Phonetics 2.1:
The vowels of American English

April 15, 2020

Recap

Characterize consonants by three main features:

(i) Voicing — WITHIN CELL POSITION

(ii) Place of articulation — COLUMNS

(iii) Manner of articulation — ROWS

Extra extra sauce...

We also have centrality and nasality to describe the nature of airflow.

Last, we have terms to describe airstream generation

$\rightsquigarrow$ What generates the airstream? (Pulmonic, Ejective, Implosive, Click)
$\rightsquigarrow$ Does air flow out (egressive) or in (ingressive)?

Need to know: All English sounds are **pulmonic**, meaning they involve air flowing **outward (egressive)** from the lungs through the vocal tract.

Non-English sounds (do not need to know)

Non-pulmonic manners:

Ejectives (egressive): A stop closure is formed in the vocal tract. The glottis (gap between vocal folds) is closed and the glottis raised, building up positive pressure behind the stop closure. The closure is then released.

Implosives (ingressive): Stop closure formed and closed glottis moves down, creating negative pressure in the vocal tract before the closure is released.

Clicks (ingressive): A stop closure is formed in the vocal tract and then the back of the tongue is moved to create negative pressure in the vocal tract. Then, stop closure is released.

Vowels

What is a **vowel**?

A sound produced with minimal constriction in the vocal tract and no audible friction.

Articulatory phonetics point of view for vowels

Question: How do we describe vowels in terms of how they're articulated?

Answer (for this class): Position of the peak of the tongue in the mouth

Main features for vowels (need to know)

Height: high, mid, low, near-high, low-mid...

Backness: front, back, central, near-back...

Lip rounding: rounded, unrounded

Note the position of the tongue for front [i] v. back [u]

iː

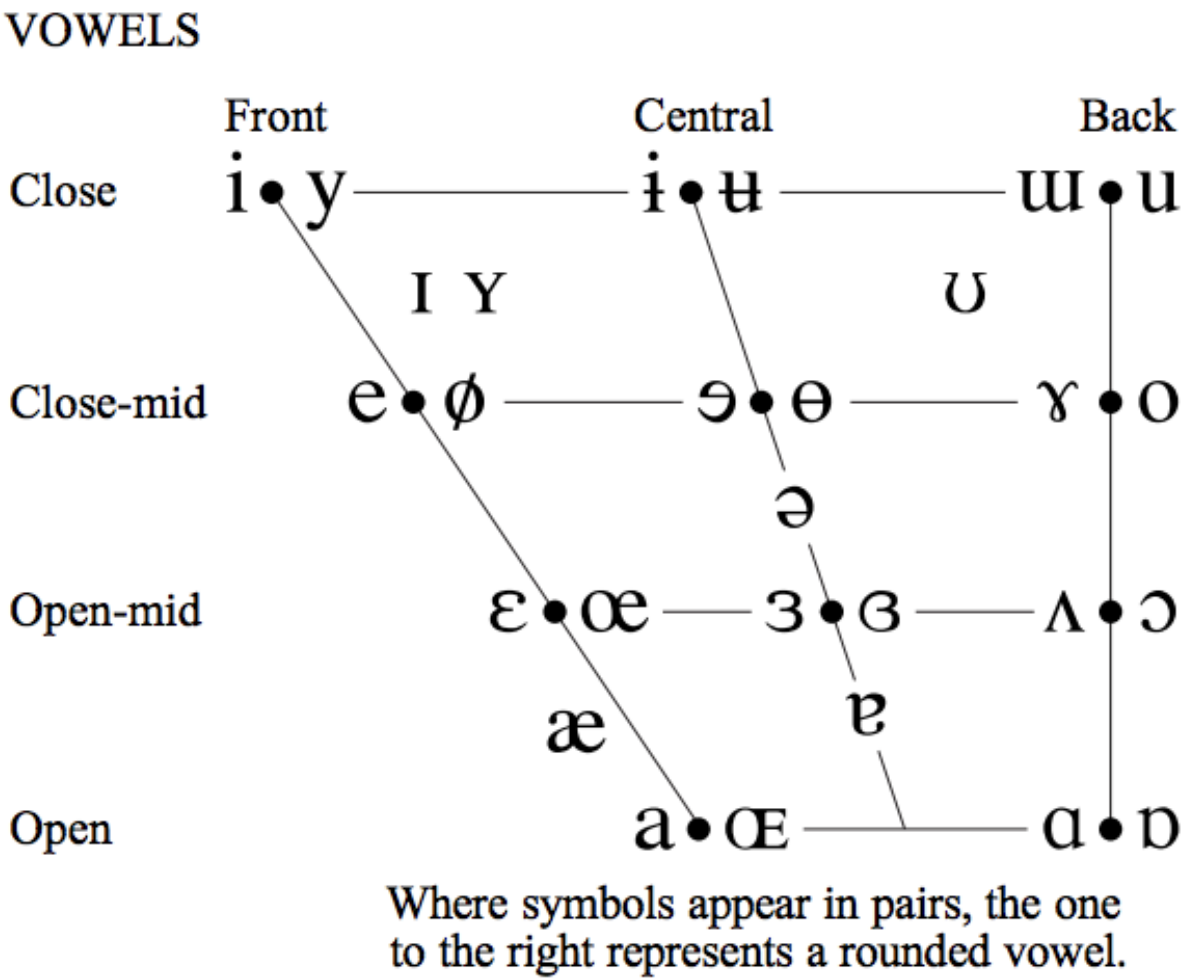
uː

Secondary feature for vowels (do not need to know)

Also relevant, but we'll focus less on them in this course:

Tenseness / "advanced tongue root" (ATR): tense, lax

Full IPA for vowels



Characterizing vowels

Read the table for monophthongs as follows:

(i) Rows	What height is the vowel
(ii) Columns	How far front/back is the vowel
(iii) Within cell position	Rounded (right) or unrounded (left)

Two main flavors of vowel

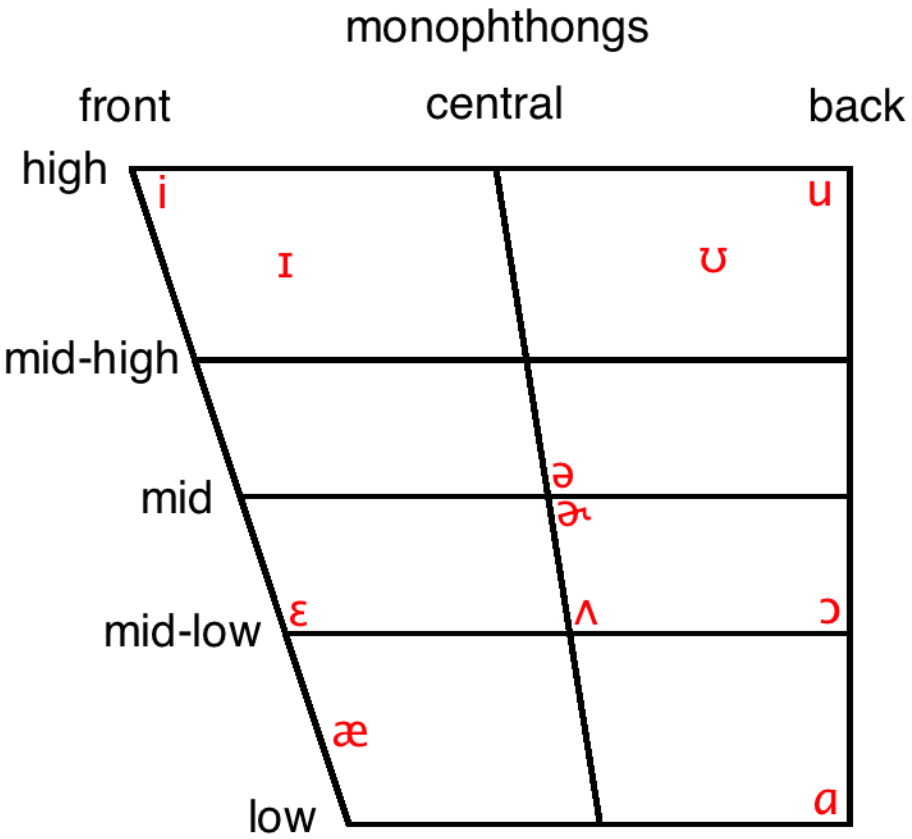
Two types of vowels:

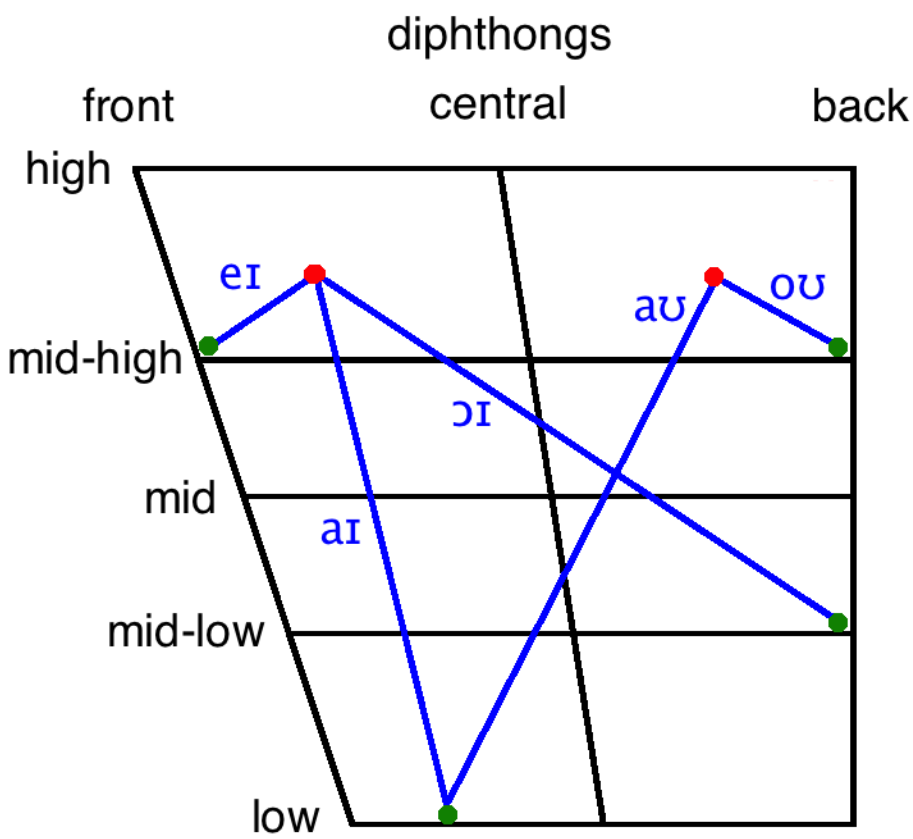
(i) Monophthongs — single vowels

(ii) Diphthongs — typically a sequence two different vowels that behaves as a single vowel (not necessary for vowels to be different)

That is why there will be two tables on the next slide showing vowels for American English.

Vowels of American English





Characterizing vowels

Read the table for monophthongs as follows:

(i)	Rows	What height is the vowel
(ii)	Columns	How far front/back is the vowel
(iii)	Within cell position	Rounded (right) or unrounded (left)

Same principles hold for diphthong table, but note movement to show first and second part of vowel (green = start; red = end).

Don't hate the lecturer, hate the game

The name of the game with IPA is

(i) Understand the tables — What does each dimension mean?

(ii) Memorize — Just gotta do it; makes life easier.

Typing IPA

A note on typing IPA:

Word, other conventional word processors:

http://ipa.typeit.org/

Generally best to copy from browser - careful with [g], [ɑ], [a], [ɻ]

Typing IPA

LaTeX

\usepackage{tipa}

\textipa{[t2N]} $\longrightarrow$ [tʌŋ]

Typing IPA

tipa symbol correspondence (LaTeX):

type	get	type	get	type	get
a	a	i	i	s	s
A	ɑ	I	ɪ	S	ʃ
\ae{}	æ	j	j	t	t
b	b	k	k	T	θ
d	d	l	l	\textteshlig	ʧ
D	ð	m	m	\texttoptiebar{tS}	t͡ʃ
\dyoghlig	ʤ	n	n	u	u
\texttoptiebar{dZ}	d͡ʒ	N	ŋ	U	ʊ
e	e	o	o	2	ʌ
E	ɛ	O	ɔ	v	v
@	ə	p	p	w	w
\textrhookschwa	ɚ	P	ʔ	x	x
f	f	R	ʀ	z	z
g	g	*r	ɹ	Z	ʒ
h	h				

End of video lecture material. Use the rest of the slides to practice and eventually memorize English vowels in IPA.

Summary — Vowels

. We characterize vowels by **height**, **front/backness** and **roundedness**.

. Diphthongs function as one vowel: they begin at vowel with first symbol and finish with vowel of second symbol

(in the diagrams below, green = start / first vowel and red = end / second vowel)

. Front vowels are unrounded; back vowels are rounded, except for [ɑ]; rounding is basically irrelevant for central vowels in English, but you can consider them unrounded.

Upshot of next couple of slides: there are a lot of details in transcription; we will not grade for the details.

To help brace yourselves for the next slide

What you should know and what you shouldn't worry about:

. Articulatory characterization (height, front/backness, roundedness) and sound for all vowels KNOW

For central vowels

. Schwa refers to [ʌ], [ə] ... (stressed, unstressed)

.. if only one vowel in word and sounds like schwa, then it is [ʌ]. KNOW

.. in words $>$ 1 syllables when to put [ʌ] v. [ə] NO WORRIES

. Rhotacized schwa [ɚ] v. consonant [ɹ]

.. [ɹ] occurs before or after a vowel, otherwise [ɚ] KNOW

.. potential exceptions NO WORRIES

Notes for the following slides and for the homework

(i) Schwa has a stressed [ʌ] and unstressed [ə] variant. These are the first vowels in *butter* and *about* respectively. If a word has only one vowel and it sounds like the first vowel in the words above, use [ʌ] (because only vowel is stressed by default). For words with more than one vowel, it can get tricky, so no need to worry about that and just use [ə] if you want. Optional: look at next slide if you want to think about stress.

(ii) Try to distinguish between [ɹ] and [ɚ]. If the sound is before or after a vowel, it is [ɹ]; otherwise, it is [ɚ]

First case = *bird* $\rightsquigarrow$ [bɚd]
Second case = *rope* $\rightsquigarrow$ [ɹoʊp] *bright* $\rightsquigarrow$ [bɹɑɪt]

Stress (optional)

For most purposes in English, you can think of stress being the most salient/prominent syllable in a word. If there is only one syllable, it is considered stressed by default.

We indicate stress with the mark [ˈ] before the first sound of the syllable, so the words on the previous slide could be transcribed as
butter $\rightsquigarrow$ [ˈbʌɾɚ] and *about* $\rightsquigarrow$ [əˈbɑʊt]

Salience/prominence is a tricky thing to work with, and to me it is not obvious in a lot of cases, so I think using a contrastive context is more reliable. With only very few exceptions, the stressed syllable in the first word is the only syllable of that word which can be lengthened (focused/emphasized) in that context.

Contrastive context: I said _____, not _____.

I said go *aroooound* the pool, not into it. [əˈɹɑʊnd] GOOD

I said get *butterrrrr*, not honey. [bəˈɾɚ] BAD

Here is a step-by-step walkthrough of the vowels of English.

Vowels of American English

beet
beat

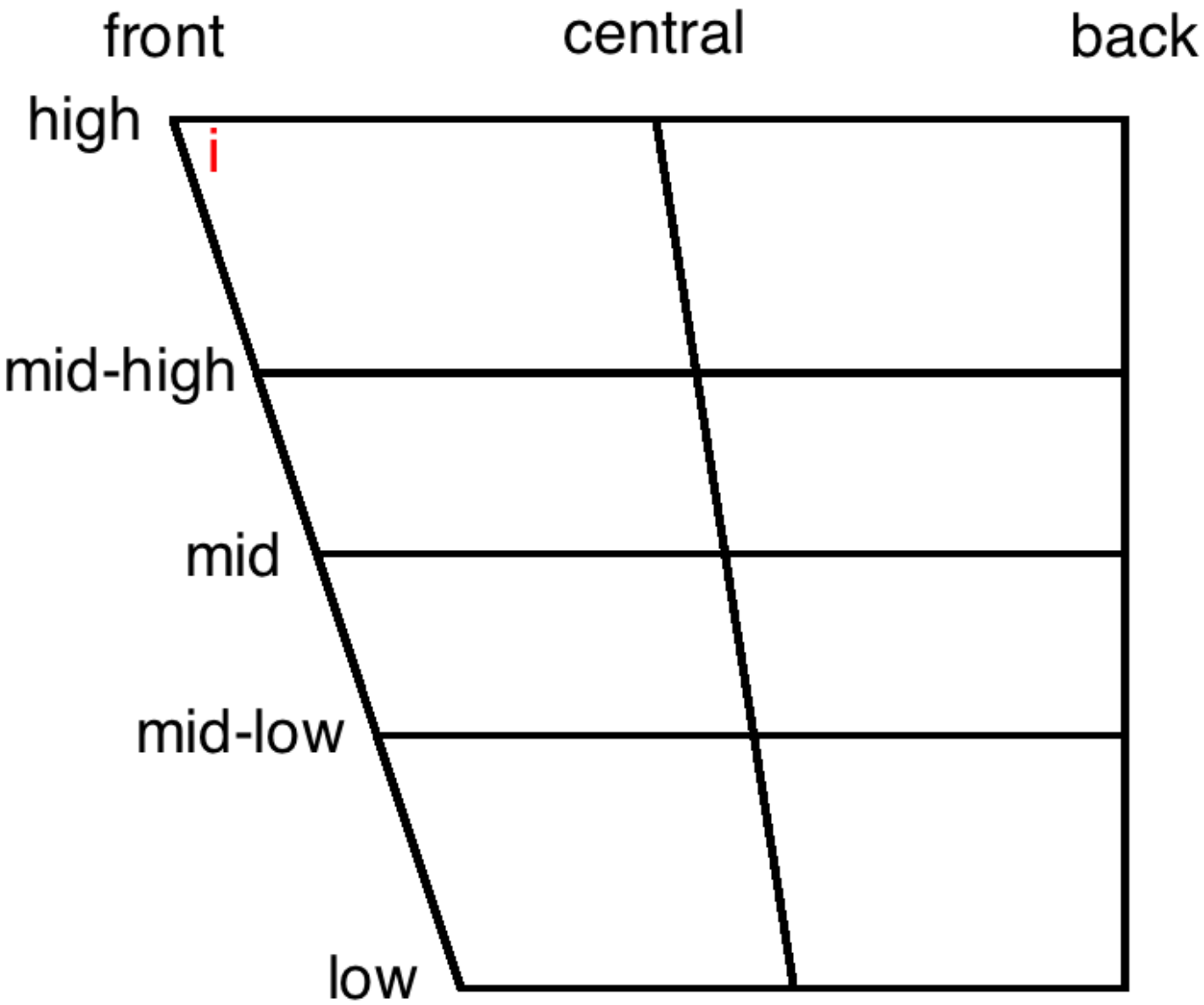
Height: high

Backness: front

Vowels of American English

[i]
high front vowel

Vowels of American English



Vowels of American English

bit

Height: near-high

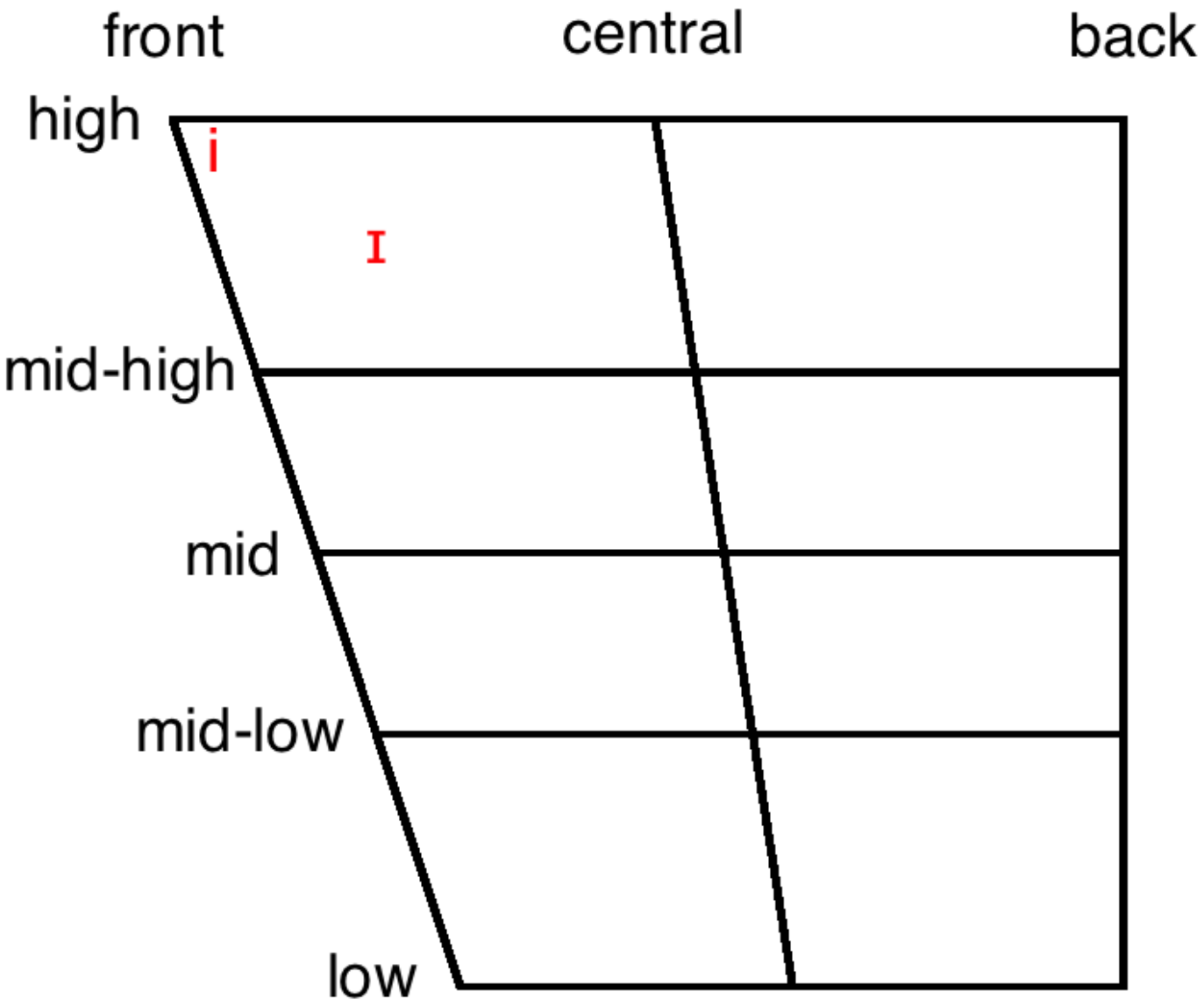
Backness: near-front

Vowels of American English

[ɪ]

near-high near-front vowel

Vowels of American English



Vowels of American English

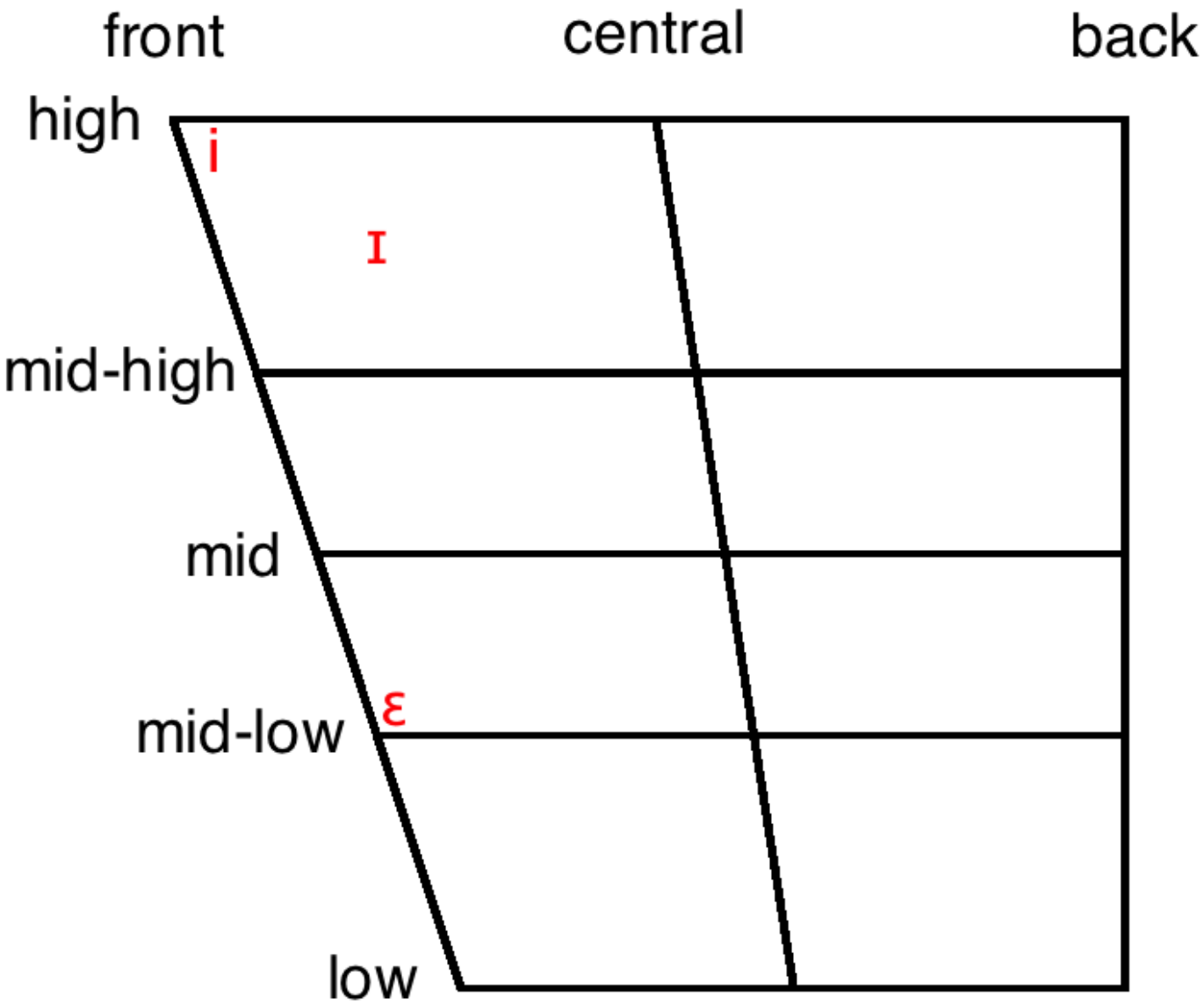
bet

Height: mid-low

Backness: front

[ɛ]
mid-low front vowel

Vowels of American English



Vowels of American English

bat

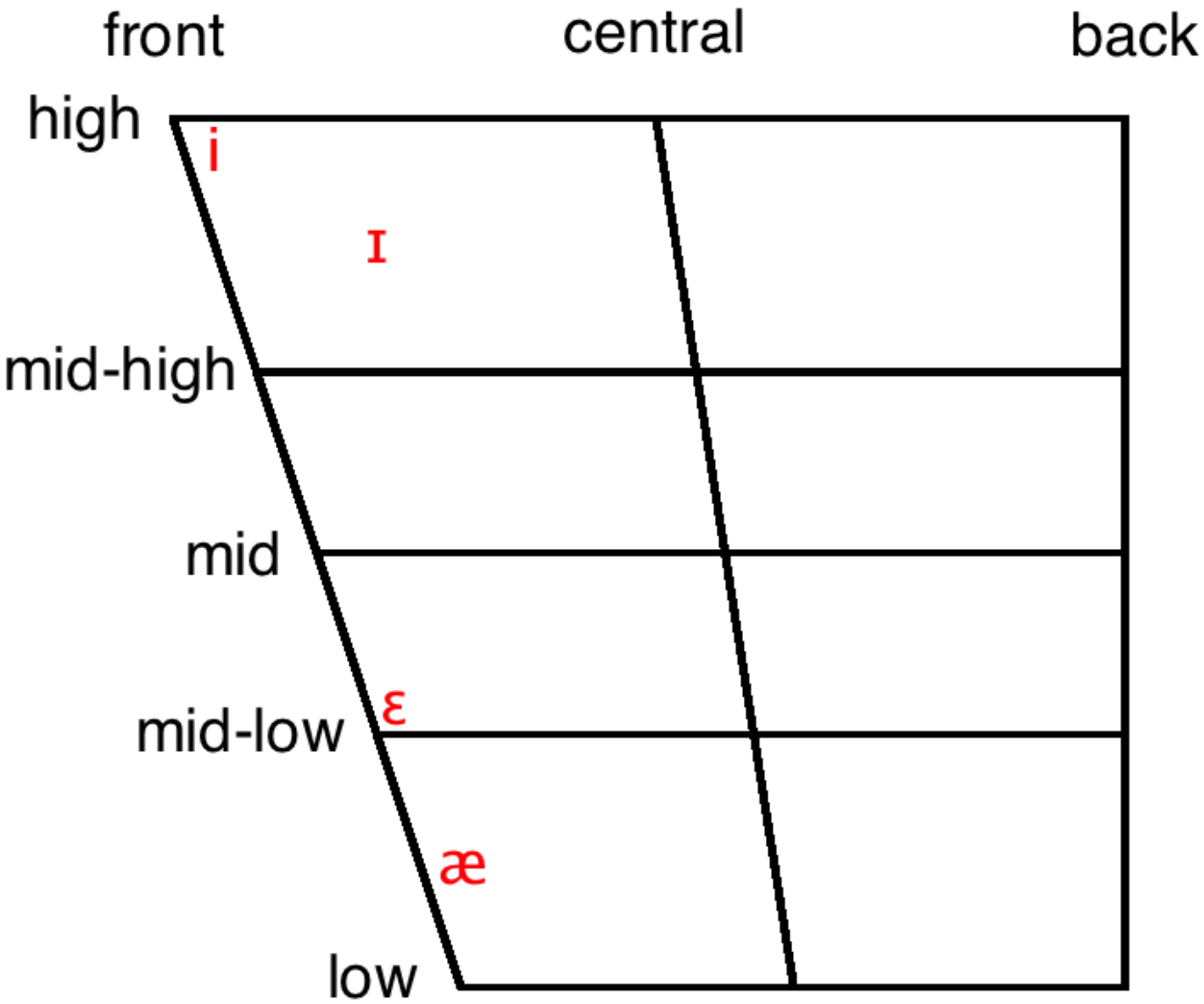
Height: near-low

Backness: front

Vowels of American English

[æ]
near-low front vowel

Vowels of American English



Vowels of American English

boot

Height: high

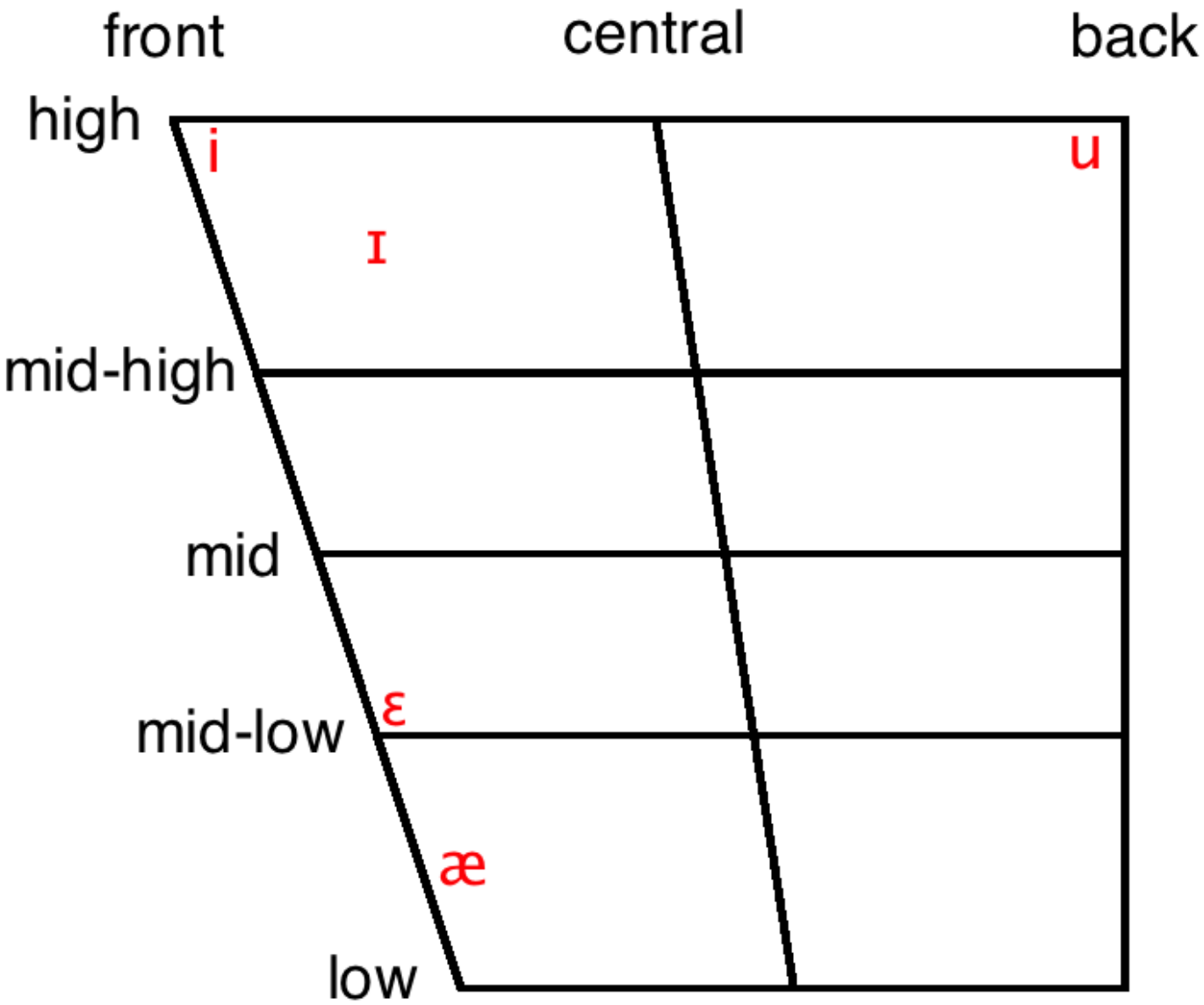
Backness: back

(**Rounding:** rounded)

Vowels of American English

[u]
high back (rounded) vowel

Vowels of American English



Vowels of American English

book

Height: near-high

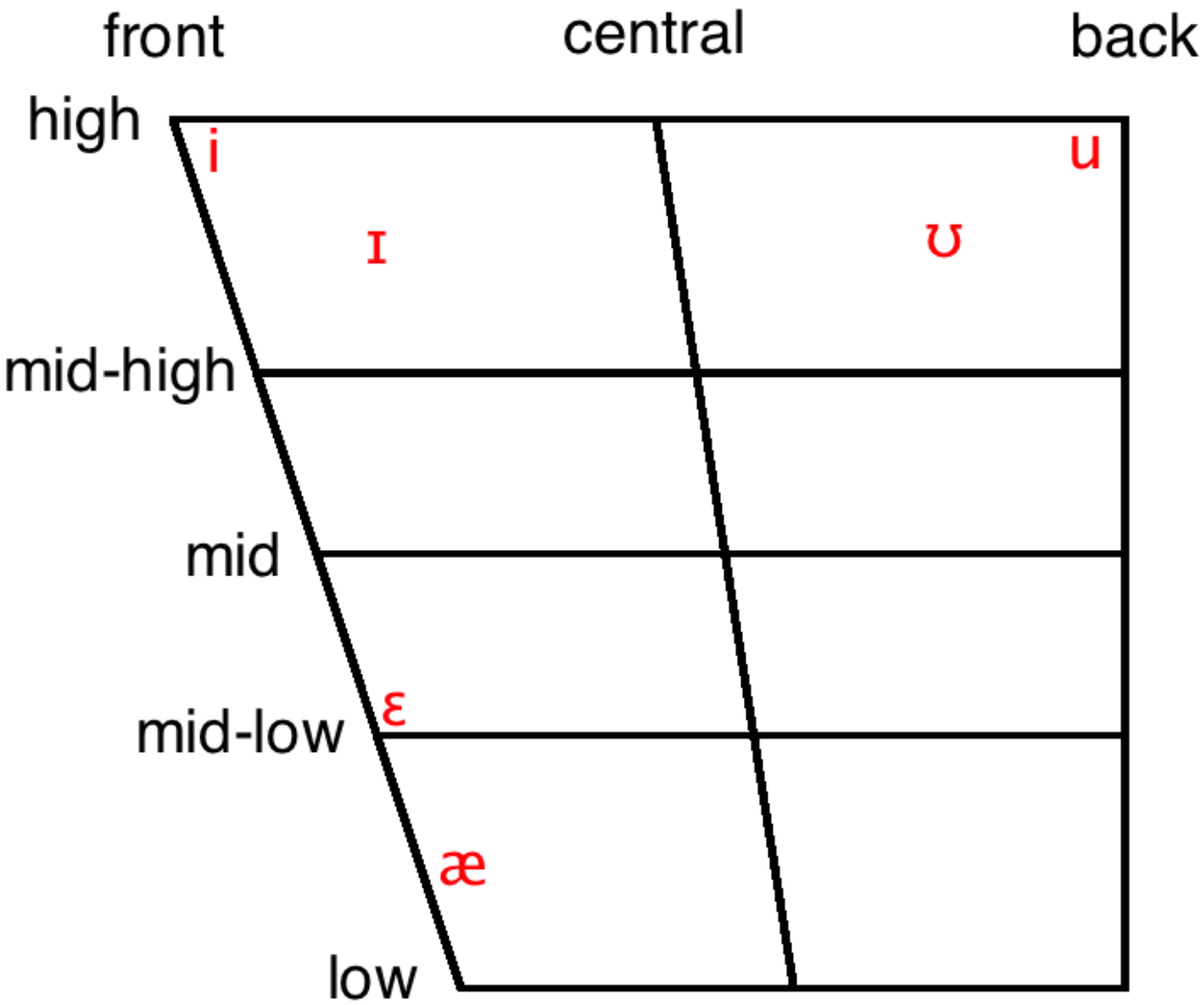
Backness: near-back

(**Rounding:** rounded)

Vowels of American English

[ʊ]
near-high near-back (rounded) vowel

Vowels of American English



Vowels of American English

bought

Height: mid-low

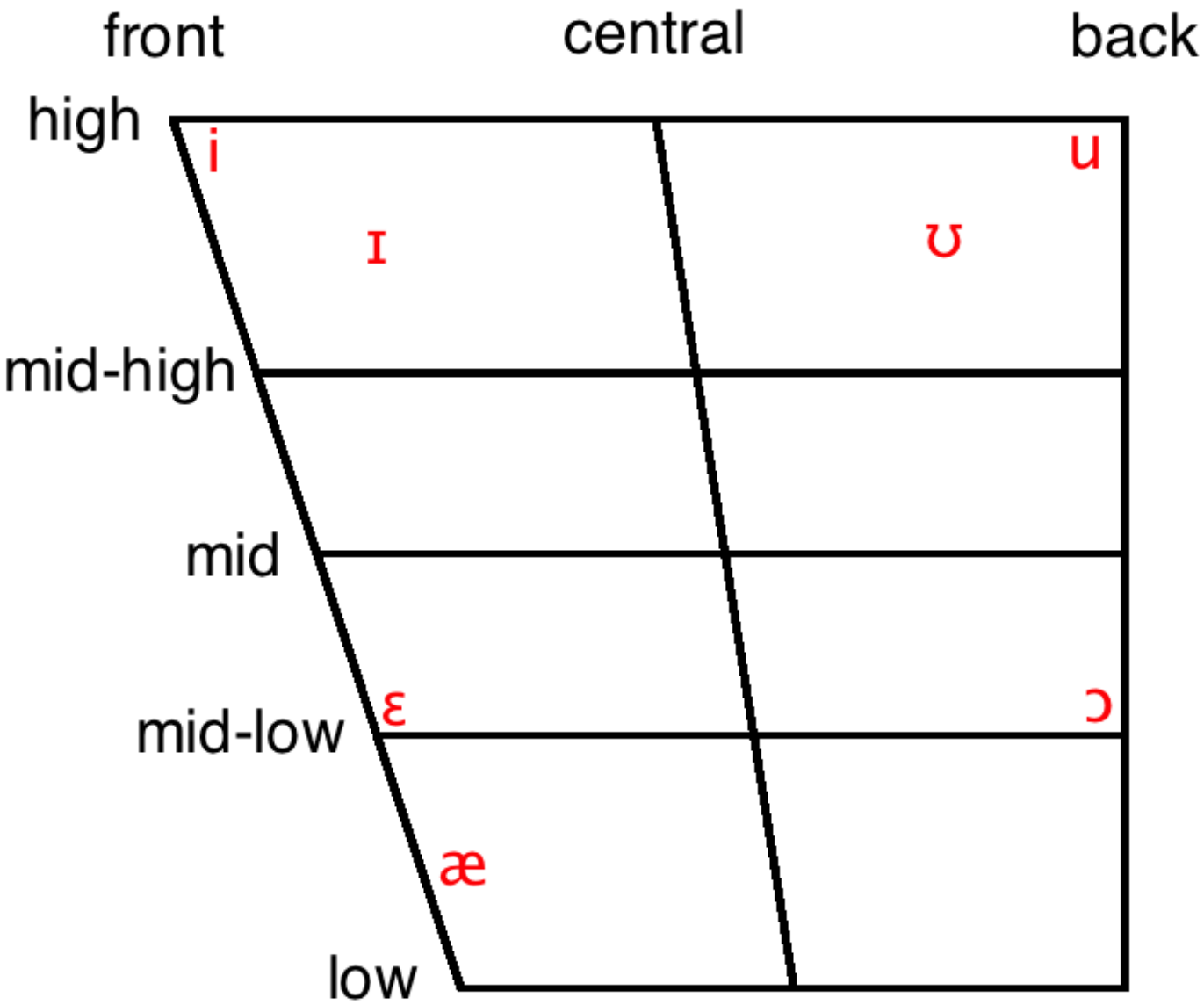
Backness: back

(**Rounding:** rounded)

Vowels of American English

[ɔ]
mid-low back (rounded) vowel

Vowels of American English



Vowels of American English

(ro)bot

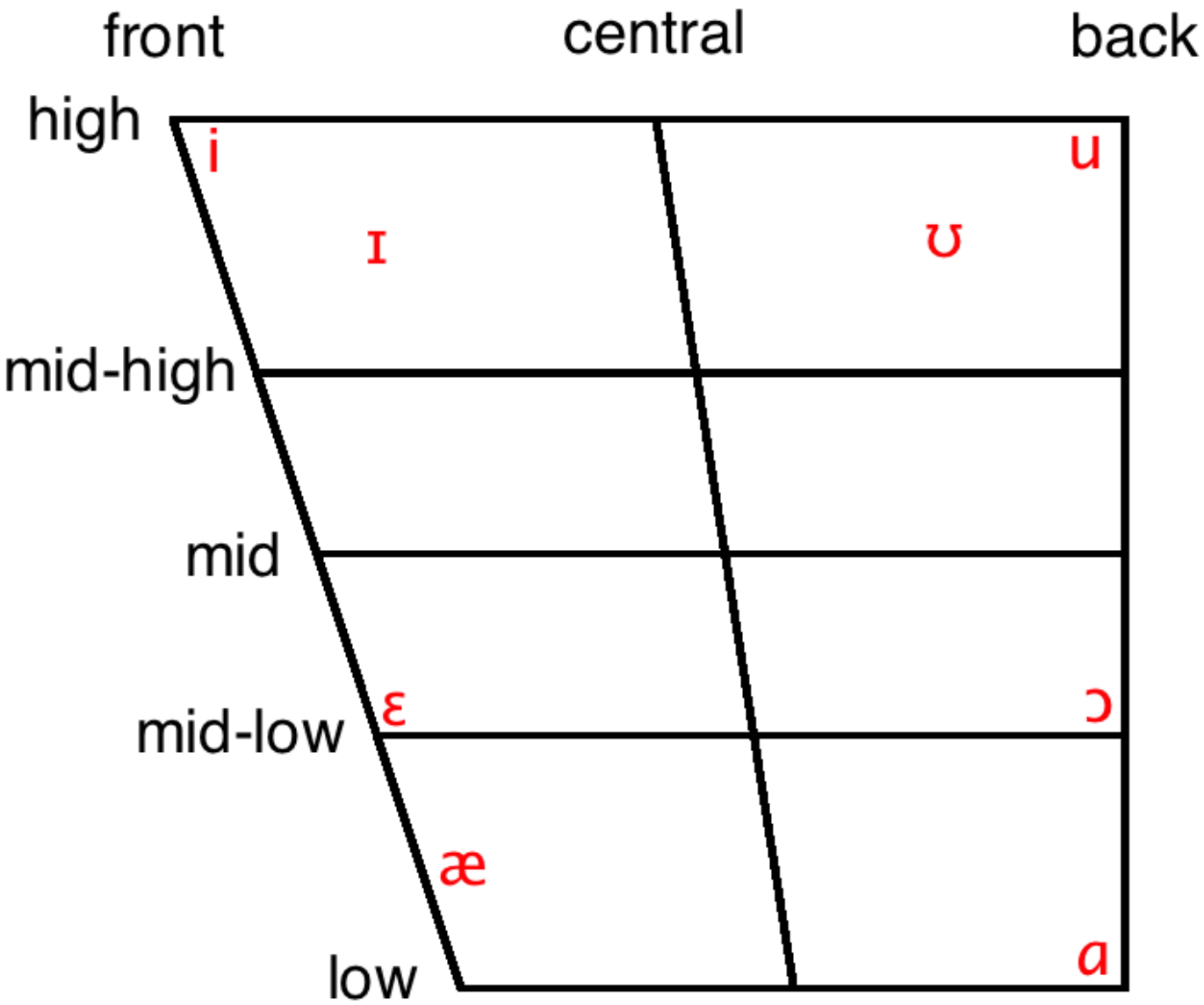
Height: low

Backness: back

Vowels of American English

[ɑ]
low back vowel

Vowels of American English



Vowels of American English

Note 1: For many American English speakers, [ɔ] and [ɑ] do not contrast with one another. You won't lose points for mixing them up in transcription exercises. Usually, these vowels collapse to [ɑ] and not [ɔ].

Note 2: For some speakers, the pronunciation of [ɑ] is more central (as opposed to back). We'll treat it as a back vowel for this class.

Vowels of American English

butt
but

Height: mid-low

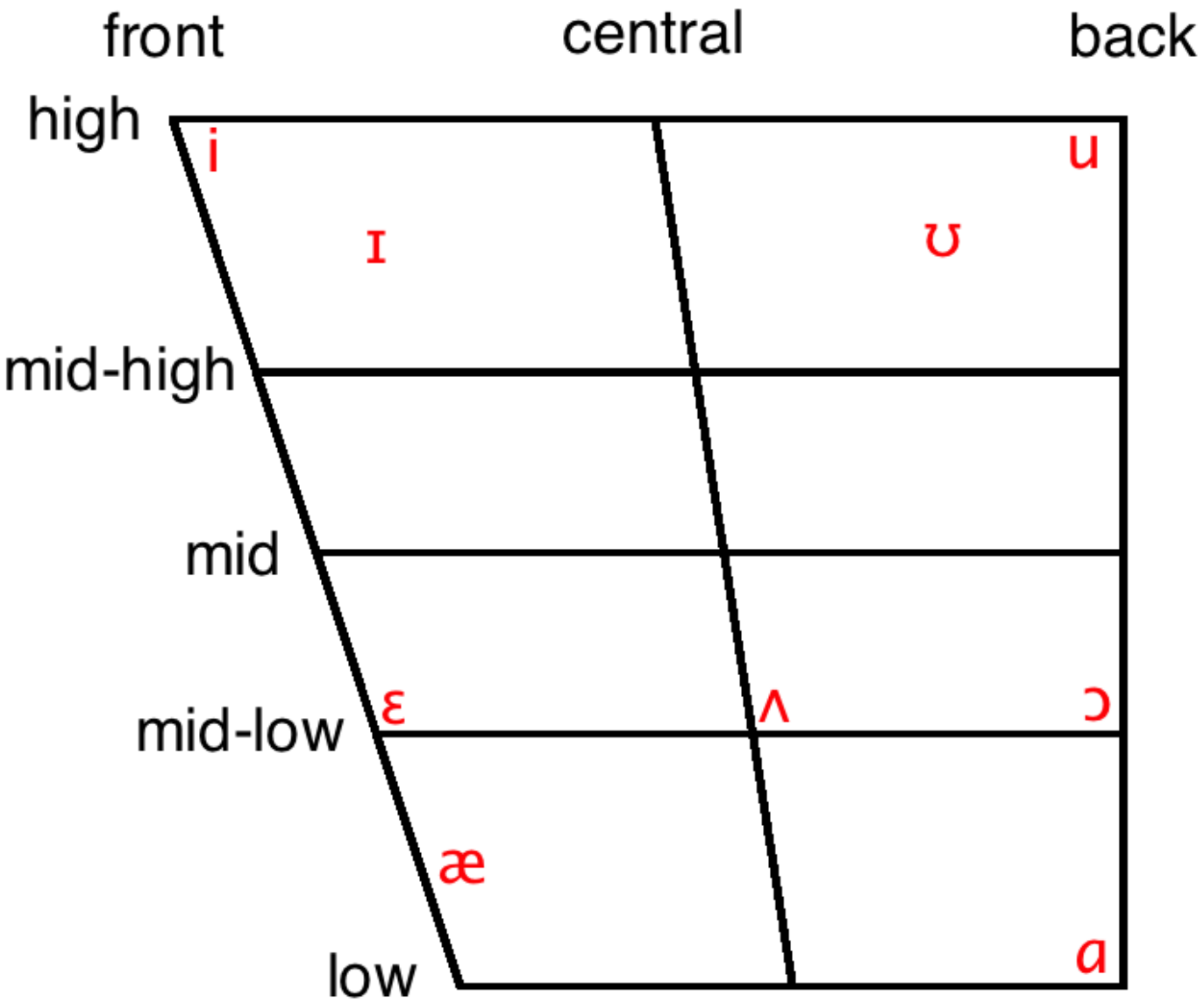
Backness: central

Vowels of American English

[ʌ]

mid-low central vowel

Vowels of American English



Vowels of American English

Note 3: The actual pronunciation of [ʌ] in American English is somewhere like near-back. We'll treat it as central for this class because it has an affinity with the next (central) vowel and to simplify the distinction between [ʌ] and [ɔ].

Vowels of American English

about
halibut

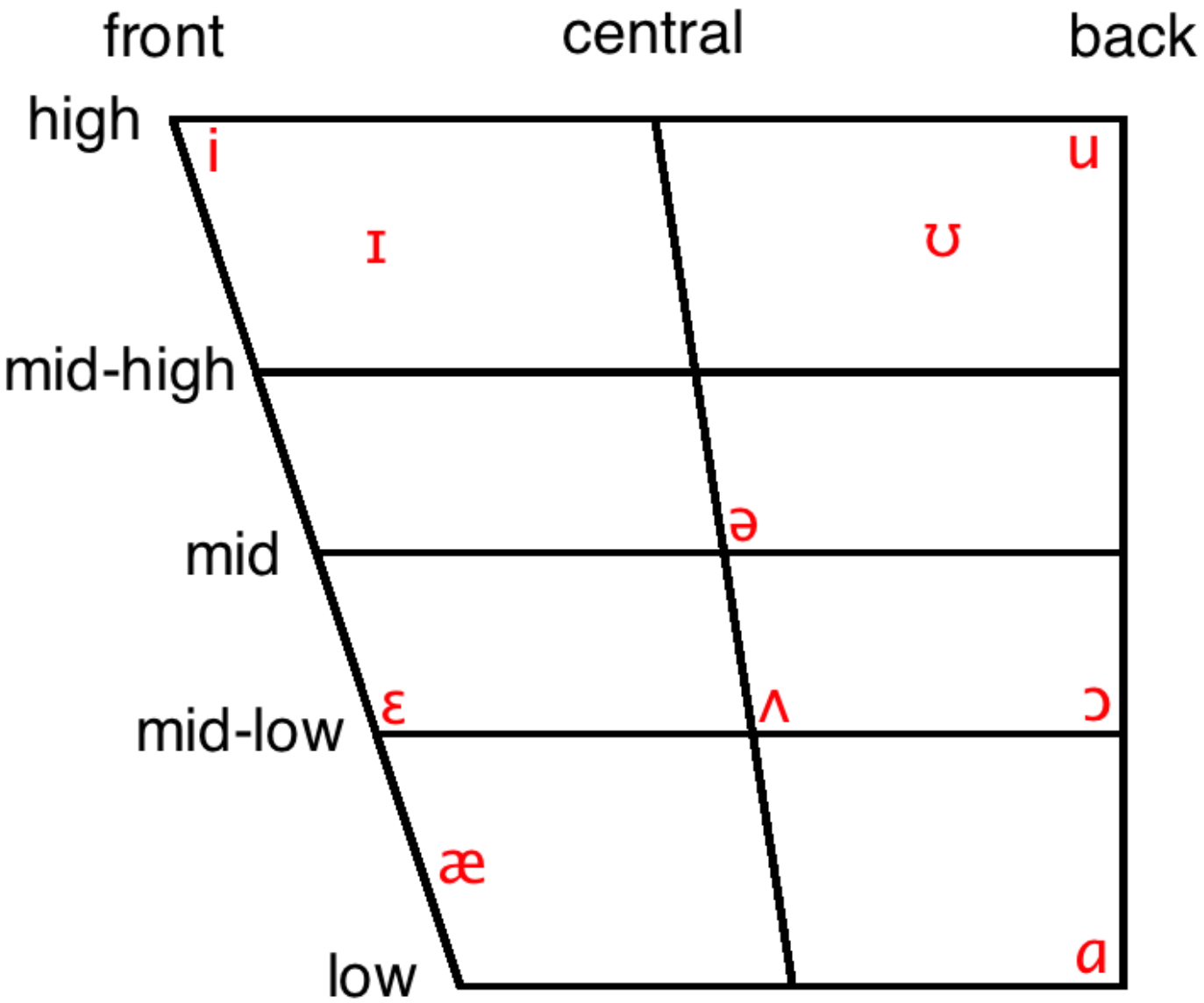
Height: mid

Backness: central

Vowels of American English

[ə]
mid central vowel
"schwa"

Vowels of American English



Vowels of American English

Note 4: [ə] and [ʌ] sound very similar.

Rule of thumb: [ʌ] in stressed syllables, [ə] in unstressed.

Vowels of American English

Bert
bird

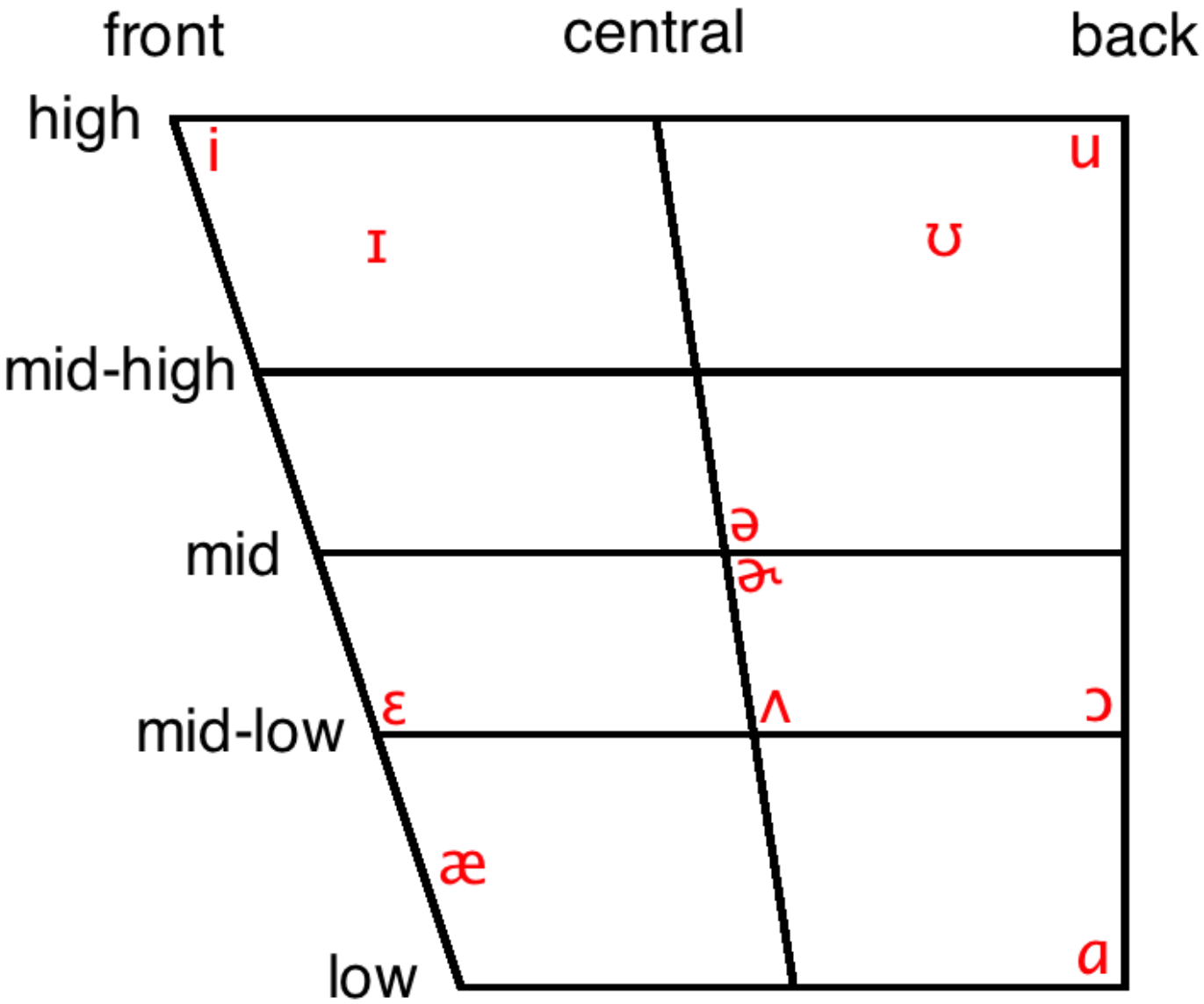
Height: mid

Backness: central

Rhotic: the vowel is accompanied by an [ɹ]-like sound

[ɚ]
mid central rhotic vowel

Vowels of American English



Vowels of American English

There are different schools of thought about what to do with *bird*.

Intuition: [bɪɹd]

When we look carefully at the signal, it's not clear that there's any separation of the vowel and the [ɹ].

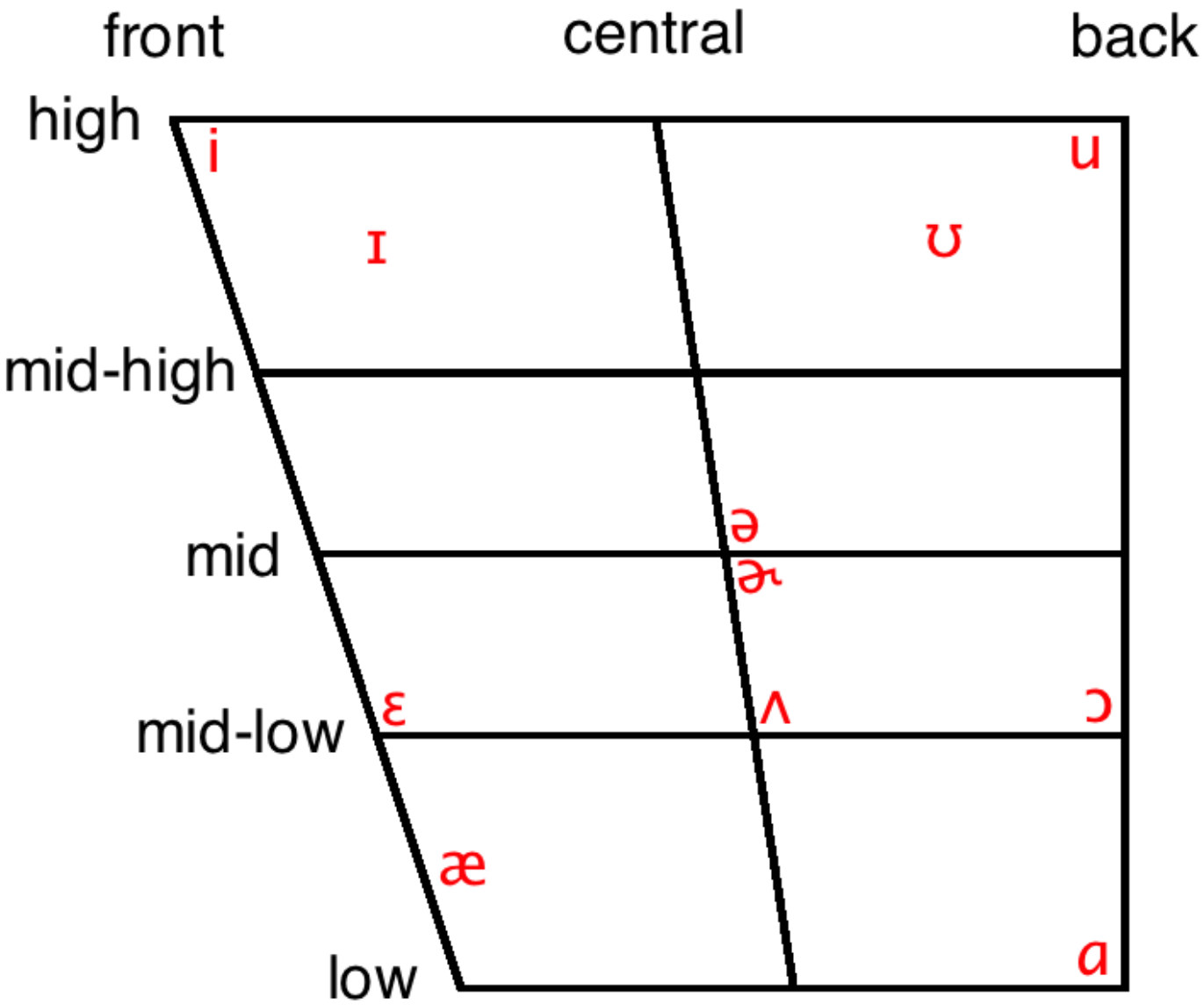
Vowels of American English

So, we'll transcribe them as happening simultaneously with [ɚ].

We'll save [ɹ] for when it's more clearly a separate segment, like the beginning of a syllable.

bird [bɚd]
rot [ɹɑt]

Vowels of American English



Vowels of American English

Are we done?

Nope!

bait, *bite*, *bout*, *boy*, *boat*

Vowels of American English

The vowels we've looked at so far are simplex

$\longrightarrow$ they involve the tongue at one position.
$=$ **monophthong**

The remaining vowels are complex

$\longrightarrow$ they involve the tongue moving from one position to another.
$=$ **diphthong**

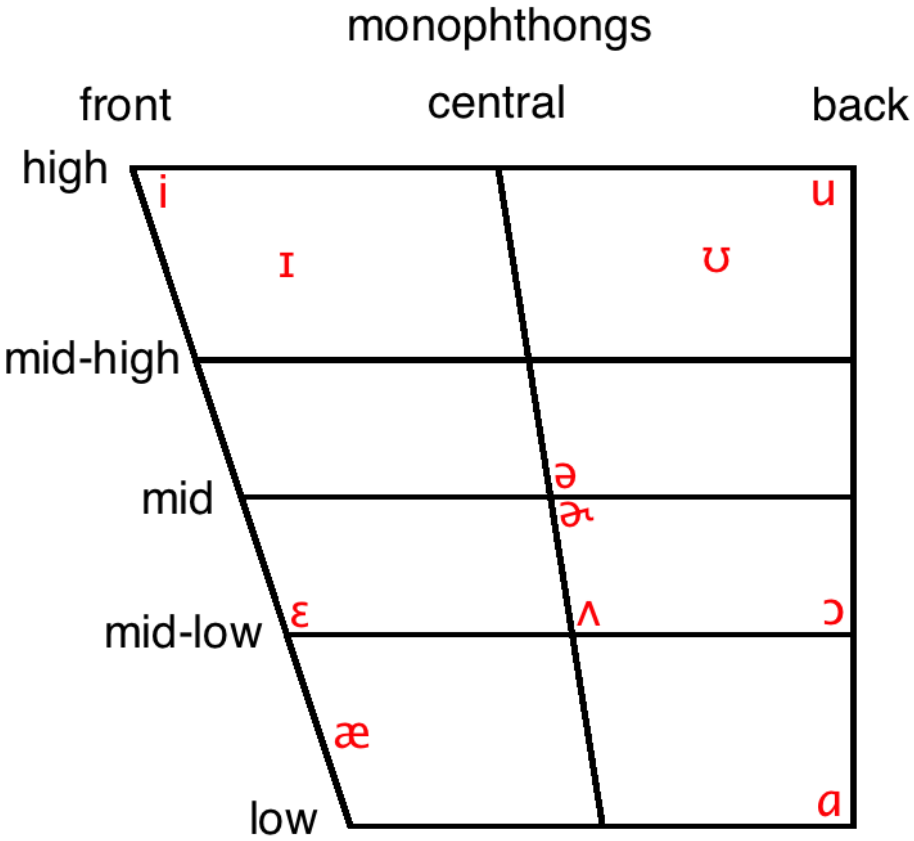
Vowels of American English

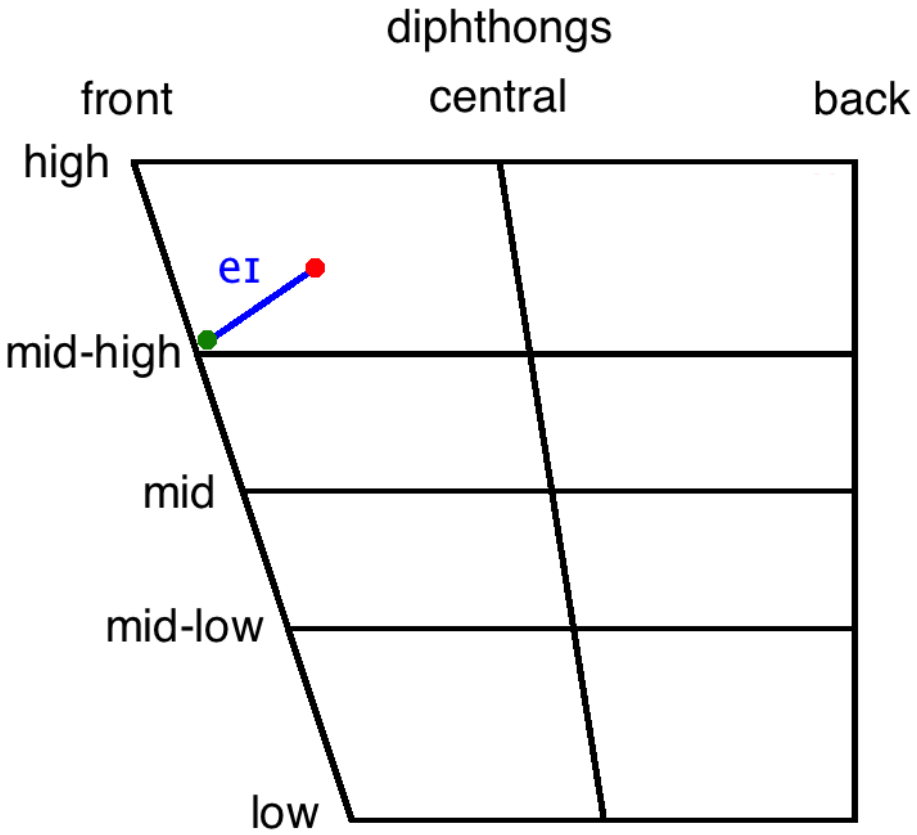
bait

	Height	**Backness**
Start	mid-high	front
Finish	near-high	near-front

[eɪ]

Vowels of American English





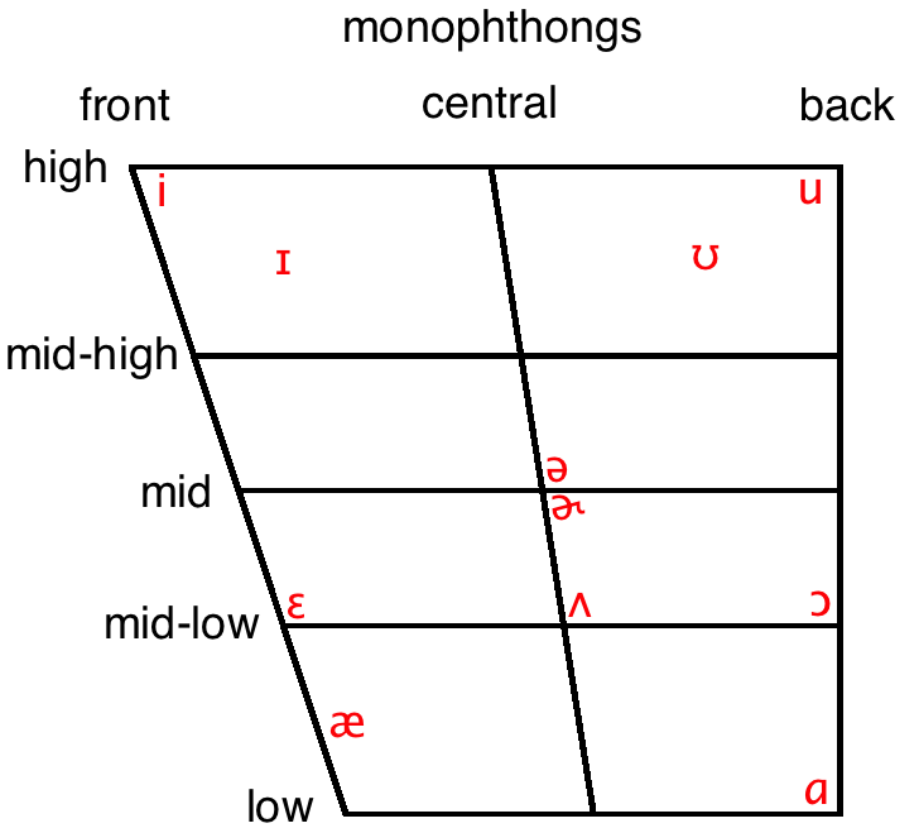
Vowels of American English

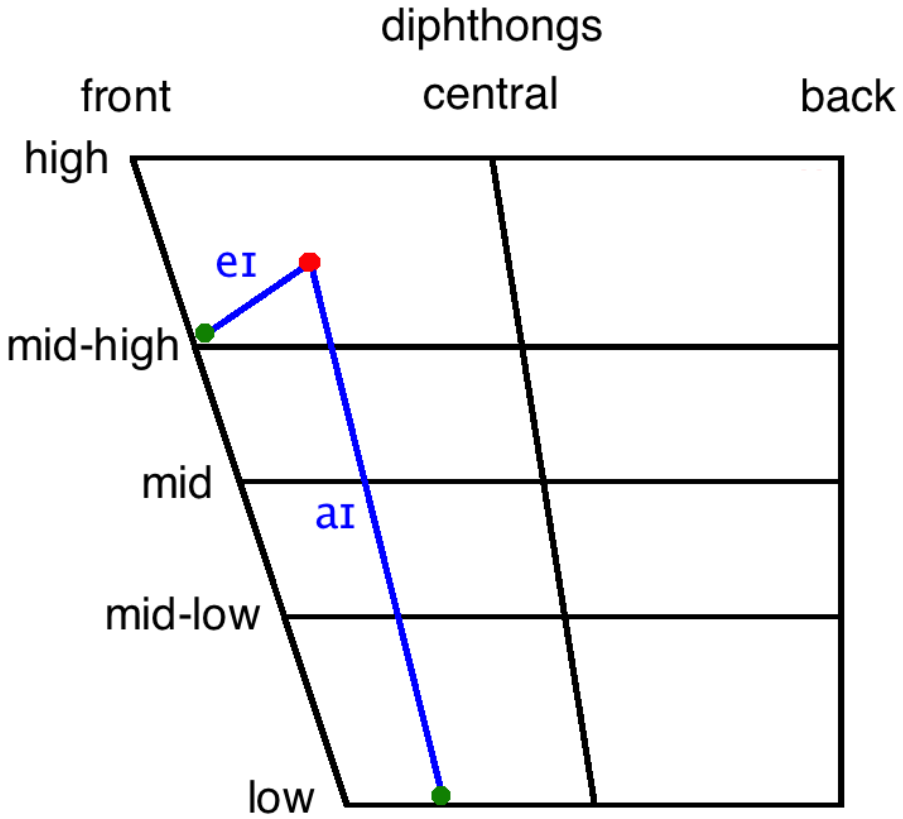
bite

	Height	**Backness**
Start	low	near-front
Finish	near-high	near-front

[aɪ]

Vowels of American English





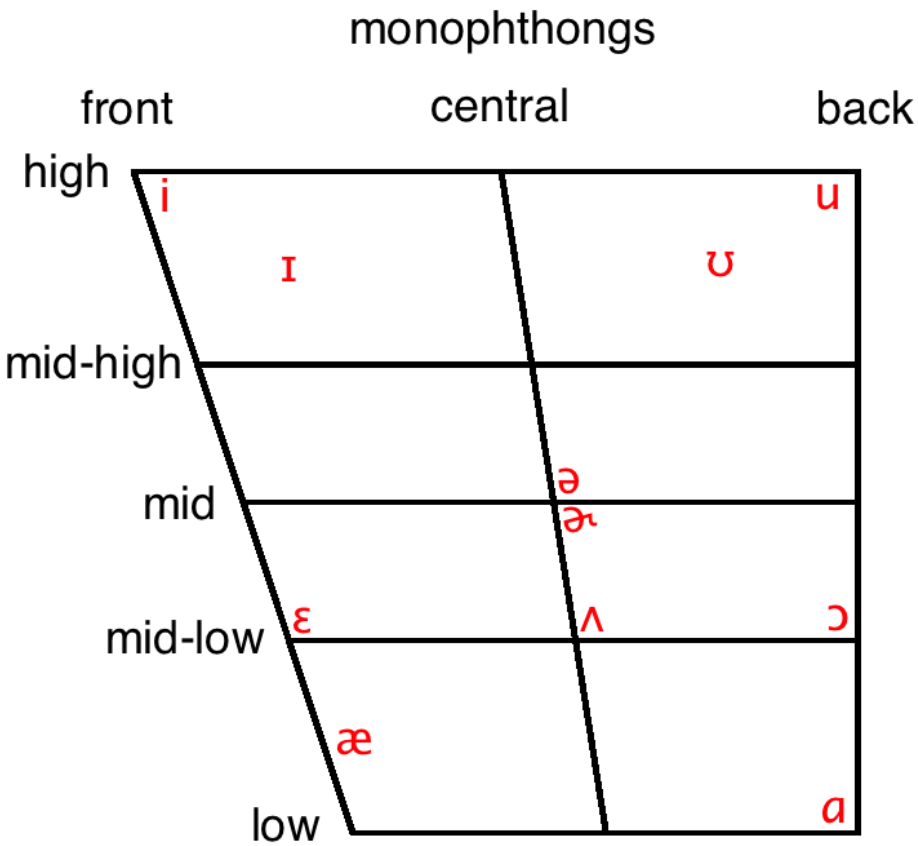
Vowels of American English

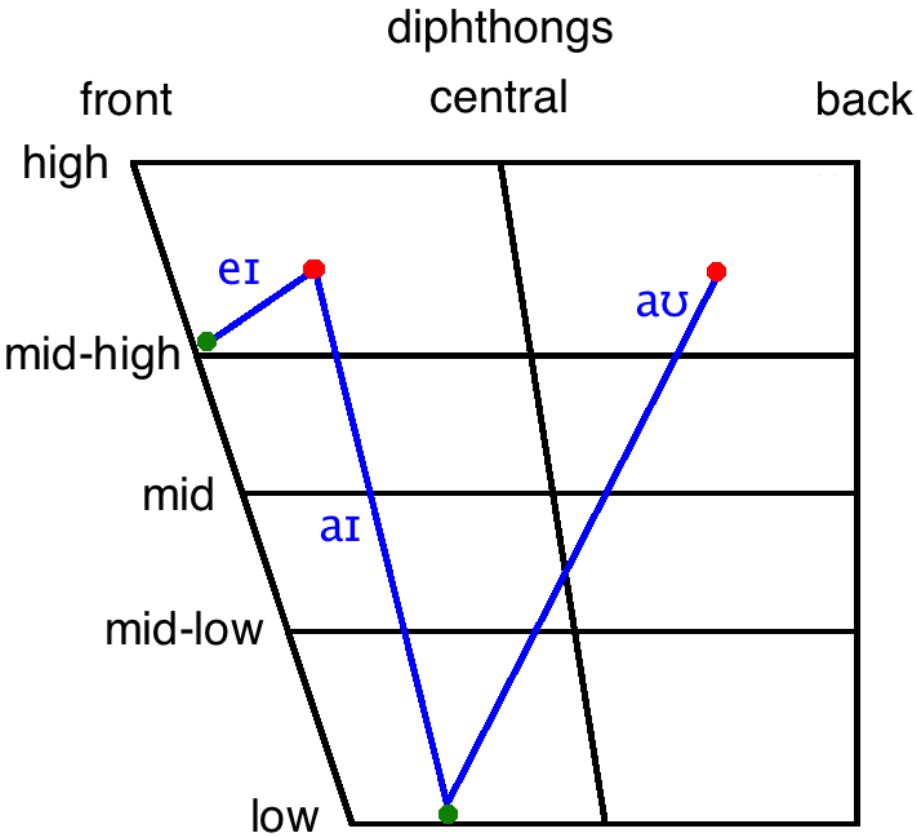
bout

	Height	**Backness**
Start	low	near-front
Finish	near-high	near-back

[aʊ]

Vowels of American English





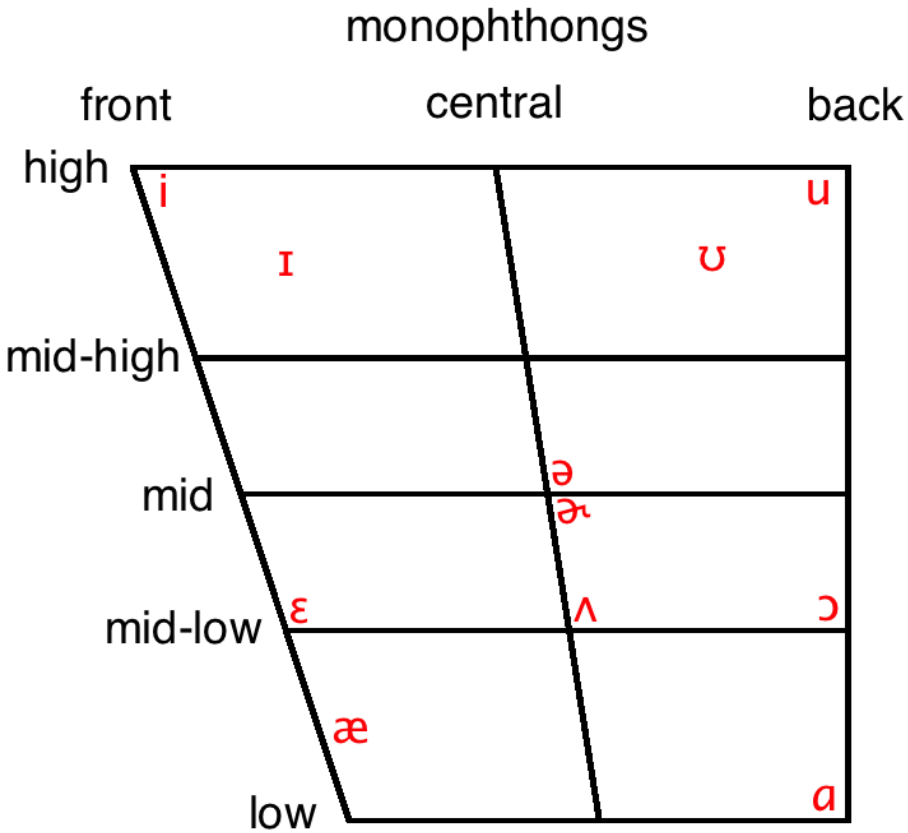
Vowels of American English

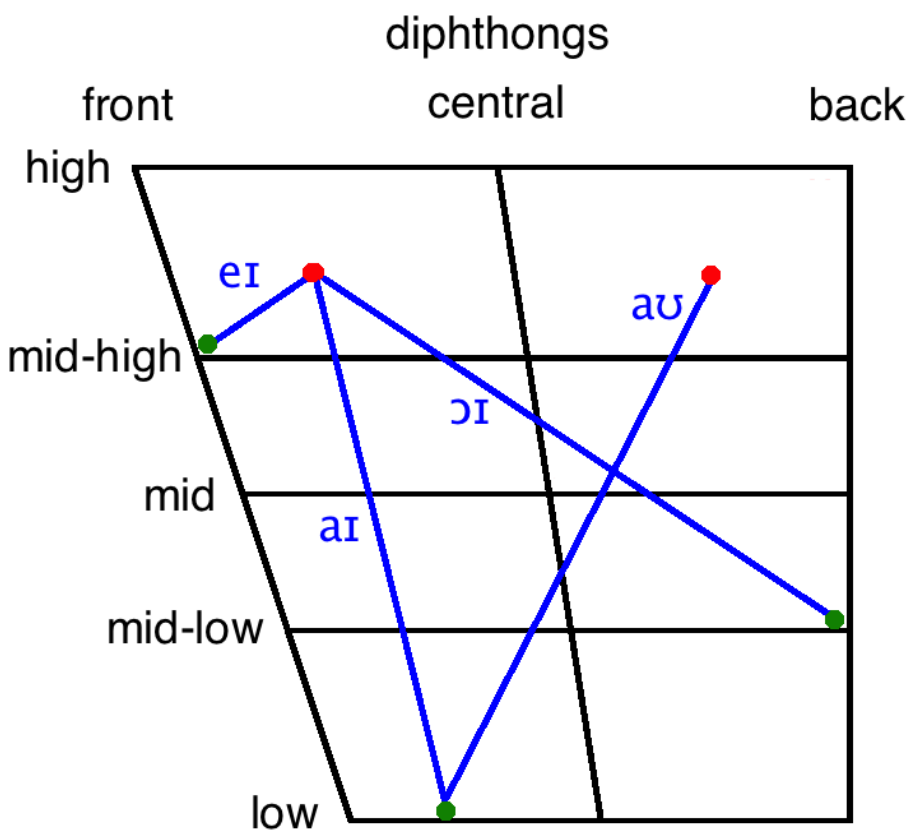
boy

	Height	**Backness**
Start	mid-low	back
Finish	near-high	near-front

[ɔɪ]

Vowels of American English





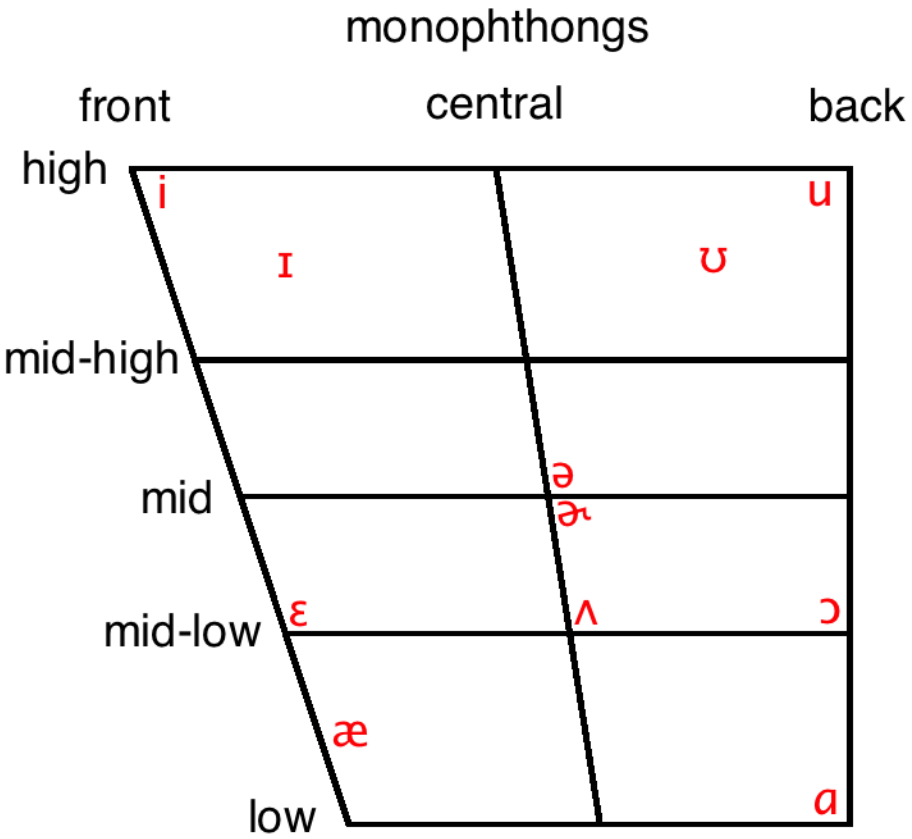
Vowels of American English

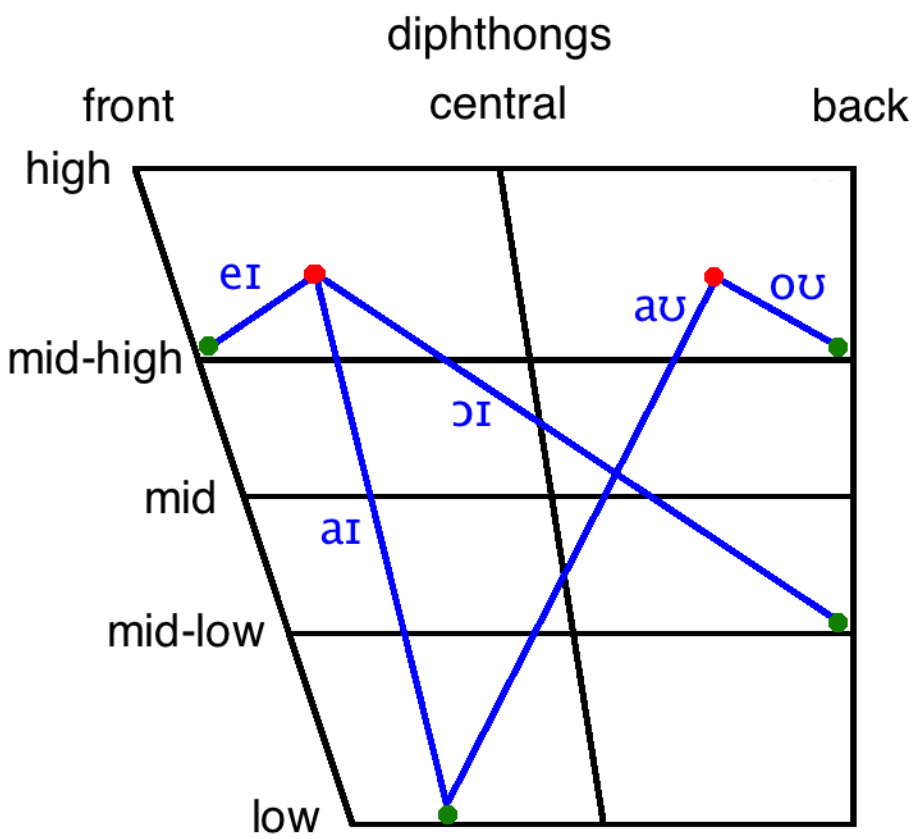
boat

	Height	**Backness**
Start	mid-high	back
Finish	near-high	near-back

[oʊ]

Vowels of American English





Vowels of American English

Now we're done!

Authoritative chart of vowels for our course: