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The segment
in monostratal phonology

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The structure of this talk

1. The formal status of the segment.
2. The view that features are contrastive and independently interpretable.
3. The representation of the palatal glide $j$ in Japanese.
4. $jV$ (ja, ju, jo) as a **light diphthong** rather than a CV sequence.
Prosody and Melody

The phonological representation of *piti* ‘pity’

Prosody

Melody

$F = \text{feature}$
Lexical contrast and phonetic interpretation

(1)

<table>
<thead>
<tr>
<th></th>
<th>Classical phonemics</th>
<th>SPE, FG</th>
<th>ET, DP</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Minimal unit of phonological contrast</td>
<td>the segment</td>
<td>features</td>
<td>features</td>
</tr>
<tr>
<td>b. Minimal unit of phonetic interpretation</td>
<td>the segment</td>
<td>the segment</td>
<td>features</td>
</tr>
</tbody>
</table>

FG = Feature Geometry, ET = Element Theory, DP = Dependency Phonology
Nasukawa (2004, 2005)

• word-final syllabic nasal is a phonetic manifestation of nasality and empty nucleus.

• geminates are pseudo-geminates in Japanese.

• Japanese is a strict CVCV language which disallows any consonant clusters and consonant endings.
The syllable structure of Japanese

\[ \sigma \]
\[ \text{Rhy} \]
\[ \text{Ons} \quad \text{Nuc} \quad \text{Co} \]
\[ (C)(G) \quad V(V) \quad \{N\} \{Q\} \]

\( \sigma = \text{syllable} \)
\( \text{Rhy} = \text{rhyme} \)
\( \text{Ons} = \text{onset} \)
\( \text{Nuc} = \text{nucleus} \)
\( \text{Co} = \text{coda} \)
\( C = \text{consonant} \)
\( G = \text{glide} \)
\( V = \text{vowel} \)
\( N = \text{syllabic nasal} \)
\( Q = \text{first part of geminate consonant} \)

\[ k \quad j \quad o \quad o \quad k \ a \ i \quad \text{‘church’} \]
\[ h \quad o \quad N \quad \text{‘book’} \]
\[ k \quad o \quad k \ k \ i \quad \text{‘national flag’} \]
**kjookai** ‘church’

(2) 

```
  σ  
  / \  
 Rhy /  
/  ONS  Nuc 
/  / 
/ k j  
/ 
/  
\  
\ o o  
\  
\ k  
\ 
\ a i
```
"kok.ki ‘national flag’ and haŋ.ko ‘stamp’"
*kok*.*ki* ‘national flag’ and *han*.*ko* ‘stamp’
Possible initial Cj in Japanese

(5)

<table>
<thead>
<tr>
<th>kja</th>
<th>kju</th>
<th>kjo</th>
<th>gja</th>
<th>gju</th>
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<tbody>
<tr>
<td>sja</td>
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<td>sjo</td>
<td>zja</td>
<td>zju</td>
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<tr>
<td>tja</td>
<td>tju</td>
<td>tjo</td>
<td>dja</td>
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<tr>
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<td>hju</td>
<td>hjo</td>
<td>bja</td>
<td>bju</td>
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</tr>
<tr>
<td>pja</td>
<td>pju</td>
<td>pjo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nja</td>
<td>nju</td>
<td>njo</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>mja</td>
<td>mju</td>
<td>mjo</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rja</td>
<td>rju</td>
<td>rjo</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Co-occurrence restriction

(6) **Co-occurrence restriction**

A sequence of the palatal glide and a front vowel is disallowed (*ji* and *je*).
Possible initial \(j\)\(V\) in Japanese

(7)

\(ja\  ju\  jo\  \ast ji\  \ast je\)
Possible initial C in Japanese

(8)

<table>
<thead>
<tr>
<th>ka</th>
<th>ki</th>
<th>ku</th>
<th>ku</th>
<th>ko</th>
<th>ga</th>
<th>gi</th>
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<td>su</td>
<td>se</td>
<td>so</td>
<td>za</td>
<td>zi</td>
<td>zu</td>
</tr>
<tr>
<td>ta</td>
<td>ti</td>
<td>tu</td>
<td>te</td>
<td>to</td>
<td>da</td>
<td>di</td>
<td>du</td>
</tr>
<tr>
<td>ha</td>
<td>hi</td>
<td>hu</td>
<td>he</td>
<td>ho</td>
<td>ba</td>
<td>bi</td>
<td>bu</td>
</tr>
<tr>
<td>pa</td>
<td>pi</td>
<td>pu</td>
<td>pe</td>
<td>po</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>na</td>
<td>ni</td>
<td>nu</td>
<td>ne</td>
<td>no</td>
<td></td>
<td></td>
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<td>mu</td>
<td>me</td>
<td>mo</td>
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</tr>
<tr>
<td>ra</td>
<td>ri</td>
<td>ru</td>
<td>re</td>
<td>ro</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The Japanese syllabary

(9)

き(ki) や(ja) ゆ(ju) よ(jo)

きゃ(kja) きゅ(kju) きょ(kjo)
OCP *[pal][pal]

(10)

a.  

```
  *  O  N
  x  x
  j  i/e
[pal]  [pal]
```

b.  

```
  *  O  N
  x_1 x_2 x_3
  C  j  i/e
[pal]  [pal]  [pal]

← OCP  
  *[pal][pal]
```
Light diphthong

(11)

\[
\begin{array}{c}
  * \\
  \downarrow \\
  \times \\
  j \\
  [\text{pal}] \\
  i/e \\
  [\text{pal}] \\
\end{array}
\]

\[\text{N} \quad \leftarrow \text{OCP} \quad *[\text{pal}][\text{pal}]\]
Disputable points concerning precedence relations between features

(11)

a. Hard to provide an explanation for why affricate contours defy typical edge effects (Lombardi 1990)
b. No clear reasons why the two features in a contour (e.g. [ʤ]) never appear in the reverse order (e.g. *[ʒd])
c. No account for the fact that the number of sub-segmental timing slots in an affricate is always two
Dependency structures for contour segments

(12)

a. Lombardi (1990) proposes a representation (based on Feature Geometry) which contains the two unordered privative stricture features [cont] and [stop].

b. Schafer (1995) accommodates Lombardi’s proposal and claims that there exists an asymmetric dependency relation between [stop] and [cont].
Dependency structures for contour segments 2

(12)

c. Nasukawa (2005) proposes that the difference between prenasalised obstruents and voiced obstruents is the headship of intra-segmental organization: the element |murmur| (|N|) is not headed in the former while the same element is headed in the latter.
d. Nasukawa & Backley (2008) claims that affrication is regarded as a performance device for improving the perceptibility of complex-resonance stops by making multiple place cues more accessible to listeners; this is achieved by enhancing the portion of the speech signal containing aperiodic noise energy, which is relatively rich in place cues.
Elements (Nasukawa & Backley 2008)

(14) \begin{align*}
onset & \quad \text{nucleus} \\
|I| \text{(dip)} & \quad \text{dental, palatal POA} \quad \text{front Vs} \\
|U| \text{(rump)} & \quad \text{labial, velar POA} \quad \text{rounded Vs} \\
|A| \text{(mass)} & \quad \text{uvula, pharyngeal POA} \quad \text{non-high Vs} \\
|?| \text{(edge)} & \quad \text{oral/glottal occlusion} \quad \text{creaky voice} \\
|H| \text{(noise)} & \quad \text{aspiration, voicelessness} \quad \text{high tone} \\
|N| \text{(murmur)} & \quad \text{nasality, obs voicing} \quad \text{nasality, low tone}
\end{align*}
Elements $|I| |U| |A|$

(15)

a. $i$       b. $u$       c. $a$

$|I| |U| |A|$
Representing $e$ and $o$ in Japanese

(16)

a. $e$

\[
\begin{array}{c}
|I| \\
|I| \\
|A| \\
\end{array}
\]

b. $o$

\[
\begin{array}{c}
|U| \\
|U| \\
|A| \\
\end{array}
\]

$i$ and $e$ often form a class involving the same phonological phenomena in Japanese (e.g. *$ji$, *$je$, *but $ja$, $ju$, $jo$: vowels which occupy verb stem ending are only $i$ and $e$, e.g. $mi$ ‘see’ and $ne$ ‘sleep’).
Representing *ja* and *e* in Japanese

(17)

a. \[ ja \]

\[
|A| \\
|A| |I|
\]

b. \[ e \]

\[
|I| \\
|I| |A|
\]
Representing \( jV \) in Japanese

(18)

a. \( ja \)  
   \[
   \begin{array}{c}
   \text{A} \\
   \text{A} \\
   \end{array}
   \begin{array}{c}
   \text{I} \\
   \end{array}
   \]

b. \( ju \)  
   \[
   \begin{array}{c}
   \text{U} \\
   \text{U} \\
   \end{array}
   \begin{array}{c}
   \text{I} \\
   \end{array}
   \]

c. \( jo \)  
   \[
   \begin{array}{c}
   \text{U} \\
   \text{U} \\
   \end{array}
   \begin{array}{c}
   \text{A} \\
   \text{A} \\
   \end{array}
   \begin{array}{c}
   \text{I} \\
   \end{array}
   \]

\( \{ \text{o} \} \)
The ill-formed sequences *ji and *je

(19)

a. *ji

b. *je

\[ \begin{array}{c}
|I| \\
|I| \\
\end{array} \] 

\[ \begin{array}{c}
|I| \\
|A| \\
|I| \\
\end{array} \]
|I| cannot (in)directly license the same type of element (|I|) in a given domain.
Representing \( wV \) in Japanese

(21)

a. \( wa \)  

b. \( *wi \)  

c. \( *wu \)
Representing $wV$ in Japanese

(21)

d. *we
e. *wo

\[
\begin{array}{c}
\text{I} \\
\text{I} \\
\text{I} \\
\text{A} \\
\text{A} \\
\text{U} \\
\end{array}
\]

\[
\begin{array}{c}
\text{U} \\
\text{U} \\
\text{U} \\
\text{A} \\
\text{A} \\
\text{U} \\
\end{array}
\]
(* |U| → |U|, * |I| → |U|)

(22)  a.  * |U| → |U|

|U| cannot (in)directly license the same type of element (|U|) in a given domain.  (*wu, *wo)

b.  * |I| → |U|

|I| cannot (in)directly license the element |U| in a given domain.  (*wi, *we)
Given the proposed dependency-based structure for jV and wV in Japanese ......

- The language is phonologically viewed as a strict CV language.
- We no longer recognize that Japanese has five types of expression which can occupy nuclei. There must be nine types: five monophthongs ($a, i, u, e, o$) and four light diphthongs ($ja, ju, jo, wa$).
Loanwords

• In the present Japanese (among non-elder speakers), in fact, the katakana spellings of many foreign proper names suggest that sequences *je*, *wi*, *we*, *wo* are (at least phonetically) possible.

• However, the actual pronunciation of these sequences are uncertain and not consistent.
Conclusion

• Japanese has more than five vowels (a, i, u, e, o). Sequences such as ja, ju, jo, wa are also vowels (light diphthongs) rather than a sequence of CV.

• This analysis aligns with the prevalent analyses of other East-Asian languages such as Chinese and Korean where the same sequences are treated as light diphthongs rather than j plus a vowel.

• We may discard the notion of bare phonological positions (e.g. C/V units, Xs and Root node).

• Then, we may ultimately represent all structures by referring only to dependency.
References 1


References 2