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## 1. IPA Vowels (English and Beyond)

### 1.1. How many vowels does English have?

We need to remember that letters and sounds are not the same thing. English has more than just “a, e, i, o, u” as vowels. Western Canadian English has about 16 vowels.

### 1.2. How to describe vowels in IPA?

We describe vowels in IPA with the following information:

- **Height:** vertical location of the highest point of the tongue
  - high, mid, or low (in English)
- **Advancement:** forward/backwards location of the highest point of the tongue
  - front, central, back
- **Tension:** whether or not the vowel is said to entail muscular tensions
  - tense or lax
  - One way to determine whether a vowel is tense or lax is to think of whether or not the vowel can be used at the end of a word. For example, the vowel /i/ can be used at the end of a word: /bi/ (be), so it is tense. The vowel /ɪ/ cannot be used at the end of a word: /bɪ/ (bih), so it is lax.
- **Rounding:** the degree to which the lips are spread as opposed to shaped like an ‘o’.
  - unrounded, rounded
  - Both high back vowels in English are rounded, all other back vowels are unrounded.

### 1.3. Monophthongs

Vowels where the tongue stays relatively still — i.e. you can hold this position/vowel for a long time.

TABLE 4-6: MONOPHTHONGS USED IN NORTH AMERICA

	Front		Central	Back	
	<i>Tense</i>	<i>Lax</i>	<i>Lax</i>	<i>Lax</i>	<i>Tense</i>
<b>High</b>	/i/ <i>beat</i>	/ɪ/ <i>bit</i>		/ʊ/ <i>book</i>	/u/ <i>boot</i>
<b>Mid</b>		/ɛ/ <i>bet</i>	/ə/ <i>sof<u>a</u></i>	/ʌ/ <i>butt</i>	/ɔ/ <i>caught*</i>
<b>Low</b>	/æ/ <i>bat</i>			/ɑ/ <i>cot</i>	

\*Many speakers do not have this vowel in their inventory of monophthongs.

#### 1.3.1. Special Notes:

1. /ɑ/ and /ɔ/ are often not distinguished in West-Coast English depending on dialect: “cot” vs “caught”. (West-Coast vs New-York coffee) Usually, both are pronounced as /ɑ/ in Western Canadian English.
2. **Two** mid central vowels can be “rhoticized” with an /ɹ/ sound added - the vowel often varies by stress.

Rhotic vowel	Description	Occurrence	Example words
/ɜ˞r/	mid central	stressed syllables	<u>b</u> ird, <u>f</u> urnish, <u>p</u> erfect
/ə˞r/	mid central	unstressed syllables	teacher <u>er</u> , Inter <u>ne</u> t, liquo <u>r</u>

### 1.4. Diphthongs

In a diphthong, the tongue moves during the vowel. We write diphthongs in IPA using two characters, which describe, respectively, the starting and ending configurations of the vocal tract and mouth. For example, the diphthong /aɪ/:

1. **Starting Position:** low central tense unrounded
2. **Ending Position:** high front lax unrounded

In English, we have three diphthongs, /aɪ/, /aʊ/, /ɔɪ/ and two ‘diphthongized vowels’, which are sometimes considered monophthongs, but often the tongue moves a bit. This means that when transcribing these two ‘diphthongized vowels’, we may write either version:

- /e/ = [e] or [eɪ] and
- /o/ = [o] or [oʊ]

## 1.5. There are a couple tricky things about vowels:

### 1.5.1. Stress vs Unstress in Central/Back Vowels

Central vowels, and to some extent, back vowels, are tricky because they change very easily depending on the stress of the syllable. For example, the stressed syllable /ɜː/ becomes /ə/ in unstressed syllables, and /ʌ/ becomes /ə/ in stressed syllables (welcome back nonchalant schwa).

In an exam, we are permitted to write the rhotic diacritic /ɹ/ as /vowel + ɹ/.

### 1.5.2. Some slight variations in how phonetics are described

- Some people use /ɹ̩/ (syllabic r) instead of /ɜː/ or /ə/. The little /̩/ means that the character above it is a syllable by itself.
- Some people may write the diphthongs slightly differently. They may write the /j/ instead of /ɪ/ to indicate the vowel glide:
  - /aj/ instead of /aɪ/
  - /ej/ instead of /eɪ/
  - /ɔj/ instead of /ɔɪ/

### 1.5.3. NA English vs British English

Something we hear, but IPA captures, is the British English pronunciation of rhoticized vowels. In British English, the rhotic sound is commonly dropped, so words like **square** are pronounced skwɛə instead of the rhotic skwɛəɹ heard in many North American accents.

## 2. IPA Suprasegmentals

How to describe English meanings *besides* consonants and vowels (i.e. suprasegmentals). Suprasegmental information refers to speech descriptions that are larger than a single ‘segment’ (a segment is a consonant or vowel). This includes:

- Lexical stress
- Rhythm and Intonation

### 2.1. Syllables and Lexical Stress

Syllables can be stressed, or unstressed. Syllables are indicated with a period in IPA: /leɪ.zə/ = “razor.” When we have things like lexical stress, we have to remember that some languages include stress as meaningful information, and some don’t.

### 2.1.1. Stress and Meaning

In French, stress is not relevant to the meaning of the word: CAFé is the same word as caFÉ, they both have the same meaning. In German, stress is relevant to meaning. The word “KAffee” means “coffee”, and the word “kaFFEE” is the place you drink coffee.

### 2.1.2. Stress in English

In English, we have primary, secondary, and sometimes tertiary stresses in words. In this course, we will only focus on primary stress.

- English stress is indicated by a syllable becoming *longer*, *louder*, and *higher pitched*.
- Most, but not all, unstressed syllables have vowel reduction to the mid-central vowel, /ə/ (schwa, may be rhoticized).
  - For example, consider the word “contrast”.
    - CONtrast: /kɒn.tʃlæst/ becomes
    - conTRAST: /kən.tʃlæst/ when stressed. Note that the vowel /ɔ/ is reduced to /ə/. This reduction is so common that the symbol /ə/ has a common name: the schwa.
  - There are some exceptions to this vowel reduction rule. The word “discount” just moves the stress without reducing the vowel:
    - DIScount: /'dɪs.kɑʊnt/ becomes
    - disCOUNT: /dɪs.'kaʊnt/

## 2.2. Rhythm and Intonation

### 2.2.1. Stress Patterns (important for learning about rhythm later)

**P** abbreviates a primary stress and **U** abbreviates an unstressed syllable.

Pattern Name	Pattern	Count	Freq (Tokens/M)	Example
trochaic	PU	3624	67693	table
dactylic	PUU	2619	24558	yesterday
	UPU	1510	15278	tomorrow
	UPUU	1331	9014	majority
	UUPU	1017	6831	unexpected
iambic	UP	995	19881*	guitar
	PUUU	497	3549	
anapaestic	UUP	369	1398	understand
	UUUP	37	97	

- \*: Some words, particularly iambic words, have a high frequency of usage despite a smaller number of them existing in the English lexicon.
  - trochees, dactyls and iambs occur very commonly in English.

### 2.2.2. Speech Rhythm and Intonation

- **Rhythm**: how the duration of speech sounds change in a sentence
- **Intonation**: Variation in pitch (whether something is rising or falling), used in spoken utterances
  - **Utterance**: a string of speech that begins and ends with a **pause**. Typically, this corresponds to a sentence, but sometimes, if the speaker is speaking multiple sentences without stopping, that would be considered one continuous utterance. Sentences can also be divided into multiple utterances, depending on the speaker's pauses.
  - Typically, we find intonation varies according to utterance, but may also vary according to sentences.
- **Intonation** and **rhythm** change together
  - Unexpected patterns of intonation and rhythm sometimes give synthetic speech an *artificial* quality which some people can pick up on or find distracting.

#### 2.2.2.1. Speech Rhythm

- **Stress timing**: utterance duration depends more on the number of stressed syllables than the total number of syllables. (English, Dutch, Russian, Arabic)
  - In English, the stressed syllables, because they last longer, contribute heavily to the relative duration of the utterance. Two sentences with the same number of stressed syllables, despite having different numbers of syllables, will have a similar duration.
  - This isn't *exactly* true, but it is a good approximation.
- **Syllable timing**: syllable duration depends more on the number of syllables than the total number of stressed syllables. (French, Cantonese, Italian, Spanish)
  - I.e. sentences with the same number of syllables in a **syllable-timed** language will have the same duration.

- **Stress timing:** An example from one person speaking

Sentence	# of stresses	# of syllables	Duration
<u>Cows</u> <u>eat</u> <u>grass</u> .	3	3	≈ 1500 ms
The <u>cows</u> <u>eat</u> the <u>grass</u> .	3	5	≈ 1530 ms
The <u>cows</u> have been <u>eating</u> the <u>grass</u> .	3	8	≈ 1680 ms
The <u>cows</u> have been <u>eating</u> the <u>green</u> <u>grass</u> .	4	9	≈ 1900 ms

Figure 1: Speech Rhythm Table for English

### 2.2.3. Contrastive Stress

Rhythm and intonation can be used together to create other kinds of meanings. The following is an example of **contrast**, where we take the same set of consonants and vowels, change the rhythm and intonation, and create new meanings which contrast from previous information/ideas.

1. **I** never said he made that

means something different than

2. I **never** said he made that

3. I never **said** he made that

4. I never said **he** made that

5. I never said he **made** that

6. I never said he made **that**

## 3. Other Useful Diacritics in IPA

1. Length of segments in IPA

2. Voice quality and syllabification in IPA

### 3.1. Review of Important Diacritics (for narrow transcriptions and languages other than english)

- ɶ = creaky voice (when speaker gets tired, end of phrases, certain sociolinguistic dialects)
- ɔ̥ = voiceless vowel (e.g. potato = [pʰəʔʰeɪrɔ̥], common after aspirated stops)
- ɑ̃ = nasalized (e.g. in French broad transcriptions)
- pʰ = aspirated - comes from leaving the vocal folds open longer, when voiceless stops are at the beginning of a word in English

### 3.2. Vowel Length [ː]

Length is useful to describe segments, especially in narrow transcriptions. We write narrow transcriptions using [brackets] instead of /slashes/.

- In Canadian English, vowel length is not a meaningful distinction
  - ‘bid’ = you could pronounce [bɪːd] or [bɪd], and both have the same meaning.
- In other dialects or languages, vowel length is important
  - Australian English:
    - ‘bead’ could be pronounced [bɪd], but
    - [bɪːd] means “beard.”
    - Australian English pronounces the “Near-close near-front unrounded vowel” /ɪ/ differently than in Canadian English.
  - In Estonian, a 3-way length contrast:
    - [saːːda] ‘to get’
    - [saːda] ‘send [imp.]’
    - [sada] ‘hundred’

### 3.3. Consonant Length [ː]

- Phonemic in Japanese
- Only useful for narrow transcriptions in north American English
  - can be used at a word boundary
    - “stop Paul” = [stɑ.pːɔl], but
    - “stop all” = [stɑ.pɔl]
  - When you combine morphemes within a word,
    - “known” = [nɒʊn], but
    - “unknown” = [ʌnːɒʊn]
    - **morphemes** are prefixes or suffixes