

Segmental phonology in Japanese: Summary

We have identified several cases in Japanese where a particular **phoneme** has multiple surface **allophones**. This handout is a summary of the patterns that we have found. Know how to analyze them using **phonetic properties** and **sound classes**.

I. Voiceless vowels

/ i / has two allophones	[i̥]	between voiceless sounds
	[i]	elsewhere
/ u / has two allophones	[u̥]	between voiceless sounds
	[u]	elsewhere

- These two patterns can be generalized with one rule that applies to *high vowels* as a sound class. Can you state that rule?

II. The /h/ allophones

/ h / has three allophones	[φ]	before /u/
	[ç]	before /i/
	[h]	before /e, o, a/ (i.e., elsewhere)

- Loanword data forces us to conclude that /φ/ also exists as an independent phoneme in Japanese (which only occurs in loanwords).
- Even in loanwords, however, the /h/ phoneme undergoes its usual rules.

III. The syllable-final nasal ("mora nasal")

/ n / has multiple allophones	[m]	before bilabial <i>stops</i>
	[n]	before alveolar and alveo-palatal <i>stops and affricates</i> (including the [dz] allophone for /z/), and before /r/
	[ŋ]	before velar <i>stops</i>
	[ɳ]	elsewhere (phrase-finally, before vowels, before glides, and before fricatives)

- We can make a generalization for all three allophones [m n ŋ] by referring to **place of articulation** and the class of sounds that are **stops** (or have a stop-like closure, for affricates and /r/).
- With the [ɳ] allophone, there is variation between a true uvular nasal (with uvular closure) and a nasalized high back vowel or glide (with no true closure).
- Compare: [kana] 'kana' (syllabary), [kama] 'sickle', [kana] 'winter crow': How many nasal phonemes do we see in Japanese?

IV. The alveolar obstruent alternations

/ t / has three allophones	[t̪] before /i/ [ts] before /u/ [t] before /e, o, a/ (i.e., elsewhere)
/ s / has two allophones	[ɕ] before /i/ [s] before /u, e, o, a/ (i.e., elsewhere)
/ z / has three allophones	[dz̪] before /i/ [dz] • after /N/ (<i>consistently</i>) • in phrase-initial position (<i>optional rule</i>) [z] elsewhere
/ d / ...	... is an interesting case that we won't discuss yet ...

- Generalizations can be made over the /t/ and /s/ cases (and others? think about this on your own) by stating the “stop becomes affricate” and “alveolar becomes alveopalatal” components of the rules separately. This demonstrates why it is more useful to conceptualize rules in terms of sound classes and changes to particular phonetic properties than to think about changing “one whole sound” into another.
- When /z/ appears *both* after /N/ (or phrase-initially) *and* before [i], it surfaces as [dz̪]; note that this is an affricate, like [dz]. Well-written rules can handle this easily!
- We further saw that loanwords have alveolar/alveopalatal obstruents in “unexpected” environments, and proposed the following way of handling this:
A contrast between /t/-/t̪/-/ts/, between /s/-/ɕ/, and between /z/-/dz̪/ exists only in loanwords (all phonemes here other than /t s z/ are loanword-specific)
The rules changing alveolars to alveopalatals before /i/ apply *only* to *non-*loanwords

V. Consonants of Japanese **that are phonemes** according to our analysis

- Compare the *phonetic* chart from an earlier handout

(Shaded symbols are separate phonemes in loanwords only)

		bilabial	alveolar	alveo- palatal	palatal	velar	uvular	glottal
(oral) stops		p b	t d			k g		
fricatives		ɸ	s z	ç				h
affricates			ts	tɕ dz				
approximants	liquids		r					
	glides				j	w		
nasal (stop)s		m	n				ɴ	

In each cell, segments on the left are *voiceless* and segments on the right are *voiced*.

- Note: This chart represents the mental grammar of younger speakers of Tokyo Japanese, who have /g/ (rather than /ŋ/) as their voiced velar stop phoneme category.