# The BAD-LAD split: Secondary /æ/-lengthening in Southern Standard British English

**Meeting of the Linguistics Society of America, Washington, DC, 7–10 January 2016**

**Thomas Kettig, University of Cambridge** (tkettig@gmail.com)

UNIVERSITY OF CAMBRIDGE

- **What conditions variation in the duration of /æ/ in Southern Standard British English (SSBE)?**
- Vowel measurements in Praat of 21 native SSBE-speaking students (Cambridge) recorded reading sentences containing 101 monosyllabic and 53 disyllabic words with stressed /æ/
- Here: analysis of monosyllabic words
- Research questions:
  - **Is this a phonemic split?**
  - **Which postvocalic segments encourage lengthening?**
- TRAP-BATH splits dubbed ***primary /æ/-lengthening***, as opposed to this study's focus on ***secondary /æ/-lengthening***

## Secondary /æ/-lengthening: previous reports

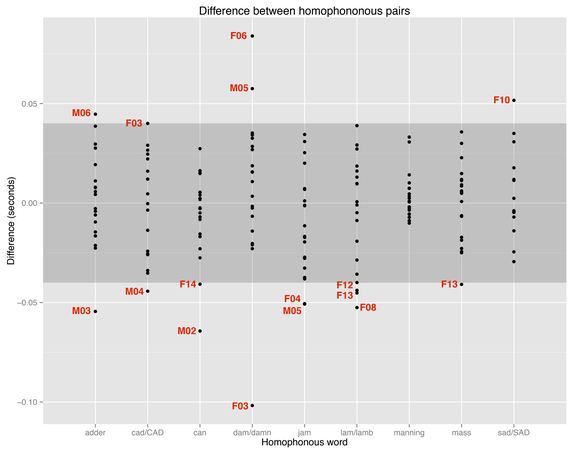
- Jones (1918)
  - 'short' *lad, pad, cat, lamp*
  - 'long' *bad, sad*
  - variable *glad, bag, man, jam, back, that*
- Wells (1982): "marginally contrastive long /æː/"
  - 'short' *lad, pad, cad, dad, fad*
  - 'long' *bad, glad, clad, mad, sad, jam, jazz*
  - "rare to find contrastive length in environments other than that of a following /d/"
- 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)
- Two consultations carried out with native SSBE speakers about their intuitions in preparation for this study:

| short [æ] | uncertain | long [æː] |
|---|---|---|
| pad, lad, fad, tad, Vlad, cad, CAD, add | | bad, glad, sad |
| tag, brag, sag | | bag |
| (door) jamb, dam, RAM, ram, swam | | Tam, jam (traffic, preserves), damn |
| ran, began | | |
| rang, sang | | |
| cant (song) | | |
| cash, cache, bash | | |
| badger | | badge |
| | jazz | |

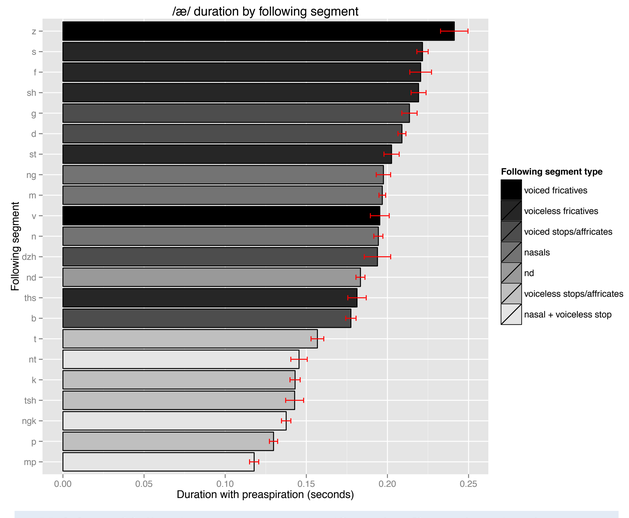
| short [æ] | uncertain | long [æː] |
|---|---|---|
| brag, wag, lag, stag, rag, slag, crag, jag (sharp) | glad | bad, sad, mad |
| jab, grab, crab, lab, cab, stab, fab, slab, blab | | bag, jag (Jaguar) |
| can (modal), can (noun) | | ran, man, tan, plan, man, began |
| RAM | ham | ram, Sam, Tam, pram, cram, exam |
| gang, sang | | |
| pant, pants | | |
| cramp, lamp | | |
| sank, bank, drank | | |
| maths | | |
| mafia | | |

## Minimal Pairs

- Several minimal pairs tested:
  - *adder* (snake) vs. *adder* (someone who adds)
  - *cad* (person) vs. *CAD* (computer-aided design)
  - *can* (noun) vs. *can* (modal verb)
  - *dam* vs. *damn*
  - *jam* (traffic) vs. *jam* (preserve)
  - *lam* (escape) vs. *lamb*
  - *manning* (of a ship) vs. *Manning* (name)
  - *mass* (of an object) vs. *mass* (in a church)
  - *sad* vs. *SAD* (Seasonal Affective Disorder)
- Differences below about 40ms in these vowels should be imperceptible (Lehiste 1970)
- **No minimal pairs show significant duration differences**



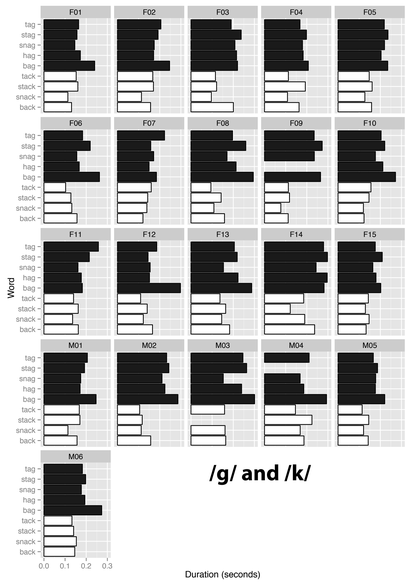

## Durations by following segment



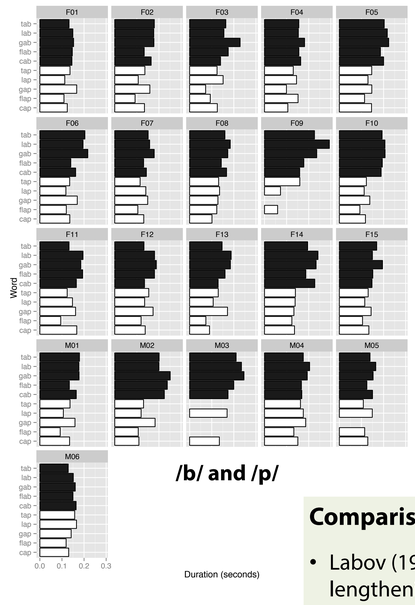

- **Voicing** of following consonant significantly affects duration ($\chi^2$ (1)=55.262, p<0.001)
- **Manner of articulation** of following consonant also affects vowel duration ($\chi^2$ (5)=80.162, p<0.0001); /æ/before fricatives on average 0.064s ± 0.012 longer than before stops (p<0.0001); fricatives also lengthened more than nasal + stop clusters by .084s ± 0.012 (p<0.0001); more than nasals by 0.067s ± 0.014 (p=0.0001) and more than affricates by 0.076s ± 0.018 (p=0.0004)
- **Place of articulation** of following consonant not significant in the overall model ($\chi^2$ (5)=0, p=1)

## Vowel lengths of individual words for each speaker (postvocalic stops)

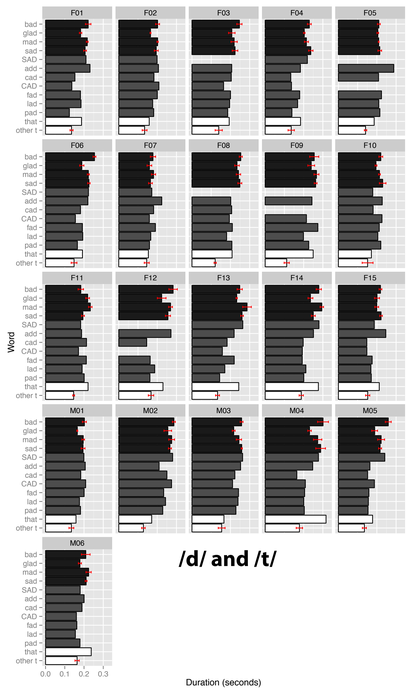
- **/d/ and /t/:** some speakers consistent in pre-/d/ durations (no split); others inconsistent, with large differences between lengths of pre-/d/ words
- **/k/ and /g/:** some lengthen *bag* much more than other /g/ words, others do not
- **/p/ and /b/:** lower voiced:voiceless duration ratio than other stop pairs
- **Large amount of inter-speaker variation** – to be expected, since only one token per word per speaker collected (except for *bad, glad, mad, sad*)




/g/ and /k/




/b/ and /p/




/d/ and /t/

## Default co-articulatory effects (Peterson & Lehiste 1960)

- All else being equal, the vowel before a voiced consonant is longer than before its voiceless counterpart
- Following fricatives lengthen vowels more than stops, with nasals in between the two sets of voiced consonants
- Established hierarchy:

voiced fric. > nasals > voiced stops/affr. ≈ voiceless fric. > voiceless stops/affr.

**z ð v  m ŋ n  g b d dʒ  ʃ θ s f  t k tʃ p**

**articulatory lengthening environments - - - - > articulatory shortening environments**

- But in the present experiment, duration measurements yield a different hierarchy (/z/ and /v/ excepted):

voiceless fric. ≥ voiced stops/aff. ≥ nasals > voiceless stops/aff. ≥ nasal + voiceless stop

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **default (P&L)** | z | ð | v | m | ŋ | n | ʃ | θ | g | d | b | s | f | dʒ | t | k | tʃ | p |
| **observed** | z | s | f | ʃ | g | d | ŋ | m | v | n | dʒ | θs | b | t | k | tʃ | p | |

## Experimental results

- Despite some native speakers intuiting 'long' vs. 'short' vowels, **no minimal pairs consistently differentiated by vowel length alone**; **secondary /æ/-lengthening does not appear to be a phonemic split**
- **Postvocalic /g/ and /d/ stand out for overall lengthening effects**; **postvocalic voiceless fricatives also notable lengthening environments**
- **Participants differ from each other** in which words contain lengthened /æ/, but this variability could be due to a small sample of tokens

## Comparison to TRAP-BATH split patterns

- Labov (1971) and Harris (1986, 1989): primary /æ/-lengthening has taken place along a recurrent hierarchy of implicational weighting
- Table below:
  - Primary /æ/-lengthening environments (BATH)
    - dark blue = all or most /æ/ lengthened
    - light blue = some /æ/ lengthened
    - red = no /æ/ lengthened
  - Secondary /æ/-lengthening environments, RP (+/-)
- Consonants (first row) ordered following Labov (1971), shaded following Peterson & Lehiste (1960)

| | f | θ | s | m | n | d | dʒ | b | g | ʃ | v | z | ŋ | p | t | tʃ | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Northern Cities Shift | | | | | | | | | | | | | | | | | |
| NYC | | | | | | | | | | | | | | | | | |
| Philadelphia | | | | | | | | | | | | | | | | | |
| RP (Jones) | | | | ± | ± | ± | | | ± | | | | | | ± | | ± |
| RP (Wells) | | | | + | | ± | | | | | | | + | | | | |
| RP (Fudge) | - | - | - | ± | ± | ± | ± | ± | ± | - | ± | ± | - | - | - | - | - |
| General American | | | | | | | | | | | | | | | | | |
| North England | | | | | | | | | | | | | | | | | |

## Discussion

- Observed lengthening deviates from expected co-articulatory hierarchy
- Similarities between primary and secondary /æ/-lengthening environments: developments common enough to have occurred twice independently?
  - Or could be through a common history, with secondary lengthening representing a linguistic 'residue' from the TRAP-BATH split
  - Wells (1982): primary /æ/-lengthening was once a quantity difference, only later developed different quality; conceivable some words/environments have continued to generate /æː/ while others changed over to /ɑː/

## References

Harris, J. 1986. Phonetic constraints on sociolinguistic variation. *Sheffield Working Papers in Language and Linguistics* 3: 120-43.

Harris, J. 1989. Towards a lexical analysis of sound change in progress. *Journal of Linguistics* 25(1): 35-56.

Jones, D. J. 1972 [1918]. *An Outline of English Phonetics, Ninth Edition*. Cambridge: W. Heffer & Sons.

Fudge, E. 1977. Long and short [ae] in one Southern British speaker's English. *Journal of the International Phonetic Association 7*(2): 55-65.

Labov, W. 1971. Methodology, in W. O. Dingwall (ed.) *A Survey of Linguistic Science*. College Park, MD: Linguistics Program, University of Maryland.

Labov, W. 2007. Transmission and Diffusion. *Language* 83(2): 344-387.

Peterson, G. E. & I. Lehiste. 1960. Duration of syllable nuclei in English. *Journal of the Acoustical Society of America* 32: 693-703.

Wells, J. C. 1982. *Accents of English* (Vols. 1-3). Cambridge: Cambridge University Press.