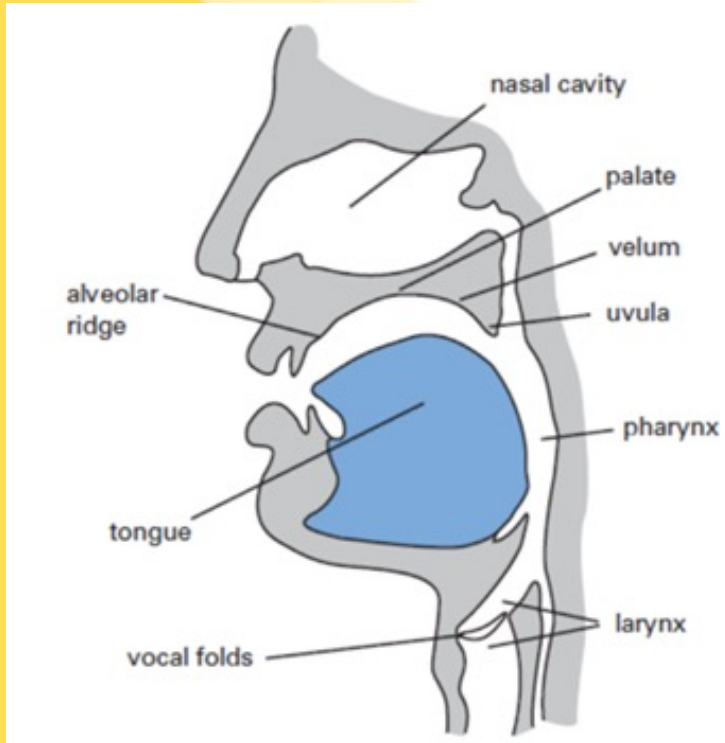


Lecture 5

# Speech Sounds

Terminology in this lecture is challenging!

# Phonetics and Phonology



Consonants

Vowels

# Vowels

## ■ Classification of vowels

Table 2.13 Some simple vowels and diphthongs of British (RP) English

Simple vowels		Diphthongs	
pit	[ɪ]	<pre> graph TD     diphthong --&gt; Closing     diphthong --&gt; Centring     Closing --&gt; VplusI["V+[ɪ]"]     Closing --&gt; VplusU["V+[ʊ]"]     Centring --&gt; VplusA["V+[ə]"]     VplusI --&gt; aI["[aɪ]"]     VplusI --&gt; eI["[eɪ]"]     VplusI --&gt; oI["[ɔɪ]"]     VplusU --&gt; aU["[aʊ]"]     VplusU --&gt; eU["[əʊ]"]     VplusA --&gt; iA["[ɪə]"]     VplusA --&gt; uA["[ʊə]"]     VplusA --&gt; eA["[eə]"]     VplusA --&gt; oA["[ɔə]"]     aI --- bite[bite]     eI --- say[say]     oI --- toy[toy]     aU --- now[now]     eU --- grow[grow]     iA --- beer[beer]     uA --- poor[poor]     eA --- pair[pair]     oA --- oar[oar]                     </pre>	
pet	[e]		
port	[ɔ:]		
pot	[ɒ]		
pat	[æ]		
putt	[ʌ]		
part	[ɑ:]		

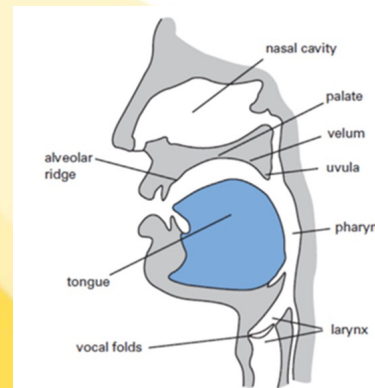
[i] *bead, beef, key, me*

[u] *boo, move, two, you*

[ʊ] *book, could, put*

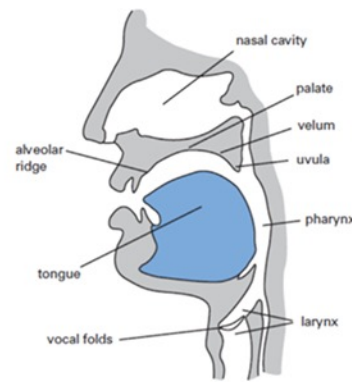
■ Closing diphthongs?

■ Centering diphthongs?



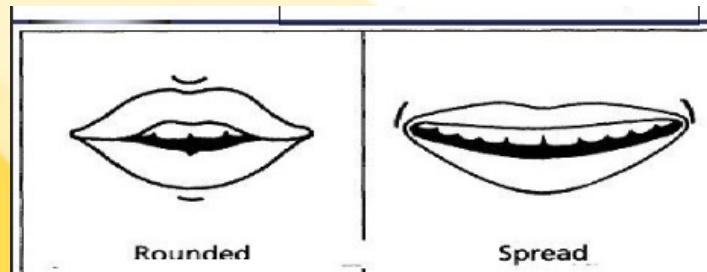
# Ways to describe vowels

- Place of articulation?
- Manner of articulation?
- State of vocal cords?



## ■ How to describe vowels?

- position of the tongue
  - How high or low in the mouth is the tongue?
  - How forward or backward in the mouth is the tongue?
- the shape of the lips
  - rounded or spread



# ■ 1. the position of the tongue

## ■ Horizontally, ...

### ■ High vowels: (closed vowels)

- - the tongue is positioned as close as possible to the roof of the mouth.

■ [i] [ɪ] [u] [ʊ]

### ■ Mid vowels:

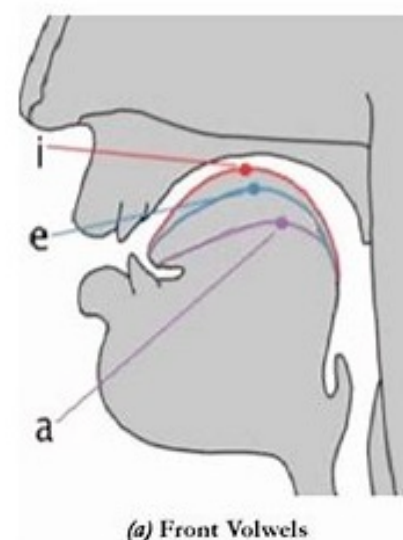
- - the tongue is positioned midway in your mouth

■ [ɛ] [ə] [ʌ] [ɔ]

### ■ Low vowels: (open vowels)

- - the tongue is positioned as far as possible from the roof of the mouth.

■ [a] [æ]



# ■ 1. the position of the tongue

## ■ Vertically, ...

### ■ Front vowels: (bright vowels)

- - the tongue is positioned as far in front as possible in the mouth

■ [i] [ɪ] [ε] [æ]

### ■ Central vowels:

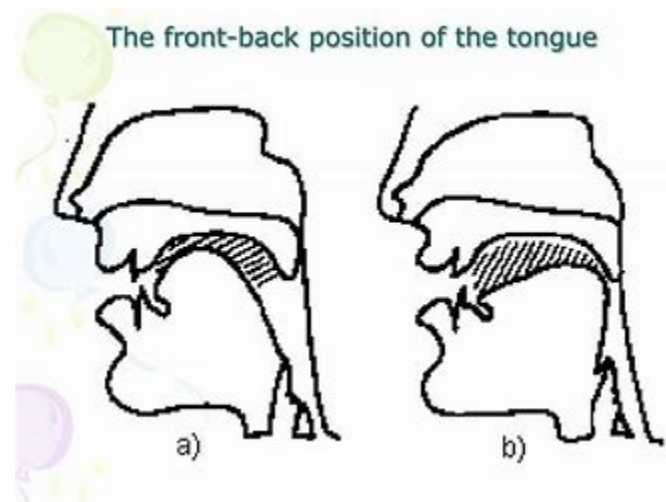
- - the tongue is positioned halfway

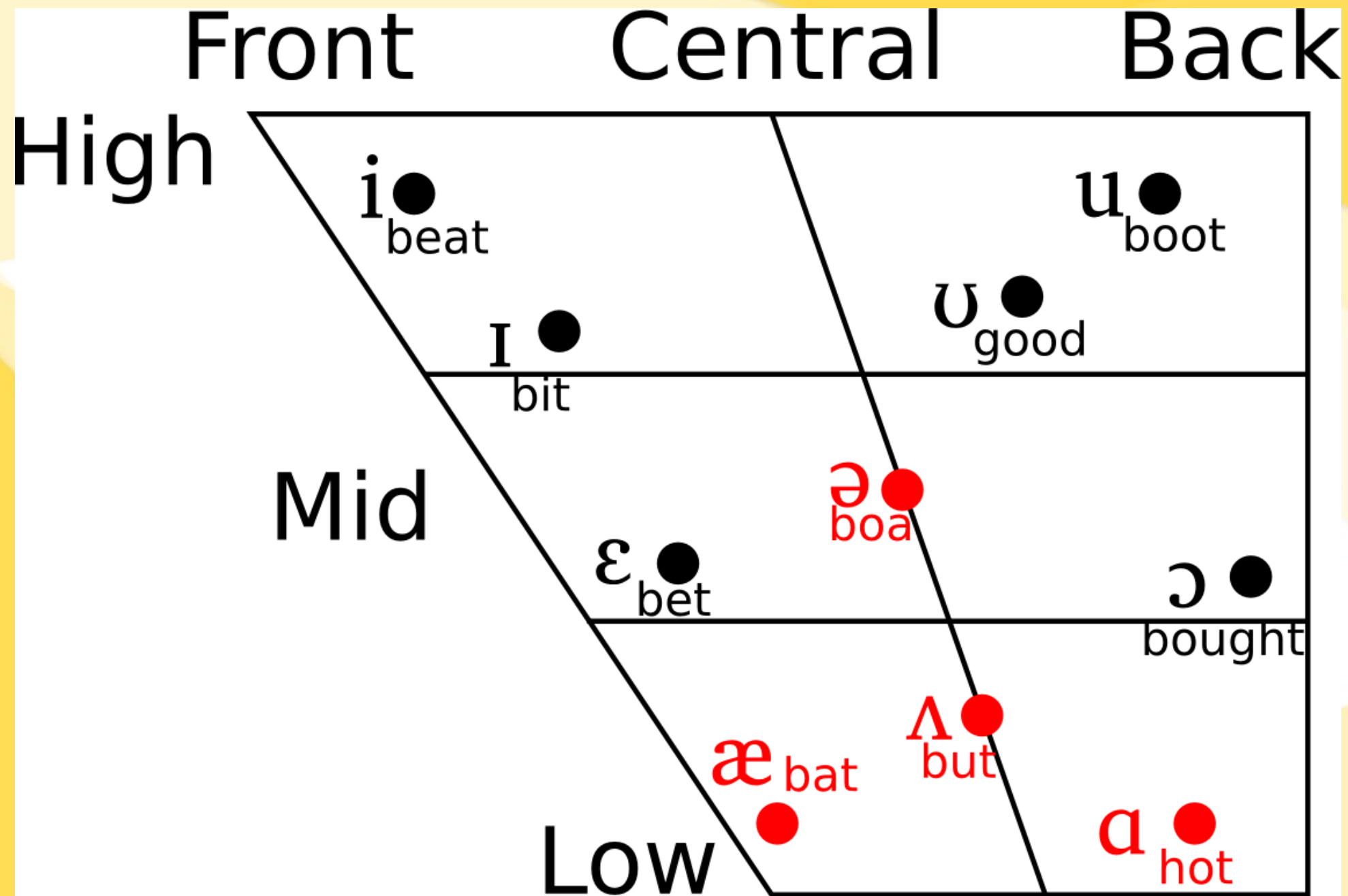
■ [ə] [ʌ]

### ■ Back vowels (dark vowels)

- - the tongue is positioned as far back as possible in the mouth.

■ [u] [ʊ] [ɔ] [a]







## ■ 2. the shape of lips

- – produced by rounding the lips
- all the nonlow back vowels in English  
**[u] [ʊ] [ɔ]**
- – produced not by rounding the lips
- other vowels in English



# Phonology

- abstract or mental aspect of speech sounds
- patterns of speech sounds



different people → same sound

the same way?



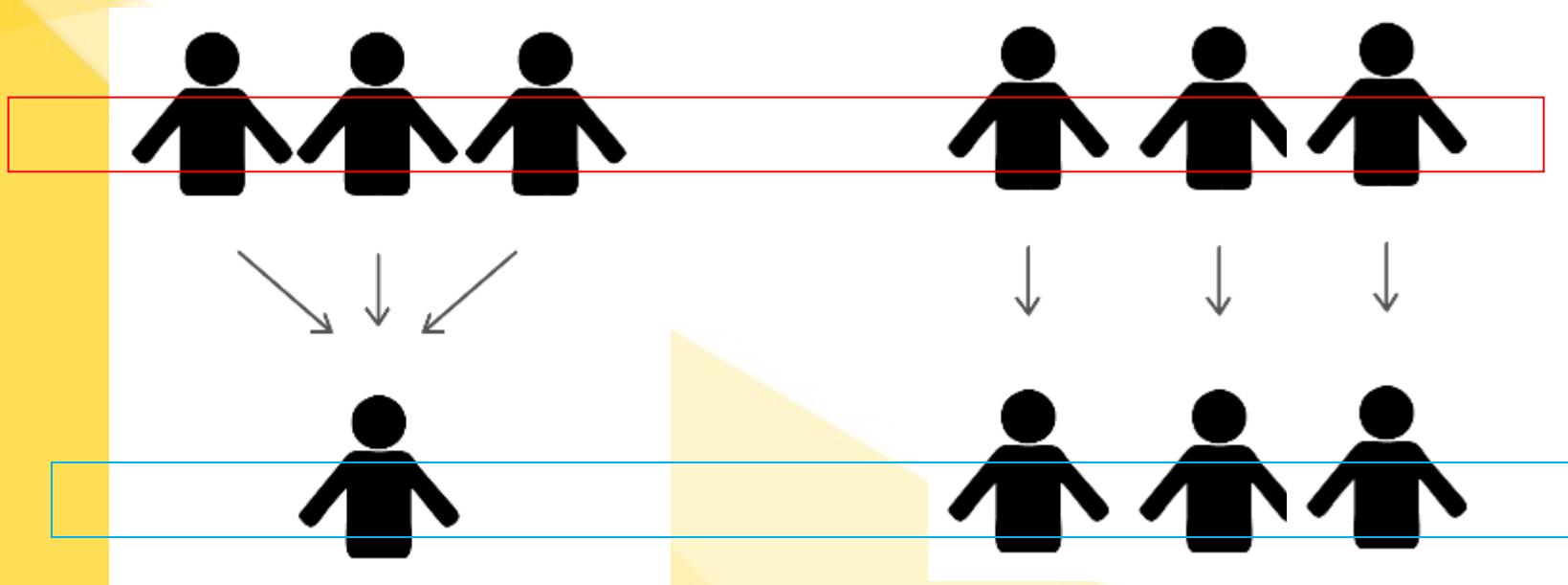
same person → same sound

different time

the same way?



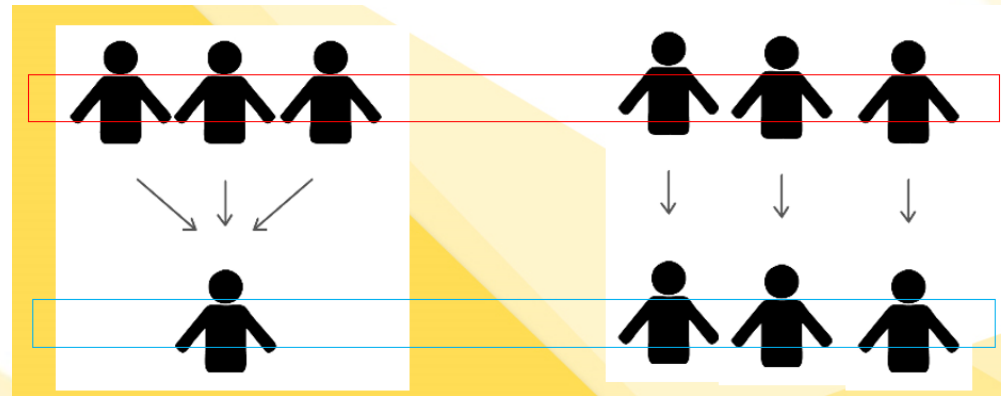
which sounds are same?  
which are not?



# Phoneme vs Phone

- actually articulated
- an **ABSTRACTION** of a group of actually articulated sounds

- spoken or heard
- **sensed in your mind**



- Not necessarily meaning distinguishing
- **meaning distinguishing**

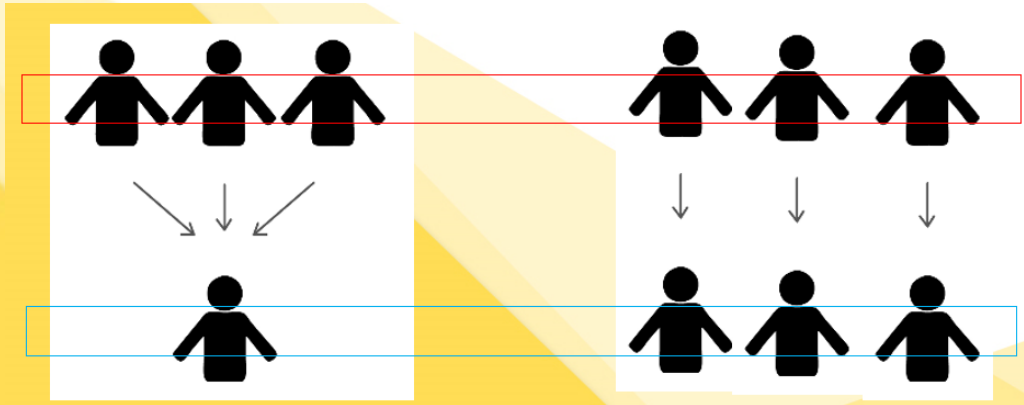
- An individual sound
- **A sound type**

Phonemes are conventionally placed between slashes (/ /) in transcription.

Phones/allophones are placed between square brackets ([ ]).

# Phoneme and Allophone

- a sound type
- different versions of a phoneme
- Phones of a same sound type



Examples?

# Examples of Allophones

## ■ Aspirated vs unaspirated sounds

Aspirated:

p<sup>h</sup>ɪl pill

t<sup>h</sup>ɪl till

k<sup>h</sup>ɪl kill

Unaspirated:

spɪl spill

stɪl still

skɪl skill

## ■ Oral vowels vs nasal vowels

bean [bɪn] bead [bið]

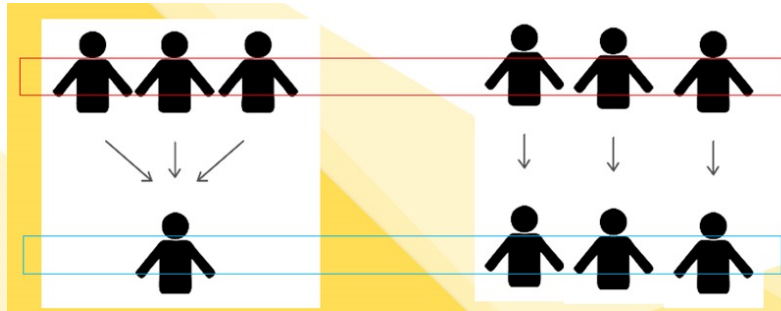
roam [rōm] robe [rɒb]

# Determination of phonemes

- Phonemes are established by the use of minimal pairs.

- minimal pairs

- *pill/bill, tear/dear, pear/bear, bet/bat, site/side, kill/kiss, pat/bat*



- a minimal set.

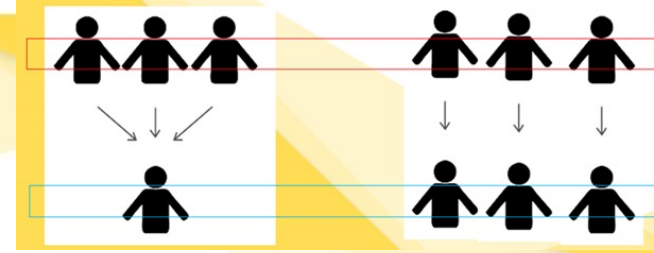
- *feat/fit/fat/feat/fought/foot; big/pig/fig/dig/wig;*
- *bill, dill, fill, gill, hill, jill, kill, lill, mill, nill, pill, sill, till, vill, will, yill, zill*



# Determination of phonemes

- a total of 48 phonemes in one dialect of English.
- Pure vowels: /i:/ /ɪ/ /e/ /æ/ /ʌ/ /ɜ:/ /ə/ /u:/ /ʊ/ /ɔ:/ /ɒ/ /ɑ:/
- Diphthongs: /eɪ/ /aɪ/ /ɔɪ/ /aʊ/ /əʊ/ /ɪə/ /eə/ /ʊə/
- Consonants: /p/ /t/ /k/ /b/ /d/ /g/ /f/ /s/ /ʃ/ /θ/ /h/ /v/ /z/ /ʒ/ /ð/ /tʃ/ /tr/ /ts/ /dʒ/ /dr/ /dz/ /m/ /n/ /ŋ/ /l/ /r/ /j/ /w/

# complementary distribution



- Allophones of a phoneme are in complementary distribution.

Aspirated:

p<sup>h</sup>ɪl pill

t<sup>h</sup>ɪl till

k<sup>h</sup>ɪl kill

Unaspirated:

spɪl spill

stɪl still

skɪl skill

- Vowels are nasalized before a nasal consonant within the same syllable structure

be

[bi]

bead

[bid]

bean

[bĩn]

**TABLE 7.2** | Distribution of Oral and Nasal Vowels in English Syllables

	In Final Position	Before Nasal Consonants	Before Oral Consonants
Oral vowels	Yes	No	Yes
Nasal vowels	No	Yes	No

# Natural classes

- A phoneme can have a lot of features.
- A natural class contains all (and only) the sounds that share a particular set of features.
- /p t k/ constitute the natural class of “voiceless stops” in English
- /p t k b d g/. This is the natural class of stops.
- /p t k b d/ do not constitute a natural class.

# Natural classes

- Identify whether the following phonemes are a natural set. If yes, specify the set of features they share.

- /p t k m n ŋ/ \*

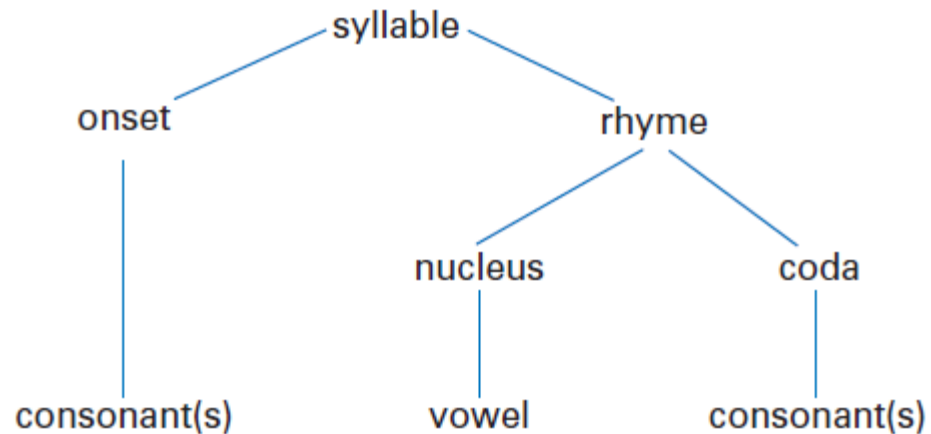
- /p b m/

- / θ ð /

- / t d n s z l r /

# Syllable

- Phoneme: an indivisible unit of sound
- Syllable: a phonological unit composed of one or more phonemes.
- Structure of a syllable (e.g., *splint*)



/m/, /n/, /l/ *rhy-thm, bo-ttle*

are, splint, post, buy, extreme, apple

## “Twinkle Twinkle Little Star” Lyrics

Twinkle, twinkle, little star,  
How I wonder what you are.  
Up above the world so high,  
Like a diamond in the sky.

When the blazing sun is gone,  
When he nothing shines upon,  
Then you show your little light,  
Twinkle, twinkle, all the night.

# Phonotactics

- **Phonemes are not combined randomly, but in a systematic and predictable way.**
- **Some phoneme sequence is acceptable while others are unacceptable.**
- /tɫ/ does not occur at the beginning of a syllable in English.
- *train, plane, tlane\**
- *atlantic, little*

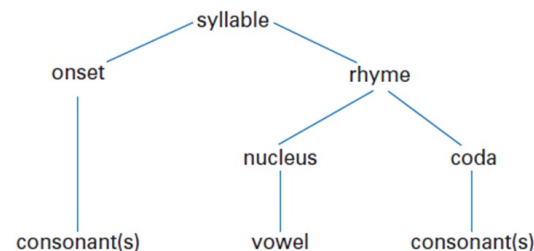
# Phonotactic/phonological rules

- - rules of sound distribution
- - rules of sound combinations



# rules of sound distribution

- It describes in which position of a syllable phonemes can occur.

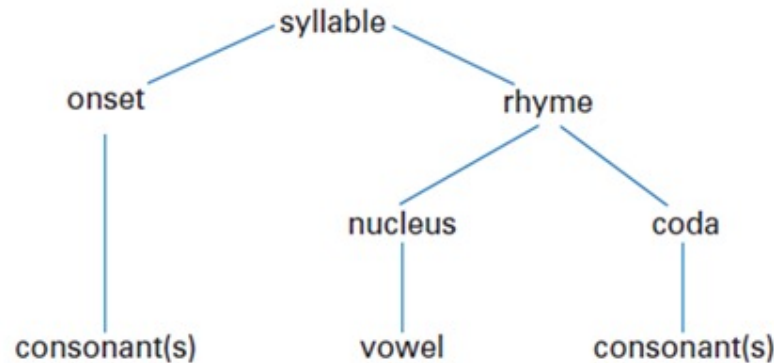


- Generally a long vowel or a diphthong can appear in an English syllable without onset and coda.
- *are, O'hara, Africa, Asia, auto, agriculture, author, ...*
- *But, a (a boy; she got a car), America, ability??*
- /ŋ/ never occurs in the onset of an English syllable.
- /lʃ/, /w/ and /h/ never occur in the coda position in English.

# rules of sound combinations

- In English onsets consisting of a three consonant cluster, the first phoneme is always a /s/, the second either /p/, /t/ or /k/ and the third /r/, /j/ or - in some cases - /l/ or /w/.

$\sigma$     [s]     $\begin{Bmatrix} p \\ t \\ k \end{Bmatrix}$      $\begin{Bmatrix} (l) \\ r \\ (w) \\ j \end{Bmatrix}$

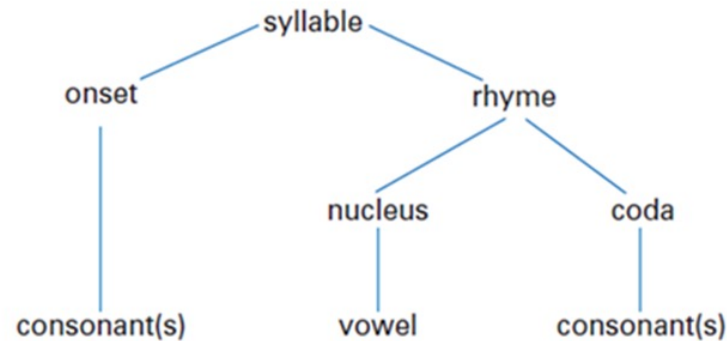


- *splay, spray, stray, squeal, scream, student, stew, \*pstay, \*wpjay*

# rules of sound combinations

- Similarly, not all possible combinations of two consonants in the onset can occur in English. In general, two consonants that share a place of articulation cannot occur together

- *\*/tʃ/* and *\*/dʒ/* (*alverolars*)



- Plosives, fricatives and liquids cannot combine with nasals
- *\*/bm/, \*/fn/, \*/ln/, \*/rm/*

- **A phonological rule based on the following examples?**
- *out, crowd, town, mouse, couch, south, rouse...*
- *\*aup, \*auk, \*aub, \*awm, \*aug, ...*

■ **A phonological rule based on the following examples?**

■ *camp, hamper, bombard, paint, intelligent, wind, think, linguistics, sing, rang*

# A brief summary

- **Phonetics:**
  - **consonants**
  - **vowels**
- **Phonology**
  - **Phoneme, phone, allophone**
  - **Syllable**
  - **Phonological/phonotactic rules**

# Reading materials for next week lecture

- **Chapter 5 Word formation**
- **Chapter 6 Morphology**