

PREASPIRATED STOPS IN THE ENGLISH OF SCOTTISH GAELIC-ENGLISH BILINGUALS

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ABSTRACT

Preaspirated voiceless stops, a well-documented feature of Scottish Gaelic, have also been anecdotally observed in the English spoken in the Scottish Hebrides island chain. This paper presents the first sociophonetic study of preaspirated stops in Hebrides English. Analysis of speech produced by 24 male and female Gaelic-English bilinguals aged 19-75 found that, while most participants produced at least some tokens of preaspiration, only older female speakers from the island of Lewis preaspirated the majority of their voiceless stops. These findings suggest that preaspiration is both geographically concentrated in Lewis and an obsolescent feature in Hebrides English generally. The effects of place of articulation, vowel quality, and stress on the duration and frequency of preaspiration are also discussed.

Keywords: Scottish English, Hebrides English, Scottish Gaelic, preaspiration, bilingualism.

1. INTRODUCTION

Preaspirated stops are a rare linguistic feature, identified in no more than a few dozen of the world's languages [4][10][17]. While preaspirated stops are well-documented in Scottish Gaelic and Icelandic [4][8][12], their presence in varieties of English has been less well-recognized until recently. In the last two decades, preaspirated stops have been described in the Tyneside [5], Middlesbrough [9], and Welsh varieties of English [11]. Preaspirated fricatives have also been described in Scottish Standard English [6][7].

In addition, there have been references to preaspiration in the varieties of English spoken in the Scottish Hebrides island chain [3][16][19]. (This variety has been referred to as *Highland and Island English* [16]; since only forms spoken in the Hebrides islands are discussed in this paper, the term *Hebrides English* is used instead, hereafter

HE.) However, these references have not been accompanied by detailed phonetic descriptions.

This paper describes the results of a study which addresses the following research questions:

1. What are the phonetic characteristics of preaspiration in HE, in terms of its form, distribution, and duration?
2. Do speakers of a particular geographic origin, age range, or gender preaspirate more than others?
3. Is it possible to discern any linguistic changes in progress, such that preaspiration is becoming more or less abundant in this variety of English?

2. METHODS

2.1. Participants

Study participants included 24 native speakers of Scottish Gaelic (Table 1). All had been monolingual in Gaelic until age 5-6, and had continued to use Gaelic regularly into their adult lives, either at work, at home, or both. All participants were bilingual in English and Gaelic, and were literate in both. They ranged in age from 19 to 75, and represented nine regions within the Hebrides island chain (Figure 1). Ten participants were male, fourteen female.

Figure 1: The Scottish Hebrides. 1 Lewis, 2 Harris, 3 North Uist, 4 Grimsay, 5 South Uist, 6 Vatersay, 7 Skye, 8 Raasay, 9 Tiree.

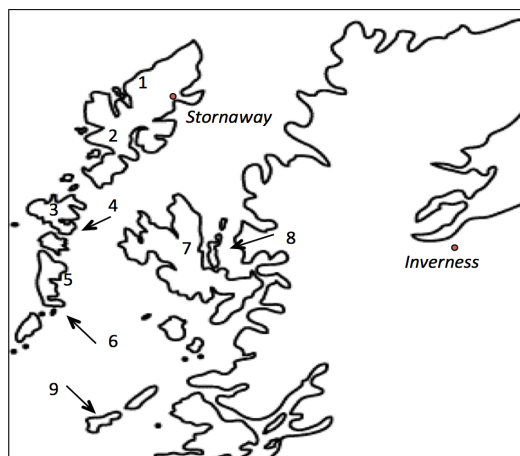


Table 1: Sex, origin, and age of study participants.

Speaker	Origin	Age	Sex	Speaker	Origin	Age	Sex
GRIM1	Grimsay	50	F	SUI1	S Uist	19	M
HAR1	Harris	47	M	RAA1	Raasay	60+	M
LEW1	Lewis	34	F	SKY1	Skye	29	F
LEW2	Lewis	34	F	SKY2	Skye	51	F
LEW3	Lewis	50	F	SKY3	Skye	58	F
LEW4	Lewis	57	F	SKY4	Skye	59	F
LEW5	Lewis	63	F	SKY5	Skye	63	F
LEW6	Lewis	26	M	SKY6	Skye	75	F
LEW7	Lewis	43	M	SKY7	Skye	58	M
LEW8	Lewis	60	M	SKY8	Skye	69	M
NUI1	N Uist	36	F	TIR1	Tiree	45	M
NUI2	N Uist	38	F	VAT1	Vatersay	30	M

2.2 Stimuli

Stimuli were sixty-one real English words, illustrating the English oral stops /p t k b d g/ in initial, medial post-stress, medial pre-stress, and word-final positions. Though cross-linguistically, preaspiration usually occurs before word-medial and word-final voiceless stops [4][8][17], stimuli representing initial and voiced conditions were included as distractors and to confirm that preaspiration did not occur outside the expected contexts in HE.

Table 2: Sample stimuli.

		initial		medial post-stress		medial pre-stress		final	
Stop	Vowel	-voi	+voi	-voi	+voi	-voi	+voi	-voi	+voi
lab	i	peek	beak	keeper	feeble	appeal	abeam	keep	grebe
cor	u	tube	dupe	suitable	noodle	attune	reduce	boot	rude
dor	a	cod	got	rocker	auger	accost	begone	rock	bog

Each target stop occurred adjacent to the stressed high vowels /i/, /u/, or low vowels /a ~ ɔ/ (Table 2), conflated in this discussion as /a/, since speakers varied in which they used in a given word. The stop either preceded this vowel for initial and medial pre-stress conditions, or followed the vowel in medial and final post-stress conditions. Some words met two conditions at once, e.g. *peek*. A small number of lexical gaps meant that not all target consonants could be represented in each condition. Each stimulus was presented twice during the experiment. Each participant thus encountered 18 voiceless stops in medial post-stress position, 16 in medial pre-stress

position, and 34 in final post-stress position, for a total of 68 voiceless post-vocalic contexts for preaspiration. In addition, the experiment included four practice words, *cat*, *dog*, *knock*, and *bake*, presented once each at the outset of the experiment.

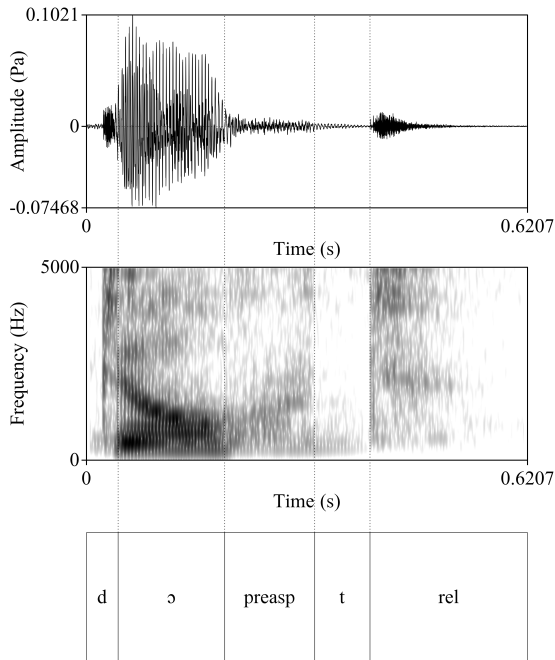
2.3 Recording and Analysis

Participants were recorded using a Shure SM93 omnidirectional lavalier microphone (80 Hz-20 kHz frequency response), and a Zoom H4n digital recorder with a 44.1 kHz sampling rate and 16-bit quantization. Participants were given verbal instructions, during which they were told that the researchers were not interested in “correct” or “proper” pronunciation, but in a conversational, informal pronunciation. Stimuli were presented singly to the participants on a laptop computer, in a predetermined random order, within the carrier sentence *I said X two times* where *X* was the target word. All participants received the stimuli in the same order. Each participant was presented with the entire set of stimuli once, and then after a brief break presented with the full set a second time, in a different random order, for a total of 122 stimuli (excluding the four practice words). Participants advanced at their own rate by pressing the space bar to move on to the next stimulus. Twenty participants were recorded in a quiet room provided by Sabhal Mòr Ostaig, the Gaelic-language college on the Isle of Skye. The remaining four were recorded in a conference room at a local community center. Each participant required about 15 minutes for this experiment.

All recordings were analyzed using Praat [2]. Preaspiration was measured as the interval between the offset of modal voicing in the preceding vowel, and the closure of the following stop (Figure 2). In most tokens, the beginning of preaspiration could be identified as the point where the periodic vocalic waveform ceased, and the aperiodic high-frequency energy of aspiration commenced. The cessation of preaspiration was marked at the point where this high-frequency energy disappeared, and the relatively flat closure waveform commenced. About one-third of the tokens of preaspiration (57 of 174, 32.5%) were realized with a component of breathy voice, visible as a noisy yet periodic waveform between the less noisy vowel waveform and the flatter closure period. Such realizations of preaspiration are not atypical, having been noted in e.g. Scottish Gaelic and Sieneese Italian [4][14][18].

There were no oral realizations such as [x] or [ç], nor any preaspirated voiced or word-initial stops.

Figure 2: Example segmentation of preaspiration in the word ‘dot’ as produced by LEW5.



3. RESULTS

Twenty of the 24 participants provided at least one preaspirated token. These speakers represented Lewis, Skye, North Uist, Raasay, Harris, and Grimsay. Four participants, SUI1, SKY7, TIR1, and VAT1 did not preaspirate in any context.

3.1 Variation according to geographic origin

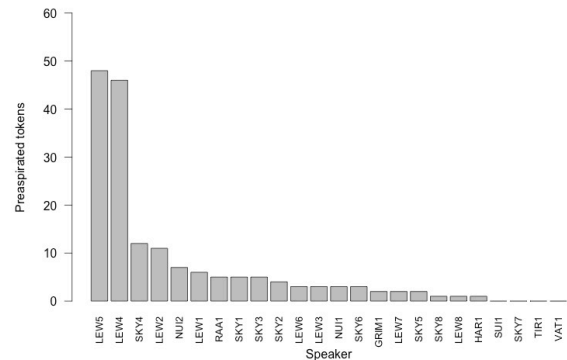
Earlier researchers have noted that preaspiration in HE was either restricted to Lewis [3], or else more prominent in Lewis than elsewhere in the Hebrides [16]. Similarly, this study found that preaspiration was more abundant among Lewis speakers than among participants from elsewhere in the Hebrides (Figure 3). All eight participants from Lewis produced at least some preaspiration. If we consider the top 12 preaspirators, six were from Lewis. Among non-Lewis participants, preaspiration was less abundant or absent.

But even among the eight Lewis speakers, the rate of preaspiration varied widely. Notably, the rate was by far the highest among the two oldest

female Lewis speakers. LEW4 (57 years) and LEW5 (63 years) displayed very similar rates of preaspiration, far outstripping the remaining 22 participants. LEW5 preaspirated in 48 of 68 possible contexts (71%), including 46 of 52 (88%) post-stressed vowel contexts and 2 of 16 pre-stressed vowel contexts (12.5%). LEW4 preaspirated in 46 of 68 contexts (68%); 44 of these followed stressed vowels (85%), and 2 preceded stressed vowels (12.5%). The remaining six Lewis speakers preaspirated much less than LEW4 and LEW5, ranging from 11 tokens (LEW2) to a single token (LEW8).

Notably, LEW4 and LEW5 are from widely separated communities: LEW5 is from the village of Carloway, on the west side of Lewis, while LEW4 is from Col, twenty miles to the east. Meanwhile, LEW3 (50, female), also from Carloway, produced only 3 preaspirated tokens.

Figure 3: Number of preaspirated tokens produced by each speaker.



3.2 Variation according to gender and age

The study also found a close relationship between gender and preaspiration rate. When participants are sorted by their rate of preaspiration, female speakers dominate in the upper ranks, and males in the lower ranks. The seven least frequent preaspirators are all male, including the four who produced no preaspiration at all.

The effect of age was less clear. While the two top preaspirators, LEW4 (57) and LEW5 (63), were the two oldest female participants from Lewis, there were older participants from other islands who preaspirated at much lower rates, notably SKY6 (75, female) and SKY8 (69, male). Meanwhile, the oldest male Lewis representative, LEW8 (60), produced just one token. Together,

these findings suggest that speakers who preaspirate at the greatest rate are likely to be older (> 50), female, and from Lewis.

3.3 The effects of vowel quality and word position

Word position strongly affected the duration of preaspiration, which was found to be significantly longer before word-final stops (mean: 75 ms) than before word-medial stops (mean: 42 ms): $t = 6.9422$, $df = 104.007$, $p < .0001$, a distinction which has also been found in Scottish Gaelic and Icelandic [4][14].

Vowel height, but not vowel backness, also affected preaspiration duration. After non-high vowels, preaspiration was significantly longer (mean: 76 ms) than after high vowels (mean: 40 ms), according to a Welch two-sample t-test: $t = 5.1489$, $df = 79.149$, $p < .0001$, cf. [7]. However, which of the two high vowels /i/ or /u/ preceded the preaspiration had no significant effect on the duration of preaspiration: the mean duration after /i/ was 44 ms, after /u/ 49 ms, $t = -0.8848$, $df = 75.025$, $p = 0.3791$.

Similar differences were found in vowel length. Because all measured vowels occurred before voiceless consonants, the Scottish Vowel Length Rule was not an issue [1][15]. Non-high vowels were significantly longer (mean: 131 ms) than high vowels (mean: 100 ms): $t = 4.5214$, $df = 112.762$, $p < .0001$. There was no significant difference between the high vowels /i/ (mean: 104 ms) and /u/ (mean: 96 ms): $t = 0.8768$, $df = 86.649$, $p = 0.383$. Vowels in final position were significantly longer (mean: 131 ms) than those in medial position (mean: 95 ms): $t = 5.5104$, $df = 133.696$, $p < .0001$. A Spearman correlation test (assuming non-normal distribution) showed a positive correlation between preceding vowel duration and preaspiration: $r_s = 0.4170392$, $p < .0001$.

3.4 The effects of place of articulation and stress

The place of articulation of the following stop was not found to have a significant effect on the duration of preaspiration, according to a linear regression model ($F = 0.2695$ on 2 and 136 degrees of freedom, $p = 0.7642$, labial mean 59 ms, coronal mean 59 ms, dorsal mean 54.7 ms). This result stands in contrast to previous studies which have found that place of articulation has an effect on the duration of preaspiration in Scottish Gaelic [4][12][13], and Icelandic [4], such that

preaspiration is generally shorter before labial stops than coronals or dorsals in those languages.

However, whether the stop would be preaspirated at all was strongly dependent on place of articulation. Just as in Scottish Gaelic [4], speakers of HE were least likely to preaspirate labial stops. Among all participants, only 24 of 432 labial post-stress tokens were preaspirated, (5.8%). Even the two top preaspirators, LEW4 and LEW5, preaspirated only 67% and 61% of labial stops, respectively. All speakers were more likely to preaspirate dorsals (42 of 336 tokens, 12.5%) and coronals (72 of 480 tokens, 15%). Coronals were especially favored in unstressed environments: of 384 voiceless stops following unstressed vowels, 31 were preaspirated (8%). Of these 31 tokens, 29 were coronal, 1 labial and 1 dorsal.

4. DISCUSSION

This study has found that preaspirated voiceless stops are a significant phonetic feature of HE. Stress, word position, and place of articulation affect the duration and frequency of the preaspiration period. Speaker age, sex, and geographic origin play a role in determining whether and how abundantly speakers preaspirate. While most speakers, representing a range of geographic origins and ages, and of both sexes, produced at least a few preaspirated tokens, female speakers preaspirated more often than male speakers, particularly older female speakers from Lewis. The greater abundance of preaspiration in female speakers of HE is consistent with other studies, including those of Welsh, Welsh English [11], and Tyneside English [5]. However, the situation stands in contrast to Tyneside: there, preaspiration appears to be an innovative feature, found most prominently in younger female speakers [5]. In the Hebrides, preaspiration is rare among younger speakers, including females, which suggests that preaspiration is a conservative, even obsolescent feature in this variety of English.

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