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► **To cite this version:**

Monika Pukli. Vowel length in Scottish English – The Scottish Vowel Length Rule from an empirical perspective. Actes de la conférence ALOES 2004, 2004, Lausanne, Switzerland. pp.21-28. hal-02550098

**HAL Id: hal-02550098**

**<https://hal.science/hal-02550098>**

Submitted on 21 Apr 2020

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## Vowel length in Scottish English – The Scottish Vowel Length Rule from an empirical perspective

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### Abstract

This paper presents an intriguing problem from the frontier of phonology and morphology in the variety of English spoken in Scotland. Scottish English vowels do not have the short-long distinction common to other accents of English, yet they do show a peculiar durational variation triggered by a set of morpho-phonological factors (a phenomenon called the Scottish Vowel Length Rule). In this paper I will first explore the controversial phonological status of vowel length in the Scottish English vowel system and argue that in some way it has to be encoded in the phonology of Scottish English. Then I go on to review the results of previous empirical studies of the operation of the Scottish Vowel Length Rule and compare these with the preliminary indications from recent Ayrshire data.

### 1. The Scottish English vowel system

This paper is concerned with the variety of English spoken in Scotland, most often referred to as Scottish English, a language continuum ranging from various regional dialects of Scots to standard English with a Scottish accent (cf. Abercrombie 1979, Wells 1982, Aitken 1984, Scobbie et al. 1999a, Carr et al. 2004, Carr this volume). More specifically, I will discuss the so-called ‘basic’ vowel system (Abercrombie 1979: 73) that most of the

literature makes reference to, and which the informants of the empirical investigation studied in this paper all share.

This vowel system consists of nine monophthongs /i ɪ e ε a ʌ ɔ o u/ and three diphthongs /ai au ɔi/. In the same segmental environment these monophthongs are of the same duration, and no length marks are necessary to distinguish longer or shorter vowels: *beat*, *bit*, *bate* and *bet* or *hat*, *hut*, *hot* and *hoot*, for example, differ distinctly in quality but are quite uniform in quantity. Distinctive pairs in RP, such as *cot* – *caught*, *ant* – *aunt* or *full* – *fool*, are homophonous for Scottish speakers with the ‘basic’ vowel system.

### 2. The controversial phonological status of vowel length

Two important aspects of English phonology will now be considered in order to illustrate the necessity of distinguishing some Scottish English vowels from others and to show that this distinction is best expressed in terms of length (or weight).

#### 2.1 Distribution

In open monosyllabic words (or at the end of the word in an open stressed syllable) not all vowels can freely occur in English. \*/bɪ/, \*/be/ and \*/bʌ/ are not possible English words, unless a consonant follows as for example in *bit*, *bet* and *but*. Of the nine monophthongs /i e ɔ o u/ can form monosyllabic words without a coda consonant (e.g. *see*, *say*, *saw*, *so*, *sue*), /ɪ ʌ/ cannot, while /a/ and /ε/ are restricted in this position: /a/ is very rare but possible in lexical words like *bra*, *shah*, *spa* or *hurrah*, and as for /ε/ *meh* can be used to refer to the cry of sheep (Aitken 1981: 133, Anderson 1988: 35).

Rejecting onomatopoeic but accepting limited lexical occurrence Scottish vowels can be divided into two groups: /i e a ɔ o u/ vs. /ɪ ε ʌ/. This asymmetric distribution can be in fact explained by considering freely occurring vowels as long and the others short (cf. Anderson 1988 and 1993) thus satisfying minimal word constraints operating in the language, which require either a long vowel if the syllable is open, or a short vowel plus a consonant. (The two-way division of the distribution of Scottish vowels is often discussed in the literature without necessarily reaching a conclusion as to its possible theoretical significance. While some consider that the two groups are /i e a ɔ o u/ and /ɪ ε ʌ/, as above, (Giegerich 1992: 46, McMahon 1991: 12, Scobbie et al. 1999a: 246), others argue that /a/ is marginal and thus belongs with the ‘restricted’ group, /i e ʌ ɔ o u/ vs. /ɪ ε a ʌ/ (Anderson 1988).)

## 2.2 Stress placement

Stress placement in English at the word level depends on morphological and phonological information, and as far as the latter is concerned the weight of the syllable, and consequently the length of the vowel it contains, is of primary importance. If one accepts the premise according to which syllable weight influences stress placement *and* maintains that Scottish English vowels are of uniform length, then it is surprising to find the same stress patterns in Scottish English and for example in RP.

However, if one considers the distributionally restricted /ɪ ɛ ʌ/ monomoraic (or short) and the rest of the monophthongs bimoraic (or long), the diphthongs being bimoraic as well, the similarity of stress assignment becomes well-motivated. There remains to explain whether or not the absence of the short phonemes (as in *put*, *dot*, *cat*) causes any disequilibrium.

## 3. The Scottish Vowel Length Rule (SVLR)

Let us now turn to a characteristic phenomenon of Scottish English, and which expressly involves durational differences. According to the Scottish Vowel Length Rule (or Aitken's Law) there will occur:

a short V / _ p t k	b d g	tʃ dʒ	f θ s ʃ	m n ŋ	l	
a long V / _		v ð z ʒ		r	_ #	

That is, the vowel sound in *troop*, *shoot*, *spook*, *tube*, *rude*, *Krug*, *smooch*, *huge*, *hoof*, *tooth*, *loose*, *bush*, *room*, *rune*, *rule* is shorter than in *move*, *smooth*, *lose*, *rouge*, *brew*, *blue*, *brewed*, *blueness* (at the end of the word, even if a suffix is added and the vowel is no longer word-final, the longer variant is used).

### 3.1 Theoretical implications

The first and foremost problem when it comes to the phonological interpretation and explanation of the phenomenon is that the appearance of durational distinction in an otherwise apparently length-less system has to be accounted for since duration becomes crucial in differentiating morphologically complex minimal pairs like *brood* – *brewed*, *need* – *kneed*, *tide* – *tied*.

One possible interpretation would be to assume that the long and short variants that occur in complementary distribution, for instance [uː] and [u], are two allophones of U, a tense high back phoneme non-specified for

length. However, if there is no inherent vowel length in Scottish English, phonology has to provide an answer as to how and at what level short-long distinction is introduced into the vowel system, in addition to motivating the asymmetric distribution of monophthongs and stress placement.

If, on the other hand, one accepts inherent length, as I argued earlier there are good grounds to do so, the SVLR can be conceived of as shortening operating on a subset of the long vowels /i: e: a: ɔ: o: u:/. It has to be mentioned that the SVLR is not often represented as shortening in the literature, but is more frequently analysed as lengthening of short vowels (see Anderson 1988 and 1993 vs. McMahon 1991, Carr 1992).

Moreover, the complex environmental and morphological triggering of the durational alternation poses an additional problem in the phonological interpretation of the SVLR. The voiced fricatives and the phonetically multi-realizational /r/ phoneme do not constitute a natural class either in terms of articulation or in terms of the sonority hierarchy. Yet we can see the same group of consonants participating in durational phenomena in Standard and Quebec French (cf. for example Montreuil 2004).

Thirdly, and equally importantly, what characteristics, if any, do vowels share that undergo lengthening (or shortening), and which precisely are these vowels?

### 3.2 Input vowels

The first account of a particularly Scottish durational alternation in vowel sounds (later termed the Scottish Vowel-Length Rule) dates from 1873 (Aitken 1981: 153), but indirect evidence suggests that it might have already been in operation in the 17<sup>th</sup> century (Aitken 1981: 146). From several ensuing and more recent studies on Scots and English with a Scottish accent a slight confusion gleams out as to the exact composition of the vowels concerned. In what follows I will try to briefly look at the main tenets concerning the possible input vowels to the SVLR and then consider actual empirical findings.

First of all, it seems certain that there is wide-ranging regional and social variation, but the extent of which is not sufficiently explored. Scots dialects are surveyed in great detail in one of the most influential papers on the subject by Aitken (1981): the highly complex account of the SVLR in Scots reports that all the vowels except /ɪ ʌ ɔi/ can have longer-shorter variants. The same set of input vowels is mentioned in the comprehensive overview of Scottish English by Wells (1982), with special emphasis on /i u ai/, which seem to be the most stable SVLR vowels in sociolinguistic and geographical terms (1982: 401).

Other descriptions of Scottish English include only the tense vowels /i e a ɔ o u/ and /ai/ as possible candidates for the SVLR (McMahon 1991, Giegerich 1992), while the set is further restricted in Edinburgh English and in Edinburgh Scots to /i e u o ɔ ai/ (Anderson 1988, Carr 1992).

Empirical studies on the other hand seem to confirm an even more limited set of SVLR vowels. The two most important surveys (the most precise and clear in terms of phonetic and statistic analyses), both looked at speakers of English with a basic Scottish vowel system. McKenna's (1988) analysis of the monophthongs of four middle class speakers from East Central Scotland showed that only /i u/ participate in the durational alternation, and the Scottish Vowel Length Rule Project (Scobbie et al. 1999a and b) with 32 middle- and working-class speakers from Glasgow revealed that among /i u ai o ɔ/ the two latter vowels do not have significant durational differences in SVLR contexts. (For details of other empirical analyses not reviewed here the reader can refer to McClure (1977) Agutter 1988, McMahon 1991, and also Scobbie et al. 1999a.)

#### 4. Empirical investigation in Ayrshire

There being no comprehensive instrumental survey available on the entire vowel system in any region of Scotland, it seemed necessary to establish a methodology for our Ayrshire study specifically testing vowel length in relevant phonological and morphological settings. A full-scale investigation involving all the vowel sounds of the 'basic' system had to be planned and conducted for an appropriate formulation of the SVLR to be possible.

##### 4.1 Word list

A list of 67 words in random order without repetition was recorded for 11 speakers in Ayrshire, Scotland in 2001-2002 (forming a part of a general PAC survey; to see more on this empirically based French project cf. Durand & Pukli 2004, Carr, Durand & Pukli 2004).

Table 1 below shows a section of the word list testing vowel length

- before voiced vs. voiceless stops (the Voicing Effect, generally applying in English and giving phonetically shorter variants before voiceless consonants, is debated and often claimed to be non-effective in Scottish English (cf. Hewlett, Matthews & Scobbie 1999, McKenna 1988, but Agutter 1988, McMahon 1991).

- before /d/ with and without a morpheme boundary as in *brew+ed* and *brood*

- and at the end of the word.

**Table 1**

	_-[-voice]	_- [+voice]	_-#d	_-#
<b>i</b>	neat	need	kneed	knee
<b>ɪ</b>	bit	bid	--	--
<b>e</b>	late	lade	laid	lay
<b>ɛ</b>	bet	bed	--	--
<b>a</b>	pat	pad	--	(hurrah)
<b>u</b>	brute	brood	brewed	brew
<b>o</b>	rote	ode	rowed	show
		road	rode	
<b>ɔ</b>	hawk	clod	clawed	claw
<b>ʌ</b>	butt	bud	--	--
<b>ai</b>	tight	tide	tied	tie
<b>au</b>	lout	loud	allowed	cow
<b>ɔi</b>	choice	avoid	enjoyed	boy

The paradigm is not complete for /a/ (*hurrahed* was first coined but then removed from the list due to the confusion of the readers), and for the distributionally restricted checked vowels /ɪ ʌ ɛ/.

Acoustic measurements were carried out with the help of the Praat software, and the duration of the vowels was determined based on waveform and spectrographic analyses. The identification of the onset and offset of vowels posed considerable difficulty, especially after /r/ and before a glottal stop or pause (echo formants).

Analyses are not complete for all the speakers and all the investigated variables; the observations below are to be taken as strictly preliminary and based on a section of the corpus only.

##### 4.2 Preliminary results and indications

The results were interpreted and are presented here in terms of relative increase for each vowel (for a global analysis of length further phonetic factors such as the manner of articulation of the consonant (vowels before a fricative are in general slightly longer than before a plosive) or vowel height

(low vowels are generally somewhat longer than high vowels) have to be taken into consideration).

The Voicing Effect seems clearly not operational for the speakers of the survey analysed so far: while in other varieties of English the same vowel can be 40-50 per cent shorter before a voiceless plosive than before a voiced plosive, our results for Vt vs. Vd show very minor differences: the mean duration of /u/ is 7% longer in *brood* than in *brute*, the mean duration of /e/ is only 5% longer in *lade* than in *late*, the same relative length difference is 13% for /i/, 11% and 15% for the diphthongs /ai/ and /au/, respectively.

Among the ‘best candidates’ – /i u ai/ – the Scottish Vowel Length Rule applies unequivocally at the end of the word and before the past tense suffix (V# and V#d) for /u/ and /ai/. The relative length increase of the vowel in *brewed* and *brew* is more than a hundred per cent compared to the monomorphemic *brood*. Accompanying measurements for *hooves* vs. *hoof* and *hoofs* (words from the same word list) show a similar tendency, before a voiceless fricative (*hoof* and *hoofs*) /u/ is about a hundred per cent shorter than before a voiced fricative (*hooves*). The length difference is less important for /ai/, around fifty per cent, but there is a distinct qualitative difference between *side* [saɪd] vs. *sighed* [saɪd] and *tide* [taɪd] vs. *tied* [taɪd], where the ‘half-long’ symbol indicates duration with reference to the difference in timing within the diphthong. (This quality difference is often described in the literature, see for example Wells 1982: 405 or Giegerich 1992: 230, and instrumental measurements of the formants and the timing of the diphthong are available in Scobbie et al. 1999b.)

Unexpected results were observed, however, for /i/. First data showing virtually no length difference between *neat*, *need* and *kneed* despite the latter word containing an SVLR triggering context (word-final position followed by the past tense suffix), and this being double-checked for all the eleven speakers of the corpus, further measurements were carried out to investigate words from another word list with the same speakers. The relative increase in the duration of the vowel was more than 110 per cent between *greed* and *agreed*, a similar mono- vs. bi-morphemic pair. (To further complicate findings, /i/ also proved to be highly variable in duration before SVLR-short consonants like /b g dʒ/ as in *dweeb*, *league* and *siege*.)

Reading effects could be responsible for this inconsistency, *greed* and *agreed* were placed next to each other in the reading list with a functional load the reader might have been prompted to emphasize, while *need* and *kneed* were randomly ordered and any intentional emphasis can be excluded. Also, *kneed* and *need* are spelt very similarly, yet it is unlikely that readers would have uniformly misread *kneed* without taking any notice of it, while corrections occurred for some readers for *tied* and *tide*. In sum,

results for /i/ might either be indicative of a flaw in the methodology or perhaps of an unpredictable lexicalisation of shorter-longer variants (marginal lexicalisation of short and long /i/ in Scots was reported for Ayrshire by Aitken (1981:146)).

For the rest of the monophthongs and the two other diphthongs it is too early to form a definitive idea as to whether their length varies along the SVLR short-long contexts. /o/ and /ɔ/ seem to be slightly but consistently longer at the end of the word and before the past tense suffix, no interpretable findings are available for /e/ and /a/, while both /au/ and /ɔi/ are of almost unchanging duration in all four contexts (Vt, Vd, V#d, V#) with no more than thirty per cent of relative increase morpheme and word-finally.

## 5. Conclusion

Following the first results, it became clear that more data is needed to answer arising questions, and a complementary word list was developed. This list tests the same range of vowels before voiced and voiceless fricatives with a more controlled preceding consonant to facilitate acoustic measurements (avoiding namely /w/ and /r/), and further items were included in order to see if there is a durational difference due to suffixation between Vz and V#z as for example in *seize* vs. *sees*, *seas* (cf. McClure 1977 vs. McKenna 1988). Naturally, another set of /i/-words was also incorporated to shed more light on the behaviour of this vowel. And finally, some words test whether or not SVLR is operational in an open syllable word internally. A complete analysis of all the variables will soon be available (Pukli in progress).

## Acknowledgements

I would like to thank the participants of the 2004 ALOES meeting for their helpful comments on my talk that have helped me shape the final version of this paper. I am also grateful for the support of James Scobbie at Queen Margaret College (Edinburgh) in the preparation of the fieldwork, and for the encouragement of Jacques Durand and Philip Carr and their helpful observations on various points discussed in this paper.

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