

The vowel system of Nasa Yuwe

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INTRODUCTION

Nasa Yuwe (Paez) Colombia

32 phonological vowels (Rojas 1998)

4 vowel qualities [i e a u]

Short/long oral/breathy/glottal/
Short/long nasal/breathy-nasal/
glottal-nasal

Oral vowels

i e a u
i̠ e̠ a̠ u̠
i̠ʔ e̠ʔ a̠ʔ u̠ʔ
i: e: a: u:

Nasal vowels

ĩ ê ã ũ
ĩ̠ ê̠ ã̠ ũ̠
ĩ̠ʔ ê̠ʔ ã̠ʔ ũ̠ʔ
ĩ: ê: ã: ũ:

Special focus is given to the acoustic and articulatory features of breathy and glottal vowels.

How are breathy vowels V^h, V̠^h realized in Nasa Yuwe?

Are there glottal vowels V^ʔ, V̠^ʔ in Nasa Yuwe? What is the difference with laryngalized vowels?

REFERENCES

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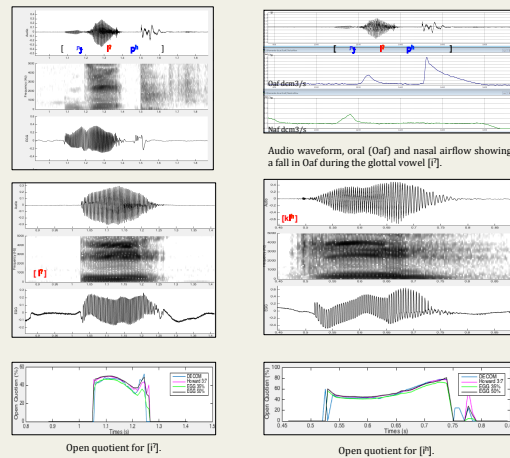
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Material and method

Material: Synchronized acoustic, EGG (Glottal ent.) and fiberoptic measurements (25 frames per sec); acoustic, aerodynamic (oral and nasal airflows), EGG with EVA2 system.

Method: 200 words containing each type of vowel, 5 subjects (3 men and 2 women) for acoustic and aerodynamic data. 1 (male) subject, for fiberoptic measurements, producing words and [i] vowels in isolation.

Results



Acoustics F1/F2/F3:

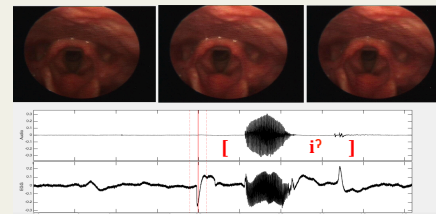
From fiberoptic measurements of [iʔ]

	F1	F2	F3
i̠ʔ	371,6	2542,5	2991,1
i̠	389	2657,8	3129,4
i	389,7	2487,6	2857,2
i:	445,4	2552,1	2988,7
i ^h	451,9	2365	2770
ĩ	515,4	2677,4	3064,1
ĩ:	518,4	2661,2	3168,9
ĩ ^h	528,3	2523,8	3180,6

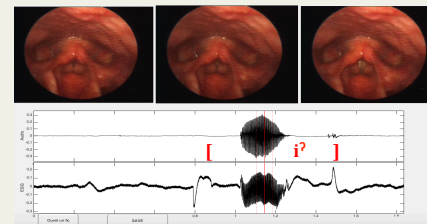
F1 is lower for glottal vowels and higher for breathy vowels. A low F1 is the acoustic feature showing the glottal character of vowels.

F1: [i̠ʔ < i̠ < i < i: < i^h < i̠ < i̠ < i̠ʔ]

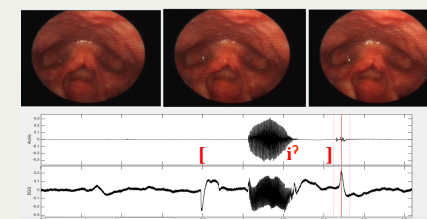
Glottal vowel [i̠ʔ], 1 frame every 40 ms (+ one on each side -dotted lines- of the main frame in red)



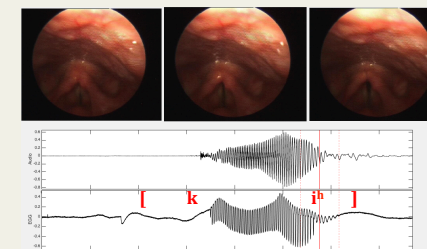
Vocal folds open before the vowel



Contribution of the ventricular folds during the vowel.



Closure of the ventricular folds at the end of the vowel. No closure of the epilaryngeal tube.



Breathy vowel in the word [ki^h]: Vocal folds abducted at the end of vowel.

Discussion

The breathy and glottal characters of vowels appear at the end, (cf. movie and open quotient measurements).

V^ʔ in Nasa Yuwe?

Interruptas of Rojas (1998) = glottals : i.e. not creaky/laryngalized.

[Glottal] indicates ventricular incursion (constriction of the lower margin of the epilaryngeal tube).

This is in accordance with Esling's (2005) Laryngeal Articulator Model (LAM) establishing a feature [\pm constricted epilarynx tube (\pm cet)] representing epilaryngeal constriction.

This feature introduces acoustic connotations (via the concept of a tube), Moisik & Esling (2011).

Laryngalized transitions between vowels might be described by a constriction of the epilaryngeal tube Moisik and Esling (2011).

However Nasa Yuwe laryngalized transitions are rather produced by the noise resulting from the vocal folds and ventricular bands relaxation.

Conclusion

- The breathy character of vowels is realized by a slight opening between the vocal folds, or by an aperture between the arytenoids, in the last part of the vowel.
- The glottal character of the vowels appears during the vowels with a contribution of the ventricular folds with a complete closure at the end. Fiberoptic and EGG data show that there is a glottal closure at the end of the vowels. Spectrographic and EGG observations show irregularities towards the end glottal vowels. This closure precedes a closure of the ventricular folds