

Chapter Ten

The life cycle of preaspiration in the Gaelic languages

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This chapter represents (yet another) contribution to the vexed issue of the role of Old Norse in the history of Scottish Gaelic. The historical, archaeological, and cultural evidence for the interaction between Norse and Gaelic speakers in the period between the start of the Viking Age in the North Atlantic and the (re-)Gaelicization of Scotland, is incontrovertible; so is the presence of numerous traces of language contact, particularly in the lexicon and toponomasticon. As for structural influence, probably the most controversial has been the proposal that the preaspiration of medial stops in the ‘voiceless’ /p t k/ series – a pervasive feature of Gaelic – shows a special connection to the very similar phenomenon in (especially Insular) North Germanic. Scholars have attributed the connection to a Norse substrate that influenced Gaelic in the later medieval period, to Gaelic influence on North Germanic in a contact situation, and to membership in a northern European ‘linguistic landscape’ – and some have denied that the connection actually exists.

In this chapter I argue that we can approach a resolution of the conundrum if we take seriously the results achieved in theoretical historical phonology. In particular, the theory of the life cycle of phonological processes allows us to reconstruct a course for the development of Gaelic preaspiration that has important implications for the contact theory of preaspiration origins. This approach, which provides a conceptual foundation for the traditional dialectological association of innovation with central areas and archaisms with peripheries, provides a remarkably good fit with what we know about the diatopic variability of Gaelic preaspiration. I argue that there is a strong case for the phonetic precursor of today’s preaspiration, which is primarily associated with Gaelic varieties in Scotland, to be treated as a pan-Gaelic feature. The distribution of this ‘proto-preaspiration’ is certainly not associated in any significant way with areas where Norse settlement was such that

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it would have provided the right sociolinguistic context for a ‘substrate’ influence of Norse on Gaelic.

1 Contact explanations for preaspiration

The first extended discussion of a Norse phonological substrate in Scottish Gaelic was provided by the Norwegian Celticist Carl Marstrand.¹ Marstrand (1932) notes that the Irish voiced stops /b d g/ correspond to fully voiceless unaspirated stops in Scottish Gaelic; whereas the voiceless stops /p t k/ in Scottish Gaelic, but not in Irish, show preaspiration in postvocalic position: a word like *bata* ‘stick’ can be relatively narrowly transcribed as [batə] in Irish but as [pa^htə] in Scottish Gaelic. He then argues that the pattern of phonological adaptation in loanwords between Norse and Gaelic shows that the Irish system is original, and the Scottish Gaelic one an innovation. Further, Marstrand notes that preaspiration is found in Scottish Gaelic, Icelandic, and Faroese. After rejecting an explanation for the Gaelic innovations from a Pictish substrate, he argues instead that the commonality is explained by a Norse substrate in Gaelic.

Marstrand’s conclusion that Gaelic preaspiration was originally a Norse (or, rather, Norwegian) feature was supported by Magne Oftedal’s (1947) finding that preaspiration was also attested in the Norwegian dialect of Gjesdal – a locality in the south-west of the country, exactly the region identified by Marstrand (1915; 1932) as the source of Norse settlement. Prior to Oftedal’s discovery, preaspiration was thought to be a relatively marginal phenomenon in Norway, occurring primarily in the highly archaic, inland varieties in northern Gudbrandsdalen (e.g. Bjørset 1899; Ross 1907; Storm 1908), the formerly Norwegian region of Härjedalen (Reitan 1930) and in Northern Norway (Iversen 1913). With preaspiration securely attested in the original home region of the Norwegian settlers (cf. also Chapman 1962; Wolter 1965; Oftedal 1972), Marstrand’s proposal received strong support. The hypothesis of Norse origin for Gaelic preaspiration was endorsed by a number of scholars, many of them Scandinavian themselves, or specialists in languages of the Nordic region: Oftedal (1962; 1968), Posti (1954); Sommerfelt (1962), Kylstra (1972); Borgstrøm (1974); Gunnar Ólafur Hansson (2001), Pétur Helgason (2002), and Rießler (2008).

The hypothesis that Gaelic preaspiration was a Norse import was lent additional support in recent years by scholars who note that preaspiration is

¹ It is worth noting, however, that some relevant remarks were also made by Henderson (1910).

cross-linguistically an unusual phenomenon: as Silverman (2003: 592) notes, ‘[preaspiration] is remarkably unstable both synchronically and diachronically... [g]enuine across-the-board [preaspiration] is very rarely found’. Therefore, its recurrence in unrelated languages in a relatively small area of Northern Europe – Gaelic, North Germanic, and Sámi – requires an explanation that goes beyond parallel internal developments. Gaelic preaspiration has therefore often been treated as an areal development (Salmons 1992; Eliasson 2000; Blevins 2017). Several scholars have also attempted to ascribe this areality not to bilateral contact but to a pre-Germanic, pre-Celtic substrate – most notably Wagner (1964), although see also, for instance, Kylstra (1967).

2 Gaelic preaspiration as an internal development

An early objection on the hypothesis that Gaelic preaspiration is of Norse origin of preaspiration was offered by Kenneth Jackson, in a paper read at the First International Congress of Celtic Studies in Dublin in 1959 (but not published in its proceedings). Jackson argued that the type of preaspiration found in the most heavily Norse-influenced areas (see section 3 below for discussion) cannot have been original. This conclusion is also endorsed by Gleasure (1983).

The contact origin of preaspiration was also questioned by scholars who preferred to look for internal developments as the source of sound change. Implicitly or explicitly, such explanations necessarily challenge the contact origins of preaspiration: as Thomason (2010: 34) puts it, ‘there is a strong tendency to consider the possibility of external causation for a change only when the search for an internal cause has failed to produce a plausible result’.

For instance, Ó Baoill (1980) argued that several sound changes in the Gaelic languages, including the rise of preaspiration, all served to create or maintain long quantity in a stressed syllable. Specifically, he suggests that the Old Gaelic forms such as (say) *aittenn* ‘gorse’ were pronounced with a voiceless geminate,² and preaspiration in modern forms like *aiteann* [a^htʲəN] was a response to the degemination of these stops, thereby maintaining syllable quantity.

Ó Baoill’s criticism of the contact theory is mostly implicit. Much more explicit is the discussion by Ní Chasaide (1986), who conducted an acoustic study of preaspiration in several varieties of Icelandic and Scottish

² Contrary to the *communis opinio* that the doubling of <pp tt cc> to denote intervocalic /p t k/ was primarily an orthographic device.

Gaelic, in addition to being the first to describe preaspiration in Irish – specifically in the Ulster dialect of Gaoth Dobhair. She levels several criticisms against the Viking-origin theory of preaspiration, by problematizing the sociohistorical background assumptions, as well as Marstrander’s interpretation of the data provided by Norse borrowings in Gaelic. Even more important for her argument is the possibility of internal development. Specifically, she ties the rise of preaspiration not so much with degemination of intervocalic [pp tt kk] as with the devoicing of the historical ‘voiced’ series [b d g]. According to Ní Chasaide’s account, the devoicing of medial [b d g] (which she also observed in Gaoth Dobhair Irish) put the contrast between the two-stop series in jeopardy, and preaspiration arose as a means to enhance the contrast.

A somewhat similar account is offered by Ó Murchú (1985), albeit on dialectological rather than phonetic grounds. Like Marstrander (1932) and Ní Chasaide (1986), he finds it particularly significant that preaspiration of the /p t k/ series co-occurs in Scottish Gaelic with lack of phonetic voicing in the /b d g/ set. Under his proposal, the devoicing of /b d g/ (and hence preaspiration) must have spread from *eastern* varieties of Gaelic westwards; implicitly, this means the Viking influence cannot have been particularly important, as it was never strong in the eastern parts of the *Gàidhealtachd*.

Finally, McKenna (2013) makes a valiant attempt at ‘turning the tables’ in the study of preaspiration, and challenges the assumption that linguistic influence must have gone with language shift from Norse to Scottish Gaelic in the course of the re-Gaelicization of the *Suðreyjar*.

3 Diatopic variation and the trajectory of development

In the previous two sections, the scholarship on the historical development of Gaelic preaspiration was viewed through the lens of its position on the issue of the phenomenon’s possible contact origin. Various scholars also considered not just the *introduction* of preaspiration into the language, but also its *subsequent* development. The two questions are, of course, related: any theory of the origin of preaspiration at least implicitly takes a stand on the starting point of its further development.

In order to understand the theories of internal development, we now need to consider the nature of diatopic variation in the realization of historical /p t k/ stops in postvocalic position across the Gaelic-speaking area. This subject has been extensively studied; see, for instance, Borgstrøm (1974), Gleasure (1983), Ó Murchú (1985), Bosch (2006), and Ó Maolalaigh (2010).

The picture that emerges from this scholarship is summarized in Figure 1; see Ó Maolalaigh (2010) for a more detailed picture.

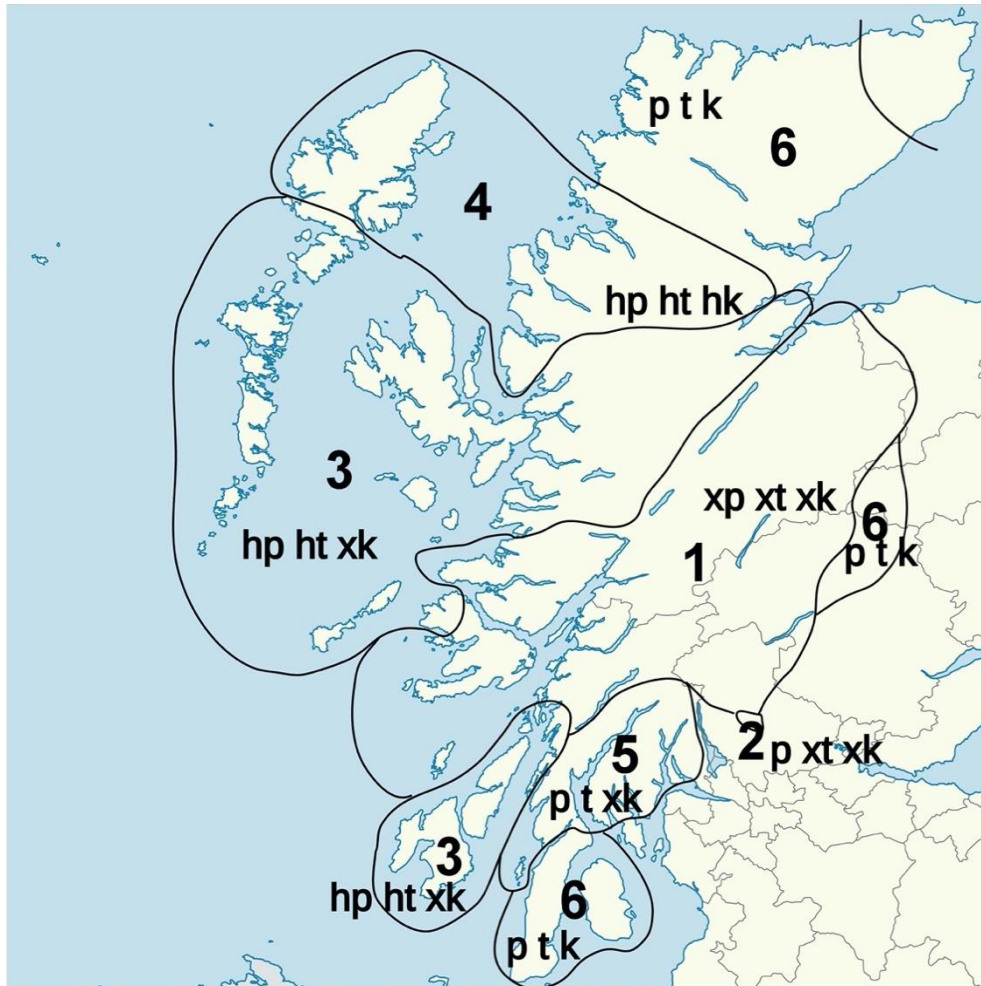


Figure 1: Reflexes of postvocalic /p t k/ in Scottish Gaelic³

There are three main reflexes of postvocalic /p t k/ across the *Gàidhealtachd*: the stops can be preceded by glottal frication (transcribed by fieldworkers as [h] or a weaker [ʰ]); they can be preceded by oral frication; and they can lack audible voiceless frication. In terms of the oral frication, we focus here on the obligatory presence of dorsal frication, usually transcribed as [x]. Here, we mostly abstract from the possibility of palatal frication that can appear in the context of high front vowels and/or phonemically slender

³ Scotland_location_map.svg: NordNordWest derivative work: Akerbeltz (https://commons.wikimedia.org/wiki/File:Gaelic_preaspiration.jpg), 'Gaelic preaspiration', Additional annotation by Pavel Iosad, released under Creative Commons-Attribution-ShareAlike 3.0 (<https://creativecommons.org/licenses/by-sa/3.0/legalcode>).

stops (*ite* ‘feather’ [içtʃə]). We also abstract from the more variable oralization of preaspiration that probably represents coarticulation with the following stop, such as [tʰaɸbɪ] recorded for *tapaidh* ‘clever’ for SGDS point 181 (Boat of Garten, Inverness-shire) – such instances are quite common, but do not show the same systematic variation as the categorical appearance of dorsal fricatives.

Of particular interest in Figure 1 are zones (1), where stops at all places of articulation are preceded by an oral fricative, and (4), where all places of articulation are associated with glottal frication. Zone (1) was interpreted by Kenneth Jackson as showing the ‘strongest’, and therefore original, form of preaspiration. Zone (4), with only glottal preaspiration, is of interest because it includes areas commonly acknowledged to have experienced some of the most intensive Norse settlement; many scholars who endorse the contact origin of preaspiration would look to this preaspiration type as the ‘missing link’ between Norse and Gaelic.

That said, the dialectological interpretation of Figure 1 is not trivial. Consider the large zone (3), with dorsal frication only before dorsal stops ([hp ht xk]). This zone is clearly transitional between zones (1) [xp xt xk] and (4) [hp ht hk], but what is the *direction* of the transition?

As noted above, scholars such as Kenneth Jackson and James Gleasure posited the ‘strongest’ form of preaspiration ([xp xt xk]) as the original one. This approach, however, has numerous weaknesses. In particular, as various scholars (e.g. Gunnar Ólafur Hansson 2001; Clayton 2010) have pointed out, this development presupposes a sound change $*xk > {}^h k$ to account for zone (4) forms such as [ma^hk] for *mac* ‘son’ or [pə^hk] *boc* ‘buck’. Irrespective of the typological plausibility of such a development, this predicts that this lenition of [x] to [h] should also affect [xk] clusters that do *not* descend from preaspirated stops, but rather reflect the historical cluster [xt], as in Old Gaelic *bocht* ‘poor’, Scottish Gaelic *bochd* always with a velar stop. Old Gaelic $*c$ and $*cht$ are indeed merged where $*c$ becomes [xk]. However, they remain distinct in zones (4), as in Lewis [pə^hk] *boc* ‘buck’ vs. [pəxk] *bochd* ‘poor’, and 6, as in East Perthshire [pək] *boc* but [pəxk] *bochd* (Ó Murchú 1985; 1989). The lack of this merger indicates the absence of a $*xk > ({}^h)k$ sound change, and undermines the case for the development proposed by Jackson.

We are thus left with the supposition that the development started from the ‘weaker’ preaspiration of zone (4) and proceeded towards strengthening, or pre-affrication, observed to the south-east of this area. This scenario is endorsed by a number of scholars:

- Borgström (1974) argues that zone (4) preaspiration is most similar to the Norse, and must be original. As it spread from the more Norse-influenced north-west (as envisaged by Marstrander 1932) towards the south-east, Gaelic dialects without preaspiration would assimilate the ‘weak’ [h] either to either [h] or [x], both of which were found in the native system.
- Both Ó Murchú (1985) and Ní Chasaide (1986) suggest that the original, ‘weak-[h]’, form of preaspiration arose under systemic pressure to enhance the contrast between postvocalic /p t k/ and /b d g/ series, which was being endangered by the loss of voicing in the latter.⁴ As the devoicing of /b d g/ progressed, preaspiration would become more and more important as the cue to the contrast, and as it ‘strengthened’ it was liable to undergo oralization.
- Silverman (2003) and Clayton (2010) argue that ‘true across-the-board’ preaspiration, corresponding to our zone (4) ‘weak’ preaspiration, is perceptually weak, and is likely to take one of the ‘exit routes’, either towards loss, or towards increasing salience – in the case of Gaelic, this is either the rise of segmental [h], or preaffrication.
- Ó Maolalaigh (2010) draws an important connection between the geography of preaspiration and the loss of postvocalic [h]. He shows that zones (1) [xp xt xk], (2) [p xt xk], (5) [p t xk], and (6) [p t k], where preaspiration is reflected as either zero or an oral fricative, but never as glottal frication, correspond very well to zones where postvocalic [h]⁵ is generally lost. He argues that this consilience is best explained if preaspiration developed along a trajectory from an original glottal frication across the board to the observed variety of preaspiration types, where glottal frication is preserved only where postvocalic [h] is allowed.

Although there is widespread agreement in the literature on the direction of the development of preaspiration patterns, opinions differ on the historical import of this finding. In particular, it is often suggested that since zone (4) preaspiration is both the most archaic and the most similar to the Nordic

⁴ Incidentally, a very similar account for the origin of preaspiration in North Germanic is independently offered by Steblin-Kamenskij (1974) and Goblirsch (2005).

⁵ Postvocalic [h] can correspond to Old Gaelic [h] from *-s- (which is rarely preserved) and Old Gaelic [θ] from *-t-; it can also appear as a hiatus filler (see Watson 1996; Ó Maolalaigh 2010 for details).

preaspiration type, we must envisage a process whereby it first spreads from the north-west towards the south-east, and then undergoes the further developments *in situ*. This is explicitly argued for by Marstrander (1932), Borgstrøm (1974), Oftedal (1983) and by Clement (1983; 2018). Ó Maolalaigh (2010) also allows this as a possibility, although is more cautious about endorsing it. On the other hand, Ó Murchú (1985), while also endorsing the trajectory, sees preaspiration spreading east-to-west rather than west-to-east. Similarly, Ní Chasaide (1986) argues that system-internal pressure is sufficient to explain the direction of the development. Crucially, she also brings in the Ulster Irish data to argue that the genesis of variable [(^h)p (^h)t (^h)k] preaspiration can occur without direct Norse input.

As this section has shown, any theory of the development of Gaelic preaspiration has to account for the trajectory of the development of the different types of preaspiration, and to accommodate data from Irish. In the next two sections I discuss two missing pieces of the puzzle that, I argue, allow us to reach a full understanding of the phenomenon. Specifically, I describe a model of sound change – the theory of the life cycle of phonological processes – that provides a solid underpinning for our understanding of the development trajectory, and discuss the status of Irish preaspiration in more detail, setting the scene for the reconstruction that follows in section 6.

4 Preaspiration in the wider context

A fuller understanding of the development of preaspiration in Scottish Gaelic requires an understanding of the broader context within the Gaelic languages. As noted above, Ní Chasaide (1986) has documented the presence of preaspiration in the Ulster Irish of Gaoth Dobhair (see also Ní Chasaide and Ó Dochartaigh 1984). Gaoth Dobhair Irish preaspiration is most closely comparable to the ‘weak’ preaspiration found in Lewis, in terms of both frequency of occurrence and phonetic properties. In Ní Chasaide’s account, both Lewis and Gaoth Dobhair represent the initial stage of the development of preaspiration in the /p t k/ series of stops as a means to maintain the contrast with a devoiced /b d g/ series.

Remarkably, preaspiration had not, to my knowledge, been reported in *any* description of Irish dialects prior to Ní Chasaide’s, even early ones that use quite narrow phonetic transcriptions. Ní Chasaide established its existence on the basis of an instrumental study (as well as, of course, being a phonetically trained native speaker of the dialect), but most other descriptions available rely on auditory transcriptions – and they essentially never mention

preaspiration of medial /p t k/ stops. Indeed, it is for this reason that the traditional literature, starting at least from Marstrander (1932), has treated the Irish and Scottish Gaelic stops systems as so drastically different in this respect as to require an explanation even when a rôle for contact with Norse is rejected.

I would suggest that variable, ‘weak’ preaspiration is found in Irish – in Ulster but possibly also in other varieties – but has historically been underreported. Although I cannot present a detailed study here, Figure 2 shows an example extracted from a fieldwork session with a speaker of Munster Irish from the West Kerry Gaeltacht.⁶ It clearly shows a fairly long period of strong frication before the dorsal stop in the word *mac* ‘son’.

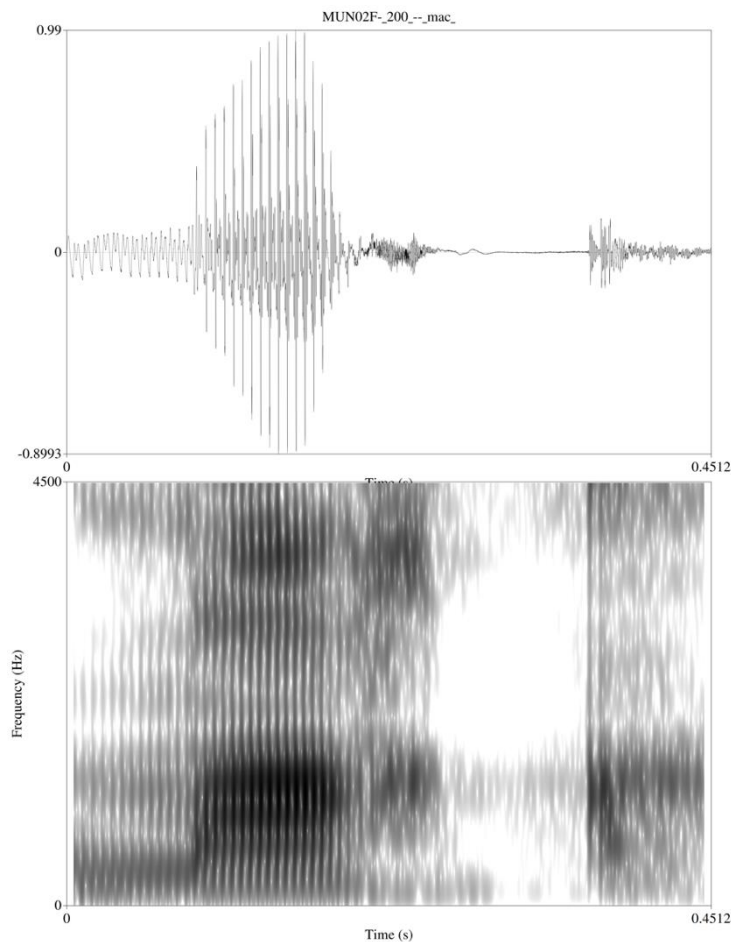


Figure 2: Preaspiration in a Munster Irish speaker [ma^hk] *mac* ‘son’

⁶ The session was conducted by Máire Ní Chiosáin for the project *The phonetics and phonology of short vowels in Irish and Scottish Gaelic*, funded by the Royal Society of Edinburgh, whose support is gratefully acknowledged.

Several descriptions of Ulster Irish also mention that these varieties differ from other Irish dialects in that consonants, including voiceless stops, are pronounced ‘long’ or ‘fortis’ (or even ‘geminated’) after short vowels. This is mentioned by Quiggin (1906); Sommerfelt (1922); Wagner (1959); Ó Baoill (1980). Wagner also draws attention to the description of Southern Donegal English by Adams (1950), who claims that the fortis stops /p t k/ are long after short vowels. It is, however, notable that Ní Chasaide’s (1986) acoustic study does not find drastic differences in stop duration after short and long vowels. This issue obviously calls for further targeted study, but I would like to suggest that at least some of these percepts of ‘length’ may have been created by the presence of preaspiration.

This under-reporting of preaspiration would not be unprecedented. As discussed earlier in section 1, preaspiration has traditionally been seen as cross-linguistically rare. However, in recent decades, especially with the advent of accessible technology for acoustic analysis, this has been reconsidered. Notably, Pétur Helgason (2002) has argued, on the basis of both traditional descriptions and new acoustic data, that preaspiration in North Germanic is not a rare phenomenon found in a few, mostly relic areas, as traditionally considered; instead, he suggests, ‘the tendency to preaspirate, although it is not normative, permeates Scandinavian stop production’ (p. 208); see also Schaeffler (2005) on Swedish and Iosad (2019) on Norwegian. Preaspiration of (long) voiceless stops has been described using acoustic analysis in Welsh (brief mentions in Ball 1984; Ball and Williams 2001; see also Morris 2010; Morris and Hejná for North Wales 2020; Spooner 2016 for south-eastern Welsh; and Iosad submitted for south-western varieties), despite an absence of mentions in traditional descriptions. I suggest, therefore, that it would not be entirely surprising if preaspiration in Irish also turned out to be more widespread than previously reported. Even so, it must still be both optional and perceptually weak, in contrast to the kind of obligatory, categorical preaspiration found in Icelandic or most varieties of Scottish Gaelic.

5 The life cycle of phonological processes

The model of the life cycle of phonological processes builds on advances in theoretical synchronic and diachronic phonology to understand how sound change proceeds from automatic consequences of speech production and perception that may not be under cognitive control to phonological rules within the grammar, and eventually to unproductive lexical residues. For discussion of various aspects of the model, see Kiparsky (1995); Bermúdez-

Otero (2007; 2015); Bermúdez-Otero and Trousdale (2012); Ramsammy (2015).

In this study, I adopt the life cycle model as presented by Bermúdez-Otero and Trousdale (2012); Bermúdez-Otero (2015) for concreteness. Under this view, the development of sound changes proceeds as follows:

- Before the initiation of sound change, some process exists as a more or less automatic variable corollary of the production and perception of speech sounds. It is not under cognitive control, and does not form part of the grammar.
- The first step in the life cycle is the *phonologization* of the sound change, at which point it *is* brought within cognitive control of the speaker, and is formalized as a (variably applied) phonetic rule. Crucially, at this point it is language-specific, and so part of the grammar, but not yet part of the categorical phonology.
- The second step is *stabilization*, when a phonetic rule becomes a categorical pattern formalized as a rule within the phonological module of the grammar. At this stage it acquires all the properties of phonological rules, such as categoricity and ability to refer to information specific to the phonological module.
- The rule then goes through a sequence of *domain narrowing* within the phonology, as it ascends from the phrase level of stratal phonological computation to the word and the stem level (see Bermúdez-Otero 2018 for an overview). These issues are of less relevance to us here.
- Once the rule has reached the end of the life cycle at the stem level, it loses productivity and only remains as a historical residue of a pattern in the lexicon.

There are two further aspects of the model assumed here that will be important for our discussion. First, the ascent of rules along the life cycle pathway can coexist with other kinds of change affecting phonological rules, such as rule inversion (Vennemann 1972a), rule telescoping (Bach and Harms 1972), and, most importantly for our purposes, rule generalization (Vennemann 1972b; Bermúdez-Otero 2015). In rule generalization, an already existing phonological rule begins applying in a wider range of contexts, because its structural description becomes simpler (i.e. more general). The new ‘generalized’ rule still undergoes all the stage of the life cycle, but it is important to note that, in contrast to the mechanism of stratal ascent involved

in the life cycle itself, rule generalization results in the appearance of a rule *expanding* its domain of application.

A second important corollary of the model is the fact that even as each step of the life cycle creates new rules with new status, the previously existing rule does not disappear. Thus, the life cycle predicts that several versions of the same process might coexist in the grammar (Cohn 1998; Bermúdez-Otero 2015; Iosad 2016), a phenomenon referred to as ‘rule scattering’. With all this in place, we can now reconsider the development of preaspiration in the Gaelic languages.

6 Reconstructing the life cycle of Gaelic preaspiration

Taking into consideration all of the above, I propose that Gaelic preaspiration developed fully in line with the life cycle of phonological processes, from an incidental phonetic phenomenon to a categorical phonological rule. Thus, the starting point must be sought in variable, ‘weak’ preaspiration such as that attested in Gaelic varieties in Ireland, and the development proceeded towards more categorical patterns of preaspiration, in line with the suggestions of Borgstrøm (1974), Ní Chasaide (1986), Ó Maolalaigh (2010), and Clement (2018). Specifically, each stage of the life cycle is attested in different varieties across the Gaelic-speaking world.

a. Pre-phonologization

Before the phonologization of preaspiration, it is a variable corollary of the realization of laryngeal contrast. The /p t k/ series of stops are generally aspirated in the Gaelic languages. The same is true of Welsh, and indeed Eska (2018; 2020) has argued that aspiration of the traditional /(p) t k/ series of stops should be reconstructed to Proto-Celtic. In this context, occasional preaspiration of stops in this series is a timing effect, whereby the glottal opening gesture associated with the aspiration on the stop is timed so that voicing in the preceding vowel ceases before the beginning of the closure. (See Hejrná 2015 for extensive discussion.) At this stage, preaspiration is only an artefact of phonetic implementation that does not enter the grammar. Presumably, this is the effect we observe in the occasional cases of preaspiration found in Irish, certainly outside Ulster.

b. Phonologization

Phonologization of preaspiration occurs when it becomes interpreted as a phonetic rule, part of the language-specific pattern of phonetic planning. It

remains variable, but the variability is now under cognitive control, and therefore is structured. Once phonologization has occurred, preaspiration can be sensitive to linguistic factors, such as place of articulation of the following stop or the properties of surrounding segments (e.g. the length or height of the preceding vowel). At this stage the feature might also become entangled with extragrammatical (for instance, sociolinguistic) factors. However, due to rule scattering and the variable nature of the rule, the pattern will continue to be influenced by substantive biases involved in speech production and perception.

In the context of Gaelic preaspiration, this stage is perhaps represented by the ‘weaker’ kinds of zone (4) preaspiration, such as that on Lewis. Preaspiration on Lewis is the best-studied variety of Gaelic preaspiration from an instrumental perspective (Ní Chasaide 1986; Ladefoged et al. 1998; Clayton 2010; Nance and Stuart-Smith 2013). These studies have shown it to be both variable and subject to robust linguistic effects; in particular, preaspiration is both most frequent and longest in duration before velar stops. Another robust result is that preaspiration is most often absent, and certainly significantly shorter after long vowels than after short vowels. In addition, Nance and Stuart-Smith (2013) demonstrate an age-grading effect in the patterning of preaspiration, which they interpret as change in progress. This again indicates that preaspiration has come under cognitive control and is best represented as a phonetic rule.

Given Ní Chasaide’s (1986) results, it may also be the case that Ulster Irish preaspiration has reached the same stage of the life cycle, since we also observe some effects of the linguistic context. More research, however, would be needed to establish the nature of the variability in this dialect.

c. Stabilization

The next step is the introduction of a categorical phonological rule. I suggest that this stage is observed in dialects such as those in zone (3), which represent preaspiration as [hp ht xk]. Abstracting for now from the [xk] type, preaspiration in these varieties is seen both in SGDS materials and in the available monographic descriptions as both being obligatory and ‘stronger’, in that it robustly segments transcribed as [h]. Figure 3 shows the waveform and spectrogram of a speaker from South Uist pronouncing the word *tapaidh* ‘clever’. We can observe that the preaspiration is both quite long (comparable in duration to the stop closure) and quite noisy. This is consistent with it being represented as a segment [h].

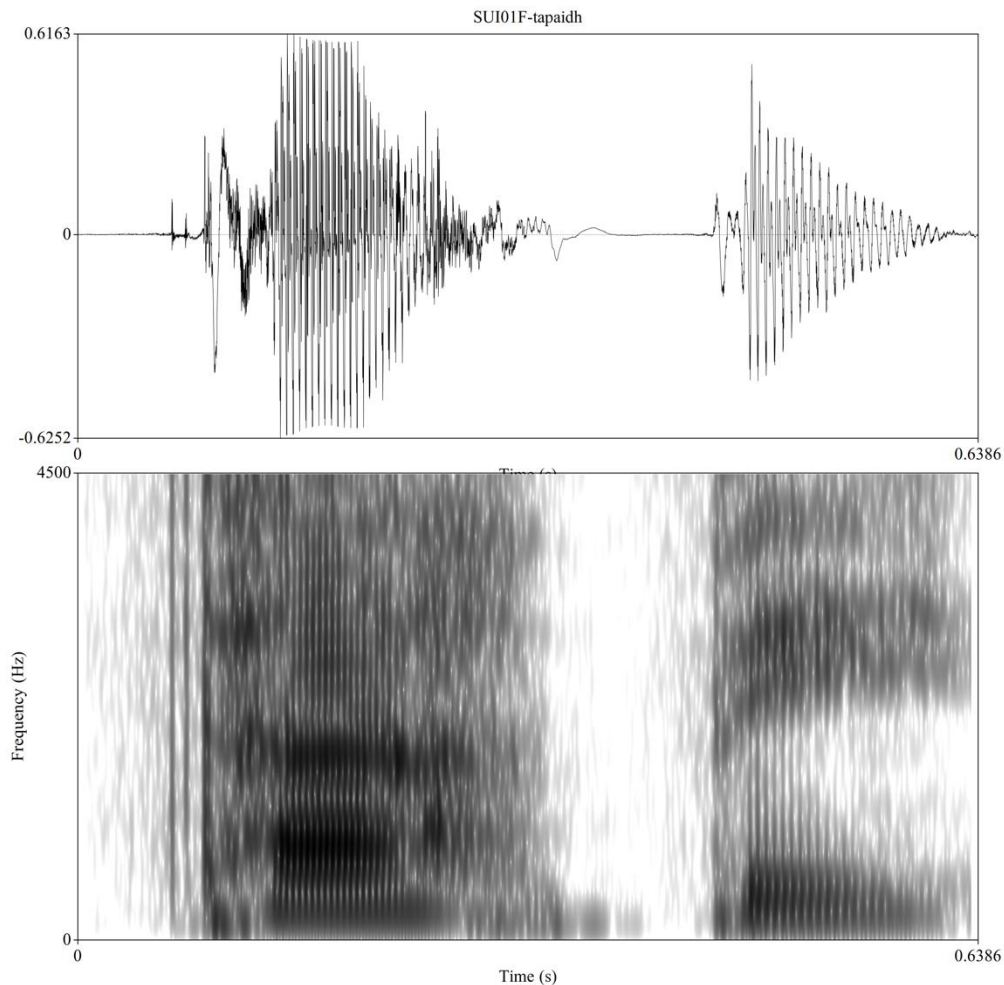


Figure 3: Preaspiration in South Uist [tʰahpi] *tapaidh* ‘clever’

However, phonetic evidence does not by itself establish the phonological status of the rule. Does the purported segmental [h] play a rôle in the phonological grammar?

Some evidence in favour is furnished by zone (3) dialects in south Argyll, notably those of Islay (Holmer 1938), Jura (Jones 2006; 2010), and Colonsay (Scouller 2017). They possess a phenomenon known as ‘glottalization’. Abstracting away from some details and contradictions in the sources, the basic pattern is that a glottal articulation is found when main stress falls on a light syllable, in words such as *radan* ‘quarrel’ [Raʔtan] or *baile* ‘village’ [paʔlə]. Glottalization is not found in closed syllables, as in *bailtean* ‘villages’ [pa(*ʔ)lʲə̃n]. The glottal stop has therefore been interpreted by authors such as Smith (1999) and Iosad (2015) as a *stress-to-weight* effect, in that it makes a stressed syllable heavy: in cases such as

bailtean the stressed syllable is heavy by virtue of having a coda, but in cases such as *baile* there is insufficient segmental material to build a heavy syllable, so the glottal stop is inserted to provide one. Under this interpretation, this is very much a phonological process, since it refers to phonological properties such as syllable weight.

Crucially, South Argyll glottalization is in complementary distribution with preaspiration: glottal stops are *never* inserted before a preaspirated stop, even in an apparently light-syllable context: [tʰa(*ʔ)hpi] *tapaidh* ‘clever’. Under the stress-to-weight account of glottalization, the easiest explanation is that the syllable structure of *tapaidh* is that same as that of *bailtean*: preaspiration is segmental, and the coda [h] projects a mora just like the coda [l] in *bailtean*. If this analysis is correct, then these South Argyll varieties provide solid evidence of the stabilization of preaspiration as a categorical rule in the phonology.⁷

d. Further sound change

Once preaspiration has stabilized as a rule producing consonant clusters of the form [hp ht hk], there are at least two paths of further development. First, [hk] can undergo ‘preaffrication’, whereby the glottal fricative appears to assimilate in place to a velar stop. This produces the zone (3) pattern [hp ht xk]. This ‘pre-affrication’ strategy of increasing the salience of preaspiration is quite common typologically (Silverman 2003; Clayton 2010). This provides part of the answer to the question asked by Ó Maolalaigh (2010: 380):

While a number of scholars have derived the ‘maximum intensity’ form of preaspiration [xp xt xk] from one of the weaker forms [...] no one has yet put forward a convincing explanation for why [x] developed as the sole marker of preaspiration.

In fact, there are several phonetic precursors to just such a change. First, as we noted in section 3, gradient assimilation of the fricative to the place of articulation of the following stop is not at all rare, and in the case of [h^k] it

⁷However, Morrison (2019) offers an alternative analysis of these facts. In particular, he points out that glottalization fails to apply not just before preaspirated stops but also before voiceless fricatives, which are *not* preceded by a [h] segment. Morrison suggests that the blocking of glottalization in these cases is not due to stress-to-weight effects but rather to the fact that glottalization (a [constricted glottis] phenomenon) is incompatible with the [spread glottis] specification of both /p t k/ stops and the voiceless fricatives /f s x h/. This analysis is not incompatible with viewing preaspiration-produced instances of [h] as moraic codas, but if it is correct it does undermine the probative value of the phenomenon for the phonological status of the preaspiration rule.

would be result in a velar fricative. Second, as noted in section 6b, Gaelic dialects without this change do show an increased frequency and duration of preaspiration before velar stops, so it should not be surprising that the particularly salient preaspiration in this context should undergo oralization.

The life cycle leads us to expect that zone (3) [hp ht xk] dialects should possess a phonological rule of the form /hk/ → [xk]. This implies that there could be a difference in phonological behaviour between underlying /k/ (which undergoes phonological rules to surface as [xk]) and underlying /xk/. This prediction appears to be correct.

Gaelic morphophonology possesses a process known as ‘slenderization’, in which the final consonant or consonant cluster within the stem undergoes palatalization, as in *òr* [o:r] ‘gold’, *òir* [o:ðʲ] ‘gold.GEN.SG’. Slenderization also affects short vowels preceding the slenderized cluster, as in *cat* [kʰaht] ‘cat’, *cait* [kʰehtʃ] ‘cat.GEN.SG’. In [hp ht xk] dialects, slenderization affects [xk] derived from an underlying /k/: *mac* [maxk] ‘son’, *mic* [mix:kʲ] ‘son.GEN.SG’. However, an underlying /xk/ cluster is both exempt from slenderization itself and fails to influence a preceding short vowel: *bochd* ‘poor’ [pɔxk], comparative *nas bochda* [pɔxkə] rather than any form such as **nas boichde* with cluster palatalization and vowel change. This demonstrates that underlying /k/ and /xk/ are distinct in [hp ht xk] dialects, and therefore that some instances of [xk] are in fact derived by a rule, whose existence is predicted by the theory of the life cycle.⁸

Another possible sound change is the *loss* of [h] from [hp ht hk] sequences, as argued by Ó Maolalaigh (2010), and, in a very different framework, by Clayton (2010). Note that this analysis makes [p t k] zones such as Sutherland, Kintyre, or East Perthshire *progressive* rather than conservative, despite their apparently peripheral location. However, Ó Maolalaigh (2010) has demonstrated that the zones where [h] is lost from segmentalized preaspiration agree very well with the zones of more general post-vocalic [h] loss, which speaks strongly in favour of the that lack of preaspiration in these cases is secondary rather than an archaism.

Finally, [hp ht xk] patterns can develop into the ‘most intensive’ [xp xt xk] type of preaspiration. One piece of evidence in favour of this interpretation of the development trajectory is offered by Ó Murchú (1985). He notes the existence of English borrowings such as [ʃɔxp] *shop*, [kʰjextəL]

⁸Another piece of evidence in favour of this distinction is the different behaviour of /k/ and /xk/ in svarabhakti. Non-homorganic sequences of a sonorant and [x] normally undergo the insertion of the so-called svarabhakti vowel (as in *seilcheag* [ʃɛlexʲak] ‘snail’); however, this does not apply when [x] is derived by a preaspiration rule: *olc* ‘evil’ [ɔLɔxk], *[ɔLɔxk].

kettle: since the [x] has no source in English, these forms have to be explained as having undergone a sound change [hp ht] > [xp xt].

Importantly, this sound change *cannot* be explained as a phonetically grounded ‘pre-affrication’ of the same sort as that which affected [xk], since the [x] is not homorganic with a following [p] or [t]. Indeed, typologically across-the-board preaffrication tends to produce homorganic sequences ([fp] for labials, [st] or [θt] for coronals, etc.): the Gaelic development is not typologically a common one.⁹ I suggest that instead it is an instance of rule generalization (section 5). In [hp ht xk] dialects, the preaspiration rule can be formulated as [h] → [x] / ₋[dorsal fortis stop], whereas across-the-board preaffrication can be formulated as [h] → [x] / ₋[fortis stop], with the tell-tale simplification of the context leading to an expansion of the domain of application. Therefore, if this analysis is correct, then the zone (1) ‘intensive preaspiration’ is a further development of the zone (3) [hp ht xk] type, and represents the most innovative pattern.

e. Rule loss

The final stage in the life cycle is the loss of productivity. There are at least two pieces of evidence that some varieties have reached a stage where the old rules are no longer productive. First, as pointed out by Ó Murchú (1985), newer borrowings in (some?) [xp xt xk] dialects adopt English medial /p t k/ stops as Gaelic unaspirated stops: /frək/ *frock*, /smək/ *smoke*.¹⁰ This indicates that medial /p^h t^h k^h/ phonemes are impossible in these varieties. By implication, there cannot be rules taking such stops as inputs, including preaspiration-related rules.

Second, as observed by MacInnes (1992), dialects where historical *c* is reflected as [xk] do not apply this rule in English borrowings; nevertheless, stops in such borrowings *do* show ‘weak’ preaspiration. There is therefore a contrast between native *tac(an)* ‘period of time, a while’ with [xk] and the borrowing from English *tack* with [h^k]. This is entirely in line with the life cycle, because this represents rule scattering: once a rule creating [xk] from /^hk/ is introduced into the grammar, the ‘old’ rule creating [h^k] from post-vocalic /k^h/ is *not* removed, but continues to coexist with the progressive pattern. Should the /hk/ → [xk] rule become unproductive, the outcome of the older preaspiration again becomes visible.

⁹ However, a similar development appears to have happened in the Lule Sámi dialect of Gällivare, as described by Collinder (1938).

¹⁰ I retranscribe from Ó Murchú’s /frəg/, /sməg/ to emphasize that the Gaelic /b d g/ stops are phonemically unaspirated rather than voiced.

In this section I have argued that the rise of *all* types of Gaelic preaspiration can be understood as deriving from the phonologization of variable, gradient preaspiration such as that observed in varieties of Irish, entirely in line with the theory of the life cycle of phonological processes. In the next section I will consider the implications of this finding for the question of the origins of preaspiration.

7 Historical implications

We can now revisit the spatial distribution of preaspiration types within the Gaelic-speaking world, including the patterning in Ireland. A simplified map of preaspiration patterns in Gaelic-speaking areas is shown in Figure 4. Notably, it includes the preaspirated stops of Ulster Irish (and also the [P T K] ‘fortis’ stops of various sources, if we allow they may also represent preaspiration).

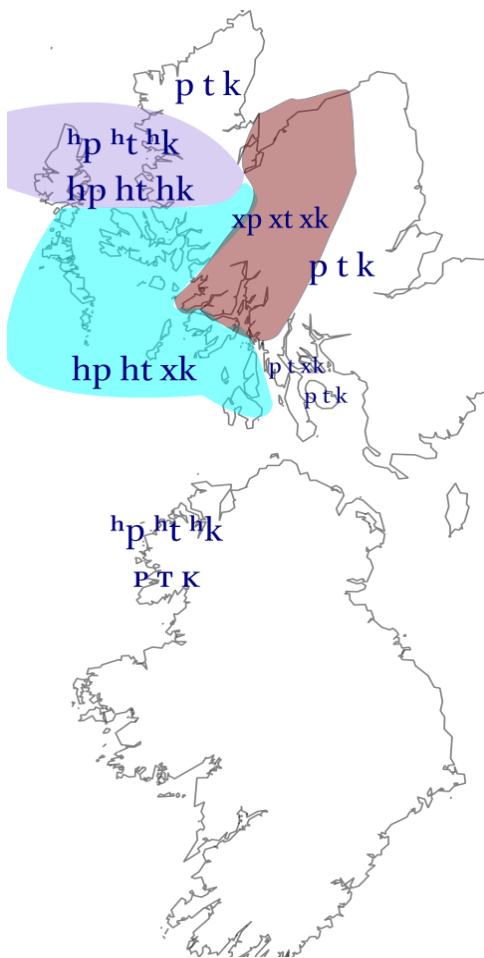


Figure 4: Preaspiration in the Gaelic-speaking world

I suggest that this perspective shows quite clearly how the life cycle outlined in section 6 corresponds to progressively smaller areas on the map, in an illustration of ‘räumliche Projection zeitlicher Unterschiede’ (Schuchardt 1885:22). This pattern has been observed before with the outcomes of rule generalization (Ramsammy 2015; Bermúdez-Otero 2015), but here we see the life cycle itself demonstrating the same effect.

In the pan-Gaelic perspective, the ‘weak’ preaspiration of north-western areas such as Lewis – a relatively early stage of the life cycle of preaspiration – is clearly part of the same zone as the weak and variable preaspiration of Ulster Irish, which is interrupted by the more progressive [hp ht xk] zone in the southern Hebrides. That zone itself surrounds the even more progressive [xp xt xk] area, as well as zones exhibiting some loss of preaspiration. In other words, each further step in the life cycle is innovated in a focal area, but does not necessarily cover the entirety of the preaspirating zone, creating the classical pattern of innovating central zones and more archaic peripheral disconnected areas not reached by the innovation. Crucially, this also means that the most innovating areas must have possessed the earlier forms of preaspiration, too, before the innovation ran its course.

This conclusion has two important implications for the contact origins hypothesis.

- First, the earliest forms of preaspiration – variable glottal frication – must have been (indeed probably still is) spread all across the Gaelic-speaking world. Even if we discount the possibility of occasional preaspiration in Ireland outside of Ulster, ‘weak’ preaspiration or its further developments is found in *all* of Gaelic Scotland and in (at least some of) Ulster.¹¹
- Second, the ‘focal area’ of preaspiration-related innovation must be located around zone (1) in the region of North Argyll (around Loch Linnhe) and the central Highlands around the Great Glen and Highland Perthshire.

Both of these results undermine the hypothesis that Gaelic preaspiration is of Norse origin. Without going into too much detail on the latest developments in historical sociolinguistics (e.g. Thomason and Kaufman 1988; Coetsem 2000; Winford 2005; Trudgill 2011), there are two principal scenarios that would enable the transfer of a phonetic (phonological?) feature such as preaspiration from Norse into Gaelic.

¹¹ I leave it to further research to identify to what extent this development supports the idea of a ‘northern Gaelic’ dialect division (Ó Buachalla 2002; Ó Muirheartaigh 2014).

One scenario corresponds to the widely assumed ‘substrate influence’ hypothesis, in which Norse speakers shift to Gaelic and thus transfer their phonetic ‘habits’, including preaspiration. In more modern terms, the transfer of phonological features under these circumstances would constitute an instance of ‘shift-induced interference’ (Thomason and Kaufman 1988), or ‘imposition’ (Coetsem 1988), or source-language agency (e.g. Winford 2005): as Norse speakers acquired Gaelic as a second language, they would be unable to acquire the target phonetic system fully (as is common in L2 acquisition), and this ‘Norse-accented’ Gaelic would therefore possess preaspiration. Just such an imposition scenario is envisaged by Stewart (2004), who notes the numerous Norse borrowings in Gaelic that have not undergone phonological adaptation.

However, if preaspiration was spread at the very least across all of Scotland and parts of Ulster, then this scenario loses plausibility. How would a feature belonging to an L2 variety of Gaelic spread across such a wide area? There are two possibilities, neither of which can be sustained:

- Sheer force of numbers: if the speakers of such an L2 variety were sufficiently numerous to constitute a majority of the Gaelic speech community, then the feature might have spread. This may have been the case in heavily Norse-influenced parts of the *Gàidhealtachd* such as the Western Isles, but is much less credible for the Scottish mainland, and all but impossible for Ulster.
- The dynamics of prestige and language dominance: even relatively small numbers of L2 speakers might have been able to exert an influence over an L1 majority variety if the L2 variety had sufficient status (this appears to be the scenario envisaged by Marstrand 1932). However, this does not seem likely either – indeed, the entire scenario is predicated on Norse speakers acquiring Gaelic precisely because of the loss of Norse political power and the incorporation of the Western Isles and other Norse-influenced areas into Gaelic polities within the Scottish sphere of influence. In this situation high status for the Norse-influenced L2 variety of Gaelic appears unlikely.

An imposition scenario thus appears unlikely. A different vector for phonetic influence might have been convergence under conditions of long-term bilingualism, i.e. ‘borrowing’ under recipient language (L1) agency. This, at first glance, appears to be more plausible, especially in light of recent approaches to the history of Norse settlement in Scotland. Where earlier

scholars envisaged almost wholesale replacement of the pre-Norse population, much recent work has emphasized the evidence for continuity and coexistence of the two populations (e.g. Magnús Stefánsson 2003; Barrett 2003a; Gammeltoft 2007; Whyte 2017).¹² From a linguistic perspective, authors such as Cox (2010) have argued that the pattern of Norse lexical borrowings in Gaelic provides some evidence for sustained long-term contact. More generally, recent work has re-evaluated the context and outcomes of contact between Celtic and Germanic languages by emphasizing long-term contact over abrupt shifts with concomitant substrate interference: see Lindqvist (2015) on Norn (and more generally Insular West Norse) in its Celtic context, Lewin (2017) on Manx and English in the Isle of Man, and Maguire (2018) on Irish and English in Ulster.

Nevertheless, this scenario also does not appear plausible. Even if we accept the historical arguments for the possibility of close, sustained contact of the kind needed to effect such an influence in parts of the *Gàidhealtachd*, we cannot project this situation to the entirety of the domain of preaspiration. In particular, recent scholarship has emphasized the difference between areas such as the Western Isles, with deep and lasting Norse influence that could have facilitated sustained bilingualism, and more southerly areas such as the Inner Hebrides and Argyll, where the Gaelic-speaking population might not have come into quite such close contact with Norse speakers, despite an undoubted Scandinavian presence at an élite level (cf. Jennings and Kruse 2009; Clancy 2011). In these latter areas, the social context does not appear to be conducive to mass long-term bilingualism.

This discussion of Argyll brings us back to the importance of the ‘central’ zone (1), which appears to be the focal area of innovation, and which Kenneth Jackson saw as the original domain of preaspiration. Although we rejected his exact reconstruction, I suggest that his insight into the central rôle of this zone is valid. Why were innovations able to spread from this area? It is worth recalling the political and cultural importance of this zone within the Gaelic-speaking world in the Middle Ages. Argyll (as *Dál Riata*) was the centre of Gaelic political power in Britain in the 1st millennium CE, and it retained a central position in an age where water transport was much more important than overland routes. Argyll contained important cultural and ecclesiastical centres – Iona first and foremost but also sites such as Lismore – and was also the power base of the Lordship of the Isles, which was the driving force in the (re-)Gaelicization of formerly Norse territories in the west

¹² However, see Macniven (2015) for a forceful recent restatement of the traditional position.

and north. In general, it was only in the later Middle Ages and the early modern period, with the beginning of language shift to Scots and English, that the political and cultural ‘centre of gravity’ of the Gaelic world shifted from Argyll and the central Highlands towards the north-west and the Western Isles (MacInnes 1992; Gillies 2009).

Thus, the reconstruction we arrived at in section 3 on purely internal grounds receives a straightforward historical interpretation. I suggest it is consistent with what we know about patterns of settlement and cultural contact in mediaeval Scotland, and offers no support to the thesis that Norse influence was a crucially necessary ingredient for the observed development of preaspiration in Gaelic. Even though Ó Maolalaigh (2010:392) is surely right to suggest that ‘in some dialects, especially Lewis, it is difficult to deny a Norse connection’, the development of preaspiration throughout the Gaelic world is entirely consistent with what we know about the course of endogenously motivated sound change.

8 Conclusion

To summarize, I have argued that the historical development of preaspiration in Scottish Gaelic can be understood as a fairly ordinary instance of the phonologization of a variable phonetic phenomenon associated with the realization of laryngeal contrast. The dialectal variation observed across the *Gàidhealtachd* in the realization of preaspirated stops is fully consistent with our current understanding of the life cycle of phonological processes. It also indicates that some form of preaspiration must have historically been present over very large parts of the Gaelic-speaking area. The pattern is not consistent with the historical evidence for the distribution and status of the Norse-speaking population in Scotland, but is in fact quite closely compatible with the sociohistorical dynamics of Gaelic society in the Middle Ages. I conclude, therefore, that preaspiration in Scottish Gaelic does not have to be ascribed to Norse influence, despite numerous suggestions to the contrary in the literature.¹³

The downside of this conclusion is that it leaves unexplained the areal pattern of preaspiration: why does this cross-linguistically rare phenomenon cluster in Northern Europe? Here, I make two brief observations. First, it seems that preaspiration is widely under-reported in the literature, as discussed in section 4, so the phenomenon may not be as rare as previously

¹³ See also Iosad (2015) for consideration of possible contact origins of tonal accents – another potential Norse feature in Gaelic.

thought. Second, much of the motivation for emphasizing the areal dimension of preaspiration seems to hinge on the idea that preaspiration is not a robust phenomenon, and is easily lost: however, under the interpretation offered here the ‘weak’ [(^h)p (^h)t (^h)k] preaspiration of Lewis Gaelic and Ulster Irish is a relatively archaic form of the phenomenon that has nevertheless persisted for a reasonably long period of time. This point, due to Clayton (2010), should lead us to question the premise that preaspiration is necessarily diachronically fragile. Thus, the ‘coincidence’ of preaspiration recurring in northern Europe, if coincidence it is, is maybe not as extraordinary as we may previously have thought.¹⁴

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¹⁴ For more discussion of these and related issues, I refer the reader to Iosad (in preparation).

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