



THE UNIVERSITY *of* EDINBURGH

Edinburgh Research Explorer

Variation in the Scottish BIT vowel

Citation for published version:

Hall-Lew, L, Elliott Slosarova, Z, Göbel, J, Cowie, C & Markl, N 2023, Variation in the Scottish BIT vowel: Comparing two corpora. in R Skarnitzl & J Volín (eds), *Proceedings of the 20th International Congress of Phonetic Sciences.*, 740, Guarant International, Prague, pp. 3681-3685, 20th International Conference of Phonetic Sciences (ICPhS), Prague, Czech Republic, 7/08/23. <<https://guarant.cz/icphs2023/740.pdf>>

Link:

[Link to publication record in Edinburgh Research Explorer](#)

Document Version:

Publisher's PDF, also known as Version of record

Published In:

Proceedings of the 20th International Congress of Phonetic Sciences

General rights

Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.



Variation in the Scottish BIT vowel: Comparing two corpora

Lauren Hall-Lew,¹ Zuzana Elliott,¹ Jessica Göbel,² Claire Cowie,¹ and Nina Markl¹

¹The University of Edinburgh and ²New York University

lhlew@ed.ac.uk, zuzana.elliott@ed.ac.uk, jessica.goebel@nyu.edu, claire.cowie@ed.ac.uk, nina.markl@ed.ac.uk

ABSTRACT

We analyse variation in the Scottish BIT vowel as produced by men from different birth years and social classes. An analysis of two Edinburgh-based speech corpora allows for a comparison of white Scottish men born between 1899 and 1996. The results indicate that BIT may be raising over time among New Middle Class and Working Class speakers. However, the conclusion is complicated by differences between the two corpora, including recording technology, addressee, register, and topic. These are just as likely to account for the patterns in BIT F1 found with respect to corpora and social class group. The paper calls for further work on the social and stylistic differences between corpora used in real time studies.

Keywords: sociophonetics, social class, style, vowels

1. INTRODUCTION

Examples of stable phonetic variables are rarer than examples of sound changes [10], with famous English examples including *-ing* velar/alveolar alternation and consonant cluster reduction. One question is how to best account for stylistic and other social changes over time which co-occur with the passage of time, itself. In this paper, we consider variation in the height and anteriority of vowels, in particular the vocalic variable known as English KIT [29] or Scots BIT [27]. Both Scottish English and Scots, and mixed styles between them, are spoken in Edinburgh. By examining speech from two Edinburgh corpora, with respondents born between 1899 and 1996, we find variation in KIT/BIT over time among Working Class speakers. We consider whether this indicates a change in progress or if stylistic differences between corpora may better account for the difference.

The Scottish BIT vowel is lower and backer than the standard English KIT vowel, so much so that it is often merged with STRUT; this is the case in general and in Edinburgh, in particular [22]. The variation correlates with socioeconomic class, with middle class speakers producing a higher and fronter (i.e., more ‘English’) variant than working class speakers [25]. This pattern has also been documented in Glasgow, in the 1970s [18] and the 2000s [7, 26].

Despite this consistent stratification across the decades, previous work has suggested that the BIT

vowel might be undergoing a change in progress. Data from Glasgow in the early 2000s found a lower vowel among middle class boys than middle class men, and a backer vowel among all boys than among all men, suggesting a lowering and/or backing change in progress [7, 8], or possibly an age graded pattern. Here, we consider data from Edinburgh which may suggest a change in progress. However, the conclusion is complicated by social and stylistic differences between corpora.

2. THE CORPORA

The present paper compares data from two corpora of Edinburgh speech, which we refer to as the Esling Corpus and the Lothian Diary Corpus. The corpora do both contain uses of Scots, but most of the speech can be best described Scottish English, albeit ranging the spectrum from very non-standard to very standard.

The Esling Corpus [9] was collected by John Esling in 1975. It consists of sociolinguistic interviews in the tradition of Labov [15] and adapted for the Scottish context. The participants were white Scottish men, stratified by socioeconomic class. Data collection took place in participants’ homes, over cups of tea, with family, friends, and pets coming and going during the recordings. About this atmosphere, Esling [9] writes, “it is extremely helpful in eliciting casual speech from the informant.” The interview topics included childhood games, school memories, and memories about the local area.

At the time, Esling, an American, was an PhD student at the University of Edinburgh, and the interviews were framed as contributions to a student project. Esling [9] writes, “[a]ll informants appeared favourably disposed towards the interviewer’s American accent, and this is thought to have been an advantage in the Scottish situation in encouraging informal speech.” Impressionistically, this seems to be true; there is no indication that speakers converged phonetically towards Esling’s American accent, nor towards a more educated or middle-class accent that might have been primed by his university affiliation. Most of the speakers were older than Esling was, at the time of recording, and Esling positions them as local experts and in the position of authority throughout the interaction. Speech acts such as joking and teasing, and channel cues [15] such as laughter, indicate that Esling was highly successful in evoking

a casual speaking style from the participants. The read-speech portions of the interview only occurred at the very end of the interaction, and participants seem unaware of attention to their speech beforehand. John Esling generously contributed the recordings to the University of Edinburgh's 'Edinburgh Speaks' archive in 2017, for further analysis.

The Lothian Diary Corpus [13, 14] was collected by a team of researchers from the University of Edinburgh between 2020-2021, and consists of audio or video self-recordings about the effects of the COVID-19 lockdowns on daily life. Self-recordings are increasingly common but remains understudied in sociophonetics [14]. In contrast to the Esling Corpus, the Lothian Diary participants represent a wide range of genders, socioeconomic classes, ages, and other social factors, but all were living in the greater Edinburgh area at the time of recording. Data collection took place wherever the participant chose, often in their home, but not always, with no direct communication between the research team and the participant prior to recording. Many participants spoke in response to prompts on the project website (e.g., "How has your life changed in lockdown?"), but many others did not refer to these questions.

The recordings were framed on the project website as contributions to (a) research on individual experiences with the Scottish lockdown measures, (b) a report for Scottish Parliament, and (c) a COVID-19 oral history collection for the City of Edinburgh. As a result, the speaker's potential *imagined audience* [2] was quite varied and diverse; it might have included the research team members, members of the Scottish Parliament, the general public, or all three. Speakers might have oriented to a more standard accent, due to the researchers' affiliation with the university, or they may have instead oriented to their role as authority and expert (on the topic of their personal experience). While some speakers produced the occasional laugh, most contributions are impressionistically sombre and serious, often reflective and philosophical. Others are delivered with a flat affect, listing the changes between life before and during the lockdown. Read speech was never directly elicited, but some participants read the website prompts aloud interspersed with their more spontaneous answers.

3. METHODS

Following Esling [9], social class was coded as ternary, which better reflects the reality of social class experience in Edinburgh than the binary coding often seen in other studies. In Edinburgh, social class corresponds, among other things, to a speaker's level and location of education, their type of work and income level, their parents' type of work and income

level, their level of wealth, and the level of social deprivation characterizing their neighbourhood. Esling's [9] three levels included 'I' (middle class, from the Morningside neighbourhood), 'III' (working class, from the Pilton neighbourhood), and 'II' (in between, e.g., working class origins but living in Morningside). These levels, and the Lothian Diary participants, were (re)coded as in [6]: the Established Middle Class ('EMC', speakers whose parents were also middle class; Esling's class 'I'), the Working Class ('WC', speakers whose parents were also working class; Esling's class 'III'), and the New Middle Class ('NMC', upwardly mobile speakers who were born to working class parents, but middle class at the time of data collection; Esling's class 'II'). The NMC primarily captures upward social mobility, but also includes stable members of the Lower Middle Class ('LMC', see [6, 16]).

For the current paper, we analysed a subset of 13 Esling Corpus speakers born between 1899-1953, aged 22-76 at the time of recording. Four were NMC and four were WC. We compare these speakers to a subset of 8 Lothian Diary Corpus speakers, also white Scottish men, born between 1964-1996, ages 24-66 at the time of recording. Three were NMC and two were WC (the only available speakers of that demographic in the corpus). The Lothian Diary Corpus speakers are all cis-gender and straight; this information was not collected for the Esling Corpus speakers but all of the 13 were in visibly heterosexual marriages at the time.

Tokens of the Scottish BIT vowel in the Esling Corpus were hand-annotated by the third author, and midpoint vowel formants and durations were hand-measured in Praat [3]. Since analysis of the Lothian Diary Corpus speakers is part of a much larger project, tokens of the same variable in the were annotated automatically using the Montreal Forced Aligner [19], and midpoint vowel formants and durations were automatically extracted using a script in Praat. Ten percent of automated annotations were checked for accuracy, though very few annotations in the sample required manual adjustment.

Valid tokens of BIT were those carrying primary lexical stress, not immediately following vowels, and not immediately preceding /l/ or /r/ (total N=945). Models were built in R [23], using the *lme4* package [1]. Initial model factors included vowel DURATION (log normalized), lexical FREQUENCY (based on the spoken British National Corpus), PRECEDING phonological place (*labial, apical, dorsal, pause*), FOLLOWING phonological place (*labial, apical, dorsal*), speaker AGE (continuous, 22-76), and social CLASS (*EMC, NMC, WC*), and CORPUS (*Esling, LothianDiaries*). Speaker year-of-birth is not included as it is nested within corpus. WORD and SPEAKER were entered as random intercepts; models

with random slopes did not converge. Models were fit to F1 and F2 separately. Model fitting used sum-coding and was based on drop-one comparisons of an initially maximal model with only logically predicted interaction factors included.

4. RESULTS

The best fits models for each formant of BIT were:

$$F1 \sim \text{LOGDURATION} + \text{CORPUS} * \text{CLASS}$$

$$F2 \sim \text{LOGDURATION} + \text{PRECEDING} + \text{FOLLOWING}$$

Thus, the preceding and following phonological environment significantly predicted vowel anteriority (F2), and the interaction between the corpus and social class significantly predicted vowel height (F1). Vowel duration is a significant predictor for both variables. Vowels are both lower and backer when produced with longer durations [28].

The non-significant predictors for both variables are lexical frequency and speaker age. Neither phonological environment factor predicted variation in F1, and neither corpus nor socioeconomic class were significant predictors for F2. The reasons for the effects of duration on both formants, and the effect of phonological environment on F2, are phonetically straightforward. We therefore concentrate for the rest of this paper on analysing the significant interaction effect for F1 (Figure 1).

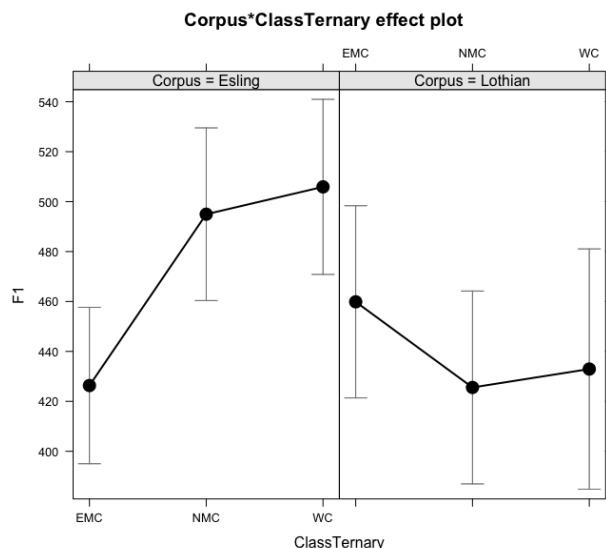


Figure 1: Second significant predictor (after vowel duration) for variation in the F1 of the Scottish BIT vowel among Edinburgh speakers of two corpora. Social class predicts vowel height, but in opposite ways by corpora.

Corpus, alone, is a significant predictor, with BIT being lower overall in the Esling Corpus than the Lothian Diary corpus. Speaker social class, alone, is

not a significant predictor. This is not surprising when class is viewed in interaction with corpus (Figure 1). While there is no significant difference between corpora among Established Middle Class speakers, New Middle Class and Working Class speakers both produce significantly higher BIT vowels in the Lothian Diary Corpus than in the Esling Corpus. In the Esling Corpus, NMC and WC BIT vowels are lower (with a larger F1) than EMC BIT vowels, in keeping with all other studies of BIT in the Scottish Central Belt. However, in the Lothian Diary Corpus, the reverse is true. So, while a low BIT vowel has been seen in previous work to be an index of working-class speech, the opposite class pattern obtains for the self-recorded COVID-19 diaries. For this small speaker sample, both the New Middle Class and Working Class produce a higher BIT vowel, closer to the standard English KIT variant, than the variant produced by the Established Middle Class.

5. DISCUSSION

There are several ways to interpret these results. The first is that there has been a change in progress in the height of the KIT/BIT vowel among white Scottish men in Edinburgh, such that the NMC and WC are shifting towards a higher variant over time. This is an entirely plausible analysis, and one that can only be addressed through a longitudinal analysis that controls for differences between corpora.

A second interpretation is that the differences between these two corpora are so great that it is impossible to determine whether or not there is a change in progress here. For this to be likely, the difference would specifically affect the NMC and WC speakers. In this section, we will consider this possibility in more depth, setting the stage for a future analysis that can tease these issues apart.

An issue for any longitudinal analysis is changes over time in recording technology, such as the type and quality of the microphone (see, e.g., [24]). This was held constant in the Esling Corpus. Every recording in the Lothian Diary Corpus was made with a different recording setup, but this information (device and microphone) was collected for each participant, and there does not appear to be any stratification in recording quality according to social class. Future analysis, with more speakers, could include recording device as a factor.

The more striking differences between the Esling Corpus from the Lothian Diary Corpus are stylistic. At least three stand out: addressee, register, and topic. Addressee refers to the person or group of people to whom participants' speech is directed [2]. In the Esling corpus, the addressee is clear: John Esling conducted casual sociolinguistic interviews with

participants and framed himself as a student and the speakers as local experts. There is no evidence that speakers converged to Esling's American accent or to a more middle-class standard, which suggests that speakers maintained a casual speaking style. For NMC and WC speakers, this included a lower BIT vowel. In comparison, the addressee in the Lothian Diary Corpus is less clear. There was no direct communication between the research team and the speakers during the recordings. The recordings themselves were framed as contributions to a COVID-19 oral history collection and a report for Scottish Parliament. Thus, the speakers' imagined audience was vaguer and more formal than in Esling's project. For NMC and WC speakers, the imagined audience is also in a position of relatively more power, while EMC speakers are at roughly the same status position (e.g., compared to members of the university and Parliament). If the former are hypercorrecting towards an EMC norm, then this would account for the production of a much higher BIT vowel than we see for speakers of the same social classes in Esling's data. From a Labovian perspective, this would suggest that the COVID-19 recordings are stylistically comparable to minimal-pair word lists.

The register difference between the two corpora is the difference between an interview and a self-recorded audio/video diary. Previous work on self-recorded speech argues that self-recordings represent an important resource for sociophonetic research due to their propensity to elicit a wider array of stylistic variation than is seen in traditional sociolinguistic interviews [411, 12]. In particular, self-recordings have been seen to elicit more advanced sound change variants than those produced in interview speech [4]. At the same time, self-recordings have also evidenced more hyperarticulated variants than interview speech, namely more fronted /s/ variants produced in Skype calls [11]. In addition, there may be an additional register effect resulting from speech directed to a physically co-present interlocutor and speech directed to a screen (whether self-recorded or not). Both of the working-class men from the Lothian Diary Corpus who were analyzed here submitted video diaries, as opposed to audio diaries, and were looking at the cameras on their recording devices for the duration of the recordings. Other Lothian Diary contributors, not analyzed here, submitted only audio recordings, and future work could compare those submissions to video made by similar participants.

Lastly, the two corpora differ in terms of topic. Esling obtained narratives about childhood games, family memories, and stories of local history. Some speakers mentioned their time in World War II, but spoke more about work and travel than about suffering and death. In contrast, the main topics of

Lothian Diary narratives were the COVID-19 pandemic, the stay-at-home order, and the effects these had on people's lives. Although the discussion prompts did ask about 'bright spots' in lockdown, most of the contributions discussed restrictions of movement and increased feelings of fear, anxiety, loneliness, and loss. These topics resulted in a much more sombre mood than in the Esling interviews. It is possible that, for NMC and WC speakers, this affect is indexically linked to a more formal speaking style, and thus a higher BIT vowel (see, e.g., [21, 22]). EMC speakers wouldn't draw on this variation for affective work because they already produce a high, front KIT/BIT vowel as their typical variant.

The potential role of affect in sociophonetics is interesting in light of classic variationist theories of style and crisis narratives. COVID-19 narratives could be considered akin to answers to Labov's [17] famous 'danger of death' question, the answers to which were purported to produce maximally informal speech. The results here suggest that there raise the questions to whether there might be stylistic differences between 'single event' crises (e.g., [5]), versus a more abstract, prolonged, and multi-faceted crises like COVID-19. In the former case, speakers are expected to be highly animated, while in the latter case, we might predict speakers to be withdrawn and subdued. Perhaps there are two types of 'danger of death' question that result in two very different, even opposite, styles. In any case, topic represents a distinct stylistic factor likely affecting results between the two corpora, given how the focus of discussions in each corpus had little overlap.

In short, while there might be a change in progress in the height of BIT, there are too many differences between the corpora to claim this conclusively.

6. CONCLUSION

Based on an analysis of two speech corpora of white Scottish men from Edinburgh, spanning 98 years of birth, there may be a change in progress in the height of the Scottish BIT vowel. If so, this change appears to be a raising of the vowel among the New Middle Class and Working Class, towards the location of the standard English KIT vowel, with no significant change in the speech of the Established Middle Class. However, differences between the two corpora with respect to addressee, register, and topic are just as likely account for the wide variation seen between the speakers of each corpus. Future work should consider other linguistic variables (e.g., *-ing*, /t/-glottal replacement; rhoticity), and other kinds of speakers, in order to understand the effect of social and stylistic differences between corpora used in real time studies.

7. REFERENCES

- [1] Bates, Douglas, Martin Mächler, Ben Bolker & Steve Walker. 2015. Fitting linear mixed-effects models using lme4x. *Journal of Statistical Software* 67, 1–48.
- [2] Bell, A. 1984. Language style as audience design. *Language in Society* 13(2): 145-204
- [3] Boersma, P., Weenink, D. 2013. Praat: Doing phonetics by computer [Computer program]. Version 5.3.56. Retrieved August 2014 from <http://www.praat.org/>.
- [4] Boyd, Z., Elliott, Z., Fruehwald, J., Hall-Lew, L., Lawrence, D. 2015. An Evaluation of Sociolinguistic Elicitation Methods. In: The Scottish Consortium for ICPHS 2015 (Ed.), *Proceedings of the 18th International Congress of Phonetic Sciences*. Glasgow, UK: the University of Glasgow.
- [5] Clark, L., MacGougan, H., Hay, J., Walsh, L. 2016. “Kia ora. This is my earthquake story” Multiple applications of a sociolinguistic corpus. *Ampersand* 3, 13–20.
- [6] Dickson, V., Hall-Lew, L. 2017. Class, Gender and Rhoticity: The Social Stratification of Non-prevocalic /r/ in Edinburgh Speech. *Journal of English Linguistics* 45(3), 229-259.
- [7] Eremeeva, V. 2002. *A Sociophonetic Investigation of the Vowels OUT and BIT in Glaswegian*. PhD dissertation, University of Glasgow.
- [8] Eremeeva, V., Stuart-Smith, J. 2003. Sociophonetic Investigation of the Vowels OUT and BIT in Glaswegian. In: Solé, M. J., Recasens, D., Romero, J. (eds.), *15th International Congress of Phonetic Sciences*. Barcelona, Spain. ISBN 1-876346-48-5.
- [9] Esling, J. H. 1978. *Voice Quality in Edinburgh: A Sociolinguistic and Phonetic Study*. PhD dissertation, University of Edinburgh.
- [10] Gardiner, S., Nagy, N. 2017. Stable variation vs. language change and the factors that constrain them. *University of Pennsylvania Working Papers in Linguistics* 23(2), 10.
- [11] Hall-Lew, L., Boyd, Z. 2017. Phonetic Variation and Self-Recorded Data. *University of Pennsylvania Working Papers in Linguistics* 23(2), 86–95.
- [12] Hall-Lew, L., Boyd, Z. 2020. Sociophonetic perspectives on stylistic diversity in speech research. *Linguistics Vanguard* 6, s1.
- [13] Hall-Lew, L., Cowie, C., McNulty, S. J., Markl, N., Lai, C., Llewellyn, C., Alex, B., Fang, N., Elliott, Z., Klinger, A. 2021. The Lothian Diary Project: Investigating the Impact of the COVID-19 Pandemic on Edinburgh and Lothian Residents. *Journal of Open Humanities Data* 7(4), 1–5.
- [14] Hall-Lew, L., Cowie, C., Lai, C., Markl, N., McNulty, S. J., Liu, S. S., Llewellyn, C., Alex, B., Elliott, Z., Klinger, A. 2022. The Lothian Diary Project: Sociolinguistic Methods during the COVID-19 Lockdown. *Linguistics Vanguard* 8(s3), 321-330.
- [15] Labov, W. 1966a. *The social stratification of English in New York City*. Washington, DC: Center for Applied Linguistics.
- [16] Labov, W. 1966b. The effect of social mobility on linguistic behavior. *Sociological Inquiry* 36(2), 186-203.
- [17] Labov, W. 1972. *Sociolinguistic patterns*. Philadelphia: University of Pennsylvania Press.
- [18] Macaulay, R. K. S. 1977. *Language, social class and education: A Glasgow study*. Edinburgh: Edinburgh University Press.
- [19] McAuliffe, M., Socolof, M., Mihuc, S., Wagner, M., & Sonderegger, M. 2017. Montreal forced aligner: Trainable text-speech alignment using Kaldi. *Proceedings of the Annual Conference of the International Speech Communication Association (INTERSPEECH)*, 498–502.
- [20] Millar, R. M. 2018. *Modern Scots: An Analytical Survey*. Edinburgh: Edinburgh University Press.
- [21] Podesva, R., Callier, P., Voigt, R., & Jurafsky, D. 2015. The connection between smiling and GOAT fronting: Embodied affect in sociophonetic variation. In: The Scottish Consortium for ICPHS 2015 (Ed.), *Proceedings of the 18th International Congress of Phonetic Sciences*. Glasgow, UK: the University of Glasgow.
- [22] Pratt, T. 2023. Affect in sociolinguistic style. *Language in Society*, 52(1), 1-26.
- [23] R Core Team. 2020. *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing. Available at www.R-project.org
- [24] Sanker, C., Babinski, S., Burns, R., Evans, M., Johns, J., Kim, J., Smith, S., Weber, N., and Bower, C. 2021. (Don't) try this at home! The effects of recording devices and software on phonetic analysis. *Language* 97(4): e360-e382.
- [25] Speitel, H. H., Johnston, P. 1983. *A sociolinguistic investigation of Edinburgh speech*. Social Science Research Council End of Grant Report. C/00/23/0023/1.
- [26] Stuart-Smith, J. 2003. The phonology of modern urban Scots. In: Corbett, J., McClure, J. D., Stuart-Smith, J. (eds.), *The Edinburgh companion to Scots*, 110-137. Edinburgh: Edinburgh University Press.
- [27] Stuart-Smith, J. 2004. Scottish English: Phonology. In: Kortmann, B., Burridge, K., Schneider, E. W., Mesthrie, R., Upton, C. (eds.), *A handbook of varieties of English, vol. 1, Phonology*, 47-67. Berlin: Mouton de Gruyter.
- [28] Toivonen, I., Blumenfeld, L., Gormley, A., Hoiting, L., Logan, J., Ramlakhan, N., Stone, A. 2015. Vowel height and duration. In: *Proceedings of the 32nd west coast conference on formal linguistics* 32, 64-71. Somerville, MA: Cascadilla Proceedings Project.
- [29] Wells, J. C. (1982). *Accents of English beyond the British Isles*. Cambridge: CUP.