Scottish Gaelic

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Scottish Gaelic is a minority language of Scotland spoken by approximately 58,000 people, or 1% of the Scottish population (speaker numbers from the 2011 Census available in National Records of Scotland 2015). Here, we refer to the language as 'Gaelic', pronounced in British English as /galɪk/, as is customary within the Gaelic-speaking community. In Gaelic, the language is referred to as *Gàidhlig* /kaːlɪc/. Gaelic is a Celtic language, closely related to Irish (MacAulay 1992, Ní Chasaide 1999, Gillies 2009). Although Gaelic was widely spoken across much of Scotland in medieval times (Withers 1984, Clancy 2009), the language has recently declined in traditional areas such as the western seaboard and western islands of Scotland and is now considered 'definitely endangered' by UNESCO classification (Moseley 2010). Analysis of the location of Gaelic speakers in Scotland and maps from the most recent Census in 2011 can be found in National Records of Scotland (2015). Figure 1 shows the location of Gaelic speakers in Scotland as a percentage of the inhabitants aged over three in each Civil Parish who reported being able to speak Gaelic in the 2011 Census.

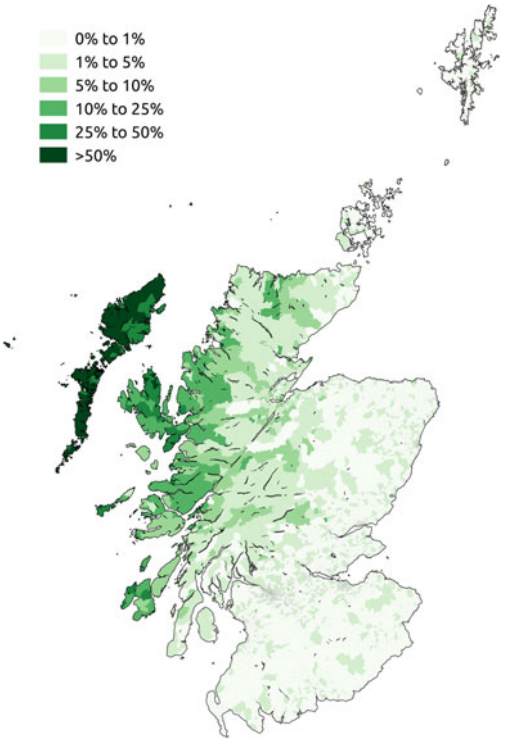
A dialect of Gaelic in East Sutherland was once described as a prototypical case of language obsolescence (Dorian 1981) but the language is now undergoing significant revitalisation measures (e.g. McLeod 2006). These include the introduction of nursery, primary and secondary immersion schooling in Gaelic, as well as adult learning classes, more university degree courses, and many other public and private initiatives. Many of these activities are coordinated by the Gaelic Language Board (Bòrd na Gàidhlig), which was created as a result of the 2005 Gaelic Language Act (Scotland). The language act states that Gaelic holds the same legal status as English in Scotland.

The speaker in the speech samples associated with this contribution is a male in his fifties. He was born and raised in Ness, a Gaelic-speaking community in the north of the Isle of Lewis, and is currently working at the University of Glasgow. Lewis is the most northerly island in the chain of islands known as the Outer Hebrides, or the Western Isles. It is the part of Scotland where the densest concentration of Gaelic speakers resides (52% Gaelic-speaking according to the 2011 Census). His speech can be considered representative of the middle-aged generation of fluent traditional Lewis Gaelic speakers, with some more levelled features due to his time in Glasgow among speakers of other dialects. We have noted where his Lewis dialect diverges significantly from other Hebridean dialects. The recordings were made onto a laptop computer in the noise-attenuated sound studio at the University of Glasgow using a Beyerdynamic Opus 55 headset and a Sound Devices USBPre2 pre-amplifier and analogue-to-digital converter.

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Figure 1 (Colour online) Percentage of people over the age of three able to speak Gaelic according to the 2011 Census.

Consonants

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Plosive	p^h p p^{jh} p^j		$t̪^h$ $t̪$		 $tʃ^h$ $tʃ$	 c^h c	k^h k	
Nasal	m		$n̪^ˠ$ $n̪^j$	n				
Tap/ trill				ɾ $ɾ^j$				
Fricative		f v f^j		 s	 ʃ	 ç	x ɣ	h
Approximant						 j		
Lateral approximant			$l̪^ˠ$ $l̪^j$	l				

Notes: 1. Non-palatalised consonants are shown in the top of the cell, and palatalised below.

2. Regarding the palatal Approximant, Oftedal (1956: 113) additionally reports a distinction in some speakers from the east coast of Lewis between /j/ and /ʝ/, for example in *ionnsaich* 'teach, learn!' /jɛ̃ũsɪç/ and *dh'ionnsaich* 'taught, learned' /ʝɛ̃ũsɪç/. Our participant is from the north-west of Lewis so does not make this distinction.

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Phoneme	Gaelic	IPA	Gloss	Phoneme	Gaelic	IPA	Gloss
pʰ	poll	pʰɔul̪ˠ	mud	pʲʰ	piuthar	pʰʲuˑəɾ	sister
	puing	pʰəiɲ̟ʲc	point		peann	pʰʲauɲ̟ˠ	pen
	capall	kʰaʰpəl̪ˠ	mare		cipean	kʰˑiˑʰpən	peg
p	bò	poː	cow	pʲ	beàrr	pʲaːɾ	cut
	buidhe	pui.ə	yellow		beò	pʲɔː	alive
	obair	opɪɾʲ	work		ribe	ɾipʲə	trap, snare
t̪ʰ	tog	t̪ʰok	lift	tʃʰ	teth	tʃʰe	hot
	tuigsinn	t̪ʰikʃiɲ̟ʲ	understanding		teòclaid	tʃʰɔːʰkl̪ˠɪtʃ	chocolate
	bata	paʰt̪ə	stick		taitinn	tʰaiˑʰtʃiɲ̟ʲ	please (verb)
t̪	doras	t̪aɾəs	door	tʃ	dealbh	tʃal̪ˠav	picture
	duine	t̪iɲ̟ʲə	anyone		deoch	tʃɔx	drink
	fada	fat̪ə	long		maide	matʃə	beam
kʰ	caol	kʰɯːl̪ˠ	thin	cʰ	ciall	cʰiəl̪ˠ	reason
	cuibhle	kʰəilə	wheel		ceòl	cʰɔːl̪ˠ	music
	aca	aʰkə	at them		aice	eʰcə	at her
k	gaol	kɯːl̪ˠ	love	c	geal	cal̪ˠ	white
	guidhe	kui.ə	wish		geòla	cɔːl̪ˠə	yawl
	agad	akət̪	at you		aige	ɛcə	at him
f	fuar	fuəɾ	cold	fʲ	fion	fʲian	wine
v	bha	va	was				
s	sùil	suːl	eye	ʃ	seinn	ʃəiɲ̟ʲ	singing
x	chaidh	xai	went	ç	chì	çiː	will see
ɣ	dhaibh	ɣaiv	for them	j	dh'ith	jiç	ate
h	fhuair	huəɾʲ	obtained				
m	math	mah	good				
n̪ˠ	nach	n̪ˠax	not[1]	n̪ʲ	neach	n̪ʲax	person
	Anna	aɲ̟ˠə	Anna		nighean	n̪ʲi.ən	daughter
	seann	ʃauɲ̟ˠ	old		bainne	pɔɲ̟ʲə	milk
					seinn	ʃəiɲ̟ʲ	singing
				n	mo	mo ni.ən	my
					nighean	pɛnɪʃ	daughter
					banais	ʃɛn	wedding
					sean		grandfather
l̪ˠ	loch	l̪ˠɔx	lake	l̪ʲ	leabaidh	l̪ʲapi	bed
	callaid	kal̪ˠatʃ	fence		caillech	kʰal̪ʲɔx	old woman
	dall	t̪aul̪ˠ	blind		caill	kʰail̪ʲ	lose
				l	mo	mo lapi	my bed
					leabaidh	kʰalɔx	cockerel
					coileach dàil	t̪aːl	delay
ɾ	ràdh	ɾaː	saying	ɾʲ	ri	ɾʲi	to
	aran	aɾan	bread		aire	aɾʲə	attention
	car	kaɾ	somewhat		air	ɛɾʲ	on

[1] The velar fricative /x/ is realised as [χ] following back vowels (including /a/ in a velarised environment). So *nach* /n̪ˠax/ 'not' is realised as [n̪ˠaχ].

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'Broad' and 'slender'

Similar to Irish, Gaelic consonants have a palatalised and a non-palatalised series. These are often referred to as 'slender' and 'broad' consonants respectively in the Gaelic literature and teaching materials (e.g. MacAulay 1992, Ó Maolalaigh & MacAonghuis 2008, Gillies 2009, Bauer 2011). Several consonants do not take part in this alternation: /m v h/. Borgstrøm (1940: 17) suggests that no labial(-dental) consonants have the alternation in Scottish Gaelic but recent articulatory work on Irish confirms that in Irish /pʰ p f/ do have palatalised counterparts (Ní Chiosáin & Padgett 2012), so we follow their work and Ladefoged et al. (1998). See also Oftedal (1965) and MacAulay (1968) for further comments on this topic. In the Consonant Table above, we have shown the non-palatalised series on the top row of each cell, and the palatalised series on the bottom row where possible. Laterals, rhotics and alveolar/dental nasals are discussed separately below. The only sounds with actively velarised counterparts are laterals and dental/alveolar nasals, which are discussed separately below. Some accounts of Irish have suggested that some other non-palatalised sounds are velarised, specifically /pˠ bˠ fˠ mˠ t̪ˠ d̪ˠ sˠ/ (Ní Chasaide 1999: 35). This has not been reported for Gaelic, see Borgstrøm (1940: 17), Ladefoged et al. (1998: 3), Ternes (2006:18), Gillies (2009: 239), Bosch (2010: 268–269). Ní Chiosáin & Padgett (2012: 174) state that in Irish, the contrast is manifested as palatalised vs. non-palatalised before back vowels and palatalised vs. velarised before front vowels. In Irish, an example commonly cited is the contrast between *buí* 'yellow' /bˠi/ and *bí* 'be!' /bʲi/ (see Ní Chasaide 1999 for audio recordings). The analogous context in Gaelic is not produced with velarisation e.g. *puing* 'point' [pʰəiŋʲc], *buidhe* 'yellow' [pui.ə], *tuigsinn* 'understanding' [t̪ʰikʃĩ], *duine* 'anyone' [t̪iɲʲə], *muinntir* 'people' [məiŋʲtʃʰəð], *suidhe* 'sit' [sui.ə].

The Gaelic broad/slender distinction manifests itself in a change of primary place of articulation for sounds produced further back than those discussed so far. For example, the palatalised dental/coronal stops are most commonly post-alveolar affricates, although some speakers produce alveolo-palatal affricates. Similarly, /ʃ/ is the palatalised counterpart to /s/. The palatalised counterparts to /kʰ/ and /k/ are produced as palatal stops /cʰ/ and /c/ respectively (e.g. Borgstrøm 1940: 17). /x/ and /ç/ are a broad and slender pair respectively, as are /ɣ/ and /j/.

Initial consonant mutations

A feature common to all the Celtic languages is the existence of initial consonant mutations, a system of consonantal alternations under certain morphophonological conditions. The most common mutation in Gaelic, and the only one recognised in orthography, is lenition. This mutation occurs in contexts such as feminine singular nominative nouns after the definite article, adjectives modifying a feminine noun, the dative case with the definite article, and the vocative of proper nouns. For full details about the contexts where lenition occurs see Ó Maolalaigh (1996) and Byrne (2002). Examples of lenition mutations (in phonemic transcription) follow below. Where there are differences between broad and slender consonants, these are shown. Where not, the mutated variants are the same as those shown. The prefix *mo* means 'my' and causes lenition.

Phoneme	Lenited	Gaelic unlenited	IPA	Gaelic lenited	IPA	Gloss
pʰ	f	p̲òg	pʰok	mo p̲hòg	mo foːk	(my) kiss
p	v	b̲ò	poː	mo b̲hò	mo voː	(my) cow
t̪ʰ	h	t̲aigh	t̪ʰəi	mo th̲aigh	mo həi	(my) house

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tʃʰ	h	t̲ìde	tʃʰiːtʃə	mo th̲ìde	mo hiːtʃə	(my) time
t̪	ɣ	d̲achaigh	t̪axi	mo dh̲achaigh	mo ɣaxi	(my) home
tʃ	j	d̲ealbh	tʃalav	mo dh̲ealbh	mo jalav	(my) picture
kʰ	x	c̲at	kʰaʰt̪	mo ch̲at	mo xaʰt̪	(my) cat
cʰ	ç	c̲eòl	cʰoːl̪ʸ	mo ch̲eòl	mo çoːl̪ʸ	(my) music
k	ɣ	g̲aol	kɯːl̪ʸ	mo gh̲aol	mo ɣɯːl̪ʸ	(my) love
c	j	g̲eòla	coːl̪ʸə	mo gh̲eòla	mo joːl̪ʸə	(my) yawl
m	v	m̲uc	mũʰk	mo mh̲uc	mo vũʰk	(my) pig
f	ø	f̲acal	faʰkəl̪ʸ	mo fh̲acal	m aʰkəl̪ʸ	(my) word
s	h	s̲ùil	suːl	mo sh̲ùil	mo huːl	(my) eye
ʃ	ç	s̲eòmar	ʃoːmər	mo sh̲eòmar	mo çoːmər	(my) room
l̪ʲ	l	l̪eabaidh	l̪ʲapi	mo l̪eabaidh	mo lapi	(my) bed
n̪ʲ	n	n̲ighean	n̪ʲiːən	mo n̲ighean	mo niːən	(my) daughter

This list shows the broad transcription of lenited consonants; Archangeli et al. (2014) note there may be phonetic differences between lenited and 'underlying' consonants i.e. incomplete neutralisation (see also Welby, Ní Chiosáin & Ó Raghallaigh 2017 for incomplete neutralisation in Irish).

A second initial consonant mutation, not shown in orthography, and not realised in all dialects, is known as nasalisation or eclipsis. The phenomenon in Gaelic is somewhat different from the Irish phenomenon of eclipsis, which is recognised in orthography (Ó Maolalaigh 1996). In Gaelic, there is some dialectal variation in the realisation of eclipsis and its realisation is not obligatory. For details see Gillies (2009: 251–252) and Ó Maolalaigh (1996). Eclipsis occurs after closely grammatically-related items such as nouns following the definite article *an,* or nouns immediately following a modifying adjective ending in a nasal consonant.

Aspiration

In word-initial position, stops are either voiceless unaspirated or voiceless post-aspirated. In word-medial and word-final position, the stop series are either voiceless unaspirated or voiceless pre-aspirated (Borgstrøm 1940, Oftedal 1956, Ladefoged et al. 1998, Ó Maolalaigh 2010, Nance & Stuart-Smith 2013). Pre-aspiration is typically longest in velar/palatal stops and shortest in bilabials. The realisation of preaspiration varies from dialect to dialect. In Lewis it is typically a voiceless [h], but preaspiration can be more [x]-like, especially preceding velar stops in dialects such as Barra (see Ó Murchú 1985). Instrumental evidence in Nance & Stuart-Smith (2013) suggests very little or no closure voicing even in word-medial stops which are orthographically *b d g*. For this reason, we follow Ladefoged et al. (1998) in stating that the contrast is one of aspiration rather than voicing and use the transcriptions /pʰ/ and /p/, etc.

Laterals, nasals and rhotics

Previous reports state that laterals, dental/alveolar nasals and rhotics participate in a three-way contrast (Borgstrøm 1940; Oftedal 1956; Ní Chasaide 1979; Shuken 1980; Ladefoged et al. 1998; Ternes 2006; Nance 2013, 2014). In earlier forms of Gaelic, it is hypothesised, there was a four-way distinction between these sounds. The alleged distinction was as follows: palatalised and velarised dental variants contrasted with palatalised and velarised alveolar variants, i.e. /l̪ʲ l̪ʸ lʲ lʸ/ (see e.g. Russell 1995 76). This previous four-way distinction has

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reduced to a three-way distinction, or a two-way distinction in the case of rhotics, in most varieties of modern Gaelic (see Ternes 2006: 19 for details). We refer to the three sounds as 'palatalised', 'velarised' and 'alveolar' as shorthand for their full descriptions.

Laterals

The laterals in modern Gaelic are a velarised dental lateral, a palatalised dental lateral, and an alveolar lateral. Following static palatographic work in Shuken (1980) and Ladefoged et al. (1998), and descriptions in Borgstrøm (1940) and Oftedal (1956), we consider the palatalised lateral as palatalised, rather than palatal. Acoustically, the velarised lateral is characterised by low F2 and high F1, the palatalised lateral by high F2 and low F1, and the alveolar lateral lies in between these two extremes (Shuken 1980; Ladefoged et al. 1998; Nance 2013, 2014).

In word-initial position, our speaker produces three laterals: the velarised and palatalised laterals differ substantially e.g. *loch* 'lake' /l̪ˠɔx/ and *leabaidh* 'bed' /l̪ʲapi/. Very few lexical items, excluding recent borrowings, begin with the alveolar lateral, but this can be derived through the lenition mutation. Generally speaking, the velarised and palatalised laterals, nasals and rhotics lose their secondary articulations in lenition conditions. For example, the lenited palatalised lateral becomes alveolar e.g. *leabaidh* 'bed' /l̪ʲapi/ but *mo leabaidh* 'my bed' /mo lapi/. It has been reported that a lenited velarised lateral will become alveolar, but our speaker did not make this distinction. In word-medial position, there is a straightforward three-way contrast e.g. *callaid* 'fence' /kʰal̪ˠatʃ/, *coileach* 'cockerel' /kʰalɔx/, *cailleach* 'old woman' /kʰal̪ʲɔx/. Similarly, there is a three-way contrast in word-final position e.g. *dall* 'blind' /t̪aul̪ˠ/, *dàil* 'delay' /t̪aːl/, *caill* 'lose' /kʰail̪ʲ/.

Nasals

Borgstrøm (1940) and Shuken's (1980) static palatography study describe the articulation of the three (dental/alveolar) nasals as /n̪ˠ/, /n/ and /n̪ʲ/. Velar and palatal variants of these sounds occur in the context of /k/ and /c/, e.g. *long* 'ship' [l̪ˠãũŋk]and *taing* 'thanks' [t̪ʰãĩɲc]. As these are the only contexts where [ŋ] and [ɲ] occur, we consider them as allophones of /n̪ˠ/ and /n̪ʲ/ respectively (see also Borgstrøm 1940: 77).

In word-initial position, there is a contrast between velarised and palatalised nasals, e.g. *nach* 'not' /n̪ˠax/, and *neach* 'person' /n̪ʲax/. Very few lexical items begin with alveolar nasal, but this can be derived through lenition. The lenitied palatalised nasal becomes alveolar e.g. *nighean* 'daughter' /nʲi.ən/, *mo nighean* 'my daughter' /mo ni.ən/. Theoretically, the lenited velarised also becomes alveolar, but our speaker did not make this distinction. In word-medial position, there is a three-way contrast e.g. *Anna* 'Anna' /an̪ˠə/, *banais* 'wedding' /bɛnɪʃ/, *bainne* 'milk' /bɔn̪ʲə/. In word-final position, there is a three-way contrast e.g. *seann* 'old' /ʃaun̪ˠ/ (produced here as [ʃãũn̪ˠ] with a very short final nasal), *sean* 'grandfather' /ʃɛn/, *seinn* 'singing' /ʃəin̪ʲ/.

Rhotics

The rhotics also historically participated in the three-way distinction between velarised, alveolar and palatalised phonemes (Borgstrøm 1940, Oftedal 1956). Traditional descriptions indicate that the velarised rhotic is produced as a velarised trill (Borgstrøm 1940, Oftedal 1956), but most speakers now produce the velarised/alveolar rhorics as taps or approximants, and trills are very rare in contemporary production (Ó Dochartaigh 1997, Nance et al. 2016). The palatalised rhotic is often produced as a dental fricative [ð] in Lewis and in other dialects.

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There is, however, substantial variation across dialects in the production of this sound, with many dialects and individuals producing some kind of tap or fricated tap (Ó Dochartaigh 1997). We have represented the current two-way contrast as a distinction between /ɾ/ and /ɾʲ/ but it should be noted that there is substantial variation in the production of these sounds.

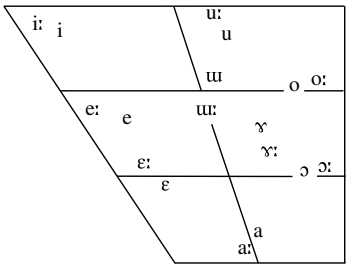
In word-initial position, the palatalised variant is almost non-existent so the contrast is effectively neutralised. The preposition *ri* 'to' /ɾʲi/ is reported to use the palatalised variant, but our speaker did not produce this rhotic substantially different to the rhotic in, for example, *ràdh* 'saying' /ɾaː/. In word-medial position, there is a two-way contrast e.g. *aran* 'bread' /aran/, *aire* 'attention' /aɾʲə/ (produced as [aðə]). In word-final position there is also a two-way contrast e.g. *car* 'somewhat' /kʰaɾ/, *air* 'on' /ɛɾʲ/ (produced as [ɛð]).

In the dialect presented here, clusters with rhotics, dental/alveolar stops, laterals, and nasals tend to be produced as retroflex, and the rhotic as a retroflex approximant, e.g. *thuirt* 'said' [hɯɽt̪]. In *-rs* clusters, the rhotic and sibilant are often produced as retroflex, e.g. *carson* 'why' [kʰaɽ̪sɔn]. In the vast majority of other Gaelic dialects, an audible [ʃ] or [s̪] occurs in *-rt* clusters, e.g. *thuirt* 'said' [hɯɽ̪st̪]; in some dialects this also occurs in *-rd* (Watson 1990).

Vowels

Monophthongs

Gaelic has nine oral monophthongs, which can be long or short. Acoustic measures of the first two formants in the monophthongs from the sample words in this Illustration are shown in Figure 2 below. For acoustic analysis of a larger dataset focussing on the high back vowels, see Nance (2011).



Phoneme	Gaelic	IPA	Gloss	Phoneme	Gaelic	IPA	Gloss
i	ri	ɾʲi	to	iː	chì	çiː	will see
e	teth	tʃʰe	hot	eː	tè	tʃʰeː	woman
ɛ	bean	pɛn	wife	ɛː	Gàidheal	kɛːəl̪ˠ	Gael
a	bata	paʰt̪ə	stick	aː	bàta	paːʰt̪ə	boat
ɔ	boc	pɔʰk	goat	ɔː	bòc	pɔːʰk	swell
o	bog	pok	soft	oː	bò	poː	cow
u	cur	kuɾ	put	uː	ùr	uːɾ	new
ɯ	turadh	t̪ʰɯɾəɣ	dry weather	ɯː	caol	kʰɯːl̪ˠ	thin
ɤ	tagh	t̪ɤ	choose	ɤː	adhbhar	ɤːvəɾ	cause

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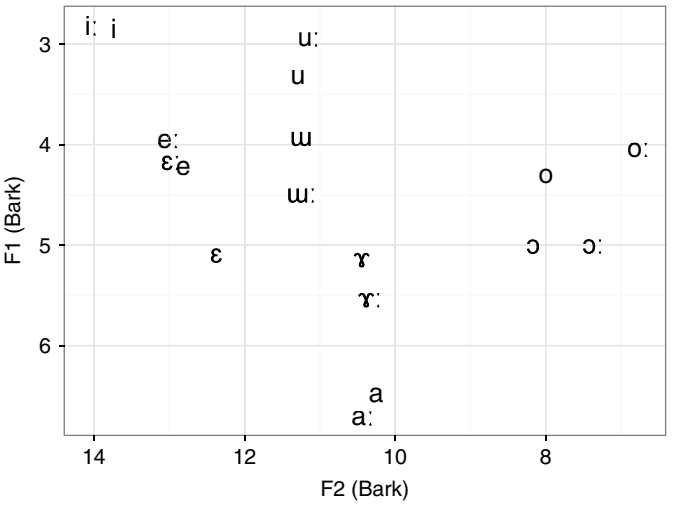


Figure 2 Formant measurements of the Gaelic monophthongs (Bark).

Long vowels are indicated by an accent grave in orthography. Generally, the long vowels are of similar acoustic quality to the short vowels, although they tend to be slightly more peripheral. The 'high back' vowels /ɤ ɯ/ are acoustically more central, or even front in the dialect represented here (Nance 2011). Borgstrøm (1940: 11) describes these vowels as phonologically, rather than phonetically, back. The two previous dialect descriptions of Lewis Gaelic, Borgstrøm (1940) and Oftedal (1956), do not use the modern IPA. We follow Ladefoged et al. (1998) in interpreting their symbols as /ɤ/ and /ɯ/. The vowel /u/ has two allophones: back [u̟], occurring in the environment of velarised sonorants, and central [ʉ], occurring elsewhere, e.g. *sùil* 'eye' [sʉːl], but *ubhal* 'apple' [u̟.əl̪ˠ]. The formant distribution of these two allophones is strikingly different; see Ladefoged et al. (1998) and Nance (2011). Similarly, /a/ is auditorily [ɑ] in the environment of velarised sonorants, e.g. *latha* 'day' [l̪ˠɑ.ə], but *leat* 'at you' [la^{h}t]. Long /ɛː/ is not common and has merged with /eː/ for some speakers, including our participant. In Lewis, a group of words containing orthographic *ea* before *g* are pronounced with /ɤ/, but /ɛ/ or /e/ in other dialects, e.g. *beag* 'small' [pɤk], *eaglais* 'church' [ɤkl̪ˠɪʃ].

Nasal monophthongs

There are disagreements in the literature on the number of nasal vowels in Gaelic, and their nature. Borgstrøm (1940: 13) reports five short nasal vowel phonemes, and six long nasal vowel phonemes. Oftedal (1956: 40), who was reporting on a dialect on the eastern side of Lewis, describes nine short and seven long nasal vowel phonemes. It is also important to note that Borgstrøm and Oftedal recorded participants born in the 1880s and before, and thus their reports may not represent the contemporary situation. Oftedal (1956: 40) notes that nasality in vowels in 'one of the most elusive features' of the phonemics of the dialect under investigation, and suggests that nasality has 'little distinctive value', referring to its very low functional load. Similarly, Borgstrøm (1940: 13) states that nasality has 'not a great functional value'. The degree of nasality appears to vary from dialect to dialect and is also to some extent speaker-specific. Oftedal (1956: 41) notes that even between two of his participants, who were from the same village and married, there was great variation in the degree of nasality among their vowels. One person, he claimed, had nasal vowels perceptibly similar to nasal vowels in French, whereas the other speaker had nasal vowels similar to a speaker of General American (see also Ó Curnáin 2007 for analysis of individuals in Irish). An impressionistic auditory analysis of our sample sound files suggests that there are variable amounts of nasality in

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different words, shown (in phonemic transcription) in the following list (potentially nasal vowels are underlined):

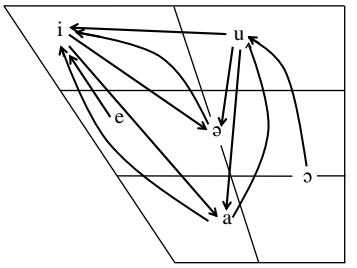
Phoneme	Gaelic	IPA	Gloss	Phoneme	Gaelic	IPA	Gloss
ĩ	ceangal	kʰĩ.aḷˠ	connection	ĩː	innse	ĩːʃə	telling
ẽ	am faic	əm fẽʰk	will see	ẽː	chan e	xaṉʲ ẽː	it is not
ɛ̃	teanga	tʃʰɛ̃kə	tongue	ɛ̃ː	sèimh	ʃɛ̃ːv	gentle
ã	abhainn	ãviṉʲ	river	ãː	tàmh	ṭʰãːv	rest, quiet
ɔ̃	cnoc	krɔ̃ʰk	hill	ɔ̃ː	Dòmhnall	ṭɔ̃ː.əḷˠ	Donald
õ	mothachadh	mõ.əxəɣ	perceiving	õː	Didòmhnaich	tʃiˈtõː.niç	Sunday
ũ	muc	mũʰk	pig	ũː	unnsa	ũːsə	ounce
ɯ̃	cruinneachadh	kʰrɯ̃ṉʲəxəɣ	gathering	ɯ̃ː	naomh	ṉˠɯ̃ːv	saint
ɤ̃	eanchainn	ɤ̃nəxiṉʲ	brain	ɤ̃ː	faoin	fɤ̃ːṉʲ	mad

See Morrison (2015) and Warner et al. (2015) for analysis of nasal airflow data. The quality of the nasal vowels is similar to that of their oral counterparts, presented in Figure 2 above; hence we do not offer a separate nasal vowel quality figure here.

Nasal vowels in Gaelic generally arose due to coarticualtion with an original nasal consonant, e.g. *tàmh* 'rest' /ṭʰãːv/. In this word, the orthographic *m* suggests that there was a bilabial nasal consonant historically, which is no longer pronounced. See Ó Maolalaigh (2003) for an account of nasalisation processes in Gaelic. Some accounts suggest that the final fricative in words such as *tàmh* is also nasalised (Borgstrøm 1940, Ternes 2006), but aerodynamic work suggests that this is not the case phonetically (see Warner et al.'s 2015 work on Skye, but see also Morrison 2015), and it has been suggested that these are unlikely in articulatory terms (Ohala 1975: 300).

Diphthongs

Gaelic has a rich diphthongal system. Borgstrøm (1940: 37) describes 14 phonemic diphthongs, /ai ɛi ei ui ɤi au ɛu ɔu iə ia iɛ uə ua uɛ/, and Oftedal (1956: 44) describes 10, /ei ui əi ai ɔu au iə ia uə ua/. We find that Oftedal's account best describes contemporary Gaelic. Sample words are listed above (in phonemic transcription).



Phoneme	Gaelic	IPA	Gloss	Phoneme	Gaelic	IPA	Gloss
iə	biadh	piəɣ	food	ei	till	tʃeiḷʲ	return
	ciall	cʰiəḷˠ	reason		cinnteach	cʰeiṉʲtʃʰɔx	certain
	fion	fʲiən	wine		grinn	krʲeiṉʲ	elegant

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ia	beul	pialˠ̪	face	əi	soillse	səilʲ̪ʃə	light
	brèagha	prʲia.a	beautiful		cuibhle	kʰəilə	wheel
	feuch	fʲiax	try		muinntir	məinʲ̪tʃʰəɾʲ	people
uə	tuath	t̪ʰuə	north	ui	suidhe	sui.ə	sit
	fuar	fuəɾ	cold		buidhe	pui.ə	yellow
	ruadh	ɾuəɣ	red		guidhe	kui.ə	wish
ua	cuan	kʰuan	ocean	au	call	kʰauˠ̪	loss
	a-nuas	əɲˠuas	down		samhradh	saurəɣ	summer
	duan	t̪uan	song		ceann	cʰauɲˠ	head
ai	dhaibh	ɣaiv	for them	ɔu	poll	pʰɔuˠ̪	mud
	cainnt	kʰaiɲʲtʃʰ	speech		donn	tɔuɲˠ	brown
	taing	t̪ʰaiɲʲc	thanks		leam	lɔum	at me

These two previous descriptions do not specifically mention whether or not nasality in diphthongs should be considered a phonemic aspect or not. However, both give examples of nasal diphthongs. We asked our speaker to produce a large number of words listed by Borgstrøm and Oftedal as containing nasal diphthongs, but they were not consistently audibly nasal. We consider the contemporary situation to be that some words contain diphthongs with nasalisation, but nasalised diphthongs are not phonemic in the language.

Prosody

Syllables, svarabhakti and hiatus

Gaelic syllable structure has been described as typically VC rather than the typologically much more common CV (Clements 1986, Bosch 1998, Smith 1999). See Ní Chiosáin, Welby & Espesser (2012) for experimental work on syllabification in Irish and similar discussion. Two classes of Gaelic words will be described in more detail here because they behave unusually within Gaelic phonology: words containing a svarabhakti vowel, and 'hiatus' words. Certain consonant sequences in Gaelic are broken up by a svarabhakti vowel, which is not represented in the orthography, e.g. *arm* 'army' [a**ɾ**am], *ainm* 'name' [an**a**m], *balg* 'belly' [paˠ̪**a**k], *dorcha* 'dark' [t̪ɔɾ**ɔ**xə], *Alba* 'Scotland' [aˠ̪**a**pə]. Usually the svarabhakti vowel is a copy of the preceding vowel (Borgstrøm 1940, Clements 1986, Bosch & de Jong 1997, Hall 2006). Svarabhakti vowels in Gaelic occur where (i) the consonant preceding the svarabhakti vowel is a sonorant, (ii) the preceding vowel is short, (iii) the consonant cluster is non-homorganic, and (iv) the second consonant is not a pre-aspirated plosive. Previous descriptions state that svarabhakti vowels do not contribute to the syllable count of a word, e.g. *falbh* 'going' [faˠ̪av] is monosyllabic, but *falamh* 'empty' [faˠ̪.u] is disyllabic (Borgstrøm 1940, Oftedal 1956, Bosch 1998). Recent experimental work (Hammond et al. 2014) suggests that speaker perceptions are more complex: words such as *falbh* were perceived as not quite monosyllabic, but not quite disyllabic either. The svarabhakti vowels are described as stressed, which is unusual for stress-initial Gaelic and also typologically (Borgstrøm 1937: 77; Bosch & de Jong 1997).

'Hiatus' words in most cases refer to a class of words in which historic intervocalic consonants are no longer pronounced, e.g. *leabhar* 'book' [l̪ʲɔ.əɾ] compared to *gu leòr* 'enough' [kə l̪ʲɔːɾ], *rathad* 'road' [ɾa.əd̪] compared to *ràdh* 'saying' [ɾˠaː]. In the word accent system of (Lewis) Gaelic (see below), words with a svarabhakti vowel such as *falbh* 'going' [faˠ̪av] are produced with the accent for monosyllabic words and words with hiatus such as *leabhar* 'book' [l̪ʲɔ.əɾ] are produced with the accent for polysyllabic words. In other dialects, hiatus is produced with an inserted glide, a period of creaky voice or a glottal stop (Holmer 1938; Jones 2000; Ternes 2006: 138).

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Tone, intonation and stress

The Lewis dialect of Gaelic, along with north-west mainland dialects such as Applecross, is described as having contrastive word accents (Borgstrøm 1940, Oftedal 1956, Dorian 1978, Bosch & de Jong 1997, Ladefoged et al. 1998, Ternes 2006, Iosad 2015, Nance 2015a, Morrison 2019). Southern Hebridean and other mainland dialects are not reported to use this prosodic feature (see Ternes 2006: 138 for details). Ternes (2006) provides the most extensive description of the Lewis Gaelic system. In this account, word accents correspond to differences in syllabicity: monosyllabic words have a rising or level low pitch, whereas polysyllabic words have a level high pitch, falling pitch, rising–falling pitch. This is schematised in Figure 3.

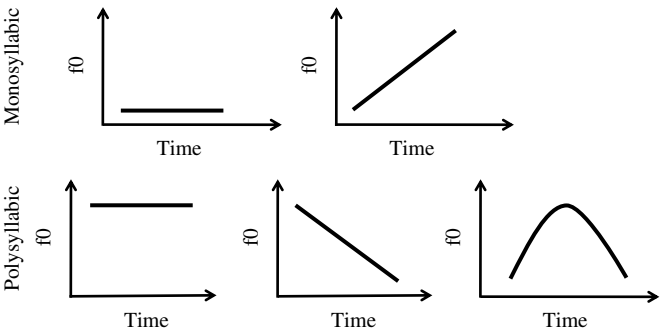


Figure 3 Schematised pitch traces for Gaelic word accents.

In general, speakers are often not consciously aware that their dialect uses pitch contrastively. When Gaelic is taught, the dialects of Skye or Uist are used as models, so tone is rarely, if ever, explicitly taught. Example pairs of words illustrating the word accent contrast are given below (in phonemic transcription). Monosyllabic words are to the left, polysyllabic comparison words to the right.

Syllabicity/Accent	Word	IPA	English	Syllabicity/Accent	Word	IPA	English
Monosyllabic/Accent 1	bò	poː	cow	Polysyllabic/Accent 2	bogha	po.ə	rockpool
Monosyllabic/Accent 1	gu leòr	kə l̪ʲɔːɾ	enough	Polysyllabic/Accent 2	leabhar	l̪ʲɔ.əɾ	book
Monosyllabic/Accent 1	sùil	suːl	eye	Polysyllabic/Accent 2	ubhal	u.əl̪ˠ	apple
Monosyllabic/Accent 1	falbh	fal̪ˠav	going	Polysyllabic/Accent 2	falamh	fal̪ˠ.u	empty
Monosyllabic/Accent 1	tinn	tʃʰeiɲʲ	ill	Polysyllabic/Accent 2	tighinn	tʃʰi.əɲʲ	coming
Monosyllabic/Accent 1	ainm	anam	name	Polysyllabic/Accent 2	anam	anəm	soul
Monosyllabic/Accent 1	ràmh	ɾãv	oar	Polysyllabic/Accent 2	rathad	ɾa.ət	road
Monosyllabic/Accent 1	sinn	ʃəiɲʲ	we	Polysyllabic/Accent 2	sithinn	ʃi.iɲʲ	venison

Spectrograms of the contrast between *falbh* ‘going’ [fal̪ˠav] and *falamh* ‘empty’ [fal̪ˠ.u] are shown in Figure 4. Analysis of the word accent system from a corpus of spontaneous speech is presented in Nance (2013, 2015a).

In terms of sentence intonation, the default pattern in declaratives is a fall in pitch (Oftedal 1956: 36; Dorian 1978: 37; MacAulay 1979). Borgstrøm (1940: 53) additionally states that if the last syllable has a (lexical) rising word accent, the rise is often very reduced. MacAulay’s (1979) descriptive account of common pitch patterns in Lewis intonation suggests that interrogatives may be realised with rising pitch.

In the vast majority of Gaelic words, the word-initial syllable is stressed. Exceptions are generally borrowings, such as *buntàta* [punˈt̪ʰaːʰt̪] ‘potatoes’, and some adverbs, such as

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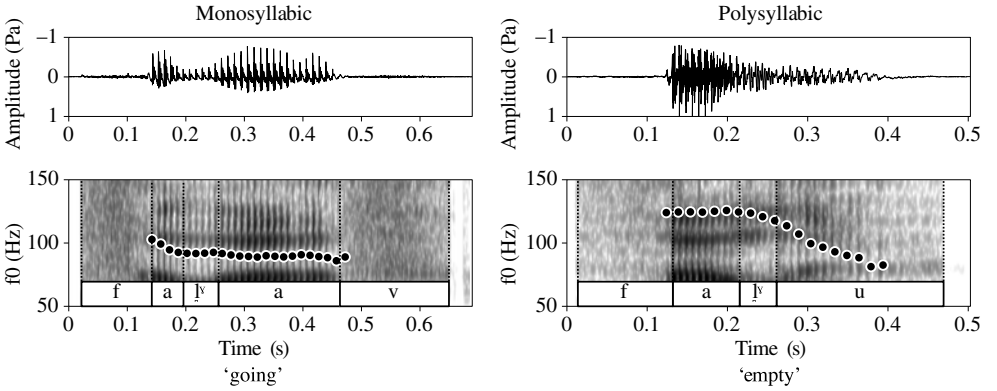


Figure 4 Spectrograms and pitch traces illustrating the word accent contrast between *falbh* 'going' (monosyllabic) vs. *falamh* 'empty' (polysyllabic).

an-diugh 'today' [ənˈtʃʉ] and days of the week, e.g. *Didòmhnaich* 'Sunday' [tʃiˈtõːniç]. Words containing a svarabhakti vowel (see above) are unusual in terms of stress and it has been claimed that both vowels bear stress (Bosch & de Jong 1997).

Airstream mechanisms

A final notable feature of Gaelic prosody is the extensive use of the ingressive airstream mechanism, especially in the last word of a phrase and discourse markers expressing agreement (Lamb 2003, Thom 2005, Eklund 2008). This use of ingressives is informally referred to as the 'Gaelic gasp'.

Sociolinguistic variation

Gaelic's endangered and minority status means that the language is susceptible to rapid and extensive change. This illustration discusses the phonetic and phonological characteristics of conservative Gaelic as spoken by older or middle-aged speakers from (at least formerly) Gaelic-dominant communities. Younger speakers may sound substantially different to the variety of Gaelic described here. For example, nasal vowels are rare in the speech of younger speakers (see also Ó Curnáin 2007: 333 for Irish). The word-accent system described above is not used by younger speakers from any background (Nance 2015a, b). Some younger speakers do not produce the three-way lateral contrast (Nance 2014, Nance published online 14 February 2019).

Transcription of the recorded passage

Phonemic transcription

va ə ɣɯː ə t̪ʰuə akəs ə ɣrʲiən ə tʃɛspət̪ kʰoː aʰkə ə pu t̪ʰrɛsə n̪ˠuərʲ ə n̪ˠɔxk n̪ʲax ʃu.əl ə va ɛrʲ ə xõːt̪əx aun̪ˠ ən kʰloːʰkə pl̪ˠaː ‖ ɣɯːn̪ˠt̪ʰɪç iət̪ kə prʲi kʰoː ə vɛrʲəɣ ɛrʲ ən n̪ʲax ʃu.əl ə xloːʰkə ə xur je əŋ̪ˠ t̪ʰɔʃɔx kər i ə viɣ ka mɛs na pə t̪ʰrɛsə na ən tʃʰeː elə ‖ ən uərʲ ʃɪn heːtʃ ə ɣɯː ə t̪ʰuə xɔ l̪ˠaːtʃɪrʲ s ə purɪn̪ʲ ji ax mar ə pə võ.ə ə heːtʃ i pauŋ̪ˠ na pə tʃʰeŋ̪ʲə ə façkəɣ ə n̪ʲax ʃu.əl ə xloːʰkə tʃʰimɪçəl̪ˠ ɛrʲ heːn ɤkəs mu jɛrʲəɣ lec ə ɣɯː ə t̪ʰuə ʃaxət̪ ən ɤrʲʰpʲ ‖ ən uərʲ ʃɪn jaːrs ə ɣrʲiən əmax kə pl̪ˠaː ɤkəs sə vat̪ xurʲ ə n̪ʲax ʃu.əl je ə xloːʰkə ‖ ɤkəs mar ʃɔn peːt̪ər t̪ɔn ɣɯːi ə t̪ʰuə atʃɔxəɣ kəm pi ə ɣrʲian ə pə t̪ʰrɛsə jɛn tʃi.iʃ aʰkə ‖

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Orthographic version

Bha a' ghaoth a tuath agus a' ghrian a' deasbad cò aca a bu treasa nuair a nochd neach-siubhail a bha air a chòmhdach ann an cleòca blàth. Dh'aontaich iad ge brith cò a bheireadh air an neach-siubhail a chleòca a chur dheth an toiseach gur i a bhiodh ga meas na bu treasa na an tè eile. An uair sin shèid a' ghaoth a tuath cho làidir 's a b'urrainn dhi, ach mar a bu mhotha a shèid i b' ann na bu teinne a phaisgeadh an neach-siubhail a chleòca tim-cheall air fhèin agus mu dheireadh leig a' ghaoth a tuath seachad an oidhirp. An uair sin dheàrrs a' ghrian a-mach gu blàth agus sa bhad chuir an neach-siubhail dheth a chleòca. Agus mar sin, b'fheudar don ghaoith a tuath aideachadh gum b' i a' ghrian a bu treasa den dithis aca.

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Supplementary material

To view supplementary material for this article, please visit http://doi.org/10.1017/S0025100319000015X.

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