

DURATIONAL EVIDENCE OF THE SCOTTISH VOWEL LENGTH RULE IN BERWICK ENGLISH

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Abstract

Berwick upon Tweed is England's northernmost town, lying in the extreme northeastern corner of Northumberland just 3 miles (5km) from the Scottish/English border. While Berwick English can be said to feature many of the typical characteristics of rural Northumbrian English, it also has much in common with dialects of Scotland, and in this sense can be regarded as a transitional dialect. The common perception that the accent of Berwick is rich in 'Scottish' phonological features leads us to hypothesise that one such feature is the series of vowel length distinctions usually termed the Scottish Vowel Length Rule, which (with one exception) has to date only been investigated auditorily in Northumbrian dialects. In this paper, preliminary evidence based on instrumental measurements of vowel durations taken from word-list recordings of eight Berwick English (BwE) speakers is presented, demonstrating that a form of the Scottish Vowel Length Rule (SVLR) much like that reported for Scottish English by Scobbie *et al.* (1999a) conditions vowel duration in the variety. There are indications, however, that SVLR-conditioned alternations are less marked and less consistent among the younger BwE speakers than among older ones. It is suggested that these age-related differences may be indicative of the weakening of the SVLR in this variety.

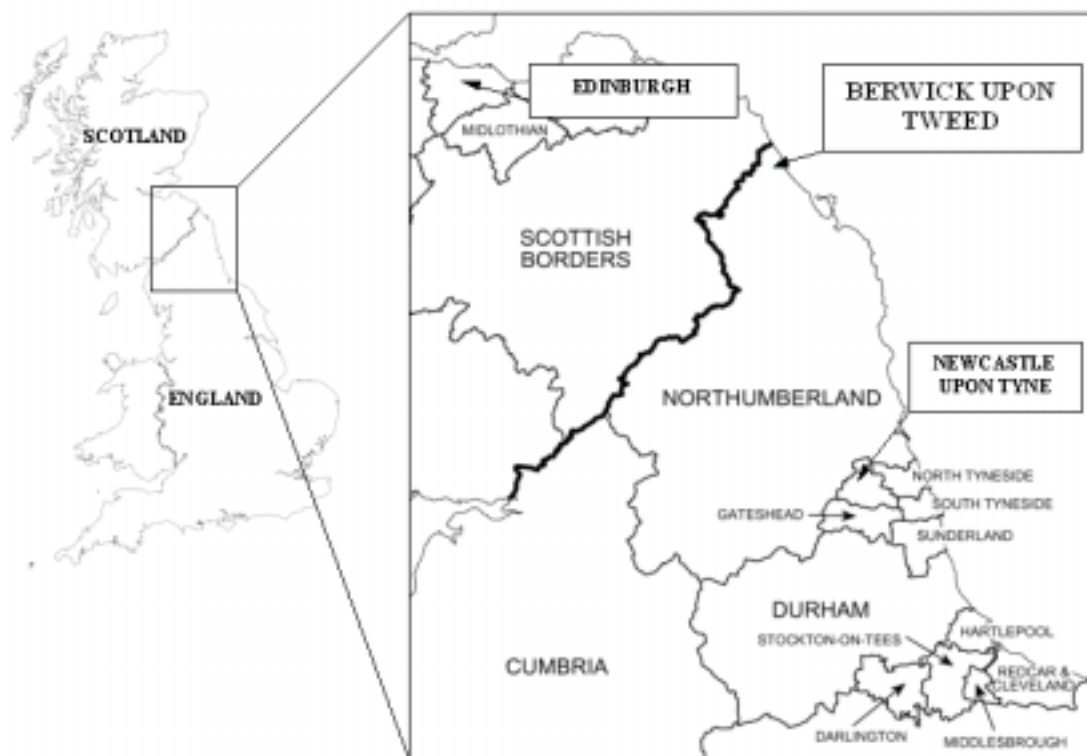
1. Introduction

Berwick upon Tweed straddles the mouth of the River Tweed on the North Sea coast of northern England, around 3 miles (5km) from the border between England and Scotland (see Figure 1).¹ It is the largest town on the coast between Edinburgh, 57 miles (91km) to the north-west, and Newcastle upon Tyne, 60 miles (96km) to the south.

As one might expect, the variety of English spoken in Berwick is some ways a 'mixture' of Scottish and north-eastern English varieties. This is true at the level of lexis (e.g. forms typical of Tyneside such as *divvent* 'don't' or *gan* 'go', Scottish *how* 'why', north-eastern English *cannot* ['kʰanət] and Scottish *cannae* ['kʰane] 'can't'), morphosyntax (e.g. use of double modals as in *he would could go*, a feature found on both sides of the border), and phonology (the lack of a COT~CAUGHT distinction, as in Scottish English, and cross-border features such as variable rhoticity, no H-dropping, [r] for (r), [ʌ] in *house*, *mouth*, etc.). There are, in addition, features of Berwick English (BwE) which appear to be typical of neither mainstream Scottish nor Northumbrian varieties but are perhaps confined to Berwick and the coastal regions between Edinburgh and Tyneside. The use of Romani-derived lexis such as *joogle* 'dog' or *barry* 'good' appears to be unusually frequent among Berwickers, particularly younger ones (Pistor 1998), while the close [i] in suffixes containing the KIT vowel (*music*, *rubbish*, etc., and the name Berwick ['berik] itself) is stereotypical of the variety, as reflected in spellings used in newspaper articles about the town and its dialect (for instance 'Give us a Bereek', *The Scotsman*, 13th October 1999).

¹ We are grateful to Richard Kiely, Carmen Llamas, Beat Glauser, Paul Johnston, Jane Stuart-Smith, Jim Scobbie, Claire Timmins, Paul Foulkes and Jutta Pistor for their helpful input and comments, as well as to our eight Berwick informants.

Figure 1. Location of Berwick upon Tweed. Reproduced from Ordnance Survey maps by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, © Crown Copyright NC/00/888.



This combination of local and supralocal features no doubt underlies the various perceptions of BwE as Scottish, north-eastern English, or a hybrid of the two. Glauser's (1997) summary of Pistor's (forthcoming) study of language attitudes in Berwick relates that 'quite a few speakers say that the language on either side of the Border is very similar' with 'differences [being] said to make themselves felt in Edinburgh or Newcastle upon Tyne'. These speakers are at the same time 'quite competent at detecting from matched guise samples whether a voice hides a person from Berwick, the Scottish or the English side of the Border. How they do this is not clear yet' (Glauser 1997: 11). Thus, there is for Pistor's informants a sense in which BwE is simultaneously a good representative of a continuum of dialects spoken across an area stretching from the Tyne to the Forth *and* a variety which is sufficiently distinct from Scottish and other Northumbrian dialects as to be easily identifiable as a separate form in its own right.

While the dialects of the border area have been the focus of many previous dialectological studies (e.g. Glauser 1974, 1988, 1991, 1994; Johnston 1979, 1997; Kolb 1966; Zai 1942), these generally say rather little about BwE itself. There is thus something of a lack of up-to-date published information on the details of the phonology of BwE, and to our knowledge no instrumental phonetic studies of the variety have been carried out. The present paper goes some of the way to addressing this gap. We present in the following sections the findings of a preliminary study of one of a series of linguistic variables we believe to be important in terms of (a) characterising Berwick English as a member of the Scottish~Northumbrian dialect continuum while (b) skewing the perception of BwE toward a closer association with

Scottish varieties than with English ones. We report on a series of duration measurements made of vowels drawn from readings by 8 Berwick English (BwE) speakers of word lists designed to elicit the vowels [i e ε a ɑ ɔ o u ai] in a range of pre-stop and pre-fricative contexts. The aim of the study was to examine whether vowel duration differences resulting from the operation of the Scottish Vowel Length Rule (SVLR) are consistently larger than those resulting from the Voicing Effect (VE) in BwE. If this is found to be the case, the vowel system of BwE can be typologically classified with the Scottish and traditional Northumbrian dialects, a grouping which is historically well-motivated (e.g. Lass 1974; Agutter 1988a,b; Glauser 1988; Milroy 1995; Beal & Corrigan 1998). It is hypothesised, however, that if the VE~SVLR distinction is found to vary between younger and older speakers there may be a change in progress with respect to the two lengthening effects. Furthermore, the direction of any change is expected to be toward a southern (VE, no SVLR) model, in line with current dialect levelling models and Glauser's (1974, 1997) projections about the divergence of Scottish and Northumbrian varieties of English.

So as to establish the nature of the phenomenon, however, we turn first to an examination of the VE and SVLR in Scottish English, and then discuss the status of the SVLR in Northumbrian English. We discuss briefly Berwick's historical background in section 2, and in section 2.1 the ambiguity in terms of social identity that derives from it. The methodology and results of the study are presented in sections 3 and 4, respectively, while in section 5 some preliminary conclusions are drawn.

1.1 The Scottish Vowel Length Rule

One of the principal diagnostic features of Scottish English (and Scots) is the set of vowel length oppositions usually known as the Scottish Vowel Length Rule² (see Aitken 1981; McClure 1977; McKenna 1988). The essence of the rule involves a length alternation whereby in word-final stressed syllables, vowels which occur before voiced fricatives, /r/, or syllable-finally are long; elsewhere they are short. It is thus rather different from the more widespread Voicing Effect, which predicts an increase in vowel length as a function of the voicing of the following consonant. Vowels in American English, for instance, have been found to be around 50% longer when followed by a voiced consonant than in pre-voiceless consonant contexts (Chen 1970, Lehiste 1996). The Voicing Effect appears to be a feature of other languages as well (such as French; see Rialland, 1994). The Voicing Effect interacts with the SVLR in Scottish English, such that the vowels in a pair like *beat* and *bead* (exempt from SVLR conditioning) nonetheless differ in length to some degree, that of *bead* being generally slightly longer (Scobbie *et al.* 1999a). The picture is further complicated by the requirement that in order for short vowels to appear before voiced consonants the following consonant should be tautomorphic, such that monomorphemic *brood* takes a short vowel, while bimorphemic *brewed* is generally found with a longer one (Scobbie *et al.* 1999b). Table 1 gives examples of words of the GOOSE set (Wells 1982) which in Scottish English (henceforth ScE) and English English (henceforth Anglo-English, or AE) feature length distinctions resulting from the operation of the Voicing Effect and/or SVLR.

² Formerly 'Aitken's Law', a term coined by David Murison.

Table 1. Vowel length alternations in [ʊ] words in Scottish English and Anglo-English (from Scobbie *et al.* 1999a: 231)

Dialect	Duration	Consonantal context					Morphological context	
		_n	_s	_z	_t	_d	_#	_#d
ScE	<i>longer</i>	-	-	bruise	-	-	brew	brewed
	<i>shorter</i>	spoon	Bruce	-	brute	brood	-	-
AE	<i>longer</i>	spoon	-	bruise	-	brood	brew	brewed
	<i>shorter</i>	-	Bruce	-	brute	-	-	-

According to this framework, then, vowel length in ScE is allophonic (predictable from context) rather than phonemic, as is the case for many of the vowels in AE systems.³ As such, it represents a major typological difference between varieties of English spoken north and south of the border.

The status of the rule in ScE and Scots has, however, stimulated a good deal of debate in the dialectological and historical phonological literature (e.g. Lass 1974, Carr 1992, Anderson 1993) and indeed the issue of whether it can be considered specifically Scottish at all has been called into question (Agutter 1988a,b; but see McMahon's (1991) reanalysis of Agutter's data, and further discussion in Scobbie *et al.* 1999a). Also, there is disagreement as to the set of vowels to which the SVLR can be said to apply. Scobbie *et al.* (1999a) find compelling evidence of SVLR operation only for the /i/, /ʊ/ and /ai/ vowels in their analysis of the speech of 32 Glaswegians (see also McKenna 1988; Stuart-Smith 1999). Given the continuum of dialects in Scotland from traditional rural varieties of Scots to the heavily anglicised Scottish Standard English of the urban central belt, and the fact that many of the studies published to date have been based on auditory analysis alone, it is hardly surprising that the picture concerning the operation of the SVLR in Scottish varieties continues to be rather unclear. Moreover, results presented by Hewlett *et al.* (1999) indicate that the successful acquisition of SVLR alternations is vulnerable to outside influence, in the sense that Edinburgh children with at least one non-ScE speaking parent exhibit less consistent use of SVLR than do children with two ScE speaking parents. And since the SVLR appears in any case to be relatively marginal to the phonology of ScE in terms of the contrastive functions it fulfils, one might expect it to fall out of use more quickly than other more marked features of ScE (such as /x/ or / /) where phonological changes originating in England begin to be adopted (for discussion, see Macafee 1983; Lawson 1998; Stuart-Smith 1999; Chirrey 1999).

1.2 The SVLR in Northumbrian English

The Scottish/English border is often considered by dialectologists to represent an unusually robust linguistic boundary: according to McArthur (1992: 895) it coincides with 'the most numerous bundle of dialect isoglosses in the English-speaking world... effectively turning Scotland into a "dialect island".' Since one might assume the SVLR's name to tie it exclusively to the phonology of English as it is

³ Note that most accounts agree that ScE /ʌ/ and /e/ are always short and are thus exempt from SVLR-conditioned alternation, as is /ɔ/, which is said generally to be long in ScE (Scobbie *et al.* 1999a).

spoken in Scotland, the search for evidence of the SVLR in a non-Scottish variety might seem a questionable exercise. There is, however, a considerable body of literature suggesting that series of alternations of the SVLR type are not exclusive to Scottish varieties but are also a long-standing feature of Northumbrian English (henceforth NbE). Glauser (1988) claims on the basis of materials collected in Northumberland, Cumberland and County Durham for the *Survey of English Dialects* (Orton & Halliday 1963-4) that quantitative and qualitative alternations in /ai/ are conditioned by the SVLR in NbE:

The context, ai in word-final position, before /r/ and before voiced fricatives, is the same as in Scotland ('Aitken's Law'), but it takes a less prominent position. On the one hand Scots innovations seem to have reached as far south as Tyneside and North Durham, and on the other hand Aitken's context exerts its influence on only a marginal part of the northern English phonological systems (Glauser 1988: 623).

In view of the common origin of ScE and NbE and the physical permeability of the Scottish/English border, this is perhaps not surprising. Aitken (1981) dates the development of the SVLR in Scots to the 15th and 16th centuries, suggesting that the SVLR is probably a contact-induced borrowing into NbE from Middle Scots, rather than a feature both varieties inherited from their Anglian ancestor. Beal (1993) and Beal & Corrigan (1998) stress the unbroken continuity of contact between speakers of Scottish and Northumbrian varieties, not least through the high levels of Scottish migration into urban Tyneside, a factor which may have delayed the attrition of the SVLR along with other traditional features of the dialect's vowel system. Milroy's (1995) study of SVLR effects in Tyneside English /ai/ found that though a form of the SVLR appears to be present in the community for this vowel, a change affecting mainly short PRICE variants ([ei], as in *knife*, rather than the long [ai], as in *five*) is underway. Preliminary observations carried out by the first author of SVLR-type alternations in the PRICE vowel and four other vowels (FLEECE, FACE, GOAT, GOOSE) for eight Newcastle speakers (4 older, 4 younger) suggest that the distinction between the Voicing Effect and the SVLR is overall smaller for younger speakers than for older ones, and that the absolute magnitudes of both vowel lengthening effects reduce with decreasing age. This would suggest that the effect of the SVLR in Newcastle English is weakening relative to that of the VE, and that the two effects are perhaps converging on a VE-like alternation of the sort found in southern Anglo-English.

While to the authors' knowledge no study of the SVLR in BwE has been carried out, the results of Krause's (1997) study of linguistic variation and change in Lowick (a small village some 7 miles (11km) south of Berwick) indicate that a series of vowel length alternations that Krause terms the 'Lowick Context Rule' is being established, in spite of interference from vowel length conditioning effects of its contact varieties (Scottish Standard English and RP).⁴ Given the situations in Lowick, Newcastle, and in Scottish English, then, we have good reasons for supposing that should a vowel length alternation conditioned by the voicing of following fricatives be in evidence in BwE, it may be undergoing change of some sort. We will return to this theme in subsequent sections; first, a brief description of the locale itself is given.

⁴ Krause (2001, forthcoming) will report on details of the Lowick Context Rule.

2. Berwick's ambiguous status

Berwick's population of 13,500 is very small by comparison with those of its nearest cities Edinburgh and Newcastle. On the other hand, as Berwick lies on the main road and rail routes between eastern England and Scotland and serves a large area of northern Northumberland and south-eastern Scotland with amenities such as rail travel, its importance can be said to be somewhat out of proportion to its size. Its current modest status belies its former centrality in Scottish economic life: Berwick was mediaeval Scotland's largest port, earning it the title 'Alexandria of the North', and indeed was Scotland's largest town of any sort in the 11th and 12th centuries (Lynch 1991: 62). Its economic and strategic importance to both Scotland and England resulted in the town changing hands between the two kingdoms no fewer than 14 times during the Middle Ages. Even after annexation by England in 1482 it enjoyed a degree of independence as a 'free burgh', and did not fall completely under English jurisdiction until 1836.

Berwick's status in relation to Scotland and England continues to be complex and ambiguous, as expressed by the frequently cited couplet 'They talk about England and Scotland indeed, but it's England and Scotland and Berwick-on-Tweed'. The county of Berwickshire⁵ actually lies entirely within Scotland, while the River Tweed, though at its mouth and for several miles upstream lying well inside England, falls under Scottish legal jurisdiction for its entire length. Thus, those parts of Berwick and Northumberland lying north of the river are (in a sense) bounded on three sides by Scotland, a situation which no doubt gives rise to the common perception that the northern half of Berwick (Berwick proper) is 'the Scottish side', while Spittal and Tweedmouth, the largely residential areas of Berwick which lie south of the river, are the 'English' part of Berwick. The town has more Scottish banks than English ones, and the dominant religious affiliations are non-conformist and Presbyterian (Church of Scotland). Berwick is also the only English town with a football team in the Scottish League; numerous local sports clubs similarly play in Scottish rather than English leagues (Kiely *et al.*, 2000). Thus, although it has been nominally an English town for more than 500 years, Berwick seems never to have become fully English in an institutional or cultural sense. As it represents something of a halfway house between England and Scotland, issues of national and social (including linguistic) identity among Berwick's inhabitants are accordingly rather complex, as discussed in the following section.

2.1 Social identity in Berwick

As might be expected, Berwick's ambiguous identity in relation to Scotland and England has led to an ambiguity in terms of how Berwickers classify themselves, and how they are classified by others. The recent study conducted by Kiely *et al.* (2000) in Berwick and the surrounding area discusses in detail aspects of this ambiguity. In terms of national identity, they suggest, one might initially expect Berwickers to see themselves as English, and, moreover, to feel a heightened sense of 'Englishness', given the proximity of Berwick to the Scottish border. But their results, based on 70 household interviews, suggest otherwise: 'people in the town turned out to be claiming, attributing, rejecting, accepting and side-stepping national identity, in ways that we had seldom or never previously encountered [...] people frequently did not play by the prevailing identity rules' (2000: 4). Predictably, Kiely *et al.* list accent

⁵ Between 1974 and 1995 Berwickshire was subsumed within Borders Region, and since 1995 has been part of the Scottish Borders unified authority.

among the ‘identity markers’ which derive from such identity rules. The question of accent and/or dialect as part of the construction of local and national identity is repeatedly brought up by Kiely *et al.*’s interviewees. For instance, one respondent remarks:

I travel south, go to watch England,⁶ they class us as Scottish, our accent as Scottish. And you quite surprise them when we tell them that we’re still in England. I get that a lot, people asking, how come you’re coming to watch England when you’ve got a Scottish accent? But I don’t, I don’t think I’ve got a Scottish accent. But to them it must (Kiely *et al.* 2000: 11-12).

Indeed, many of Kiely *et al.*’s informants in Alnwick, a town around 30 miles (48km) south of Berwick, ‘expressed surprise that the majority of people in Berwick-upon-Tweed did not see themselves unproblematically as *Scottish*’ (2000: 11). Alnwickers’ principal cue for labelling Berwickers as Scottish ‘was that they perceived [the Berwick] accent or dialect as Scottish’ (*ibid.*). But while a Berwick accent is often interpreted as Scottish by (non-Berwick) English people, the converse is also true: Kiely *et al.*’s respondents in Eyemouth, a coastal village 9 miles (14km) north of Berwick, ‘did not interpret the Berwickers’ accent as Scottish, but tended to see it as Northumbrian or Geordie [i.e. Newcastle], and certainly English.’ (*ibid.*). This perception of dual identity is no doubt the origin of the nickname ‘MacGeordies’ for Berwickers.

These judgments should, however, be contextualised in relation to how Berwickers see themselves in terms of nationality. In answer to the question ‘How often do you use the following identities [Berwick, Northumbrian, Borderer, English, Scottish, British, European] to describe yourself?’, 24% claimed to identify themselves to some extent with *both* Scotland and England. Yet none wished to claim any form of hybrid identity (such as ‘British’) – rather, ‘many Berwickers seemed to want to avoid attaching themselves to either [Scottish or English] nationality’ (Kiely *et al.* 2000: 14). Furthermore, in response to ‘How often do you use [Scottish] to describe yourself?’, 15% of the 54 respondents replied ‘Always’, 2% ‘Usually’, 11% ‘Occasionally’, and 13% ‘Hardly ever’. Thus, almost half (41%) of the Berwick informants interviewed by Kiely *et al.* describe themselves as Scottish at least some of the time, though there is clearly a good deal of ambivalence about the habit among the majority who did not claim *always* to do so.

The lack of consensus as to identity in Berwick brings to mind Llamas’ demonstration that phonological changes in Middlesbrough English can be linked to shifts in self-identity emerging from the way in which labels attached to Teessiders by others lead to changes in the way Teessiders label themselves (Llamas, this volume). It may turn out on the basis of further studies planned for BwE that a pattern rather similar to that found in Middlesbrough emerges.⁷ Questions to be addressed by such research would include (i) what specific linguistic features of BwE accents give rise to their perception as ‘Scottish’ or ‘Geordie/English’ among listeners? (ii) to what extent do these perceptions accurately coincide with patterns of language use among

⁶ i.e., an English national sports team.

⁷ There are indications that the use of glottalised variants of (t) in words like *water* or *better* – a feature very typical of Tyneside, and increasingly Teesside, English – is on the increase in BwE, while as in Teesside the frequency of the tapped [r] variant of (r) (a pronunciation very closely associated with Scottish English) has declined sharply over the last generation or two (Ingham 1999).

Berwick speakers? (iii) what links can be posited between demographic variation/change and linguistic variation/change among the Berwick population? (iv) how central are patterns of linguistic usage to self-identity among Berwickers? and (v) is there any evidence that changes in self-identity correspond to patterns of linguistic change in BwE?

The remainder of the present paper summarises and discusses some preliminary results which are pertinent to the above questions. The study focusses specifically on the presence and extent of operation of the SVLR in BwE, and its interactions with the VE. In the following sections the methodology and results of the study are discussed, while section 5 contains a summary of the findings and some conclusions.

3. Method

3.1 Informants

The second author (CI) is a native of Berwick, and thus locating informants and obtaining permission to make recordings of the requisite number of BwE speakers was straightforward. A total of eight speakers - four males and four females in two distinct age groups - were recorded in their own homes reading aloud 66 word list items per speaker. Details of the informants are shown in Table 2.

Table 2. Berwick informants

	Name	Age	Parents' place of origin
Young	Lyndsey	17	Berwick (both)
	Claire	18	Berwick, Kent
	Malcolm	18	Berwick (both)
	Nolan	24	Berwick (both)
Older	Agnes	57	Berwick (both)
	Margaret	59	Berwick (both)
	Ken	59	Berwick, Newcastle
	Jim	65	Berwick (both)

Parental origin is included as a factor here as it has been shown to influence the consistency with which ScE-speaking children implement the SVLR (Hewlett *et al.*, 1999; see below, section 4.2.2). Given the small number of informants, however, any attempts to generalise trends found in the linguistic data to social groups at large need to be made carefully. It is for this reason that social class is not considered as a formal variable in the present analysis, though with a larger sample of speakers, class might well emerge as a conditioning factor.

3.2 Materials

Scobbie *et al.* (1999a) conclude that the SVLR only applies to /i ʌ ai/ in Standard Scottish English. That this has been shown for Standard (urban) ScE, however, need not preclude the possibility that in more traditional rural Scottish and Northumbrian varieties the set of vowels conditioned by the SVLR is larger than this. As the range of vowels to which an SVLR-type effect might apply in BwE has not yet been ascertained, a larger set of nine vowels ([i e ε a ʊ o u ai]) was used. Each vowel was placed in pairs of English words conforming to contexts shown in ScE to condition the VE (vowel + voiceless and voiced stops at the same place of articulation) and SVLR (vowel + voiceless and voiced fricatives at the same place of articulation). The 36 items in question are shown in Table 3.

The choice of words for each context involved a trade-off between recognisability, comparability of the items in each pair, unambiguousness of written form, and ease of segmentation in the subsequent instrumental analysis. The proper names *Bess* and *Des*, for instance, were chosen for the [ɛ]+fricative context because of a lack of suitable reasonably commonly-occurring tautomorphic [-ɛz] sequences in English; the pair *less~Les* was considered here, but rejected in favour of words beginning with stops since vowel onsets tend to be easier to discern spectrographically when preceded by stops as opposed to voiced liquids.

Table 3. Target words (vowel+stop, vowel+fricative)

Vowel	V+STOP		V+FRICATIVE	
	Voiceless	Voiced	Voiceless	Voiced
i	<i>feet</i>	<i>feed</i>	<i>fleece</i>	<i>please</i>
e	<i>mate</i>	<i>made</i>	<i>face</i>	<i>phase</i>
ɛ	<i>bet</i>	<i>bed</i>	<i>Bess</i>	<i>Des</i>
a	<i>bad</i>	<i>bat</i>	<i>staff</i>	<i>have</i>
ɑ	<i>heart</i>	<i>hard</i>	<i>scarf</i>	<i>starve</i>
ɔ	<i>fort</i>	<i>ford</i>	<i>gorse</i>	<i>gauze</i>
o	<i>wrote</i>	<i>rode</i>	<i>loaf</i>	<i>clove</i>
u	<i>foot</i>	<i>food</i>	<i>loose</i>	<i>lose</i>
ai	<i>height</i>	<i>hide</i>	<i>price</i>	<i>prize</i>

Similarly, a lack of tautomorphic [-os]~[-oz] pairs differing orthographically⁸ meant that words ending in labiodental rather than alveolar fricatives were chosen as SVLR contexts (also for [a] and [ɑ]; note that *have* is very often pronounced [hev] or [hiv] in BwE). From the point of view of post-vocalic rhoticity, the [ɑ] and [ɔ] test items are also potentially problematic, but since lexical items containing [-ɔd], [-ɑd], [-ɔs] and [-ɑs] sequences but for which no etymological /r/ is attested are extremely rare, and because in any case rhoticity appears to be recessive in BwE, these items were included all the same. The results for [ɑ] and [ɔ] therefore ought to be approached with some caution.

The individual items in Table 3 were printed on cards and mixed in random order with 30 cards on which various distractor items were printed (see Appendix 2 for the complete list). Presentation of each target item individually was undertaken so as to eliminate any effects of list intonation and to reduce the possibility of speakers recognising the inclusion of minimal or near-minimal pairs. Each form was read by each speaker once only, but as no misreadings took place, all speakers provided the required number of tokens for each vowel.

The recordings were made in a quiet room using high-fidelity recording equipment with only the informant and CI present. Informants were requested to talk in a 'normal speaking voice' for their readings but were not told of the purpose of the recording until they were debriefed at the end of the session.

3.3 Sampling and duration measurements

⁸ *Close* (adj.) and *close* (vb.) were rejected for being orthographically identical (*close* [klos] also being a noun in ScE, referring to a narrow passage between buildings); *dose* and *doze* are orthographically distinct, but *dose* is generally pronounced [do z] in BwE and ScE.

The recordings for each speaker were downloaded and digitised from audio tape at a sampling rate of 11,025Hz using Sensimetrics *SpeechStation2* spectrographic analysis software running on a PC. The resulting sound files were displayed as time-aligned broad-band spectrograms and speech waveforms from which durational measurements (in milliseconds) could be made of the vowels under study. As per Hewlett *et al.* (1999), the vowel onset was determined from the onset of the first formant, and the offset was determined from the offset of the second formant. In the majority of cases, vowel duration was easy to measure, since the onsets and offsets of the vocalic portion of the utterance were generally very clear in relation to preceding and following stops and fricatives. Where vowels occurred following liquid consonants (as in *wrote~rode* or *loaf~clove*), the boundary between the two was located by visual analysis of formant patterns in the spectrogram in combination with the software's looped audio-playback feature.

3.4 Conversion of duration measurements into voicing ratios

So as to maximise comparability between speakers, the differences in vowel duration between vowels occurring in voiceless stop/fricative vs. voiced stop/fricative contexts were expressed as ratios of the form

$$V_{\text{duration}_{\text{voicedC}}} : V_{\text{duration}_{\text{voicelessC}}}$$

rather than as pairs of absolute durations. For example, the duration of the [i] in Ken's production of *feet* was 83ms, while his *feed* vowel was 102ms long. His *feed:feet* ratio is thus 1.229, in line with what the VE might predict (i.e. the [i] in *feed* is 22.9% longer than that in *feet*; compare this with the ratio of 3.233 for Ken's *fleece* (103ms) and *please* (333ms), which as predicted by the SVLR is a good deal larger than his *feed:feet* ratio). These ratios form the basis of the analysis reported in the following sections.

4. Results

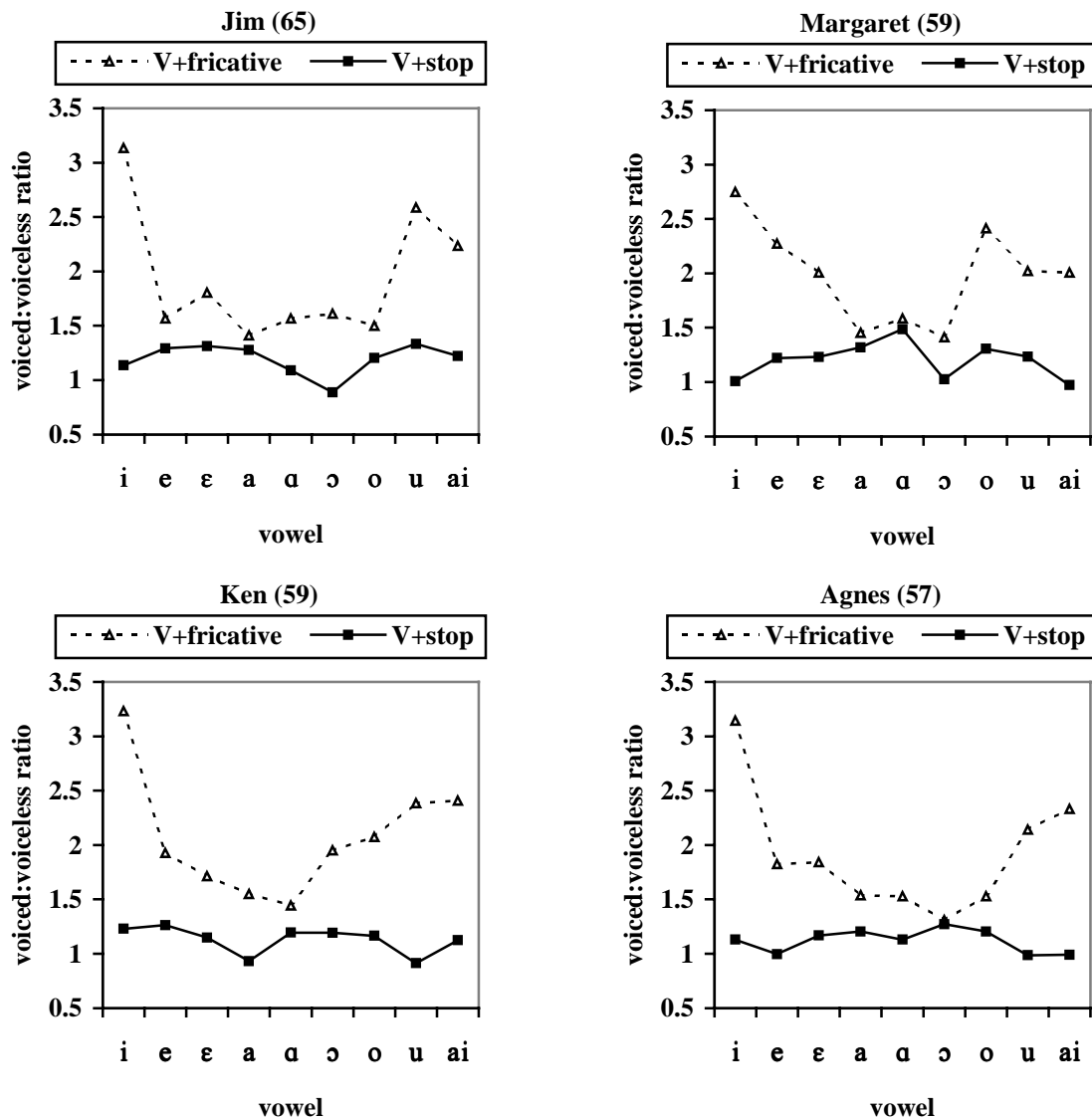
The results for the analysis of the vowel productions of the eight BwE speakers are given in this section. We begin with a discussion of the figures for the four older speakers (see also Tables A-D, Appendix 1).

4.1 Older speakers

Figure 2 shows the ratios of vowel durations in pre-fricative contexts (the dashed lines) and pre-stop contexts (the solid lines), for each of the four older speakers. The vertical axis in each panel refers to the duration of vowels followed by voiced consonants relative to those followed by voiceless ones. 1 indicates parity (i.e. no lengthening effect). A ratio of, say, 2.3 for a given vowel would indicate that the vowel is more than twice as long (in this case 130% longer) when followed by a voiced consonant than before a voiceless consonant with the same place and manner of articulation ([z] as opposed to [s], for instance). Assuming our hypothesis (that both the SVLR and the VE are operational in BwE) to be correct, we would expect to see a pattern whereby the duration difference between vowels occurring before voiced versus voiceless fricatives (SVLR) is consistently *larger* than that obtaining between vowels in voiced versus voiceless stop contexts (VE): plotted on the same scale, as in Figure 2, we would expect to see V+fricative ratios to be higher than V+stop ratios (i.e. the dashed line would be closer to the top of each chart than the solid one, and the lines would not cross).

We must also consider the factor of vowel identity. If the SVLR and VE affect all vowels in the series equally strongly, we would expect each speaker's pair of contours in Figure 2 to be parallel, and horizontal. If, however, there were a differential in the operation of either lengthening effect as a function of vowel identity, the contours would diverge at certain points. Given Scobbie *et al.*'s (1999a) results for Scottish Standard English, we have reason for thinking that BwE [i], [u], and [ai] might be more prone to SVLR lengthening than other vowels, particularly open vowels. If this is the case, and since the vowel series in each panel in Figure 2 is arrayed with [i] to the left and [u] and [ai] to the right, the V+fricative contour in each speaker's chart in Figure 2 ought to exhibit an approximate 'U' shape. Existing accounts of the VE suggest that its operation is less dependent upon vowel identity than is the case for the SVLR, and therefore the V+stop contour is likely to be 'flatter' and more horizontal than that for the SVLR.

Figure 2. Vowel duration ratios of vowels in voiced and voiceless stop and fricative contexts for 4 older Berwick English speakers



These expectations are borne out in the data. For the four older speakers, the V+fricative ratios are significantly larger than those for the V+stop ratios, in all but a handful of cases (e.g. Jim's and Margaret's [a]; Margaret's [ɑ]; Agnes' [ɔ]). In other words, the magnitude of the duration increase among vowels preceding fricatives as a function of the fricative's voicing is almost always in excess - sometimes greatly so - of that among vowels before voiceless and voiced stops. Thus, we have strong evidence here for the independent operation of the SVLR and VE in Berwick English.

The V+stop contours are indeed rather flat by comparison with those for the V+fricative ratios, indicating that VE-conditioned duration increases are relatively uniform across the vowel series. In over 80% of cases VE increases are in the 0 – 50% band; none exceeds 50%. As might be expected, when the figures for the older speakers are averaged for each vowel there is a slight tendency for non-close vowels to exhibit larger VE increases than the close vowels and [ai] (the exception being [ɔ]; this might indicate that since this vowel, as has been suggested for ScE, is generally long in all contexts, a VE-related increase of a given size is liable to have less of an effect on relative duration than would be the case for other vowels).

The V+fricative contours, on the other hand, are strongly suggestive of a quite different trend. For all four speakers, there is a marked trough in the voiced:voiceless fricative context ratios across the vowel series, whereby [i] is approximately twice as long and [u] 50 – 100% longer before voiced fricatives as are [a] or [ɑ] in the same contexts. The duration increase in [ai] before a voiced fricative as opposed to a voiceless one is approximately similar to that for [u]. There are other strong V+fricative effects on [e] and [ɛ] for Jim and [o] for Margaret, but overall it appears that, as Scobbie *et al.* (1999a) found for ScE, the vowels most prone to SVLR lengthening in BwE are the close monophthongs and /ai/.

In no case does the duration difference between a vowel before a voiced stop versus that of a vowel before a voiceless stop exceed that between the parallel contexts in the fricatives; that is, no two contours in Figure 2 cross, although they approach each other very closely in places. Thus, although the SVLR effect relative to the VE is minimal in some vowels for some speakers, the SVLR in every case still results in a larger lengthening effect than that produced by the VE. The SVLR and VE are independent to a greater or lesser extent across the vowel series, then, but crucially, all four speakers implement the two effects in very similar ways.

We look next at the data for the four young speakers.

4.2 Young speakers

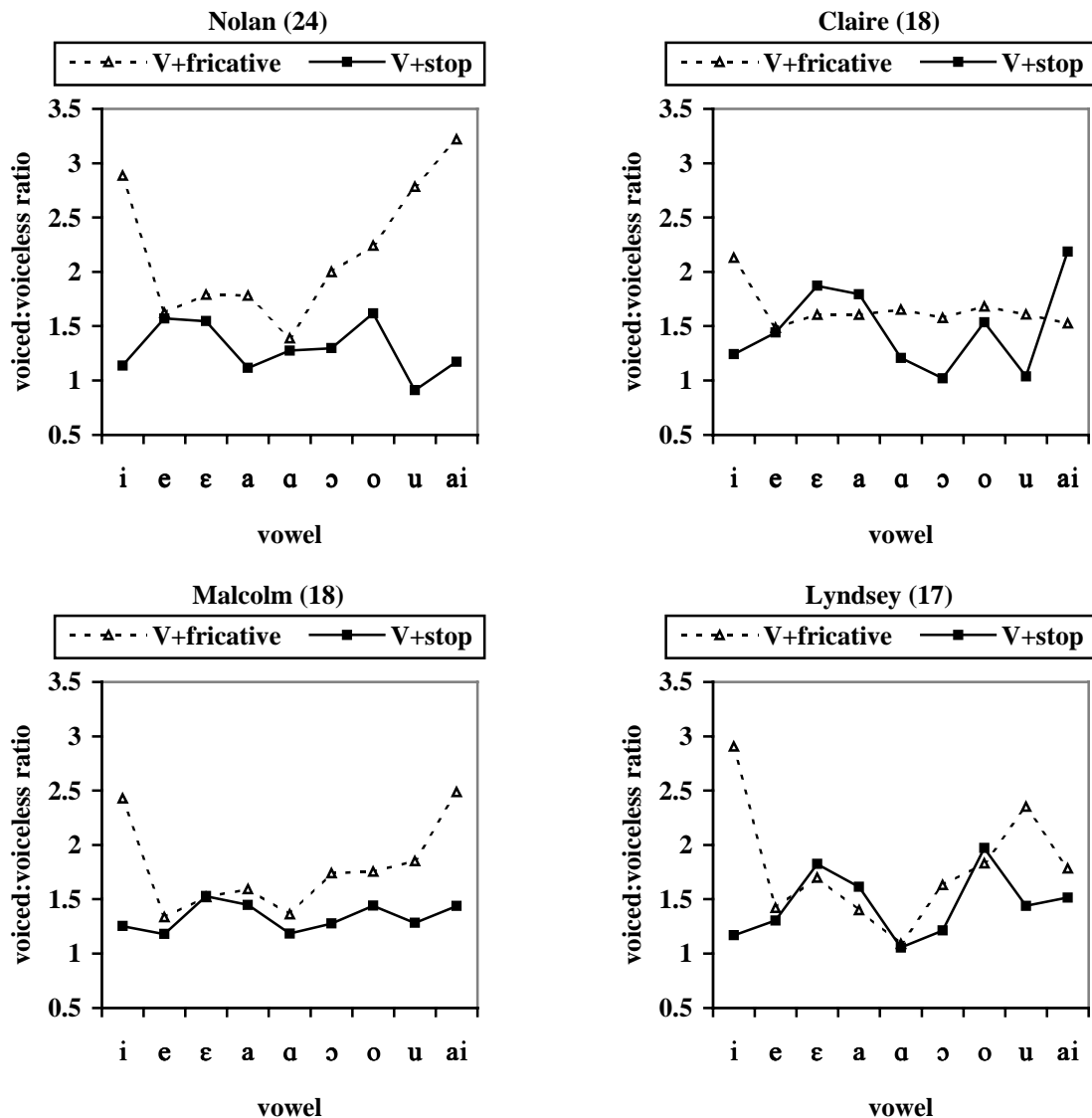
4.2.1 Males

The results for the young speakers are summarised in Figure 3 (see also Tables A-D, Appendix 1). It can be noted immediately that there is a good deal less consistency from speaker to speaker than was the case for the older group in Figure 2.

Looking first at the V+fricative and V+stop contours in the charts for the male speakers Nolan and Malcolm, we see that the two contours are generally separate across the vowel series, and thus it can be said that the SVLR operates independently of the VE for these speakers. Like the four older speakers, Nolan and Malcolm appear to observe the SVLR to a greater or lesser degree in all but a few cases. Note also that while Nolan's SVLR ratios lie between about 1.4 (for [ɑ]) and 3.2 (for [ai]), those for

Malcolm range somewhat less widely. On the other hand, there is more variation in Nolan's VE values (standard deviation = 0.241) than in Malcolm's (sd = 0.129), suggesting that for Nolan vowel identity has a stronger influence on VE application than is the case for Malcolm and for the older speakers (highest sd = 0.169). This is also true for the young females (see below), whose V+stop contours exhibit far less uniformity across the vowel series than was evident in Figure 2 for the older speakers.

Figure 3. Vowel duration ratios of vowels in voiced and voiceless stop and fricative contexts for 4 young Berwick English speakers



4.2.2 Females

The young female speakers Claire and Lyndsey show very different V+fricative and V+stop patterns from one another, and from all other speakers. Claire's V+fricative contour does not exhibit the trough-like profile of the V+fricative contours for all seven other speakers; rather, apart from a relatively minor effect for [i], the contour is more or less horizontal, showing little differentiation between close and open vowels, and no particular effect for [ai] relative to the monophthongs (this

diphthong in fact having in Claire's sample a lower SVLR ratio than all other vowels except [e]). She does, however, have the highest mean VE value (1.481) of all speakers, but also the highest standard deviation (0.402) for this set of alternations, suggesting a certain instability in the way in which she applies the effect in her speech. [ɛ] and [a] are especially strongly conditioned by the VE in Claire's sample, as is [ai].

There thus appear to be few points of similarity between the pattern of vowel lengthening resulting from the SVLR exhibited in Claire's speech and that shown for the other speakers. But since Claire's [i] and [u] vowels are still longer before voiced fricatives than they are before voiced stops (as are [ɑ], [ɔ] and perhaps [o]), we can conclude that the SVLR is evident in her speech, albeit in a reduced form, and only partially in that [ai] appears to be unaffected. It should be borne in mind, however, that Claire's mother is originally from the south of England (Table 2), and that, much as Hewlett *et al.* (1999) found for Edinburgh children with one or more English parent, the SVLR in BwE may be incompletely acquired if at least one parent is not a native speaker of the dialect.

The results for Lyndsey's sample also suggest a weakening of the contrast between the SVLR and the VE in terms of degree of vowel lengthening, but in a different way. While for Claire the V+fricative contexts do not appear to promote increases in vowel duration which are significantly larger than those resulting from the VE (with the exception of [i]), Lyndsey's V+fricative contour implies that vowel length across the series is strongly influenced by the voicing of the following fricative. In this sense, her SVLR effect is very similar to those for the other speakers (except Claire). This should be qualified, however, by pointing out the fact that there is a good deal of overlap between Lyndsey's V+fricative and V+stop ratio values, suggesting that in some cases (just as we saw for Claire) the distinction between the two lengthening effects is neutralised. Like Claire, Lyndsey exhibits far more disparity across the vowel series in terms of the VE than was the case for the older speakers: Lyndsey's VE contour is anything but flat. While her SVLR contour may resemble in overall shape those found for the young males and the older speakers, the lack of separation between it and her VE contour implies a certain instability with regard to the independence of the two effects. Again, however, the vowels most closely associated with the SVLR – [i u ai] – are clearly distinct in terms of the distance between the contours. But although this would suggest that for Lyndsey the SVLR is robust 'where it counts', so to speak, it also indicates that the inventory of vowels to which the SVLR may apply in BwE is confined to close vowels and the closing diphthong [ai] only.

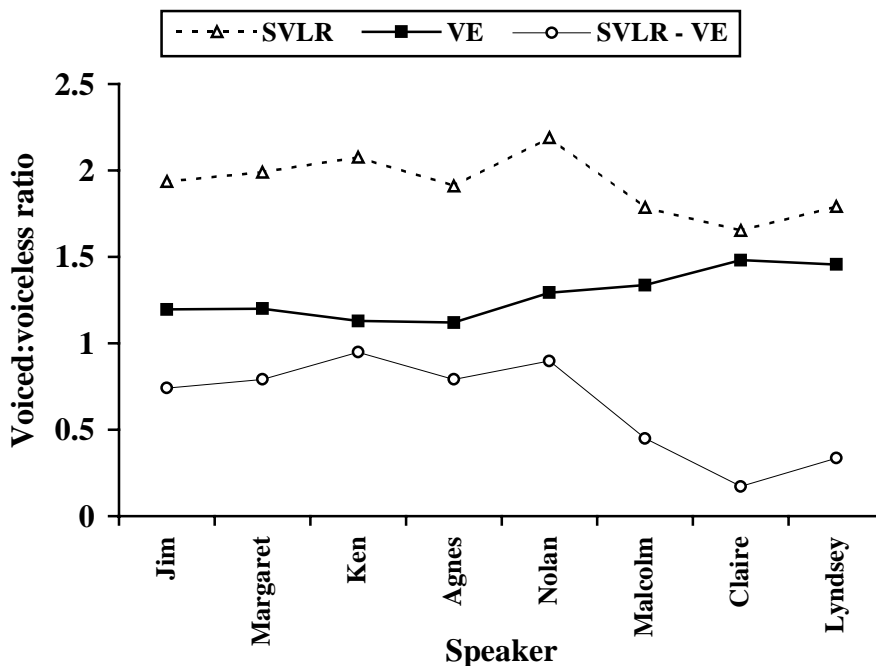
In order to appreciate the weakening of the SVLR relative to the VE for these young speakers, and so as to compare the weakening effect with the more consistent patterns in the older group's samples, it is appropriate to express the disparity in VE-conditioned vowel duration increases and those conditioned by the SVLR as the difference between the (generally smaller) V+stop ratios and the V+fricative ratios. In this way we may arrive at an estimate of the degree to which the two lengthening effects can be said to be independent for each speaker. The resulting figures and their implications are discussed in the following section.

4.3 Implications of the reduction of SVLR effects relative to the VE

4.3.1 Overall results

The general pattern of weakening is apparent in Figure 4, which shows the mean SVLR and VE contours for each speaker, ranged in descending order of age from left to right (figures for all nine vowels are conflated for each speaker). The differences between these ratios are indicated by the lowest contour in the figure.

Figure 4. Mean SVLR ratios, VE ratios, and SVLR – VE differences, pooled across vowel series, for eight speakers (descending order of age, left to right)



The pattern in Figure 4 is one of convergence: while SVLR ratios overall appear to be decreasing in size, so VE ratios seem to be on the increase; thus, the difference between SVLR- and VE-conditioned effects declines from the older age group to the younger. The larger mean VE ratios in the young age group are found to be highly significantly different from those of the older speakers ($p = .002$, one-tailed t -test). The age-related trend in the SVLR figures is rather more complex, however, since although the mean SVLR ratios for Malcolm, Claire and Lyndsey are lower than those for the older speakers, Nolan's is the highest of all speakers. Although no convincing age effect is found for the SVLR as a consequence of Nolan's pattern ($p = .351$, two-tailed t -test), we argue that the *difference* between the SVLR and VE is the more important factor in terms of the maintenance versus neutralisation of the independence of the two lengthening effects. Even with the inclusion of Nolan's figures, the convergence of the VE on the SVLR for the other three young speakers (suggested by their low values for SVLR – VE in Figure 4) is sufficiently marked to result in a statistically significant effect for age ($p = .035$; one-tailed t -test).

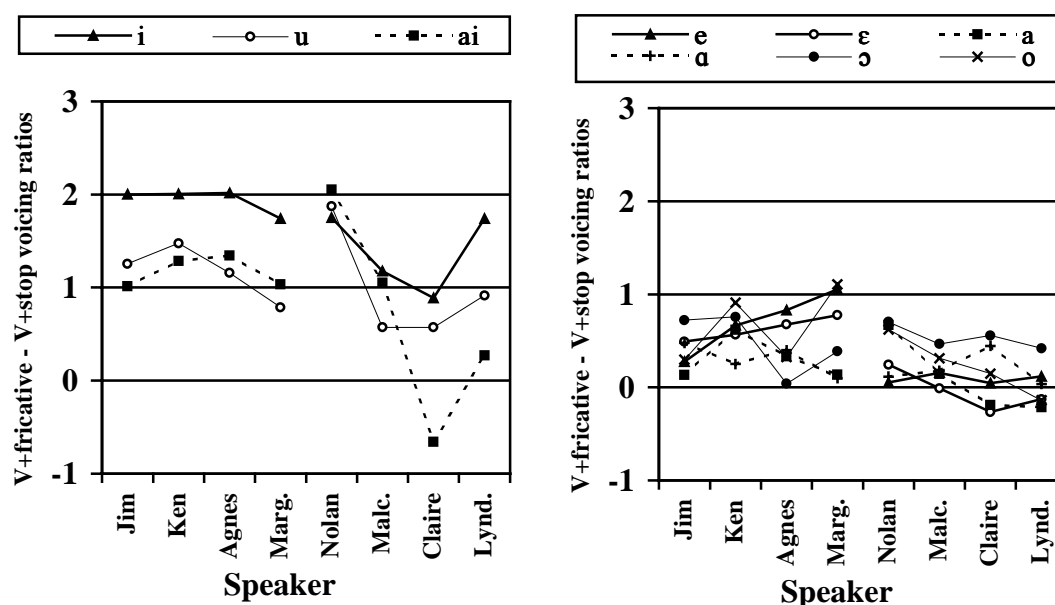
Nolan's mean SVLR and VE ratios are, in a sense, something of a combination of the patterns for older and younger speakers. While it is clear from Figure 3 that his SVLR is similar to those found for the four older speakers, Nolan's VE is a good deal less consistent across the vowel series than is the case for the older group, and resembles the patterns seen for Claire and Lyndsey. This may be related to the fact that Nolan has lived away from Berwick for several years as a university student in southern England; also, at 24 he is several years older than the other young (teenage) speakers. As such, his speech is perhaps less than wholly representative of BwE as it is spoken among young Berwickers, many of whom will have had much less contact with southern AE speakers than Nolan, and who may be less aware of their own linguistic habits.

Overall, however, there is clear evidence that across the vowel series as a whole the teenage speakers are showing a tendency to neutralise the effect of SVLR relative to the VE. It should be remembered, however, that within each speaker's sample the differential application of the SVLR as a function of vowel identity is crucial, since it may be that (as per ScE) SVLR alternations in [i u ai] are more important as a cue to 'Scottishness' than they are in other vowels. The figures are broken down by vowel identity in the following section.

4.3.2 Individual vowels

Figure 5 shows SVLR – VE ratio differences (as per the lowest contour in Figure 4) for each of the nine vowels individually, for each speaker; the SVLR – VE differences for the most SVLR-prone vowels [i u ai] are shown in the right-hand panel, while those for the other vowels [e ε a ɔ o] are in the given in the left-hand panel (the contours for each vowel are discontinuous across the two age groups, for clarity).

Figure 5. Differences between SVLR-conditioned and VE-conditioned vowel duration ratios for nine vowels in Berwick English, as produced by 8 speakers (left panel: close monophthongs and [ai]; right panel: non-close monophthongs)



On the basis of Scobbie *et al.*'s (1999a) findings, and the results already presented in Figures 2 and 3, we would expect to see larger SVLR – VE differences for [i u ai] than we would for [e ε a α ɔ o]. A comparison of the left and right panels reiterates the pattern seen in Figures 2 and 3 that in general the effect of the SVLR on [i u ai] is indeed greater than that of the SVLR on the other vowels, in that values lie by and large in the range 1 – 2 for [i u ai], and between 0 and 1 for [e ε a α ɔ o].⁹ Of all vowels, the difference between SVLR and VE ratios is consistently highest for [i]; for the older speakers, the SVLR~VE ratio difference in [i] is fairly stable at around 2. In other words, the SVLR effects a duration increase on [i] about twice the size of that brought about by the VE on [i] for these speakers. The strength of the SVLR is less marked in the case of [u] and [ai] for the older group, with values falling mostly in the range 1 – 1.5. Such consistency is altogether absent for the four younger speakers, however: instead of the narrow range of values seen for [i u ai] among the older speakers, there is a good deal of spread for all three vowels between 2 and about 0.5, with a negative value for Claire indicating that for her the duration difference between the vowels of *height* and *hide* was larger than that between [ai] in *price* and [ai] in *prize* (see Figure 3, above, and Tables A-D, Appendix 1).

The right-hand panel shows, as expected, that the magnitude of the SVLR duration increase over that of the VE on the non-close monophthongs [e ε a α ɔ o] is much smaller than was the case for [i u ai]. This is true for both age groups, and indeed the pattern appears to be one of comparative stability across age and consistency across vowels. However, there are differences between the age groups in terms of the neutralisation of the SVLR with respect to the VE: for the older speakers, values are all positive and are generally higher than among the younger ones, indicating that for all four older speakers the SVLR affects all the non-close monophthongs to at least a small degree.

In summary, then, the difference between the older and younger age groups can be (tentatively) characterised as a change involving the collapse of the SVLR with the VE which affects all the vowels tested to some extent, but the SVLR-prone vowels [i u ai] most markedly. The non-close monophthongs pattern with one another rather consistently in both age groups, with reduction or neutralisation of the disparity between SVLR and VE effects among the younger speakers relative to the pattern among the older ones. Among the close monophthongs and [ai] vowels produced by the younger speakers, however, the stable pattern seen for the older speakers is absent, with the relationship between the three vowels and the relatively narrow ranges of the ratio differences for each vowel being in some sense 'disrupted'.

5. Conclusion

This study has found that the SVLR is, as hypothesised, a feature of the phonology of BwE, and that it patterns closely with the SVLR as reported for Scottish Standard English by Scobbie *et al.* (1999a). For all the speakers tested here, there is a noticeably or significantly greater voicing-dependent lengthening effect for the [i] vowel in contexts where it appears before a voiced fricative (as in *please*) as opposed to a voiceless one (as in *fleece*) than in those where the vowel is followed by a voiced

⁹ The preference for [i u ai] in terms of SVLR conditioning is reflected by the result of a one-tailed *t*-test comparing the overall means of the SVLR - VE differences in [i u ai] and those in [e ε a α ɔ o], where *p* = .0005.

stop (as in *feed*) as opposed to a voiceless one (as in *feet*). This is also true of [u]. For seven of the eight speakers (i.e. all except Claire) [ai] exhibits the predicted lengthening effect whereby the vowel of *prize* has a greater duration relative to that of *price* than the is the case for the VE effect obtaining in the *height~hide* pair. There are similar effects apparent for the non-close monophthongs [ɛ e a ɔ o], though these are generally smaller than was found for [i u ai], especially among the open vowels, and there is less consistency across the speaker group as a whole with respect to a clear distinction between the SVLR and VE effects than was found for [i u ai]. Thus, *contra* Scobbie *et al.* (1999a), we argue that the SVLR is a conditioning factor in BwE not just on [i u ai] but on *all* the vowels surveyed to a greater or lesser degree.

The SVLR and VE duration increases are generally quite consistent across the four older speakers' samples, as was seen in Figures 2, 4 and 5. The same cannot be said of the four younger speakers. While the young males appear to follow roughly the pattern seen among the older speakers, the SVLR and VE effects in the samples for the young women Claire and Lyndsey are not applied in the same way as was found for the other speakers. In particular, the SVLR effect on [ai] appears to be relatively insignificant for these two girls.

Viewed as a whole, there are suggestions that the effect of the SVLR on the BwE vowel system appears to be weakening, in that the average disparity between SVLR- and VE-related duration increases is smaller among young speakers than among older ones (Figures 4 and 5). Such a trend implies an eventual neutralisation of the SVLR with respect to the VE, and the convergence of the BwE vowel system on a VE-only model typical of southern forms of AE. This type of levelling of the variety toward a more mainstream AE series of alternations might stand as an example of the changes in NbE described and predicted by Glauser (1997), who is of the opinion that varieties spoken on the southern side of the border are presently levelling toward Standard (Anglo-) English. He remarks:

Some of the heteroglosses that follow the border very narrowly in my material could tentatively be fixed in Durham at the time of Joseph Wright [viz., the latter part of the 19th century]. Quite a few of my heteroglosses along the Border are of (very) recent date. My conclusions... were twofold. If the Standard influence continues, new heteroglosses could be expected to concentrate along the Border. Secondly, the evidence of Standard influence being much less striking north of the Border, the dividing effect of the geographical border is bound to increase. (Glauser 1997: 6-7).

Glauser's comments here refer to trends observed in the use of non-standard lexis on either side of the border, but lexical divergence between varieties of English in lowland Scotland and Northumberland might be taken as symptomatic of a process of change affecting language use at multiple levels (although whether these come about under the influence of 'Standard English' is open to question). Where Berwick would fit into such a divergent pattern is unclear, since, as we saw in section 2, there is a good deal of uncertainty as to the town's identity with respect to national affiliation, and thus the mapping between the geographical border and the 'psychological' border may vary widely from individual to individual. It might be the case, for instance, that those speakers who consider themselves fully Scottish, or more Scottish than English,

would be more inclined to retain (or even increase their usage of) features typically associated with Scottish varieties, such as the SVLR, post-vocalic rhoticity, or tapped (r) (cf. results reported by Stuart-Smith & Tweedie (2000)); conversely, those biased toward to an English and/or north-eastern English set of sociocultural values might tend to eliminate ‘Scottish’ features from their speech more quickly than would others.¹⁰ Consideration of the interaction of social identity with socioeconomic grouping is also likely to be invaluable in explanatory terms. Without further research these hypotheses are necessarily rather speculative, but there is clearly wide scope for more detailed investigation in this area.

The limitations of the present study in terms of scale are acknowledged, and any inferences drawn on the basis of the data should consequently be taken as more suggestive than conclusive at this stage. While the evidence for the operation of the SVLR in BwE as demonstrated among the four older speakers is compelling, the pattern among the younger speakers requires more complex interpretation. The younger speakers are rather heterogeneous with respect to one another, and are probably not all especially typical of the speech community as a whole. The fact that Claire’s mother is from south-eastern England, for instance, may explain why Claire’s SVLR pattern is so distinct from those of the other seven speakers. Nolan’s atypicality has already been discussed (section 4.3.1), but assuming the difference between Nolan and the other young speakers to be one based on Nolan’s age, it is possible that any convergence of the VE and SVLR effects on each other is so recent as to be evident only in the speech of Berwickers younger than Nolan. Alternatively, Nolan’s prolonged contact with southern AE speakers might have led to a ‘strengthening’ of the feature in his speech, as Glauser (1974) suggests might be the case for speakers of ScE who have high levels of contact with AE speakers. This recalls Labov’s (1963) findings for young educated men on Martha’s Vineyard, whose unexpectedly high usage of the localised variants of (ay) and (aw) were interpreted as a statement of loyalty to the locality and its way of life.

It is clear, then, that a larger sample of speech from BwE speakers, in combination with more sophisticated statistical analysis than that used here, is needed in order to clarify the question of whether the weakening of SVLR effects among the young Berwickers sampled for the present study is part of a general ongoing trend in BwE characterised by divergence away from the traditional VE- and SVLR-conditioned system of alternations toward a VE-only system.

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¹⁰ Kiely *et al.*’s study unfortunately does not provide any information on age-related differences between informants in terms of perceptions of Berwick and Berwickers. All but a handful of their respondents were significantly older than the members of the 17-24 ‘young’ age group used here. It seems on the basis of anecdotal evidence, however, that some older Berwickers believe that their children do ‘not associate as strongly with the notion of being Berwickers [as do older people] and might be more inclined to describe themselves as being English rather than Berwickers when being asked about their national identity’ (Richard Kiely, personal communication).

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APPENDIX 1: Tables

Table A. Vowel durations in voiceless stop contexts (ms)

Item	Jim	Marg.	Ken	Agnes	Nolan	Malc.	Claire	Lyndsey
<i>feet</i>	126	118	83	132	81	103	108	132
<i>mate</i>	185	168	171	241	105	156	186	214
<i>bet</i>	227	196	195	258	97	121	116	177
<i>bat</i>	231	211	174	324	158	174	126	197
<i>heart</i>	244	292	247	341	175	202	251	309
<i>fort</i>	215	281	243	262	155	174	246	255
<i>wrote</i>	203	200	159	289	123	145	159	142
<i>foot</i>	102	107	136	134	89	103	134	98
<i>height</i>	221	347	204	197	122	126	108	198
MEAN	194.9	213.3	179.1	242.0	122.8	144.9	159.3	191.3

Table B. Vowel durations in voiced stop contexts (ms)

Item	Jim	Marg.	Ken	Agnes	Nolan	Malc.	Claire	Lyndsey
<i>feed</i>	143	119	102	149	92	129	134	154
<i>made</i>	239	205	216	240	165	184	268	279
<i>bed</i>	298	241	224	301	150	185	217	323
<i>bad</i>	295	278	162	390	176	252	226	318
<i>hard</i>	266	434	295	385	223	239	303	326
<i>ford</i>	191	288	290	333	201	222	251	309
<i>rode</i>	244	261	185	348	199	209	244	280
<i>food</i>	136	132	124	132	81	132	139	141
<i>hide</i>	270	337	229	195	143	181	236	300
MEAN	231.3	255	203	274.8	158.9	192.6	224.2	270

Table C. Vowel durations in voiceless fricative contexts (ms)

Item	Jim	Marg.	Ken	Agnes	Nolan	Malc.	Claire	Lyndsey
<i>fleece</i>	104	127	103	132	78	96	156	118
<i>face</i>	203	154	155	238	122	164	212	240
<i>Bess</i>	200	172	168	222	124	158	175	159
<i>staff</i>	224	203	191	268	119	162	162	245
<i>scarf</i>	238	245	254	339	188	194	190	277
<i>gorse</i>	203	297	183	348	151	166	253	168
<i>loaf</i>	196	150	149	247	121	134	179	178
<i>loose</i>	126	146	109	183	83	217	176	105
<i>price</i>	149	168	118	126	81	156	198	162
MEAN	182.6	184.7	158.9	233.7	118.6	160.8	189	183.6

Table D. Vowel durations in voiced fricative contexts (ms)

Item	Jim	Marg.	Ken	Agnes	Nolan	Malc.	Claire	Lyndsey
<i>please</i>	326	349	333	415	225	233	332	343
<i>phase</i>	318	350	299	434	198	219	315	341
<i>Des</i>	361	345	288	409	222	240	281	270
<i>have</i>	316	295	296	412	212	258	260	343
<i>starve</i>	373	388	367	518	261	264	314	302
<i>gauze</i>	327	419	357	456	302	289	399	274
<i>clove</i>	294	362	309	378	271	235	301	326
<i>lose</i>	326	295	260	392	231	402	283	247
<i>prize</i>	333	337	284	294	261	388	302	289
MEAN	330.4	348.9	310.3	412	242.6	280.9	309.7	303.9

APPENDIX 2: Berwick word list

FEET	ENGLISH	BED	LOAF	FLEECE
PLEASE	WHO	LOT	HOUSE	BAT
DAY	RODE	FACE	RAKE	SLEEP
WHITE	HAPPY	BET	LOSE	BREAK
FOOT	SCARF	DES	CHINA	SUN
CLOVE	FEED	GORSE	FOOD	MADE
PETER	HARD	HEIGHT	GREAT	EAT
LOOSE	NOW	PHASE	FORT	WROTE
PRINCE	WHISKY	DRINK	PRICE	SNOW
WHIP	BESS	STAFF	SMALL	BAD
FISH	VANISH	GAUZE	HIDE	
STARVE	FORD	PRIZE	HAVE	
LETTER	DOG	TEA	MESS	
HEART	MATE	FRIEND	BIKE	