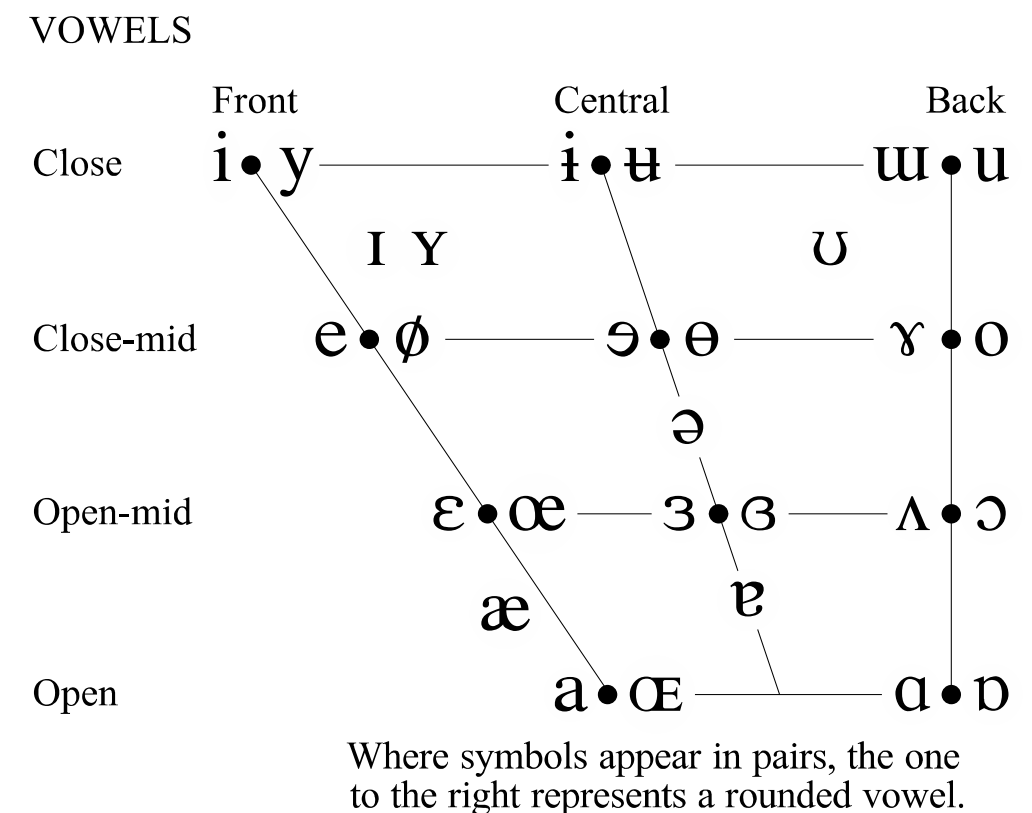


HS 133: Introduction to Phonetics

August 23, 2024

Vowels and Consonants| Vowel features

- Vowels are described in terms of **height**, **backness** and **roundness**.
- Static vowels are monophthongs
- Dynamic vowels are diphthongs [ai], [au], [oi]
- Some evidence for triphthongs [auə] as in '*hour*'



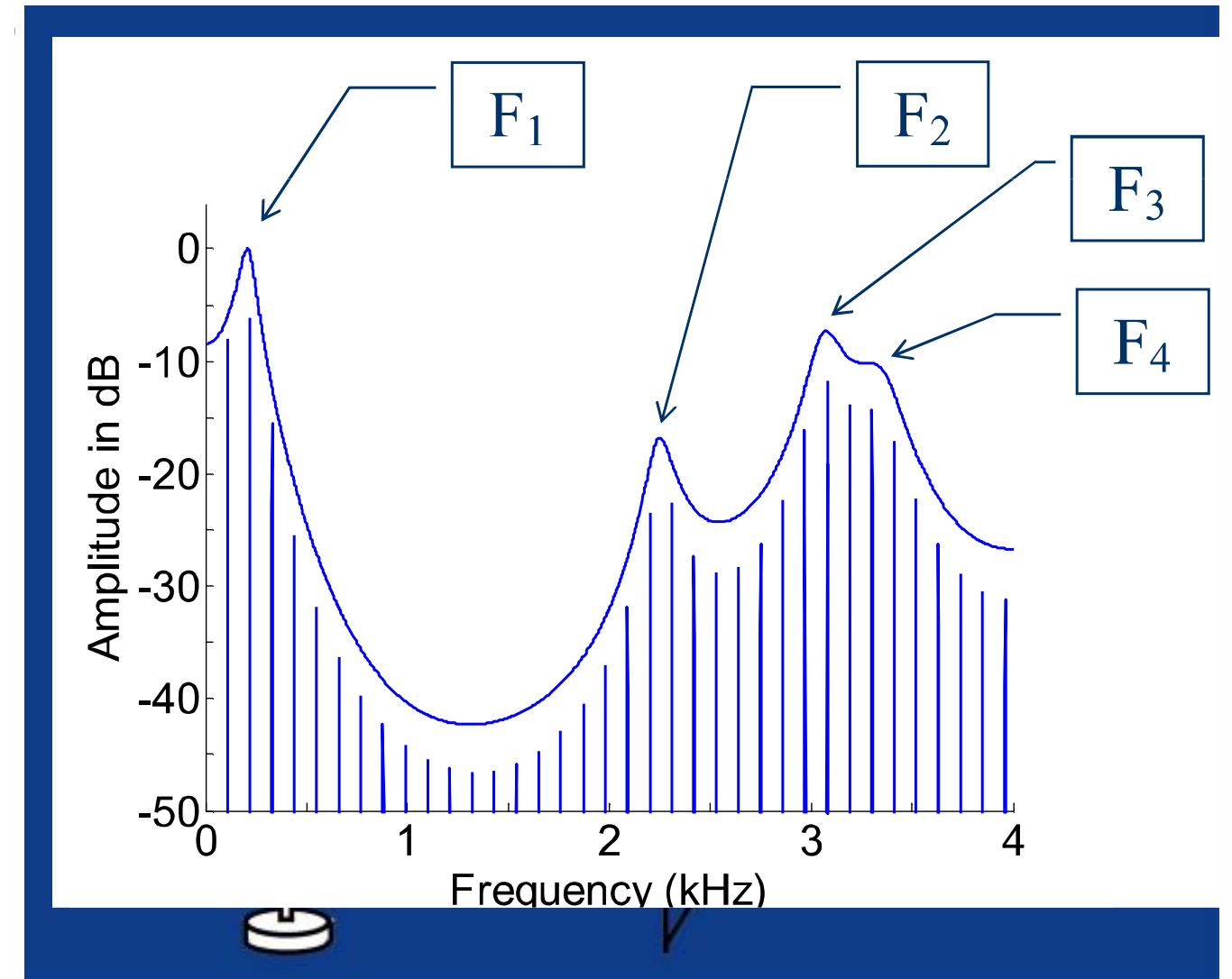
Acoustics of vowels | Vowel features

ə



Acoustics of vowels | Vowel formants

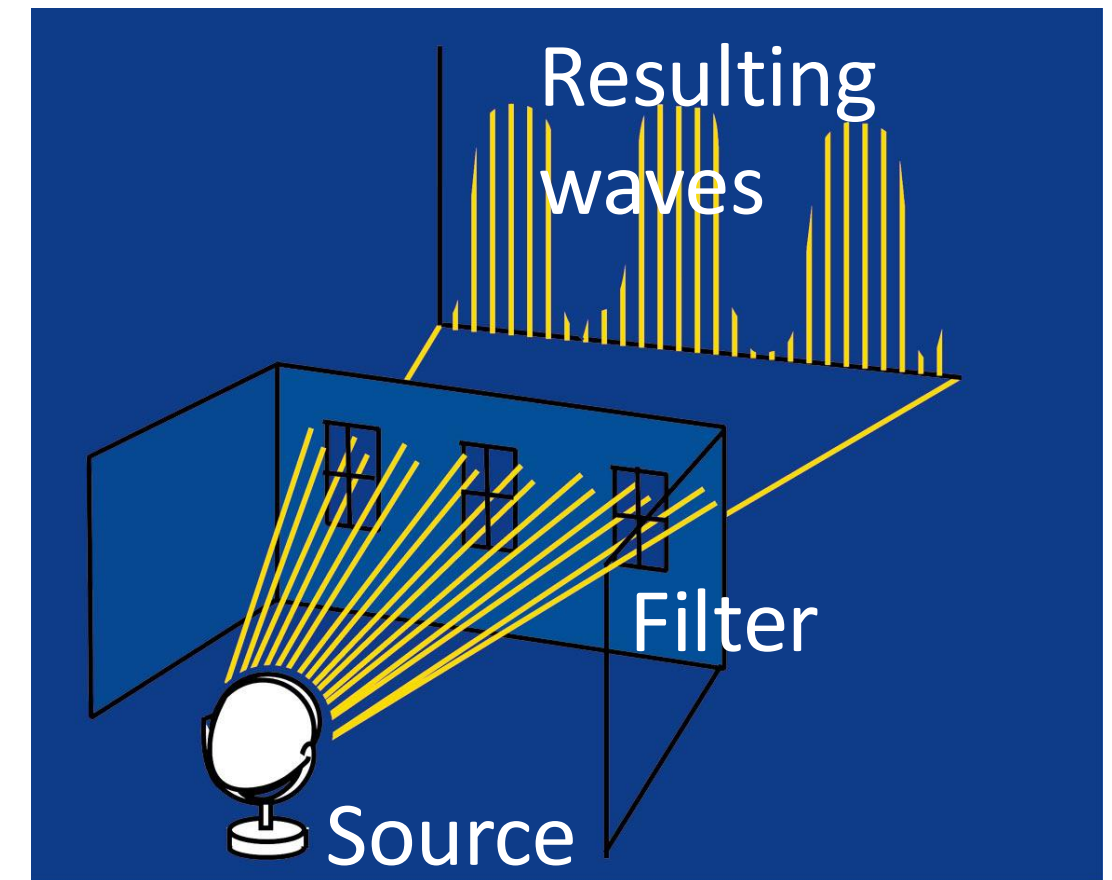
- Filtered source signals filter out certain harmonics and allows certain harmonics
- The peaks formed by 'allowed' harmonics are called F1, F2 and F3 etc.
 - F1 is inversely proportionate to tongue height
 - F2 is related to vowel backness
 - F3 is related to vowel rounding



Source: Fitch, W. T. Evolution of Speech: A Comparative Review. Elsevier Science,

Harmonics

- Recall from source filter theory that the oral cavity filters the source signals
- The oral cavity inhibits some harmonics and allows some others



Vowels

- The Source Filter Theory
 - Glottal Source
 - Vocal Tract Filter
- Acoustic specification of vowels
 - First two formants
 - All formants lowered in lip rounding
 - Front vowels, lip rounding influences F3
 - $F_3 = 5c/4L$ ($c = 340\text{m/s}$)
- Vowel length
 - Vowel specific length

Acoustics of vowels | Vowel visualizations

