

Unit 4

Vowels (1)

Approaching vowels via acoustic and articulatory phonetics

Slides for the session of
Phonetics with Listening Practice (British)
held on
16 May 2023

Vowels (1)

Goals

Acoustic phonetics and vowels

Vowels: phonetics vs phonemics

Vowel quadrilateral and cardinal vowels

English vowel phonemes vs. cardinal vowel positions

Using diacritics for vowels

Vowels: comparing German and English

Robert Spence
English Department
Saarland University

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〈English Phonetics: Unit 4〉

/'ɪŋ ɡlɪf/ /fə 'net ɪks/ /'ju:n ɪt/ /'fɔ:/

['ɪŋ.ɡlɪf fə.'net.ɪks 'ju:n.əp̣̃ 'fɔ:] (AusE)

〈Vowels (1)〉

/'vaʊəlz/ /wʌŋ/

['væ̃əl̩z 'wʌŋ̩] (AusE)

〈Approaching vowels via acoustic and articulatory phonetics〉

/ə 'prəʊtʃ ɪŋ/ /vaʊəlz/ /'vaɹ_ə/ /ə 'ku:st ɪk/ /ən(d)/ /ɑ: 'tɪk jəl ət_ər i/ /fə 'net ɪks/

[ə.'pr̥əʊtʃ.ɪŋ 'væ̃.əl̩z ,vaɹ̩.əɹ_ə.'kʰɪ:st.ɪk_ən_ɑ:.'tʰɪk.jəl.ət̩.i fə.'net̩.ɪks
(modern RP)]

- 1 Goals
- 2 Acoustic phonetics and vowels
- 3 Vowels: phonetics vs phonemics
- 4 Vowel quadrilateral and cardinal vowels
- 5 English vowel phonemes vs. cardinal vowel positions
- 6 Using diacritics for vowels
- 7 Vowels: comparing German and English

The goals of today's session are:

- 1 To briefly discuss the acoustics of sound, concentrating on vowel sounds as made in the human vocal tract (10 mins)

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- 3 To check which vowel phonemes in English fall close to cardinal vowels, and which do not (10 mins)
- 4 To prepare the ground for a comparison between German and English vowel phonemes and their typical phonetic realizations (allophones) (10 mins)



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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

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- Motion of particles in direction of propagation of wave ...

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- ... but can be represented perpendicular to it.

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- Musical sounds as an easy “way in”

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- <http://www.spence.saar.de/akustik.jpg>

- voiced continuants and nasals have a fundamental frequency (F_0 , “F zero”)

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- voiced continuants and nasals have a fundamental frequency (F_0 , “F zero”)
- partial overtones (or ‘upper harmonics’):
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- formants: *amplified* upper harmonics

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- formants: *amplified* upper harmonics
- identifying vowels by their formants (F_1 and F_2)

Distinguishing vowels by means of formants

- The distinctive ‘quality’ of a vowel depends on how the vocal tract was shaped when it was being formed, and thus on the acoustic ‘formants’ (especially F_1 and F_2)

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How to read a spectrogram

- a spectrogram records: frequency (y), time (x), intensity (shading)

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- Italian has / i e ε a ɔ o u /
- French has / i e ε a ɑ ɔ o u /

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- Spanish has / i e a o u /
- Italian has / i e ε a ɔ o u /
- French has / i e ε a ɑ ɔ o u /
- English has / i: ɪ e æ a: ʊ ʌ ɔ: ʊ u: /

Vowel quadrilateral and cardinal vowels

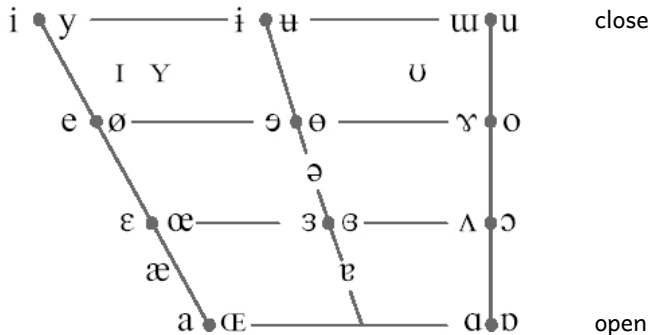
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highest point of tongue is:

jaw is:

front

back



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

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Only for freaks

- the meaning of the vowel quadrilateral in terms of formants:

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vs
front [i] (high F_2 , high F_2-F_1 difference)

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 - try $F_1 = 240$ & $F_2 = 2400$ (leave F_3 blank); what did you hear?
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- The pronunciation of the English phoneme /ə/ is [ə], i.e. it falls exactly on one of the cardinal vowel positions.
- The pronunciation of the English phoneme /e/ falls halfway between the cardinal vowel positions [e] and [ɛ].

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English vowel phonemes vs. cardinal vowel positions

- The cardinal vowel positions on the IPA chart are reference points, designed to ‘sound equidistant’.
- The pronunciation of the English phoneme /ə/ is [ə], i.e. it falls exactly on one of the cardinal vowel positions.
- The pronunciation of the English phoneme /e/ falls halfway between the cardinal vowel positions [e] and [ɛ].
- We write /e/ rather than /ɛ/ because we want to discourage German speakers from pronouncing that English phoneme as [ɛ], which would sound too German; pronouncing it as [e] would merely sound too Australian.

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Vowels (1)

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- See if you can identify other cardinal vowels that are used in pronouncing English phonemes.

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- Beware the English phoneme /ʌ/. This has evolved away from the [ʌ] position, and is now nearly [ɐ]. (Should it be written as /ɐ/?)

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- Beware the English phoneme /ʌ/. This has evolved away from the [ʌ] position, and is now nearly [ɐ]. (Should it be written as /ɐ/?)
- Look at the **diacritics** on your IPA chart for ways of ‘fine-tuning’ phonetic transcriptions of vowels.

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ē Raised

Lowered e

ū Advanced

Retracted i

ä Centralized

Mid-Centralized i^x

ö More rounded

Less rounded ö

ẽ Nasalized

Rhoticity ɜ̃

φων

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- This will be one of the main topics we will be dealing with over the two weeks, but we will also be comparing different dialects of English with each other and getting you to practise the vowels of RP (the Received Pronunciation of British English)

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- Which English vowels do you think will be most problematic for native German speakers?

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- Which English vowels do you think will be most problematic for native German speakers?
- Which English diphthongs do you think will be most problematic for native German speakers?

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