The fate of the Scottish Vowel Length Rule in contemporary Scottish English

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Vowel duration patterning in English

• most varieties of English show **Voicing Effect**
• vowels are short before voiceless obstruents, and long before voiced obstruents, also nasals, liquids

<table>
<thead>
<tr>
<th>English</th>
<th>SHORT</th>
<th>LONG</th>
<th>LONG</th>
</tr>
</thead>
<tbody>
<tr>
<td>beat</td>
<td>bead</td>
<td>bees</td>
<td></td>
</tr>
</tbody>
</table>
The Scottish Vowel Length Rule (SVLR)

- vowels are short except
  - before /r/, e.g. beer
  - before voiced fricatives, e.g. please, breathe
  - before morpheme boundary, e.g. bees

Scottish English:  
\begin{tabular}{ccc}
\textbf{SHORT} & \textbf{SHORT} & \textbf{LONG} \\
beat & bead & bees \\
\end{tabular}

English English:  
\begin{tabular}{ccc}
\textbf{SHORT} & \textbf{LONG} & \textbf{LONG} \\
beat & bead & bees \\
\end{tabular}

(e.g. Aitken, 1981/2015; Scobbie et al 1999)
The Scottish Vowel Length Rule (SVLR)

- Vowels are short except
  - Before /r/, e.g. *beer*
  - Before voiced fricatives, e.g. *please, breathe*
  - Before morpheme boundary, e.g. *bees*

Scottish English:
- *beat*
- *bead*
- *bees*

English English:
- *beat*
- *bead*
- *bees*

(e.g. Aitken, 1981/2015; Scobbie et al 1999)
The Scottish Vowel Length Rule (SVLR)

- continues earlier historical process in Scots, which appears to be receding
- contact with Anglo-English linked with SVLR weakening towards Voicing Effect in Edinburgh (Hewlett, Matthews & Scobbie, 1999)
- real-time SVLR weakening in Glasgow, especially in strong prosodic position (e.g. Rathcke & Stuart-Smith, 2016)
SVLR: which vowels in which dialects?

• no alternation for KIT and STRUT for all dialects (Aitken, 1981, 2015; Scobbie et al 1999)

• differences in SVLR in North East (Warren, 2018; Watt and Yurkova 2007)

• SVLR now only in FLEECE, BOOT and PRICE/PRIZE for Standard Scottish English and Scottish Central Belt (Scobbie et al, 1999)

• possible SVLR in Glasgow for FACE and GOAT in early 20th Century (Stuart-Smith et al 2017)
Research questions

- Which vowels show SVLR in Scottish English?
- How is the SVLR influenced by social factors such as gender and social class?
- How has the use of the SVLR changed over time in Scottish English?
Scottish English with no diversity yet by ethnicity

343 speakers
Glasgow
Sounds of the City,
Brains in Dialogue
SCOTS 177 (88F) 152,364 tokens

Highlands, Islands and Insular
SCOTS 15 (10F) 5,842 tokens

Northern
1Speaker2Dialects, SCOTS 49 (26F) 105,692 tokens

South
SCOTS 17 (6F) 13,860 tokens

Edinburgh/Standard
Scottish English
SCOTS, Edinburgh,
Doubletalk 85 (41F) 41,418 tokens

timespan: decade of Birth
from 1890 to 1990

343 speakers
Vowels analysed

• FLEECE KIT FACE DRESS CAT COT STRUT GOAT BOOT /ɪ ɛ ɛ a ɔ ʌ o ʉ/
• all monosyllables
Data analysis using Integrated Speech Corpus Analysis (ISCAN)

- each audio corpus (soundfiles + time-aligned transcripts) imported into ISCAN (McAuliffe et al 2019) [https://spade.glasgow.ac.uk/software/](https://spade.glasgow.ac.uk/software/)
- vowel durations automatically extracted
- removed vowels with durations
  - < 49ms (likely to be reduced, e.g., Dodsworth, 2013)
  - > 2000ms (likely erroneous) durations
=> 319,177 tokens
Predictions for SVLR by vowel

- **KIT, DRESS, STRUT**: unlikely to show SVLR
- **CAT, COT**: unlikely to show SVLR in most dialects
- **FACE, GOAT**: might show SVLR in some dialects
- **FLEECE, BOOT**: likely to show SVLR in Central Belt, perhaps all dialects
Linear mixed effects modelling of log vowel duration in R

Fixed factors

• Vowel, following Context
• (log) speech Rate deviation, phrase position, (log) word frequency (Subtlex-UK)
• Gender, Time (birth Decade)
• all possible interactions

Random intercepts: Word, Speaker (slopes did not converge)
Vowel duration

beat  bead  bees
SHORT  SHORT  LONG

SVLR
SVLR
Voicing Effect

Vowel duration

beat
SHORT
SHORT

bead
SHORT
LONG

bees
LONG
LONG
Results
Results – sanity check!

Vowels are:
• shorter at faster speech rates
• shorter in more frequent words
• longer in utterance-final position

No SVLR or Voicing Effect for KIT DRESS STRUT
CAT, COT

N = 116,776
CAT, COT

SVLR only for COT for Northern
Voicing Effect only for CAT for Highland-Island-Insular

N = 116,776
FACE GOAT

N = 30,968
FACE GOAT

- SVLR only for FACE for Northern dialects
- ‘anti-Voicing Effect’ visible in both vowels

N = 30,968
FLEECE BOOT

- SVLR – *bees* always longer than *beat/bead*
- ‘anti-Voicing Effect’ – *bead* shorter than *beat*
SVLR – *bees* always longer than *beat/bead*

‘anti-Voicing Effect’ – *bead* shorter than *beat*

Voicing Effect only in BOOT (Northern)
SVLR and prosodic factors (FLEECE, BOOT)

SVLR lengthening more extreme in phrase-final position

N = 33,679
SVLR and prosodic factors (FLEECE, BOOT)

SVLR patterning retained despite increased speech rate

N = 33,679
Social factors

• no clear effect of gender on patterning of vowel duration for any vowel

• social class captured in Edinburgh dialect, who are mostly Standard Scottish English speakers

• no evidence of difference in SVLR in these speakers
SVLR and time e.g. KIT, STRUT, DRESS

• no evidence for weakening of SVLR over time
• real-time shortening, moderated by vowel and dialect

N = 137,754
Discussion
• SVLR in FLEECE, BOOT confirming Scobbie et al 1999 (and in FACE and COT in North East; cf Warren 2018)
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• Interactions with prosody show that SVLR in FLEECE and BOOT is well embedded structurally
• only weak evidence for Voicing Effect
• only weak evidence for Voicing Effect

• vowel duration patterns seem to be rather different in spontaneous speech (cf VOT, voicing)
• unexpected ‘anti-Voicing Effect’: extreme shortening in SVLR short (VE long) *bead* context

• increased difference between Anglo-English and Scottish English irrespective of social variety
• no interaction with time
Social factors, time and SVLR

• SVLR is consistent across gender and social variety of Scottish English – as for e.g. Glasgow in 1990s for wordlist speech (Scobbie et al 1999)

• no evidence of weakening of SVLR over time from this, large-scale, perspective (cf Rathcke and Stuart-Smith 2016)
Next steps for SVLR

• add ethnicity with the Glaswasian corpus, and other ethnicities if possible
• Import more Scottish datasets
• consider ‘time’ in terms of birth and recording decade
• adapt modelling strategies to Bayesian modelling see James Tanner’s poster today on large-scale analysis of SPADE datat for Voicing Effect in English!
Thank you!

...and to James Tanner, Morgan Sonderegger, Vanna Wilerton, and our Data Guardians for sharing their data with us!

http://spade.glasgow.ac.uk/