

GLOTTALIZATION, F₀, AND TONAL VARIATION IN MEDŪMBA

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ACAL 51/52

GLOTTALIZATION

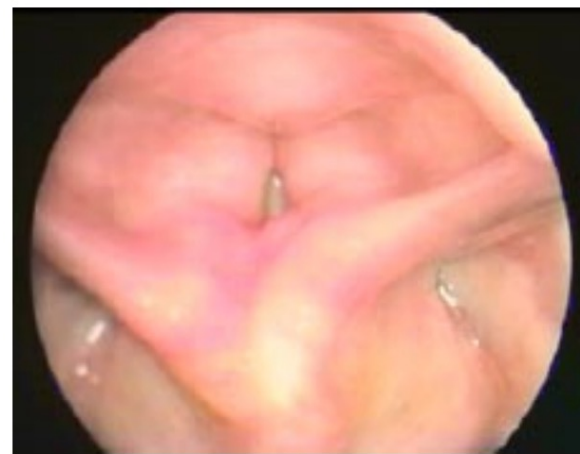
- Complete or partial closure of the larynx during articulation of a sound



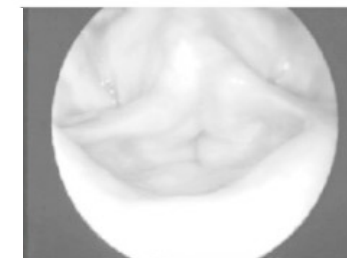
Aspiration



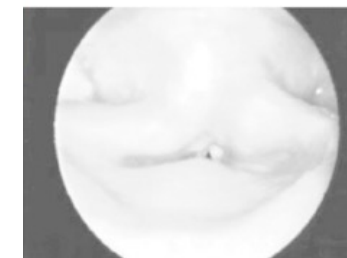
Pre-phonation



Glottal stop



glottal stop [ʔ]



creaky voice

(Harris 1999; Esling et al. 2019)

GLOTTALIZATION

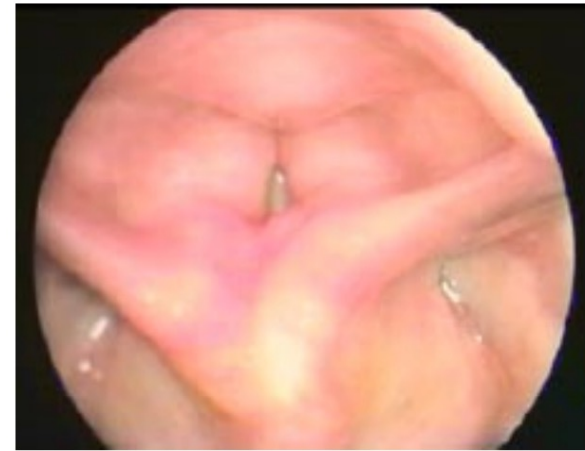
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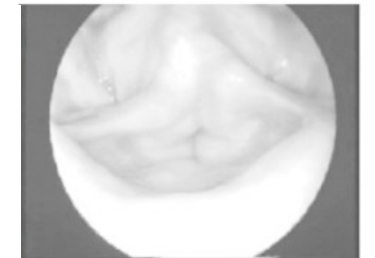
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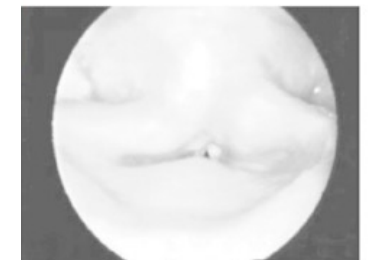
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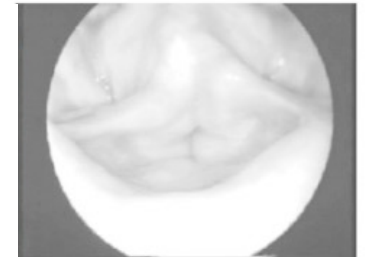
Aspiration



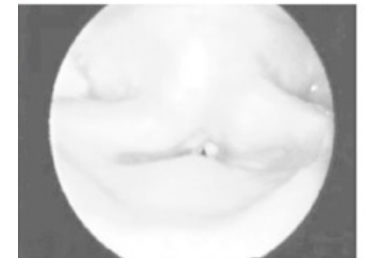
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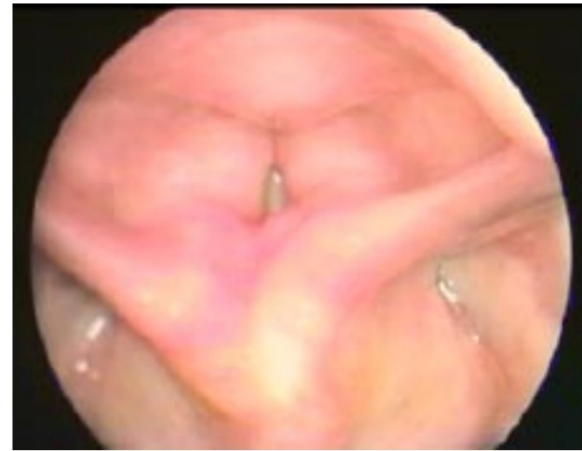
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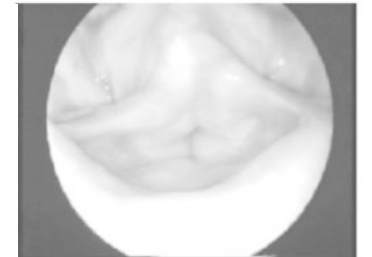
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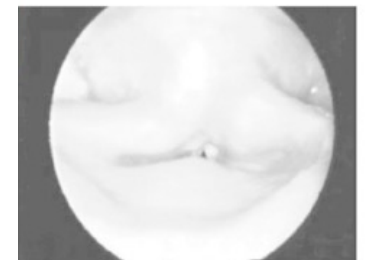
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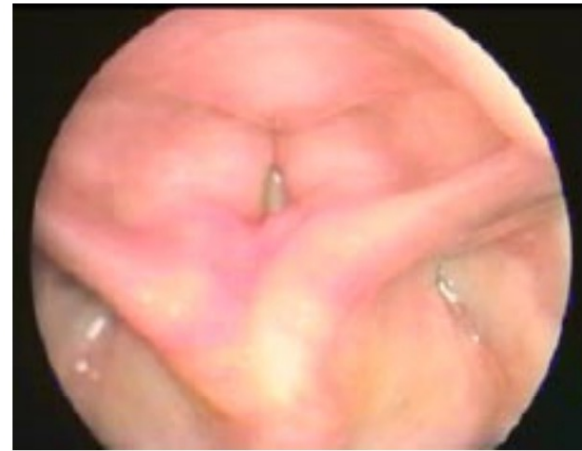
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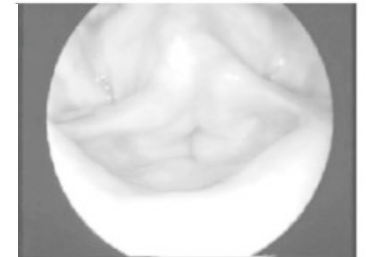
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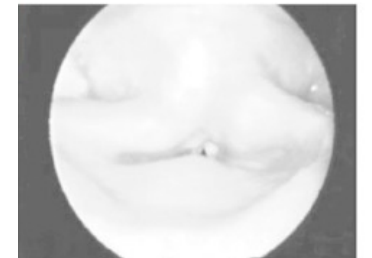
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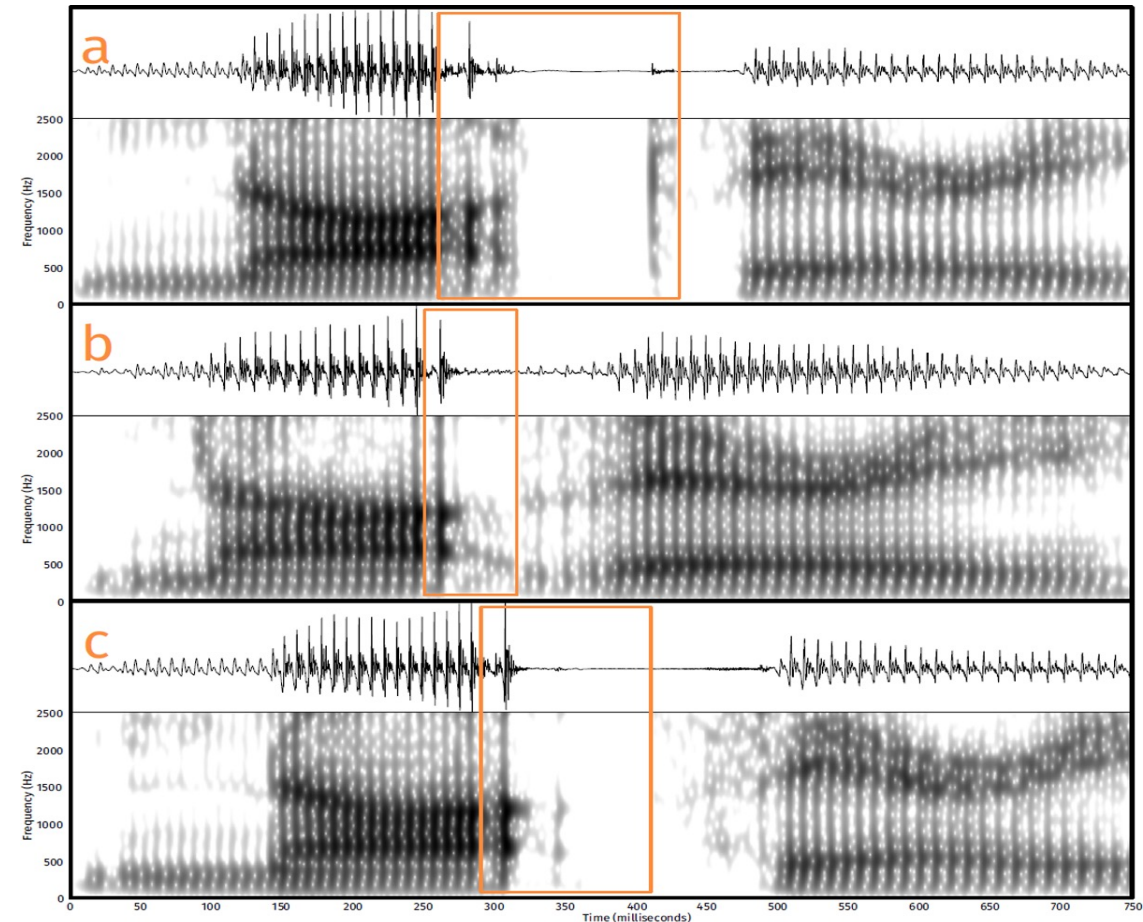
(Harris 1999; Esling et al. 2019)

ENGLISH ‘NOT VERY’

a) Irregular glottal pulses + complete [t] closure

b) Irregular glottal striations, no full [t] closure

c) Sustained glottal closure (‘true’ glottal stop)



GLOTTALIZATION & F0

- Shortening and thickening of the vocal folds due to supraglottal constriction at the aryepiglottic folds hypothesized to lead to **F0 lowering** on vowels in the environment of glottalization (Lindqvist 1972).
- In reality, the pattern is much more complex...

GLOTTALIZATION & F0

- Variation in whether glottalization leads to **raising or lowering of f0** can depend on:
 - Type of glottalization (e.g. full closure vs. pulsing)
 - Extent of glottalization/type of segment glottalized
 - Timing of glottalization with respect to an accompanying oral gesture

(DiCanio 2011)

GLOTTAL STOP CODAS & F0

- Several languages show evidence for **F0 lowering** preceding a coda glottal stop
 - Burmese (Lee 2008)
 - Lhasa Tibetan (Hu & Xiong 2010)
 - Navajo (Kingston 2005)
- Other languages show evidence for **F0 raising** preceding a glottal stop
 - Arabic (Hombert et al. 1979)
 - Chinese (Matisoff 1973)
 - Vietnamese (Haudricourt 1954)
- For still other languages, picture is mixed
 - Different varieties of Mixtec show **either F0 raising or lowering** (Dürr)
 - Itunyoso Trique shows **no effect** of ‘abrupt’ glottalization in glottal stops on F0 (DiCanio 2011)

GLOTTAL CODAS IN GRASSFIELDS BANTU

- Glottal stop codas attested in a large proportion—around 2/3—of the Grassfields Bantu languages of Cameroon; more prevalent here than in many other parts of the Niger-Congo family (Hyman et al. 2019)
- Little acoustic phonetic work has been conducted to explore possible coarticulatory effects of coda glottals and tone/f₀ in this language group

MEDŪMBA

- Grassfields Bantu language spoken in Cameroon
- Spoken by around 200,000 speakers (Ethnologue, 2020)
- A primary language of communication, governance, and commerce in the greater Bangangté area in Ndé Division, West Region



CODA GLOTTALS IN MEDŪMBA

- According to Proto-Grassfields reconstructions by Hyman (1979), coda glottals in MedŪmba appear to have evolved from final /k/

Proto-Grassfields	MedŪmba	English Trans.
*nàk	nàʔ	cow
*lák	láʔ	village
*bùk	bùʔ	slave
*dúk	dʒúʔ	spoon
*tÚk	tswəʔ	night
*dík	dèʔ	place

CODA GLOTTALS IN MEDŪMBA

- In a dictionary tally:
 - 70% of monosyllabic words with word-final glottal stops were **low tone**, vs. only **30% high tone** (N=81)
 - 63% of polysyllabic words with word-final glottal stops had **low tone** final syllables vs. only **37% high tone** (N=126)

Source: *Swanda Mədũmbà* (Tchana 2002)

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Do we see evidence synchronically of a lowering effect of glottal codas on F0 in Medŭmba?

Source: *Swanda M̀d̀ŭmb̀* (Tchana 2002)

CODA GLOTTALS IN MEDŪMBA

- Some evidence that tone change may have occurred as a result of glottalization on some words

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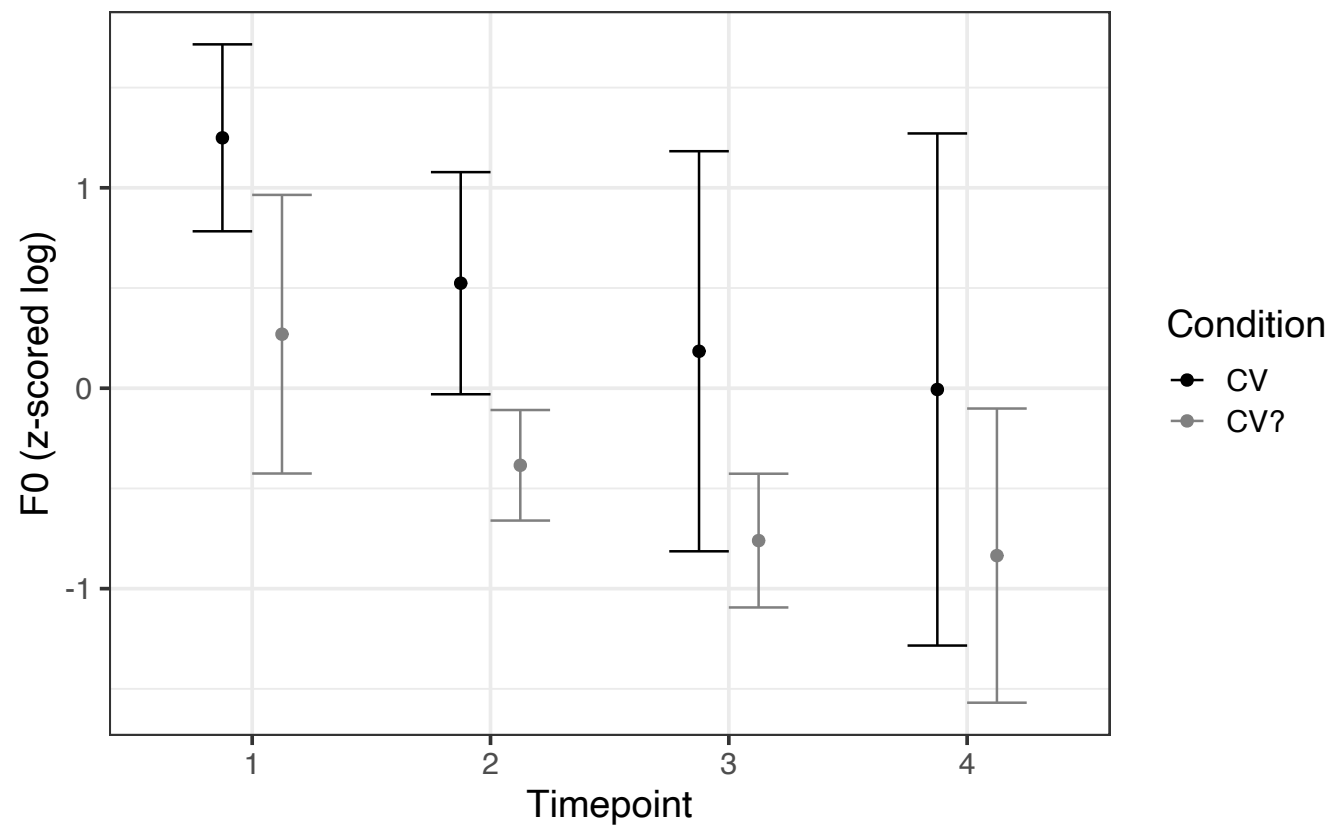
METHOD

- Measured f0 across four high tone minimal pairs with and without coda glottals

CV	CV?
ʒu 'thing'	ʒuʔ 'understand'
bə 'be'	bəʔ 'yam'
to 'intestine'	toʔ 'box'
la 'pineapple'	laʔ 'village'

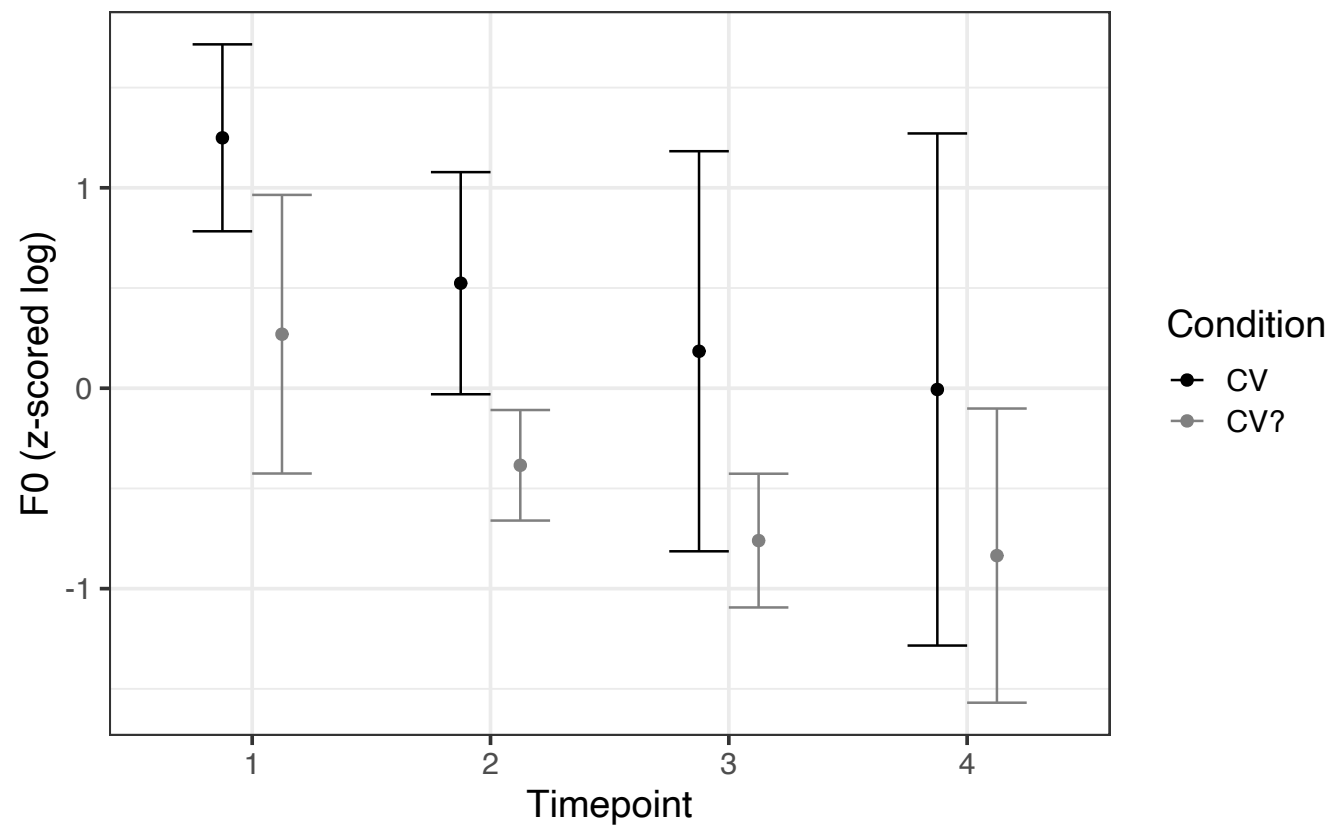
- Spoken by 4 native speakers (3 female, 1 male) in phrase-final position. Each participant repeated each word 8 times. Stimuli were presented in random order.
- F0 measurements were taken from the vowel onset until the end of periodic vocal fold vibration (prior to the onset of word-final creaky voice for tokens containing it).
- Mean f0 extracted from four equal timepoints in the vowel and log-transformed.

OVERALL RESULTS

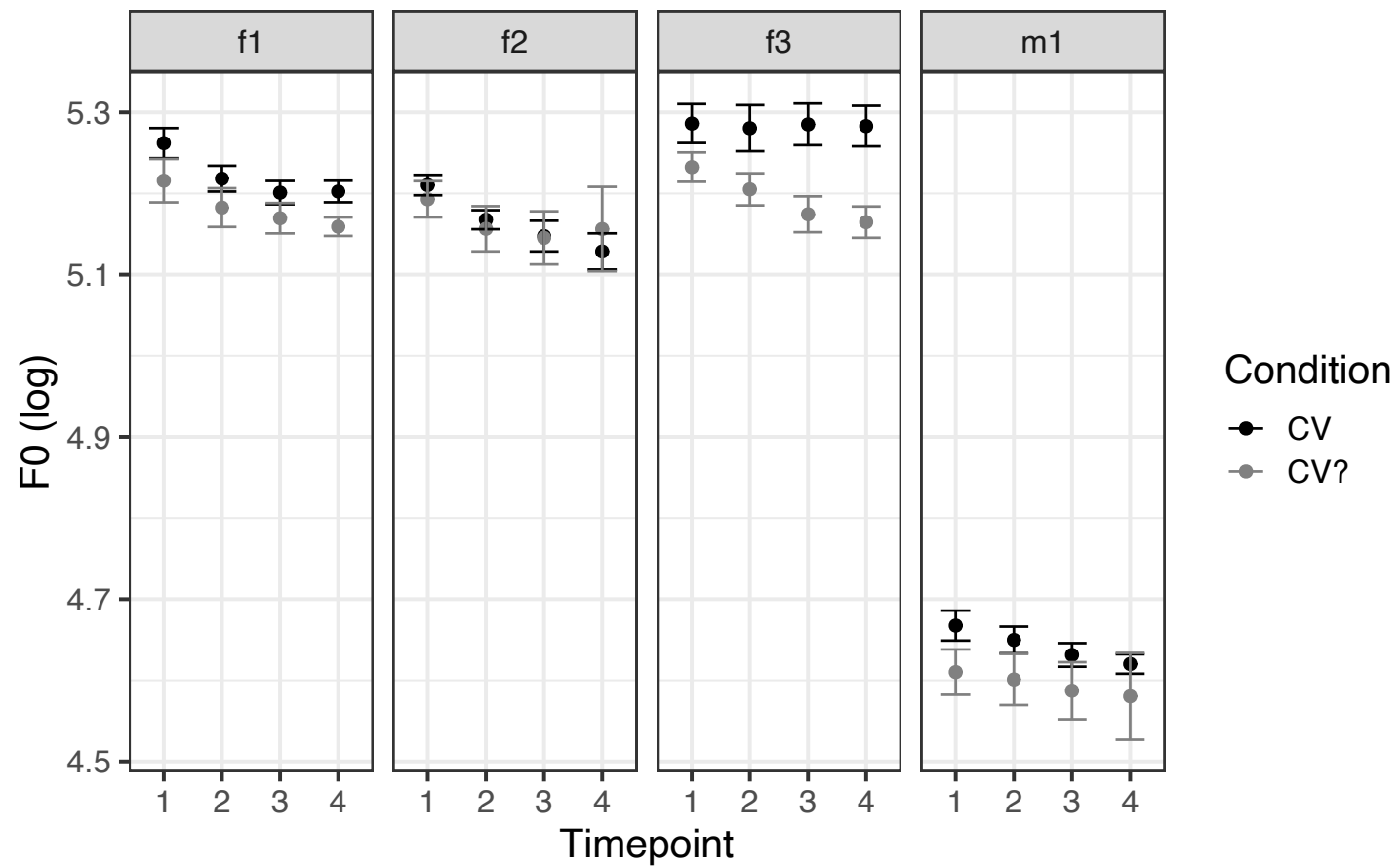


OVERALL RESULTS

CV > CV? ***

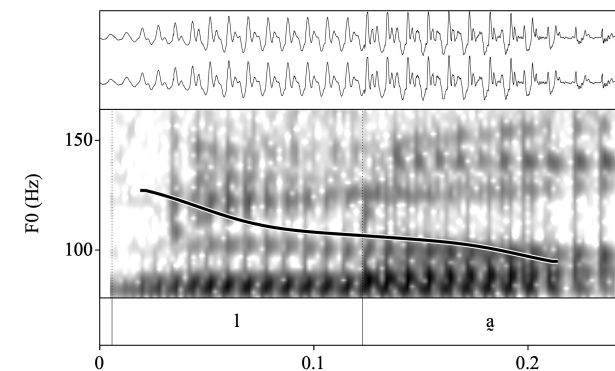
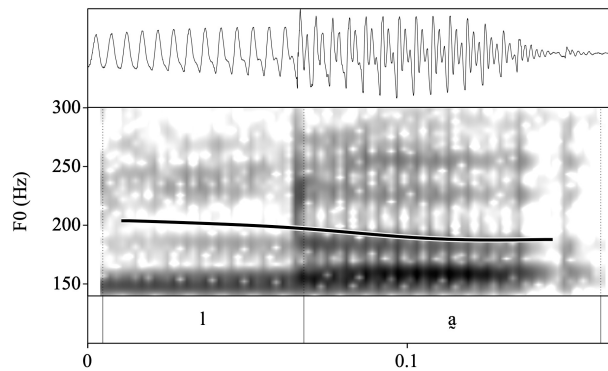
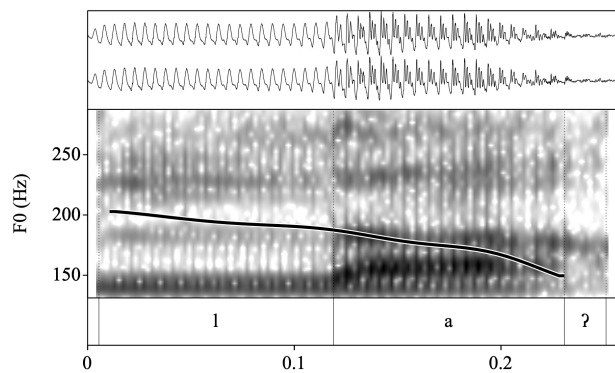


BY-SUBJECT RESULTS

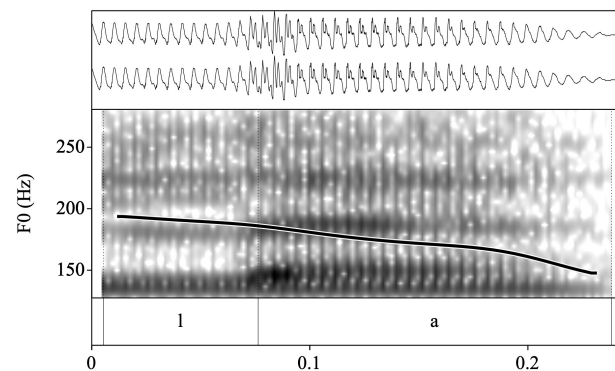


BETWEEN-SPEAKER VARIATION

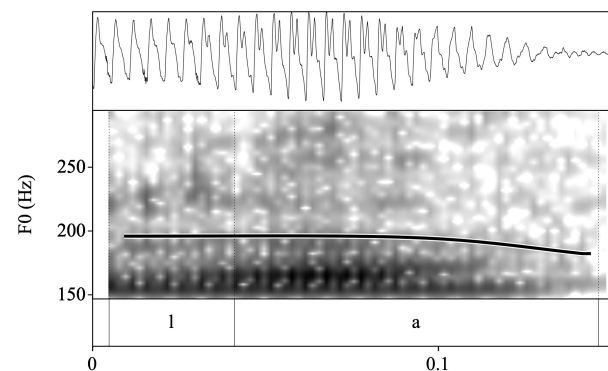
CV?



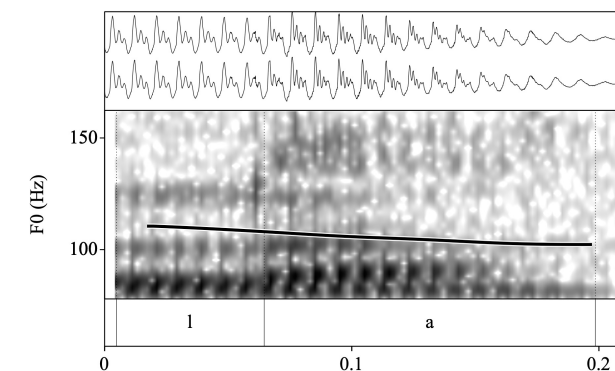
CV



f2

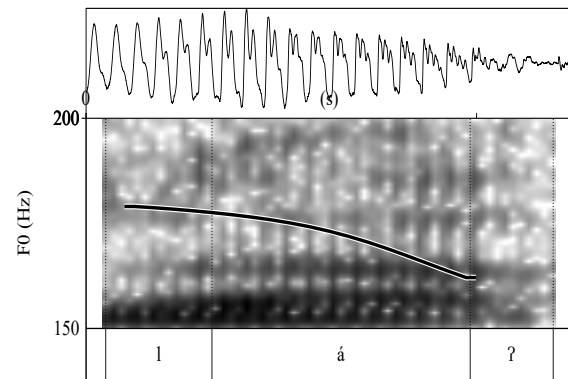


f3

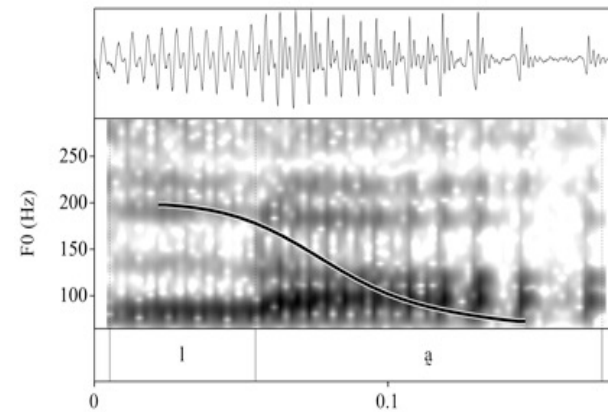


m1

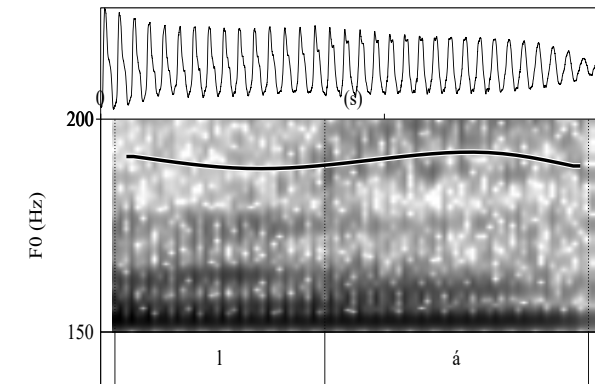
WITHIN-SPEAKER VARIATION: SUBJECT F1



lá? 'village' – glottal constriction



lá? 'village' – glottal pulsing



lá 'pineapple' – no glottalization

SYNCHRONIC EVIDENCE FOR GLOTTAL-INDUCED TONAL VARIATION?

- Possible source of evidence: tense markers

CODA GLOTTALS IN TENSE/NEG

- A number of tense auxiliaries and some types of negation markers have glottal stops in Medumba. In dialects in and around Bangangté, people tend to intuit that they bear contour tones.

(1) Mə nâʔ ↓jən ↓mén
1sg DPST see child
'I saw the child a while ago.'

(2) Mə kâʔ ↓jən ↓mén
1sg NEG see child
'I didn't (just) see the child.'

CODA GLOTTALS IN TENSE/NEG

- In some other dialects (e.g. Bazou dialect), some of the markers are intuited to carry **high tones**, not falling contours

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c.f. Keupdjio 2020

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Bazou

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Bangangté

(1) Mè nâ? ↓jən ↓mén

1sg NEG see child

‘I didn’t (just) see the child.’

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CODA GLOTTALS IN TENSE/NEG

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Glottal-induced lowering as an innovation?

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1sg DPST see child

‘I saw the child a while ago.’

Bangangté

(1) Mè nâ? ↓jən ↓mén

1sg NEG see child

‘I didn’t (just) see the child.’

c.f. Keupdjio 2020

CODA GLOTTALS IN TENSE/NEG

- Even in Bangangté dialects, there are environments—such as with subject focus—where the distant past marker shows up with a high tone.

(3) Mǎ ná? njón ↓mén

1sg DPST see child

‘I (FOC) saw the child a while ago.’

CODA GLOTTALS IN TENSE/NEG

- Possibly similar patterning of future tense (F4) marker in Ngomba, another Bamileke language from the Eastern Grassfields group (Satre 2002)

(4) M̂ wɔnɛ **ńtáʔ** ↓ɛsaʔ ɲɔŋ wɔnɛ
‘This child shall (one day) rule this country.’

(5) M̂ wɔnɛ **ńtâ** ɛsaʔ ɲɔŋ wɔnɛ
‘This child shall (one day) rule this country.’

CONCLUSIONS

- Despite considerable variation in the production of coda glottal stops in Medumba, we find acoustic evidence that coda glottals have a **lowering effect on F0**
- This may help to explain:
 - Disproportionately high number of glottal-final words with (final) low tones
 - Possible tone change on some words from H to L from Proto-Grassfields
 - Synchronic variation in the tonal behavior of some glottal-final words—glottal-induced contour-genesis?

THINGS TO CONSIDER

- Variation between speakers:
 - Not everyone showed lowering to the same extent; even within speakers, pitch could be quite variable.
- Some limitations:
 - Relatively small dataset
 - Words only examined in phrase-final context; full range of acoustic patterns for coda glottals will benefit from data drawn from across phrase positions
- Other factors worth looking at:
 - Tonal environment—cases of synchronic variation all seem to involve syllables which precede a downstep; tonal coarticulation may compound glottal-related lowering effects

Thank you!
Má làbtà zíná!

Thank you to the Medumba speakers who participated in this research.

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