

The nature of the change: Language-internal and external aspects of derhotacization in young urban Scottish English (YUScE)

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Abstract

Scottish English is generally referred to as a rhotic variety of English, i.e. one in which /r/ is articulated both prevocally as in red and merry, as well as postvocally as in far, farmer, and similar. However, recent research in the field of sociophonetics (Lawson et al. 2014b, Celata & Calamai, 2014, Schützler, 2015) suggests that a process of derhotacization, that is, a gradual loss or lenition of postvocalic /r/, is taking place among young urban speakers of Scottish English. The present article presents the results of an auditory study of reading tasks performed by 80 informants from Glasgow and Edinburgh during the spring and summer 2016. By looking into the extent to which the 80 speakers produced derhotacized realizations during the reading task, it is found that if the process of derhotacization in YUScE could eventually result in full non-rhoticity, then the process is clearly in its early stage: speakers of YUScE are still to a large extent rhotic, and even for the few speakers who produce a considerable number of derhotacized realizations, the instances in which these realizations are completely non-rhotic are rather few. The article, furthermore, investigates the nature of derhotacization in YUScE with respect to two aspects: the language-external and language-internal aspects of the change. In terms of the language-external aspects of the change, derhotacization is examined in relation to the extra-linguistic variables of gender, socio-economic status, and geographic affiliation. In terms of the language-internal aspects of the change, derhotacization is examined in relation to a number of language-internal variables: the vowel preceding /r/, the tautosyllabic consonant following /r/, the position of /r/ in a word, i.e. whether /r/ is in word-final or pre-consonantal position in utterance-final words, and in relation to prosodic stress, i.e. whether /r/ is found in accented or deaccented words. It is found that the nature of derhotacization in YUScE is rather systematic in the sense that the change occurs according to several underlying social factors, and happens more frequently among some speakers of YUScE than others depending on gender, socio-economic status, and geographic affiliation, as well as according to several underlying language-internal factors, by which the change occurs more frequently in some phonetic and phonological contexts than in others. It is, furthermore, found that the process of derhotacization in YUScE possibly follows a natural law of articulatory economy, meaning that /r/ is first lost in phonetic and phonological contexts in which the reduction of

articulatory effort is highest, and that rhoticity, at least in this stage of the process, is still retained in contexts in which the reduction of articulatory effort is lowest.

Introduction

“Och naw! Scottish accent is dying out as people north of the border drop distinctive R’s from their speech”
- *The Daily Mail*, 19 July 2015

Scottish English is generally referred to as a rhotic variety of English, i.e. one in which /r/ is articulated both prevocally as in *red* and *merry*, as well as postvocally as in *far*, *farmer*, and *similar*. However, recent research in the field of sociophonetics (Lawson et al. 2014b, Celata & Calamai, 2014, Schützler, 2015) has shown that weakened realizations of postvocalic /r/ are increasingly being used by speakers of Young Urban Scottish English (YUScE), as opposed to the historically most common and widespread realizations of postvocalic /r/ in Scottish English, a trill [r], tap [ɾ], or retroflex approximant [ɻ] (Jones 1997).

The loss or lenition of postvocalic /r/ in Scottish English is in the literature referred to as a process of *derhotacization*, and is argued to be a slow-moving long-term vernacular change which could potentially result in the completion of derhotacization that is non-rhoticity (Celata & Calamai, 2014: 65). Given the fact that, as stated by Trudgill (2010: 143), the “division between rhotic and non-rhotic accents is a fundamentally important distinction between two radically different types of English segmental phonology”, which “involves not only word phonotactics but also the structure of vowel systems, with non-rhotic accents having a set of vowels not found in rhotic accents”, any move towards non-rhoticity should, surely, be regarded as a significant language change.

In this article, the results of an auditory study of the loss or lenition of postvocalic /r/ among 80 young speakers from Glasgow and Edinburgh will be presented. The study is based on auditory analyses of recordings made of a single reading task performed by the 80 speakers respectively during the spring and summer 2016.

In the study, I investigate the extent to which speakers of YUScE show derhotacization, and whether or not speakers of YUScE are, in fact, becoming non-rhotic. I do this in section 3 by weighing the percentages of derhotacized realizations against the percentages of rhotic realizations produced by the 80 speakers during the reading task. I, furthermore, examine the nature of derhotacization in YUScE with respect to two aspects: the language-external and language-internal aspects of the change. The language-external aspects of the change are examined in section 4. Here, I consider whether derhotacization correlates with the extra-linguistic variables of gender, socio-economic status, and geographic affiliation. I do this by examining whether derhotacization occurred most frequently among the male or female speakers, and among the speakers from Glasgow or Edinburgh. The language-internal aspects of the change are investigated in section 5. Here, I consider whether derhotacization in YUScE occurs more frequently in some phonetic and phonological contexts than in others; in section 5.1, I examine derhotacization in relation to the vowel preceding /r/; in section 5.2, derhotacization is examined in relation to the tautosyllabic

consonant following /r/; in section 5.3, I investigate whether derhotacization occurs more frequently when /r/ is in word-final or pre-consonantal position in utterance-final words; finally, in section 5.4, I look into the possible correlation between derhotacization and prosodic stress.

Methodology

Location



Figure 1: The Scottish Central Belt region

Glasgow and Edinburgh, situated in the Central Belt region, are the cities with the highest numbers of citizens in Scotland. Though there is regular interaction between the citizens of Glasgow and Edinburgh, the two cities have retained rather distinct identities: Glasgow characterized by its history as an industrial city with a large working-class population and Edinburgh as the capital with a large middle-class population. Furthermore, as noted by Lawson et al. (2014b: 58), “Glasgow and Edinburgh are Scotland’s centres of commerce, transport, government, education and media.”

Taking into account that linguistic innovations in general spread from cities to less populated areas, one could expect that linguistic changes occurring in the Central Belt region may diffuse throughout Scotland in the long term (Lawson et al. 2014b: 58), and it is for that reason that these locations were chosen for this study.

Informants and procedure

The study involved 80 speakers aged 13-22 who were recorded in either Edinburgh, March 2016, or in Glasgow, July 2016. None of the speakers had lived abroad or in any other cities in Scotland for more than 6 months. The audio recordings were made with an Apple iPhone 4 and a Samsung Galaxy Alpha smartphone.

The 80 informants were randomly selected on the streets, in shopping malls, fast-food restaurants, and in parks in and around the city centres of Glasgow and Edinburgh¹. The speakers were not made aware of the exact purpose of the study till after the recording, and all informants were given the same information about the project before the recording, that is, that it was for a BA-paper in English at the University of Copenhagen, Denmark².

The 80 speakers can be distributed into the four groups Glasgow males, Glasgow females, Edinburgh males, and Edinburgh females, based on their gender and geographic affiliation. Each of the four groups consists of 20 speakers.

During the interviews, each informant performed a reading task, which consisted of 32 sentences and 292 words in total³. Of these, 58 words were made object of auditory analysis, namely those which contained postvocalic /r/. In order to easily locate the words containing postvocalic /r/ during the auditory analysis, the majority of the words were placed sentence-finally in the reading task.

An auditory analysis was carried out in a silent room using iTunes and Mediaplayer. In the auditory analysis, I classified each speaker's realizations of postvocalic /r/ in the 58 words as either rhotic or derhotacized. I classified realizations as rhotic if they had one of five variants of /r/: the retroflex approximant [ɻ], the alveolar approximant [ɹ], the central rhotic vowel [ə], a tap [ɾ], or a trill [r]. Ø realizations of /r/ as well as realizations where there were features associated with rhoticity, i.e. velarization or pharyngealization of the preceding vowel but no segmental rhotic, I classified as derhotacized.

After I had carried out the auditory analysis, I re-listened to all 80 recordings 2 times altogether to verify the coding.

Results: the extent of derhotacization in YUScE

The auditory analysis revealed that 2 speakers were consistently rhotic during the reading task. Thus, these speakers did not produce any derhotacized realizations. 78 speakers, however, did produce derhotacized realizations of postvocalic /r/. Thus, these results support the findings of previous research and show that speakers of YUScE are producing weakened realizations of postvocalic /r/. Nevertheless, we must note that none of the speakers produced derhotacized realizations in all 58 words, and that the speakers on an average produced derhotacized realizations in 19% of the words, while they produced rhotic realizations in an average of 81% of the 58 words. Figure 2 below, however, shows that there was considerable variation in the extent to which the 80 speakers produced derhotacized realizations.

Figure 2 shows that 11 speakers produced derhotacized realizations in more than 35% of the 58 words. 15 speakers, on the other hand, were almost consistently rhotic and showed derhotacization in less than 10% of the words. Nevertheless, the majority of the speakers, notably 54 speakers, showed derhotacization in 10-35% of the words. Thus, the majority of the speakers were those who did produce derhotacized realizations, but who were still to a large extent rhotic.

Though Figure 2 showed that some speakers produced derhotacized realizations of /r/ in more than 35% of the words, we may, however, note that these derhotacized realizations include both Ø realizations of /r/ as well as realizations where there were some features associated with rhoticity, i.e. velarization or pharyngealization of the preceding vowel, but no segmental rhotic. If we consider only the percentages of Ø realizations produced by the 80 speakers, as is depicted in Figure 3 below, the picture is rather different.

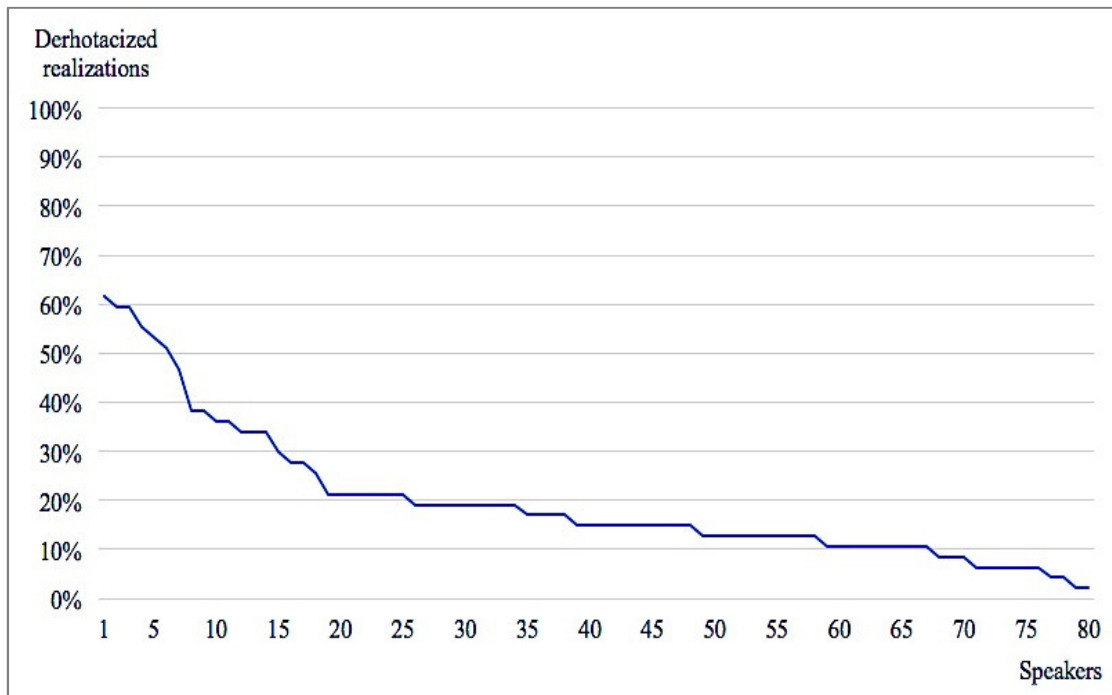


Figure 2: percentages of derhotacized realizations produced by each of the 80 speakers

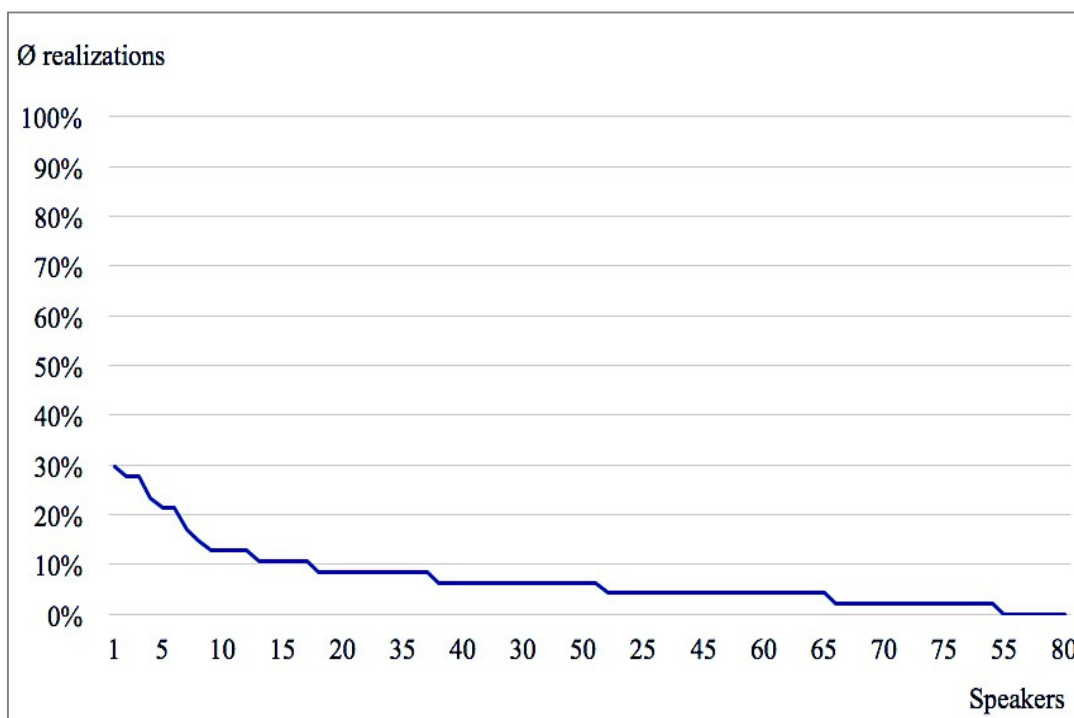


Figure 3: percentages of Ø realizations produced by each of the 80 speakers

In Figure 3, we see that 7 speakers produced Ø realizations in 15-30% of the words, while the remaining 73 speakers produced Ø realizations in less than 15% of the words. What is more, 6 speakers did not produce any Ø realizations. A reasonable summary of the extent of derhotacization

in YUScE would, therefore, be that though almost all speakers of YUScE produce derhotacized realizations of /r/, most speakers are still to a large extent rhotic, and even for those speakers who produce a considerable number of derhotacized realizations, the instances in which these realizations are completely non-rhotic, i.e. Ø realizations, are still rather few. Thus, the results presented in section 3 indicate that if derhotacization in YUScE is, in fact, a slow-moving long-term vernacular change, which could in the long term result in full non-rhoticity, as is argued by Celata & Calamai (2014: 65), then this process is clearly in its early stage.

Language-external aspects of derhotacization in YUScE

Previous research (Romaine, 1978, Johnston, 1985, Stuart-Smith, 2003, Schützler, 2015, Celata & Calamai 2014) has shown that derhotacization is a change most prominent in the speech of males, while rhoticity to a greater extent is retained among female speakers of Scottish English. What is more, it has been shown that derhotacization in Scottish English plays a part of a local system of differentiation, and is a change led from below by working-class speakers, which carries covert prestige, while the use of the retroflex approximant [ɹ] is a movement led from above by middle-class speakers, which carries overt prestige:

r-lessness seems to be an example of change from below. (...) Observations on the loss of post-vocalic /r/ in Edinburgh indicate that it is a new feature adopted by the younger generation of working-class speakers. (...) The use of [ɹ], on the other hand, seems to be an example of a change from above, which is fairly well advanced. It is being spread by overt social pressure from the top of the hierarchy since [ɹ] has been associated with middle class, and particularly female speech in Scotland. Furthermore, it has been linked with Highland English, which is one of the few English accents native to Scotland, which has prestige in, and outside of, Scotland (Romaine, 1989: 204).

In this section, I will examine whether the results of this study align with those of previous studies, and show that derhotacization in YUScE correlates with the extra-linguistic variables of gender and socio-economic status, as well as with the variable of geographic affiliation. I do this by examining whether derhotacization occurred most frequently among the speakers from Glasgow or Edinburgh, and among the female or male speakers.

As mentioned in section 2.2, the 80 speakers of this study can be distributed into the four groups Glasgow males, Glasgow females, Edinburgh males, and Edinburgh females, based on their sex and geographic affiliation. Each of the four groups consists of 20 speakers. Table 1 below shows the average percentage of derhotacized outcomes and the standard deviation for each of the four groups of speakers.

Table 1: the average percentage of derhotacized outcomes and standard deviation for each of the four groups of speakers

Group of speakers	Average percentage of derhotacized realizations	Standard deviation
Glasgow males	26%	8.56
Edinburgh males	23%	8.84
Glasgow females	18%	6.18
Edinburgh females	11%	3.85

In terms of the possible correlation between derhotacization and geographic affiliation, Table 1 shows that the male speakers from Glasgow exceeded the male speakers from Edinburgh with 3 percentage points, while the female speakers from Glasgow exceeded the female speakers from Edinburgh with 7 percentage points in average derhotacized outcomes. What is more, the average percentage of derhotacized outcomes for all speakers from Glasgow was 22%, while that for all speakers from Edinburgh was 14%. Thus, there was a difference of 8 percentage points in the average derhotacized outcomes produced by all speakers from Glasgow and that produced by all speakers from Edinburgh. In that respect, the results show that the extent to which speakers of YUScE show derhotacization, does, in fact, depend on the speakers' geographic affiliations, and that derhotacization, in general, is most advanced among speakers from Glasgow, while rhoticity is generally most retained among speakers from Edinburgh.

In terms of the possible correlation between derhotacization and gender, the numbers in Table 1 reveal that among speakers from both Glasgow and Edinburgh, it was the male speakers who produced the highest numbers of derhotacized outcomes, while the female speakers to a greater extent retained rhoticity.

We see then that derhotacization was most advanced among male speakers, and speakers from Glasgow, while rhoticity was most retained among female speakers, and speakers from Edinburgh. What is more, we may note that though the retroflex approximant [ɹ] was the most common realization of /r/ among all 80 speakers, the female speakers from Edinburgh were the speakers who most consistently produced the retroflex approximant [ɹ] realization of /r/ during the reading task, while the Edinburgh males, Glasgow males, and the Glasgow females, to a greater extent switched between producing \emptyset realizations of /r/, alveolar and retroflex approximants, as well as a few taps. Though I in this study have not taken into account the socio-economic statuses of the 80 speakers, given that Glasgow is characterized by a large working-class population, and Edinburgh a large middle-class population, the results could possibly reflect what has been demonstrated in previous studies: that derhotacization is a change led by male working-class speakers, which carries covert prestige, while middle-class female speakers to a greater extent retain rhoticity and prefer the retroflex approximant realization of /r/, which carries overt prestige. In that respect, the findings in this study do appear to align with those of previous studies, and suggest that derhotacization in YUScE is both gender, socio-economically, and geographically stratified.

Though the findings in this study appear to align with those of previous studies, the data in Table 1 suggest that there may be two additional ways in which derhotacization in YUScE correlates with the variables of gender, socio-economic status, and geographic affiliation: firstly, if we compare the speakers of the opposite sex in each city, Table 1 reveal that the male and the female speakers from Glasgow differed only with 8 percentage points, while the male and female speakers from Edinburgh differed with 12 percentage points in average derhotacized outcomes. Similarly, in terms of standard deviation, the numbers show that the standard deviations of the Glasgow males and Glasgow females differed with only 2 percentage points, while those of the Edinburgh males and Edinburgh females differed with 5 percentage points. If we consider the speakers from Glasgow to possibly be working-class speakers, and the speakers from Edinburgh to possibly be middle-class speakers, the data thus suggest that working-class speakers of the opposite sex are more homogenous than middle-class speakers of the opposite sex both in terms of standard deviation and average percentage of derhotacized outcomes. In that respect, we may note that the effects of gender on the extent to which speakers produce derhotacized realizations appear to be greater for middle-class speakers than for working-class speakers of YUScE.

Secondly, if we compare the speakers of the same sex throughout the two cities, we see that the male speakers from Glasgow and Edinburgh differed with only 3 percentage points, while the female speakers from Glasgow and Edinburgh differed with 7 percentage points in average derhotacized outcomes. Similarly, in terms of standard deviation, the numbers show that the standard deviations of the Glasgow male speakers and of the Edinburgh male speakers varied only with 0.28 percentage points, while the standard deviations of the Glasgow female speakers and of the Edinburgh female speakers varied with 2.6 percentage points. If we again consider the speakers from Glasgow to possibly be working-class speakers, and the speakers from Edinburgh to possibly be middle-class speakers, the data thus suggest that male working-class and male middle-class speakers are more homogenous than female working-class and female middle-class speakers both in terms of standard deviation and average derhotacized outcomes. In that respect, we may note that the effects of socio-economic status on the extent to which speakers produce derhotacized realizations appear to be greater for female speakers than for male speakers of YUScE.

Language-internal aspects of derhotacization in YUScE

In section 3, we saw that none of the 80 speakers consistently produced derhotacized realizations of postvocalic /r/ during the reading task. This means that speakers of YUScE in some instances produce rhotic realizations, while they in other instances produce derhotacized realizations. For that reason, sections 5.1–5.4 examine whether derhotacization in YUScE occurs sporadically when a person speaks, or whether the change correlates with some language-internal variables, and occurs more frequently in some phonetic and phonological contexts than in others.

Derhotacization and the vowel preceding /r/

In this study, I have chosen to use Wells' (1982, vol. 2: 399) lexical sets for Scottish English to examine the occurrence of derhotacized realizations in relation to the vowel preceding /r/. For the

analysis, I use the following 9 lexical sets wherein /r/ is preceded by different vowels in the Scottish English vowel system:

/i/ in Wells' lexical set NEAR

/e/ in the lexical set SQUARE

/ʉ/ in the lexical set CURE

/ə/ in the lexical set lettER

/ʌu/ in the lexical set MOUTH⁴

/a/ in the lexical set START

/ɜ~ʌ/ in NURSE

/ɔ~ɒ/ in NORTH

/o/ in FORCE

As we see, the description above shows two different lexical sets for NORTH and FORCE words. This is because Scottish English has generally not undergone the FORCE-NORTH merger (Wells, 1982, vol. 2: 408), and speakers of Scottish English thus do not have the same vowel in FORCE and NORTH words. What is more, I include 2 different vowel possibilities in Wells' lexical set NORTH. This is because, according to Wells, some speakers of Scottish English may have the open-mid back vowel /ɔ/, while others may have the open back vowel /ɒ/ in NORTH words (Ibid: 399). I also include two different vowel possibilities, /ɜ~ʌ/, in the NURSE words. This is because, according to Wells (Ibid: 407), some speakers of Scottish English have retained the open-mid back vowel /ʌ/, while others have the open-mid central vowel /ɜ/ in words such as *fur*. In this study, I do not distinguish between which of the different vowel possibilities, /ɜ~ʌ/ and /ɔ~ɒ/, the 80 speakers produced in the respective NURSE and NORTH words during the reading task. Thus, in this study, all vowel possibilities are included in the 2 lexical sets, and the mark ~ indicates that the individual speakers' pronunciations may have varied between the different vowels written before and after the mark in the given lexical sets.

Table 2: the _r# words in the 9 lexical sets

Lexical set	Vowel preceding /r/	Utterance-final _r# words
NEAR	/i/	year
SQUARE	/e/	air
CURE	/ʉ/	pure
lettER	/ə/	similar, thunder
MOUTH	/ʌu/	hour
START	/a/	far
NORTH	/ɔ~ɒ/	war
FORCE	/o/	more
NURSE	/ɜ~ʌ/	fur

In order to investigate whether derhotacization in YUScE occurs more frequently after some vowels than others, I selected for each of the 9 lexical sets at least one _r# word. This means that e.g. the word *year* was chosen for the lexical set NEAR, and e.g. *air* for lexical set SQUARE. To ensure that the occurrence of derhotacization would not be influenced by any other language-internal factors such

as prosodic stress or a following consonant sound, only utterance-final words wherein /r/ was in word-final position were chosen for the analysis. The _r# utterance-final words in each of the 9 lexical sets used in the analysis are shown in Table 2.

Figure 4 shows the average percentages of rhotic and derhotacized realizations produced by the 80 speakers when /r/ was preceded by the different vowels in the 9 lexical sets used in the study.

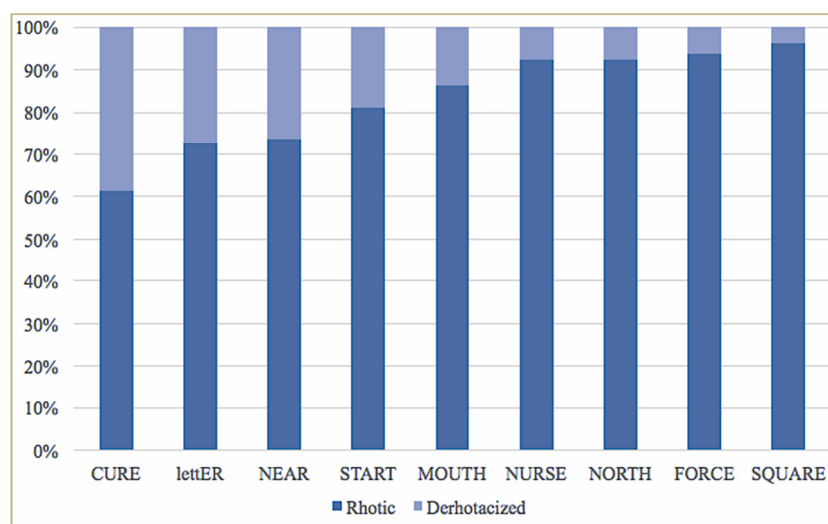


Figure 4: the average percentages of rhotic and derhotacized realizations produced by the 80 speakers when /r/ was preceded by the different vowels in the 9 lexical sets

The results show that derhotacization occurred least frequently in the 4 lexical sets NURSE, NORTH, FORCE, and SQUARE, and thus in the words *fur*, *war*, *more*, and *air*, as here, the speakers only produced derhotacized realizations in an average of 3–8% of the instances in which the words were read aloud. Derhotacization occurred most frequently in the 5 lexical sets CURE, lettER, NEAR, START, and MOUTH, and thus in the words *pure*, *letter*, *year*, *far*, and *hour*: in the lexical sets START and MOUTH, the speakers produced derhotacized realizations in an average of 14–19% of the instances in which the words were read aloud. In the lexical sets NEAR and lettER, the speakers produced derhotacized realizations in an average of 26–28% of the instances. In the lexical set CURE, the speakers produced derhotacized realizations in an average of 39% of the instances in which the word was read aloud.

When considering the articulatory properties *vowel roundedness*, *vowel frontness/backness*, and *vowel height* of the vowels that precede /r/ in the respective 9 lexical sets⁵, we see that in the 4 lexical sets NURSE, NORTH, FORCE, and SQUARE, in which derhotacization occurred least frequently, /r/ was equally preceded by rounded and unrounded vowels, but was, however, often preceded by back, open-mid or close-mid vowels, while never preceded by completely close vowels. In the 5 lexical sets CURE, lettER, NEAR, START, and MOUTH in which derhotacization occurred most frequently, /r/ was often preceded by vowels that are unrounded, central or front, and close (or have a close second element in the case of /ʌu/). Given that the retroflex approximant, which is the variant of /r/ that was

most commonly produced by the 80 speakers, has a rather back place of articulation, perhaps the reason why derhotacization occurred most frequently after front vowels and least frequently after back vowels could be that moving from a rather back vowel sound, e.g. /o/ or /ɔ~ɒ/, to the rather back place of articulation of [ɹ] requires less articulatory effort than moving from a front vowel sound, e.g. /i/ or /a/, to [ɹ]. In relation to this, we could argue that economy of articulatory effort is also the reason why derhotacization occurred frequently after close vowels and less frequently after open or open-mid vowels: given that the articulators are in a stricture of open approximation during the articulation of [ɹ], meaning that there is a fairly wide space between the articulators, perhaps moving from a close vowel, e.g. /i/ or /u/, in which there is only a narrow space between the articulators, to [ɹ] requires greater articulatory effort than moving from an open or an open-mid vowel, e.g. /ɜ~ʌ/ or /ɔ~ɒ/, to [ɹ].

In terms of the 5 lexical sets in which derhotacization occurred most frequently, we may, furthermore, note that when the speakers produced Ø realizations following these vowels, the speakers showed features, notably schwa-epenthesis and longer vowel length, which are associated with non-rhoticity: when the speakers produced Ø realizations in the CURE, NEAR, and MOUTH words, the vowels /ʌ, i, ʌu/ were often followed by schwa epenthesis, so that the words *pure*, *year*, and *hour* were realized [pʰʌ, jɪə, ʌuə]. What is more, when the speakers produced Ø realizations in the START WORD, the vowel /a/ appeared to have a rather long duration compared to when the speakers produced rhotic realizations. These observations may align with the findings of Lawson et al. (2014b: 69), who in their study noted: “the majority of CVr## words labelled as /r/-less by one or more classifier contained high vowels, usually followed by prominent vocalic epenthesis”, and with the findings of Celata & Calamai (2014: 75), who noted that “derhotacized outcomes of /r/, even plain vowels, are still significantly distinct from words without <r>, so e.g. derhotic *heart* shows a longer, more retracted vowel than *hat*”. According to Celata & Calamai and Lawson et al., the observations could indicate that if derhotacization in YUScE would eventually lead to full non-rhoticity, postvocalic /r/ could potentially be replaced by the epenthetic off-glide, and contrasts between words with and without <r> could conceivably be retained by differences in the vowel system as is seen in other non-rhotic varieties of English.

Derhotacization and the tautosyllabic consonant following /r/

In this study, there is not much data from which the possible correlation between derhotacization and the tautosyllabic consonant following /r/ can be examined. Only two lexical sets, NURSE and START, can be examined, as these are the only lexical sets in the study that contained words wherein /r/ was followed by different consonants. In terms of the NURSE words, /r/ was followed by tautosyllabic /s, d, θ, k/ in the 6 words *nurse*, *heard*, *birthdays*, *birds*, *earth*, and *worked*. The percentages of rhotic and derhotacized realizations produced in the 6 words are shown in Figure 5.

The data revealed that derhotacization occurred most frequently when /r/ was followed by /s/ in *nurse*. Here, the speakers produced derhotacized realizations in 9% of the instances in which the word was read aloud. Though the speakers showed some derhotacization when /r/ was followed by /d/ in *heard* and /θ/ in *birthdays*, the speakers produced 0% or close to 0% derhotacized realizations

when /r/ was followed by /d/ in *bird* and /θ/ in *earth*. The speakers produced 0% derhotacized realizations when /r/ was followed by /k/ in *worked*.

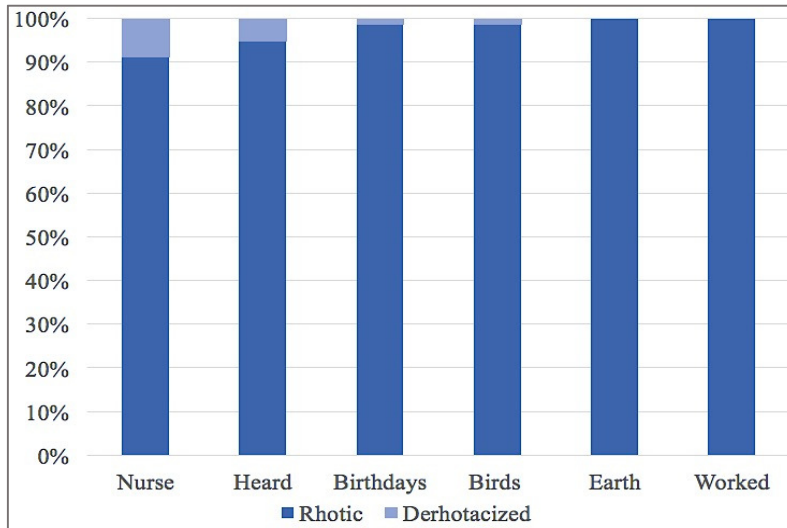


Figure 5: the average percentages of rhotic and derhotacized realizations produced by the 80 speakers in the 6 NURSE words

In terms of the START words, /r/ was followed by tautosyllabic /z, m, k/ in the words *mars*, *farmer*, and *market*. Figure 6 shows the percentages of rhotic and derhotacized realizations produced in the 3 START words.

Here, we see that the speakers produced derhotacized realizations in 40–42% of the instances in which /r/ was followed by tautosyllabic /m/ in *farmer* and /z/ in *mars*, while the speakers produced derhotacized realizations in only 9% of the instances when /r/ was followed by /k/ in *market*.

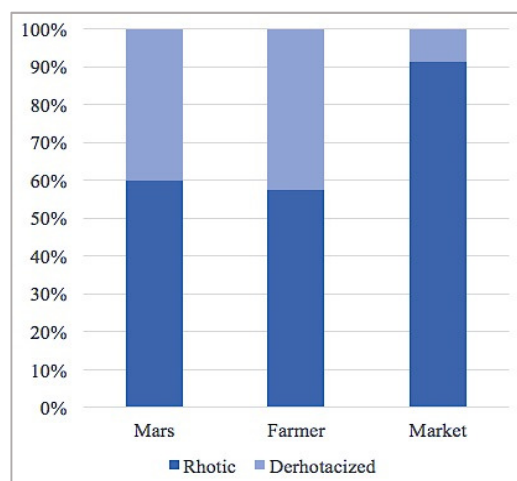


Figure 6: percentages of rhotic and derhotacized realizations produced in the START words

If we compare the results of the NURSE words to those of the START words, we see that derhotacization occurred rather frequently among the 80 speakers when /r/ was followed by the alveolar fricatives /s, z/ in *nurse* and *mars*. However, we may note that derhotacization did also occur when /r/ was followed by bilabial nasal /m/, alveolar stop /d/, and dental fricative /θ/. Thus, perhaps the odd one out of the consonants is the velar plosive /k/, as in both instances in which /r/ was followed by /k/ in *worked* and *market* rhoticity was clearly retained. Given the fact that /s, z, m, d, θ/ all are anterior consonants, meaning that they are produced with a primary constriction at or in front of the alveolar ridge, while /k/ is a posterior consonant, meaning that it is produced with a primary constriction behind the alveolar ridge, the results could indicate that derhotacization in YUScE, in general, occurs more frequently when /r/ is followed by a consonant sound that has a rather front place of articulation, while less frequently when /r/ is followed by a consonant sound that has a rather back place of articulation, perhaps for a similar reason that derhotacization occurred most frequently after front vowels, while less frequently after back vowels: that moving from the rather back place of articulation of [ɹ] to a posterior consonant sound, e.g. /k/, requires less articulatory effort than moving from [ɹ] to an anterior consonant sound, e.g. /s/, /z/ or /m/.

If we again compare the results of the START and NURSE words in Figure 5 and Figure 6 above, we see that in the two instances in which derhotacization occurred least frequently, in *market* and *worked*, rhoticity was utmost retained when /r/ was both followed by a back consonant /k/ as well as preceded by a back or central vowel /ɜ~ʌ/ in *worked*, as opposed to when /r/ was followed by a back consonant /k/ and preceded by a front vowel /a/ in *market*. In relation to this, when we consider the words in which derhotacization occurred most frequently, in *mars* and *nurse*, derhotacization occurred utmost frequently when /r/ was both followed by the anterior (front) consonant /z/ as well as preceded by the front vowel /a/ in *mars*, as opposed to when /r/ was followed by the front consonant /s/ and preceded by the central or back vowel /ɜ~ʌ/ in *nurse*. In that respect, we may note that in words in which /r/ is in pre-consonantal position, the variable of the vowel preceding /r/ and the variable of the tautosyllabic consonant following /r/ appear to influence the occurrence of derhotacization rather interrelatedly, so that derhotacization occurs utmost frequently in words where /r/ is both preceded and followed by sounds that have front places of articulation, while rhoticity is utmost retained in words where /r/ is both preceded and followed by sounds that have back places of articulation, which may also be due to economy of articulatory effort: if we consider the two words *mars* and *worked*, we could argue that it requires greater articulatory effort to move from the front place of articulation of [a] to the back [ɹ] and then to the front place of articulation of /z/ in *mars*, than it requires to move from the central or back articulation of /ɜ~ʌ/ to the back [ɹ] and then to the back place of articulation of /k/ in *worked*.

Derhotacization in _r# and _rC words

The reading task used in the study contained 10 _r# words, that is, words in which /r/ was word-final, as in *far*, and 17 _rC words, that is, words in which /r/ was pre-consonantal, as in *mars*. All 27 of these words were in utterance-final position. The 10 _r# and 17 _rC utterance-final words in the reading task are shown in Table 5 below.

Table 5: The 10 *_r#* and 17 *_rC* utterance-final words used in the analysis

Lexical set	Utterance-final <i>_r#</i> words	Utterance-final <i>_rC</i> words
NEAR	year	appears
SQUARE	air	repaired
CURE	pure	ensured
lettER	similar, thunder	letters, brothers
MOUTH	hour	hours
START	far	mars
NORTH	war	horse, storms, north
FORCE	more	hoarse, force
NURSE	fur	nurse, heard, earth, birds, birthdays

Figure 7 shows the average percentages of rhotic and derhotacized realizations produced by the 80 speakers in the *_r#* and *_rC* utterance-final words.

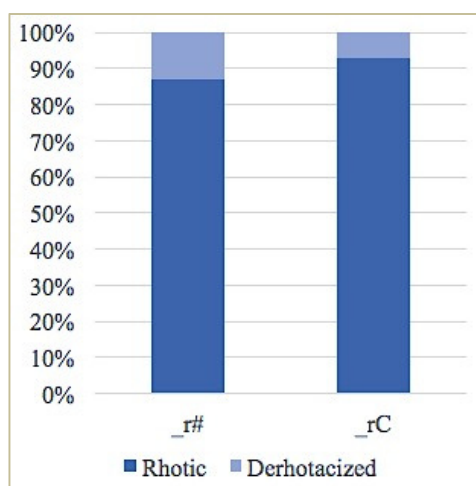


Figure 7: average percentages of rhotic and derhotacized realizations produced in the *_r#* and *_rC* utterance-final words

The results show that the speakers produced derhotacized realizations in an average of 13% of the *_r#* words and in 7% of the *_rC* words. Thus, derhotacization occurred most frequently when /r/ was word-final than when it was pre-consonantal. Given that Schützler (2015) in his study of university and private school Edinburgh students found that derhotacization occurred most frequently when /r/ was pre-consonantal (Ø realizations occurred in 5.7% of the *_r#* words and in 16% of the *_rC* words), it is, however, surprising that the reverse was true in this study.

Derhotacization and prosodic stress

In the study, there were 4 lexical sets, NEAR, SQUARE, letter, and MOUTH, in which the possible correlation between prosodic stress and derhotacization could be tested. In each lexical set, there were two *_r#* words that were preceded by the same vowel, however, one of the words was

accented and in utterance-final position, while the other was deaccented and in non-utterance-final position¹. In total, I used 4 accented and 4 deaccented r# words in the following analysis. The accented r# words were *year*, *air*, *similar*, and *hour*, which all take the nuclear positions in the respective intonation phrases. The deaccented r# words were the function words *their*, *after*, and *our*, and the main verb *hear*, which was deaccented before nucleus *thunder* in the intonation phrase *they could hear thunder*. Table 6 shows the accented and deaccented r# words in the respective 4 lexical sets used in the analysis and the phrases in which they occurred in the reading task.

Table 6: the 4 accented and 4 deaccented r# words used in the analysis, and the phrases in which they occurred in the reading task

Lexical set	Accented <u>r#</u> word (underlined)	Deaccented <u>r#</u> word (underlined)
NEAR	<i>They would go there once a <u>year</u>.</i>	<i>Sometimes during the night, they could <u>hear</u> thunder.</i>
SQUARE	<i>On Mars, there is no <u>air</u>.</i>	<i><u>Their</u> main income was from selling fur.</i>
lettER	<i>The landmass of Mars and Earth is very <u>similar</u>.</i>	<i>Mars is named <u>after</u> the Roman God of war.</i>
MOUTH	<i>On some days, the sun only sets there for half an <u>hour</u>.</i>	<i>Home to the tallest mountain in <u>our</u> solar system is the planet Mars.</i>

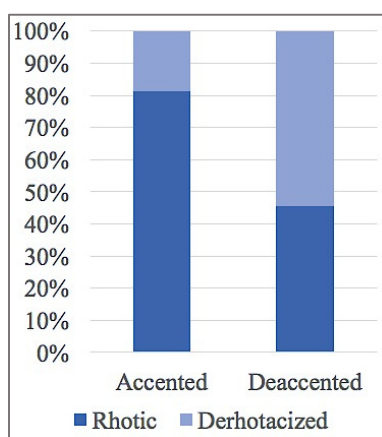


Figure 8: average percentages of rhotic and derhotacized realizations produced in the accented and deaccented r# words respectively

Figure 8 shows the average percentages of rhotic and derhotacized realizations produced by the 80 speakers in the accented and deaccented r# words respectively.

¹ All r# words that occurred in non-utterance-final position were immediately followed by a consonant sound.

The results show that the speakers on an average produced derhotacized realizations in 19% of the accented *_r#* words and in 54% of the deaccented *_r#* words. Thus, when the *_r#* words occurred in contexts in which they were deaccented, the number of derhotacized outcomes was increased by 35 percentage points. In alignment with these results, Schützler (2015) has found that outcomes of \emptyset increased with 18.5 percentage points in maximally weak function words as compared to when /r/ was found in syllables that take the nuclear position in an intonation phrase. As is also argued by Schützler (2015: 128), we may interpret derhotacization in deaccented words as resulting from a reduction of articulatory effort that occur during connected speech.

Conclusion: the nature of derhotacization in YUScE

The findings presented in this article confirm that changes are taking place in YUScE, and that young speakers of Scottish English from Glasgow and Edinburgh are producing weakened variants of /r/ compared to the tap [ɾ], trill [r̄], and retroflex approximant [ɻ] that historically have been the most common and widespread realizations of postvocalic /r/ in Scottish English. However, in this article, we have seen that if derhotacization is a slow-moving long-term vernacular change, which could eventually result in full non-rhoticity, then this process is clearly in its early stage: speakers of YUScE are still to a large extent rhotic, and even for the speakers who do produce a considerable number of derhotacized realizations, the instances in which these realizations are completely non-rhotic are, indeed, rather few.

Through the findings presented in this article, the nature of derhotacization in YUScE has been examined with respect to two aspects: the language-external and the language-internal aspects of the change. In terms of the language-external aspects of the change, we have seen that the findings in this study align with previous studies, and suggest that derhotacization in Scottish English plays a part of a local system of differentiation, and is a change led from below, by male working-class speakers, whereas the spread of [ɻ] realizations seems to be a change led from above, by middle-class female speakers. Nevertheless, we have seen that there may be two additional ways in which derhotacization in YUScE correlates with the variables of gender, socio-economic status, and geographic affiliation: firstly, we have seen that both in terms of standard deviation and average derhotacized outcomes, male working-class and male middle-class speakers appear to be more homogenous than female working-class and female middle-class speakers, for which the effects of socio-economic status on the extent to which speakers produce derhotacized realizations appear to be greater for female speakers than for male speakers of YUScE. Secondly, we have seen that working-class speakers of the opposite sex appear to be more homogenous than middle-class speakers of the opposite sex both in terms of standard deviation and average derhotacized outcomes, for which the effects of gender on the extent to which speakers produce derhotacized realizations appear to be greater for middle-class speakers than for working-class speakers of YUScE.

In terms of the language-internal aspects of the change, we have seen that speakers of YUScE in some instances produce derhotacized realizations, while they in others retain rhoticity. We have, however, also seen that derhotacization does not occur sporadically throughout speech, but that it

occurs more frequently in some phonetic and phonological contexts than in others, often possibly due to economy of articulatory effort: in terms of the vowel preceding /r/, we have seen that derhotacization occurs most frequently when /r/ is preceded by vowels that are unrounded, central or front, and are close or have a close second element, while least frequently when /r/ is preceded by rounded or unrounded, back, and open vowels, possibly because moving from a rather back or open vowel sound requires less articulatory effort than moving from a front and close vowel sound to [ɹ]. In terms of the tautosyllabic consonant following /r/, we have seen that derhotacization occurs more frequently when /r/ is followed by anterior consonant sounds than when it is followed by posterior consonant sounds, possibly because moving from [ɹ] to the back place of articulation of a posterior consonant requires less articulatory effort than moving from [ɹ] to the front place of articulation of an anterior consonant. What is more, we have seen that when /r/ is in pre-consonantal position, derhotacization occurs utmost frequently when /r/ is both preceded and followed by sounds that have front places of articulation, while rhoticity is utmost retained in words in which /r/ is both preceded and followed by sounds that have back places of articulation, possibly because moving from a back vowel sound to [ɹ] to a back consonant sound requires less articulatory effort than moving from a front vowel sound to [ɹ] to a front consonant sound. In terms of derhotacization in *_r#* and *_rC* words, we have seen that derhotacization occurs more frequently when /r/ is in pre-pausal position than when it is in pre-consonantal position in utterance-final words. Lastly, in terms of prosodic stress, we have seen that derhotacization occurs more frequently in *_r#* words that are deaccented than in *_r#* words that are accented and in nucleus position of an intonation phrase. As is also argued by Schützler, we may interpret derhotacization in deaccented words as resulting from a reduction of articulatory effort that occur during connected speech.

We see then that if we consider derhotacization in YUScE to be a process in which there is a gradual loss of postvocalic /r/, which could eventually result in full non-rhoticity, then there are various language-internal factors which indicate that the change occurs according to, what we may refer to as, *a natural law of articulatory economy*, whereby /r/ is first lost in phonetic and phonological contexts in which the reduction of articulatory effort is highest, and rhoticity, at least in this stage of the process, is still retained in contexts in which the reduction of articulatory effort is lowest. In that respect, we see that the nature of derhotacization in YUScE is, in fact, rather systematic in the sense that not only has the change been shown to occur according to several underlying social factors, by which it is most prominent among some speakers than others depending on gender, socio-economic status, and geographic affiliation, but the change has also been shown to occur according to several underlying language-internal factors, by which it occurs more frequently in some phonetic and phonological contexts than in others as it possibly follows a natural law of articulatory economy.

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Appendices

APPENDIX A

The reading task used in the interviews (consists of two texts).

Highlighted words are those containing postvocalic /r/.

Text 1: The Red Planet

1. Home to the tallest mountain in our solar system is the planet Mars.
2. It has the longest seasons of dust storms.
3. A day on the planet may be as long as 25 hours.
4. And the Sun appears about half the size as it does on Earth.
5. To go there, one would have to travel very far.
6. A group of scientists has named themselves the Mars Force.
7. They have found that liquid water exists on the planet, and it is very pure.
8. If there once was life on the planet, it exists no more.
9. On some days, the sun only sets there for half an hour.
10. Mars is named after the Roman god of war.
11. On Mars, there is no air.
12. Mars is spelled with four letters.
13. The landmass of Mars and Earth is very similar.

Text 2: The South African Farmer

14. The farmer had to get her tractor repaired.
15. She had the flu so her voice was very hoarse.
16. The farmer's sister worked as a nurse.
17. On the ranch, they had a lot of birds.
18. There was also an old horse.
19. Their main income was from selling fur.
20. The farmer's husband was Bill.
21. Luckily, the tractor was ensured.
22. Sometimes during the night, they would hear thunder.
23. She wrapped the hay in a bale.
24. They never celebrated birthdays.
25. At lunchtime, they would ring the large bell.
26. The farmer had two brothers.

27. On the field, they once found a Python.
28. They would sell the fur at a market up north.
29. They would go there once a year.
30. When it's too hot, they go to the lake to bathe.
31. They went back to look for the Python, but it was no longer there.
32. On quiet nights, the sounds of the ocean can be heard.

APPENDIX B

Description of the articulatory properties of the vowels that precede /r/ in the 4 lexical sets in which derhotacization occurred least frequently and in the 5 lexical sets in which derhotacization occurred most frequently.

Table 7: The 4 lexical sets in which derhotacization occurred least frequently

Lexical set	Vowel preceding /r/	Vowel height	Vowel frontness/backness	Vowel roundedness
NORTH	/ɔ~ɒ/	Open-mid for /ɔ/, open for /ɒ/	Back	Rounded
FORCE	/ɒ/	Close-mid	Back	Rounded
NURSE	/ɜ~ʌ/	Open-mid	Mid for /ɜ/, back for /ʌ/	Unrounded
SQUARE	/e/	Close-mid	Front	Unrounded

Table 8: The 5 lexical sets in which derhotacization occurred most frequently

Lexical set	Vowel preceding /r/	Vowel height	Vowel frontness/backness	Vowel roundedness
CURE	/ʉ/	Close	Central	Rounded
lettER	/ə/	Mid	Central	Unrounded
NEAR	/i/	Close	Front	Unrounded
START	/a/	Open	Front	Unrounded
HOUR	/ʌu/	Open first element, close second element	Back first element, back second element	Unrounded first element, rounded second element

Notes

¹ As the informants were selected in public, some of the informants were alone during the recording, while others were accompanied by one or more person(s): what appeared to be friends, schoolmates, or relatives.

² In Edinburgh, the interviews were made in the presence of a second, male interviewer, who recorded 6 of the interviews.

³ The reading task can be found in the appendix.

⁴ In this study, I include Wells' lexical set MOUTH, as the words *hour* and *hours* in the reading task are preceded by the same vowel /ʌu/ found in MOUTH words.

⁵ For a description of the vowel properties of the respective 9 vowels, see Table 3 and Table 4 in appendix B on p. 21

⁶ The words *water* (l. 7), *there* (l. 11), and *fur* (l. 28) were excluded in the auditory analysis, as these were immediately followed by vowel sounds. The word *tractor* (l. 14) was also excluded in the analysis, as the word was immediately followed by /r/ in the word *repaired*. Hence, why these words are not highlighted in the reading task.