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Vowel harmony in Buchan Scots English[1]

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In this article, I discuss vowel reduction, stress, and vowel harmony in Buchan Scots English, a dialect spoken in Aberdeenshire in northern Scotland. Work by Wölck (1965) describes Buchan Scots English as having vowel harmony. This article explores the conditions that restrict the distribution of vowels in those syllables that do not receive a primary stress. Such syllables allow a smaller range of contrasts, and vowel height in these syllables is at least partially predictable from a preceding stressed vowel. These facts show that both vowel reduction and vowel harmony operate in Buchan Scots English.

1 Introduction

The study of the phonology of Modern English and the associated dialects has led to quite an extensive literature on stress, vowel quality, and vowel reduction (see, for example, Chomsky & Halle, 1969; Liberman & Prince, 1977; Ladefoged, 1993; Hayes, 1984, 1995; Hammond, 1999, and many others). The facts are as follows. First, the set of vowels allowed in stressed syllables is typically larger than the set of vowels allowed in unstressed or reduced vowels. In many English dialects, one or more of [ə, ɪ, ɨ] acts as the reduced vowel (Ladefoged, 1993). Second, as stress changes in morphologically related words, the vowel quality often changes. These same English dialects also exhibit some form of alternation with schwa (or another reduced vowel) depending on the stress pattern, as shown in (1):

(1) Vowel alternations and stress changes in American English words:

(a)	parent [pɛ́ɹənt]	*versus*	parental [pəɹɛ́ntl̩]
(b)	medicine [mɛ́dəsən]	*versus*	medicinal [mədísəñl̩]
(c)	virile [vɪ́ɹəl]	*versus*	virility [vəɹɪ́lərɨ]
(d)	admonish [ədmɑ́nɪʃ]	*versus*	admonition [æ̀dməníʃən]

The phenomenon of vowel reduction has been widely discussed, described, and analyzed for English. This phenomenon has not been taken to involve or interact with any process of vowel harmony. In this article, I will discuss vowel reduction, stress, and vowel harmony in Buchan Scots English. Buchan Scots English is a dialect spoken in northern Scotland, in Aberdeenshire. Wölck (1965) characterizes this dialect as having vowel harmony. Of the eight vowels permitted in stressed

[1] A very special thanks to Wolf Wölck for many helpful discussions of these issues. All Buchan Scots English data in this article come from Wölck (1965). For additional helpful comments, my thanks to Karin Michelson. This material benefited from a presentation at the 2001 Annual Meeting of the LSA in Washington, DC, and two anonymous reviewers. Any errors are solely my fault, and this article does not necessarily reflect the views of anyone acknowledged here.

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syllables, only four can occur in unstressed syllables. The purpose of this article is to explore the conditions that restrict the distribution of vowels in unstressed syllables. The basic generalization about reduced vowels in this dialect is that nonhigh reduced vowels only follow other nonhigh vowels, while high reduced vowels can follow all vowels (albeit with restrictions). The evidence for this generalization comes from distributional patterns and alternations. Suffixes like *-ful* show this. Compare the final surface vowel in this suffix in Buchan Scots English in (2) with its counterpart in General American English in (3). The forms show that Buchan Scots varies the unstressed suffixal vowel. When the stem vowel is high, so is the suffixal vowel. When the stem vowel is nonhigh, so is the suffixal vowel. In General American, the suffixal vowel is always [ə], regardless of the preceding vowel's height.

(2) The *-ful* suffix in Buchan Scots English:
  (a) [áf̲ə̲] 'awful'[2]
  (b) [ísf̲ɪ̲] 'useful'

(3) The *-ful* suffix in General American English:[3]
  (a) [rǽθf̲ə̲l]/[rɑθf̲ə̲l] 'wrathful'
  (b) [wófə̲l] 'woeful'
  (c) [glíf̲ə̲l] 'gleeful'

What this pattern shows, and what is shown by the data explored in the remainder of this article, is that Buchan Scots English is a dialect of English that displays vowel harmony, as well as vowel reduction. The set of contrasts permitted in unstressed syllables is not only smaller than that allowed in stressed syllables, but the vowel quality of reduced vowels is at least partially predictable from the preceding stressed vowel. Depending on the environment, Buchan Scots English shows two types of harmony patterns. The 'unrestricted harmony' pattern is complementary, where high vowels only follow high vowels, and nonhigh vowels only follow nonhigh vowels. The 'restricted harmony' pattern is asymmetric; high vowels follow high vowels and nonhigh vowels, while nonhigh vowels follow only nonhigh vowels. The asymmetry lies in the height mismatch when high vowels follow nonhigh vowels.

This article has the following organization. Section 2 lays out the vowel inventory of Buchan Scots, showing the set of contrasts permitted in monosyllabic words and describing the basic facts for stress. Section 3 describes restricted harmony, which consists of the environment where the entire set of reduced vowels can occur. Included is a description of the limited set of contrasts in an unstressed syllable closed by a rhotic, and a discussion of the asymmetric pattern in restricted harmony. The subsequent section describes the cases of unrestricted harmony provided by the

[2] The data used in this article reflect the published material in Wölck (1965), which represents recordings made from 1960 to 1962. Speakers in Wölck's study come from Aberdeenshire, mostly from the town of Fraserburgh, but also from New Aberdour, Pennan, Peterhead, and nearby towns. One of the reviewers contributed comparative dialectal data from another Aberdeenshire town, Huntly, in which the facts are somewhat different. One major difference is in the vowel inventory, as Huntly has a high rounded front vowel, [y], and the low vowel [a] is central, rather than front. There are also cases where Huntly shows further neutralization of vowel quality.

[3] Transcriptions for the General American English examples come from Kenyon and Knott (1995).

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diminutive and other suffixes. These cases mimic the complementary, classic cases of vowel harmony found in other languages. Section 5 summarizes the patterns, and section 6 comments on comparisons with other English dialects.

2 Vowel inventory

The basic vowel system of Buchan Scots English consists of eight vowels and three diphthongs. The vowels contrast in height and backness/frontness, and the high back and mid back vowels are also both round. The inventory is given in (4):

(4) The vowels of Buchan Scots English (following Wölck, 1965):[4]

	Front	Central	Back
High	i	ɪ	u
Mid	e	ə	o
Low	a		ʌ

Diphthongs:	ei	
	ai	au

These vowels occur in relatively limited distribution with each other. While all eight vowels are allowed in stressed syllables, only four vowels, [i, ɪ, e, ə], can appear in unstressed syllables. The features [back], [round], and [low] do not occur in unstressed syllables, meaning that they never occur more than once within prosodic words. Affixation and allomorphy also play a role in determining what vowels co-occur.

The forms in (5) show the range of vowel contrasts permitted in monosyllabic content words, those words that must be stressed. The left-hand column lists permissible open syllables, and the right-hand column lists permissible closed syllables. In the latter case, the coda is always [n], while there is some variation in the onset of the syllable. Only a subset of the vowels are permitted in monosyllabic words with an open syllable: [i, u, e, o, a]

(5) Vowel contrasts in monosyllabic content (stressed) words:

	Open syllable		Closed syllable	
i	li	'lie'	bin	'bone'
ɪ	–		bɪn	'bind'
u	pu	'pull'	lun	'*loun*'[5]
e	te	'tea/toe'	hen	'hen'
ə	–		fən	'fin'
o	θro	'throw'	don	'Don'
a	la	'law'	han	'hand'
ʌ	–		fʌn	'when'

[4] For simplicity's sake, I use the same symbols as in Wölck (1965); the reader should note that these symbols do not reflect their current IPA value, although they are positioned in this chart according to vowel features.

[5] Italicized glosses indicate Scottish words.

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The facts of stress are relatively uncomplicated. Stress is generally word-initial, and so is indicated in forms only when it is noninitial. The forms in (6) show the typical distribution pattern of initial stress, while (7) gives forms with the less common noninitial stress pattern.

(6) Initial stress (unmarked; typical distribution pattern):
- (a) ivnɪn 'evening'
- (b) dɪzɪn 'dozen'
- (c) bulɪr 'bowler'
- (d) pelək '*pellock*'
- (e) šələn 'shilling'
- (f) gokət '*gowkit*'
- (g) ganǯe 'guernsey'
- (h) tate 'potato'
- (i) bʌxən 'Buchan'

(7) Noninitial stress (marked; atypical distribution pattern):
- (a) dɪpén 'depend'
- (b) dɪvál '*devel V.N.*'
- (c) əfór 'before (afore)'
- (d) kəmplín 'complain'

In comparing these two stress patterns, we find an interesting asymmetry. The fewest number of contrasting reduced vowels ([ə, ɪ]) occurs in a stressless initial syllable. That is, in those cases with noninitial stress, there are only two possible vowels that can occur in the initial syllable, [ə, ɪ]. Furthermore, the environment following these two vowels allows the widest range of vowel contrasts. Noninitial stressed [ə] and [ɪ] have the fewest tokens occurring. There are also no cases where [ɪ] precedes either [ʌ] or [o], although this is likely to be an accidental gap given the attested pattern [ɪ...ú]. The full range of vowels occurring with noninitial stress is given in (8a–b).[6]

(8) Vowel co-occurrence patterns with noninitial stress:

(a)	[ə]			
i	ðəstrín	'*thestreen*'	kəmplín	'complain'
ɪ	əhín	'behind (ahind)'		
u	əlú	'allow'	ərún	'around'
e	ðədé	'today'	əmézt	'amazed'
ə	ðənə́xt	'tonight'	–	
o	əmó	'among'	ədóp	'adopt'
a	strəmáš	'*stramash*'	əkwánt	'acquainted'
ʌ	əmʌ́n	'among'	təmʌ́rə	'tomorrow'[7]

[6] In all subsequent data sets, I attempt to give examples of the target vowels in an open syllable (on the left-hand side) and a closed syllable (on the right-hand side). Where this is not possible, I give two examples of the target pattern. However, not all patterns are robustly attested.

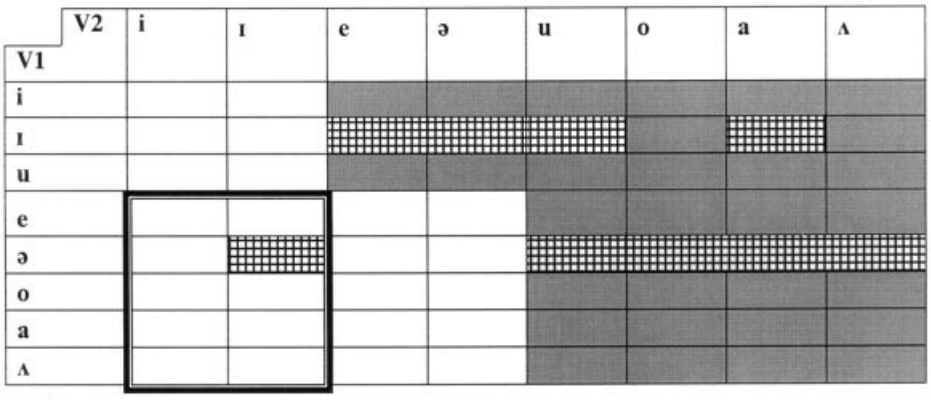
[7] Also found as [ðəmórn] 'tomorrow' in Wölck (1965).

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(b)	[ɪ]			
i	mɪnír	'*mineer*'	–	
ɪ	–			
u	ɪnjúx	'enough'	ʒɪlúz	'*jalouse*'
e	dɪpén	'depend'	ɪkspék	'expect'
ə	bɪgén	'begin'	–	
o	–			
a	ɪgzákle	'exactly'	bɪgán	'begin Pt.'
ʌ	–			

We see that [ɪ] and [ə] contrast in these positions, with an unrestricted distribution. There are no apparent height restrictions on the following vowels. In contrast, the remaining sets of data do not have an unrestricted distribution. The chart in (9) below illustrates the distributional restrictions described in this section and those to come. The attested patterns are indicated by white cells, while gray cells indicate an unattested pattern. Grid-marked cells indicate a pattern that only occurs if V2 is stressed (the data immediately above in (8)). The double-lined box within the box indicates the twist: nonhigh vowels can be followed by unstressed high vowels. Unrestricted, complementary harmony would expect to find high vowels only after high vowels and nonhigh vowels only after nonhigh vowels. However, the boxed set of patterns are those that represent the asymmetric distribution of 'restricted harmony', where high vowels can follow nonhigh vowels in some conditions.

(9) Vowel co-occurrence patterns



This chart previews the co-occurrence patterns of Buchan Scots English vowels. The next sets of data more fully illustrate the distribution and alternations. What we will see is that there are certain domains where we find restricted harmony, and other domains where we find unrestricted harmony. The cases together suggest that in Buchan Scots English, there is both vowel reduction and vowel harmony.

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3.1 Restricted harmony: a first glance

Let us now turn to an examination of the cases with the most typical stress pattern, word-initial. The initial stress pattern results in the widest range of unstressed vowels, as four vowels occur here: [i, ɪ, e, ə]. These nonback, nonlow vowels can be generalized as follows. First, [e] and [ə], which are nonhigh, occur only after nonhigh vowels. Second, [i] and [ɪ], which are high, occur after high and nonhigh vowels. It is the latter condition, high vowels occurring after nonhigh vowels, which makes this 'restricted' harmony.

(10) Unstressed [e, ə] occur only following nonhigh vowels:

(a)	[e]			
i	–			
ɪ	–			
u	–			
e	beke	'*baikie*'	kere	'carry'
ə	skərle	'*skirlie*'	dəfrent	'different'
o	tofe	'toffee'	krošet	'crocheted'
a	tate	'potato'	dalez	'*dallie's*'
ʌ	bʌke	'*buckie*'	fʌske	'whisky'

(b)	[ə]			
i	–			
ɪ	–			
u	–			
e	femlə	'family'	berəks	'barracks'
ə	lətlən	'*littlin*'	θərəp	'*thirrap*'
o	borə	'borrow'	slorəx	'*slorach*'
a	šalə	'shell N.'	abləx	'*ablach A.N.*'
ʌ	ʌŋkə	'*uncouth*'	ʌmən	'woman'

The nonhigh vowels never follow high vowels, only nonhigh vowels. When noninitial, the high vowels, [i] and [ɪ], can follow any vowel. The one qualification to this is that, apparently, [ɪ] is always stressed after [ə].

(11) Unstressed [i, ɪ] occur following high and nonhigh vowels:

(a)	[i]			
i	drixi	'*dreichy*'	piri	'*pearie*'
ɪ	sɪmɪtri	'cemetery'	twɪnti	'twenty'
u	budi	'*boodie*'	tuliz	'Toolies'
e	speŋi	'*spainyie*'	–	
ə	əlki	'*ilke Al.*'	brəmstin	'brimstone'
o	podli	'*podlie*'	dorbi	'*dorbie*'
a	bradi	'*bridie*'	sani	'sandy'
ʌ	krʌni	'*crannie*'	skʌdi	'*scuddy*'

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(b)	[ɪ]			
i	idjɪt	'idiot'	ǯilɪs	'jealous'
ɪ	wɪndɪ	'window'	bɪgɪt	'*big Pt. PP.*'
u	hulɪt	'owl'	surɪk	'*sourock*'
e	elbɪ	'elbow'	feǯɪn	'pheasant'
ə	əhín	'behind (ahind)'	–	
o	bodɪ	'body'	ovɪn	'oven'
a	kabɪǯ	'cabbage'	fadɪm	'fathom'
ʌ	rʌbɪt	'rabbit'	krʌmpɪt	'crumpet'

Unstressed [i] and [ɪ] can follow any vowel (except for [ə. . .í]). There do also seem to be some gaps with regard to the distribution in open and closed syllables. Unstressed [i] rarely appears in a closed syllable and unstressed [ɪ] is under-represented in final open syllables.

3.2 Restricted harmony before a rhotic

In other English dialects, the set of vowel contrasts that are permitted before rhotics is smaller than the set of contrasts permitted elsewhere. Buchan Scots English also limits the number of permissible contrasts in this environment. This next set of data shows that only the two central vowels are allowed before a rhotic in an unstressed syllable. Otherwise, the generalizations are the same as for the previous forms that showed restricted harmony. In a reduced syllable before the rhotic [r], [ə] occurs only after nonhigh vowels, while [ɪ] occurs after high and nonhigh vowels. So words that end in a reduced vowel followed by [r] only allow one of the central vowels.

The set of data below illustrates these patterns. The forms include cases where *-Vr* is a suffix (such as the agentive or comparative) as well as cases where it is arguably not a suffix. What this suggests is that at least at some level of representation in some of these forms, it is possible to treat the distribution of [ɪ] and [ə] as an alternation.

(12) The *-Vr* ending alternates between *-ɪ* and *ə*

(a)	[ɪ]			
i	blitɪr	'*bleeter*'	hifɪr	'heifer'
	strikɪr	'stretcher'	blizɪr	'blazer'
	ridɪr	'redder/reader'		
ɪ	gɪmɪr	'*gimmer*'	ɪdɪr	'other'
	lɪmɪr	'*limmer*'	klɪvɪr	'clever'
	fɪvɪr	'fever'	nɪxɪr	'*nicher*'
u	kupɪr	'cooper'	ludɪr	'louder'
	kutɪr	'coulter'	pudɪr	'powder'
	kutɪr	'cottar'	šudɪr	'shoulder'
e	bledɪr	'bladder/blather/blether'	geðɪr	'gather'
	edɪr	'*edder*/either/udder'	hedɪr	'heather'
ə	–			
o	klovɪr	'clover'		

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a	waǯɪr	'wager'	lajɪr	'lawyer'
	fadɪr	'father'	laŋɪr	'longer'
	šargɪr	'*sharger*'	havɪr	'halver'
ʌ	hʌbɪr	'*habber*'		

(b)	[ə]			
i	–			
ɪ	–			
u	–			
e	hemər	'hammer'	betər	'better'
	čepər	'cheaper'	eftər	'after'
	denər	'dinner'	letər	'letter/later'
	telər	'tailor/teller'	pepər	'paper/pepper'
	menər	'manner'		
ə	lexər	'lower'	fəxər	'*ficher*'
	lənər	'*linder*'	ləmər	'*limmer*'
	bətər	'bitter'		
o	kotər	'cottar'	stotər	'stutter'
	snoxər	'*snocher*'		
a	danər	'*dander V.N.*'	kalər	'caller/colder'
	hapər	'hopper'	kwartər	'quarter'
	kraftər	'crofter'	labstər	'lobster'
	akər	'acre'	njatər	'natter'
	čamər	'chamber'	sapər	'*sapper*'
	farər	'farther'	skalər	'scalder'
	slaxtər	'slaughter'	tapnər	'*tappiner*'
ʌ	swʌpərt	'*swippert*'	šʌnərz	'cinders'
	bʌtər	'butter'	skʌnər	'*scunner*'
	hʌŋkər	'*hunker*'	hʌnər	'hundred'

These forms show that there is a degree of harmony to be found in the distribution of the two central vowels. High vowels are followed by the high vowel allomorph, *-ɪ*, and nonhigh vowels are followed by the nonhigh allomorph, *-ə*. The asymmetrical data in (12b) are those cases where a high vowel is followed by a nonhigh vowel in the reduced syllable. This is asymmetrical because it is not the expected harmonic pattern where a nonhigh vowel is followed by a nonhigh vowel. We discuss those cases in a little more depth in the next subsection.

The harmonic split between nonhigh and high vowels is further emphasized in words with variable pronunciations. In such words, the vowels may switch between high or nonhigh. The key observation, however, is that there is never a mismatch between the vowels such that a word contains both nonhigh and high vowels (in any order). The reduced vowel always agrees with the high/nonhigh quality of the previous vowel.

(13) Variable pronunciations and vowel harmony:

(a)	kutɪr	*versus*	kotər	'cottar'
(b)	lɪmɪr	*versus*	ləmər	'*limmer*'
(c)	pipɪr	*versus*	pepər	'paper'
(d)	sɪkɪn	*versus*	sekənt	'second'

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(e)	pinɪn	*versus*	penən	'Pennan'
(f)	juki	*versus*	joke	'*youky*'
(g)	krušit	*versus*	krošet	'crocheted'

The forms in (13) show that variable forms surface with distributional patterns that mimic the unrestricted harmony. These forms either contain all high vowels or all nonhigh vowels. The variable pronunciation forms never result in a mismatch in terms of these height categories. Also noteworthy in (13) is the fact that this generalization holds regardless of the type of syllable in which the reduced vowel occurs. The examples in (13) consist of the prerhotic environment, as well as including reduced syllables that are open, closed by a nasal, or closed by a coronal inflectional affix. The range of forms supports the notion that vowel harmony is present in Buchan Scots English.

To summarize here, the prerhotic pattern shows a central vowel 'alternation'. This reduction pattern also mimics the distribution pattern of the set of all reduced vowels, especially the forms where the high variant follows nonhigh vowels. Both patterns suggest a 'restricted harmony'. The prerhotic environment also shows cases where there is variable pronunciation in forms. A further look at these variable cases shows that they display unrestricted harmony, as there is always height agreement within a word. The main point of the prerhotic data is to show that reduced vowels are not in an entirely complementary relationship, because high vowels can follow nonhigh vowels, but that this environment shows restricted harmony.

3.3 The asymmetry in restricted harmony: nonhigh vowels followed by reduced high vowels

The asymmetrical pattern, where high vowels follow nonhigh vowels, is worth additional discussion. The additional generalization is that the only prosodic words in Buchan Scots English that allow unstressed [ə] to follow a voiced obstruent are those cases where the following vowel is stressed (as in (8) above). Otherwise, [ə] never appears after a voiced obstruent, while [ɪ] does appear in this environment. The incomplete distribution of [ə] after obstruents is shown by the comparison between (14) and (15–17). The forms in (14) show both [ɪ] and [ə] can appear in an unstressed syllable after a voiceless obstruent, while the forms in (15) show something different, that only [ɪ] can appear in an unstressed syllable after a voiced obstruent. (Also included are the few cases where the nonhigh vowel is followed by [i].) In all three cases, examples are given first for the harmonic patterns (a high vowel followed by a high vowel, a nonhigh vowel followed by a nonhigh vowel). The third set of forms, where available, consist of the disharmonic pattern (a nonhigh vowel followed by a high vowel).

(14) After voiced obstruents, only high can appear, never [ə]
  (a) High vowels followed by a high vowel:
    blizɪr 'blazer'
    briðɪr 'brother'

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pužɪn ‘poison’
vizɪt ‘visit’
wɪdɪ ‘widow’
wɪndɪ ‘window’
dɪzɪn ‘dozen’

(b) Nonhigh vowels followed by a nonhigh vowel:
–

(c) Nonhigh vowels followed by a high vowel:
neðɪr ‘neither’
robɪn ‘robin/robbing’
javɪnz ‘*awns*’
bodɪm ‘bottom’
klovɪr ‘clover’
gerdɪn ‘garden’
tesðɪr ‘tether’
waǯɪr ‘wager’

We see above in (14) that there is a defective distribution after the voiced obstruents. [ə] can never appear in this environment. Thus after a voiced obstruent, both high and nonhigh vowels are always followed by a high vowel. The forms in (15) do not exhibit this gap. Here the environment is the vowel following a voiceless obstruent. For these cases, all three possibilities occur, showing us that this environment exhibits the range of possible distribution patterns for restricted harmony.

(15) After voiceless obstruents, both high and nonhigh can appear

(a) High vowels followed by a high vowel:
strikɪr ‘stretcher’
splitɪr ‘splutter’
nipɪr ‘neighbor’
tjuxɪt ‘*teuchit*’
strɪxɪn ‘Strichen’

(b) Nonhigh vowels followed by a nonhigh vowel:
stopət ‘stopped’
letər ‘letter/later’
stošəs ‘*stotious*’
nefə ‘nephew’
netər ‘nature’
merkət ‘market’
lesən ‘lesson’
hʌŋkər ‘*hunker*’
stʌmpərt ‘*stump(ert)*’
sʌnšəx ‘*shanshagh*’
pəktər ‘picture’
kaŋkərt ‘*cankert*’
kraftər ‘crofter’
məkstər ‘mixture’

(c) Nonhigh vowels followed by a high vowel:
haŋki ‘hanky’
haŋkɪt ‘hank Pt. PP’

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krʌmpɪt	'crumpet'
grantɪt	'granted'
kəči	'kitchen'[8]
əlki	'*ilke Al.*'

Below in (16–17), we show that the post-sonorant environment also allows the full set of restricted harmony cases. In (16), the vowel following a liquid is permitted to be either high or nonhigh. Although high vowels can only be followed by high vowels, nonhigh vowels can be followed by high and nonhigh vowels.

(16) After liquids, contrast allowed, both high and nonhigh can appear[9]

(a) High vowels followed by a high vowel:

wiklɪn	'weakling'
bulɪr	'bowler'
ɪŋlɪš	'English'
ǯilɪs	'jealous'
milɪk	'*mealick*'

(b) Nonhigh vowels followed by a nonhigh vowel:

kalər	'caller/colder'
felə	'fellow'
folə	'follow'
telər	'tailor/teller'
lətlən	'*littlin*'
skalər	'scalder'
berəks	'barracks'
dəfrəns	'difference'
femlə	'family'
antrən	'*antrin A.*'
farlən	'*farlan*'
kalrəf	'*cauldrife A.N.*'

(c) Nonhigh vowels followed by a high vowel:

eblɪnz	'*aiblins*'
podli	'*podlie*'
hʌŋri	'hungry'
kodlɪn	'codling'

The environment shown in (17) is for the target vowel to appear in an unstressed syllable after a nasal. Here we see that high vowels appear after high vowels and after nonhigh vowels, while nonhigh vowels only appear after nonhigh vowels.

(17) After nasals, contrast allowed, both high and nonhigh can appear

(a) High vowels followed by a high vowel:

minɪt	'minute'
bɪnɪn	'binding'
ivnɪn	'evening'
wɪnɪr	'wonder'

[8] This form, and the one after it, is also listed with the front nonhigh vowel: *kəče*, 'kitchen' and *elki*, '*ilke Al.*'.

[9] There are two cases where after a glide, a nonhigh vowel is followed by a high vowel. The two examples are *laŋwɪǯ* 'language' and *lajɪr* 'lawyer', and there is an alternate form for the latter: *lavjɪr*.

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	krimɪn	'Crimond'
	gɪmɪr	'*gimmer*'
	wimɪn	'woman Pl.'
(b)	Nonhigh vowels followed by a nonhigh vowel:	
	kemǝst	'chemist'
	čamǝr	'chamber'
	stanǝn	'standing'
	skʌnǝr	'*scunner*'
	lǝmǝr	'*limmer*'
	menǝr	'manner'
	denǝr	'dinner'
	mormǝn	'*Mormond*'
(c)	Nonhigh vowels followed by a high vowel:	
	laŋɪr	'longer'
	krani	'*crannie*'
	sani	'sandy'
	speŋi	'*spainyie*'
	krani	'crow'

This section has expounded on the cases of restricted harmony, looking at the consonantal environment as a possible way of predicting the asymmetric disharmonic cases, where high vowels can follow nonhigh vowels. There is definitely a gap in that an unstressed [ǝ] never follows a voiced obstruent. However, the disharmonic cases and their harmonic counterparts do all surface in other environments: after a voiceless obstruent, after a liquid, after a nasal. Therefore, this gap does not appear to offer an explanation for the disharmonic cases. There is a generalization: [ǝ] is not permitted after a voiced obstruent. However, it is not the case that the asymmetric pattern in restricted harmony is accounted for by this one generalization. A systematic examination of the previous consonant shows that the asymmetric pattern surfaces in other contexts, and in these other contexts, we also find both harmonic patterns as well.

4 Unrestricted harmony: the diminutive and other suffixes

This section shows an alternation between the front vowels [i] and [e], a pattern of 'unrestricted harmony'. These examples of harmony are unrestricted in that high vowels only follow other high vowels, and nonhigh vowels only follow other nonhigh vowels. The asymmetric distribution of restricted harmony, where the high vowels can also follow nonhigh vowels, is absent here. Instead, we see unrestricted harmony occurring in a complementary fashion.

The pattern of unrestricted harmony surfaces in several cases of allomorphy, giving us alternations as evidence for Buchan Scots harmony. The most robust of these cases comes from the diminutive suffix in Buchan Scots English. This suffix consists of only a single front vowel. The nonhigh [e] occurs only after nonhigh vowels, while the high [i] occurs only after high vowels. The data below show this distribution.

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(18) The diminutive suffix alternates between *-i* and *-e*:

(a)	[i]		Diminutive forms	
i	minɪt	'minute'	minit	'minute (Dim)'
	dim	'dame'	dimi	'dame (Dim)'
ɪ	–			
u	mu	'mouth'	mui	'mouth (Dim)'
	–		kluti	'clout (Dim)'
	du	'dove'	dui	'dove (Dim)'
	bjuk	'book'	bjuki	'book (Dim)'
e	–			
ə	–			
o	–			
a	lad	'lad'	ladi	'lad (Dim)'
ʌ	–			

(b)	[e]			
i	–			
ɪ	–			
u	–			
e	lem	'loam'	leme	'loam (Dim)'
ə	bət	'bit'	bəte	'bit (Dim)'
o	žok	'Jack'	žoke	'Jackie'
a	ba	'ball'	bae	'ball (Dim)'
			drape	'drop (Dim)'
			saftez	'soft (Dim) Pl.'
			šale	'shell (Dim)'
	las	'lass'	lase	'lass (Dim)'
ʌ	kjʌrn	'corn'	kʌrne	'corn (Dim)'
			pʌkle	'*pickle (Dim)*'

What the forms in (18) show is a pattern with unrestricted harmony. The high vowels are all followed by *-i*; nonhigh vowels are followed by *-e*.[10] This is particularly interesting given the absence of the asymmetric distribution systematically found in the previous contexts. The unrestricted harmony exhibited by the front vowels is also found for the central vowels, as well as in other cases involving the front vowels. Other affixes show this patterning, although the tokens for these other affixes in Wölck (1965) are not as numerous as for the diminutive suffix.

Notably, this same unrestricted harmony occurs for central vowels with the suffix *-ful*.[11] The high vowels are followed by the high central vowel, [ɪ], while the nonhigh vowels are followed by the nonhigh central vowel, [ə].

[10] The only exception being *ladi* 'lad (Dim)'. This exception may be attributed to some type of word frequency effect.

[11] It is also interesting that for these cases the surface level shows both the front and central vowels as occurring in open syllables. However, one might wish to make a case that the central vowels appear in closed syllables at some level, given the affixes these have derived from historically.

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(19) Unrestricted harmony with *-ful*
  (a) High stem vowel followed by a reduced high vowel:
    isfɪ 'useful'
    mufɪ 'mouthful'
  (b) Nonhigh stem vowel followed by a reduced nonhigh vowel:
    afə 'awful'
    pelfə 'pailful'

We see another example of unrestricted harmony with the front vowels in (20). In these cases, the adverb-forming suffix, *-ly*, shows unrestricted harmony with reduced front vowels. The pattern is consistent with the generalization of this section: the high vowels are followed by the high front vowel, and the nonhigh vowels are followed by the nonhigh front vowel.

(20) Unrestricted harmony with *-ly*
  (a) High stem vowel followed by a reduced high vowel:
    lɪkli 'likely'
  (b) Nonhigh stem vowel followed by a reduced nonhigh vowel:
    ɪgzákle 'exactly'
    ferle '*ferlie*/fairly'

The contrast can also be seen in this pair, where the *-land* morpheme acts more like a suffix than an independent word, suggesting the following examples are prosodic words which exhibit harmony in reduced vowels:[12] *hilɪn* 'highland' versus *skotlən* 'Scotland'. Finally, in addition to surfacing in morphemes, these patterns of vowel harmony emerge in reduced versions of function words. This is shown in (21), where again high vowels are followed by high vowels in reduced syllables, and nonhigh vowels are followed by nonhigh vowels in reduced syllables.

(21) Unrestricted harmony in function words
  (a) lost ə̲t *versus* θɪŋk ɪ̲t
    '(I) lost it' *versus* '(I) think it'
  (b) ənéθ ə̲m *versus* əbín ɪ̲m
    'beneath him' *versus* 'above him'

5 Summary

The previous sections have described the behavior of Buchan Scots English vowels. The entire inventory consists of eight vowels, all of which can appear in stressed syllables. However, only a subset of these vowels can appear in unstressed syllables. There are only four reduced vowels, [i, ɪ, e, ə]; no back vowels or low vowels occur in this set. These vowels are not able to freely combine in words with other vowels, and no other vowel can occur in a stressless syllable in this dialect.

One scenario might be that the distribution of reduced vowels is unpredictable,

[12] Compounds in Buchan Scots English allow two stressed vowels, and the conditions on permissible combinations differ from the generalizations here for noncompounds. This reinforces the point that harmony with the stressed vowel controls the distribution of reduced vowels.

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and the vowels can occur in any type of phonological environment. However, we find clear divisions between the high reduced vowels and the nonhigh reduced vowels. Given the logically possible combinations of high with nonhigh, we might expect all four patterns (no harmony), or only two combinations (harmony). What we actually get is three possibilities:

(22) Logically possible and actually attested height combinations in Buchan Scots English

	High	Nonhigh
High	✓	✗
Nonhigh	✓	✓

Depending on the phonological environment, we find a number of subpatterns. First, there is the pattern where all the reduced vowels occur with restricted harmony. In these cases, the nonhigh vowels can be followed by high vowels, and all four reduced vowels can occur. Second, we found that only the central reduced vowels occur (with restricted harmony) in the prerhotic environment. Third, we found that the front reduced vowels occur with unrestricted harmony in the diminutive suffix. Fourth, the central reduced vowels occur with unrestricted harmony in suffixes (like *-ful*) and in function words.

Finally, the overall generalizations (going back to the chart in (9)) show that there are severe co-occurrence restrictions on the distribution of various features within Buchan Scots English words. First, there are no words that ever have more than one round vowel or one low vowel.[13] Second, round vowels and low vowels are always stressed. Third, the only unstressed initial vowels are the central vowels [ɪ, ə]. Fourth, the largest set of possible vowel contrasts occur following initial central vowels (with above conditions respected). Fifth, high vowels can only be followed by front and central high vowels. Sixth, nonhigh vowels can be followed by any of [i, ɪ, e, ə], but the conditions are limited as to exactly what environments permit one of the high vowels to appear.

6 Comparison with other dialects of English

The charts in (23–25) give the vowels of three dialects of English: Received Pronunciation (British English), General American, and Scottish Standard English. In all three cases, the inventory is larger than that of Buchan Scots English. It is also notable that there is a robust contrast between tense and lax vowels in both RP and GA, and these contrasts are reduced in SSE, and nonexistent in Buchan Scots English. At any rate, below are the inventories from these three other dialects of English for a comparison.

[13] The feature value [+round] makes [+back] predictable. The remaining back vowel, the unrounded [ʌ], can be characterized in terms of its feature value of [+low].

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(23) The vowels of Received Pronunciation (British English) (Giegerich, 1992):

	Front	Central	Back
High	i, ɪ		u, ʊ
Mid	e, ɛ	ə, ʌ	o
Low	a		ɒ, ɔ ɑ

Diphthongs:		əɪ
	ai	ɑʊ

(24) The vowels of General American English (Wolfram & Schilling-Estes, 1998):

	Front	Central	Back
High	i, ɪ		u, ʊ
Mid	e, ɛ	ə, ʌ	o
Low	æ	a	ɔ

Diphthongs:		ɔɪ
	ai	aʊ

(25) The basic vowel system of Scottish Standard English (Giegerich, 1992):

	Front	Central	Back
High	i, ɪ		u
Mid	e, ɛ	ə, ʌ	o
Low	a		ɔ

Diphthongs:		ɔɪ
	ai	aʊ

There are several observations that emerge if we consider Buchan Scots English in the context of what we know about the phonology of English and its other dialects. First, like many English dialects, the central vowels function as reduced vowels in Buchan Scots English. The central vowels also parallel the behavior of lax vowels, which many dialects do not allow word-finally or in monosyllabic vowel-final content words. The central vowels never appear in a monosyllabic content word without a coda consonant. They can be found word-finally, although such examples are not extensive.

Second, the generalization about the absence of [ə] following a voiced obstruent is interesting because other dialects of English also show interactions with the voiced obstruents. Both Received Pronunciation and General American have phonetic lengthening of vowels before voiced obstruents (Ladefoged, 1993). Voiced obstruents are also key in the Scottish Vowel-Length Rule (also known as Aitken's Law), by which tense vowels are realized as long before voiced fricatives, [r], and word boundaries (Wells, 1982; Giegerich, 1992; Carr, 1999, and others).[14]

[14] The second anonymous reviewer suggests that perhaps the absence of schwa in these cases is a result of the Scottish Vowel Length Rule at work, speculating that there may be restrictions on the overall permissible syllable length or weight. This reviewer suggests that this strategy would allow the avoidance of the 'highly sonorant schwa', with words instead surfacing with the shorter [i] vowel. One

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Third, syllable structure is important to vowel quality; this point is similar to the first one. Closed and open syllables also affect the distribution of tense and lax vowels in other English dialects, as in the vowel shift rule, 'trisyllabic shortening', or closed syllable shortening rules in words like *serene* ([i]) and *serenity* ([ɛ]) (Chomsky & Halle, 1968; Myers, 1987; Prince, 1990). Whether or not a syllable is open or closed exerts a degree of control over the distribution of the central vowels in Buchan Scots English.

Fourth, another major parallel is the reduction of contrasts before a rhotic (well attested in English and found in other languages). There are English dialects that allow full contrasts in certain vowel sets; one example of this is the dialect of American English with a three-way contrast in vowels for 'Mary', 'merry', and 'marry'. Most American dialects neutralize this contrast and allow only one vowel in the three words, although there are some dialects that allow a two-way contrast here. In unstressed vowels in Buchan Scots English, only central vowels are ever allowed before rhotic.

However, Buchan Scots English also displays reduced vowels that are unlike their dialectal counterparts. The set of vowels that can appear in unstressed syllables ([i, ɪ, e, ə]) are restricted in a way that does not appear to be reported for other dialects of English (see, for example, Ladefoged, 1993 or Hayes, 1995). Here the nonhigh vowels can only follow nonhigh vowels, while high vowels can only be followed by high vowels in some situations, or by both high and nonhigh vowels in other cases. The presence of vowel harmony in a dialect of English is definitely a noteworthy phenomenon; the Buchan facts require wider attention in the literature on English phonology.

7 Conclusion

In conclusion, this study has shown that there are significant co-occurrence restrictions for vowels in Buchan polysyllabic words, and that these restrictions lead to a most unusual fact: Buchan Scots English has vowel harmony. In this way, the dialect appears to be unlike other English dialects in terms of phonological patterns.

These distributional patterns cannot be simply analyzed as the product of reduction processes. The distribution patterns and suffixal alternations suggest that there is a process of height harmony operating in Buchan Scots English, restricted

potential problem with such an account is the fact that [ə] can appear in closed syllables in a variety of positions:

(i) mormən '*Mormond*'
kalrəf '*cauldrife A.N.*'
stʌmpərt '*stump(ert)*'
lətlən '*littlin*'

If [ə] is heavy, and if closed syllables are heavy, then it would be difficult to explain the above words under an analysis whereby words have an overall limit on size/weight.

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harmony in some domains, unrestricted in others. This looks like a novel pattern for an English dialect.

Various questions are raised by this study. First, it has not addressed the issue of underlying forms and the role of comparative and diachronic evidence in a phonological analysis of Buchan Scots English. All the generalizations given here are made from the perspective of surface forms only, without an eye to the forms in other dialects. However, Wölck (1965) does include a comparison of Scottish Standard English forms with Buchan forms, so at least some of the comparative and dialectal issues are discussed there. A phonological analysis of these data would require some attention to the issue of how these lexical items should be represented. Certainly, the study here has focused on surface generalizations and patterns. Some of these patterns have abstracted away from processes such as segment deletions that might be necessary to compare these forms to other dialects.

A second important issue is how harmony developed in a dialect of English. As mentioned in the previous section, the vowel inventory of other English dialects is significantly larger than Buchan Scots English. Furthermore, the set of what is permitted in a reduced syllable is significantly smaller than in other dialects. One possible account is that such a small set of reduced vowels lends itself to harmony because the allowable contrasts are already so few in the given context. Another possible explanation is that perhaps with such a small set, the distribution will necessarily be not as wide, and so the system develops the appearance of harmony. Once there is something that looks like harmony, language learners may generalize from the apparent pattern and impose the judgement that this system has a process of vowel harmony.

A third issue is the comparative phonology of English dialects. Buchan Scots English demonstrates how certain phonetic and phonological configurations resonate in English dialects, even with a twist. The previous section discussed how Buchan Scots English varies the processes associated with closed versus open syllables, tense versus lax vowels, prerhotic neutralization, and voiced obstruents. It is especially interesting that these configurations exert an influence in all other dialects of English, even while the results of their influence vary.

Finally, we have seen that there are significant conditions that restrict the distribution of vowels in unstressed syllables. These vowels are restricted in terms of the distinction between high and nonhigh vowel classes. There are no cases where a stressed high vowel is ever followed by anything other than another high vowel. The data concerning nonhigh vowels show that stressed nonhigh vowels can be followed by either nonhigh or high vowels. Notably, there are cases of unrestricted harmony, where stressed nonhigh vowels are only followed by nonhigh vowels. What this means is that vowel harmony has developed in a dialect of English. This is particularly interesting given that this dialect, spoken in Scotland, was presumably not in contact with another language that does display vowel harmony.

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