Syllable structure in English, Japanese and Kaqchikel
Part II

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Introduction
This paper will argue that

- The foot/word structure of Kaqchikel (a K’iche’an language of the Mayan family) is head-final.

- while its syllable structure (consisting of a vowel and an onset) is head-initial.
Introduction 2

The reasoning for this depends on the followings:

• a primary stress always appears in domain-final Vs.

• aspiration (which functions as a prosodic boundary marker in Kaqchikel) always appears in domain-final Cs.

• domain-final Cs are immune to weakening.
Roadmap

1. Head-dependency relations in phonological representation
2. Identifying the prosodic structure of Kaqchikel
3. Head-dependency relations and parametric settings controlling phonetic interpretation
4. Concluding remarks in relation to syntactic structure
Head-dependency relations in phonological representation
The English word ‘puppy’

(1)
Reasoning for the structure in (1)

(2)  
   a. A primary stress always appears in the first V of the domain.
   b. Aspiration (the prosodic boundary marker of English: Nasukawa and Backley 2012) always appears in domain-initial Cs.
   c. Domain-initial Cs are immune to weakening. (Weakening typically takes place domain-finally and intervocalically.)
The English word ‘pot’

(3)

(4)  a. Directionality of dependency relations at the foot level: right-headed / left-headed

b. Directionality of dependency relations at the syllable level: right-headed (universal)
Identifying the prosodic structure of Kaqchikel
Kaqchikel consonants

<table>
<thead>
<tr>
<th></th>
<th>bilabial</th>
<th>labiodental</th>
<th>alveolar</th>
<th>alveopalatal</th>
<th>palatal</th>
<th>velar</th>
<th>uvular</th>
<th>glottal</th>
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<td>aspirated/plain</td>
<td>(p^h/p)</td>
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<td>k’</td>
<td>q’</td>
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<td>f</td>
<td>s</td>
<td>f</td>
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<td>x</td>
<td>(\chi)</td>
<td>h</td>
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<td>M</td>
<td>n</td>
<td></td>
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<td>(\eta)</td>
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<tr>
<td>lateral</td>
<td>(\l(\d)/l)</td>
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<tr>
<td>tap</td>
<td>(\r(\j)/\r)</td>
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<td>glide</td>
<td>(w(\d)/w)</td>
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<td></td>
<td></td>
<td></td>
<td>(j(\z)/j)</td>
<td></td>
</tr>
</tbody>
</table>

Symbols in square brackets are phonetically realized forms of symbols with diacritic ‘.‘.
Identifying strong positions

(6)  a. V positions where a stress is assigned: **domain-final Vs.**

b. C positions where a prosodic marker appears ([asp] in Kaqchikel): **domain-final Cs.**

C. C positions which are immune to weakening: **domain-final Cs.**
The distribution of $p^h \sim p$

(7)

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word-initial $p$:</td>
<td>[poʔtʰ]</td>
<td>po’t ‘Indian regional dress’</td>
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<tr>
<td></td>
<td>[páɾ]</td>
<td>par ‘skunk’</td>
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<tr>
<td>Word-medial prevocalic $p$:</td>
<td>[nupats’án]</td>
<td>nupatz’an ‘my dry cornfield cane’</td>
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<td></td>
<td>[pispiʔy]</td>
<td>pispi’y ‘gizzard’</td>
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<td></td>
<td>[ʃuts’apíʃ]</td>
<td>xutz’apij ‘It covered it’</td>
</tr>
<tr>
<td></td>
<td>[ʃupúx]</td>
<td>xupuj/xuxupuj ‘blew it’</td>
</tr>
<tr>
<td>Word-final $p^h$:</td>
<td>[ʃikópʰ]</td>
<td>chikóp ‘bird’</td>
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<td></td>
<td>[sipʰ]</td>
<td>sip ‘tick’</td>
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<tr>
<td></td>
<td>[topʰ]</td>
<td>top ‘crab, crayfish’</td>
</tr>
<tr>
<td>Pre-consonantal $p^h$:</td>
<td>[ʃʃupʰniqʰ]</td>
<td>chupnáq ‘turned off’</td>
</tr>
<tr>
<td></td>
<td>[ʃʃupuníqʰ]</td>
<td>chupunáq ‘turned off’</td>
</tr>
</tbody>
</table>

(Zaragoza, Patzún, Panajachel)

(other variants)
The distribution of aspiration

\( (C = \text{obstruent}) \)

(8)

a. \( \text{CV}C^h \)

b. \( \text{CV}C^h\text{CV}C^h \rightarrow ^*\text{CV}C\text{CV}C^h \)

e.g. \( \text{ʃ} \text{ʃak}^h \text{ʃot}^h \rightarrow \text{ʃ} \text{ʃak} \text{ə} \text{ʃot}^h \) ‘bent forward repeatedly’

\( \text{ʃ} \text{ʃak}^h \text{ʃot}^h \)

perfect aspect ‘bend forward’ reduplicated part for expressing repeated action

e.g. \( \text{ʃ} \text{u} \text{xup}^h \text{la}^2 \rightarrow \text{ʃ} \text{u} \text{xup} \text{u} \text{la}^2 \) ‘repeatedly emptied a container’

\( \text{ʃ} \text{u} \text{xup}^h \text{la}^2 \)

perfect aspect 3rd p.s. ‘empty’ suffix for expressing repeated action
C alternations

(9)

\[ \text{f} > s \quad (\text{fpaʔtʃ} > \text{spaʔtʃ} \sim \text{i} \text{spatʃ}: ‘lizard’) \]

q > x \quad (\text{saʔmoloʔ} > \text{saʔmoloʔ}: ‘egg’) \)

q’ > ? \quad (\text{q’aq’} > \text{ʔaq’}: ‘fire’) \)

\(6 > ? \quad (\text{xuɓän} > \text{xuʔän}: ‘tongue’) \)
Strong positions = Heads

(10)

<table>
<thead>
<tr>
<th></th>
<th>English</th>
<th>Kaqchikel</th>
</tr>
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<tbody>
<tr>
<td>a.  V position for a stress:</td>
<td>domain-initial</td>
<td>domain-final</td>
</tr>
<tr>
<td>b.  C position for a prosodic marker:</td>
<td>domain-initial</td>
<td>domain-final</td>
</tr>
<tr>
<td>c.  C position immune to weakening:</td>
<td>domain-initial</td>
<td>domain-final</td>
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</table>
$top^h$ ‘crab, crayfish’

(11)
Head-dependency relations and parametric settings controlling phonetic interpretation
Dependency relations and their phonetic manifestation 1
(cf. Takashi 2004, Nasukawa 2011)

(12) a. **Endocentric Dependency** (the dependent is of the same type as its head):

If $\alpha \rightarrow \beta$, then $\alpha \ll \beta$

In endocentric dependency wherein $\alpha$ and $\beta$ are the head and the dependent position, respectively, $\alpha$ strictly and immediately precedes $\beta$ in phonetic interpretation.
Dependency relations and their phonetic manifestation 2
(cf. Takashi 2004, Nasukawa 2011)

(12)

b. **Exocentric Dependency** (the dependent is of a different type from its head):

if $\alpha \rightarrow \beta$, then $\alpha \gg \beta$

In endocentric dependency wherein $\alpha$ and $\beta$ are the head and the dependent position, respectively, $\alpha$ strictly and immediately follows $\beta$ in phonetic interpretation.
English

(13)

C₁ V₁ C₂ V₂
pʰ d t

Endocentric

Exocentric

head-initial

head-final
Kaqchikel

(14)

\[ V_2 \quad C_2 \quad V_1 \quad C_1 \]

Endocentric \quad head-final

Exocentric \quad head-initial

\[ t \quad o \quad p^h \]
Prosodic structure

\[ V_1 (p) \rightarrow C_1 (p^h) \rightarrow V_2 \rightarrow C_2 (t) \]

Linearisation

Endocentric (head-\textit{initial}): \[ V_1 V_2 \]

Exocentric (head-\textit{final}): \[ C_1 V_1 \quad C_2 V_2 \]

as a result, \[ C_1 V_1 C_2 V_2 \quad [p^h \text{not}] \]
(16) Prosodic structure

\[
\begin{align*}
V_1 \ (o) & \longrightarrow C_1 \ (p^h) \\
\downarrow & \\
V_2 & \longrightarrow C_2 \ (t)
\end{align*}
\]

Linearisation

Endocentric (head-final):

\[V_2 \ V_1\]

Exocentric (head-initial):

\[C_1 \ V_1 \ C_2 \ V_2\]

as a result,

\[V_2 \ C_2 \ V_1 \ C_1\]

\[\text{[top}^h\]
Parametric settings of dependency relations

(17)

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<thead>
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<tr>
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<tr>
<td>head-final</td>
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<tr>
<td>b. Exocentric dependency:</td>
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<tr>
<td>head-initial</td>
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<tr>
<td>head-final</td>
<td>✓</td>
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Concluding remarks
• All data shown in this talk were collected in Guatemala in March 2011.

• There seems to be some correlation between the above phonological anomaly and the syntactically marked properties of Kaqchikel (e.g. VOS word order).
References 1


References 2


References 3


References 4

