Posterior affricate in Mee and consonant-vowel place interactions

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Annual Meeting on Phonology 2018

Overview

- Primary data on a laterally-released velar stop in Mee, Papuan
- Evidence that this consonant is /g/ phonologically
- Previously undocumented allophonic variation: [gᴸ] before front vowels ~ [gᴷ] before back vowels, supported in an acoustic study
- Potential historical stage in the development of uniform velar laterals
- Consonant-Vowel place interaction in major place (contra Ní Chiosáin & Padgett 1993)

Mee basics (iso ekg; a.k.a Ekari, Ekagi)

- Paniai Lakes Papuan language (Doble 1987, a.o.)
- System of tonal contrasts analyzed by Hyman & Kobepa (2013)
- Syllables: (C)V(V) (onsetless – word-initial only)

Consonants:

	Labial	Coronal	Dorsal
Stops	p b	t d	k g
Nasals	m	n	
Glides	w	j	

Vowels and diphthongs:

i i:	u u:
e e: ei eu	o o: ou
a a: ai au	

The velar/uvular affricate: a rare sound

- Voiced closure + lateral/fricative release. New uvular allophone.
- **Mee allophony**: velar [gᴸ] before front vowels, and uvular [gᴷ] before back vowels. The latter allophone never reported before.

(1) gᴸe:gᴸe: 'to dry in the sun'
jugᴸei 'to crush'
jagᴸi: 'to fall'

(2) gᴷa:ti 'ten'
dagᴷu 'room'
egᴷou 'to pull'

- **Vowel reduction**: short /i e/ are over-short and highly lateralized after [gᴸ]

(3) gᴸĭdi: 'to take out'; gᴸĕmo: 'cool'; dagᴸĭ 'head'

Mee velar lateral corresponds to a stop /g/ phonologically

- Patterns as a stop in the consonant system (Doble 1987)
- Corresponds to a 'proper' stop [g/k] in a related language Moni (Tebay 2018)
- Always has a clearly identifiable closure

Some cross-linguistic parallels:

- Pre-stopped velar lateral in Hiw, Oceanic (François 2010)
- In Mid-Waghi it variably lacks the closure phase (Ladefoged et al. 1977)
- In general though, velar laterals are *almost always pre-stopped* in other languages (Blevins 1993; François 2010)
- [gᴷ] is a variant of [g], marginal in Xumi (Chirkova & Chen 2013)

Data and method

Data from two consultants, both men between 25 and 35 years old

- S1: elicitaiton data and a controlled set of /g/ recordings
- S2: only elicitation data

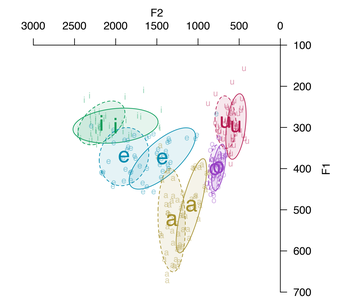
Although we will focus on the results from S1, the elicitations with S2 suggest the same pattern.

Controlled recordings:

- Bisyllabic or longer words, tone is not controlled for
- 158 tokens (52 words) for g_V[-bk] and 154 tokens (45 words) for g_V[+bk]
- All vowel contexts represented, except for i_u
- Randomly interspersed with fillers with 1-to-1 ratio. Carrier phrase.

Formant transitions in V_1gV_2

F1 and F2 transitions (at 9/10 of V_1 duration) into [gᴸ] (dotted) and [gᴷ] (solid). Ellipses show ±1 s. d.



- V_1 transitions had a higher F2 before [gᴸ] than before [gᴷ], compatible with our description ($\beta = 220; SE = 60; p < 0.001$). LME regression with V_1 quality and V_2 frontness as fixed effects; item and repetition number as random effects
- Significant interaction: V_2-frontness with V_1 being /e/ ($\beta = 246; SE = 87; p < 0.01$), and marginal V_2-frontness with V_1 being /o/ ($\beta = -175; SE = 90; p = 0.055$). See the Figure.
- We don't yet have a full explanation for the special behavior of /e/ and /o/

Release quality

- We could separate the release from V_2 in about a third of the tokens: aperiodic signal or attenuated energy in higher frequencies
- Perceptually very distinct release for [gᴸ] vs. [gᴷ]

- Release periodicity annotated
- Release tends to be periodic for [gᴸ] but aperiodic for [gᴷ]
- Confound: V_2 qualities are different for [gᴸ] vs. [gᴷ], hence no direct acoustic comparison is possible

Release periodicity:

	[gᴸ]	[gᴷ]	Total
Aperiodic	6	23	29
Periodic	35	39	74
Total	41	62	103

Discussion

Our acoustic results are compatible with a categorical [gᴸ] ~ [gᴷ] allophony pattern, based on V_2 frontness

- Release quality is different for two /g/ allophones
- V_1 transitions are different, suggesting a distinction in constriction location

C-V coarticulation: potential history for [gᴸ]?

Velar laterals from stops: Tebay (2018): *g > gᴸ for Paniai Lakes

- Hypothetical two-step development, for Paniai Lakes languages:

C-V coarticulation > Categorical allophony > Leveling to [gᴸ]
*g + V (Moni) [gᴸ~gᴷ](Mee) [gᴸ] (Wodani)

Velar laterals from rhotics: François (2010): *r > ᴳL in Hiw (Oceanic)

- François suggests *r > ʀ as a first step in this development
- C-V coarticulation could contribute to reinterpreting *ʀ as [gᴷ] and to the development of an allophonic pattern, akin to that in Mee
- This hypothesis relies on phonetic similarity and phonological affinity between uvular fricatives and rhotics
- Later leveling towards just the velar variant (as above, for Paniai Lakes)

Summary: Mee could represent a stage in the emergence of velar laterals.

- If reinterpretation of C-V transitions is a common source of velar laterals, this might explain why these sounds are almost always pre-stopped
- This hypothesis remains to be further investigated

Implications: CV interactions

CV coarticulation in Mee extends to both the closure and the release, thus targeting major place of the dorsal/uvular affricate.

- This goes against the claim that C-V place interactions only affect secondary place (Ní Chiosáin & Padgett 1993)

Assumptions:

- Complex segmens like /g/ in Mee have two distinct phases
- Uvular laterals do not exist, hence the release changes to fricated, rather than lateral

Summary of the account:

- CV-coarticulation constraints account for a place difference in the release
- Additional pressure: closure and release must have the same place.
- Overall effect: major place of the whole consonant affected