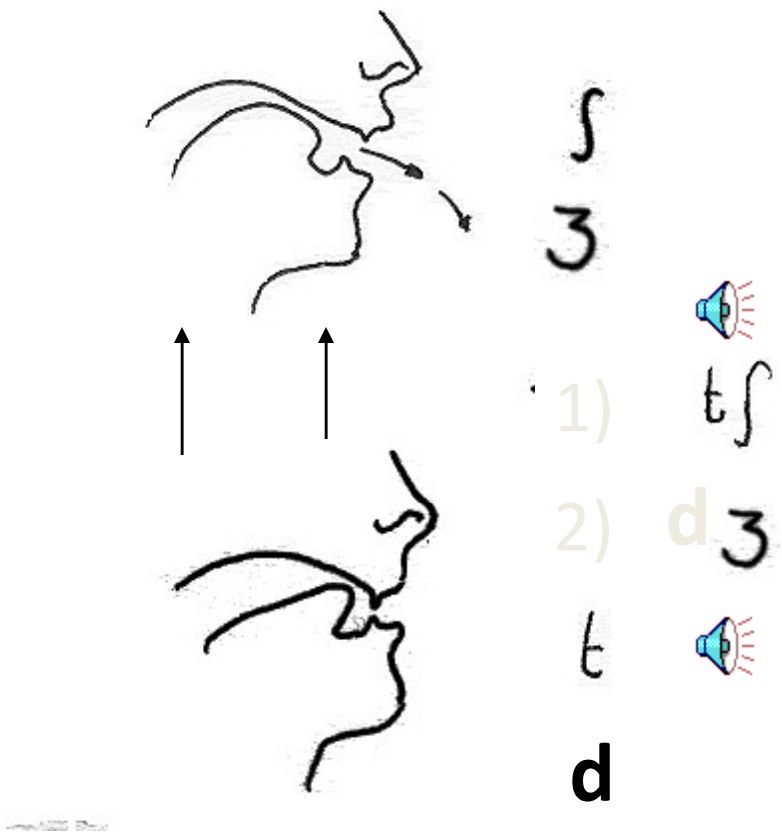
It is known as a

Glottal Fricative

Affricatives

Affricatives are made by making a complete closure at some point in the mouth, similar to plosives. However, affricatives differ as the air is released slower than a plosive.

The sounds ‘ch’ and its voiced version make up this group.



These sound are made by combining the two sounds shown here.

The plosive sound made by the t/d is changed by the fricative that follows the release of pressure.

1) ***ch***ur***ch,*** crun***ch*** & lun***ch***

2) ***J***eans, ***g***enerator & bri***dge***

These sounds are known as

Palato-alveolar Affricatives

Nasals

Nasal sounds are made by making a complete closure in the mouth and allowing the air to escape through the nose.

This group includes the sounds */n/ /ng/ /m/*

1) n

2) ŋ

These sounds are made by blocking off part of the mouth by using the tongue. The air moving through the nasal passages creates the sound.

1) ***n***o, bee***n,*** ***n***i***n***e & ***kn***ow. It is known as a

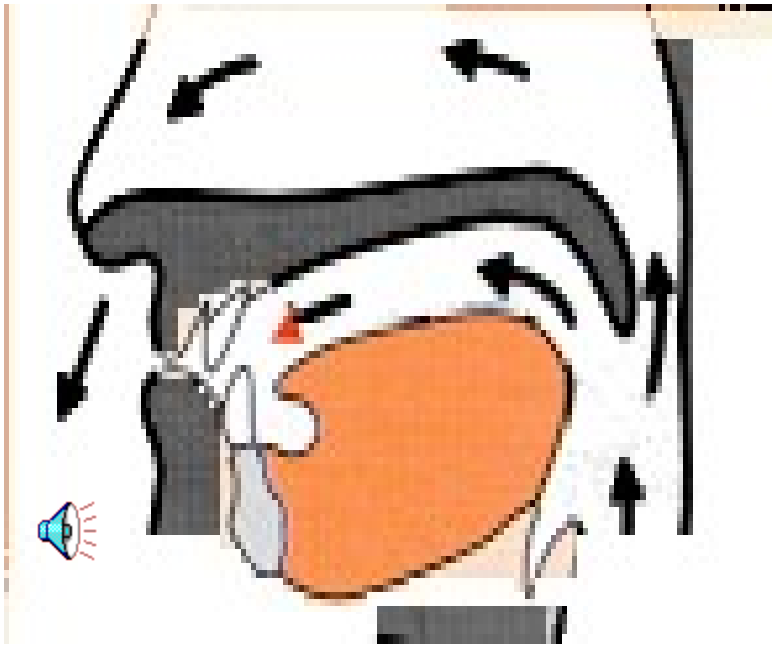
Alveolar Nasal

2) So***ng,*** E***ng***lish & tha***n***k. It is known as a **Velar Nasal**

(This sound is common in words that have ‘ng & ‘nk’ spellings.)

The ‘m’ sound is made by closing both lips and allowing the sound to travel through the nasal passages

My/ drea***m***/ s***m***ile/ re***m******m***ber



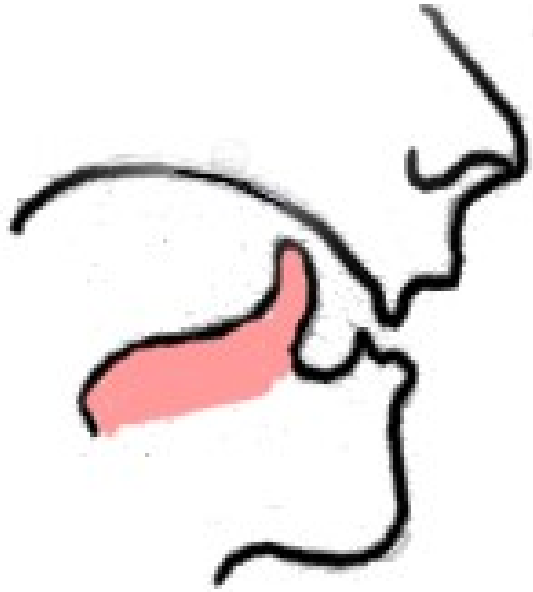
This sound is known as a **Bilabial Nasal**

Oral Continuants

Some consonants are in some ways like vowels as they are frictionless. (The previous group ‘Nasals’ are also frictionless)

Some are also midway between a consonant and a vowel, the ‘*w*’ and ‘*y*’ in ‘yes’ are sometimes called semi-vowels or glides.

These with ‘*l*’ and ‘*r*’ make up the group called continuants or sonorants



r

The sound ‘r’ is made when the tip of the tongue is held close to the alveolar ridge (but not touching). The side of the tongue should touch the lower back teeth.

The sound is usually quite difficult for Asian students and can be confused with ‘l’.

(***r***ed, desc***r***ibe, b***r***ead, f***r***ee, d***r***ain, t***r***ouble)

This is known as a

Post-alveolar Approximant

l

The sound of ‘l’ is divided into two distinct sounds, which occur according to the following rules. If the sound occurs at the beginning or middle of the word then ‘clear l’ is made; if the sound occurs at the end of the word then the sound is a ‘dark l’.

Clear- the tip touches the centre or the alveolar ridge allowing the air to escape around the sides

Dark- the same as the clear ‘l’ but the centre of the tongue is raised to the soft plate.

dark l

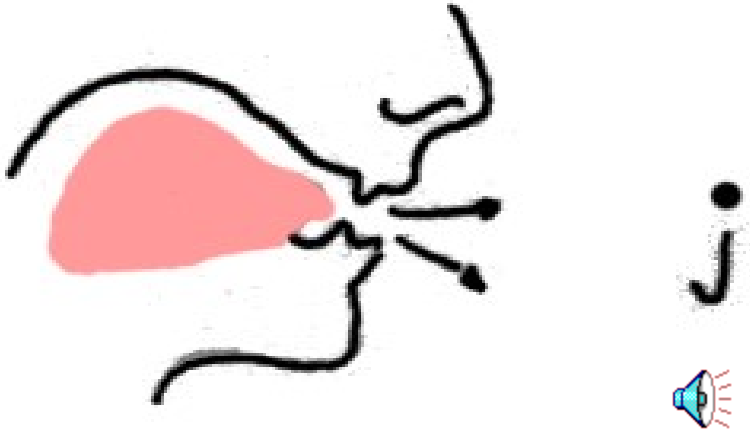
Know as **Laterals**

w

A ‘w’ sound is similar to the y***ou*** sound but the lips are rounded to give more tension. The tongue too is similarly positioned only it is raised slightly more.

(***w***edding, ***w***indow, ***w***here, ***w***as, ***w***hat, ***w***ear, re***w***ind & ***w***ish)

Known as a **Labio-velar semi-vowel**



The sound is made by raising the centre of the tongue towards the soft plate and lips are **neutral**

(*y*esterday, ***y***ear, ***y***our, yeah, and to devoice a strong (fortis) consonant as in p(***y***)ure, a glide)

Known as a **Palatal semi-vowel**

2.2.2 vowels

- Cardinal vowels:
- 1) A set of vowel qualities arbitrarily defined, fixed and unchanging, intended to provide a frame of reference for the description of the actual vowels of existing languages. When the cardinal vowels are explained, examples are usually given from various languages to help the student. It should not be thought, however, that the cardinl vowels are actually based on the examples given.

VOWELS

Next major topic: Vowel articulation and (a little bit) the acoustics of vowel production.

What's a vowel? A speech sound produced with a (relatively) unimpeded air stream.

What's a consonant? A speech sound produced with air stream impeded, constricted, or obstructed.

Bottom line: Vowels are *open-ish*, consonants are *closed-ish.*

bababababababa (CVCVCV… closed, open, closed, open …)

shashashashashasha (CVCVCV… closed, open, closed, open …)

hahahahahahahaha (CVCVCV… closed, open, closed, open …)

Constriction can be anywhere – in the case of [h], it's way down at the larynx. Still counts as a constriction, which makes [h] a consonant.

Not all vowels are equally open. Compare the vowels in *"keep"* and *"cop"*: The /ɑ/ of *"cop"* is much more open that the [i] of *"keep"* (note how much further your jaw drops for [ɑ]).

Not all consonants are equally closed. **Compare the consonants in *"beep"* and *"weep":* The [b] of *"beep"* is much more closed that the [w] of *"weep"*; i.e., for [b] the closure at the lips is complete, while for [w] the air steam is merely impeded.**

So, what's the formal definition of a vowel; i.e., how open does the vocal tract have to be for a sound to qualify as a vowel? Or, how closed does the vocal tract have to be for a sound to qualify as a consonant?

Don’t have a formal definition or dividing line; don’t really need one. Your intuitions from grade school about vowels and consonants will *almost* always be right. (Vocalic /r/ is the one tricky case – we’ll talk about it.)

One grade school idea to get out of your head – *the vowels of English are not A, E, I, O, U.* These are the letters that are used to represent vowels in English orthography. *English has many more than 5 vowels.*

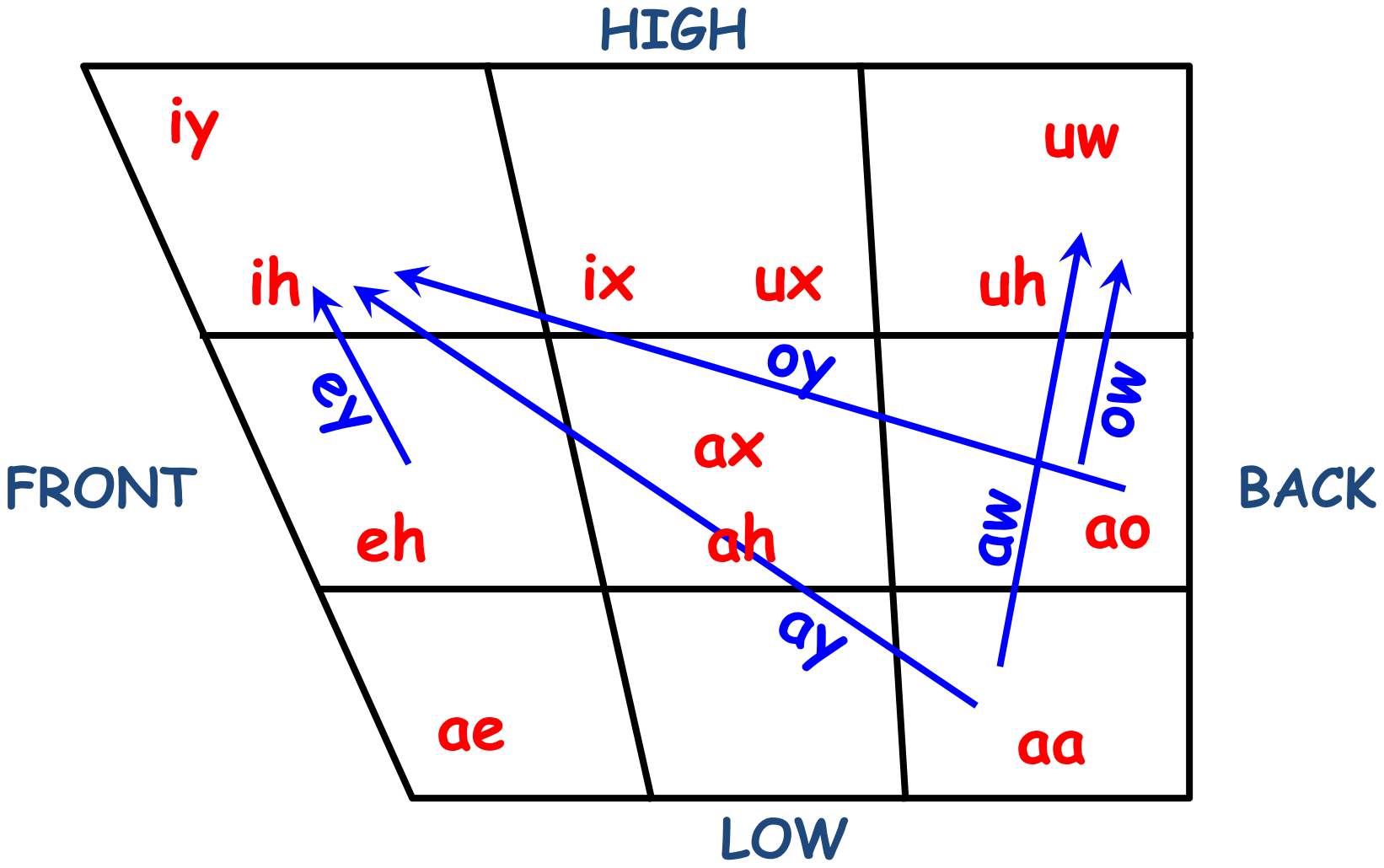
Vowel Symbols

/♓/	heed	small i
/♟/	hid	cap i, or small cap i
/♏/	hayed, bait	small e
/☜/	head	epsilon
/✈/	had	ash
/✌/	hod, pod	script a (note the difference between /✌/ and /♋/)
/❷/	hawed, caught	open o
/☐/	hoed, boat	small o
/☥/	hood	upsilon
/◆/	who'd, boot	small u
/☝/	hud, but	caret or wedge or turned v
/♌/	heard	schwar
/★/	about, mantra	schwa

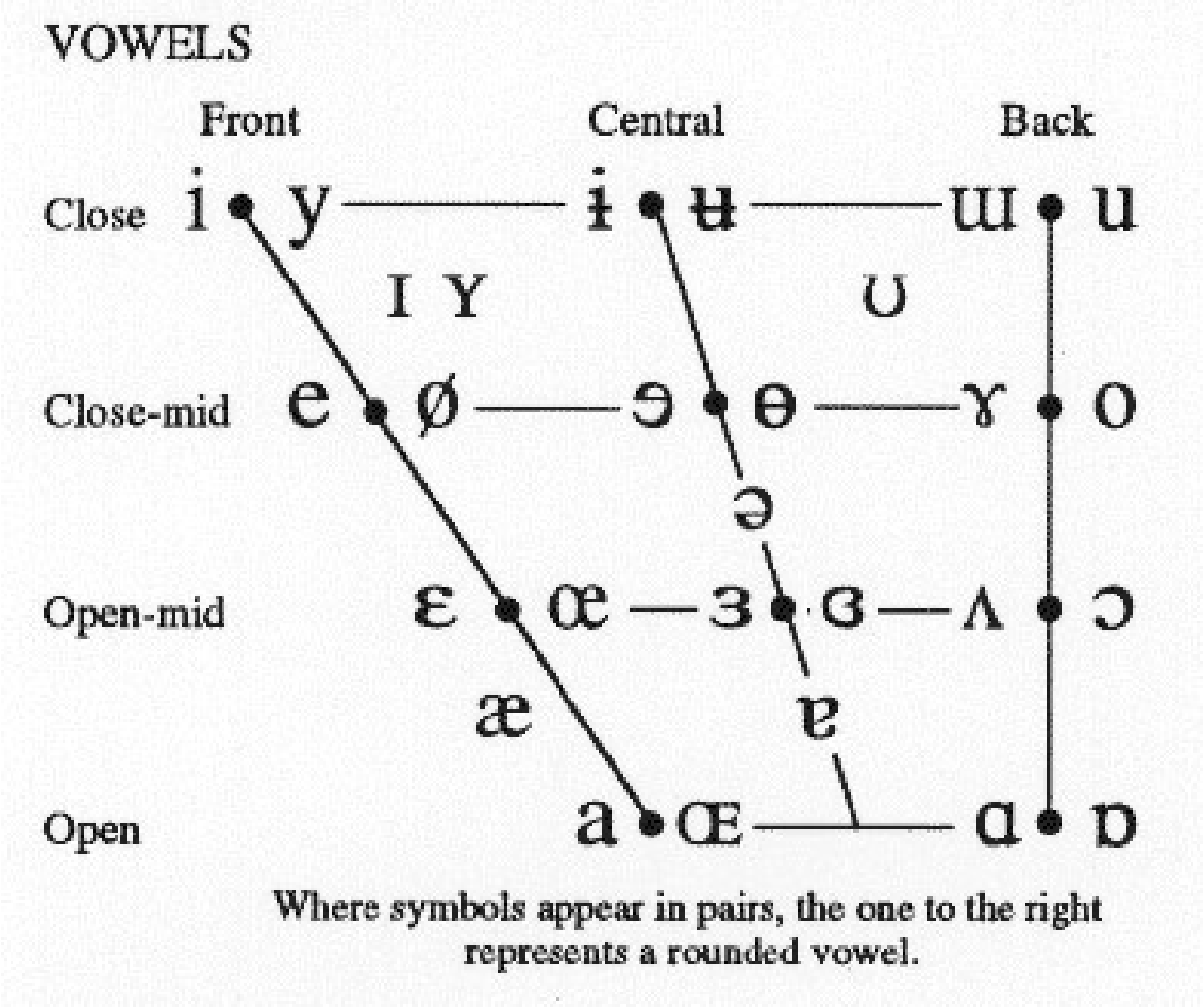
Vowels

- Vowel height
  - How high is the tongue? high or low vowel
  - Where is its highest point? front or back vowel
- How rounded are the lips?
- Mono vs. diphthong, e.g. [ei]
  - 1 vowel sound or 2?

American English vowel space

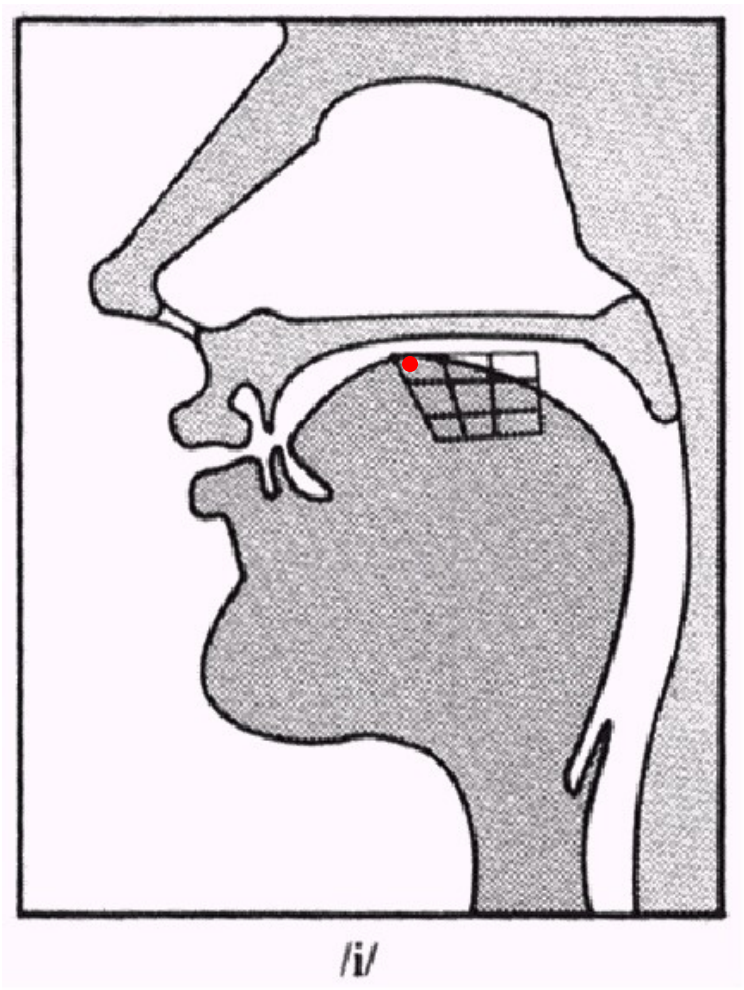


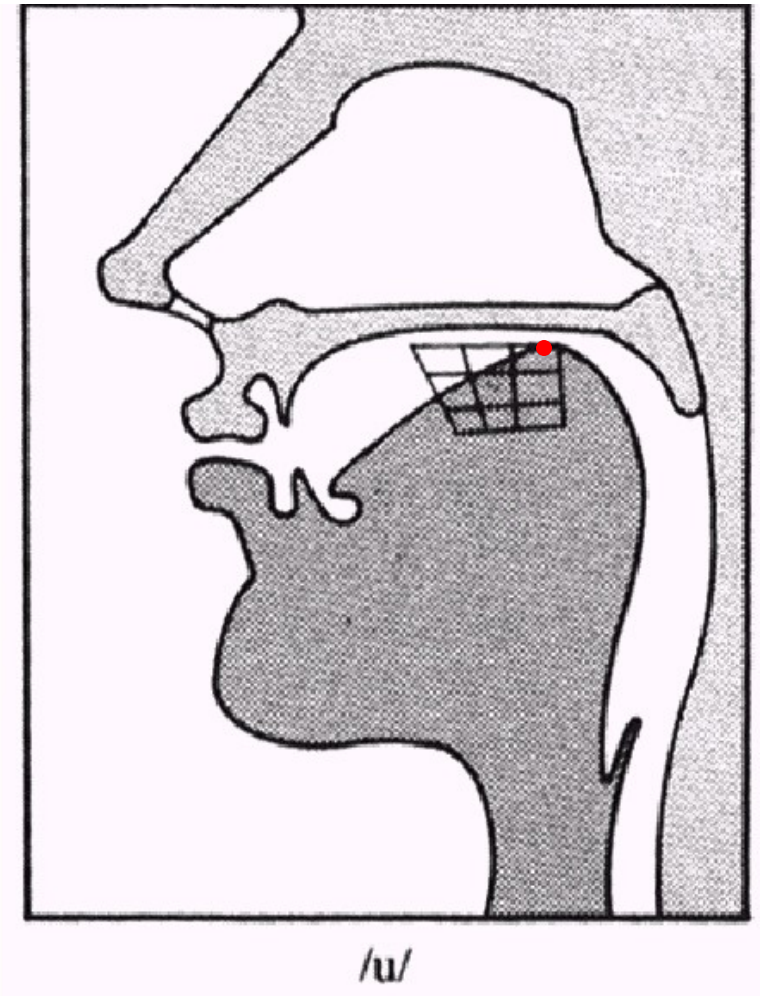
IPA vowels



(Distributed by the International Phonetics Association.)

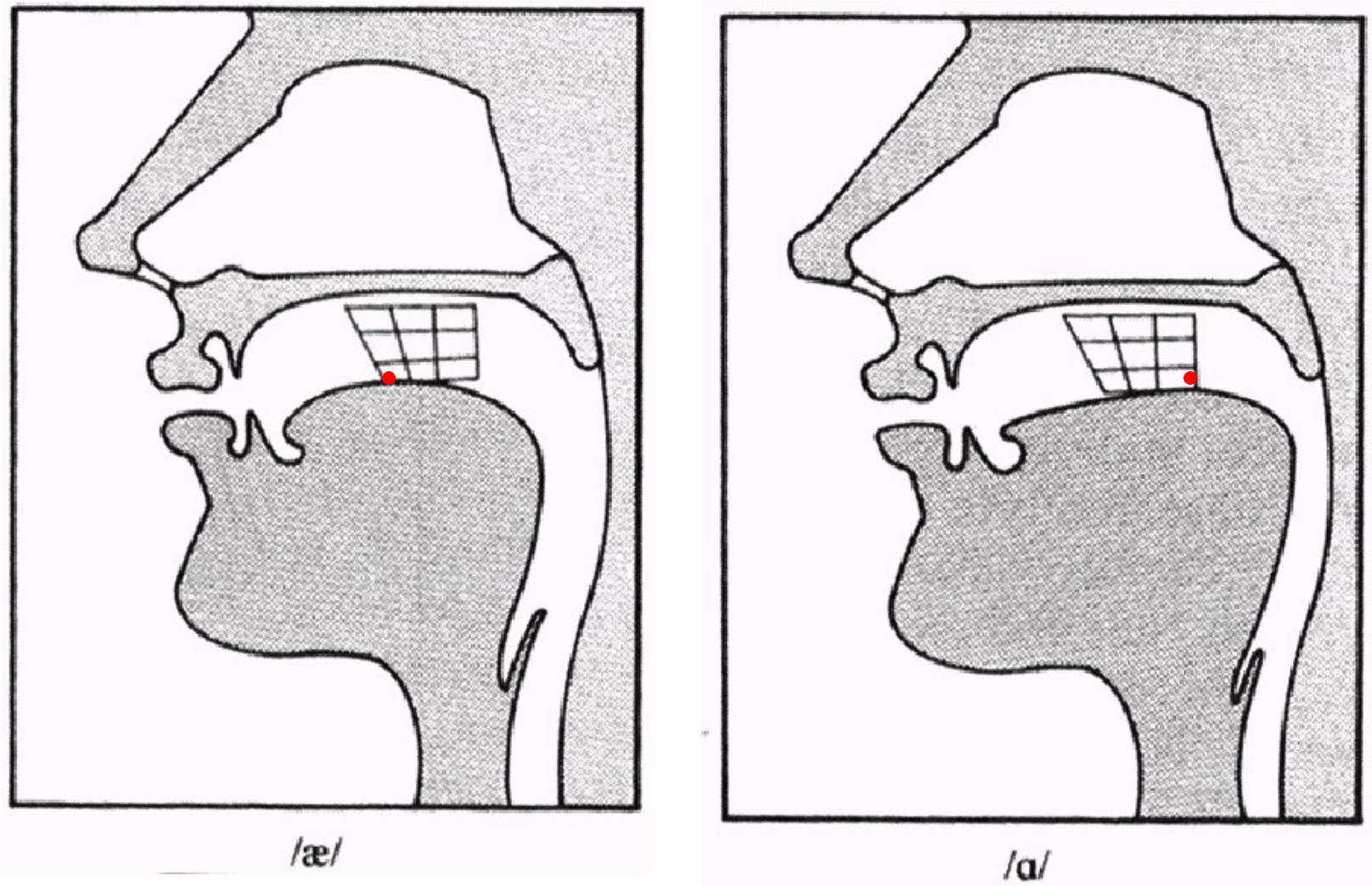
[iy] vs. [uw]





(From a lecture given by Rochelle Newman)

[ae] vs. [aa]



(From a lecture given by Rochelle Newman)

Vowel Articulation

Dimensions of vowel production (Slightly different list from MacKay; Major dimensions 1-3 in red; 4-8: secondary dimensions)

(*Major dimensions in red*)

1. **Tongue height [e.g., [i] ("*beet*") vs. [æ] ("*bat*")]**
2. **Frontness or advancement [e.g., [æ] ("pat") vs. [ɑ] ("pot")]**
3. **Lip rounding (e.g., [u] vs. [ɑ])**
4. **Tense vs. lax (e.g., [i] vs. [ɪ], [u] vs. [ʊ], [e] vs. [ɛ])**
5. **The special case of vocalic R ([ɚ] or [ɝ] as in "*bird" or "sir"*)**

Vowel Articulation (cont'd)

6. Length/Duration/Quantity: Any vowel can be spoken at any duration, but different vowels have different *typical* or *inherent* durations (e.g., *beet-bit, bait-bet, suit-soot, bat-bet*, etc).
7. Phonation/Breathy/Whisper: Vowels can be phonated, whispered, or anywhere in between (part buzz *and* part hiss = *breathy*)

1. Tongue height

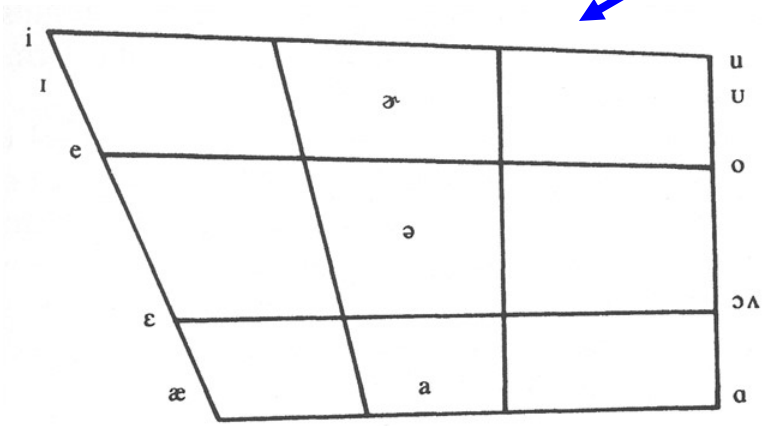
a. Compare tongue/jaw position for [i] (“*beet*”) and [æ] (“*bat*”)

b. Attend to tongue/jaw position for this sequence: [i ɪ e ɛ æ]

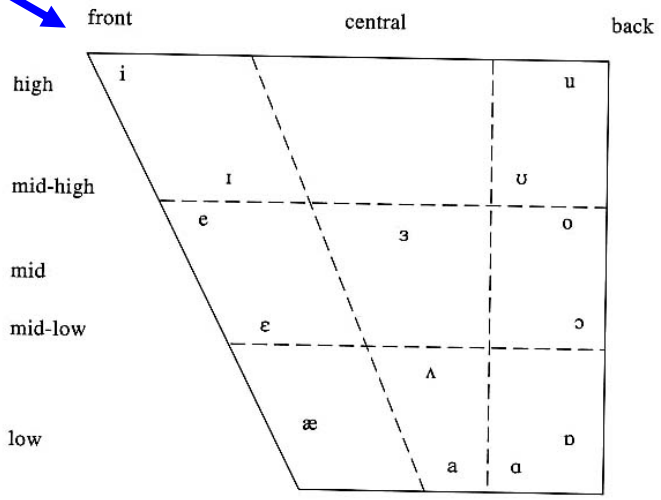
c. Attend to tongue/jaw position for this sequence: [ɑ ɔ o ʊ u]

Vowel Quadrilateral

MacKay

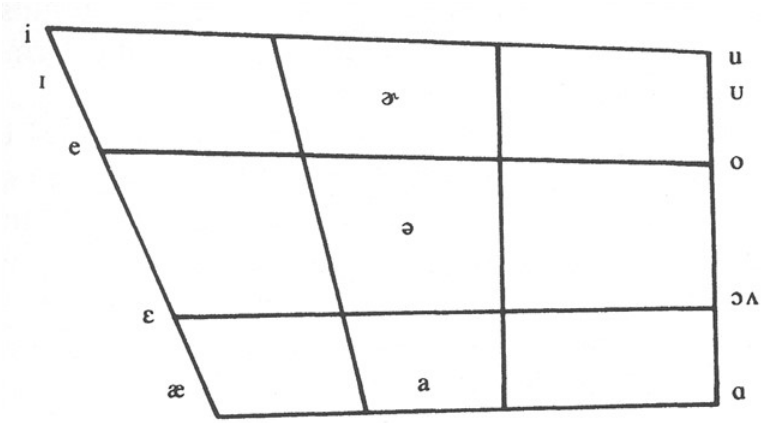


Ladefoged (many others)

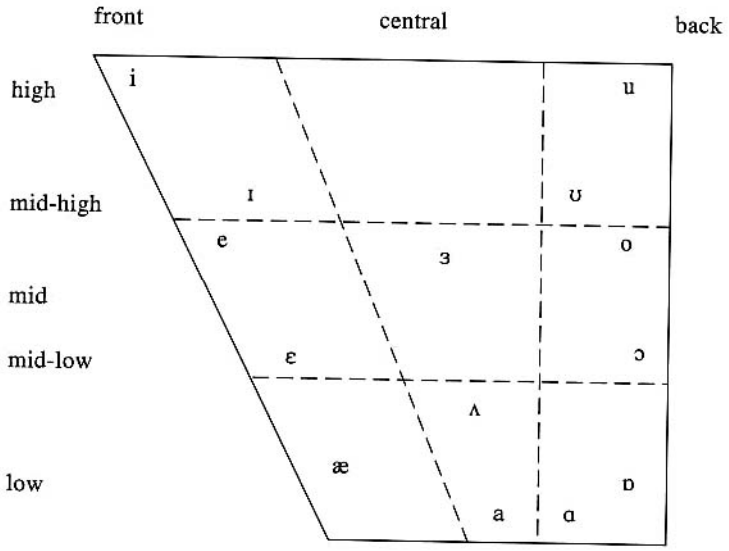


For now, attend only to [i ɪ e ɛ æ] and [ɑ ɔ o ʊ u] Slight difference of opinion on [ʊ] and [ɪ]; otherwise these two vowel quadrilaterals are quite similar (for these 10 vowels).

MacKay



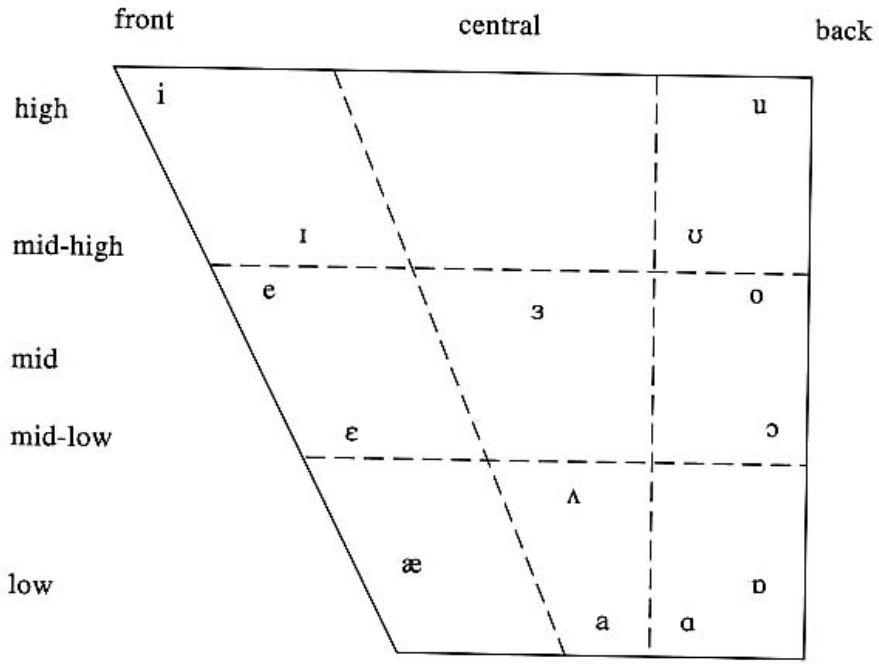
Ladefoged (many others)



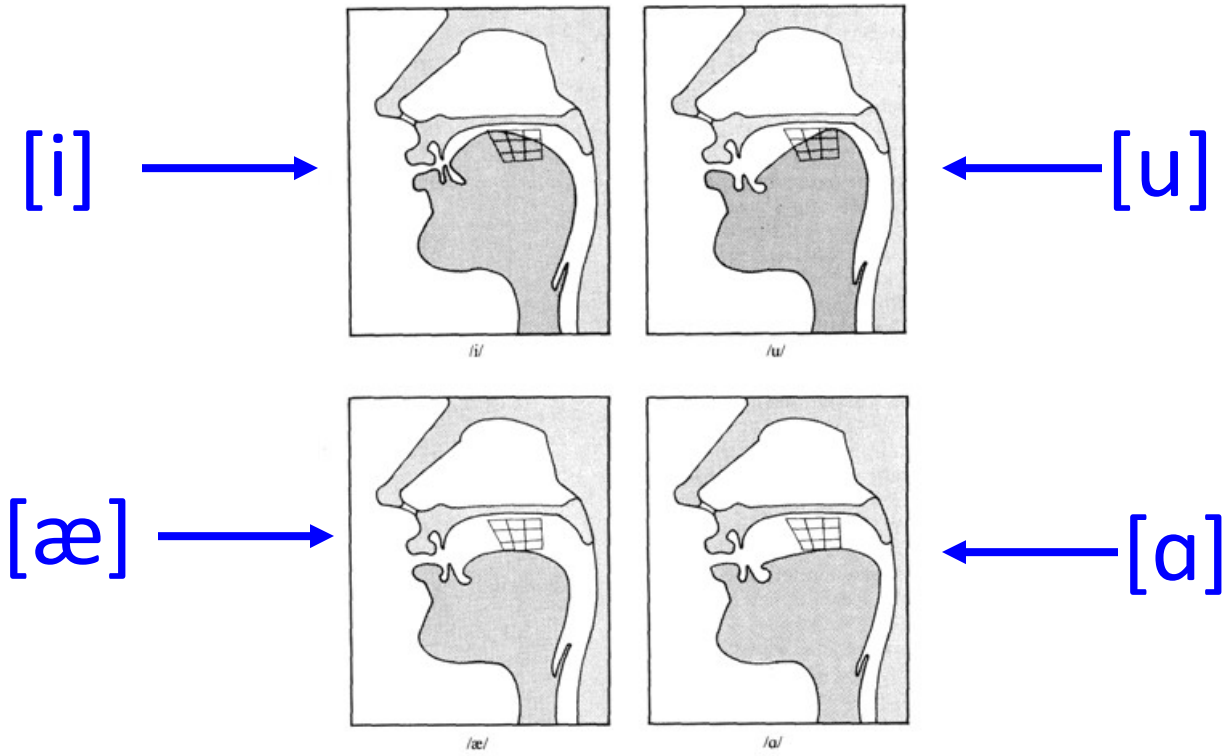
Note especially difference in location of [ɻ, but see also ☯🖐☸⌧ ☯✝☸⌧ ☯✌☸👄 Who's right? Not sure. Probably Ladefoged. Some may reflect dialect differences.

Terminology: Vowels differing in tongue height are classified as *high, mid, or low*. Note: When we're talking about tongue height, vowels like [e ɛ o ɔ] are *mid*, not *central.* The term *central* distinguishes vowels based on *advancement* or *frontness*, not tongue height.

Mid = midway between high & low; *Central* = midway between front and back. *You just have to memorize it.*



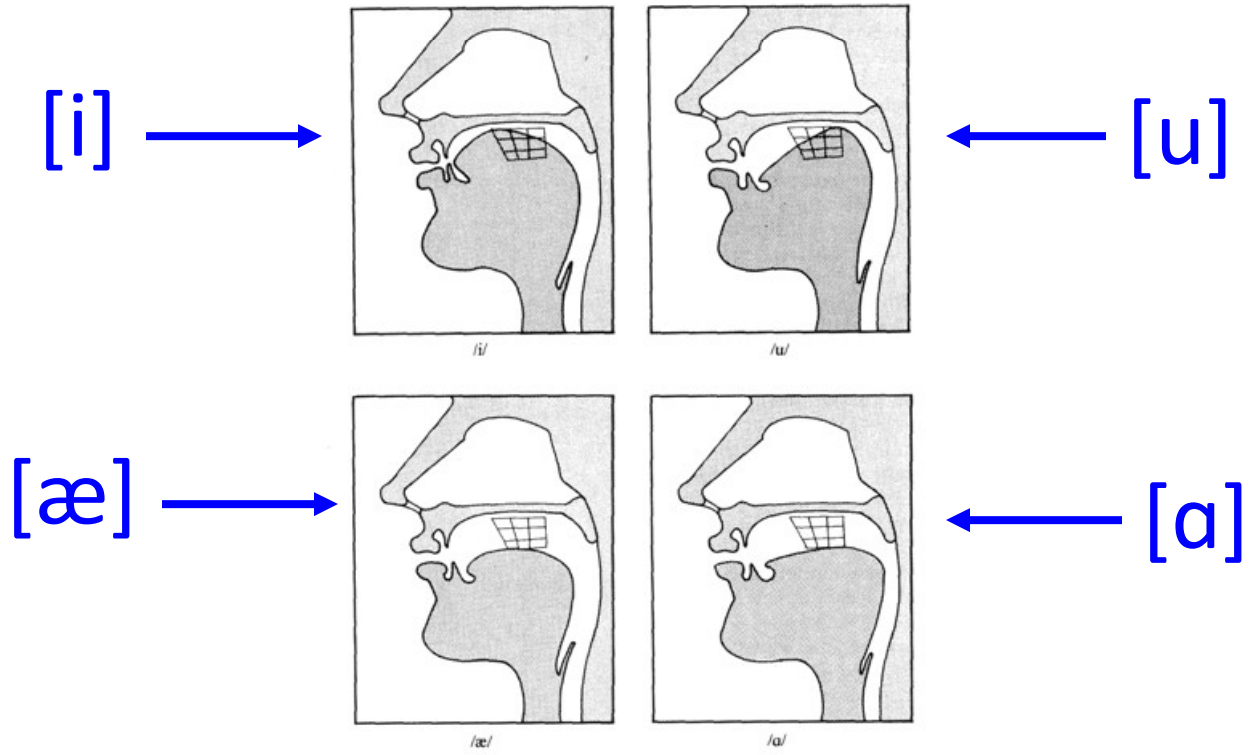
Note the *tongue height* differences between: (a) [i] ♋■♎ [æ] and, (b) [ɑ] and [ʊ]☝ There are other differences that distinguish /♓/-/✈/ and /✌/-/◆/☝ For now, focus on tongue-height differences only.



2. Tongue advancement or frontness

a. Compare front-to-back tongue position for [ɑ] (“*pot*”) and [æ] (“*bat*”). You should notice that the tongue is further forward for [æ] than [ɑ].

b. Compare front-to-back tongue position for [i] (“*beet*”) and [u] (“*boot*”) [ignore lip shape – for now]. You should notice that the tongue is further forward for [i] than [u].



3. Lip rounding

Produce the sequence: [ɑ ɔ o ʊ u]. What is happening to the lip shape from [ɑ] to [u]?

Lip rounding is important In English, but *it is <u>not an independent parameter</u>* of vowel articulation:

1. Running through the sequence [ɑ ɔ o ʊ u], lip rounding is *not the only parameter that is changing.* What else is changing?
2. There is no pair of English vowels that differs only in lip rounding (except maybe /❷/ ❖♦  /  / -- though there isn't good agreement on this).

***Lip rounding is an independent articulatory parameter in some languages*: e.g.,**

- **French has a high, front retracted (i.e., unrounded) vowel ([i]) and a high, front rounded vowel ([y] or [ü]).**
- **German also has *rounded and unrounded versions of vowels with the same height and advancement.***

The vowel in the French word "*tu*" ("*You*.") is not [u], but [y] (also transcribed [ü]); i.e., a high, front, *rounded* vowel.

Classification of English vowels

- **A dichotomy**
- **1. Monophthongs: individual vowels**
- **2. Diphthongs: vowels which are produced by moving from one vowel position to another through intervening positions.**
- **[ei, ai, au, əu, +, iə, eə, uə]**

Classification of English monophthongs

- **1. In terms of the position of the tongue**
- **A. fornt:**
- **B. central:**
- **C. back:**

Classification of English monophthongs

- **2. In terms of the openness of the mouth**
- **A. close:**
- **B. semi-close:**
- **C. semi-open:**
- **D. open:**

Classification of English monophthongs

- **3. In terms of the shape of the lips**
- **A. unrounded: all the front vowels, central vowels, and [a:].**
- **B. rounded: all the back vowels except [a:].**

Classification of English monophthongs

- **4. In terms of the length**
- **A. short:**
- **B. long:**
- **5. In terms of the state of the larynx**
- **A. tense: all the long vowels**
- **B. lax: all the short vowels**

Features of vowels

- All vowels in English are voiced and involve a continuous flow of air through the oral cavity. English vowels can be categorized by 4 distinctive features:

  (1) Height of the tongue

  (2) Frontness/backness of the tongue

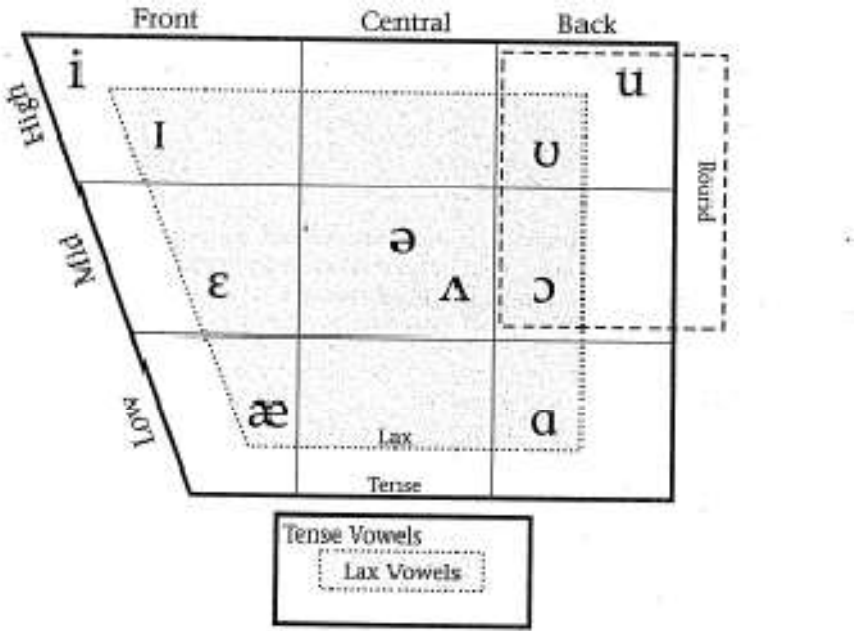
  (3) Tenseness/laxness i.e. whether the tongue muscle is tense or lax

  (4) Round/unrounded i.e. whether the lips are rounded or not

Every vowel is a combination of 4 features.

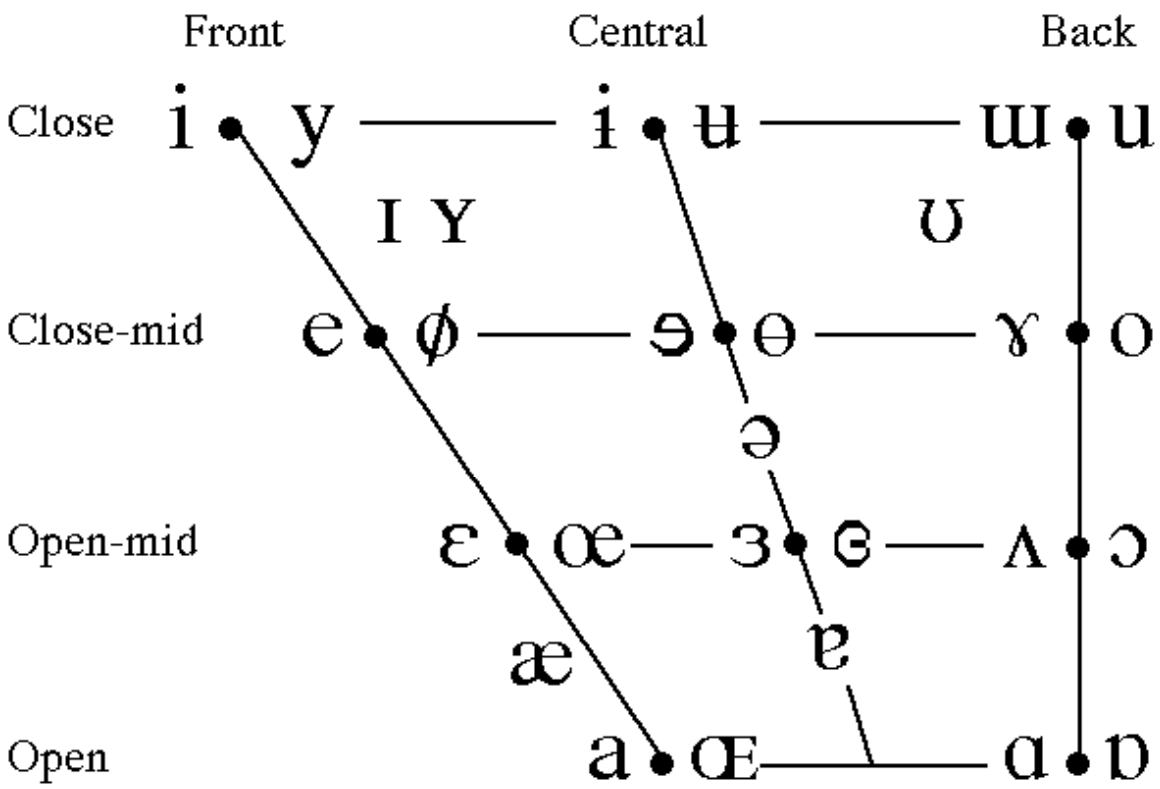
- [i] as in *m<u>ee</u>t* is high front tense unrounded vowel
- [æ] as in *p<u>a</u>t* is low front lax unrounded
- [ɑ] as in *p<u>o</u>t* is low back lax unrounded

Vowels of English



Consonants vs. Vowels

- consonantal sounds: obstruction of airflow in vocal tract
- vowel sounds: little to no obstruction of airflow



Where symbols appear in pairs, the one to the right represents a rounded vowel.

- 2) abstract concepts
- 3) a set of hypothetical positions for vowels used as reference points.
- 4) primary cardinal vowels
- 5) secondary cardinal vowels
- 6) further secondary cardinal vowels
- 7) SCHWA
- 8) symbols for distinguishing delicate differences

- 9) pure vowels / monophthongs
- vowels diphthongs
- triphthongs
- 10) theoretically,
- a vowel
- a sound must be either
- a consonant
- but some sounds are neither a vowel nor a consonant, so they are named as
- /h/
- SEMI—VOWELs /w/
- /j/

2.2.3 the sounds of English

- What is RP?
- What is GA?
- The major differences of the two are?
- Two sounds are distinguished by VOICING when they share the same place and manner.
- Symbols for vowels in this book are provided by ***Wells*** in 2000.

- Two major differences of vowels in RP and GA:
- 1)
- 2)
- Several things to be explained:
- 1)
- 2)
- 3)

The description of English vowels

- The description needs to satisfy the four basic requirements:
- 1) the height of tongue raising
- 2) the position of the highest part of the tongue
- 3) the length or tenseness of the vowel
- 4) the shape of the lips — rounded / unrounded — spreading / neutral

2.3 from phonetics to phonology

- 2.3.1 coarticulation and phonetic transcription
- Sounds are influenced by their neighbors.
- Often they are produced together, this simultaneous articulation is called COARTICULATION.
- anticipatory coarticualtion
- coarticulation
- perseverative coarticulation
- NASALIZATION (鼻音化) is an example of anticipatory articulation.

- Diacritics are used to record the variations of the same sound. This is called narrow transcription. It is put inside [ ]. Narrow transcription is used in phonetic transcription by phoneticians.
- Broad transcription uses only symbols to record a sound. It is put inside / /. It is used in phonemic transcription by phonologists.

2.3.2 phonemes

- phonological study concerns the sounds which can cause the change of meaning of a word or a phrase.
- Minimal pair is used to decide whether two sounds are two different sounds.
- Phonemes are sounds which distinguish meaning.
- A phoneme is a unit of explicit contrast.
- Languages differ in the selection of contrastive sounds.

- By convention, PHONEMIC TRANSCRIPTION are placed between slash lines (/ /) .

2.3.3 allophones

- Allophones are variants of the same phoneme. They are phones.
- Complementary distribution
- Example one
- Example two

- Not all the phones in complementary distribution are considered to be allophones of the same phoneme. They must meet anther restriction, that is , they must be phonetically similar.
- Phonetic similarity means that the allophones of a phoneme must bear some phonetic resemblance.
- The allophones are both phonetically similar and in complementary distribution.

Diphthongs, Triphthongs & Glides

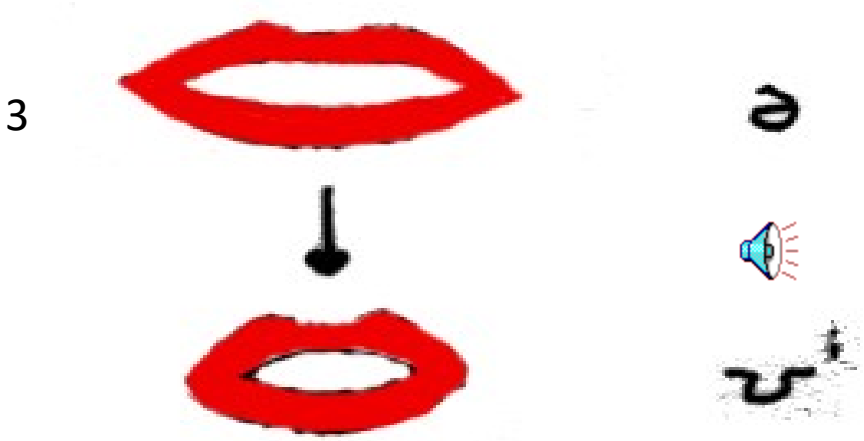
Diphthongs are combinations of two sounds-

English has 8 diphthongs

Triphthongs are combinations of three sounds-

English has 1 triphthong (a diphthong + a schwa sound)

Glides are sounds made when the tongue moves from one position to another.

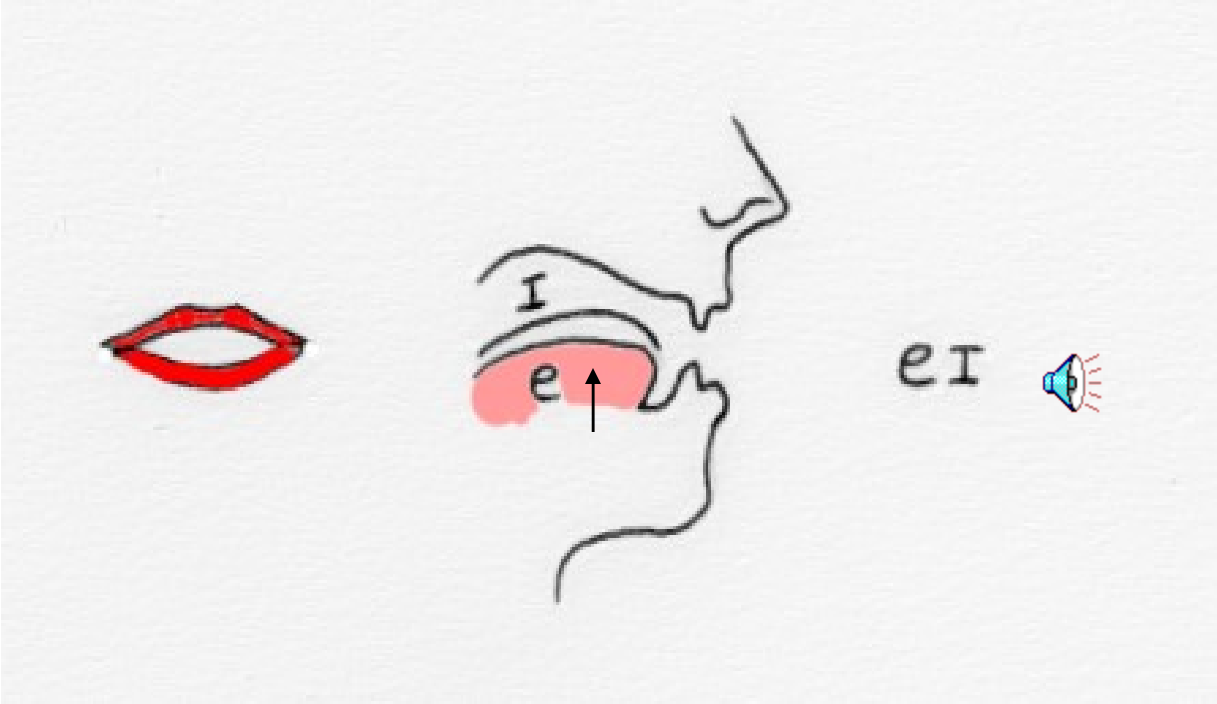


Here we have three sounds;

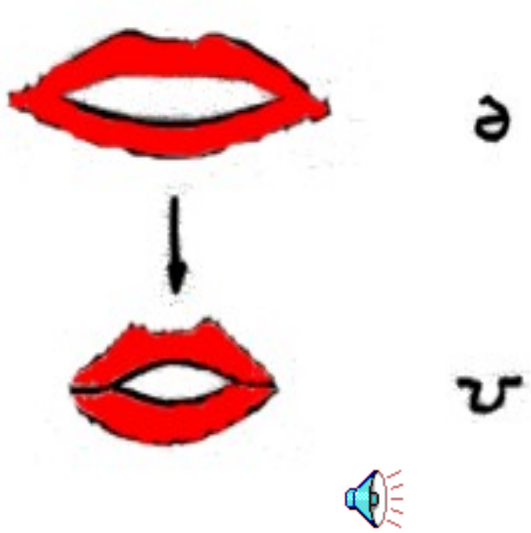
The sounds from 1) f**or** 2) t**our** 3) g**o**

Two of these sounds are diphthongs, combinations of vowels.

Diphthongs are made by sliding the tongue for one position to another - this is know as a glide.



This diphthong is found in – h***ay,*** d***a***te, scr***a***pe & v***ei***n.



Here two more pure vowels are combined to make a sound. This sound is like saying the letter ‘O’. It begins with a ***er*** (schwa) and moves towards the ‘***oo***’ sound found in g***oo***d.

To make / aʊ / add a short / ʊ / after the long / æ / sound.

Words like *cow, down, ground* and *town* all contain this sound.

(The *a:* is also used to make this diphthong)

Diphthongs are combinations of pure vowels.

aː + ɪ = ‘aɪ’ - t*ie*, b*uy,* h*eigh*t & n*igh*t

e + ɪ = ‘eɪ’ - w*ay,* p*ai*d & g*a*te

ɔː + ɪ = ‘ɔɪ’ – b*oy,* c*oi*n & c*oy*

e + ə = e ə - wh*ere,* h*air* & c*are*

ɪ + ə = ɪ ə– h*ere,* h*ear* & bee*r*

Review all 8 sounds and try the exercises on the worksheets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THANKS 4 UR ATTENTION !