Repairing Onsetless Syllables during Late Childhood

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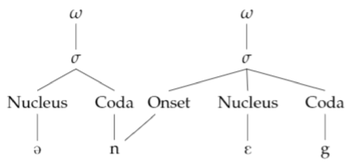
Introduction

- This study examines the production of word-external preconsonantal onsetless syllables during late childhood (e.g., an egg).
- Cross-linguistically syllables with onsets (CV) are preferred over syllables without them (V or VC) (Kahn, 1976; Selkirk 1982, 1984 a.o.).



Previous studies

Acquisition of word-external repairs:

- **Newton and Wells (1999, 2002)** examined V#V junctures in an English-speaking child (2;4 to 3;4), children aged 3 to 7, and adults. Early stage (2;9-2;11) of glottal stop insertion [ʔ] (40%) to a higher degree than older children and adults (15%).
- **Pak (2014)** reported instances of ʔ-epenthesis in 'an + vowel-initial word' sequences after the age of 6.

Phonetic studies in adult production:

- **Cruttenden (1994: 183)** (as cited in Scobbie & Pouplier [2010]), suggests that, in the absence of ambisyllabicity, glottalization might occur around the word-initial vowel.
- **Gick (2006)** also puts forth the idea that strong vowels (i.e. prosodically prominent vowels) prevent resyllabification processes.

Research Questions

RQ1: Does early ʔ-epenthesis (Newton & Wells, 1999; 2002) in the production of onsetless syllables (i.e. /C#V/) persist during late childhood (Pak, 2014)?

RQ2: If so, does the rate of ʔ-epenthesis diminish between 6 to 10 years old?

RQ3: Does ʔ-epenthesis in late childhood children follow adult-like phonological patterns? That is, are strong vowels (vowels with primary stress) more often glottalized than weak vowels (vowels without primary stress)?

Methods

Participants

Children 6-8 years old: (7 F, 7 M) (M= 7.69, SD = 0.68)

Children 9 -10 years old: (5 F, 5 M) (M = 9.68, SD = 0.51)

Adults: 8 young adults (5 F, 3 M) (M = 23.12, SD = 5.17)

Research Materials

8 /C#V/ words were elicited in stressed (e.g., *onion*) and unstressed word-initial syllables (e.g., *iguana*).

Initial primary stress (log freq)	Non-initial primary stress (log freq)
octopus ['ɒktəpəs] (1.28)	umbrella [əm'brɛlə] (1.77)
island ['aɪlənd] (0.95)	aquarium [ə'kwɛriəm] (0.60)
onion ['ʌnjən] (0.90)	iguana [ɪ'gwɑnə] (0.90)
olive ['ɑləv] (0.33)	avocado [ævə'kɑdoʊ] (0.00)

Table 1. Log frequencies from CHILDES corpus (MacWhinney, 2000)

Procedure

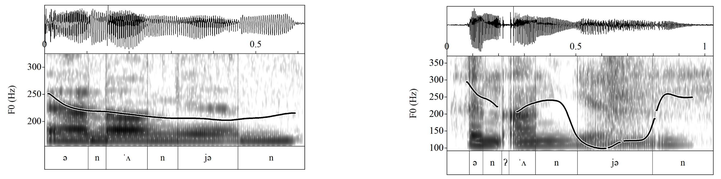
The production task 24 trials (4 items x 2 stress x 3 coda). The three codas elicited in this experiment are /l/ , /s/ and /n/ with the function words *all, this, an.*

EXP: This is a cookie and this is…
CH: *an olive*

768 tokens (20 tokens excluded) N= 748

Coding

- Categorical coding: Modal phonation / Glottal phonation (creaky phonation and glottal stop)

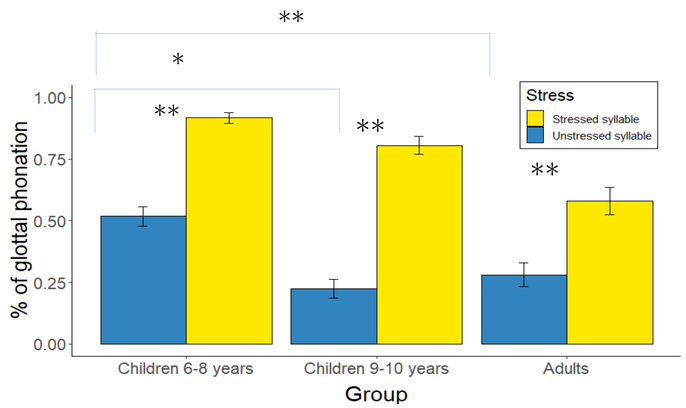


- Continuous measurement: Harmonics-to-Noise-Ratio at frequency below 500Hz (HNR05): proportion to harmonic sound to noise in dB extracted at 25% of vowel using VoiceSauce (Shue, et al. 2011).

Categorical Coding

Mixed Effects Logistic Regression (lme4 [Bates et al., 2018])
phonation ~ group * stress + (1|subject) + (1|item) (Helmert Coding for Group)

Sig. higher rates of glottal phonation in **Stressed syll**. than in **Unstressed syll.** ($p < 0.01$)
Sig. higher rates of glottal phonation in **Children 6-8yo** than **Children 9-10yo** and **Adults** ($p < 0.05$) and in **Children 9-10yo** than **Adults** ($p < 0.01$)



Continuous measurement

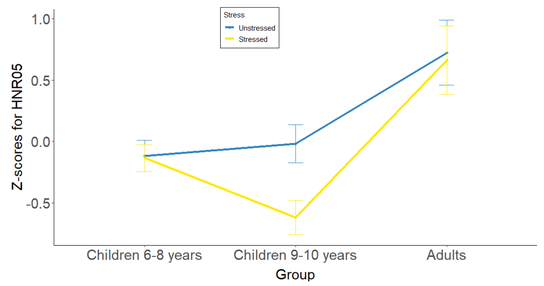
↓ HNR05 ↑ Glottal phonation

HNR05 has been shown to correlate with glottal phonation (Garellek, 2013; Keating et al., 2015).

Linear Mixed Effect Models (Helmert Coding for Group)
phonation ~ group * stress + (1|subject) + (1|item)

HNR05 N = 707
Sig. higher values of glottal phonation (low HNR) in **Children 6-8yo** than **Children 9-10yo** and **Adults** ($p < 0.05$).

Interaction effect: while stressed syllables show lower HNR05 values in **Children 9-10yo**, they do not show lower HNR05 values in **Adults** ($p < 0.01$).



Discussion

RQ1. ʔ-epenthesis persists during **late childhood** and remains a strategy to repair onsetless syllables (/C#V/) in mature **adult grammars**.

- These results align with adult phonetic studies (Gick et al., 2006; Scobbie & Pouplier, 2010).

RQ2. However, the rate of glottal phonation decreases during late childhood and repairs with ambisyllabicity become more available at the age of ~ 9.

- Word-external repair strategies might be acquired later than most word-internal processes (Roberts, 1990). Contrary to Newton and Wells' (1999,2002) findings, we show that word-external processes continue to develop past the age of 3.
- Misalignments in the syllabic structure might be **more costly to acquire** than epenthetic processes. Possible explanation: while amisyllabicity weakens the prosodic word-boundaries, ʔ-epenthesis enhances them, which facilitates **prosodic word perception** (Pompino-Marschall & Żygis, 2010).

RQ3. The categorical coding shows that stress mediates modal phonation **from 6-8yo**. However, the continuous measurement (HNR05) indicates a U-shape acquisition process.

- ʔ-epenthesis is mediated by strong prosodic positions (primary stress), following Davidson and Erker's (2014) proposal for hiatus resolution.
- Ambisyllabicity becomes more promptly an option to repair onsetless syllables in **unstressed syllables** than in stressed syllables. Interestingly, children 9-10 show a larger difference in stress-unstressed syllables, which suggests the **formation of a categorical distinction** in the use of repair strategies.

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