Unit 5

The syllable nucleus in the material world

shaping the airflow to form vocoids.

Slides for the session of
Phonetics with Listening Practice (British)
held on
06 May 2025

Robert Spence
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1. Goals
2. Acoustic phonetics and vowels
3. Where vowels are formed in the mouth
4. Vowels: phonetics vs phonemics
5. Vowel quadrilateral and cardinal vowels
6. English vowel phonemes vs. cardinal vowel positions
7. Using diacritics for vowels
8. English sounds classified
9. Listening Exercise

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2. To become acquainted with the vowel quadrilateral and the cardinal vowels
3. To become acquainted with the diacritics that are used to specify positions 'in between' the cardinal vowels
4. To check which vowel phonemes in English fall close to cardinal vowels, and which do not

Brief overview of acoustic phonetics in relation to vowels

1. Physics of sound waves
2. Overtones and formants
3. Distinguishing vowels by means of formants
4. How to read a spectrogram

Physics of sound waves

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- `http://www.spence.saar.de/akustik.jpg`

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- identifying vowels by their formants (F_1 and F_2)

Distinguishing vowels by means of formants

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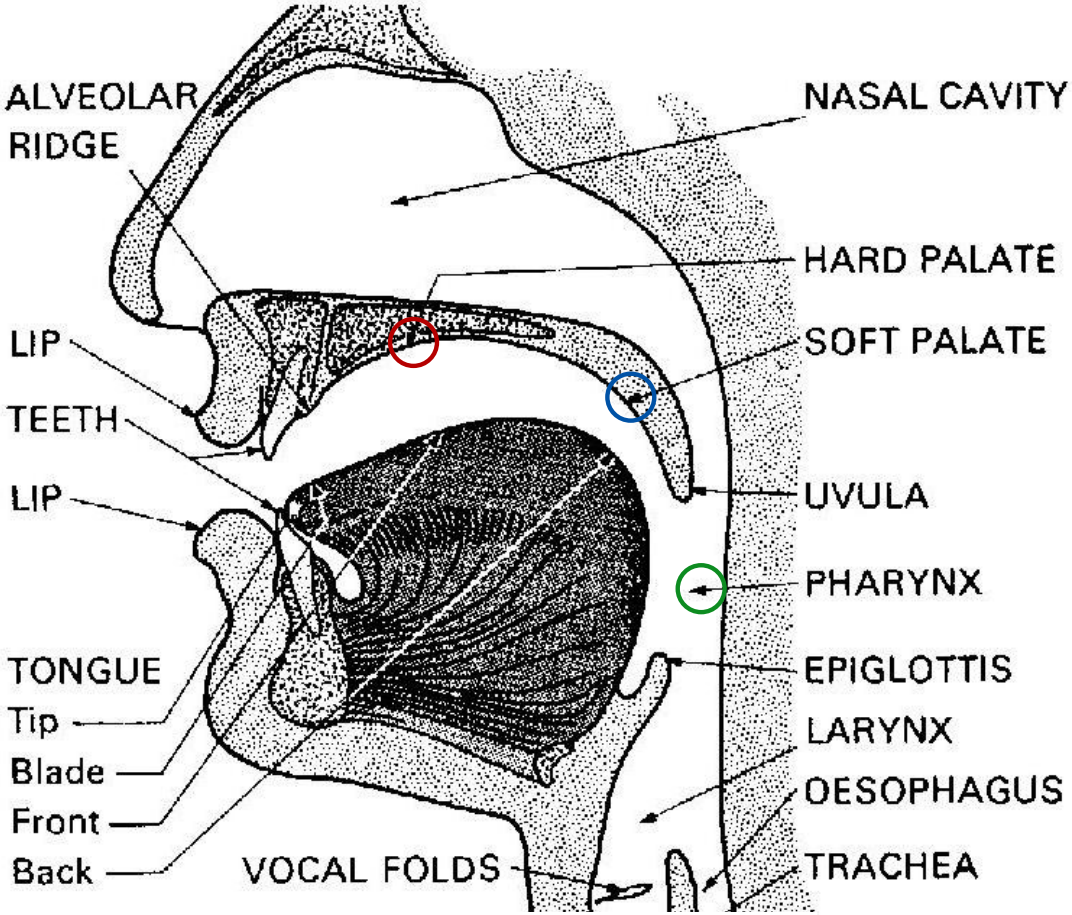
Outer boundaries of the space where vowels can be formed



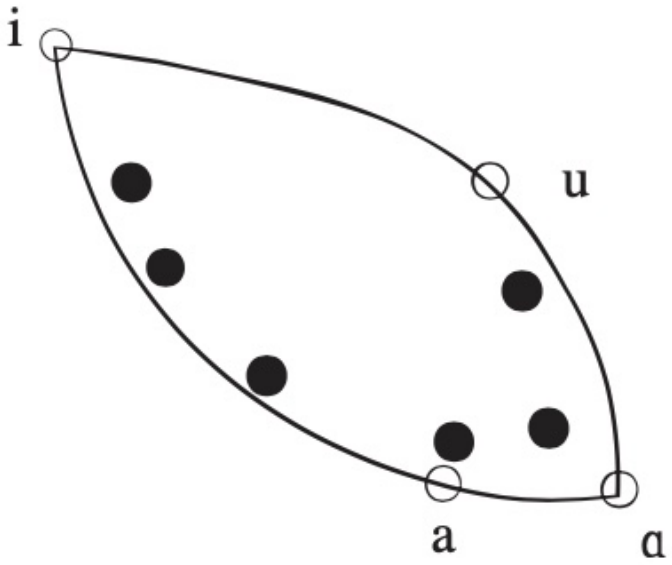
THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

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	N		
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.

Position of highest part of tongue in relation to the four basic cardinal vowels



Source: Alex Jones *australian english grammar*, Wild and Woolley, 2001, page 170.

The empty circles show the location of the four basic cardinal vowels [i], [a], [ɑ], [u].

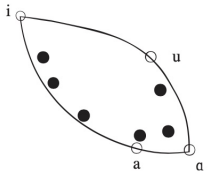
The black circles show the location of the six short vowels of Australian English that are heard in

KIT, DRESS, STRAP, STRUT, LOT, FOOT

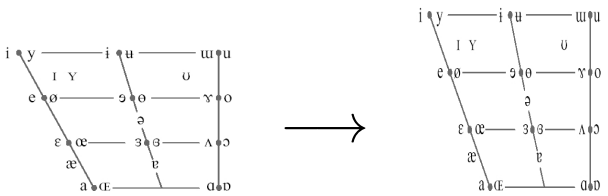
(counter-clockwise from upper left).

From the ‘AFL football’ to the ‘vowel quadrilateral’ … and beyond

The roughly oval ARTICULATORY shape as measured in the mouth:



can be stylised to form the ‘vowel quadrilateral’, based partly on anatomical and partly on psychological (PERCEPTUAL) criteria; this, in turn, can be modified on the basis of ACOUSTIC measurements:



Finally, the quadrilateral shape can be idealised further to form a square or rectangle, if necessary:

/ɪ/		/ʊ/
/e/		
/æ/	/ʌ/	/ɒ/

Vowels: phonetics vs phonemics

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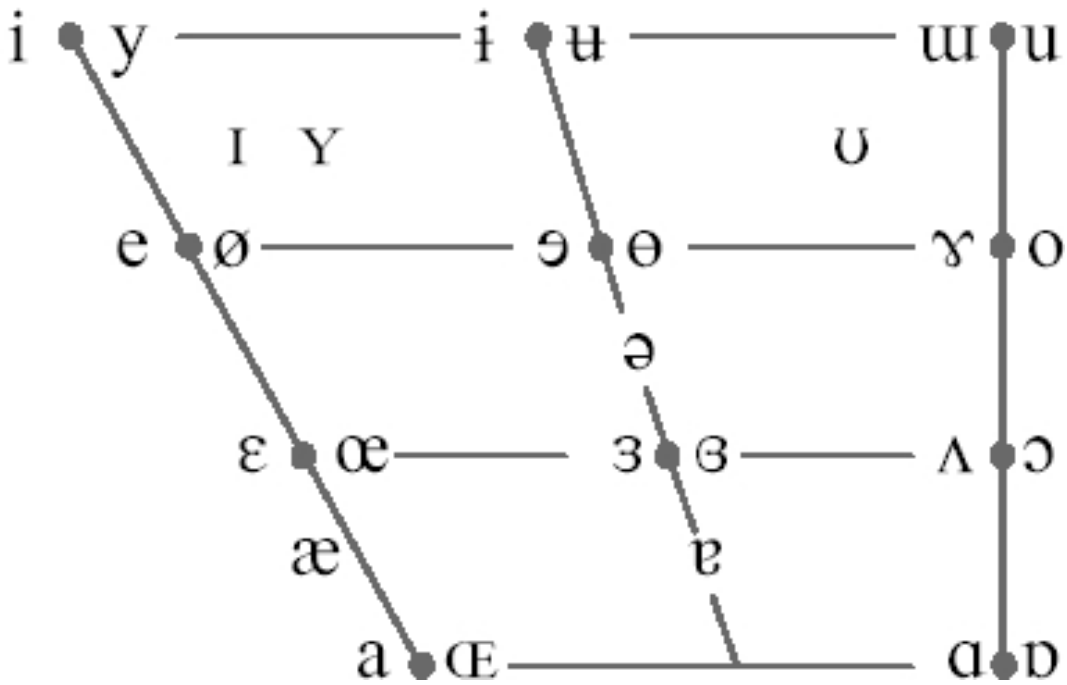
- **English** has / iː ɪ e æ ɑː ɒ ʌ ɔː ʊ uː /

Vowel quadrilateral and cardinal vowels

highest point of tongue is:

front ***back***

JAW IS:



CLOSE

OPEN

lips are ***unrounded*** (symbol to the ***left*** of the dot) or ***rounded*** (symbol to the ***right*** of the dot); beware [ə] [ɐ] (***unrounded***), [ʊ] (***rounded***): NOTE: [a] is ***'front'*** (just like [i])

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- Look at the **diacritics** on your IPA chart for ways of ***'fine-tuning'*** phonetic transcriptions of vowels.

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Using diacritics for vowels

e̝ Raised	Lowered e̞
u̟ Advanced	Retracted i̠
ä Centralized	Mid-Centralized ɪ̽
ɔ̹ More rounded	Less rounded ɔ̜
ɛ̃ Nasalized	Rhoticity ɜ˞

English sounds classified

<table>
<tr><td colspan="3">SOUNDS</td></tr>
<tr><td rowspan="2">OBSTRUENTS</td><td colspan="2">RESONANTS</td></tr>
<tr><td>NASAL AND LATERAL RESONANTS</td><td>CENTRAL ORAL RESONANTS</td></tr>
<tr><td>[p t tʃ k]
[b d dʒ g]
[f θ s ʃ]
[v ð z ʒ]</td><td>[m n ŋ]
[l / ɬ]</td><td>[w ɹ j]
[ə]
[ɪ e æ ʌ ɒ ʊ]
[i: eɪ aɪ ɔɪ u: əʊ aʊ]
[ɪə eə ɜː ɑː ɔː ʊə]</td></tr>
<tr><td colspan="3">[h]</td></tr>
<tr><td colspan="2">CONTOIDS</td><td>VOCOIDS</td></tr>
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Listening Exercise

If you have time, do this listening exercise:
http://www.spence.saar.de/phonetics/exercise_sheet_02-01/exercise_sheet_02-01.pdf