Khoekhoegowab tone sandhi and extended projections

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bit.ly/sandhi2019

Tone sandhi

Khoekhoegowab (Khoe-Kwadi, Namiba, ~200,000 speakers, also called Khoekhoe) has a process of opaque melodic substitution termed **sandhi**:

Citation	Sandhi	Example	Gloss
Superlow	Low-Falling	[!ǎas] / [ne !àǎs]	'(this) servant'
Low	Low	[‖àas] / [ne ‖àas]	'(this) tie'
Low-Rising	Low-Rising	[!nǎàs] / [ne !nǎàs]	'(this) story'
High	Low-Falling	[ǂáas] / [ne ǂàǎs]	'(this) plain'
Superhigh	High	[!nā́as] / [ne !náas]	'(this) tortoise'
High-Rising	Low	[ǂáǎs] / [ne ǂàas]	'(this) spittle'

Table 1. Khoekhoe tone classes (Brugman 2009)

In most syntactic contexts, the sandhi follows the following generalization:

- The **leftmost** word in a constituent retains citation form; all other words undergo sandhi.

For example, in DPs:

(1) a. súúku
pots

b. ǀápā̀ sùuku
red pots

c. !nání ǀàpa sùuku
six red pots

d. ‖nā́ā̀ !nàni ǀàpa sùuku
those six red pots

Since VP is head-final, this generalization predicts that sandhi on the verb will depend on transitivity. **Instead, verb sandhi is more complicated,** but prior analyses disagree:

- Brugman (2009): Sandhi in matrix clauses, citation in embedded
- Haacke (1999): Sandhi triggered by preceding tense marking

Tense marking

Khoekhoegowab packages tense, aspect, & polarity information into a set of separable particles. These come in two classes:

- **Postverbal particles** (2) occur clause-finally.
- **Preverbal particles** (3) encliticize to some arbitrary preverbal constituent.

(2) Aob ge mai-e húní tsi ‖gan-e áḿ tama.
man DECL pap stir and meat grill NEG.NF
"The man didn't stir the pap or grill the meat."

(3) a. Aob ge mai-e húní tsi ‖gan-e go àm.
man DECL pap stir and meat PST grill
"The man stirred the pap and grilled the meat."

b. Aob ge mai-e go hùni tsi ‖gan-e àm.
man DECL pap PST stir and meat grill
"The man stirred the pap and grilled the meat."

Finding: sandhi on verbs

In matrix clauses:

- Verbs undergo sandhi exactly when preceded by tense-marking.
- This is true even at a distance:
  In (3a) only the second verb undergoes sandhi; in (3b) both do.

In (most) embedded clauses:

- Verbs never undergo sandhi.

Experimental methodology

A prosodic production experiment:

- 4 native speakers (3F; ages 20–35), reading from slides
- 40 test items, 14 fillers, 2 repetitions; each speaker saw all items
- All verbs had either High or High-Rising citation form
- Manipulation: preverbal vs. postverbal tense marker

Items came from different syntactic frames:

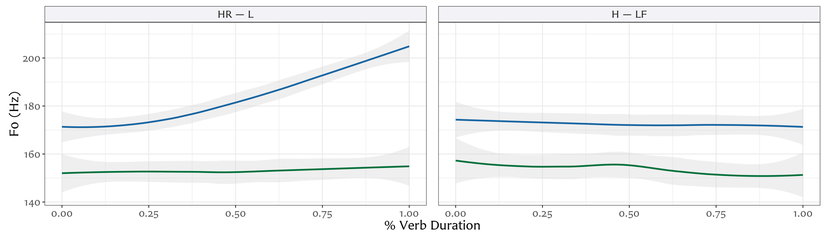
1. Matrix declarative
2. Question
3. VP Coordination
4. Quotative clause
5. Relative cleft
6. Nominalized clause

Frames 1–4 are syntactically 'matrix-like'; frames 5 & 6 are embedded.
(See `bit.ly/sandhi2019` for all stimuli.)

Transcription

- 4 phonetically-trained transcribers, blinded to manipulation: the author & 3 naive
- Given recordings of verbs (no context), asked to sort into 'high' (citation) or 'low' (sandhi)
- Fleiss' Kappa: 0.77 (substantial agreement)

Mean pitch tracks confirm transcribers were correctly separating classes. (Items were treated as having sandhi form only if marked as 'low' by a majority of transcribers; otherwise were treated as citation form.)



Results

A logistic regression:

- `sandhi transcribed ~ syntactic frame * tense position`

Only the following coefficients were found to be significant at the $p < 0.05$ level:

	Estimate	Std. Error	z value	Pr(>|z|)	
Matrix-like * Position	3.9183	0.7060	5.550	2.86e-08	***
Position	3.2699	0.2837	11.524	< 2e-16	***
Nom vs. Rel	2.8904	1.0522	2.747	0.00601	**

Table 2. Statistically-significant effects on sandhi likelihood

- The significant effect of Position tells us that sandhi is much more likely when tense marking precedes the verb.
- The significant interaction tells us that Position only affects sandhi in matrix-like clauses — embedded verbs never undergo sandhi.
- Nom vs. Rel is because of a confound with downdrift — the verb is much later in the sentence in the Nom condition.

Analysis

We can maintain the generalization that sandhi targets all but the leftmost item in some domain.

- The verb must always share a sandhi domain with tense marking.
- When tense precedes the verb, it won't be leftmost and will undergo sandhi (4).
- When tense follows the verb, it will be leftmost and will keep citation (5).

(4) (go … hùni) (5) (húní … tama)

One way to capture this: **Extended projections** (Grimshaw 1991) must phrase together. (cf. López 2009; Clemens To appear)

- This overrides the pressure to phrase the VP together, creating a syntax-prosody mismatch.

References

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