VARIABLE RHOTICITY IN GLASGOW ENGLISH: SOCIOLINGUISTIC FACTORS AND ABSTRACTIONS VS. EXEMPLARS

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ABSTRACT

This paper uses a corpus of Glasgow English unscripted speech to investigate the variability in the realization of pre-consonantal /r/. The relationship between the gender of the speaker, as well as their familiarity with the interlocutor, and the presence of pre-consonantal /r/ is investigated using mixed-effects binomial regression modeling. Additionally, the dataset is probed for evidence of abstract representations and phonetically-rich exemplars in the storage of /r/.

A statistically significant influence of the interaction between familiarity with interlocutor and speaker gender on the likelihood of non-rhoticity provides some evidence that non-rhoticity is a prestige variant for the speech community that the corpus is representative of. The statistical significance of by-word random intercepts, attesting to word-specific effects, provides evidence for exemplars. The lack of a statistically significant effect of a clearly definable phonological context (the backness of the vowel preceding /r/) on the likelihood of the presence of pre-consonantal /r/ means that the current study does not provide support for abstractionism or hybrid models.

Keywords: variable rhoticity, Glasgow English, sound change, corpus phonology

1. INTRODUCTION

Scottish English accents are generally thought of as rhotic, with /r/ being realized as a consonant (an approximant [ɹ], a tap [ɾ], or a trill [r]) regardless of its position in a syllable [1, 2].

However, there is actually considerable variation with regard to the presence of pre-consonantal /r/ in Scottish English accents [3, 4], including Glaswegian [5, 6]. Early reports of weakening rhoticity in Glasgow English identified the loss of pre-consonantal /r/ in working-class speech [7, 2], suggesting it is a local development, specifically not driven by the non-rhoticity of the London-based English accent.

1.1. Change from below or from above?

The incipient non-rhoticity in working-class speakers in Glasgow has been interpreted as a local development, given low volume of face-to-face interactions with speakers of non-rhotic English accents. Findings such as [3], on the other hand, suggest that non-rhoticity might be a new overt prestige variant after all.

In cases of change in progress, style-shifting, with higher rates of the innovative variant over the conservative variant when more attention is paid to speech, has been shown to be indicative of 'change from above', i.e. conscious adoption of a variant associated with a language variety regarded as higher in prestige [8]. Additionally, women have often been shown to be the leaders of change, regardless of whether the change is from above (driven by the overt prestige of a language variety it is imported from) [9] or from below [10] the level of consciousness (imbued with the 'covert' prestige of the local variety). The present study considers the influence of subtle changes in speech style due to familiarity with the interlocutor or lack thereof. Style-shifting, in particular among women, in the direction of non-rhoticity will be seen as indicative of non-rhoticity being a prestige variant. Style-shifting in the direction of rhoticity, on the other hand, will be seen as indicative of speakers orienting themselves to the rhotic variant as prestigious, with non-rhoticity carying 'covert' prestige.

1.2. Phonological storage: Abstractions vs. exemplars

The abstractionist approach to phonological storage and processing is exemplified by most generative frameworks, and rests upon the model of speech production proposed by Levelt et al. [11], with abstract lexical representations and feed-forward architecture of speech production involving discrete modules. The phonetic shape of a lexical item is based on the abstract phonological building blocks that it is composed of. The phonetic shape is further allowed to be influenced by frequency effects

- with higher frequency items showing a greater degree of reduction. Any word-specific effects beyond frequency effects, however, are ruled out by this approach. Finding an effect of an abstract phonological feature (here: vowel backness) on the rate of non-rhoticity will be taken as supporting the abstractionist approach.

The rich storage approach, on the other hand, is associated with the exemplar theory [12, 13, 14] and posits phonetically rich representations as playing a pivotal role in speech production. Phonetically rich representations of lexical items are assumed to be stored in the mental lexicon, and lexical items, which if analyzed into abstract phonemes would be identical, might in fact have different phonological representations. Multiple exemplars of lexical items are drawn upon in speech production. Hence, word-specific effects which go beyond frequency effects are expected to be commonplace. Finding an effect of by-word random intercepts will be taken as supporting the rich storage approach.

Reconciling the two approaches by recognizing the need for both kinds of representations in the mental lexicon, so-called hybrid models of phonology have been proposed [15, 16, 17]. Finding an effect of both vowel backness and by-word random intercepts will be taken as supporting hybrid models.

2. METHOD

2.1. Data

The data come from the freely available HCRC Map Task corpus [18]. It contains recordings of unscripted speech of speakers coming from three areas: (1) Glasgow, (2) elsewhere in Scotland, and (3) 'rest of the world' (as per speaker metadata). Each speaker interacted with a person they knew - a familiar interlocutor, and a person they did not know - an unfamiliar interlocutor. For the present study, only speakers from Glasgow were included. After the exclusion of non-Glasgow speakers, some Glasgow speakers were left speaking only to either a familiar, or only to an unfamiliar interlocutor; these speakers were also excluded (final number of speakers: N = 29). Speaker age ranged from 18 to 26, with most speakers closer to the lower end of the spectrum (*median* = 19). Pairs of speakers performed an information-gap speaking task, where speaker A, using a map they were given, had to give instructions to speaker B, who was also provided with a map, so that speaker B would trace a path from start to finish. Due to mismatches in the placement of landmarks on the maps provided to each member of the pair, the need for clarification would often ensue. The HCRC Map Task corpus is distributed with word-level time-aligned orthographic transcriptions in XML format. They were converted to TextGrids and imported into LaBB-CAT [19] for additional automatic annotation and for querying. Using a phonemic transcription layer created in LaBB-CAT, 5,330 word tokens with pre-consonantal /r/ were retrieved. The tokens were then manually annotated by the author based on audition, supported by inspection of waveforms and spectrograms, as belonging to one of the four categories: non-rhotic (1), containing an approximant (2), tap (3), or trill (4). Examples of each of the four categories are shown in in Figs. 1-4.

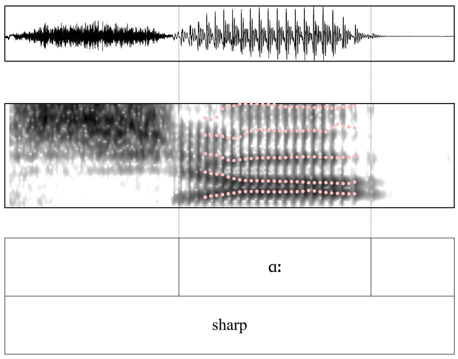

Figure 1: A token of *sharp* tagged as **non-rhotic**, produced by a 17-year-old male speaker

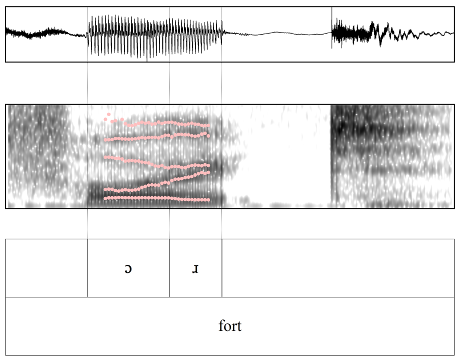

Figure 2: A token of *fort* tagged as an **approximant**, produced by a 19-year-old female speaker

2.2. Empirical results

2,039 tokens (37.7%) were non-rhotic, 1,969 tokens (36.4%) were realized as approximants, 1,373 tokens (25.8%) were realized as taps, and only 7 tokens (0.1%) were realized as trills.

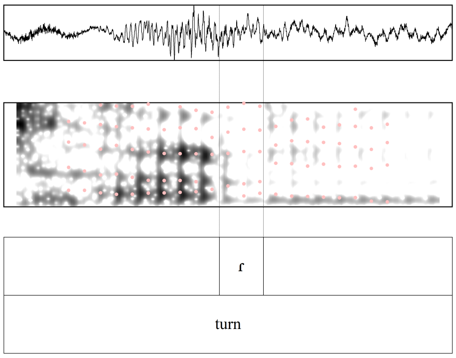

Figure 3: A token of *turn* tagged as a **tap**, produced by an 18-year-old male speaker

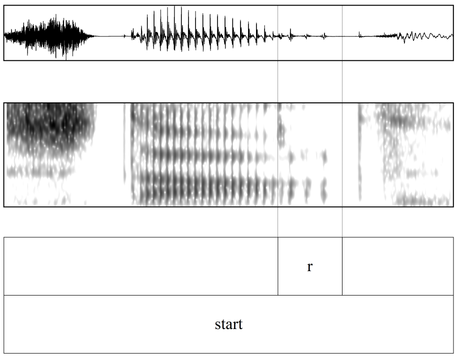

Figure 4: A token of *start* tagged as a **trill**, produced by an 18-year-old male speaker

For further analysis, trills were removed due to their extreme rarity, and approximants and taps were grouped together as 'rhotic' realizations.

There is a good deal of individual variation: some speakers are close to being categorically rhotic, some are close to being categorically non-rhotic, with most positioned somewhere along these two end points. A Bayesian mixed-effects binary regression intercept-only model with by-item and by-speaker varying intercepts was fitted to estimate the population-level and speaker-level probabilities of non-rhoticity. The population-level estimated mean probability is 0.3 (95% Credible Interval = [0.21, 0.4]). Speaker-level probabilities are shown in Fig. 5.

The results, broken down by speaker gender and by familiarity with the interlocutor are presented in Fig. 6. For men, there is no appreciable difference in non-rhoticity rate contingent on the familiarity with their interlocutor: it is very close to the population-level mean (37%) regardless of whether they are speaking with a familiar (36%) or an unfamiliar interlocutor (39%). For women, however, the non-rhoticity rate goes above the

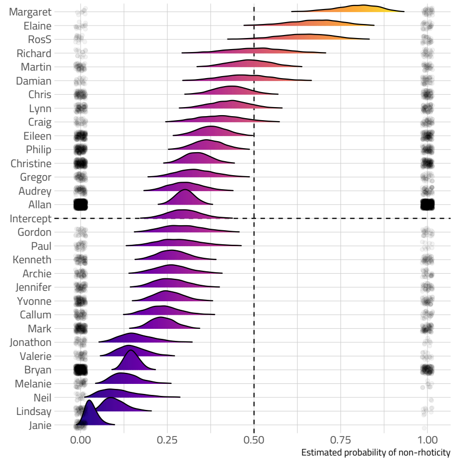

Figure 5: Estimated probabilities of non-rhoticity for individual speakers. 'Intercept' is the population-level estimate, jittered and semi-transparent points are individual tokens (rhotic at 0; non-rhotic at 1)

population-level mean when they are speaking with an unfamiliar interlocutor (42%), and sinks well below the population-level mean when they are speaking with a familiar interlocutor (31%).

Breaking the results down by vowel backness, 49% of tokens with back vowels were non-rhotic (618/1,253), 34% of tokens with central vowels (1,155/3,401), and 32% of tokens with front vowels (219/676). Hence, back vowels seem to favor non-rhoticity.

The statistical significance of the effects is assessed in the next section.

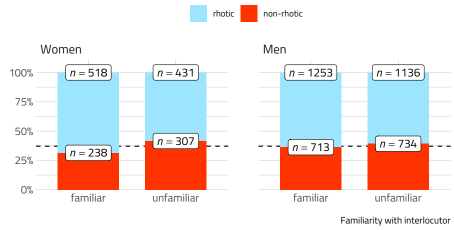

Figure 6: Rate of non-rhoticity by gender by familiarity with interlocutor

2.3. Modeling

A mixed-effects binary logistic regression model of non-rhoticity, i.e. the absence of pre-consonantal /r/ was fitted using the *lme4* package [20] in R [21]. Calculation of all *p*-values for the purposes of significance testing was conducted by means of likelihood ratio tests.

2.3.1. Test variables

Speaker gender (binary categorical predictor, reference = *female*, and familiarity with the interlocutor (binary categorical predictor, reference = *yes*) were coded based on corpus metadata. Additionally, their interaction was included to allow for the fact that familiarity/unfamiliarity with the interlocutor might have a larger influence on women than on men.

In the present data set, /r/ occurred before front vowels in the NEAR /i/ and SQUARE /e/ lexical sets, before central vowels in the NURSE /ʌ/, START /a/, and CURE /ʉ/ lexical sets, and before back vowels in the FORCE /ɔ/ and NORTH /o/ lexical sets

Back vowels /ɔ/ and /o/ have been previously shown to favor non-rhoticity [22], which is in line with the descriptive statistics of the present data set. Vowel class was coded as a binary categorical predictor with the levels *non-back* and *back* (reference: *non-back*). This enabled significance testing relevant to the question of an abstract phonological feature (here: vowel backness) influencing non-rhoticity.

To capture word-specific effects, a by-word random intercept was included in the model.

2.3.2. Control variables

Since non-rhoticity can be argued to be influenced by frequency effects, word forms were tagged with *Log*10 frequency from *SUBTLEX-UK* [23] and entered as a numerical predictor.

To allow for speaker-specific effects (which is always necessary when multiple data points from a single speakers appear in the data set, but compare also Fig. 5), a by-speaker random intercept was included.

2.4. Results

Table 1 presents the estimates of the model and their associated *p*-values. Note that all estimates are in log-odds. Women are more likely (b = 0.52) to produce non-rhotic tokens when speaking to unfamiliar interlocutors than when speaking to familiar interlocutors. As attested by the familiarity by gender interaction term, the degree to which familiarity with the interlocutor affects each gender is different. When the estimate for the interaction (b = -0.41) is added to the estimate for familiarity speakers (b = 0.52) the result is very close to zero (0.11): there is hardly any difference in the predicted rate of non-rhoticity for men, regardless of whether they are speaking to a familiar or to an unfamiliar interlocutor.

The higher rate of non-rhoticity for back vowels has not turned out to be statistically significant (p = 0.196).

The by-word random intercept (not shown in the table), on the other hand, has turned out to be statistically significant ($p < 0.001$), which was assessed, like for fixed effects, with a likelihood-ratio test.

The frequency predictor has a positive estimate (b = 0.32) and is statistically significant (p = 0.018), showing that increased frequency is associated with a higher probability of non-rhoticity.

Fixed effect	Estimate	*p*-value
$(Intercept)$	-2.5	< 0.001
$familiar = no$	0.52	< 0.001
$gender = m$	0.38	0.02
$log10frequency$	0.32	0.018
$vowel = back$	0.39	0.196
$familiar = no : gender = m$	-0.41	0.005

Table 1: Fixed effects of the mixed-effects binary logistic regression model of **non-rhoticity**: *p*-values calculated with likelihood ratio tests

3. DISCUSSION

The results with regard to gender and familiarity are consistent with the hypothesis that non-rhoticity is an innovative prestige variant in the speech community that the corpus is representative of. Given that reports of non-rhoticity in Scottish English accents are relatively recent, we are more likely seeing a case of language change in progress than stable stylistic variation. Non-rhoticity is more likely when speaking to an unfamiliar interlocutor, when, arguably, more attention is being paid to speech than when speaking to a familiar interlocutor. Thus, the results attests to style shifting, and non-rhoticity appears to be a prestige variant. The effect is observable in women, who often display more style-shifting than men. The finding that non-rhoticity carries overt prestige concurs with [3], and seems to contrast with earlier reports of non-rhoticity carrying covert prestige in working-class Glasgow speech [7, 2]. Conceivably, though, non-rhoticity has different socio-indexical meaning for Glasgow English speakers depending on their socio-economic status (for the corpus used here, unfortunately, no data pertaining to speakers' *SES* is available).

As for the question of abstractionist versus phonetically rich versus hybrid models of phonological storage, the word-specific effect on the probability of non-rhoticity which goes beyond frequency effects provides support for the rich storage approach. Even though non-rhoticity was more likely in the context of back vowels than in the context of non-back vowels, this effect was not statistically significant. Thus, no support for abstractionism, and, by extension, for hybrid models, is provided.

4. ACKNOWLEDGMENTS

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