Posterior affricate in Mee and consonant-vowel place interactions

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Velar laterals are a rare class of sounds that involve posterior closure and lateral release (François, 2010; Ladefoged et al., 1977; Blevins, 1994). This paper documents a pattern of velar lateral allophony in the Wissel Lakes Papuan language Mee (a.k.a. Ekari: Doble, 1987; Hyman & Kobepa, 2013, a.o.). The velar lateral sound appears with dorsal closure and lateral release before front vowels but with uvular closure and fricative release before back vowels. We transcribe the Mee velar lateral as [g^{l}] ∼ [ɢ^{ʁ}]. The dorsal stop /k/ exhibits a similar allophony pattern. We compare the Mee pattern to other known cases of interaction between vowel frontness and dorsal/uvular consonant place to draw some implications for the diachronic sources and formal representation of consonant-vowel place feature interactions.

Data. Our data come from fieldwork with two male speakers of Mee. Although we only have detailed acoustic data from S1, the velar lateral allophony patterns are quite salient and appear to be the same in both speakers.

The Mee consonant inventory includes stops /p b t d k g/, nasals /m n/, and glides /w j/. The velar lateral sound corresponds to /g/ in this system (see also Doble, 1987), and therefore we propose to treat this segment as an affricate rather than pre-stopped lateral or a sequence of two sounds (François, 2010). Mee has five vowels /i e a o u/, each contrasting in length, and five diphthongs: /ei ai eu au ou/. Mee only allows CV syllables. The tonal contrasts are analyzed by Hyman & Kobepa (2013).

/g/ is realized phonetically as [g^{l}] before front vowels and corresponding diphthongs /ei eu/ (1a, tones not shown). Before back vowels /a o u/ and corresponding diphthongs /ai au ou/, Mee /g/ is realized as [ɢ^{ʁ}] (1b). In parallel to this pattern, /k/ is uvularized before back vowels, although we did not yet substantiate /k/ allophony with controlled acoustic measurements.

(1) Examples of Mee posterior affricate

a. [g^{l}eːg^{l}eː] ‘to dry in the sun’; [jug^{l}ei] ‘to crush’; [jag^{l}iː] ‘to fall’

b. [ɢ^{ʁ}aːti] ‘ten’; [daɢ^{ʁ}u] ‘room’; [eɢ^{ʁ}ou] ‘to pull’

c. [g^{l}ĭdiː] ‘to take out’ [g^{l}ĕmoː] ‘cool’; [ag^{l}ĕ] ‘floor, ground’; [dag^{l}ĭ] ‘head’

Short /i e/ are shortened and highly lateralized after [g^{l}] (written with a breve sign in (1c)). This reduction process is more pronounced in connected speech and in non-first syllables. The contrast between /gi/ and /ge/ in non-first syllables, as in the last two words in (1c) appears hardly perceptible, although our consultants do seem to distinguish such words.

In order to document the Mee posterior affricate allophony, we recorded a set of words with /g/ in each vocalic environment from speaker S1. Whenever possible, three distinct Mee words were identified for each context where /g/ occurs, and each word was repeated three times in a carrier phrase [itoko __ natidodou] ‘say __ now’. For contexts where we couldn’t find enough distinct words (e.g. between [u] and [o]), we recorded more repetitions of the available words. Stimuli were presented in a random order in Mee orthography, and were randomly interspersed with an equal number of fillers. Recordings were made in a sound-attenuated room using Neumann TLM103 cardioid microphone and M-Audio Mobile Pre preamplifier.

Results. To confirm our description of posterior affricate allophony, we performed a detailed examination of the affricate release before front and back vowels, as well as an analysis of vocalic transitions in the vowel before /g/ (V1). Affricate release could be separated from the following vowel in only about a third of our recordings. An examination of those tokens revealed that /g/ release before front vowels was usually realized as a lateral, showing continuous formant structure with the following vowel, and reduced energy in higher frequencies. On the other hand, /g/ release before back vowels appeared with a stronger burst and usually short frication. Due to the very high variability of release spectra, no statistical analysis of spectral properties was performed.

Transitional values of vowel formants were measured in Praat at the 9/10 of V1 duration (Boersma & Weenink, 2017). The resulting vowel space is presented in Figure 1.

We analyzed F2 transitions into /g/ with a linear mixed effects model taking V1 quality and V2 frontness as fixed effects and item as a random effect. The significant V2 frontness effect $(\beta = 210; SE = 67; p < 0.01)$ suggests that before back vowels /g/ is realized with a closure that is further back, hence triggering lower F2 on the preceding vowel. An expected significant effect of V1 quality was also found for all vowels. The interaction between V1 being [e] and V2 frontness was also significant.

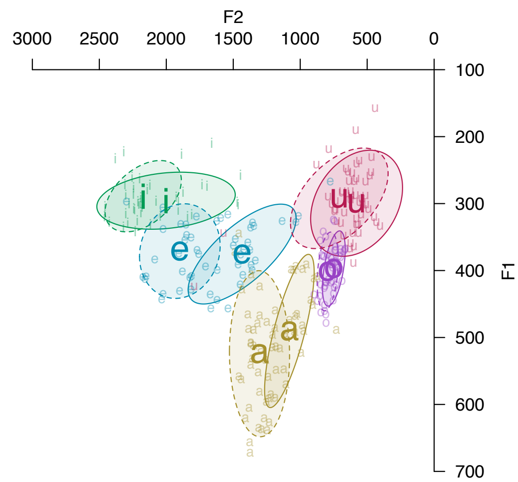

Figure 1: Formant transitions from V1 into [gˡ] (dotted line) and [ɢʶ] (solid line).

These results confirm our description of /g/ allophony. While the release differences are clearly audible, the formant transition data suggest that the two /g/ allophones differ not only in release quality, but also in constriction location.

Discussion. So far as we know, the uvular allophone of the velar lateral is reported here for the first time (cf. Chirkova & Chen, 2013, on a similar sound in Xumi). The alternation between lateral and fricative release based on vowel frontness is another interesting new finding. The pattern of /g/ allophony extends to all dorsals, and this has interesting implications for the typology and history of C-V interactions.

In Mee, the interaction between dorsal/uvular consonants and vowel frontness is strictly local, but similar non-local interactions are found in Altaic languages (see e.g. Svantesson et al. (2005) on Mongolian, Becker (2016) on Uyghur). The existence of very similar local and non-local C-V interactions in genetically diverse languages contributes to substantiating Bessel's (1998) hypothesis that non-local C-V interactions emerge from local coarticulation patterns.

The Mee data also provide new additional evidence for the typological commonality of C-V interactions of posterior consonants (dorsal, uvular, pharyngeal) with vowel height and frontness (Bessell, 1998; Rose & Walker, 2011). The propensity of posterior consonants to interact with vowels presents a challenge to the idea that only V-place features are involved in C-V interactions (Ní Chiosáin & Padgett, 1993). This propensity may be explained by the high compatibility of vowels with tongue root retraction gestures (Bessell, 1998), and formalized within a feature theory where all vowels have Dorsal place (Halle, 1995; Halle et al., 2000; Flynn, 2004).