# Reconstructing (labialized-)velar plosives in proto-Pahoturi

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## 1 Introduction

### 1.1 Question under discussion

- The Pahoturi River family (PR) is a Papuan isolate, spoken in the South Fly region of Papua New Guinea (see Figure 1).
- PR has six members with distinct phonological inventories.
- All language varieties have velar stops /k g/ (see Table 1 b,d)
  - Two varieties (Idi and Taeme) have labialized velar stops /kʷ gʷ/ (see Table 1 a,c).
- Question: Are the varieties with labiovelars conservative or innovative?
  - If innovative, are the labiovelars a result of language contact?

Table 1: Cognate sets for labiovelars preceding vowels

| | Idi | Taeme | Ende | Kawam | Em | Agob | Gloss | YF[1] |
|---|---|---|---|---|---|---|---|---|
| a. | kʷɪɽ or | kʷɪɽ or | kuɽ | kut͡ʃ | kuɽ | kuɽ | 'bone' | 13 |
| b. | tikəp | tikəp or | tikop | tikop | tikop | tikop | 'heart' | 23 |
| c. | gʷəg | gʷəg or | gogo | gogo or | gogo | gogo | 'erect' | 324 |
| d. | gəz | gəz | gəz | god͡ʒ | goz | goz | 'kill' | 318 |

### 1.2 Linguistic landscape

- PR languages are spoken in southwest Papua New Guinea south of the Fly River delta.
- Neighboring families include **Yam** (e.g., Nen and Len to the west and southwest), **Trans-New Guinea** (e.g., Bitur to the north and Kiwai to the southeast), **Eastern Trans-Fly** (e.g., Wipi and Bine to the east), and **Pama-Nyungan** (e.g., Kalau Kawau Ya to the south).

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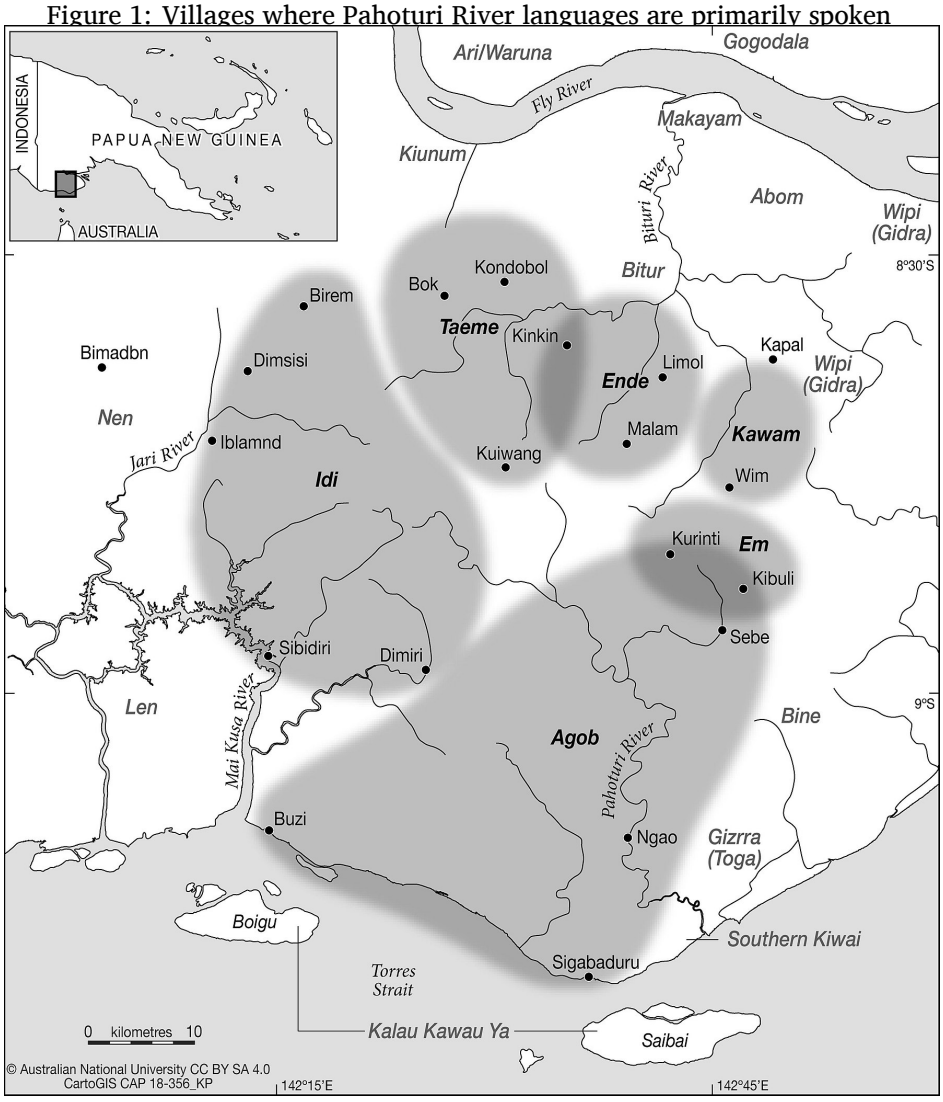
[1] YF refers to the lexical item number in the Yamfinder list, a lexical database which includes 338 words that are relevant specifically to the region of Southern New Guinea (Carroll et al., 2016).

Figure 1: Villages where Pahoturi River languages are primarily spoken




- PR is considered a dialect continuum and is divided into two subgroups:
  - Western: Idi and Taeme[2]
  - Eastern: Agob, Em, Ende, and Kawam[3]
- The language varieties vary in their phonological inventories:
  - Western varieties contain velar plosives that vary between labialized velar plosives /k$^{w}$ g$^{w}$/ and coarticulated labiovelar plosives /k͡p g͡b/ (Schokkin et al., 2021).
    - Compare the realizations of *kwak* 'moon' by Idi speaker Titi Masa: [k͡pak] and [k$^{w}$ak]
  - These are in addition to the velar plosives /k g/ that are found in all varieties, such as Ende (Lindsey, 2021).
- Western varieties are in contact with Yam languages, such as Nen,[4] which have both velar plosives /k g/ and coarticulated labiovelar plosives /k͡p g͡b/ (Evans and Miller, 2016).

[2] [ISO 639-3: idi, glottocode: idii1243]
[3] [ISO 639-3: kit, glottocode: agob1244]
[4] [ISO 639-3: nqn, glottocode: nenn1238]

Table 2: Phonemic inventories of southern New Guinea languages

| Plosive types | Yam (e.g., Nen) | Western PR (e.g., Idi) | Eastern PR (e.g., Ende) |
|---|---|---|---|
| velar plosives | k g | k g | k g |
| labio-velar plosives | k͡p g͡b | kʷ gʷ or k͡p g͡b | |

## 2 Velars, labialized velars, and labiovelars

- Velar plosives are frequent in all language varieties in initial, medial, and final positions (see Tables 3 and 4 a,b).
- Labialized velars are infrequent in the Western varieties, and only occur in initial and intervocalic positions (see Table 4 c,d).

Table 3: Ende velar phonemes in various syllable positions (Lindsey, 2021)

| | Plosive | Initial | Intervocalic | Final |
|---|---|---|---|---|
| a. | k | /kab/ 'rope' | /kakab/ 'leftover' | /kak/ 'grandmother' |
| b. | g | /gaguma/ 'yamhouse' | /daga/ 'tree type' | /ag/ 'morning' |

Table 4: Idi velar phonemes in various syllable positions (Schokkin et al., 2021)

| | Plosive | Initial | Intervocalic | Final |
|---|---|---|---|---|
| a. | k | /kak/ 'grandparent' | /məkat/ 'rat' | /kak/ 'grandparent' |
| b. | g | /gæd/ 'child' | /age/ 'banana' | /æg/ 'morning' |
| c. | kʷ | /kʷak/ 'moon' | /mikwɪɽ/ 'angry' | |
| d. | gʷ | /gʷæd͡ʒi/ 'prawn' | /drgʷag/ 'chase' | |

- Sequences of a velar plosive /k g/ followed by a labiovelar glide /w/ are observed in the Eastern varieties, but are not considered phonemic (Lindsey 2021).

## 3 Comparative data

- To aid in the reconstruction of proto-PR (see other efforts by Lindsey 2017 and Evans et al., 2019), Lindsey and Schokkin collected lexical data for each variety using the Yamfinder word list (Carroll et al., 2016).
- The Yamfinder word list is a list of 338 words that are relevant specifically to the region of Southern New Guinea.
- There were 89 items that contained velars /k g/.
- We identified seven correspondence sets and predict to find an eighth (Set #2) if we had access to more cognate sets (see Table 5).
- The sets are distinguished by:
  - the presence of a following rounded or unrounded vowel (cf. Set 1 v. 3, Set 2 v. 4)
  - the presence of unrounded vowels in the west and rounded vowels in the east (see Sets 5 and 6)
  - and the co-ocurrence of unrounded vowels in the west with labialized velars which correspond to rounded vowels in the east with non-labialized velars (see Sets 7 and 8).

Table 5: Eight correspondence sets

| Set | Western PR | Eastern PR | Idi (W) | Em (E) | Gloss |
|---|---|---|---|---|---|
| 1 | $k^{V}_{[+\text{labial}]}$ | $k^{V}_{[+\text{labial}]}$ | mə**ko** | mo**ko** | ‘sweet’ |
| 2 | $g^{V}_{[+\text{labial}]}$ | $g^{V}_{[+\text{labial}]}$ | *non-cognate* | **gu**ɽem | ‘snake’ |
| 3 | $k^{V}_{[\text{-labial}]}$ | $k^{V}_{[\text{-labial}]}$ | bər**ke** | bor**ke** | ‘parrot’ |
| 4 | $g^{V}_{[\text{-labial}]}$ | $g^{V}_{[\text{-labial}]}$ | **gə**b | **gə**ba | ‘shade’ |
| 5 | $k^{V}_{[\text{-labial}]}$ | $k^{V}_{[+\text{labial}]}$ | ti**kə**p | ti**ko**p | ‘heart’ |
| 6 | $g^{V}_{[\text{-labial}]}$ | $g^{V}_{[+\text{labial}]}$ | **gɐ**$\widehat{\text{dʒ}}$ | **go**z | ‘kill’ |
| 7 | $\mathbf{k^{w}}^{V}_{[\text{-labial}]}$ | $k^{V}_{[+\text{labial}]}$ | **k$^{w}$a**k | **ko**k | ‘moon’ |
| 8 | $\mathbf{g^{w}}^{V}_{[\text{-labial}]}$ | $g^{V}_{[+\text{labial}]}$ | **g$^{w}$ə**g | **go**go | ‘build’ |

# 4 Reconstruction analysis

- We suggest a reconstruction of four velar plosives for proto-PR: /*k *k$^{w}$ *g *g$^{w}$/
- Each of the four proto-PR plosives were followed by rounded and unrounded vowels.
- The eight synchronic correspondence sets can be explained by positing different resolutions of four diachronic patterns.
  - Pattern 1: A labialized velar followed by an unrounded vowel (e.g., /ə/) resulted in a sequence of [+labial][-labial].
    - Both varieties: reanalyzed $^{C}_{[+\text{labial}]}\,^{V}_{[\text{-labial}]}$ to $^{C}_{[\text{-labial}]}\,^{V}_{[+\text{labial}]}$ (rule (1)).
    - This rule would result in rounded vowels such as /ɵ/, a rounded schwa, which are not currently observed in any of the languages. We propose that the Western and Eastern varieties used different strategies to resolve this conflict:
      - Western: reanalyze the vowel segment to eliminate the rounding (rule (3))
      - Eastern: merge the vowel with the nearest back rounded vowel (rule (5))
    - This resulted in correspondence sets 5 and 6 (above).
  - Pattern 2: A labialized velar followed by a rounded vowel resulted in a sequence of two [+labial] features.
    - Western: reanalyzed $^{C}_{[+\text{labial}]}\,^{V}_{[+\text{labial}]}$ as $^{C}_{[+\text{labial}]}\,^{V}_{[\mathbf{\text{-labial}}]}$ (rule (2)).
    - Eastern: reanalyzed $^{C}_{[+\text{labial}]}\,^{V}_{[+\text{labial}]}$ as $^{C}_{[\mathbf{\text{-labial}}]}\,^{V}_{[+\text{labial}]}$ (rule (4)).
    - This resulted in correspondence sets 7 and 8 (above).
  - Patterns 3 and 4 are straightforward:
    - A sequence of a non-labialized velar and a rounded vowel is retained as such in all varieties.
    - A sequence of a non-labialized velar and an unrounded vowel is retained as such in all varieties.

    - These patterns resulted in correspondence sets 1-4 (above).

- Labialized velars are only retained in one of the two patterns (pattern 2) where labialized velar plosives are reconstructed. This is consistent with the relative rarity of labialized velars synchronically.
- The four patterns are enumerated in Tables 6 and 7 below, for the voiceless and voiced plosives, respectively.

Table 6: Reconstruction of voiceless (labialized) velars

| Pattern | Proto-PR | Western PR | Eastern PR |
|---|---|---|---|
| 1. | *kʷu | kʷɪ | ku |
| 2. | *kʷə | kə | ko |
| 3. | *ku | ku | ku |
| 4. | *kə | kə | kə |

Table 7: Reconstruction of voiced (labialized) velars

| Pattern | Proto-PR | Western PR | Eastern PR |
|---|---|---|---|
| 1. | *gʷu | gʷɪ | gu |
| 2. | *gʷə | gə | go |
| 3. | *gu | gu | gu |
| 4. | *gə | gə | gə |

### 4.1 Western PR varieties

(1) $\mathrm{k}^{\mathrm{w}} \underset{\text{[-labial]}}{\mathrm{V}} \rightarrow \mathrm{k} \underset{\text{[+labial]}}{\mathrm{V}}$

(2) $\underset{\text{[+labial]}}{\mathrm{V}} \rightarrow \text{[-labial]} \ / \ \text{[+labial]\_}$

(3) $\begin{bmatrix} \mathrm{V} \\ +\text{labial} \\ +\text{central} \end{bmatrix} \rightarrow \text{[-labial]}$

### 4.2 Eastern PR varieties

(1) $\mathrm{k}^{\mathrm{w}} \underset{\text{[-labial]}}{\mathrm{V}} \rightarrow \mathrm{k} \underset{\text{[+labial]}}{\mathrm{V}}$

(4) $\underset{\text{[+labial]}}{\mathrm{V}} \rightarrow \text{[-labial]} \ / \ \text{\_[+labial]}$

(5) $\begin{bmatrix} \mathrm{V} \\ +\text{labial} \\ +\text{central} \end{bmatrix} \rightarrow \text{[+back]}$

## 5 Further directions

- Rule (1) implies an intermediate stage where proto-PR has /ɵ/ which is then lost in every language. Independent evidence for this hypothesis may be found through further reconstruction of the proto-PR vowel system.
    - The precise quality of this intermediate-stage vowel is not known, and reconstruction of the vowel system may suggest better candidates than /ɵ/.

  - An OT analysis might obviate this problem. Assuming highly ranked rule like *ɵ, changes in the underlying form might not commit us to this intermediate-stage.

- While we predict Western and Eastern PR varieties to have correspondences between $g^{V}_{[+\text{labial}]}$ and $g^{V}_{[+\text{labial}]}$, our current data do not contain cognates in this environment (see Table 5, set 2). Further work may find cognates showing the predicted correspondence.
- The relative chronology of these changes should be investigated further. While we motivate an East-West distinction, independent evidence from other consonants can further refine this division and suggest subdivisions within them.
- Alternative analyses include:
  - $k^w$ and $g^w$ are innovative in the Western PR varieties potentially via contact with the Yam languages to the west.
    * More comparative work is needed to understand the relationships between the two language families.
    * (Follow active work by Eri Kashima, Dineke Schokkin, and Nick Evans who are filling this gap.)
  - Evidence from Idi (as spoken in Sibidiri; Volker Gast, p.c.) indicates that the labial glide /w/ and the rounded vowels /o/ and /u/ may be in complementary distribution.
    * A phoneme W is realized as /w/ when parsed in the onset of the syllable and as a /u/ or /o/ when parsed in the nucleus of the syllable (Gast, p.c.).
    * Could this be an innovative reanalysis of the distribution of the [+labial] feature in the syllable, or a clue to the phonology of proto-PR?
    * (Follow active work by Volker Gast and Adam Tallman who are investigating these issues.)

# References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