

Variation in English Infant-Directed Speech

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I. Introduction

- Casual adult-directed speech (ADS) has copious phonetic variation [e.g., 4]
- In contrast, infant-directed speech (IDS) has been previously argued to be more canonical (faithful to dictionary pronunciation) [5][6]
- However, recent studies find IDS and ADS to be equally variable [2]
- Typically, IDS variation examined word-finally
- But cross-linguistically in adult grammars, onset positions are more phonologically stable and salient [1]

Does the extent of phonetic variation in IDS differ based on segment position in a word?

II. Methods

- IDS from Providence Corpus (longitudinal) [3]
 - 6 monolingual English-speaking 1- to 3-year-olds interacting with parents (usually mothers) at home during everyday activities
 - Data from two age ranges, 16-18 and 22-24-month-old
- Utterances with coronal stops and fricatives (/t/, /d/, /n/, /s/, /z/) identified using orthography
- Forced-alignment [7]
- Alignment check, phonetic transcription of allophonic variants by 3 phonetically-trained native speakers of English,
- Automated data extraction, problematic tokens (alignment/transcription error) rechecked by 4 phonetically-trained native speakers of English
- Segments coded for

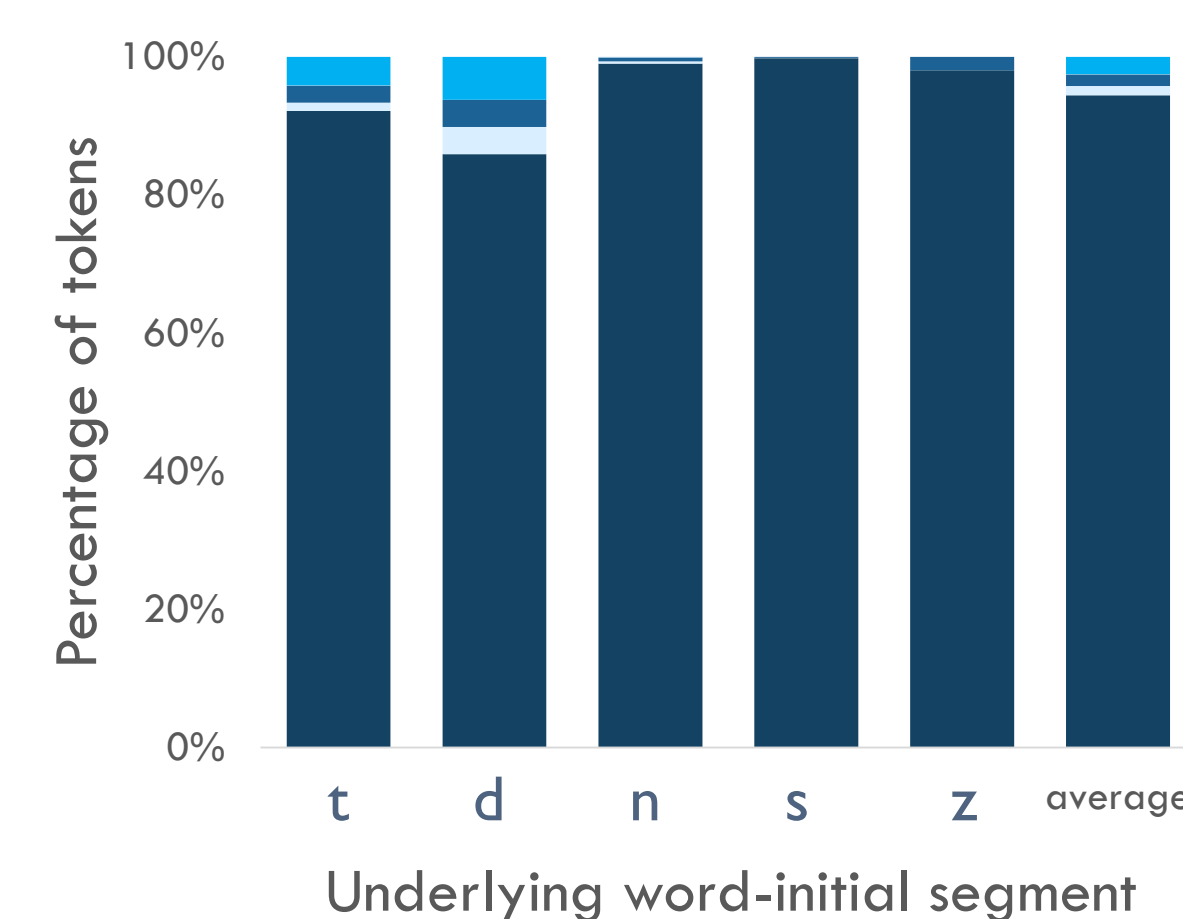
Target sound	Phonetic realization	Position in word	Preceding segment	Following segment	Word	Part of speech
t	ʔ	final	ʌ	n	cat [now]	content
s	s	medial	p	t	upstairs	content

- Final corpus: 28,775 segments
- Currently processed: 25,296 segments

III. Results – Variants by position

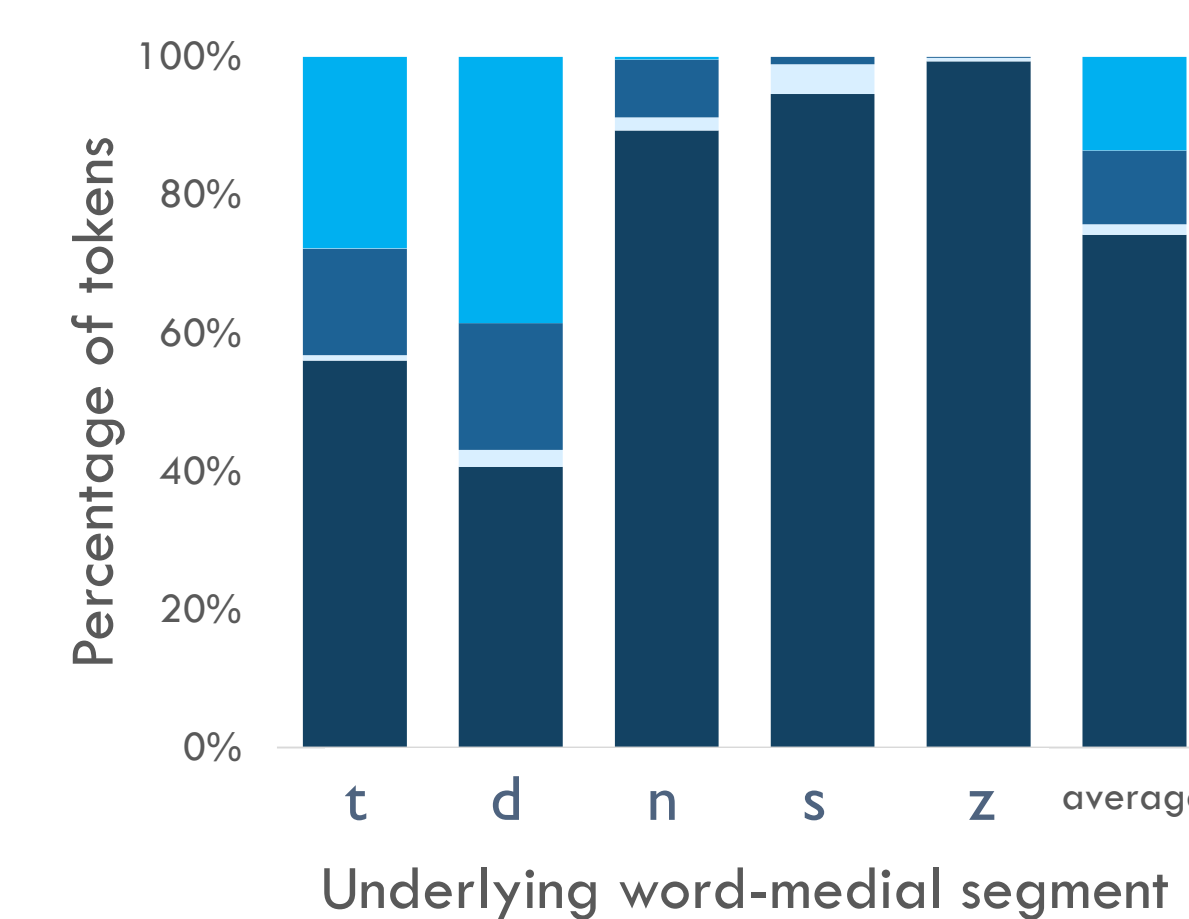
Onset (7,054 tokens)

- Canonical variant [released stop/fricative] was **the most** frequent variant for every segment



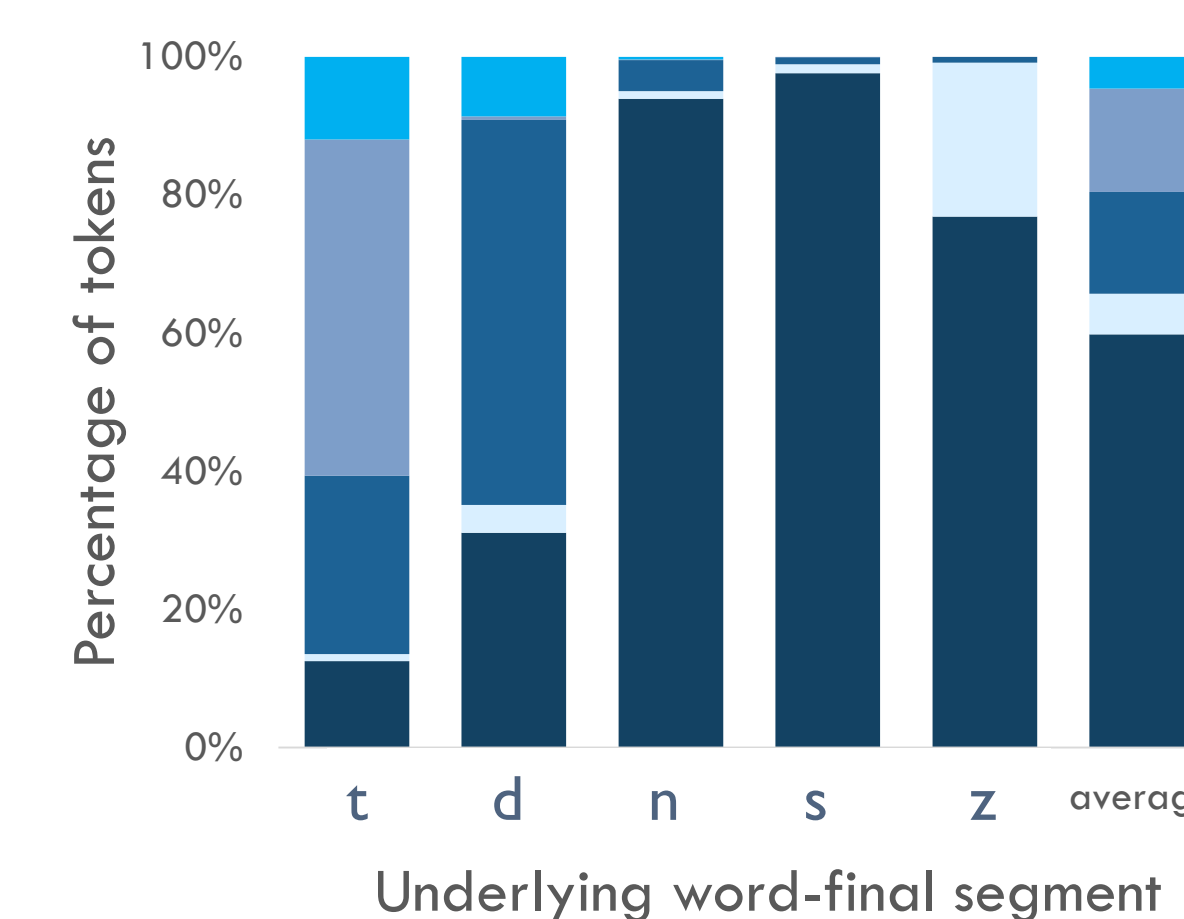
Medial (7,095 tokens)

- Canonical variant was still **the most** frequent variant for every segment, but to a lesser degree



Coda (11,147 tokens)

- Canonical variant is **not the most frequent variant** for either /t/ (13%) or /d/ (31%)
- Large differences by segment



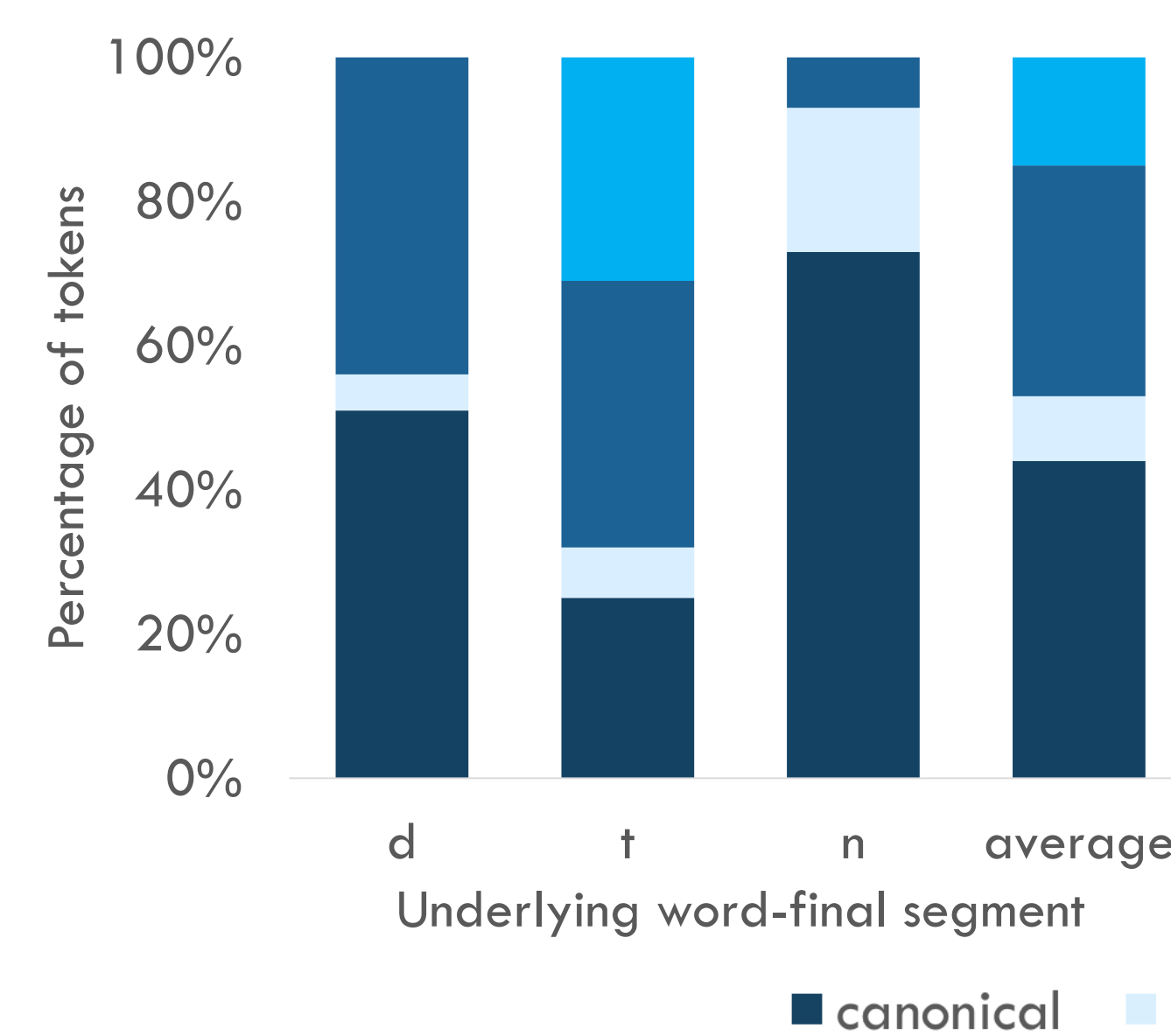
■ canonical ■ assimilated ■ deleted ■ glottalized ■ tapped

IV. Results - Comparison to ADS

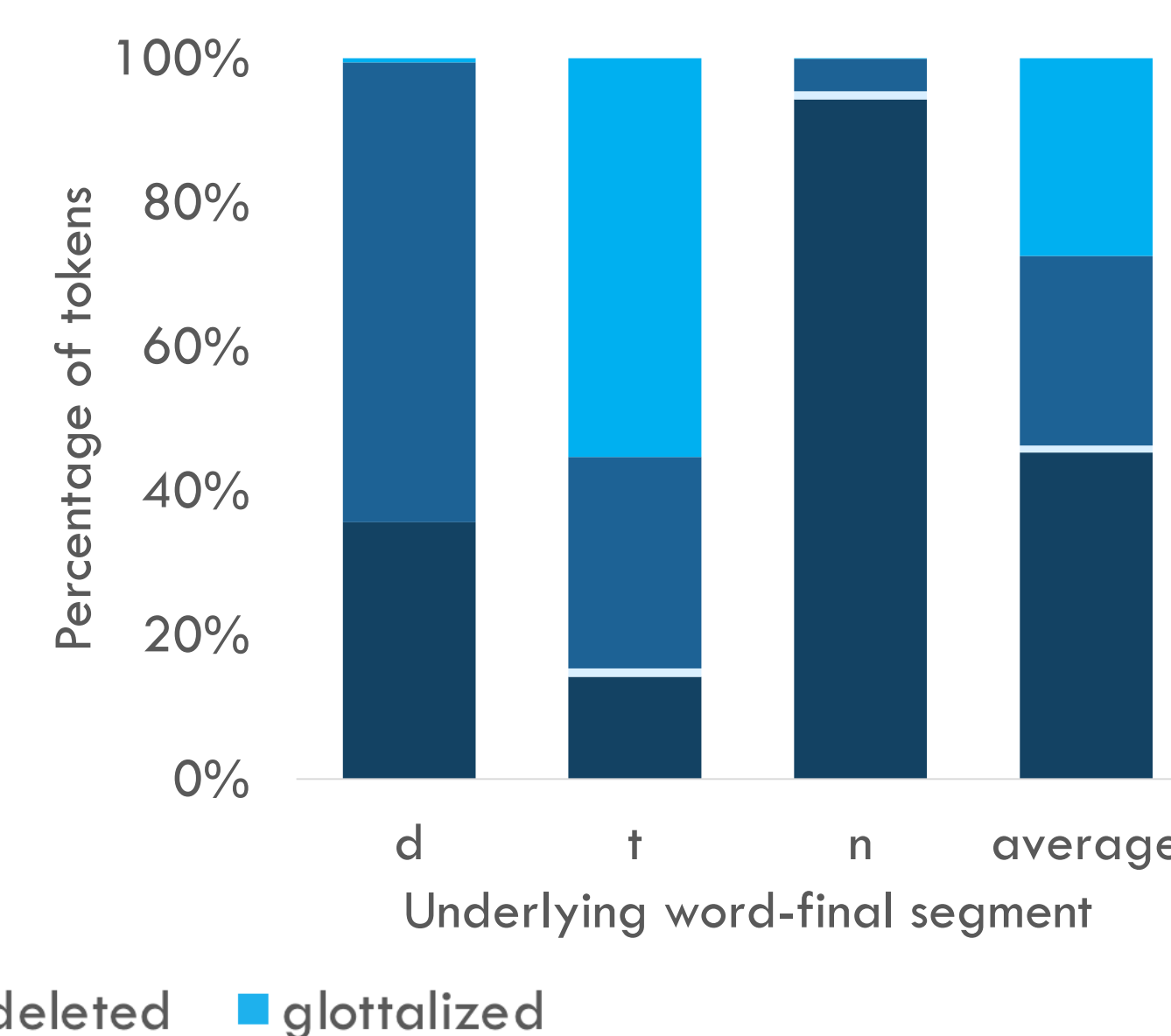
- Comparing a subset of our IDS data in assimilation contexts (word-final /d/, /t/ and /n/, 725 tokens) directly to the ADS study by [4] (4349 tokens)
- Less canonical in current IDS study:

$$\begin{cases} /t/ (\chi^2(2,323, N = 2,324) = 56.77, p < .001) \\ /d/ (\chi^2(1,308, N = 1,309) = 33.33, p < .001) \end{cases}$$
- Similarly variable in current IDS study: /n/ ($\chi^2(1,117, N = 1,118) = 0.03, p = 0.86$)

ADS (Dilley & Pitt, 2007)



IDS (Current study)



■ canonical ■ assimilated ■ deleted ■ glottalized

V. Summary

- We replicate [2]'s results that IDS is **not** more canonical than ADS
- Not all segments are equally variable - /n/ and /s/ are produced mostly canonically, /t/ has many more variants
- Variation is mostly limited to coda positions
 - In onsets, the canonical variant is always the most frequent
 - This is no longer true for codas
- This **positional difference** could be beneficial for category learning:
 - Word-initial segments: acquire canonical forms, support word segmentation
 - Word-final segments: variation, learn allophonic variants in connected speech
- Future work: more on acoustic properties of phonetic variants

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Selected references

[1] Beckman, J. (1998). *Positional Faithfulness*. Ph.D. thesis, University of Massachusetts at Amherst. ♣ [2] Buckler, H., Goy, H., & Johnson, E.K. (in press). What infant-directed speech tells us about the development of compensation for assimilation. *Journal of Phonetics*, 66, 45-62. ♣ [3] Demuth, K., Culbertson, J. & Alter, J. (2006). Word-minimality, epenthesis, and coda licensing in the acquisition of English. *Language & Speech*, 49, 137-174. ♣ [4] Dilley, L. C., & Pitt, M. A. (2007). A study of regressive place assimilation in spontaneous speech and its implications for spoken word recognition. *The Journal of the Acoustical Society of America*, 122(4), 2340-2353. ♣ [5] Fernald, A., Taeschner, T., Dunn, J., Papousek, M., de Boysson-Bardies, B., & Fukui, I. (1989). A cross-language study of prosodic modifications in mothers' and fathers' speech to preverbal infants. *Journal of Child Language*, 16(3), 477-501. ♣ [6] Ratner, N. B. (1984). Phonological rule usage in mother-child speech. *Journal of Phonetics*, 12(3), 245-254. ♣ [7] Rosenfelder, I., Fruehwald, J., Evanini, K., & Yuan, J. (2011). FAVE (forced alignment and vowel extraction) program suite. <http://fave.ling.upenn.edu>