



ONE HUNDRED YEARS OF STABILITY: THE CASE OF THE BAD-LAD SPLIT

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Secondary /æ/-lengthening: historical reports

- 20th-century scholars comment on particular /æ/ (TRAP) words being lengthened
 - Jones (1918)
 - 'short' *lad, pad, cat, lamp*
 - 'long' *bad, sad*
 - variable *glad, bag, man, jam, back, that*
- Wells (1982): "marginally contrastive long /æ:/"
 - 'short' *lad, pad, cad, dad, fad*
 - 'long' *bad, glad, clad, mad, sad, jam, jazz*
- "rare to find contrastive length in environments other than that of a following /d/'", especially adjectives
- Fudge (1977) recorded own (very complex) lexical split
 - Minimal pairs included 'short' verbs *jab, drag, flag, wag* vs. 'long' noun equivalents; *can* (modal) vs. *can* (noun)

What we already know (Kettig 2016)

- Some native speakers intuit 'long' vs. 'short' words
- Phonetic measurements show no minimal pairs consistently differentiated by vowel length alone
- Observed lengthening deviates from expected co-articulatory hierarchy (Peterson & Lehiste 1960)

Improvement of dataset

- When preaspiration is present, vowel measurement should include modal and breathy portions of the vowel, excluding true preaspiration (Hejná 2015)
 - Dataset recoded to separate preaspiration out
- Vowel duration = modal + breathy voicing
- F1 and F2 measurements also extracted for each token
 - Measured at F1 contour maximum within modal section of vowel

Methodology

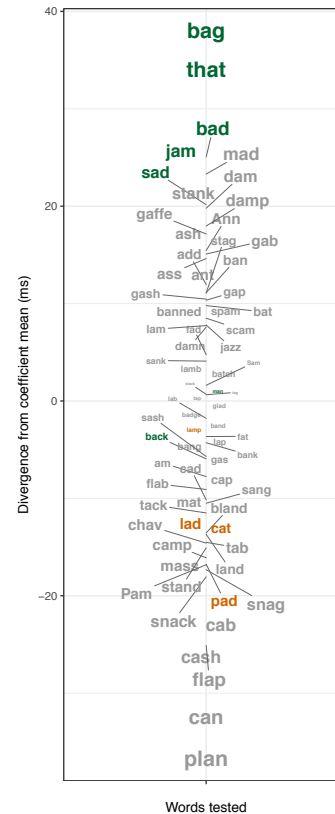
- Speakers: native SSBE-speaking students at the University of Cambridge (n=21)
- Read sentences containing 101 monosyllabic and 53 disyllabic words with stressed /æ/
 - Analysis here: 73 monosyllabic words (token n=1,790)
- Vowel lengths measured in Praat (Boersma & Weenink 2016)

/æ/ length reporter

	Jones	Wells	Fudge
bad	æ:	æ:	æ:
sad	æ:	æ:	æ:
glad	æ/æ:	æ:	æ:
mad		æ:	æ:
add		æ/æ:	æ
lad	æ	æ	æ:
pad	æ	æ	æ
cad		æ	æ:
fad		æ	æ/æ:
bag	æ/æ:		
jam	æ/æ:	æ:	æ:
man	æ/æ:		æ:
jazz		æ:	æ:
lab			æ:
cab			æ
cat	æ		(æ)
bat			(æ)
cap			(æ)
lamp	æ		æ
back	æ/æ:		æ
that	æ/æ:		æ

Previous reports of /æ/ length by word

- Jones (1918)
 - a Long
 - o Short
 - o No mention



Words investigated, plotted by by-word random intercept

Establishing by-word lengthening effects

- Linear mixed effects model run in R (R Core Team 2016)
- Word frequency as measured by SUBTLEX-UK also added as fixed effect (Van Heuven et al. 2014)
- p-values determined by Satterthwaite approximation to degrees of freedom calculated by lmerTest (Kuznetsova et al. 2016)
- By-word coefficients measure 'unexpected lengthening'

Formula: duration ~ voicing + manner + place + freq. + (1 | Word) + (1 | Word:Subject) + (1 | Subject)

Number of obs: 1790
Groups: Word:Subject, 1481; Word, 73; Subject, 21

	Estimate	Conf. Int.	p-value
Fixed Parts			
(Intercept)	232.74	216.43 – 249.05	<.001***
voicing (voiceless)	-57.2	-67.69 – -46.71	<.001***
manner (nasal)	-31.23	-49.98 – -12.48	0.002**
manner (nas + stop)	-46.53	-63.51 – -29.54	<.001***
manner (stop)	-28.98	-43.76 – -14.20	<.001***
place (labial)	-13.55	-24.74 – -2.37	0.02*
place (pal-alveolar)	-9.7	-27.82 – 8.43	0.298
place (velar)	2.23	-10.51 – 14.98	0.732
frequency	6.62	1.39 – 11.84	0.016*

Discussion

- Secondary /æ/-lengthening is stable sub-phonemic, lexically-specific allophony: 'long' words targeted by Jones (1918) still have the highest coefficients
- Resembles first stages of primary /æ/-lengthening diachronic shift, but appears to have been stable for past 100 years
- Based on this statistical model, past linguists seem to have intuited the BAD-LAD split on the basis of comparison to a phonological baseline
- Two possible ways to account for stability:
 - Intergenerational transmission of subphonemic detail
 - Same structural pressures are at work now as they were in English 100 years ago
- Structural pressure hypothesis seems more likely: possible cumulative lengthening effect of emphatic/basic words
- Effect of frequency on duration is reverse of what is usually noted (Bybee 2001; Gahl 2007)
- F1 effect: centralizing consistent with reduction rather than emphatic tensing
 - Not consistent with TRAP-STRUT rotation

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Does secondary /æ/-lengthening correlate with F1/F2?

- TRAP-STRUT rotation (Fabricius 2007) is an ongoing lowering and backing of TRAP and raising of STRUT in SSBE
- This sample only included young adults, so apparent-time data cannot be discerned
- Correlation between F1 and F2 and lengthening coefficients tested
 - Formula: F1 or F2 ~ coef_freq + voicing + manner + place + (1 | Word) + (1 | Word:Subject) + (1 | Subject)
- Result: the more lengthened, the lower the F1 (Est. = -0.27; std err = 0.128; p = 0.039); no F2 effect (p = 0.46)
 - Result not found when Jones' (1918) categorizations are coded as categorical variable
- This means that longer /æ:/ words may also tend to be slightly more centralized
- No general frequency effect observed for either F1 or F2