# Prosodic structure in Japanese

## I. Background

(1) Prosodic structure

(a) Phonologists in the 1960s tried to explain phonological patterns in human language based on **segments** (consonants and vowels) and word/morpheme **boundaries** only

(b) This doesn't work — to state phonological generalizations, we need to recognize that segments are organized into larger phonological units, such as the **mora** or **syllable**

(c) These units are known collectively as **prosodic constituents**; the phonological organization of a language above the segmental level is called **prosodic structure**

(2) **Controversy** concerning Japanese: Does it have syllables? (Is the syllable universal?)

## II. The mora: Evidence and basic patterns

(3) The mora (μ) is a prosodic unit that plays a large role in Japanese

(a) The mora is a phonological structure that contains, and thus groups together, one or more segments

(b) See Tsujimura (2014: ch 3, sec 3) and the data set "Mora structure in Japanese"

- We will take T's discussion as a starting point, but further refine her approach

(4) Evidence from speech errors: If we assign mora structure as in Tsujimura's (80), we can say that moras are what is substituted for or transposed in speech errors

```
μ  μ   μ  μ   μ  μ   μ  μ    μ
/| |   /| |   /| |   /| |   ⁄⁄|
da ɴ   ga  i   sa  i   ba ɴ  sjo      'court of impeachment'
   ↓       ↓
   i       ɴ

μ  μ  μ   μ  μ   μ  μ  μ
/| |  /| /| |   /| /| |
kɯ ɯ  bo mi d   do we e              'aircraft carrier Midway'
   ↓
   b        ↑
```

(5) Evidence from language games

```
μ  μ  μ              μ  μ  μ  μ  μ  μ
/| /| /|      →      /| /| /| /| /| /|
te ga mi             te be ga ba mi bi        'letter'

μ  μ  μ  μ           μ  μ  μ   μ  μ  μ  μ  μ
/| |  /| |      →     /| /| /|  /| /| /| | /|
ga k  ko o           ga ba tsɯ bɯ ko bo o  bo  'school'
```

- To what extent are language games affected by orthography?

  [ gakkoo ]  がっこう  <ga> + small <tu> + <ko> + <u>

## III. The mora: Implications for the phonological grammar

(6) The phonological grammar models a native speaker's **knowledge of language**

(a) We've already seen that the phonological component of the mental grammar contains:

- A set of segmental phonemes
- Rules to produce any additional allophones of those phonemes in the appropriate environments

(b) We have argued that these phoneme categories and phonological rules are necessary for describing speaker behavior

- Example: One cause of a 'foreign accent' is when your native-language phonemes or phonological rules carry over into a new language

(7) If speaker behavior shows that segments are systematically organized into moras in Japanese, then the phonological grammar of Japanese must have a means for *producing* and *enforcing* the necessary mora structures

(8) Proposal (for the phonological grammar of Japanese):
**Algorithm for building mora (μ) structure**

(a) Moras dominate (i.e., contain) segments in phonological structure. All segments must be associated with some mora in a well-formed surface representation.

- A surface representation that does not conform to this requirement is rejected as ungrammatical, unless some phonological rule applies to bring it into conformity

(b) Segments are associated with moras as follows:

i. Every instance of a vowel projects, and associates to, a μ
(long vowels associate to two μ)

ii. Every /j/ to the left of a μ associates to that μ

iii. Every instance of /ɴ/ projects and associates to a μ

iv. Every unassociated consonant to the left of a vowel or /j/ associates to the μ of the vowel or /j/

v. An unassociated consonant may project and associate to a mora *only if* it is the first half of a long consonant
(i.e., is identical to the following consonant)

- These steps are carried out in order. Note that for many of the steps, it matters whether a segment is already incorporated into mora structure or not.

(9) Back to the **three types of moras** identified by Tsujimura (as amended in class discussion): Does our proposed mora-building algorithm correctly produce all three types?

Type (a): (C)(G)V

Type (b): The first part of a long consonant (=the first part of a geminate)

Type (c): 'Moraic' nasal /ɴ/

→ Try **applying** this algorithm to some of the examples on the mora-structure data set!

## IV. The syllable

(10) What evidence shows that syllables (σ) are necessary in Japanese?

- See the examples on the "More about mora structure" data set handout

(11) **Algorithm for building syllable (σ) structure**

(a) Syllables dominate (i.e., contain) moras in phonological structure. All moras must be included in some syllable in a well-formed surface representation.

- A surface representation that does not conform to this requirement is rejected as ungrammatical, unless some phonological rule applies to bring it into conformity

(b) Moras in Japanese fall into two types, $\mu_1$ and $\mu_2$, where:

- $\mu_1$ must be a (C)(j)V mora *i.e.,* must contain at least V
- $\mu_2$ is not a C(j)V mora *i.e.,* C is okay; V is okay; N is okay; but not C(j)V
- Note that a V mora can be either $\mu_1$ or $\mu_2$

(c) Moras are associated with syllables as follows:

i. Assign all moras a label as $\mu_1$ or $\mu_2$

ii. Every instance of $\mu_1$ projects, and associates to, a σ

iii. Every $\mu_2$ to the right of a $\mu_1$ associates to the σ of that $\mu_1$

- These steps are carried out in order. This algorithm ensures that all syllables in Japanese have the structure $\mu_1(\mu_2)$.

(12) Additional points about syllable structure in Japanese

(a) When there are two vowels in a row, our model allows either two light syllables (μ+μ) or one heavy syllable (μμ) to be formed — what actually happens?

- A number of factors appear to be relevant, including which vowels are involved and where the pitch accent is located
- See examples on the "More about mora structure" data set handout

(b) It appears that Japanese occasionally tolerates a syllable with *three* moras

- Loanwords: [ toon ] 'tone', [ tɕeeɴ ] 'chain'
- Complex words: [ nihom-ppoi ] 'Japan-like', [ toot-ta ] 'pass-PAST'