Syllable Structure in Japanese

1. Basics of Japanese Syllable Structure

1.1. Light vs. Heavy Syllables

Japanese syllables contrast in what is called syllable weight. That is, some syllables are "light" and some are "heavy." The unit of weight is the mora. Light syllables have one mora, heavy syllables have two.

Using the Greek letters μ and Σ to represent the mora and syllable, respectively, light and heavy syllables can be represented as follows:

(1) Light syllable  \[ \Sigma \]  
(2) Heavy Syllable  \[ \mu \]  \[ \Sigma \]

1.2. Long vs. Short Vowels

Japanese has a five-vowel system:

\[ i \quad u \quad e \quad o \quad a \]

Vowels contrast in length, e.g. kite 'come!' vs. kiite 'listen!'.

[Long vowels are spelled with doubled letters, e.g. ii, uu, etc.]

A syllable with a short vowel is light, a syllable with a long vowel is heavy:

(4)  \[ \Sigma \]  \[ \Sigma \]  
(5)  \[ \Sigma \]  \[ \Sigma \]  

These prosodic structures represent syllables and syllable weight. The light syllables of kite have one mora each. The heavy initial syllable of kiite has two morae. A bimoraic vowel is realized as a long vowel. The initial syllable of kiite has one long vowel, represented as a vowel dominated by two morae. The double letters are just a spelling convention.

1.3 Onset, Nucleus, and Coda

Each syllable of Japanese contains a vowel, which is the nucleus of the syllable. A consonant preceding the vowel is the onset of the syllable. Some syllables have an onset, others do not. Where a syllable ends in a consonant (cf. §1.5 below), the consonant ending the syllable is its coda.

1.4 Diphthongs

Japanese has diphthongs: ay, oy, aw, spelled as ai, oi, au, respectively, in Japanese orthography. A syllable with a diphthong is heavy. Thus the word tai 'red snapper' is bimoraic:
A syllable with a diphthong has a complex nucleus, i.e. both the vowel and the following glide belong to the nucleus.

1.5 Closed Syllables

A closed syllable is a syllable that ends in a consonant. Closed syllables in Japanese are heavy; the coda consonant is dominated by a mora. This is the prosodic structure of *pan* 'bread':

(7) \[
\sum \mu \mu
\]
\[
\mu \mu
\]
\[
\mu
\]
\[
\mu
\]
\[
\mu
\]
\[
\mu
\]
pan

The word *kitte* 'cut!' has this prosodic structure:

(8) \[
\sum \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
\[
\mu \mu \mu
\]
2. Syllabification

An intervocalic non-geminate consonant is always syllabified as onset of the following syllable (rather than as coda of the preceding syllable).

For example, *kono* 'this' has the structure:

\[
\text{(9)} \quad \sum \quad \sum \\
\mu \quad \mu \\
\setminus \quad \setminus \\
\text{ko} \quad \text{no}
\]

The *n* is the onset of the second syllable, not the coda of the first.

An intervocalic consonant cluster is split between two syllables: the first consonant is coda of the preceding syllable, the second is onset of the following syllable. Thus, the word *hontoo* 'truth' has the syllable structure:

\[
\text{(10)} \quad \sum \quad \sum \\
\setminus \quad \setminus \\
\mu \quad \mu \quad \mu \quad \mu \\
\setminus \quad \setminus \\
\text{h o n} \quad \text{t o}
\]

3. The Foot

The *foot* is a higher-level unit of prosodic structure. In Japanese a foot consists of two morae. Thus, it may consist of two light syllables or a single heavy syllable. The word *hontoo* consists of two feet, each consisting of a single heavy syllable:

\[
\text{(11)} \quad \text{F} \quad \text{F} \\
\sum \quad \sum \\
\mu \quad \mu \quad \mu \quad \mu \\
\setminus \quad \setminus \\
\text{h o n} \quad \text{t o}
\]

The family name *nakamiti* consists of two feet, each consisting of two light syllables:

\[
\text{(12)} \quad \text{F} \quad \text{F} \\
\sum \quad \sum \\
\mu \quad \mu \quad \mu \quad \mu \\
\setminus \quad \setminus \\
\text{na} \quad \text{ka} \quad \text{mi} \quad \text{ti}
\]

4. Melody vs. Prosody
The sequence of segments that make up a word is known as its *melody*. The organization of the melody into prosodic constituents (morae, syllables, and feet) is known as its *prosody* or *prosodic structure*. Distinct words can have the same melody but differ in prosody, as in the case of *kite* 'come!' vs. *kiite* 'listen!' vs. *kitte* 'cut!'. Compare their prosodic structures in (4), (5), and (8).

5. Some Extralinguistics Uses of the Mora in Japanese

5.1 Poetry
The mora is the basic unit in terms of which the poetic line is constructed. For example, a *haiku* consists of three lines: the first has five morae, the second seven morae, and the third five morae.

5.2 Orthography
In the Japanese writing system, each symbol represents a mora. Thus the units *ka, ke, ki, ko, ku* are each written with a single symbol. The word *pan* is written with two symbols since it has two morae; the first symbol represents *pa* and the second *n*.

6. Some Conventions of Japanese Orthography
Two conventions that we will use to write Japanese words have already been introduced: long vowels and geminate consonants are written with double letters.

We will use certain other conventions of Japanese orthography, transposed into the Latin alphabet.

I. Diphthongs are indicated with vowel letters:
   - *ai* indicates [ay].
   - *oi* indicates [oy].
   - *au* indicates [aw].

II. Some consonants are indicated in indirect ways:
   - *s* before *i* and *sy* elsewhere indicate [s].
   - *t* before *i* and *ty* elsewhere indicate [č].
   - *z* before *i* and *zy* elsewhere indicate [j].
   - *tu* indicates [cu], as in *tunami* 'tsunami'.
   - *hu* indicates [fu], as in *taihuu* 'typhoon'.

7. Exercise
Draw the full prosodic structures, indicating feet, syllables, and morae, for the following words:

1. *tookyoo*   'Tokyo'
2. *asuparagasu*   'asparagus'
3. *herikoputaa*   'helicopter'
4. *kaereru*   'can return'
5. *maisin*   'streptomycin'
6. *hantai*   'opposite'
7. *bankuubaa*   'Vancouver'
8. *hankati*   'handkerchief'
9. *hattori*   a family name
10. *intorodakusyon*   'introduction'
11. *hurasutoreesyon*   'frustration'