The phonology of Gaelic tonal accent

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It is well known that many varieties of Gaelic show an opposition between two classes of words that is implemented by suprasegmental means such as pitch and glottalisation. These phenomena have been compared to the 'tonal accents' of the North and West Germanic languages (notably by Ternes 1980, 2006), and a number of analyses have been proposed in the theoretical linguistics literature. In this paper, I summarise the patterns found across traditional varieties of Scottish Gaelic, and focus on the (limited number of) synchronic alternations that involve accent-related phenomena. In particular, I address the interaction between tonal accents and vowel-zero alternations. I argue that it further supports the analyses of Gaelic tonal accents as reflecting differences in syllabification or metrical structure more generally, as envisaged by Oftedal (1956), Clements (1986), Smith (1999), Iosad (2015) and most recently in the comprehensive analysis by Morrison (2019). I also discuss what kind of new data is necessary to make further progress in our understanding of the accentual phonology of Gaelic.

The Gaelic tonal accents

Most, if not all, traditional varieties of Scottish Gaelic, present a distinction between two classes of words which I shall refer to as bearing 'accent 1' and 'accent 2', following recent practice by Ternes (2006), Iosad (2015), Morrison (2019), but against Nance (2015). The distinction becomes relevant in three groups of words. In almost all cases, 'accent 1' is generally found in words that are historically disyllabic, as reflected in their Old Gaelic forms and in present-day Gaelic spelling, whilst 'accent 2' is associated with historically monosyllabic words.

The basic rules

There are two main groups of words where the accentual contrast is present in Gaelic. The first group contains word-final long vowels. Accent 2 words are categorically produced with long final vowels, whilst accent 1 words usually permit free variation between a long vowel and a sequence of short vowel and a schwa. The long vowel variants thus present minimal pairs with accent 2 words.

Accent 1	**Accent 2**
adha ‘liver’ [¹ˈaː] ~ [¹ˈaə]	*àth* ‘ford’ [²ˈaː]
bodha ‘submerged rock’ [¹ˈpoː] ~ [¹ˈpoə]	*bò* ‘cow’ [²ˈpoː]

Table 1: Accentual minimal pairs with long vowels

A similar contrast obtains between accent 2 diphthongs and accent 1 sequences of two short vowels:

Accent 1	**Accent 2**
dubhan ‘hook’ [¹ˈtu.an]	*duan* ‘poem’ [²ˈtu͡an]
ubhal ‘apple’ [¹u.əlʸ]	*gual* ‘coal’ [²ˈku͡əlʸ]

Table 2: Accentual (sub)minimal pairs with diphthongs and vowel sequences

A third context for the accentual distinction is presented by words with svarabhakti vowels, that is to say vowels that are obligatorily inserted in certain kinds of sonorant + consonant clusters. In this case, minimal pairs are difficult to come by, since the svarabhakti vowel is generally a copy of the vowel preceding the sonorant, at least in ‘central’ varieties, that is, those of the Hebrides and central and western Highlands; in other varieties, the svarabhakti vowel is reduced, as it generally is in Irish. In non-svarabhakti words the set of possible vowels in the non-initial syllable is severely reduced (essentially, barring a small number of exceptions, to [i u ə a]). Nevertheless, pairs such as those in table 3 are often cited.

Accent 1	**Accent 2**
ballag ‘skull’ [¹ˈpalʸak]	*balg* ‘bag, belly’ [²ˈpalʸak]
aran ‘bread’ [¹ˈaran]	*arm* ‘army’ [²ˈaram]

Table 3: Accentual (sub)minimal pairs with svarabhakti words

It is widely recognised that the distinction between accent 1 and accent 2 corresponds broadly to the distinction between disyllabic and monosyllabic words at earlier stages of the language. Thus, in the cases shown in table 1 and table 2, accent 2 words represent Old Gaelic long vowels and diphthongs: *bó* ‘cow’, *dúan* ‘poem’. Accent 1 words, on the other hand, descend either from words that were disyllabic with hiatus in Old Gaelic (as in *adha* < *aë*, from Old Gaelic *óa*), or disyllabic words that underwent intervocalic consonant loss (as in *ubhal* < Old Gaelic *ubull*).[i]

Similarly, accent 1 disyllables generally continue Old Gaelic disyllabic words (as in *ballag* from *ball + óc*, cf. eDIL *ballóc, ballán* ‘drinking vessel’), whilst svarabhakti words are usually written as monosyllables in Old Gaelic, and count as such for metrical purposes in poetry (see the discussion of svarabhakti and ‘middle quantity’ by Greene (1952)).

The phonetic realisation of the accents

It is generally acknowledged that the two accents are, in most traditional varieties, realised at least to some extent by pitch differences, with the exception of an area in south Argyll.

By far the best described is the accentual system of the Gaelic of Lewis: we have traditional monographic descriptions from Borgstrøm (1940) (Great Bernera) and Oftedal (1956) (Leurbost), and phonetic data from Ladefoged and others (1998) (again Great Bernera), Brown (2009) (Ness), and Nance (2015) (several speakers). Although these descriptions differ in detail, there is a widespread recognition that in both accent 1 and accent 2 words the realisation of the stressed syllable is associated with a pitch peak, and the difference between the accents lies in the timing of this peak. In accent 1 words, the peak is realised earlier than in accent 2 words. This results in the following differences, at least as far as forms elicited in isolation go:

- In the case of hiatus words (accent 1) vs. long vowels/diphthongs (accent 2), the former are realised with high or falling pitch, and the latter with rising pitch throughout: *adha* [¹ˈâː] or [¹ˈáə̀] ‘liver’ vs. *àth* [²ˈăː] ‘ford’;
- In the case of historical disyllables (accent 1) vs. svarabhakti words (accent 2), the earlier peak timing in accent timing manifests as a high or falling tone on the stressed syllable continued as a fall in the second syllable, whereas in accent 2 there is a fall throughout the initial vocalic portion followed by a rise of pitch throughout the sonorant and the svarabhakti vowel: *balach* [¹ˈpálʏɔ̀x] ‘boy’ vs. *balg* [²ˈpâlʏák] ‘belly’.

Pitch differences are also identified as an exponent of the accent distinction in other varieties of Gaelic. The instrumental study by Bosch and Jong (1997) focuses on the difference between historical disyllables and svarabhakti vowels in Barra; similar to Lewis, they find a later placement of the peak in accent 2 (svarabhakti) words. Ternes (2006) reports, for Applecross, a similar overall falling contour for accent 1 words, but a ‘wavier’ accent 2 with a pronounced fall before the rising-falling contour. Hammond et al. (2014), who also focus on svarabhakti, report an earlier placement of the pitch peak in accent 1 words compared to accent 2 words from Skye, although they do not discuss the contours in detail. For East Perthshire, Ó Murchú (1989: 92–3) reports a pitch difference between disyllables and

svarabhakti words: he finds no difference in peak timing, with high pitch on the initial vowel in both cases, but a less steep fall (and greater duration of the sonorant) in accent 2 (svarabhakti) words. In East Sutherland Gaelic, Dorian (1978: 38, 60–61) recognises a distinctive rise-fall-rise pattern in accent 2 words in non-final contexts; normally stressed syllables are said to bear a high pitch. For Gairloch, Wentworth (2005) describes accent 1 disyllables as having a high tone on the first syllable followed by a fall, and accent 2 disyllables as having a level high tone throughout.

One interesting early description of the accentual differences is provided by Waltman (1904), using the traditional Swedish notation for the indication of pitch, based on the speech of a single speaker from Aviemore.[ii] The description can be difficult to interpret, but Waltman does note an accentual difference between words with long vowels such *àth* 'ford', *feur* 'grass'[iii] etc. on the one hand, and hiatus words such as *latha* 'day', *beatha* 'life', *giuthas* 'pine', on the other: he notes the former as bearing the 'circumflex' accent (described as falling-rising)[iv] and the latter as having the 'acute' accent (described as having a 'mildly rising' pitch on the stressed syllable followed by a lack of accentual prominence of the following syllables).[v] As for svarabhakti groups, Waltman gives examples of both historical disyllables (*a*['] *chailleach* 'the hag', *coileach* 'cockerel', *tolladh* 'bore.VN') and svarabhakti words (*arm* 'army', *tilg* 'throw', *borb* 'harsh') under the rubric of the 'acute' accent. This may indicate that the accentual distinctions between disyllables and svarabhakti words was lost in the Gaelic of Strathspey, with both being treated as disyllabic. Indeed, the SGDS materials for points in the area (179–188) show widespread loss of the distinction, with words written as disyllables.[vi]

As is well known, a different realisation of the distinction between accent 1 and accent 2 words is found in many southern varieties of Gaelic, particularly in south Argyll, including Islay (Holmer 1938), Jura (Jones 2000, 2006, 2010), Colonsay (Scouller 2017), Tiree (Ternes 1980), Kintyre (Wagner 1958–69: 4; Holmer 1962: 35, 362n.), and Arran (Wagner 1958–69; Holmer 1954). In these varieties, accent 1 words (i.e. hiatus words and historical disyllables) show the phenomenon of glottalisation, interpreted variously as an allophonic property of the following consonant, a suprasegmental 'glottalisation' feature, or a glottal stop: *gobhar* 'goat' [ˈkoʔur], *latha* 'day' [ˈlʏaʔa], *balach* 'boy' [ˈpaʔləx]. Accent 2 words (i.e. words with long vowels and svarabhakti vowels) lack the glottalisation: *bò* 'cow' [poː], *marbh* 'dead' [ˈmarəv] (rather than *[ˈmaʔrəv]). However, the tonal accents of the more northerly dialects are not distributed in exactly the same way as the glottalisation of the Argyll dialects. Specifically,

there are several additional restrictions on glottalisation which mean that some words with accent 1 correspond to words without glottalisation in Argyll.

First, this concerns words consisting of a single light syllable such as *math* ‘good’ and *gruth* ‘curds’. As discussed below, it is not immediately clear which category they belong to in dialects such as Lewis, and so whether they should be glottalised. Sources do record it in these cases, but only Holmer (1938) does so consistently (so [mɛʔ] for *math*). Other sources generally do not record glottalisation *in pausa*: however, Scouller (2017) notes for Colonsay that glottalisation *can* appear in such words in sandhi, if they are followed by a clitic: *math thu fhèin!* ‘well done you’ [mɛʔu ˈheˑ]. For Arran, Holmer (1954) also says that the glottalisation is ‘usually not’ present after a short vowel *in pausa*, but does occur before a vowel-initial word: *gheibh i bàs* ‘she will die’ [joʔ i bɑːs].

Second, glottalisation is generally absent from monosyllabic words containing a short vowel and a coda, such as *creid* ‘believe’. Once again, in ‘tonal’ dialects such words can only have Accent 2, and so we expect lack of glottalisation in Argyll; yet again, however, it is reported both by Jones (2000 *et passim*) for Jura and by Scouller (2017) for Colonsay that glottalisation in such words is possible when they are followed by a clitic: Jura *stad an car* ‘stop the car’ [ˈstaʔt ən kʰar].

Finally, glottalisation is subject to segmental restrictions, and its status in closed syllables is somewhat unclear. It has been suggested (Smith 1999; Iosad 2015) that it is impossible in the presence of a coda. The reasoning is based on South Argyll patterns, where glottalisation appears to interact with the pattern of stop preaspiration. Where preaspiration occurs in the area, it belongs to the type [hp ht xk] common across much of the Hebrides: that is to say, the labial and coronal stops are obligatorily preceded by a long period of glottal frication, whilst the velar stops are preceded by a homorganic oral fricative. If we treat the preaspiration as a sequence of a fricative and a stop, then the preceding syllable has to be treated as closed, and we predict that preaspirated stops cannot be preceded by glottalisation, which is correct: Colonsay *tapaidh* ‘clever’ [ta(*ʔ)hb̥i], *socair* ‘gentle’ [sɔ(*ʔ)xg̥iɾ̥].

However, Morrison (2019) draws attention to the fact that another class of segments is systematically excluded from glottalisation, namely voiceless fricatives: Colonsay *siobhag* ‘straw’ [ˈʃi(*ʔ)fag], *seasamh* ‘stand’ [ˈʃe(*ʔ)səv], *drochaid* ‘bridge’ [d̥rɔ(*ʔ)xɪd̥͡ʃ]. On this basis, he argues that the exclusion of preaspirated stops from glottalisation follows not from their status as clusters, but from the fact that they, like voiceless fricatives, are phonologically specified as [+spread glottis] (see e.g. Halle and Stevens 1971; Avery and Idsardi 2001; on fricatives specifically see Vaux 1998). Since glottalisation involves constriction of the glottis

rather than its opening, Morrison (2019) concludes that they are incompatible. Morrison (p. c.) further notes that the presence of the coda may be entirely irrelevant in view of examples of glottalisation before consonant-initial clitics, as in *dh'fha²n mi* (Jones 2006), or in *fa²d na h-uine* (Tobar an Dualchais, Record ID 5312, at 0:23). This issue deserves further study: glottalisation before clitics does not appear to be entirely regular according to Jones (2006, 2010).

Gaelic accents beyond the basics

The previous section focused on the 'core' cases of the accentual contrast, where the pitch contour of absence of glottalisation can be predicted with relative ease from the segmental make-up and syllable structure of the word. If that were the case across the board, accentual distinctions would have a very low functional load, being entirely parasitic on segmental and syllabic structure. However, in a number of cases we observe more or less systematic deviations of the observed accentual patterns from what might be expected on segmental grounds.

One source of such mismatches that is very common across Gaelic dialects concerns the deletion of voiced fricatives. The voiced fricatives [v] and [ɣ] are often deleted intervocalically; word-finally after a vowel, they may be vocalised, deleted, or occluded to a stop. This can happen irrespective of whether the preceding vowel is underlying or a svarabhakti vowel. As a result of this process, the motivation for svarabhakti may disappear, as there is no longer a consonant cluster on the surface. Nevertheless, the common outcome in this case is that the form preserves both the segmental svarabhakti and its accentual characteristics. This leads to pairs of forms such as *marbh* 'dead' [ˈ²marav], *mharbhadh* 'would kill' [ˈ²vara.əɣ] (SGDS s.vv.) in accentual dialects. Similarly, in glottalising dialects we see examples such as [ˈmarəv] (where the absence of glottalisation may be explained by the status of the [ə] as a svarabhakti vowel in the [rv] cluster), *marbhaidh* 'will kill' [ˈmarıç], where the [ı] cannot be a svarabhakti vowel, because it is part of the future morpheme [-ıç], and therefore we should have expected glottalisation to occur (*[ma²rıç]).

A second source of such mismatches is common when a svarabhakti vowel occurs in an unexpected segmental context. As is well known, the basic rule of svarabhakti in the Gaelic languages can be formulated as follows (e.g. Ó Siadhail 1989; Ní Chiosáin 1999; Smith 1999; Bosch 2010): insert a vowel between a sonorant and a following consonant, unless the following consonant is either homorganic to the sonorant, or is a stop belonging to the /p t k/ series. Across varieties of Gaelic, however, we find numerous examples that go

beyond this rule, that is to say, words that bear accent 2 despite lacking the right segmental context. One source of such exceptions is the additional generalisation, noted by Morrison (2019), that *fortis* sonorants trigger svarabhakti even before preaspirated stops, although still not in homorganic clusters: cf. Gairloch (Wentworth 2005): *calpa* ‘calf, leg’ [ˈ²kʰalʸaʰpə],[vii] *cairrceach* [ˈ²kʰarʸaʰkɔx] ‘rough’. However, even this valuable additional generalisation does not explain some svarabhakti forms recorded by Wentworth (2005), such as *dealradh* ‘shining’ [ˈ²t͡ʃɑlʸɑrək], , *tairrneas* ‘will pull’ [ˈ²tʰarʸaɲəs], [ˈ²mũluʰkʲiɲ] for *muinchill* ‘sleeve’, [ˈ²pɪrʲɪʰkʲək] *birceadh*, [ˈ²hapat͡ʃɪxʲəs] *shabaidicheas* ‘will fight’. For Lewis, Morrison (2019) notes the exceptional form *cainb* [ˈ²kʰanaʰp] ‘hemp’.

A third kind of mismatch arises when svarabhakti *fails* to apply in a segmental context that is expected to trigger it. One very common example occurs in those dialects where stops of the /p t k/ series show oralised preaspiration, particularly /k/, i.e. are realised with a preceding [x]. This can lead to the creation of clusters that normally trigger the insertion of a vowel, and so accent 2, but this appears impossible: for instance, for the headword *olc* ‘evil’ many SGDS points return forms such as [ˈ²ɔlʸxk] or similar, but we do not find forms such as *[ˈ²ɔlʸɔxk].

Finally, much of the literature assumes that the quality of the svarabhakti vowel is the same as that of the ‘underlying’ vowel that appears before the sonorant, hence *balg* ‘bag.NOM.SG’ [ˈ²palʸak] but *builg* ‘bag.GEN.SG’ [ˈ²pulʲukʲ] (or other similar forms, see below), in contrast to accent 1 disyllables where the combination of vowel qualities across an intervening sonorant is freer, but the set of vowels allowed in the non-initial syllable is reduced. While vowels such as [a], [i], [u] (and to an extent [ɔ], [ɛ]) are common in these unstressed syllables, the vowels [ɯ], [e], [o] (and [ɤ], unless we assume [ɤ] and [ə] are the same phoneme) are generally only found in accent 2 words. Thus, words such as *aon-chuid* ‘either’ [ˈ²ɯ̃nɯ̟xut͡ʃ] can only occur under accent 2; conversely, only accent 1 permits combinations such as, for instance, [ɛCi] (*faicinn* ‘seeing’ [ˈ¹fɛ̃ʰkʲiɲ]). There is some overlap in the distribution – contrast *aran* [ˈ¹aran] and *arm* [ˈ²aram] – but in general the assumption in the literature is that the svarabhakti vowel is a copy of the preceding one (cf. Stanton and Zukoff 2018). The two major exceptions are, first, dialects in regions such as South Argyll or East Sutherland, where the svarabhakti vowel often reduces (as in Irish) to a schwa, and second, the dialect of Barra (Borgstrøm 1937),[viii] where the quality of the svarabhakti vowel is said to be influenced by both the ‘source’ vowel and the intervening consonant (cf. Clements 1986; Bosch and Jong 1997; Nevins 2010). However, as pointed out for Gairloch by Wentworth (2005: 596), svarabhakti groups *can* include non-identical vowels in

other circumstances, too, in way that cannot easily be ascribed to the surface phonological context: *sealbhach* ‘fortunate’ [ˈ²ʃelʸɑ.ɔx], *tairbh* ‘ox.GEN.SG’ [ˈ²tʰɑrʲi], *oirbh* ‘on.2PL’ [ˈ²ɔrʲi].[ix]

These difficulties are nicely illustrated for Gairloch by the behaviour of *garbh* ‘rough’. In the form *garbh*, accent 2 applies transparently in a /rʸv/ cluster: [ˈ²kɑrʸɑv]. The plural *garbha* can appear as regular [ˈ²kɑrʸɑvə], or as [ˈ²kɑrʸɑ.u], with vocalisation of [v] and segmentally unmotivated svarabhakti and accent 2. In the genitive/comparative form *(nas) gairbhe*, the deletion of intervocalic /v/ (or rather /vʲ/) also removes the surface motivation for accent 2, producing [ˈ²kɑrʲɑ.i] (or [ˈ²kɑrɑ.i]). Finally, Wentworth records a variant form of the genitive with both accent 2 and vowel quality change: [ˈ²kɑrʲi].

All these difficulties present an insurmountable challenge to any analysis of svarabhakti and tonal accent that expects the distribution of the two accentual classes to be entirely motivated by the surface phonological context. If need be, all the cases considered in this section can be derived with recourse to some kind of ordering between svarabhakti and other processes such as deletion of intervocalic fricatives, insertion of [x] before stops, or vowel changes; a very complete and successful analysis along these lines is offered by Morrison (2019). Other analyses face significant problems in accounting for the more complicated data shown here. Thus, Smith (1999) offers an account in terms of parallel Optimality Theory, which faces well-known problems with analysing opacity, particularly overapplication opacity of the kind seen in cases like *marbhaidh* [ˈ²mɑrɑ.i]; cf. Vaux (2008). The analysis by Hind (1996), couched in Articulatory Phonology, would face issues on a number of counts, both with cases where svarabhakti lacks surface motivation and possibly with cases of vowel quality mismatch (since the svarabhakti vowels are meant to represent the same gesture as the underlying ones). A similar objection applies to the proposals by Hall (2006) and Iosad (2015), who crucially see svarabhakti as a late process that applies to the output of phonology, and therefore cannot be followed by other processes like voiced fricative deletion.

The phonology of tonal accent in Gaelic

What, then, is the best analysis of Gaelic tonal accents, and what are the similarities and differences of the system with respect to the patterns with which it has traditionally been compared, notably the North and West Germanic systems? Is the Gaelic accent primarily a tonal phenomenon, as suggested by authors such as Macaulay (1993) and Ternes (1980, 2006), or is a different account more appropriate?

To approach these questions, it is worth looking to Germanic for a comparison. The recent handbook overview by Köhnlein (2020) sets up a useful distinction between two different approaches to analysis of similar phenomena in North and West Germanic. In one approach, exemplified by, say, Riad (2014) for North Germanic or Gussenhoven and Peters (2004) for West Germanic, the difference between the two accentual classes is a matter of lexical tone. Thus, for instance, in Riad's account of Stockholm Swedish (see also Myrberg and Riad 2015), Accent 2 differs from Accent 1 by the presence of an additional High tone. In a different approach, exemplified by Kristoffersen (2006) or Morén-Duolljá (2013) for North Germanic and Köhnlein (2016) or Kehrein (2018) for West Germanic, the difference is not tonal: instead, the accentual contrasts are analysed as involving different associations of the same (intonational) tones to different moraic or syllabic structures. Köhnlein (2020) refers to the latter as the 'metrical' approach (since it centrally involves metrical units such as morae, syllables, or feet).

The controversy between the two approaches to Germanic is instructive, because it highlights both the opportunities for further study of the Gaelic accentual contrasts and the valuable contribution that Gaelic can make to the general theoretical debate. The parallels between the Gaelic and Germanic systems have long been well known (cf. Borgstrøm 1974), and indeed something like the 'metrical' approach had been proposed for Gaelic earlier than for Germanic. We can see the analyses by Borgstrøm (1940) or Oftedal (1956), which discuss the phenomena in terms of syllable division, or the proposal by Ternes (1973) to treat the 'accentual' phenomena as a matter of three degrees of length, as early precursors of the metrical approach. Analyses of Gaelic that involve distinctions of syllable structure without tonal distinctions have been proposed by Hind (1996), Smith (1999, 2004), Ladefoged (2003), Wentworth (2005) and Iosad (2015), and most recently, Morrison (2019) has offered a comprehensive metrical analysis.

Approaching the analysis

In order to better understand the synchronic pattern of the 'accentual' phenomena of Gaelic, we need to consider both the restrictions on the 'accentual' classes in terms of their distribution, and the alternations in which they are involved. As discussed in section 1.2, there are significant segmental and prosodic restrictions on the distribution of both tonal contrasts, where they exist, and glottalisation contrasts. In particular, no tonal contrast is found in word-final light syllables: words like *math* do not show accentual contrasts in tonal varieties. It is not immediately obvious to which category these words should be assigned.

The most explicit discussion of pitch in words of different shapes is provided by Oftedal (1956: 28–9), who brackets such items with what he treats as monosyllables, i.e. our accent 2. There is, however, no clear motivation for this beyond the historical number of syllables. As Donald Alasdair Morrison (p. c.) points out, bracketing light monosyllables with accent 2 words might predict that when they are followed by an enclitic (as in *math thu*), these sequences should have an accent 2 pitch sequences (like *balg*). Although I am not aware of explicit statements in the literature to this effect, this is appears exceedingly unlikely. I will therefore treat these words as belonging to accent 1.

In glottalising varieties the realisation of these words appears to vary depending on whether they are found phrase-finally (where glottalisation is blocked, *pace* Holmer 1938) or in sandhi, where it is obligatory – however, there is again no contrast in this position. Accent 1 and Accent 2 (or presence and absence of glottalisation respectively) contrast in words of the shape CVː (as in *bò* vs. *bodha*), and in CVCV . . . contexts (as in *ballag* vs. *balg*). As for the contexts where a CVː(C) . . . initial sequence is followed by another syllable, svarabhakti is blocked in this context, so the accentual contrast is neutralised, cf. Gairloch *mìorbhailt* ‘miracle’ [ˈmi͡ɑrvɑʎ͡tʃ], *mòrchuis* ‘splendour’ [ˈmoːrxuʃ]. Again, the analysis in terms of accentual category is not obvious: Oftedal (1956) treats all polysyllabic words as having the same distribution of pitch across syllables, which would make them belong to accent 1, whereas Morrison (2019) notes that they share the later peak placement associated with monosyllabic long-vowel words like *àth*, and so assigns them to accent 2. I follow the latter solution here.

It is less clear what generalisations can be made about non-final hiatus sequences, i.e. the context CV.VCV, potentially contrasting with CVːCV. The contrastive status of the accentual distinction is undermined here by the fact that, as observed by Morrison (2019), in non-final syllables qualitative coalescence, at least with schwa, is blocked: contrast *leabhraichean* [²ˈʎɔːrɪçən] (not *[²ʎɔərɪçən]) with *lathaichean* [¹ˈlʸaəçən], [¹ˈlʸa.jən] and similar forms with a short vowel (but never *[¹]lʸaːxən]). In these cases, the accentual distinction may be redundant, since it is predictable from the segmental contrast. It may be the case that something like coalescence *can* occur when the unstressed vowel is not schwa, potentially producing something like long vowels, as in *figheadair* ‘knitter’ (cf. *fighe* ‘knitting’ [¹ˈfiː]) vs. *ìobair* ‘sacrifice’ [²ˈiːpəðʲ]. However, this requires further empirical scrutiny. Similarly, a diphthong as in *fuaran* ‘well’ [²ˈfu͡əran] can contrast with a hiatus sequence as in *fuathasach* ‘terrible’ [¹ˈfu.asəx] (not *[²ˈfu͡asəx]), Old Gaelic *úathbásach* (all examples in this paragraph are from Oftedal 1956).

Similar reasoning applies to hiatus after long vowels. This context could support a contrast, if CV:VCV forms such as *rìoghachdan* ‘kingdoms’ are prosodically distinct from ordinary CV:CV forms like *gòrach* ‘silly’. There is some evidence that the syllabic structure contrast can be upheld in this context: Ternes (2006: 94) notes [ˈsɯːulʸtə] for *saoghalta* ‘worldly’ (cf. unsuffixed [ˈsɯːulʸ]; contrast *Gàidheal* ‘Gael, Gaelic speaker’ [ˈkaːalʸ] vs. *Gàidhlig* ‘Gaelic language’ [ˈkaːlʲikʲ] with loss of the unstressed vowel after a hiatus).[x] However, once again it seems that in cases like *saoghalta* the unstressed vowel fails to take on the quality of the preceding long vowel, and so there are no minimal pairs that would allow us to posit an accentual distinction in this position. (That is to say, there are no cases where a sequence like [aːa], potentially contrasting with [aː], is retained in a non-final syllable). These cases might then properly belong to a type $CV_i{:}V_jCV$, which cannot enter an accentual contrast.

The salient generalisation, in any case, is that accentual *contrast* is most clearly supported within a domain consisting of a word-final trochaic foot, that is one that contains either a single heavy syllable, i.e. one with a long vowel or diphthong (Ḧ) or two syllables with short vowels (ĹL). In contexts where this segmental basis is too short, no contrast is possible (accent 2 in tonal varieties; contextual glottalisation in glottalising varieties). Where the word begins with a monosyllabic foot of the type (Ḧ), the accentual contrast is weakened, or possibly neutralised outright. This is shown in table 4.

Context	**Accent 1**	**Accent 2**
CV	✓ *math*	✗
CV:	✓ (*latha*)	✓ (*àth*)
CVCV	✓ (*ballag*)	✓ (*balg*)
CV_iV_jCV	✓ (*fuathasach*)	✓ (*fuaran*)
CV:CV	✗	✓ (*gòrach*)
CV:CCV	✗	✓ (*mìorbhailt*)
$CV_i{:}V_jCV$	✗	✓ (*saoghalta*)

Table 4: The distribution of accentual contrasts

This dependence of accentual contrast on *domain* structure of the host word does not sit particularly well with a tonal analysis: after all, if the accentual contrast was due to a lexical tone, it should be perfectly possible for that tone to be realised whatever the metrical structure

of the word – particularly with longer words. This is not what we observe: instead, the contrast is only robustly attested whenever there is a suitable metrical constituent.[xi] In this respect, 'metrical' analyses such as those offered by Ladefoged (2003) become attractive. In Ladefoged's proposal (based on the Lewis pattern), accentual contrasts arise from differences in how a single intonational melody (in his analysis, LHL) aligns to metrical structure. The insight is that contrasts are only possible when there are possible differences in metrical structure: specifically, structures that provide enough material for the entire melody (i.e. disyllabic, accent 1 words) contrast with those that fail to do so (i.e. monosyllabic, accent 2 words), leading to a truncated tonal melody in accent 2. Under this approach, words like CV cannot support a contrast because they just do not have enough segmental material to support a non-truncated melody; conversely, longer structures like CV:CCV are *always* able to host the full melody, and no contrast is possible.

A second possible source of insight into the synchronic functioning of the accentual contrast is provided by alternations within paradigms. The importance of this phenomenon is that alternations are usually motivated by some general pattern within the phonology of the language, and thus the fact that certain contexts require accentual changes might tell us something about the nature of the accentual distinction.

In Gaelic, the principal alternation involving the accentual contrast can be exemplified by classic examples such as *ubhal ~ ùbhlan* or *leabhar ~ leabhraichean*. The facts are well known; for discussion, cf. Smith (1999, 2004); Ternes (2006); Iosad (2015). In tonal dialects, these pairs can be represented as [¹ˈuːlɣ] ~ [²ˈuːlɣən], [¹ˈʎɔːr] ~ [²ˈʎɔːrɪçən]; in glottalising varieties, we find instead [ˈuʔulɣ] ~ [ˈuːlɣən], [ˈʎɔʔər] ~ [ˈʎɔːrɪçən].

In the literature, these alternations are generally analysed as instances of syncope: that is to say, the accent 1 ('disyllabic') forms are assumed to be underlying, with the second-syllable schwa being deleted in the presence of a following syllable. There are two main arguments in favour of such an analysis. First, the reverse analysis, with underlying accent 2 changed to accent 1 in a final syllable, is not tenable in view of paradigms with non-alternating accent 2 such as *sùil* [²ˈsuːl] ~ *sùilean* [²ˈsuːlən], *sràid* [²ˈstraːt͡ʃ] ~ *sràidean* [²ˈstraːt͡ʃən]. Second, these alternations are clearly parallel to very similar patterns that do not involve hiatus, but instead are found between consonant clusters, particularly (but not exclusively) obstruent-sonorant clusters, such as *obair ~ obrach* 'work.NOM.SG ~ GEN.SG' or *acair ~ acraichean* 'anchor.NOM.SG ~ NOM.PL', and these are traditionally analysed as syncope (see particularly Smith 1999). This parallelism should not be surprising in view of the fact that hiatus, which produces accent 1 long vowels, often goes back to an Old Gaelic

voiced fricative, and so most of the relevant words did indeed had an obstruent-sonorant cluster at an earlier historical stage.

A second kind of accentual alternation related to syncope is exemplified by cases such as [¹ˈpalʸəx] *balach* ‘boy’ ~ [²ˈvalʸaxu] ‘boy.VOC.PL’ *a bhalachaibh*, where the vowel-zero alternation in an originally disyllabic form produces a ‘svarabhakti cluster’ (so this only occurs when the cluster consists of a sonorant and a following consonant).

Without going into too much detail, it must be noted here that an analysis of the accentual facts in terms of regular syncope is not entirely unproblematic. It is true that the vast majority of items ending in an accent 1 long vowel followed by a sonorant follow the alternation pattern identified above. This is again not surprising given their history: like most items of this shape, they underwent vowel-zero alternations already in Old Gaelic: so *ubull* ‘apple’, NOM.PL *ubla*, *lebor* ‘book’, ACC.PL *libru*, like *claidib* ‘sword.NOM.SG’ ~ *claidbiu* ‘sword.ACC.PL’. However, there is no general restriction on a non-final hiatus syllable in Gaelic. In particular, we observe no alternation in accent 1 words that lack a final sonorant: *latha* ‘day’ [¹ˈlʸaː] ~ *lathaichean* [¹ˈlʸaəçən], *ogha* ‘grandson’ [¹ˈoː] ~ *oghaichean* [¹ˈoəçən]. Even with a final sonorant, the requirement for alternation is not exceptionless: for instance, for Leurbost Oftedal (1956) notes [¹ˈfu.aliç mi] (not *[²ˈfu͡alıç]) for *fuaighilidh mi* ‘I will sew’ (cf. Old Gaelic *(f)úaigél*). In parallel, the alleged syncope process that produces consonant clusters is equally not as regular as sometimes assumed (cf. forms such as *spirisean* ‘roosts’, *cuisilean* ‘veins’ recorded by Oftedal 1956); cf. Hall (2006), Morrison (2019).

Whatever the precise analysis of the vowel-zero alternation, the salient fact about its relationship to accentual contrasts is again that changes in domain structure, i.e. the presence or absence of a syllable, trigger a change in the accentual pattern. This is, again, quite unexpected under a tonal analysis. This is particularly relevant if we consider the fact that the alternations happen in polysyllabic words, so there is really no question of insufficient segmental material to host all the tones. The alternations, however, can be more easily understood in light of the patterns of distribution found in table 4. All cases of alternation involve the creation of long vowels or diphthongs (rather than sequences of non-identical vowels) in non-final syllables – that is to say, exactly those contexts where an accentual contrast is not found in present-day Gaelic. This, I argue, strongly suggests that a metrical analysis of Gaelic is more insightful: under this approach, accentual alternations are produced precisely because the domain restrictions on the realisation of accents are real, and so a change in the domain (i.e., metrical) structure of the word automatically leads to an accentual alternation. In the tonal approach, if, say, [¹ˈuːlʸ] and [²ˈsuːl] differ by a lexical tone, it

remains unclear why the suffixation of /-ən/ leads to a neutralisation of the accentual contrast in [²ˈuːlʸən] and [²ˈsuːlən].

Conclusion and prospects

What is the typological significance of the Gaelic tonal accents, and what further work is needed to better understand their structure? In the previous section, I argued that the phonological patterning of the Gaelic tonal accent strongly indicates that its distribution is closely bound with the domain structure of the word, and specifically its metrical (syllabic or foot) structure. As noted, this is a point often made previously, but rarely considered in light of a broader approach to metrical patterns of the language. A recognition of the close connection between changes in metrical structure such as 'syncope' and vowel coalescence on the one hand and patterns of accentual alternation on the other leads us to further confirm the advantages of a metrical approach to accentual distinctions over a tonal one. In this context, Gaelic tonal accents highlight a number of important points.

The metrical approach to tonal accents in other European languages has been controversial; cf., on West Germanic, Köhnlein (2016); Gussenhoven and Peters (2019); Köhnlein (2019). In particular, metrical representations are quite abstract, and require additional machinery to derive the actual pitch distinctions – what is sometimes referred to as 'tonal mapping'. In the Gaelic case, a clear example of this mechanism is the truncation of the final L of the LHL contour in accent 2, as proposed by Ladefoged (2003). The tonal analysis is usually able to derive the pitch distinctions directly from the tonal specifications. However, as emphasised by Morrison (2019), the fact that the metrical analysis is more successful than the tonal in the case of Gaelic supports the feasibility of metrical approaches to accentual contrasts in general, and by extension with application to the more controversial cases such as those of Germanic.

In fact, Gaelic offers a particularly strong argument in favour of the metrical approach, because the accentual distinctions are reflected not just in the facts of pitch. The domain structures indicated by the accentual distinctions agree closely with domain distinctions identified on the basis of *segmental* phenomena – in fact at least two distinct segmental phenomena, namely vowel-zero alternations, and svarabhakti. In the case of vowel-zero alternations, changes in accents align with 'syncope' patterns that also occur independently of accentual changes (as in *obair ~ obrach*). As for svarabhakti, it is well known in the literature that the facts of distribution (e.g. the possibility of non-initial [ɯ]) and alternation (particularly slenderisation) support the 'monosyllabic' account of accent 2 forms. In this

respect, Gaelic offers valuable evidence for the viability of a metrical approach, which is lacking for Germanic: whilst West Germanic has been argued to provide some evidence for segmental reflexes for the metrical structure required by tonal accents (Köhnlein 2018a, 2018b, 2018c), North Germanic generally seems to lack such segmental correlates, raising issues for the metrical approach.

However, our empirical understanding of the Gaelic accentual patterns remains incomplete. Beside some of the gaps in our understanding identified elsewhere in the paper, much more work is required to understand, first, the typology of accentual systems within Gaelic, and second, the role of intonation in the realisation of accentual distinctions. With respect to the first point, as discussed in section 1.2, the literature mentions various correlates of the accentual distinctions within Gaelic, such as pitch contours, segmental duration and glottalisation. However, the descriptions of different dialects are not always comparable, and it is widely recognised that all of these phonetic correlates may be involved in the realisation of accentual distinctions. It therefore remains to be seen to what extent apparent phonological differences among dialects, such as the 'tonal' nature of Lewis contrasts versus the quantity-based distinctions in Applecross, are differences in the emphasis of the description rather than real analytical distinctions. In addition to this, there is a recognition that where tonal correlates exist, they may also differ among dialects; see, for instance, the discussion of Ó Curnáin (1990) by Hind (1997). A wider-ranging study among these lines remains a desideratum.

With respect to the role of intonation, the study of Germanic tonal accent has shown that the pitch contours involved in accentual distinctions are not generally atomic primitives, but instead differ according to the intonational context. Ever since Bruce (1977), it has been known that North Germanic accents are best understood as combining some intonational tones (such as focus or boundary tones), which can be different according to both grammatical and pragmatic context; much the same applies to West Germanic, where the tonal contours involved may differ quite drastically, e.g. between declarative and interrogative contexts (for the Gaelic languages, one might refer here to work on Irish by Dalton and Ní Chasaide 2005, 2007). Irrespective of whether the tonal or metrical approach to Gaelic is correct, our understanding of the 'make-up' of the Gaelic accents is still rudimentary. One exception here is the study of Ness Gaelic intonation in the context of accentual distinctions by Brown (2009), who considers the distribution of tones in accent 1 and accent 2 words across three different contexts. A particularly striking finding from this work is that the high/rising tone on the svarabhakti vowel that is so prominent in discussions

of the realisation of accent 2 in Lewis Gaelic is absent in non-focus contexts. Brown (2009) argues that the H tone in these cases is an intonational marker of focus, rather than an intrinsic tone associated with accent 2 words. Not only does this have potential implications for the tonal vs. metrical debate in the analysis of accents, but this finding also shows how important it is to understand the workings of the intonational system before we approach the more specific issues related to accentual distinctions. Such empirical work promises to further expand our understanding of this typologically and theoretically important part of the sound system of Gaelic.

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i Cf. also *fiach* ‘debt’ [²ˈfi͡əx] (Old Gaelic *fíach*) and *fitheach* ‘raven’ [¹ˈfi.ɔx] from Old Gaelic *fiach*. The Old Gaelic forms show the difference in syllabification clearly in the interaction between vowel and consonant quality: monosyllabic *fíach* has the genitive singular *féich*, but disyllabic *fiach* has the dative singular *fiuc[h]*. (In Irish, although eDIL records some instances of *féich* forms for ‘raven’, Ó Dónaill’s dictionary still gives the genitive singular for this item as *fiaigh* rather than **féich*)

ii Waltman does not note the speaker’s date of birth; the initial fieldwork was conducted in 1890, when the speaker worked on a Swedish sawmill, with a second data collection exercise with the same speaker ‘six years later’. The speaker’s occupation is given as an engineer or machinist (*maskinist*) in 1890; it would seem that he cannot have been born much later than 1870.

iii This item is recorded for this speaker as [feːr], without breaking to [i͡a]. Interestingly, in SGDS materials the isogloss for breaking in this word divides points lower down the Spey, where it does not occur, from points further up the valley, where [i͡a] forms are found, with both [fɛːr] and [fi͡ar] at point 183 on the outskirts of Aviemore.

iv *sjunkade-stigande*

v Specifically, Waltman describes it as follows: ‘I have identified [the acute] with the Swedish acute accent. The acute is followed by *levissimus* [the lowest grade of accent prominence, out of four] on the unstressed syllable or syllables in the same word. The pitch trajectory in the relevant word is (at least as a rule) mildly rising’ (. . . *som jag identifierat med svenskans akuta aksent. Efter akut följer i samma ord levissimus på den eller de svagtoniga stavelserna. Tongången i hithörande ord är (åtminstone i regeln) obetydligt stigande*).

vi The exception is point 185 Drumguish, where the ‘svarabhakti group’ notation (as in [g̥ˌɔrɔˌm] s.v. *gorm*) is used quite consistently for the relevant clusters. This does not seem to be a fieldworker effect, as data collection at most points in the region was conducted by one fieldworker (Fred Macaulay).

vii Note that this generalisation obviates the usual appeal to the historical origin of the /p/ in *calpa* as a *bth* cluster to explain its participation in svarabhakti (see e.g. Smith 1999)

viii And more generally the more southerly Outer Hebridean varieties.

ix Cf. also Ternes 2006: 91.

x In Ternes’ transcription, [kaːʟ] vs. [kaˑlʲɪkʲ].

xi I leave it as an intriguing observation that the ‘core’ context for the accentual contrast appears to be what Itô and Mester (2015) call ‘the perfect prosodic word’, i.e. a prosodic word that is coextensive with a trochaic foot.