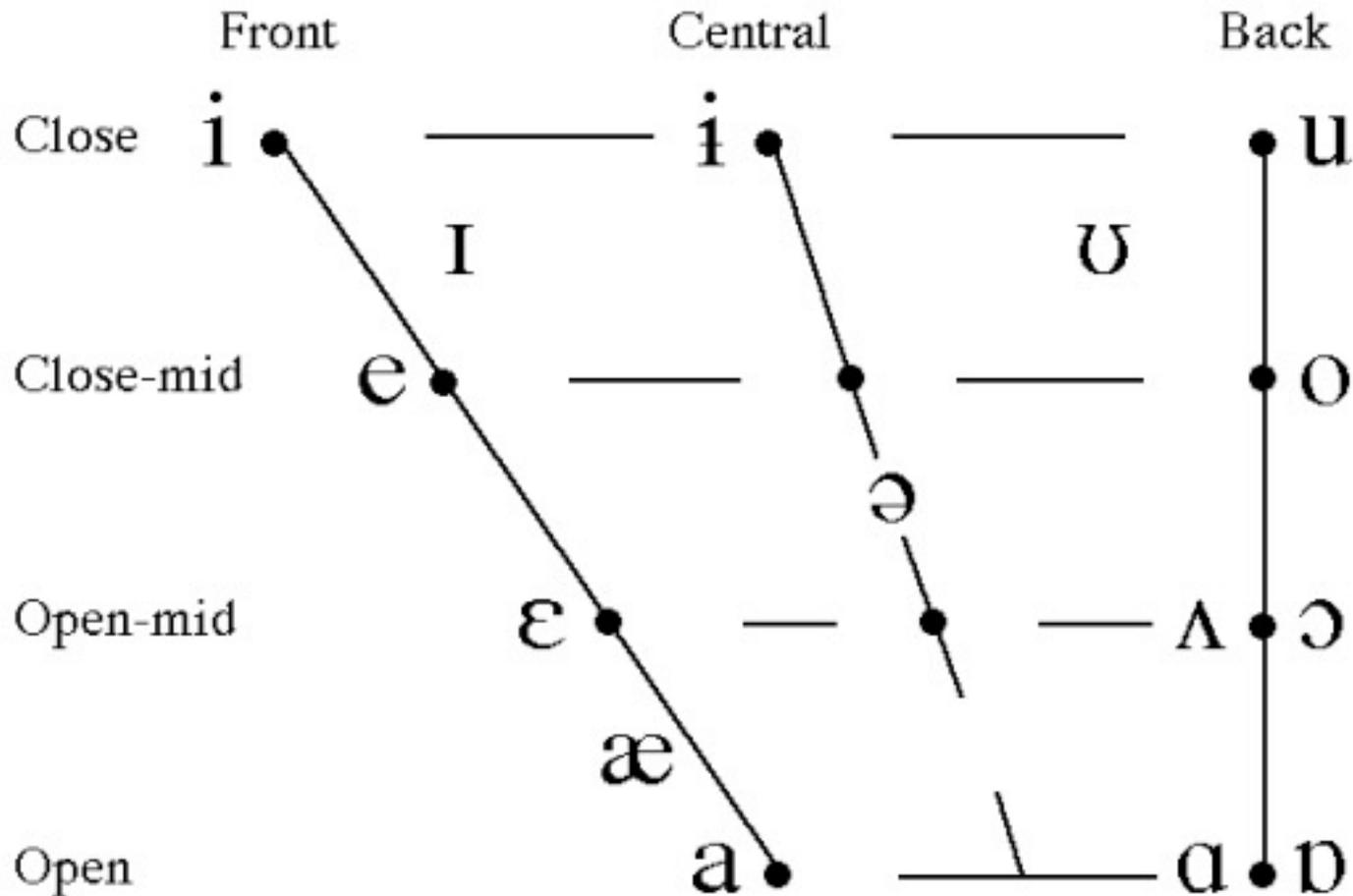


# Cardinal Vowels

# Vowel Review

- Vowel articulations can be characterized along four dimensions:
  1. Height (of tongue body)
    - high, mid, low
  2. Front-back (of tongue body)
    - front, central, back
  3. Roundedness (of lips)
    - rounded vs. unrounded
  4. “Tenseness”
    - tense/lax

# The Vowel Space



Where symbols appear in pairs, the one to the right represents a rounded vowel.

# Other Vowel Features

- Rounding:
  - [u], [ʊ], [o], [ɔ] are pronounced with rounded lips
  - the other English vowels are not
- “Tenseness”
  - a “tense” vowel is closer to the edge of the vowel space
  - a “lax” vowel is closer to the center
  - Ex: [i] is tense, [ɪ] is not.
- Tense/lax distinctions:
  - found predominately in Germanic languages
  - are **very hard** for non-native speakers of English to hear

# Tense vs. Lax

- There are five lax vowels that can be stressed in English.

## Tense

## Lax

heed

[hi:d]

hid

[hɪd]

hayed

[heɪd]

head

[hɛd]

who'd

[hu:d]

hood

[hʊd]

hod

[hɑ:d]

hud

[hʌd]

hoed

[hoʊd]

had

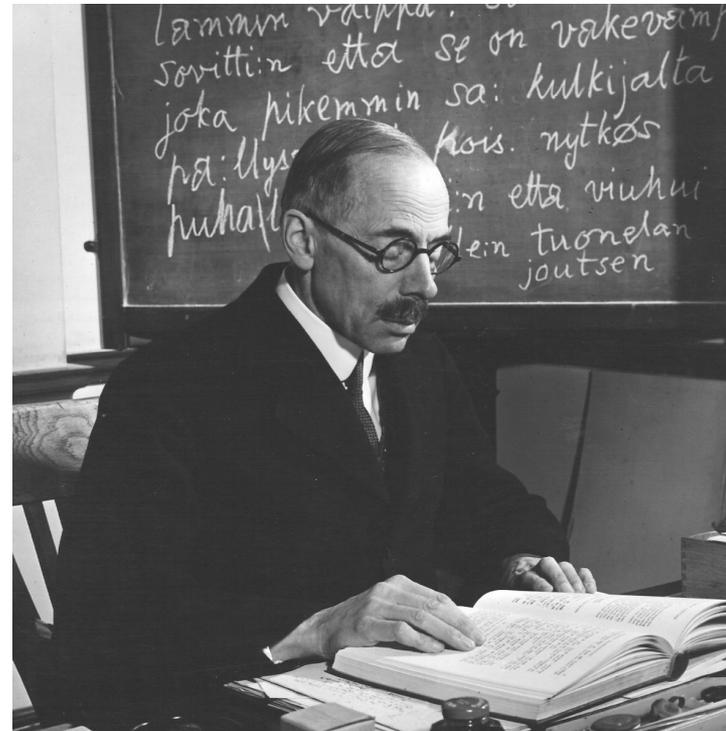
[hæd]

- These lax vowels do not appear at the end of a syllable.
- They also often have a [ə] offglide. ([ə] is lax!)
- Lastly: they are **shorter** than their tense counterparts.

# The Cardinal Vowels

- A set of 8 reference vowels
- Brainchild of English Phonetician Daniel Jones  
(1881-1967)

- “Cardinal Vowels can only be learnt from a teacher who knows how to make them or from a gramophone record or tape record.”



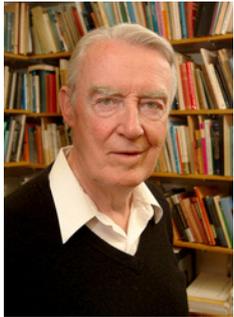
# Lineage



- Henry Sweet taught phonetics to Daniel Jones.



- Daniel Jones taught David Abercrombie.



- David Abercrombie taught Peter Ladefoged.



- Peter Ladefoged taught Sarah Dart.



- Sarah Dart taught me.

- I am teaching you.

# Wait for it...



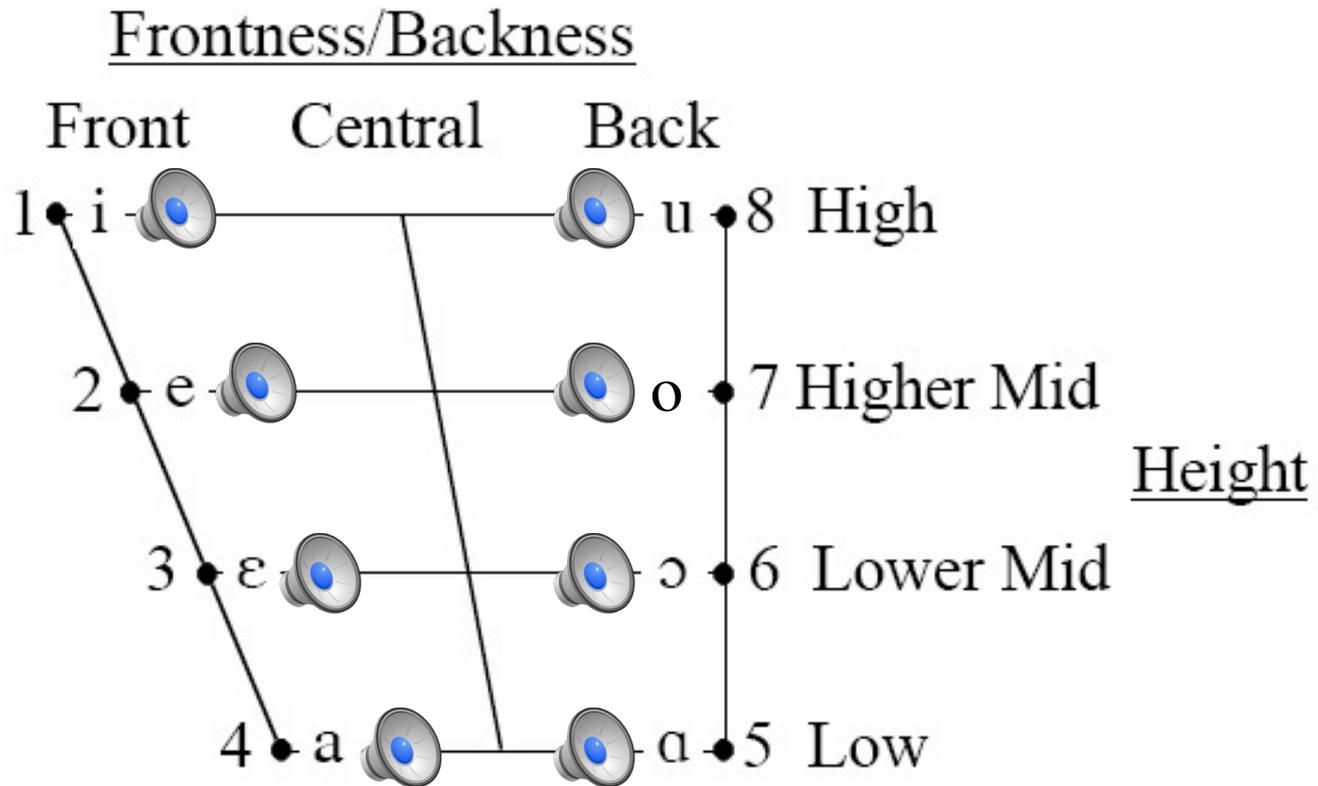
- Steven Winters taught me.
- I am teaching you!

# The Cardinal Vowels

- So let's learn about the Cardinal Vowels.
- Two “anchor” vowels:
  - [i] - Cardinal Vowel 1 - highest, frontest vowel possible
  - [ɑ] - Cardinal Vowel 5 - lowest, backest vowel possible
- Remaining vowels are spaced at equal intervals of frontness and height between the anchor vowels.
- Note: [u] - Cardinal Vowel 8 - may serve as a third anchor as the highest, backest, **roundest** vowel possible

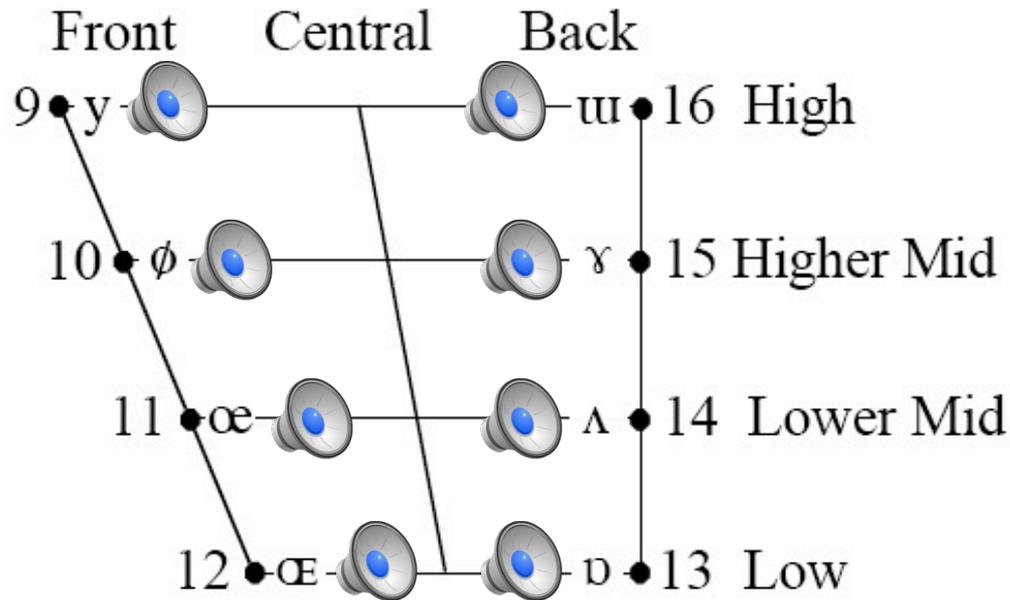
Cardinal Vowels recorded by Jones in 1965 when he was 75.

(Audio clips from: <http://www.let.uu.nl/~audiufon/>)



# Secondary Cardinal Vowels

The Secondary Cardinal Vowels are reference vowels with opposite lip position.



# Origins?

- Why are the primary Cardinal Vowels primary and not secondary?
- Possible influence of late 19th/early 20th century French vowel system:
  1. [i] lit [li] 'bed' 8. [u] loup [lu] 'wolf'
  2. [e] les [le] 'the' 7. [o] lot [lo] 'lot, share'
  3. [ɛ] lait [lɛ] 'milk' 6. [ɔ] loque [lɔk] 'rag'
  4. [a] la [la] 'the' 5. [ɑ] lache [laʃ] 'loose'
- French phonetician Paul Passy was President of the IPA when it adopted the Cardinal Vowel system for vowel classification.

# Caveats and Addenda

- The Cardinal Vowels are not the vowels of any language; they are reference vowels.

- There were also two “central” Cardinal Vowels: [ɨ] and [ɥ]

- 17 – [ɨ]      “barred i” 

- 18 – [ɥ]      “barred u” 

- Central vowels only appear in unstressed syllables in English.

- [ə] ‘about’                      “Martin”                      [mɑ:tɪn]

- [ɨ] ‘roses’

- Also: New Zealand and Scottish English



# Parting Shots

- The Cardinal Vowels were based on an articulatory, three-dimensional characterization of vowels:
  1. Height (high, mid, low)
  2. Front/central/backness
  3. Roundedness

Ex: [i] is a high, front, unrounded vowel

[ɔ] is a low-mid, back, rounded vowel

- With the invention of the sound spectrograph in World War II...
  - an acoustic/auditory understanding of vowel distinctions superseded the old articulatory characterization.