W3-1: English phonology

JAPN398D: The Sounds and Dialects of Japanese

9/11/2023

Today's class

- Phonetics: The study of the sounds of spoken language.
  - English phonetics: How native English speakers produce English consonants and vowels?

- Phonology: The study of the sound system of a language.
  - English phonology: How sounds are organized in English?

Today’s class

- Phonemes vs. Allophones
- Free variation
- Features
- Phonotactics
- Complex sounds (affricates and diphthongs)
- Phonological phenomena in (American) English

Phonemes vs. Allophones

- Phoneme
  - A class of speech sounds identified by a native speaker as the same sound (*Language Files*, p. 706).
  - Slashes // are used for phonemes.

- Allophone
  - One of a set of noncontrastive realizations of the same phoneme; an actual phonetic segment (*Language Files*, p. 690).
  - Square brackets [] are used for allophones.

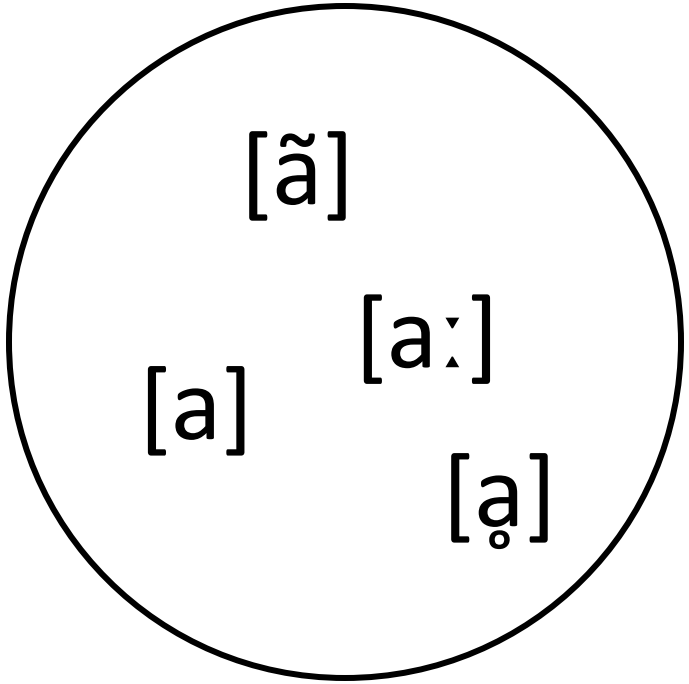
Phonemes vs. Allophones

- Phonemes are categories of sounds.
- Allophones are sounds in the same category.

- In this language, [a], [ã], [aː], and [a̰] are allophones of /a/.

/a/

The label is arbitrary. In general, we use the most common symbol in the category.

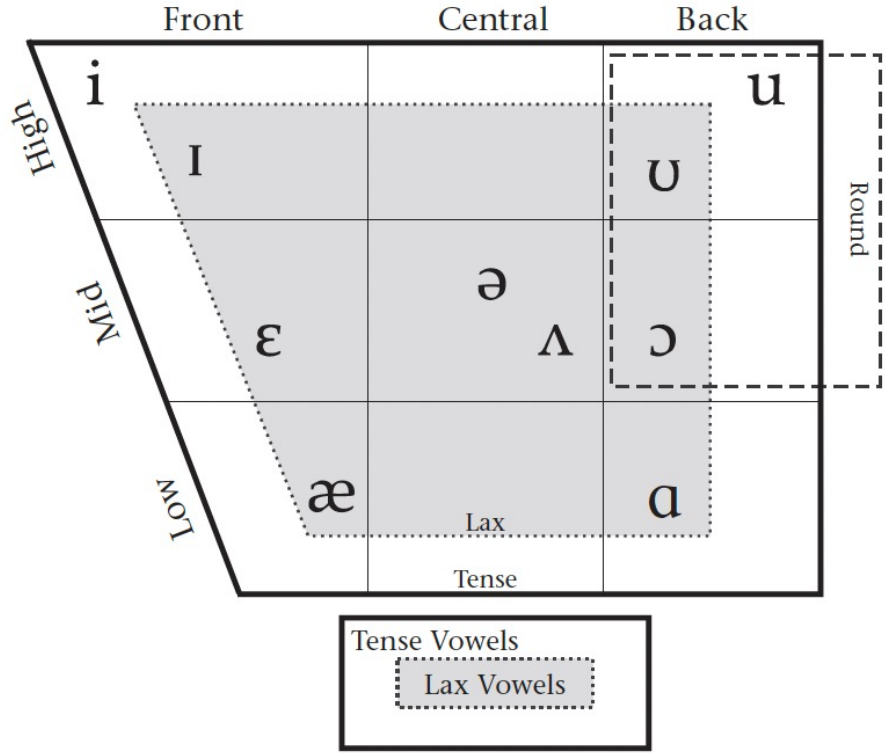


Phonemes vs. Allophones

American English consonant phonemes

	Bilabial		Labio-dental		Dental		Alveolar		Post-alveolar		Palatal		Velar		Glottal	
Stop	p	b					t	d					k	g	ʔ	
Fricative			f	v	θ	ð	s	z	ʃ	ʒ					h	
Affricate									tʃ	dʒ						
Nasal		m						n						ŋ		
Lateral								l								
Retroflex								ɹ								
Glide		w										j				

American English vowel phonemes



These phonemes are in the mental grammar of native speakers of American English.

Phonemes vs. Allophones

- English has the phoneme /p/.

- In English, syllable-initial voiceless stops are aspirated.
  - *speak* [spik] (/spik/)
  - *peak* [p^{h}ik] (/pik/)

- [p] is an allophone of /p/.
- [p^{h}] is an allophone of /p/.

Phonemes vs. Allophones

- Phonemes are contrastive, while allophones are non-contrastive.
  - Phonemic differences are meaningful.
  - Allophonic differences are non-meaningful.

- We can identify phonemes, using minimal pairs.

- Minimal pair
  - Two words that differ only by a single sound in the same position and that have different meanings (*Language Files*, p. 703).

Phonemes vs. Allophones

- For example, *pat* /pæt/ and *bat* /bæt/ form a minimal pair in English.
  - /p/ and /b/ are contrastive (= phonemes) in English.

- We can also have a minimal set!
  - *pat* /pæt/, *bat* /bæt/, *mat* /mæt/, *fat* /fæt/, *vat* /væt/, *that* /ðæt/, *tat* /tæt/, *Nat* /næt/, *sat* /sæt/, *rat* /ɹæt/, *chat* /tʃæt/, *cat* /kæt/, *hat* /hæt/

- In contrast, we cannot find minimal pairs like *pat* /pæt/ and *p^{h}at* /p^{h}æt/.
  - /p/ and /p^{h}/ are non-contrastive in English.

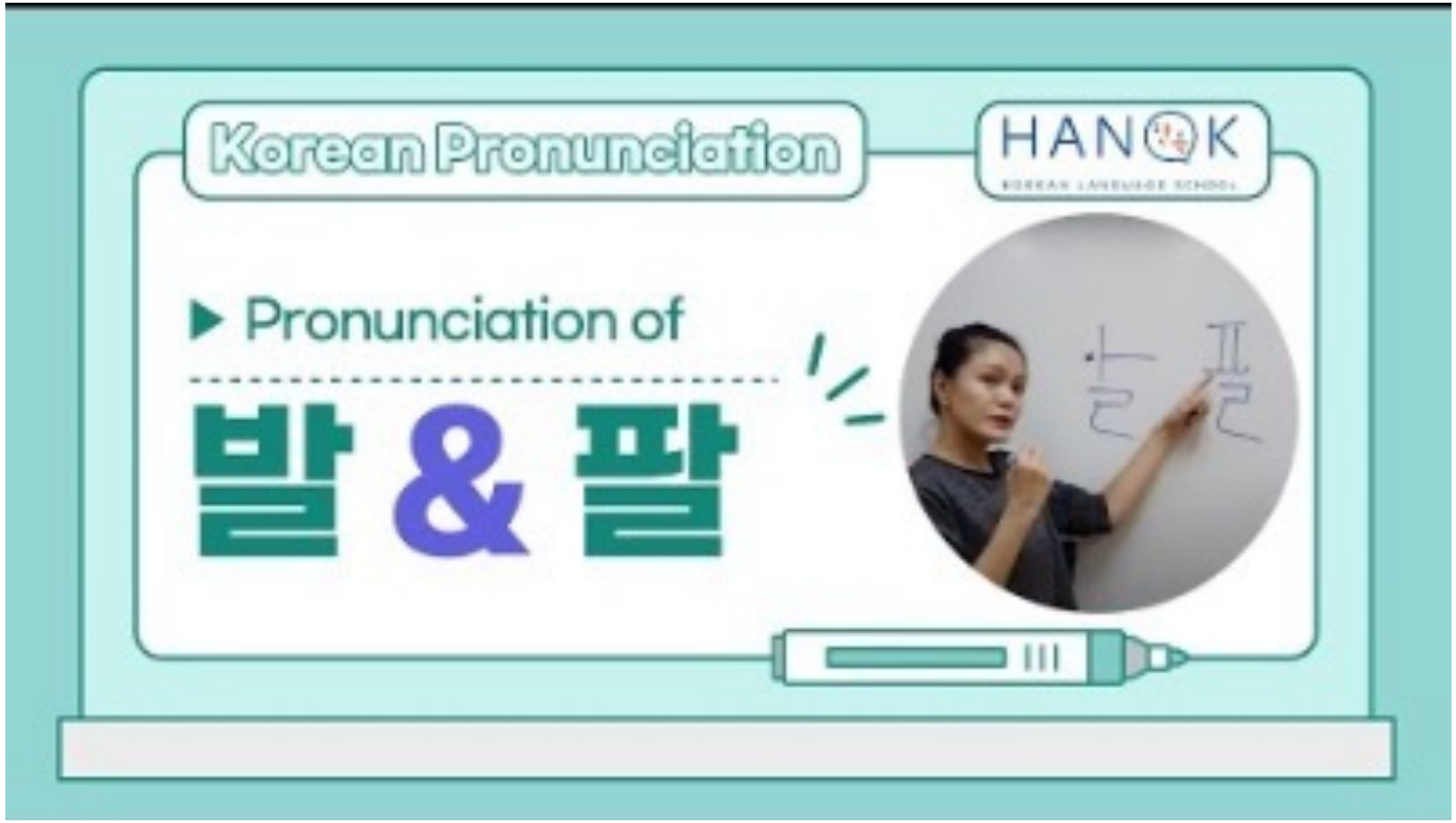
Phonemes vs. Allophones

- 발 /pal/ ‘foot’ and 팔 /p^hal/ ‘arm’ form a minimal pair in Korean!
  - In Korean, /p/ and /p^h/ are contrastive (= phonemes).

- In contrast, there is no word like /bal/ in Korean.

- However, /p/ becomes [b] between vowels in Korean.
  - e.g. 내 발 [nɛ bal] ‘my foot’
  - [p] and [b] are allophones of /p/.

발 /pal/ ‘foot’ and 팔 /p^hal/ ‘arm’ in Korean



https://www.youtube.com/watch?v=K0DzRdgBB7M

Phonemes vs. Allophones

- Writing systems help us identify phonemes and allophones.
  - Because native speakers cannot recognize allophones.

- English: *speak* [spik], *peak* [p^{h}ik], *beak* [bik]
  - “p” is used for [p] and [p^{h}], but “b” is used for [b].

- Korean: 발 [pal] ‘foot’, 팔 [p^{h}al] ‘arm’, 내 발 [nɛ bal] ‘my foot’
  - “ㅂ” is used for [p] and [b], but “ㅍ” is used for [p^{h}].

Phonemes vs. Allophones

- Allophones of the same phoneme are often in complementary distribution.
  - They do not occur in the same environment.

- For example, aspirated and unaspirated voiceless stops in English are in complementary distribution.
  - *peak* [p^{h}ik] → Aspirated [p^{h}] occurs only in syllable-initial position.
  - *speak* [spik] → Unaspirated [p] occurs elsewhere.

Phonemes vs. Allophones

- /h/ and /ŋ/ (called “engma”) are in complementary distribution in English.
  - /h/ occurs syllable-initially, while /ŋ/ occurs syllable-finally.

- However, they are NOT allophones of the same phoneme.
  - Why?

- Allophones must be phonetically similar.
  - e.g. [p] and [p^h] are phonetically similar, but [h] and [ŋ] are not.

Phonemes vs. Allophones

Clark Kent

https://smallville.fandom.com/wiki/Clark_Kent?file=Clark_kent_profile.png

Superman

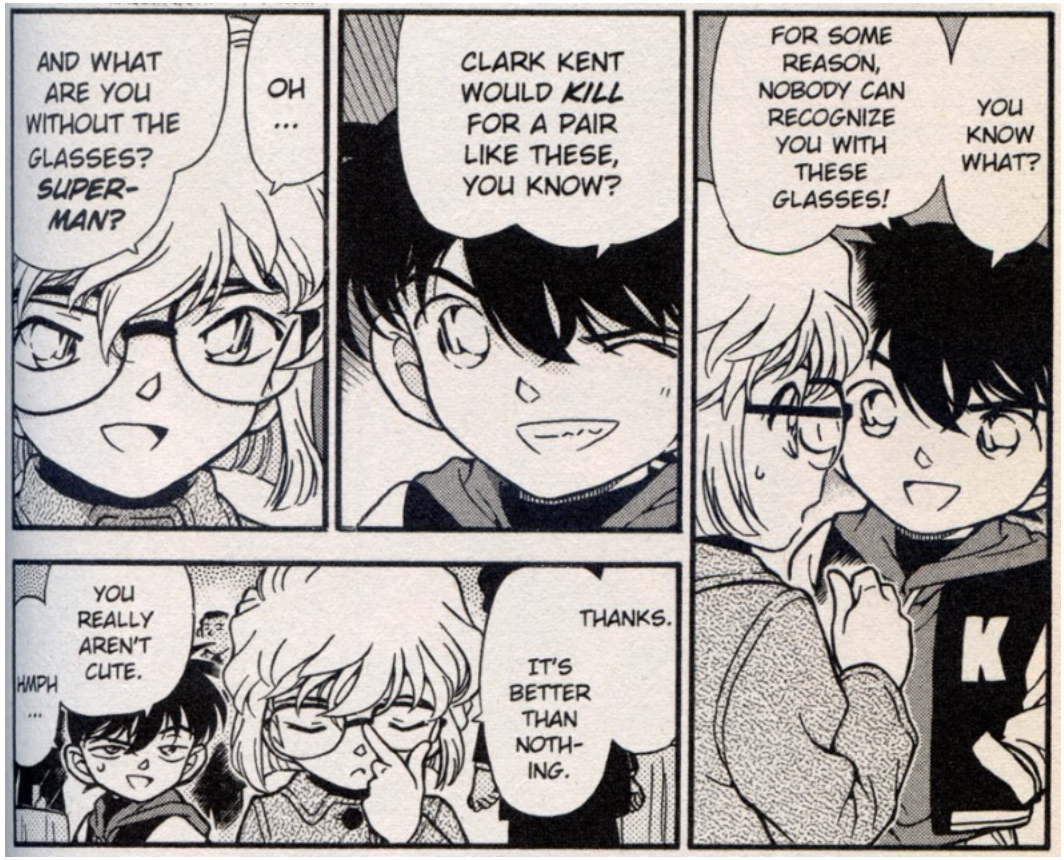
https://smallville.fandom.com/wiki/Clark_Kent?file=Season_11_Superman.PNG

https://www.conan-portal.com/#charaContent

Phonemes vs. Allophones

- Allophones in complementary distributions are similar to the relationship between Kudo Shinichi (工藤新一) and Edogawa Conan (江戸川コナン) in *Detective Conan/Case Closed*!

Phonemes vs. Allophones



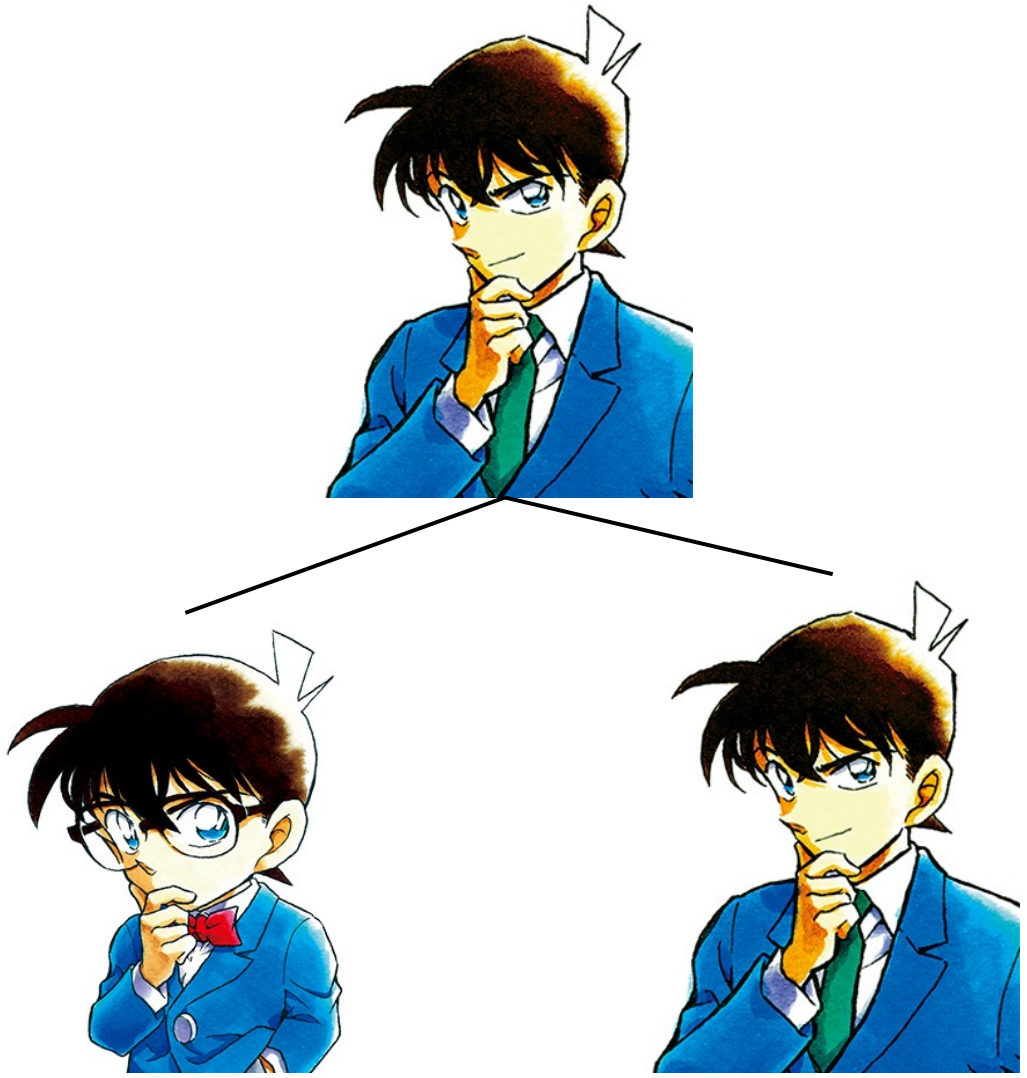
Detective Conan/Case Closed Vol. 24

Phonemes vs. Allophones

/p/

[p^h] syllable-initial

[p] elsewhere



Free variation

- The /p/ in “Wake up!” can be pronounced [p] or [p̚] (allophones).
  - English does not have [p̚] as a phoneme.
  - [p̚] = unreleased; Stop → Closure + Release

- The word *data* can be pronounced /dætə/ or /deɪtə/.
  - /æ/ and /eɪ/ are phonemes in American English.

- Free variation → overlapping distribution
  - [p] and [p̚] occur in the same environment (allophonic free variation).
  - /æ/ and /eɪ/ occur in the same word (phonemic free variation).

Summary

	Phonemes	**Allophones**
Predictability of distribution	Unpredictable	Predictable
How you can tell	Minimal pairs	Complementary distribution
Examples	bat /bæt/ vs. mat /mæt/	peak [p^hik] vs. speak [spik]

Adapted from *Language Files*, p. 120 (7)

- Free variation → Overlapping distribution (unpredictable)
  - Allophonic free variation: e.g. *up* [ʌp] vs. [ʌp̚]
  - Phonemic free variation: e.g. *data* /dætə/ vs. /deɪtə/

Exercise 1

- Can you come up with examples of free variation in English, Japanese or other languages?

- 寒い ‘cold’ → さむい /m/ or さぶい /b/
  - Phonemic free variation; denasalization

Features

- Sounds can be classified into natural classes, according to features.

- Examples of features
  - Consonant/Vowel
  - Voicing ([±voiced])
  - Place of articulation
  - Manner of articulation (e.g. [±nasal], [±sonorant], [±aspirated])
  - Tongue height (e.g. [high])
  - Tongue advancement (e.g. [back])
  - Lip rounding ([±rounded])

Sonorants ←→ Obstruents

Features

- Voiced consonants in English
  - /b, m, v, ð, d, n, z, l, ɹ, ʒ, dʒ, g, ŋ, w, j/
- Sonorant consonants in English
  - /m, n, l, ɹ, ŋ, w, j/
- Nasal sounds in English
  - /m, n, ŋ/
- High vowels in English
  - /i, ɪ, ʊ, u/
- Back vowels in English
  - /ʌ, ɔ, ʊ, u/
- Rounded vowels in English
  - /ɔ, ʊ, u/

Features

- /p/ and /b/ are contrastive in English.
  → Voicing is a distinctive feature (contrastive) in English.
- /p/ and /p^h/ are non-contrastive in English.
  → Aspiration is a non-distinctive feature (non-contrastive) in English.

- /p/ and /p^h/ are contrastive in Korean.
  → Aspiration is a distinctive feature (contrastive) in Korean.
- /p/ and /b/ are non-contrastive in Korean.
  → Voicing is a non-distinctive feature (non-contrastive) in Korean.

Phonotactics

- Phonotactics deals with possible combinations of phonemes in a language.

- Phonotactics determines permissible syllable structure of a language.
  - What is syllable?

Phonotactics

- Syllable is a unit of speech, made up of an onset and rhyme (*Languages Files*, p. 711).
  - Onset (e.g. C) + Rhyme (e.g. VC) = Syllable (e.g. CVC)

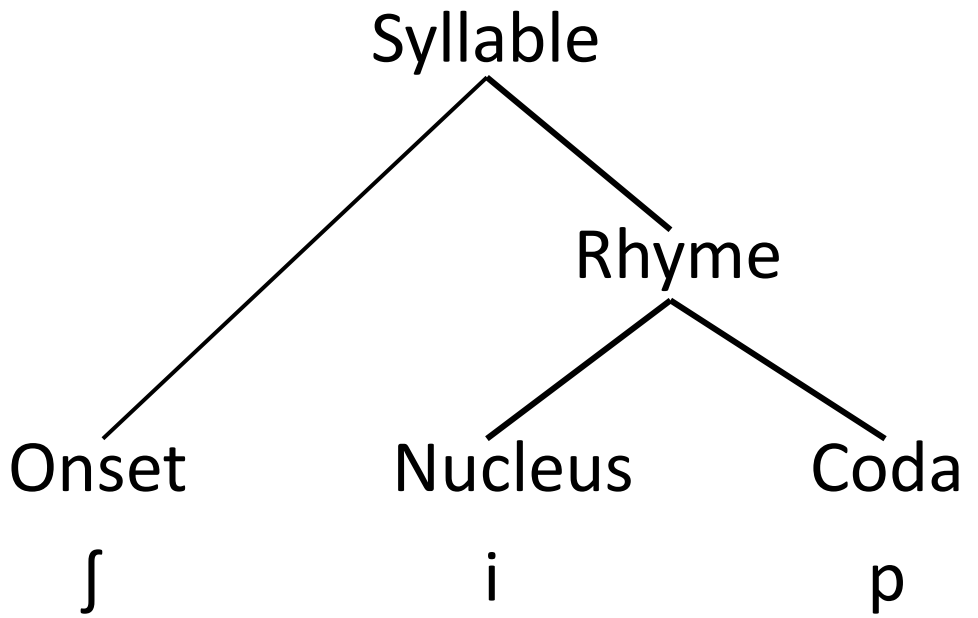
- Onset is any consonant(s) that occurs before the rhyme in a syllable (*Language Files*, p. 705).

- Rhyme/Rime is the vowel and any consonants that follow it in a syllable (*Language Files*, p. 709).
  - Vowel (called Nucleus) + Consonant(s) (called Coda) = Rhyme/Rime

Phonotactics

- Syllable structure is hierarchical.
- Rhymes are related to rhyming in poetry and songs.
  - e.g. *keep* /kip/, *deep* /dip/

sheep /ʃip/



Phonotactics

- The syllable template for English is (CCC)V(CCCC).
- English has up to 3 onset consonants.
  - e.g. *up* /ʌp/ (0), *peak* /pik/ (1), *trick* /tɹɪk/ (2), *street* /stɹit/ (3)
- English has up to 4 coda consonants.
  - e.g. *he* /hi/ (0), *heat* /hit/ (1), *hint* /hɪnt/ (2), *text* /tɛkst/ (3), *texts* /tɛksts/ (4)
- V can be a syllabic consonant.

Phonotactics

1. Vowels
2. Glides
3. Liquids
4. Nasals
5. Voiced fricatives
6. Voiceless fricatives
7. Voiced stops
8. Voiceless stops

- In general, sonority in a syllable increases toward the nucleus and decreases towards the end of the syllable.

- However, the first onset C and the last coda C in CCCVCCCC in English must be /s/.
  - *street* /stɹit/
  - *texts* /tɛksts/

- Example
  - print /pɹɪnt/ (CCVCC)

- /p/ → Voiceless stop
- /ɹ/ → Liquid
- /ɪ/ → Vowel
- /n/ → Nasal
- /t/ → Voiceless stop

Phonotactics

- In contrast, the syllable template for Japanese is very simple!
- Phonotactics is related to loanword adaptation.
- English
  - *stress* /stɹɛs/ (CCCVC; 1 syllable) in English is ストレス /sɯ.to.ɹe.sɯ/ (CV.CV.CV.CV; 4 syllables) in Japanese.

Complex sounds

- Affricates (consonants) and diphthongs (vowels) are complex sounds.
- English affricates (stop → fricative): /tʃ/and /dʒ/
- The stop and fricative in an affricate must be homorganic.
  - e.g. /pf, bv/ (labial), /ts, dz/ (alveolar), /tʃ, dʒ/ (palatal), /kx, gɣ/ (velar)
- English diphthongs: /eɪ/, /ɑɪ/, /ɔɪ/, /oʊ/, /ɑʊ/

Complex sounds

- An affricate is treated as a single sound: /tʃ/ (/č/) and /dʒ/ (/ǰ/).
- Likewise, a diphthong is treated as a single sound.

- Reasons

1. Native speakers of English analyze them as single sounds.
2. Speech errors: *slumber party* /slʌmbəɹ paɹti/ can be *lumber sparty* /lʌmbəɹ spaɹti/, but *cheap rack* /tʃip ɹæk/ cannot be **sheep track* /ʃip tɹæk/.
3. Word-note correspondences in songs

Phonological phenomena

- Neutralization
- Assimilation
- Elision (Deletion)
- Epenthesis (Insertion)

Neutralization

- Many American English speakers pronounce /t/ and /d/ in unstressed syllables as [ɾ] (voiced alveolar flap/tap; flapping).

- Flapping makes *latter* /læt̬ɹ/ and *ladder* /læd̬ɹ/ sound identical [læɾ̬ɹ] (neutralization).

https://en.wikipedia.org/wiki/File:En-us-latter-ladder-flapped-unflapped.oga

Assimilation

- Assimilation is a process by which a sound becomes more like a nearby sound in terms of some feature(s) (*Language Files*, p. 691).

- Nasal place assimilation in rapid pronunciation
  - /n/ (= alveolar nasal) in words such as *infant* /ɪnfənt/ and *convex* /kɑnvɛks/ takes the place of articulation of the following sound (= labio-dental in this case) and becomes [ɱ] (= labio-dental nasal).

- Another example
  - *symphony* /sɪmfəni/ as [sɪɱfəni] in rapid speech

https://en.wikipedia.org/wiki/File:Symphony-pronunciation-audio.ogg

Elision

- Elision (or deletion) is a process by which a sound present in the phonemic form (i.e. underlying form) is removed from the phonetic form (i.e. surface form) in certain environments (*Language Files*, p. 695).

- Examples
  - *fifths* /fɪfθs/ as [fifs] in rapid speech
  - *library* /lɑɪbɹɛɹi/ as [lɑɪbɛɹi] in rapid speech

Epenthesis

- Epenthesis (or insertion) is a phonological process by which a segment not present in the phonemic (or underlying) form is added in the phonetic (or surface) form (*Language Files*, p. 700).

- Examples
  - *something* /sʌmθɪŋ/ as [sʌmpθɪŋ]
  - *dance* /dæns/ as [dænts]

Exercise 2

- Can you find minimal pairs in English, Japanese, and other languages?
- What do the minimal pairs tell you about the phonology of the language?
- Example
  - In English, *pat* /pæt/ and *bat* /bæt/ form a minimal pair. This example tells us that /p/ and /b/ are contrastive and phonemes in English. It also tells us that voicing is contrastive in English.

Spanish consonants

	Bilabial		**Labio-dental**		**Dental**		**Alveolar**		**Alveolo-palatal**		**Palatal**		**Velar**	
Stop	p	b			t̪	d̪						ɟ	k	g
Affricate									tʃ					
Fricative			f		(θ)		s						x	
Nasal		m						n				ɲ		
Lateral								l				(ʎ)		
Tap								ɾ						
Trill								r						

Based on Campos-Astorkiza (2018): Table 8.1

Spanish vowels

	Front	**Central**	**Back**
High	i		u
Mid	e		o
Low		a	
	Unrounded		Rounded

Based on Ronquest (2018): Table 7.1

References

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