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Change in Buchan vowel harmony

DEBBIE SCHINDELMAN
Université Côte d'Azur

Abstract

English is not typically considered to be a vowel harmony language, and yet one of its cousins, Buchan Scots, clearly shows vowel-harmonic patterns. This involves a type of height harmony which is blocked by certain consonants and consonant clusters (which do not form a natural class). The front vowel /ɪ/ has historically functioned as a high vowel but seems to have changed into a non-high vowel in the inland dialectal variant. This article considers whether this change has also occurred in the costal variant of the dialect. From newly collected data, I observe that /ɪ/ continues to behave as a high vowel in the Buchan spoken on the coast. However, there are some indications that the group of blocking consonants is shifting to include simple nasals and /r/. While simple nasals have been documented as blocking consonants in some varieties, /r/ has not.

1 Introduction

English is not typically described as a vowel harmony language, and yet one of its cousins, Buchan Scots, clearly shows vowel harmonic patterns. These form the topic of this article. In section 2, I introduce the Buchan dialect and its pattern of vowel harmony. In section 3, I present new data from Buchan from personal interviews, and in section 4, I consider an analysis of this data. Section 5 considers the implications of this analysis, showing that the vowel /ɪ/ continues to function as a high vowel in the coastal variant of the dialect, unlike what has been described for other varieties. I also argue that Buchan vowel harmony is changing to include simple nasals and /r/ as consonants as harmony blockers. Section 6 concludes.

2 Vowel harmony in the Buchan dialect

The pattern of vowel harmony that is found in the Buchan dialect of Scots is notable because of the way in which it is disrupted by certain consonants that intervene between vowels. In this section, I briefly present the dialect, its vowel system, the functioning of its vowel harmony, and also the conditions under which this harmony is blocked.

2.1 The Buchan dialect

The Buchan dialect is a form of Scots spoken in North-East Scotland, in the Aberdeenshire region (shown in figure 1). Two major variants have been described: a so-called 'fisherman' dialect spoken on the North Sea coast (e.g., around Fraserburgh) and a 'farmer' dialect spoken inland.

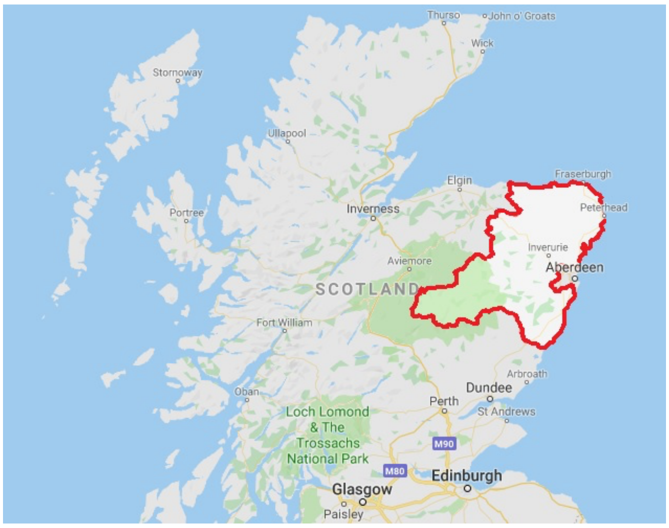

Figure 1: The Aberdeenshire region of Scotland (from Google Maps).

Scots can be described as a cousin to Standard English (as in the genealogical tree in figure 2) and is distinct from Scottish English (English spoken with a Scottish accent). While Scottish English is close to Standard English as spoken in England, dialects of Scots are very different. The Buchan dialect is one of these. One characteristic that makes it so distinct, even from most other Scots dialects, is its vowel harmony.

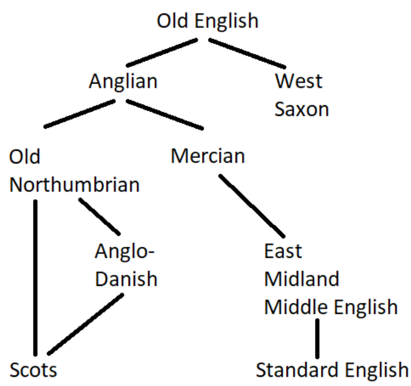

Figure 2: From Old English to modern Scots (adapted from Macafee & Aitken 2002).

2.2 Vowel and consonant systems in Buchan

This section presents the Buchan vowel and consonant systems and the basic vowel-harmonic patterns that have been described in previous work.

2.2.1 The Buchan vowel system

The different variants of Buchan Scots have slightly different vowel systems. In general, they have eight or nine monophthongs.[1] Youssef (2010) proposes a vowel system that will work for our purposes, adapted slightly here as figure 3. This system agrees fundamentally with those proposed by most other researchers who have studied Buchan (e.g., Dieth 1932, Wölck 1965, Fitzgerald 2002).

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

Figure 3: The Buchan vowel system (adapted from Youssef 2010).

The vowels in this system are divided into two groups, in line with how they pattern in harmony: the high vowels [i, ɪ, u] and the non-high vowels (which includes all the other vowels in the system).

2.2.2 The Buchan consonant system

The Buchan surface consonant system includes segments that are common to most varieties of English plus three more: [ç, x, ʍ], as shown in figure 4.

	Bilabial	Labio-dental	Inter-dental	Alveolar	Alveo-palatal	Palatal	Velar	Glottal	Labio-velar
Stop	p b			t d			k g		
Fricative		f v	θ ð	s z	ʃ ʒ	ç	x	h	ʍ
Affricate					ʧ ʤ				
Nasal	m			n			ŋ		
Lateral				l					
Trill				r					
Glide					j				w

Figure 4: Phonetic description of the 27 Buchan surface consonants (Youssef 2010).

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[1] There are also three diphthongs in the Buchan vowel system, but only the monophthongs will be considered in this paper.

2.3 Buchan vowel harmony

Harmony is a phonological process and a form of assimilation. When the articulation of a phonological unit is influenced by another phonological unit in a word, we can say that these units harmonize. Vowel harmony occurs when (at least some of) the vowels in a word share the same articulatory characteristic — for example height or rounding.

Buchan vowel harmony involves progressive height harmony across trochees (disyllables where the first syllable is stressed).[2] For the trochee CV́.CV (where C is a consonant and V is a vowel) the height of the stressed vowel influences the height of the unstressed vowel. The basic pattern is that, if the stressed vowel is high, the unstressed vowel will be high, as in [bíri] 'bury', and conversely, if the stressed vowel is non-high, the unstressed vowel will also be non-high, as in [bʌ́ke] 'Buckie'.

Buchan vowel harmony can be blocked by certain consonants. Dieth (1932), in his study of an inland dialect, clearly describes this unbalanced harmony for CV́.CV trochees. He described three possible scenarios, as shown in figure 5 (adapted from Dieth 1932), where V_H is a high vowel, V_{NH} is a non-high vowel, $C_‡$ is a blocking consonant or blocking consonant cluster, C is a non-blocking consonant and C_0 is any consonant.

Scenario	Phonetic representation	Orthographic representation
1. $C_0\acute{V}_HCV_H$	[bíri]	*bury*
2. $C_0\acute{V}_{NH}C_‡V_H$	[rʌ́bɪt] [kə́lti]	*rabbit* *kiltie*
3. $C_0\acute{V}_{NH}CV_{NH}$	[bʌ́ke]	*Buckie*

Figure 5: The three Buchan vowel harmony scenarios (examples from Youssef 2010).

Figures 6, 7 and 8 show the segments that belong to each group according to previous work (reanalysed from the analyses in Youssef 2010).

High vowels (V_H)	Non-high vowels (V_{NH})
[i], [ɪ], [u]	[ə], [e], [a], [o], [ʌ]

Figure 6: High and non-high vowels in Buchan.

[2] I follow the large majority of previous work on the Buchan phonological patterns in describing them simply as a case of vowel harmony. Youssef (2010) argues that a full description of situation also requires consonant-to-vowel assimilation, but this requires two-way assimilatory/harmonic spreading and non-standard features and takes in more patterns than those considered here, so I set these arguments aside.

Blocking consonants and clusters (C‡)	
Voiced obstruents	b, d, g
Voiced fricatives	v, ð, z, ʒ
Voiced affricates	ʤ
Nasals	n,[3] ŋ
Nasal + unvoiced obstruent	mp, nt, ŋk
/l/ + unvoiced obstruent	lt, lk

Figure 7: Blocking consonants in Buchan.

Non-blocking consonants (C)	
Unvoiced obstruents	p, t, k
Unvoiced fricatives	f, θ, ç, s, ʃ, x[4]
Unvoiced affricates	ʧ
Nasals	m
Liquids	l, r

Figure 8: Non-blocking consonants in Buchan.

In figure 5, scenario 1 is a case where harmony may be active: a high vowel is followed by a high vowel because the medial consonant is non-blocking. In the example [bíri] 'bury', [i] is a high vowel and [r] is a non-blocking consonant. The same kind of thing is observed in scenario 3: a non-high vowel is followed by a non-high vowel because the medial consonant is non-blocking. In the example [bʌ́ke] 'Buckie', [ʌ] and [e] are non-high vowels and [k] is a non-blocking consonant.[5] On the other hand, we can see that harmony is disrupted in scenario 2: a non-high vowel is

[3] Youssef (2010) recognises, following Dieth (1932) and Wölck (1965), that [n] is, in fact, sometimes blocking and sometimes non-blocking, and goes on to consider how this can be understood diachronically (as the blocking [n] derives from [nd] clusters). Youssef gives a synchronic account of this, too. I set this complication aside here, and return to it in section 5.3. In fact, Youssef's account treats these consonants as being active in the phonological process — my analysis of them as blockers is in line with the majority of other work on Buchan (and footnote 2).
[4] I have not directly observed the effect of the dorsal fricatives [ç] and [x] — they are included here by extrapolation (as voiceless fricatives).
[5] This is the kind of patterning which explains why Buchan vowels are grouped into two classes (high and non-high) in figures 3 and 6 — vowels which are either phonetically mid or low pattern together (as 'non-high').

followed by a high vowel. In the example [rʌ́bɪt] 'rabbit', [ʌ] is a non-high vowel and is followed by a high vowel [ɪ]. Here, harmony is not allowed because a blocking consonant, the voiced obstruent [b], intervenes between the two vowels. The same thing is observed in the word [kə́lti] 'kilt'. This time, the harmony is blocked by a consonant cluster, [lt], which is part of the blocking consonant clusters of the type /l/ + unvoiced obstruent.

From figure 7 it can be seen that the blocking consonants (and consonant clusters) do not form a natural class. But by making a comparison with the non-blocking consonants in figure 8, we can see that the voicing of the consonant seems to play a role. For obstruents, fricatives and affricates, the only difference between blocking and non-blocking consonants is voicing. For example, [b] is a voiced consonant identified as blocking in figure 7 whereas its unvoiced counterpart [p] is listed as a non-blocking consonant in figure 8, however the sonorants are split into blocking and non-blocking consonants.[6] A key question for any analysis of this kind of harmony is whether it involves raising or lowering — I consider this in section 5.1.

3 New data

Of all the studies cited in this paper, Paster (2004) is the only relatively recent one to collect data in the field. Her data is from the inland dialect near Turriff, the same location where Dieth based himself for his work in 1932. At that time, Dieth showed that /ɪ/ functioned as a high vowel. Paster shows that the behavior of /ɪ/ had changed relative to vowel harmony in the 72 years that elapsed between the two studies. In 2004, /ɪ/ functions as a non-high vowel in the relevant dialect.

For the coastal dialect from Fraserburgh, the last fieldwork was done in 1965 by Wölck. At that time, Wölck showed that /ɪ/ functioned as a high vowel, just as it did in the inland dialect in 1932. No new data has been collected since. In the little less than half a century between Wölck's data and mine (collected in 2019), I aimed to discover if the vowel harmony described by Wölck for the coastal variant had changed in the same way as the inland variant between 1932 (Dieth) and 2004 (Paster). A key question for this paper is thus: has the reanalysis of /ɪ/ as a non-high vowel in the harmony pattern spread to the coastal dialect or does it continue to behave as a high vowel? I also considered whether the patterns of blocking and non-blocking consonants that have been described in previous work are still accurate.

[6] I do not consider the phonological rational for the patterning of the class of blocking segments and clusters in this article (see the discussion in Paster 2004, Youssef 2010 for a consideration of some relevant issues).

3.1 Informants

I recorded two native speakers (half-sisters) from Fraserburgh for this purpose. The elder speaker, JD, is 33 years old and comes from a family that has lived in Fraserburgh for at least 3 generations. As an adult, she has also lived in Aberdeen, London, the Netherlands and France. The younger speaker, RC, is 21 years old and was born and raised in Fraserburgh, but only her father is from the area. As an adult, RC recently moved to Aberdeen. She has therefore always lived in or near a Buchan-speaking area.

3.2 Method

The investigation consisted of three steps. First, the corpus of material to be used for data elicitation was established. Second, the data was collected (which involved recording several interviews). Finally, the data was analyzed.

I started by asking the speakers to read aloud a list of words from the dialect, but this did not elicit dialect pronunciations. Therefore, I proposed that they read stories about local daily life which were written in the Buchan dialect. These stories feature protagonists and themes from Northeast Scotland. I hoped that my informants would be more focused on the content of the story rather than the words themselves, therefore leading to more natural pronunciation.

3.3 Corpus

To build the corpus of material for the speakers to read, I relied on two anthologies of short stories written in the Buchan dialect.[7] The spelling used in these stories reflect the inland dialect, but as the informants did not have any difficulty reading them, their pronunciation was presumably not altered by the spelling. The selection of the stories that my informants read was based on the following principle: In these stories, I identified all the trochees (CV́C(C)V) and I retained the stories that contained trochees with consonants or groups of consonants that were varied enough (in terms of potentially blocking and non-blocking consonants) and in sufficient number. Figure 9 below shows an example of the relevant words from one story, *Duncan's Dilemma*. The medial consonants of scenario 2 that are expected to be blocking consonants appear in italics and bold.

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[7] From *Doric, Alive an Kickin* (Leslie 2004) and *Doric, Alive an Kickin 2* (Leslie 2006).

Word	Frequency	Gloss
Archie (19)	2	
bittie	3	bit (dim.)
cheery	1	
da***nd***y	1	
faimly	2	family
funcy	1	fancy
gui***lt***y	2	
hair***d***ly	3	hardly
Hu***nt***ly	1	
ki***nn***a	1	kind of
likely	2	
mi***lk***ie	1	milk (dim.)
ony	2	any
Petrie	1	
pilie	1	pile (dim.)
shottie	1	shot (dim.)
sta***nn***in	2	standing
surely	1	
wi***nn***erfu	1	wonderful
wi***nn***er(in)	2	wondering
u***nn***erstan	1	understand
Total	**Total**	
21	32	

Figure 9: Example of analysis performed for the selection of short stories with a high proportion of disyllabic trochees.

Short stories in which at least 30% of the types of trochees contained blocking consonants were selected and submitted to the informants. For this story, the percentage is 47.62%. The number of different blocking consonants and clusters found in the trochees present in the story was also considered — here it is 6.

The selected stories normally needed to have at least 10 keywords on average per page. This minimum number of keywords was to ensure a maximum number of target words per page resulting in a shorter reading time as this kind of interview can be tiring for the informants.

In some cases, such as the story analyzed in figure 9, however, a lower proportion of keywords per page was accepted (here the number is 4.75 on average per page) in order to include target words containing rare medial consonants in the language. In the case above, the goal was to collect words containing the medial consonant ‘n’ which derives from an etymologically /nd/ cluster as in *kina* ‘kind of’ or *stannin* ‘standing’. Finally, it should be noted that words whose frequency of appearance in the corpus was much higher than that of other words (such as the names of characters) were given the value 2 to avoid distorting the average. The actual frequency is indicated next to the word in parentheses, as can be seen for *Archie* (19 occurrences). Using this selection method, five stories and two story excerpts were chosen for the first round of recordings.

After processing the first set of recordings, it appeared that the number of words corresponding to scenario 3 (trochee with two non-high vowels) was insufficient to analyze the vowel harmony process. I therefore wrote a text in standard English containing 33 words proposed by Paster (2010) that exemplify scenario 3. This list of 33 words contains some dialect words spelled as in Leslie (2004). This 8th text was then modified by JD to include dialect words that seemed more natural to her (see the Appendix for the text of the story as read by JD).

3.4 Interviews and data preparation

For the recordings, JD received the texts from Leslie’s short stories shortly before the interview to allow her to become familiar with them. The seven scripts were read over a two-week period during four live interviews (JD was in Nice, France, at the time). One of the scripts was sent to RC so that she could record it herself. The 8th text was recorded by JD three months later.

Once the recordings were made, the target words were transcribed, paying attention to the acoustic quality of the vowels. For trochees in which the vowels were difficult to identify, the words were extracted using Audacity version 2.3.1. Then, the audio files of these words were analyzed with Praat version 6.0.50 which allows the visualization of their spectrograms. The values of the F1 and F2 formants of the vowels were collected whenever possible. A portion of the words could not be used because the values of F1 and F2 were difficult to identify. Figure 10 shows the spectrogram of a word that could not be used.

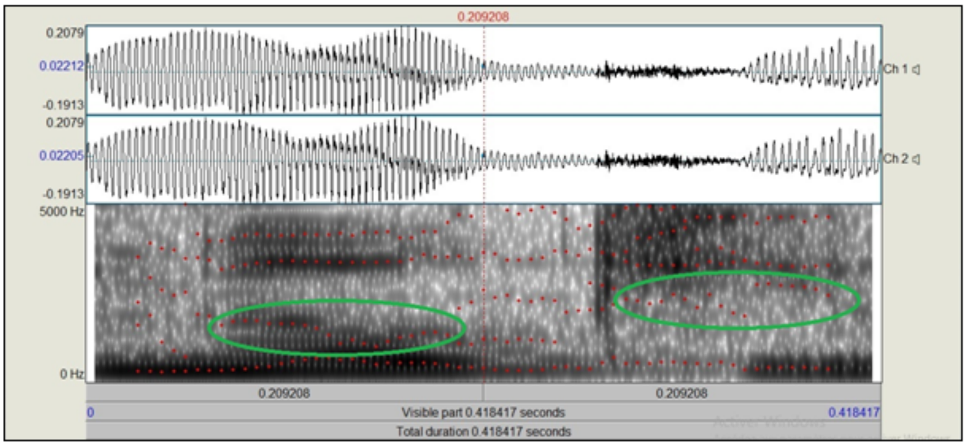

Figure 10: Spectrogram of *milkie* — the F2 value of the vowels is not clear.

4 Data analysis

To characterize the vowels used by JD, a selection of words from the original recordings were analyzed. These words do not necessarily correspond to the trochees that are the subject of the present study. Figure 11 shows an example of this.

Word	F1	F2	English	Perceived value	Possible values	F2-F1
upst**ai**rs	623.77405	2489.7521	[eə]		[e]	1865.97801
paid	569.63862	2544.7015	[eɪ]		[e]	1975.06287
m**ay**be	535.31028	2442.2167	[eɪ]		[e]	1906.90645
on his f**a**ce	545.57749	2188.7037	[eɪ]		[e]	1643.12619
family aff**ai**r	512.62421	2376.7768	[eə]		[e]	1864.15258
day	488.50911	2260.3204	[eɪ]		[e]	1771.81128
inst**ea**d	526.61537	2408.3293	[ɛ]		[e]	1881.71394
apparent**ly**	647.29131	2497.6432	[i]	[e]	[e]	1850.35192
famil**y** affair	560.53656	2483.3912	[i]	[i]/[e]	[e]	1922.85468
	488–647	2188–2544				1643–1975

Figure 11: Word analysis to determine the formants of the front mid-closed vowel [e] for speaker JD.

For each word, the formants were measured using Praat. This allowed me to determine a range of values for F1 and F2. As can be seen in figure 11, F1 for [e] varies between 488 and 647 Hz. I did the same analysis for the difference between the two formants F1 and F2. I found a range of 1643 to 1975 Hz with an average of 1850 Hz, which is the standard deviation usually given (2300 – 500 = 1800 Hz). The vowel produced in English Standard English for these words is given in the 'English' column. The highlighted rows correspond to words where the vowel in Buchan exhibits a completely different acoustic quality than its counterpart in Standard English.

Next, the formant values of each of the vowels studied were plotted on a diagram to show the extension areas of each vowel. In the diagram in figure 12, we can see that the vowel [i] is separated from the other vowels. Although the rectangular extension areas of the vowels [ɪ], [e], and [ɛ] overlap, there is no intersection between the polygons drawn by the occurrences of each of these vowels produced by JD (shown with dashed lines in the diagram below). For the other vowels (low and back), this is less clear but less important for this vowel harmony study in which I focus mainly on the alternation between high and mid front vowels. JD also produced the low vowels [ɑ], [a], and [æ], the rounded back vowels [ɒ], [ɔ], [o], and [ʊ], as well as the vowel [ʌ]. But their distribution in space suggests that they are not all phonologically distinct and that groupings must be made. For this reason, I have not included all of them in my analysis of JD's vowel system. The choice of low and back vowels in the system remains an assumption. More data on non-high vowels would have to be collected and analyzed to support such a claim.

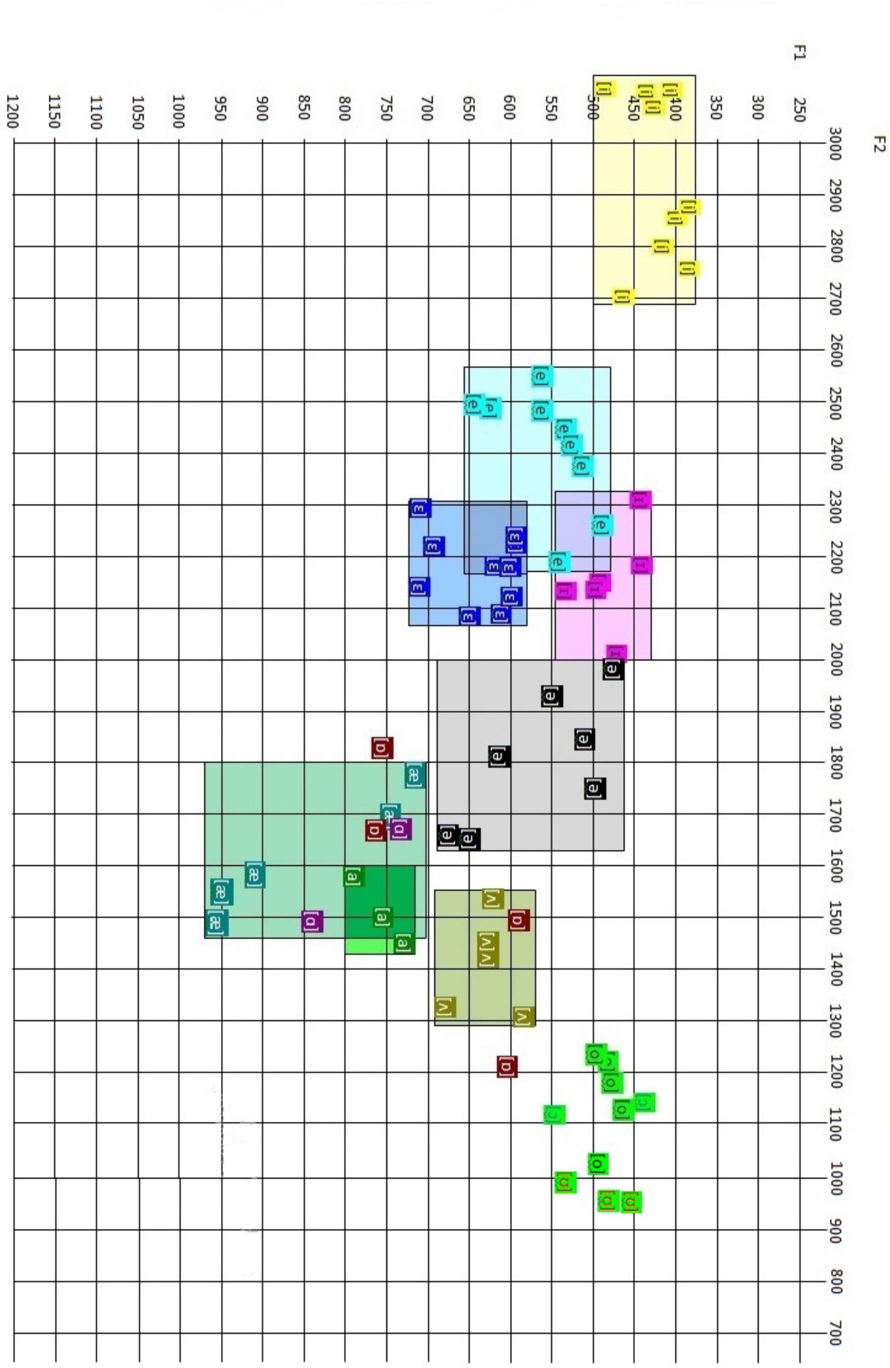

Figure 12: Plot of values for F1 and F2 formants of vowels produced by JD.

The results of the above-mentioned analysis produce the 9-vowel system shown in figure 13. The range of values of the F1 and F2 formants is given in figure 14.

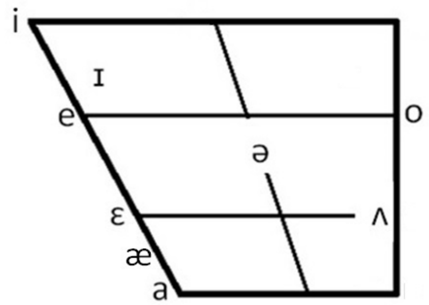

Figure 13: JD's 9-vowel system (hypothetical for low and back vowels).

IPA	F1	F2
[i]	386 – 487	2703 – 3164
[ɪ]	445 – 532	2018 – 2306
[e]	488 – 647	2188 – 2544
[ɛ]	589 – 708	2088 – 2297
[æ]	716 – 952	1494 – 1773
[a]	730 – 785	1450 – 1579
[ə]	475 – 676	1653 – 1983
[ɑ]	736 – 843	1494 – 1671
[ɒ]	590 – 757	1205 – 1829
[ʌ]	581 – 679	1305 – 1535
[ɔ]	441 – 549	1106 – 1138
[o]	461	1122

Figure 14: The frequency ranges of the vowel formants of JD's vowel system.

As Paster notes, F1 values alone are sufficient to identify vowels. The absence of the vowel [u] in JD's system is certainly due to the focus on high front vowels in this study. It is likely that JD's idiolect system includes two rounded back vowels, as reported by other authors who have studied Buchan (Dieth 1932, Wölck 1965, Fitzgerald 2002, Paster 2004, Youssef 2010). More speakers and more test words would be needed to determine the full vocalic system of Buchan Scots in Fraserburgh today.

After establishing the vowel system (at least for the high front vowels), I analyzed the trochees extracted from the recordings. The audio files of the words in which one of the three scenarios was encountered were measured using Praat. For each vowel in these words, I measured the F1 and F2 formants at regular intervals ranging from 5ms to 15ms depending on the vowel duration (see figure 15). Then, each formant was assigned the average of these measurements in order to limit errors. Based on the frequency ranges associated with each vowel in JD's vowel system (figure 13), I identified the vowels in each of these words. This method was particularly useful in cases where the vowel was difficult to identify by ear or when the formant values placed it in an intermediate zone between two vowels of the system.

The table in figure 15 gives the formant values found for each of the two vowels (v1 and v2) of the trochee 'thingies'. The values t1 and t2 indicate respectively the duration of v1 and v2 in this sample. In the table, there are 11 formant values. So, the duration of these two vowels were separated into 10 intervals (6.25ms for v1 and 15.625ms for v2). Just below t1 and t2 in the first column, are the proposed IPA representations for vowels v1 and v2 which were identified according to the frequency ranges provided in figure 14. At the bottom of each measurement column, there is the mean value and the standard deviation for each formant. The highlighted cell corresponds to formant values for which the standard deviation exceeds 100 Hz. This indicates that the formant values fluctuated significantly and are therefore less reliable.

thingies	F1	F2	F1	F2
t1=0.0625s	520.343656	2047.104	454.45982	2957.8299
t2= 0.15625s	551.338648	2069.0128	327.26939	2998.94872
v1 = [i] or [ɪ]	546.390593	2203.3584	267.06181	3011.33507
v2 = [i]	536.450886	2509.1842	317.4105	2990.24312
	524.337657	2642.4745	364.82807	2990.15629
	511.462249	2753.387	332.00681	3002.22087
	498.707365	2810.2938	302.5118	2970.112
	481.148145	2809.2422	308.58462	2915.32225
	462.571412	2835.9057	304.1602	2871.6271
	439.670346	2838.3836	347.84158	2761.62099
	406.822993	2881.4272	363.05282	2786.04281
Average	**498.113086**	**2581.7976**	**335.38067**	**2932.31447**
Standard deviation	36.770809	272.46016	34.301744	71.7535846

Figure 15: Analysis of the 'thingies' trochee (scenario 2) for which the vowels have been identified.

By identifying the vowel qualities of all relevant trochees, I was able to determine those in which vowel harmony is effective and those in which it is blocked. Therefore, I could determine whether my informants pronounced their vowels according to the principles outlined by Paster and Youssef (in line with the 3 scenarios from figure 5) or not.

The answer is, overall, positive, as I explain in the following section. The table in figure 16 below gives some examples of words from the corpus illustrating how these scenarios should function.

Scenario[8]	Phonetic representation	Orthographic representation
Scenario 1: $C_0\acute{V}_HCV_H$	[ízɪ]	*easy*
Scenario 2: $C_0\acute{V}_{NH}C‡V_H$	[bódi]	*person*
Scenario 3: $C_0\acute{V}_{NH}CV_{NH}$	[kófe]	*coffee*

Figure 16: Examples of words from the corpus illustrating the scenarios of Buchan vowel harmony.

5 Implications

In this section, I focus on findings which disagree with those of Paster (2004), the other recent study of Buchan vowel harmony. I first comment on the assumptions used to determine the underlying vowel form. Then, in section 5.2, I discuss the high or non-high behavior of the vowel /ɪ/. Finally, in section 5.3, I consider the blocking or non-blocking nature of simple nasal consonants and /r/.

5.1 A note about underlying vowels used in this study

I focus here on Buchan words in which the final sound is represented graphically by *-i/-y/-ie* (such as *twenty*, *Gamrie*, etc.). To determine if these words have been affected by vowel harmony, the underlying form must be known, and in particular the nature of the final, unaccented vowel *-i*. Otherwise, it is impossible to determine whether the surface form results from a harmony process or not.

For example, the hypothetical surface form [sórke] (in which both vowels have the same height) could be considered the result of vowel harmony only if the underlying form has vowels with different heights (as in /sórki/ for example). On the other hand, if the underlying form is

[8] Where VH is a high vowel, VNH is a non-high vowel, C‡ is a blocking consonant or a group of blocking consonants, and C_0 is a non-blocking consonant or a non-blocking group, as in figure 5.

/sórke/ and the surface form is [sórke], it is impossible to know if vowel harmony has taken place or not.

Applying this to vowel harmony in Buchan trochees, if the final vowel of the underlying form is low, harmony has taken place if the surface form contains two high vowels (scenario 1). For example, *window* → [wíndɪ]. As another example, if the underlying form of the word *bittie* was /bíte/, it could be concluded that a surface form [bíti] underwent vowel harmony. Conversely, if the final vowel of the underlying form is high, harmony can only be seen when the unaccented vowel lowers. An underlying low accented vowel would cause the underlying high unaccented vowel to lower (in a scenario-3-type situation). For example, if the underlying form of the word *Buckie* was /bʌ́ki/, an active vowel harmony process would be required to give the surface form [bʌ́ke].

Paster (2004) considers the final vowel of words with *-y*# or *-ie*# (adverbs, diminutives, etc.) to be underlyingly high and therefore concludes that vowel harmony in Buchan is a lowering harmony. Youssef (2010) counters that it is a raising harmony, which would mean that these final vowels are underlyingly low. While both scholars present arguments for their choice of underlying forms, neither makes reference to an in-depth study that would clarify the origin of the *-i* suffix in Buchan. I follow Paster in assuming that the underlying form of the *-i* suffix (adverb, diminutive, etc.) is a high vowel in Buchan and that harmony occurs in scenario 3.

5.2 The behavior of /ɪ/

Let us now consider the behavior of the vowel /ɪ/. Recall that in scenario 2, /ɪ/ behaves as a high vowel according to the observations of Dieth and Wölck, among others. It behaves as a non-high vowel in the later observations of Paster in her study of the inland dialect (2004). What about my informants? To answer this question, I undertook a closer examination of the diminutive forms produced by JD. These results were then compared to a sample of diminutive forms produced by RC. The spectrogram of the word *bittie* in figure 17 contains the two vowels [i] and [ɪ].

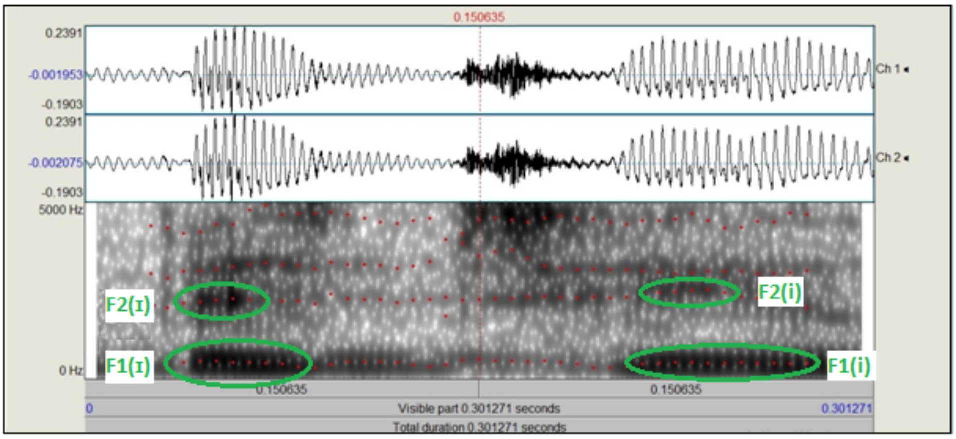

Figure 17: Acoustic signal and spectrogram generated by Praat for [bíti] *bittie* (produced by JD).

In the spectrogram in figure 17, the difference between the formant values for [ɪ] and [i] is difficult to visualize. The formant values in Hz are F1=481.6 and F2=2243.7 for the first vowel [ɪ]; F1=454.9 and F2=2504.8 for the second vowel [i] (however, the second vowel is significantly longer than the first). By analyzing the samples containing front high vowels, ranges of values can be identified to distinguish the tense vowel from the lax vowel.

	accented		**unaccented**	
	F1	**F2**	**F1**	**F2**
i	370	2737	389	2694
ɪ	498	2330	459	2490

Figure 18: Average formant values (in Hz) for closed front vowels from JD.

	accented		**unaccented**	
	F1	**F2**	**F1**	**F2**
i	323	2600	434	2374
ɪ	499	1880	471	1909

Figure 19: Average formant values (in Hz) for closed front vowels from RC.

As can be seen in figures 18 and 19, there is a difference of less than 100 Hz between the F1 values produced by JD and those produced by RC. However, the difference is much larger for the respective F2 values. This data therefore supports Paster's observation mentioned earlier that it is the F1 value which determines vowel quality.

I now have all the elements to answer the question of whether the vowel /ɪ/ behaves as a high vowel or not. To determine this, I need to know if this vowel appears as the second vowel in the trochees in scenario 2. As a reminder, in Scenario 2, non-high accented vowels are followed by high non-accented vowels when the medial consonant is a blocking consonant. The group of blocking consonants includes voiced obstruents and certain clusters such as [nt] and [lt]. For JD, most dissyllabic diminutives fitting with scenario 2 end in the high vowel [i]. For example: *body* 'person' [bódi] or *mebbe* 'maybe' [mébi]. There are a few words in which a clear [ɪ] can be heard, such as in *hungry* [hʌ́ngrɪ] or *ilky* 'every' [ʌ́lkɪ]. This suggests that /ɪ/ does indeed behave as a high vowel. However, in order to confirm this observation, it is necessary to examine trochees in which the medial consonant is unvoiced (scenario 3). Scenario 3 concerns words in which there is an accented non-high vowel followed by an unaccented non-high vowel and in which the medial consonant is not a blocking consonant. If /ɪ/ does indeed behave as a high vowel, then it should never appear in scenario 3 (the behavior of medial nasal consonants will be discussed in section 5.3).

In JD's recordings, trochees containing an unvoiced obstruent or an /l/ as a medial consonant mostly follow scenario 3. That is, when the accented vowel is non-high, the final vowel has a non-high vowel ([e] or [ɛ]) as its surface form. A sample of this data is given in the table in figure 20, where the column on the far right with bold IPA symbols gives the surface form of the final vowel (sometimes a diminutive suffix) whose underlying form is a high vowel. I found that this final vowel has been lowered to match the accented non-high vowel. The highlighted cells indicate formant values for which the calculation shows a standard deviation that exceeds 100 Hz.

		accented vowel				**unaccented vowel**			
		F1 (Hz)	F2 (Hz)	duration	vowel	F1 (Hz)	F2 (Hz)	duration	vowel
Buckie	[bʌke]	666.63454	1200.66	0.0809	[ʌ]	567.100035	2550.11577	0.1235	**[e]**
coffee	[kofe]	497.84392	893.40513	0.0916	[o]	593.012932	2480.35308	0.1177	**[e]**
*ga**m**rie*	[gemre]	520.69662	2679.9819	0.1052	[e]	591.4229	2372.17584	0.1542	**[e]**
*Lily*1	[lɜlɛ]	587.62671	1698.0478	0.0552	[ɜ]	602.253706	2244.55646	0.0646	**[ɛ]**
*Lily*2	[lɜlɛ]	580.51894	1729.2759	0.0695	[ɜ]	636.079732	2232.51901	0.0762	**[ɛ]**
messy	[mese]	633.22479	2494.866	0.1104	[e]	647.003382	2361.28448	0.0688+	**[e] / [ɛ]**
*Nessy*1	[nese]	671.95978	2439.2276	0.1053	[e]	494.706913	2556.49729	0.1718	**[e]**
*Nessy*2	[nese]	706.36012	2365.0626	0.1442	[e]	550.042101	2518.58959	0.1313	**[e]**
*Nessy*3	[nese]	638.32185	2472.2776	0.073	[e]	638.910198	2377.15551	0.0608	**[e] / [ɛ]**
telly	[tele]	643.91011	2193.8736	0.1122	[e]	600.869912	2393.39393	0.1191	**[e]**

Figure 20: A sample of words fitting with scenario 3 ([e] / [ɛ] = between [e] and [ɛ]).

Nevertheless, I found a few exceptions: these include one word with the medial consonant /t/ and two occurrences of the same word with the medial consonant /m/ (*goatie* and *mummy* in figure 21). In these words, the measurements yield a final high-to-mid vowel, where it should have an unambiguously non-high vowel. More data would be needed to explain these anomalies.

		accented vowel				unaccented vowel			
		F1 (Hz)	F2 (Hz)	duration	vowel	F1 (Hz)	F2 (Hz)	duration	vowel
goatie	[goti]	421.74962	842.24786	0.1036	[o]	501.896652	2621.88744	0.1565	**[e] / [i]**
mummy1	[mʌmi]	443.38718	1023.0587	0.0742	[ʌ]	421.946361	2504.11469	0.0841+	**[ɪ] / [e]**
mummy2	[mʌmi]	722.67155	1436.34	0.0842	[ʌ]	630.936661	2694.11775	0.1224+	**[e] / [i]**

Figure 21: Words in which scenario 3 was expected but not observed
([e] / [i] = between [e] and [i] *etc*).

From these results, I conclude that a vowel that is underlyingly high is indeed lowered to match the preceding non-high accented vowel in Scenario 3. There is a clear pattern indicating that *the vowel /ɪ/ functions as a high vowel for my informants*. From this we can conclude that the change that Paster (2004) identified as having occurred in the inland variety of Buchan (since Dieth's observations in 1932) has not spread to the coastal variety from Fraserburgh.

5.3 The behavior of medial nasals and /r/

The medial consonants of all the words mentioned above in figures 20 and 21 correspond to scenario 3. However, the nasal /n/ requires additional comment. In previous studies, there was not a unanimous opinion regarding the status of nasals. Paster (2004) states that a simple /n/ does not participate in scenario 2 (it is not a blocking consonant). She claims that only consonant clusters containing /n/ block harmony. But Youssef and Wölck include simple nasals in the set of blocking consonants.[9] In JD's pronunciations, I found more cases in which /n/ behaves as a blocking consonant than the contrary (some examples are shown in figure 22), showing that the simple alveolar nasal can indeed behave as a blocker.

Previous descriptions of blocking in Buchan vowel harmony have never seen /r/ behave as a blocking consonant. However, of the two

[9] As mentioned in footnote 3, Youssef argues that /n/ (which originates from /nd/) and /ŋ/ are blocking consonants (cf. Youssef 2010). Wölck (1965) assumes that only /ŋ/ is a blocking nasal.

occurrences of the word *Mary* in the corpus, the first contains a high final vowel, while the second contains a non-high final vowel. These words appear in figure 22.

		accented vowel				unaccented vowel			
		F1 (Hz)	F2 (Hz)	duration	vowel	F1 (Hz)	F2 (Hz)	duration	vowel
bonny	[boni]	539.9857	884.55354	0.1038	[o]	579.768227	2747.73405	0.11	[e] / [i]
pennies	[penez]	639.33637	2518.5896	0.1112	[e]	605.585863	2582.30266	0.0935	**[e]**
quinie	[kʷaɪni]	667.66545	2013.3351	0.1144	[aɪ]	514.375	2853.79191	0.0558	[i]
*Stanley*1	[stanlɪ]	808.34762	1824.9663	0.0712	[a]	462.689164	2289.35849	0.0561	[ɪ]
*Stanley*2	[stanlɪ]	778.59216	1857.2924	0.0943	[a]	471.270879	2058.72091	0.0873	[ɪ]
tinnie	[tene]	600.29522	2357.8457	0.0515	[e]	623.783562	2605.69581	0.048	**[e]**
*Mary*1	[meri]	535.96747	2652.8548	0.1152	[e]	465.847477	2607.21187	0.0928+	[e] / [i]
*Mary*2	[mere]	552.09822	2535.4164	0.1447	[e]	487.56726	2557.28477	0.0875+	**[e]**

Figure 22: Words that oscillate between scenarios 2 and 3 ([e] / [i] = between [e] and [i]).

These results are interesting in that they may indicate a change in how Buchan vowel harmony functions. It is possible that the simple medial nasal is gradually becoming a blocking consonant in the coastal dialect. As for the medial consonant /r/, it may be that it is beginning to behave like the nasals /n/ and /ŋ/, which are also sonorants, given its (so far marginal) participation in scenario 2. (It is also possible that this oscillation can be explained by the influence of the Standard English pronunciation of *Mary*). I have too little data in the present study to support such a hypothesis. These questions could be explored in future research.

6 Conclusion

This article has shown that the patterns of vowel harmony that have long been described for Buchan Scots are still active in Fraserburgh, in the coastal area of Buchan. I argue that this involves lowering of the unstressed vowels of trochees (following Paster 2004), and I show that it still targets the three high vowels (/i, ɪ, e/) in Fraserburgh. This is what was described in the earliest work on Buchan, but Paster (2004) has shown that it is no longer the case in the inland variety (where only two vowels now count as high: /i, e/). I have also shown that there is some evidence that the set of blocking consonants may be changing in Fraserburgh, to include /r/.

Comments invited

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Author contact details

Debbie Schindelman
Université Côte d'Azur
MSHS Sud-Est Pôle Universitaire Saint Jean d'Angely
Bâtiment SJA 3 24 avenue des Diables Bleus
06357 Nice Cedex 4
France

ed.deborah@gmail.com

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Appendix

Lily and Stanley (in Standard English)

Lily and Stanley, originally from Buckie, had been very lonely since their little girl Mary moved to Gamrie. While Stanley watched the soccer game on TV, Lily made coffee and counted the coins in her piggy bank on the counter. Lily sighed, looked out the window and saw Nessy, their little furry goat pulling on the grass in the backyard with contentment. Smiling, she remembered little Mary feeding Nessy. She had run into the little house with her hair a mess and a beautiful smile. 'Mommy, Mommy! Nessy tried to eat this little piece of tiny nail and I saved her!'

'GOAL!' yelled Stanley, very happy that Le Broch had won the soccer game. Pulled from her reverie, Lily was sad to return to her worries. They were both well into their forties, she and Stanley, with no hope of grandchildren on the horizon.

'Do you think Mary will ever find a good single man at her age,' Lily asked from the kitchen? When she got no answer, she went into the living room and found Stanley totally immersed in the game. She stuck her pointy finger into his arm, which startled Stanley. 'What do you want from this young girl, Lily? Have mercy on her, woman, she's only 24!'

Lily let out another sigh. She knew she shouldn't worry, but young girls today seemed to marry so late! 'I'll see if the mailman dropped off a copy of that hunting magazine you ordered,' Lily said, to change the subject. Stanley grunted, reabsorbed by his game.

As Lily walked out into the front yard, her mind became absorbed in the subject of dinner. 'Maybe I should make that recipe I saw in Bon Appetit magazine...those little grilled bits swimming in the sauce...?'

'Ouch!' Suddenly, Lily found herself slumped in the grass on the 'hilly' side of the garden. She had wandered into the stony section without noticing and severely injured her right shin. She was slouching and looking up at the sky. Dark clouds were coming in fast. With a clap of thunder, the sky opened up and hail began to pour down.

Poor Lily was almost in tears when she turned around and looked up to see Stanley running towards her. 'What have you done to yourself, woman!', he bellowed as he picked her up and pulled her inside. He set her down on the couch and went to get a bandage. 'Mary just called,' Stanley said from the other room. 'She's coming by to see us in the morning.' Lily wiped a tear from her eye and smiled, despite herself. She had a good man and a beautiful daughter for a child. There may have been a hailstorm outside, but inside there was warmth and love.

Lily and Stanley (in Buchan Scots)

Lily and Stanley fa Buckie were feeling affa lonely since their quinie Mary had moved to Gamrie. File Stanley watched the futba on the telly, Lily was making coffee and counted her pennies fay her tinnie on the counter. She sighed and looked out o the winde and saw Nessy, their wee hairy goatie happily pulling at the gerse in the garden. Smiling, she remembered Mary as a wee bairn feeding Nessy. She would run into the housie, with messy hair and a bonny grin. 'Mummy, mummy! Nessy was trying to eat this bittie o nailie and I saved her!'

'GOAL!' shouted Stanley, faire chuffed that The Broch had won the futba. Shaken from her reverie, Lily was sorry to return to her worries. They were both well over forty, she and Stanley, with no hope of any grandbairns on the horizon.

'Do you think Mary will ever find herself a batchie mannie at her age?' Lily called out from the kitchen. Fen she received no answer, she walked back into the living room to find Stanley totally absorbed in a game. She poked his arm with a sharp finger and Stanley startled. 'What do you want from the lassie, Lily? Ha mercy on her, quine, she's only 24!'

Lily sighed again. She knew she shouldn't worry, but lassies these days seemed to marry so late! 'I'll go out and see if the postie has delivered a copy of yon gamie magazine you ordered,' said Lily, changing the subject. Stanley grunted, reabsorbed into the game.

As Lily went out to the front garden to check the mail, her mind drifted to dinner. ‘Maybe I should make that French recipe I saw in Bon Apetit magazine… those toasty wee bitties with a saucy gravy…?’

‘ACH!’ Lily suddenly found herself sprawled in the gerse on the ‘hilly’ side of the garden. She had wandered into the rocky bit without noticing and had fair gotten herself a fair hurtie on her right shin. She flopped back down and looked up into the sky. Black clouds were rolling in quickly. With a clappie o thunder, the sky opened and a muckle o hailies started pouring down.

Poor Lily was nearly in tears as she rolled herself over and looked up to see Stanley running towards her. ‘Fit have you done to yourself, quine?’ he bellowed as he scooped her up and pulled her inside. He plonked her on the setee and went to fetch a bandage. ‘Mary just phoned,’ Stanley said from the other room. ‘She'll be round to visit the morn.’ Lily wiped a tear from her een and smiled in spite of herself. She had a good mannie and a bonny bairn for a daughter. There may be a storm o hailies outside, but inside, there was warmth and love.