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# Theoretical Phonetics

— Lecture 2 —

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# Articulatory and functional aspects of speech sounds

1. Speech sounds as physiological, physical, and linguistic phenomena
  2. Organs of speech
  3. Articulatory aspect of Speech sounds
  4. Monophthongs and diphthongs
  5. Consonants
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# Phonetics

## Segmental

**Segmental units (sound of speech):**

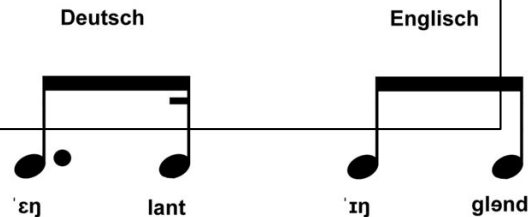
- Vowels
- consonants

A B C D E F G H I J K  
L M N O P Q R S T U V  
W X Y Z 1 2 3 4 5 6 7 8  
9 0 a b c d e f g h i j k  
l m n o p q r s t u v w x y  
z

## Suprasegmental

**Larger units of connected speech**

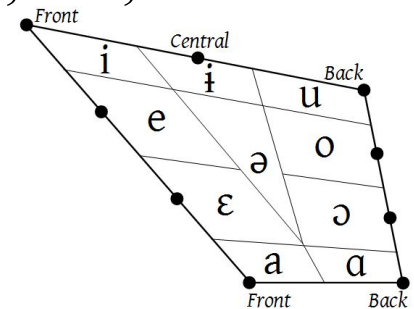
- Syllables
- Accentual (rhythmic) units
- intonation groups
- utterances



# Components of the phonetic system of language

## 1 *the system of its segmental phonemes (allophones):*

- the system of its phonemes as discrete isolated units;
- the distribution of the allophones of the phonemes;
- the methods of joining speech sounds together in words and at their junction, or the methods of effecting VC, CV, CC, and VV transitions.



# Components of the phonetic system of language

## 2 *the syllabic structure of words*

- syllable formation
- syllable division

## 3 *the accentual structure*

- the physical (acoustic) nature of word accent
- the position of the accent in disyllabic words and the position of the accent in polysyllabic words
- the degrees of word accent

Consonants															
b	c	d	f	g	h	j	k	l	m	n					
b	k	d	f	g	h	dʒ	k	l	m	n					
bib	cake	dad	fife	gag	hat	judge	kick	lull	mime	noon					
ŋ	p	r	s	ʌ	t	v	w	y	z	ʒ					
ŋ	p	r	s	z	t	v	w	j	z	ʒ					
sing	pipe	roar	sauce	is	tot	valve	will	yes	zoo	vision					
Joined consonants								Short vowels							
ʧ	ʃ	θ	ð	wh	a	e	i	o	u	ɔ					
ʧ	ʃ	θ	ð	ɹ	æ	ɛ	ɪ	ɒ	ʌ	ʊ					
church	shush	thin	then	whale	at	egg	in	odd	up	book					
Long vowels / diphthongs															
ɑ	æ	aɪ	ɛ	ɛ	ɔ	u	eɪ	ie	oi	ou					
ɑ:	eɪ	ɔ:	i:	oʊ	u:	ju:	aɪ	ɔɪ	aʊ						
father	ape	all	eat	oak	oore	use	ice	oil	owl						
Also, /r/ is used following a vowel letter to write the sound in "earn" etc															

# Components of the phonetic system of language

*4 the intonational structure of utterances:*

*Components of the phonetic system of language*

- phonemic
- syllabic
- accentual
- intonational

# Aspects of speech sounds

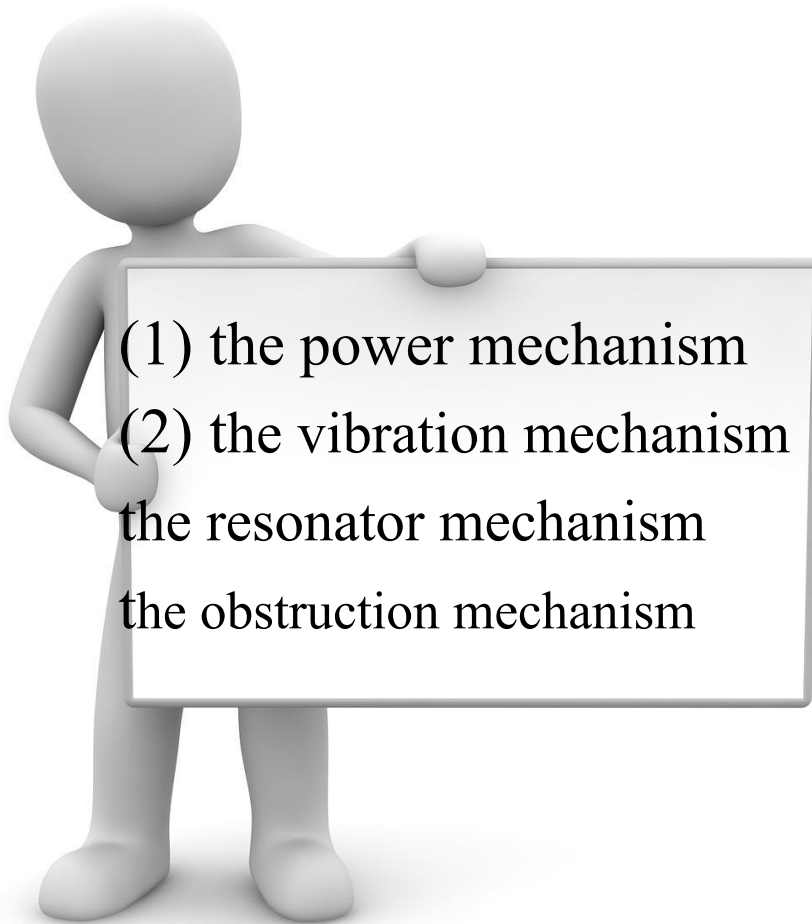


**1 articulatory**

**2 acoustic**

**3 auditory**

**4 functional** (linguistic, social).



- (1) the power mechanism
- (2) the vibration mechanism
- the resonator mechanism
- the obstruction mechanism

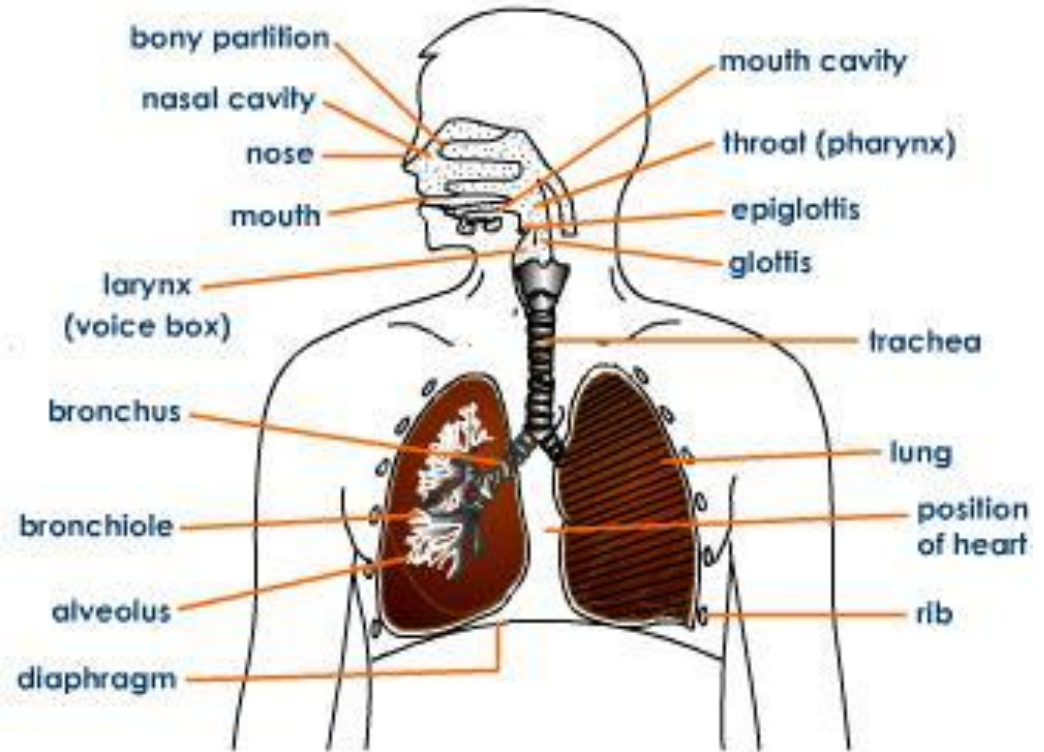
## Articulation

**Groups of organs  
involved into  
sound production (3)  
according to their (4)  
function**



# 1 The power mechanism

1. the diaphragm
2. the lungs
3. the bronchi
4. the windpipe, or trachea
5. the glottis
6. the supraglottal cavities



## **2 The vibration mechanism**

- larynx, or voice box, containing the vocal cords.

## **3 The resonator mechanism**

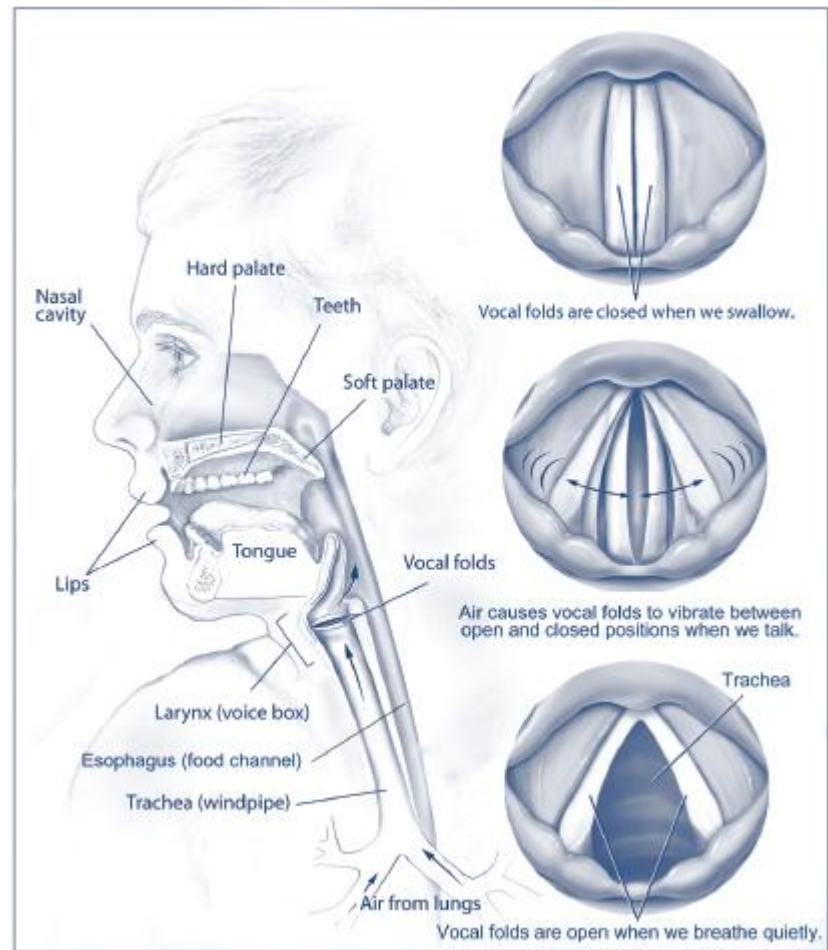
- The pharynx, the larynx, the mouth, and the nasal cavity

## **4 The obstruction mechanism**

- the tongue, the lips, the teeth, and the palate

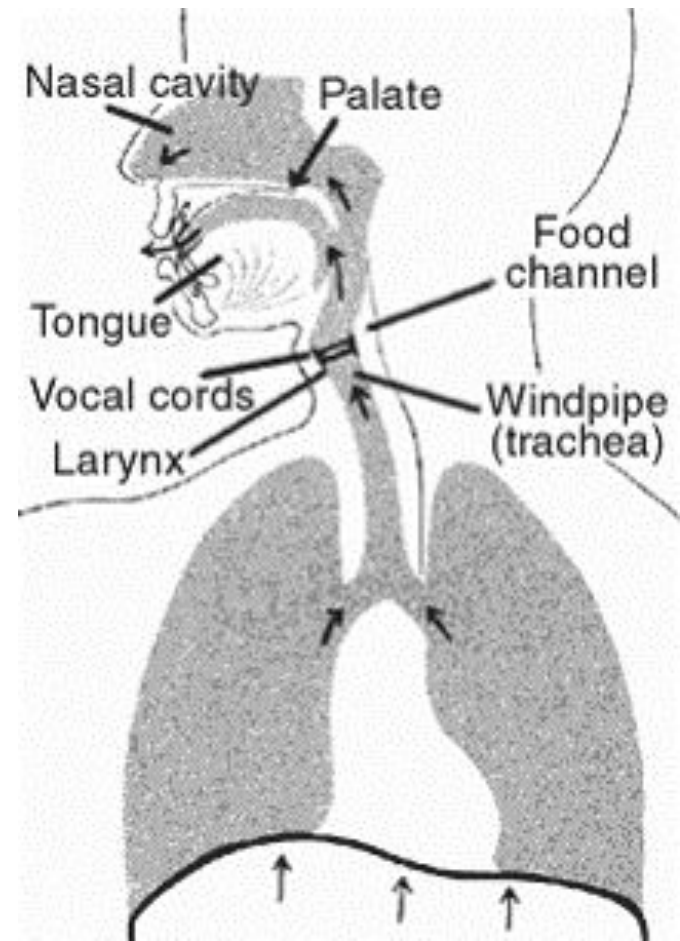
## 2 The vibration mechanism

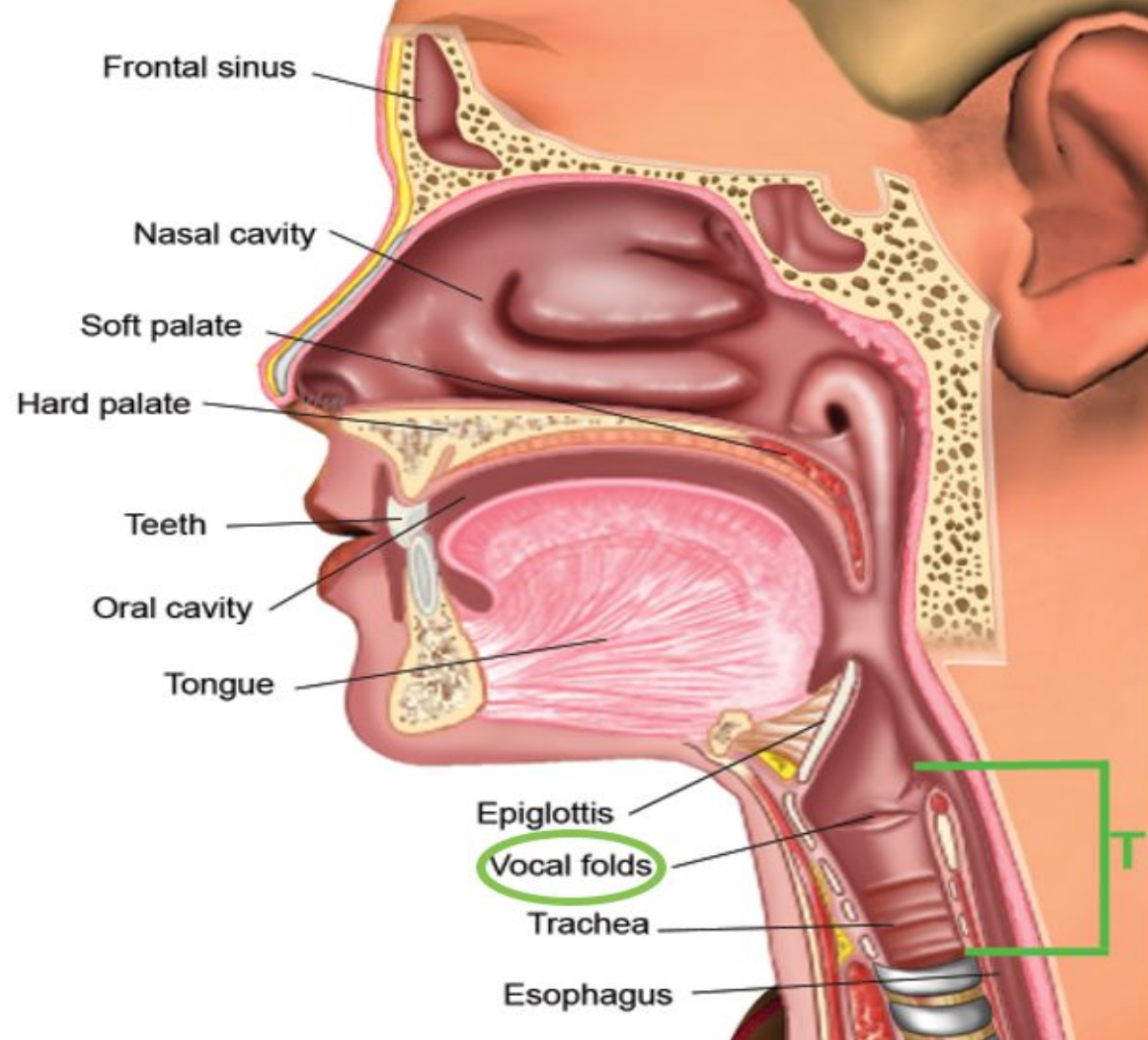
- larynx, or voice box, containing the vocal cords.



# Speech and breathing

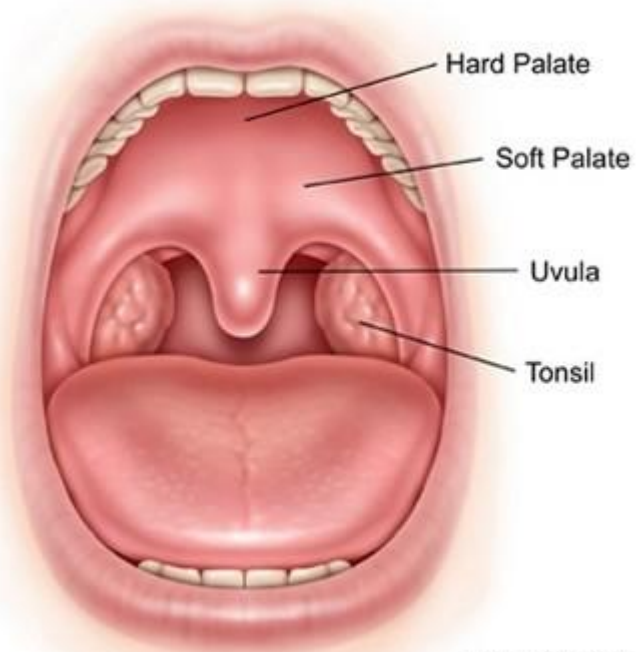
1. Air inside the chest
2. Lungs
3. Throat (vocal folds)
4. Mouth (the articulators)
5. Out into the open air





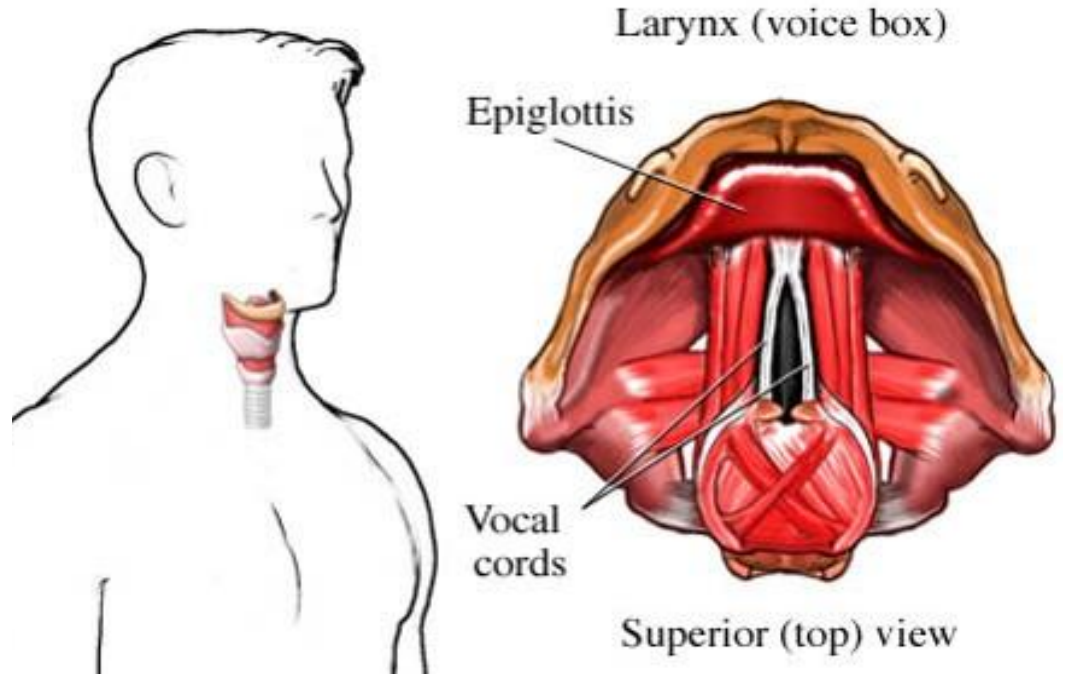
The larynx

# Mouth



Dr Sonia S V

# The Larynx



# Vocal tract above larynx and articulators

## Active Organs of Speech

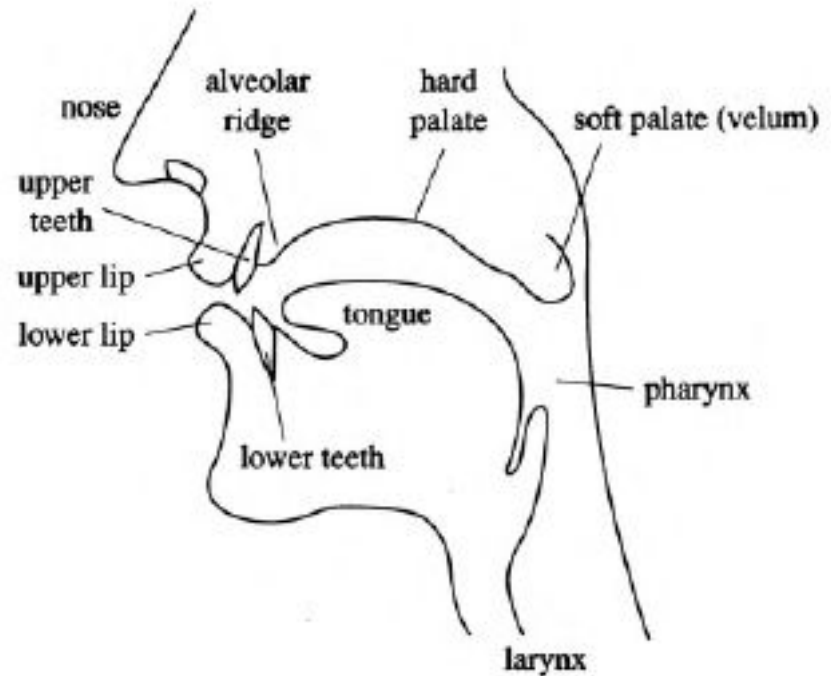
(movable articulators)

## Passive Organs of Speech

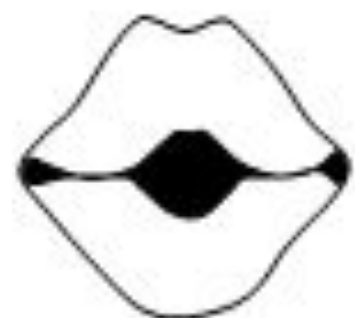
(fixed articulators)

## Cavities (= Spaces)

- Nasal
- Oral (mouth)
- Pharynx
- larynx



The articulators



Round /u: /



Spread /i: /

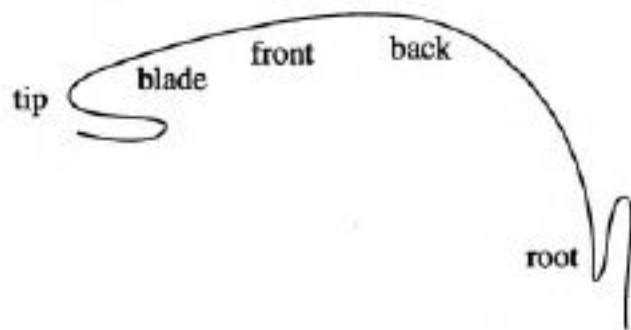
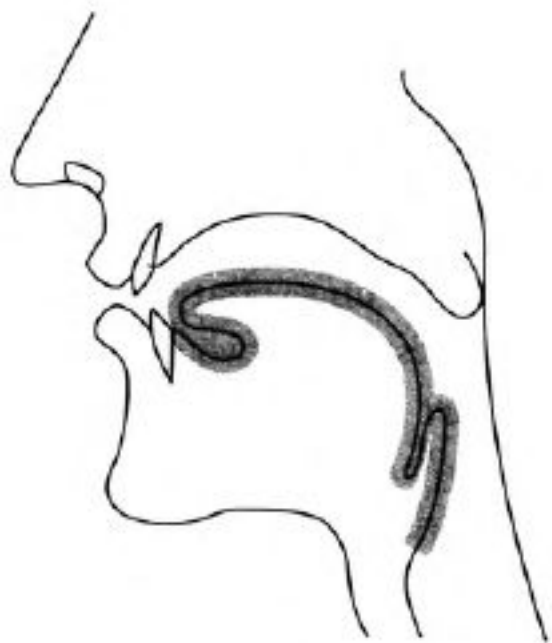


Neutral /ɑ: /

Vowel Lip Postures: adapted from Jeremy Harmer



# Parts of Tongue



# SAND

Lips	CLOSED OPEN				
Tongue tip	RAISED LOWERED				
Velum	CLOSED OPEN				
Voicing	ON vvv OFF —				
		s	æ	n	d

Figure 2.2. Diagram of articulator movements for the word *sand*



# Revision

NAME 7 ARTICULATORS USED IN SPEECH

# The Articulators

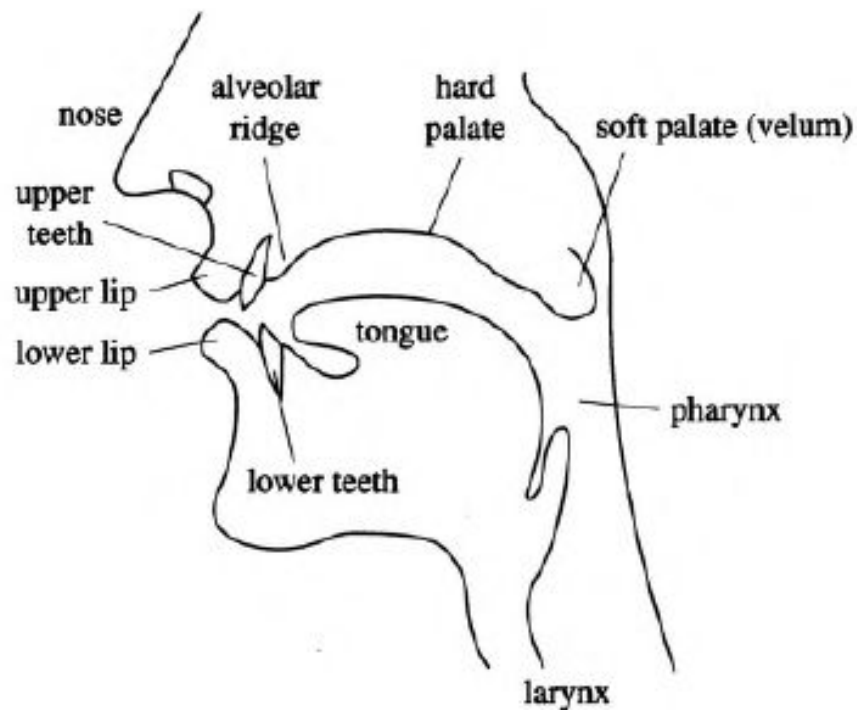
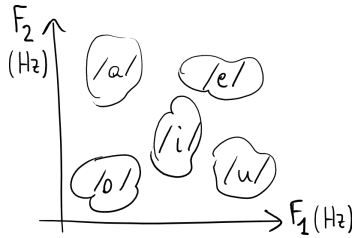


Fig. 1 The articulators

# Articulatory Classification of Speech Sounds

## INTRODUCTION

*pin* and *bin*; the difference between /ɪ/ and /æ/ - *bit* and *bat*



- **Phoneme** is abstract
- You hear the **realization** of the phoneme
- physical forms of phonemes are **allophones**

# SYMBOLS FOR PHONEMES AND ALLOPHONES

- **phoneme symbols** - slant brackets:

/e/, /s/,

- **phonetic symbols** - square brackets:

[ø], [ŋ]

***E.G.***

***Ostrich*** /ɒstrɪtʃ/

[ɒstɪʔtʃʷ].

# SPEECH SOUNDS AS ARTICULATORY UNITS AND THE PROBLEM OF THEIR CLASSIFICATION

## VOWELS

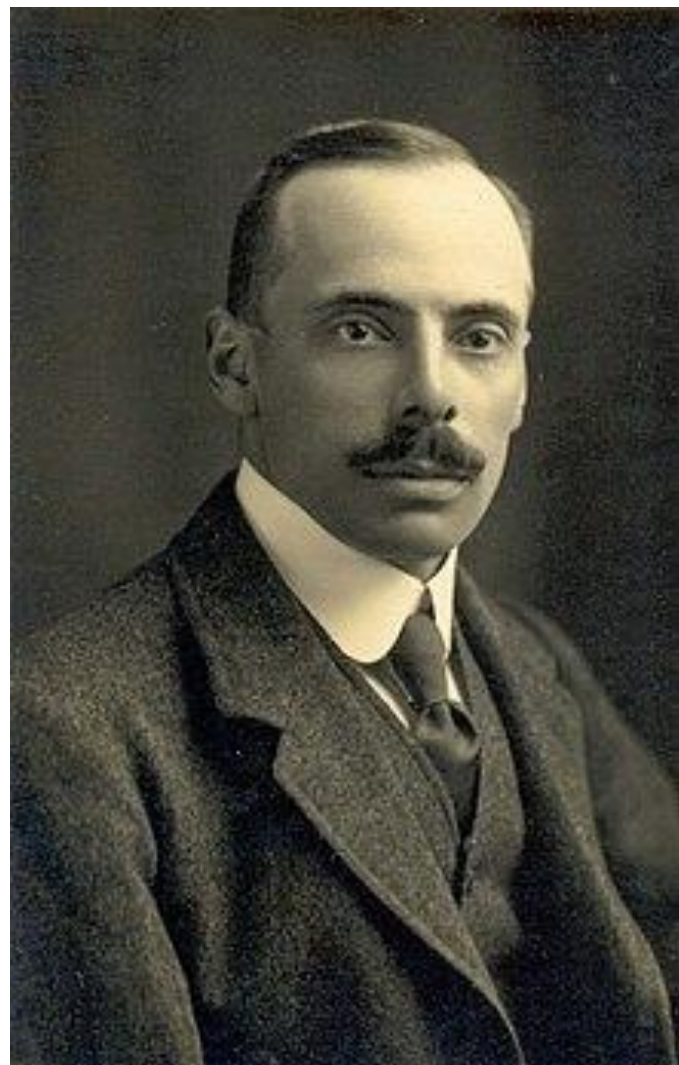
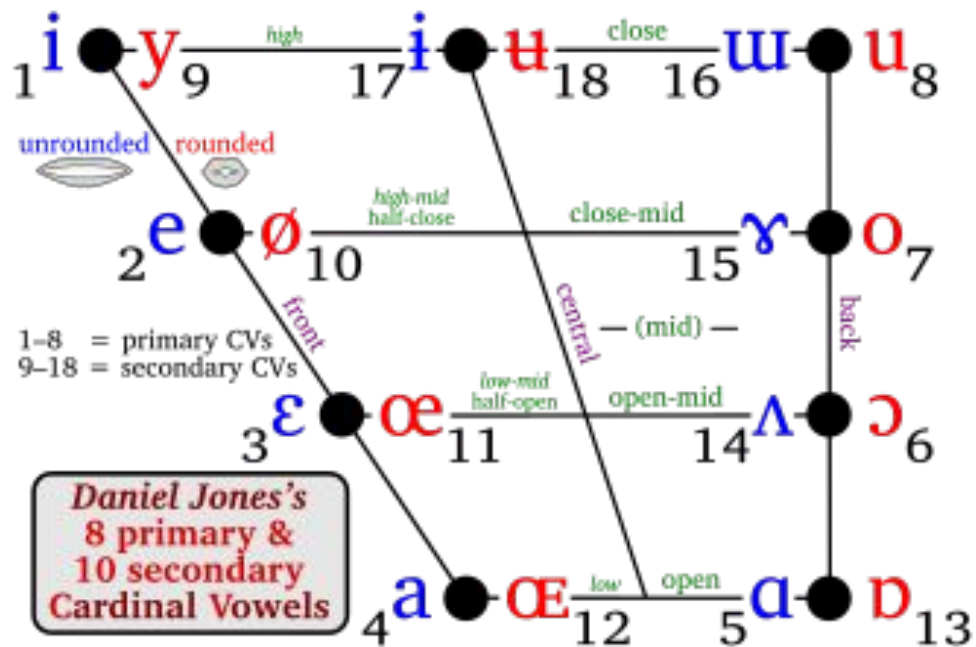
- in the articulation of V the air passes freely through the mouth cavity
- Vowels have no place of obstruction
- The **particular quality of Vs** depends on the volume and shape of the mouth resonator
- **acoustically** vowels are called the sounds of voice (high acoustic energy)
- **Functional** differences : Vs are syllable forming elements

## CONSONANTS

- in making C an obstruction is formed in the mouth cavity , obstruction is formed by the speech organs
- Consonants articulations are relatively easy to feel ( can be localized)
- obstruction or narrowing for each C is made in a definite place of the speech apparatus
- The **particular quality of Cs** depends on the kind of noise
- consonants are the sounds of noise (low acoustic energy. )
- **Functional** differences: Cs are units which function at the margins of syllables



# Prof Daniel Jones



# Phoneticians

## English

**Henry Sweet**  
**Daniel Jones**  
**Ida C. Ward**  
**Alfred CHARLES Gimson**  
**John Christopher Wells**

## Russian

**L. Scherba**  
**L. Trubetskoi**  
**V.A. Vasiliev**  
**G.P Torsuev**

## H. Giegerich [1997], M. Pennington [1996] Classification

set of basic binary (two-way) distinctions in terms of

(i) phonation;

(ii) oro-nasal process;

(iii) manner of articulation.

# Binary Distinction by H. Giegerich and M. Pennington

1) Phonation	2) Oro-nasal process	3) Manner of articulation
<b>Sonorants:</b> sounds whose phonetic content is predominantly made up by the sound waves produced by their voicing	<b>Oral:</b> sounds in the production of which the air escapes through the mouth.	<b>Stops:</b> sounds made with a complete obstruction or stoppage of the airflow coming up from the lungs. They are also termed <i>plosives</i> .

# Binary Distinction by H.Giegerich and M. Pennington

**Obstruents (noise consonants):** sounds produced as a result of obstruent articulation involving an obstruction of the air stream that produces a phonetic effect independent of voicing. They can typically occur in voiced and voiceless variants.

**Nasal:** sounds in the production of which the soft palate is lowered, and the air escapes through the mouth.

**Continuants:** sounds in which the obstruction of the airflow is only partial, so that the sound can be prolonged for a period of time.

**Vowels** are one type of continuants and there are three consonant types of continuants:

**fricatives:** whose phonetic content includes a hissing noise, produced by turbulence in the air stream as it is forced through the narrow gap between the articulators;

**affricates:** complex sounds which consist of two components which correspond to two phases of articulation- an oral- stop phase followed with a short friction phase.

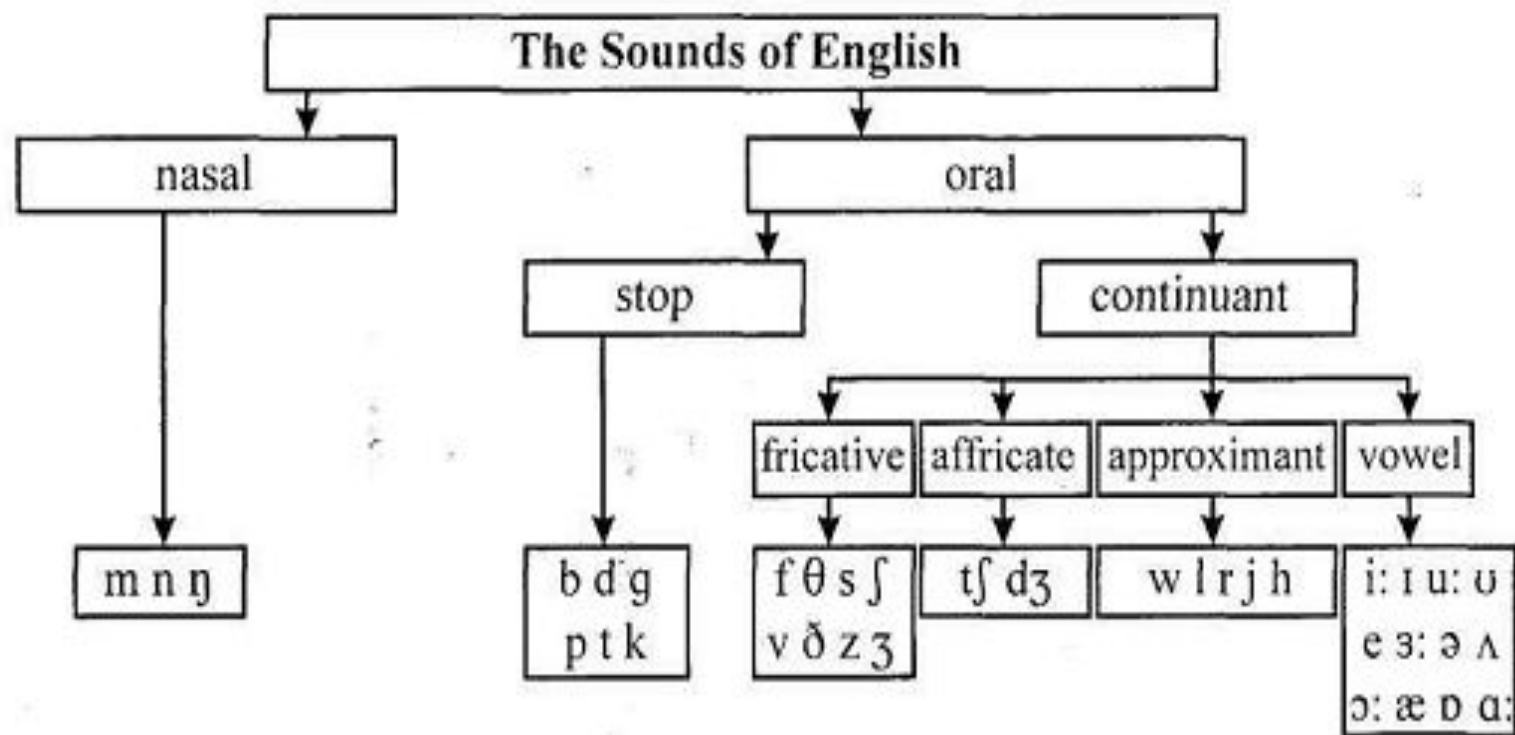
**approximants:** sounds in the production of which one articulator moves close to another, though not so close as to cause a turbulent as to produce friction.

**r, w, j** are termed *central approximants* because air passes through the oral tract along the center of the opening.

**l** is called a *lateral approximant* because air passes out along the side/s of the articulation.

**h** is a *glottal approximant*.

In some phonological systems approximants are treated as *semi-consonants (l, r)* or *semi-vowels (w, j)*



# THE ARTICULATORY CLASSIFICATION OF THE ENGLISH VOWELS

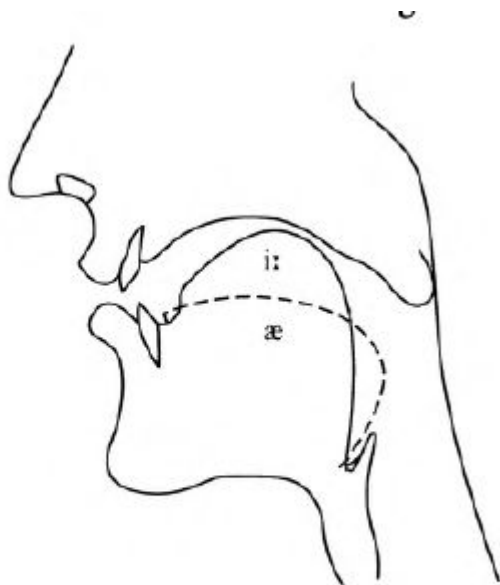
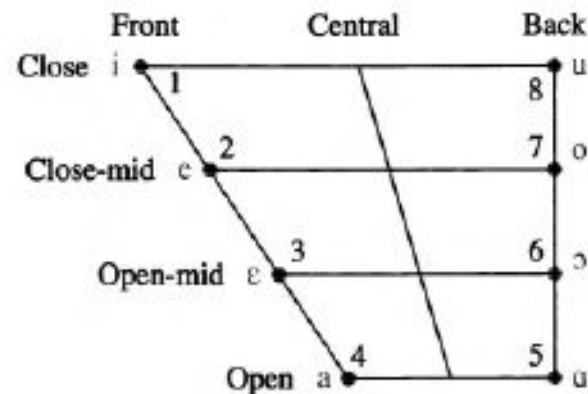
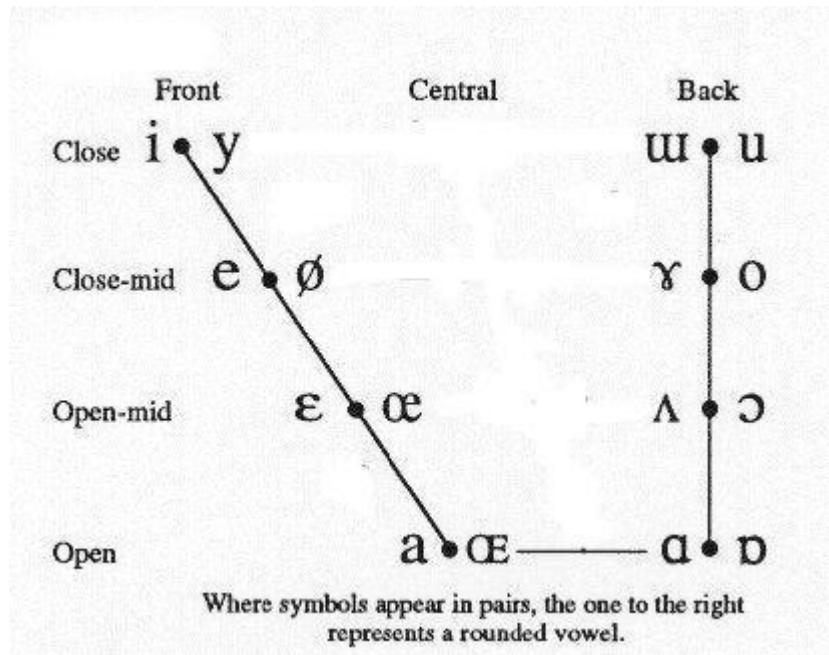


Fig. 3 Tongue positions for i: and æ

	Front	Back
Close	i:	u:
Open	æ	ɑ:

# Cardinal Vowel Diagram



. 4 Primary cardinal vowels



# Cardinal Vowels

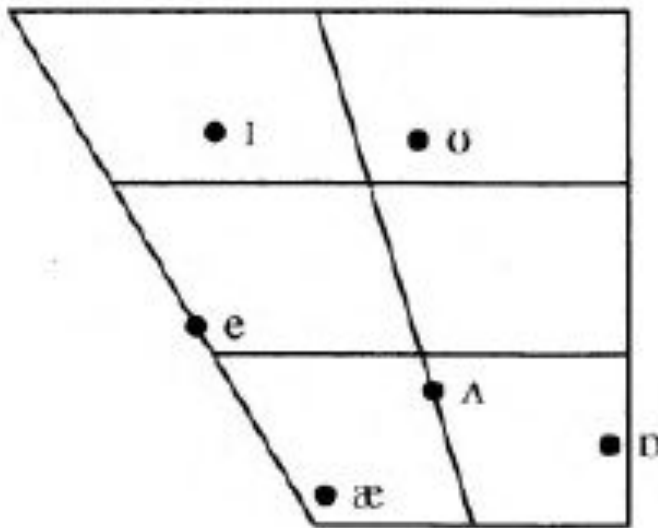


Fig. 5 English short vowels

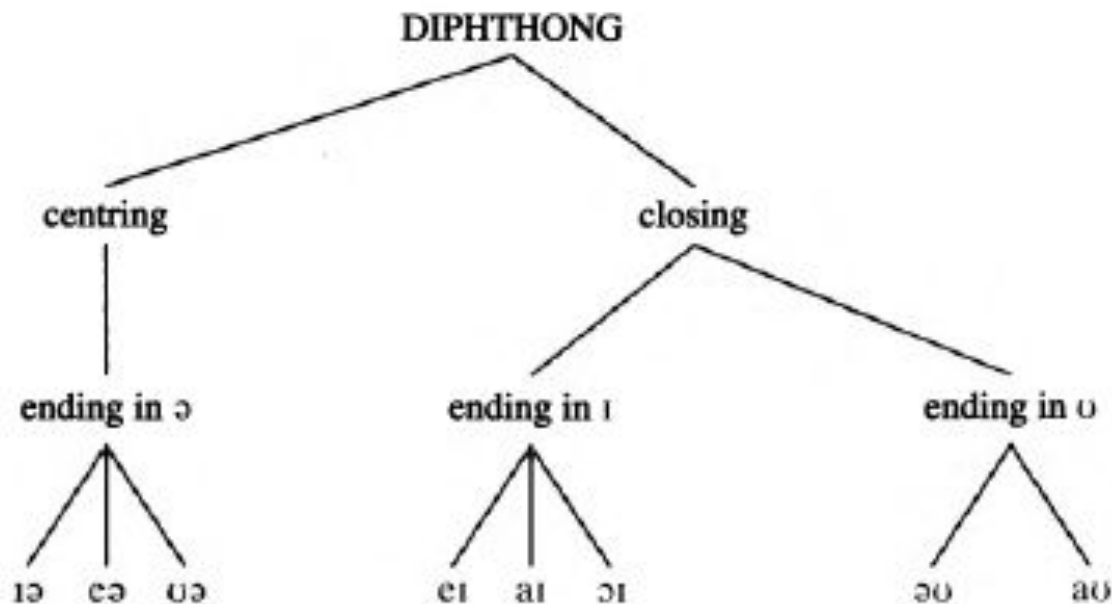
# Criteria for classificatory description:

1. Stability of articulation
2. Tongue position
3. Lip position
4. Character of the vowel end
5. Length
6. Tenseness

# Vocalic System

1. Stability of articulation		Monophthongs – 12				Diphthongs – 8
2. Length of articulation		Long – i:, u:, a:, ɔ:, ɜ:		Short – ɪ, e, æ, ʊ, ʌ, ʊ, ə		
3. Degree of muscular tension		Tense – i:, u:, a:, ɔ:, ɜ:		Lax – ɪ, e, æ, ʊ, ʌ, ʊ, ə		
4. Lip participation		Rounded (labialized) u:, ʊ, ɔ:, ɒ		Unrounded (non-labialized) ɪ, e, æ, ʌ, ə, i:, a:, ɜ:		
5. Vertical movement of the tongue		6. Horizontal movement of the tongue				
		fully front	front retracted	central (mixed)	back advanced	fully back
High (close)	narrow variety	i:				u:
	broad variety		ɪ		ʊ	
Mid (mid-open)	narrow variety	e		ɜ:		
	broad variety			ə ʌ		
Low (open)	narrow variety					ɔ:
	broad		æ			ɒ a:

# Diphthongs



# Centering Diphthongs

- $iə$  example words: 'beard', 'weird', 'fierce'
- $eə$  example words: 'aired', 'cairn', 'scarce'
- $uə$  example words: 'moored', 'tour', 'lure'

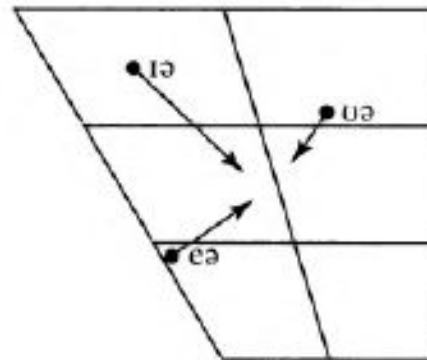


Fig. 8 Centring diphthongs

# Closing Diphthongs

eɪ  
'paid', 'pain', 'face'

aɪ  
'tide', 'time', 'nice'

ɔɪ  
'void', 'loin', 'voice')

əʊ  
'load', 'home',

aʊ  
'loud', 'house'

three of the diphthongs

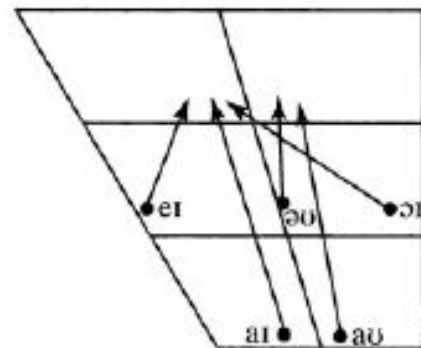


Fig. 9 Closing diphthongs

# Triphthongs

$eɪ + ə = eɪə$

$aɪ + ə = aɪə$

$ɔɪ + ə = ɔɪə$

$əʊ + ə = əʊə$

$aʊ + ə = aʊə$

$eɪə$  'layer', 'player'

$aɪə$  'liar', 'fire'

$ɔɪə$  'loyal', 'royal'

$əʊə$  'lower', 'mower'

$aʊə$  'power', 'hour'