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Glottal variation in /t/ in non-native English speech: patterns of acquisition.¹

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Abstract

This paper explores the linguistic and social factors behind the acquisition of glottal variation in English /t/ by native Polish speakers living in Manchester, UK. It investigates the speech of 40 Polish adults of varying levels of English language proficiency, who have been in Manchester for varying lengths of time, in order to establish what might be encouraging or prohibiting the acquisition of this widespread linguistic feature. Using quantitative sociolinguistic methods, factors such as level of English, length of residence, age, gender, motivation and attitude are considered in accounting for the variation in acquisition. Findings suggest that in addition to level of English and length of residence effects there is a fairly robust gender difference, with women tending to use glottal variants more frequently than men. This gender difference is explored in more detail with reference to a gender as practice type approach.

Key words

sociolinguistic variation, glottal variation in /t/, t-glottaling, L2 variation, gender, Polish, immigration, Manchester.

1. Introduction

The application of variationist concepts and methods to the context of second language acquisition (SLA) research has increased rapidly over the last fifteen to twenty years. Numerous studies (see Young 1999; Tarone 2007 for a detailed overview) have established that learner speech, or interlanguage (IL), is in fact highly systematic and therefore open to influence from

¹ This article is based on work submitted as part of my PhD thesis (Drummond 2010). I would therefore like to thank my supervisor, Dr Maciej Baranowski, for his comments on earlier versions. I would also like to thank the editor and anonymous reviewers for their useful insights and recommendations.

linguistic and social factors. In the process, two types of studies into SLA variation have emerged: those that investigate the acquisition of ‘obligatory’ native speaker (NS) target forms (linguistic competence), and those that investigate the acquisition of NS patterns of variability (sociolinguistic competence). Linguistic competence has been referred to as “the vertical continuum” (Corder 1981; Young 1988; Adamson & Regan 1991) or “Type 1 variation” (Mougeon *et al.* 2004), and sociolinguistic competence as “the horizontal continuum” or “Type 2 variation”. But this is not to say that the two areas of investigation are, or should be, entirely separate. Movement along the horizontal continuum is not possible without a certain degree of movement along the vertical continuum first; and the degree of that vertical movement is generally a factor in the degree of horizontal movement.

With this in mind, the present study investigates the internal (linguistic) and external (social) factors influencing the acquisition of glottal variation in /t/ in the speech of Polish migrants living in Manchester, UK. More specifically, it investigates this acquisition by Polish migrants who moved to the UK as adults and who arrived with at least a basic proficiency in English as an L2. This is primarily an example of Type 2 variation, as t-glottaling is a variable feature in the speech of NSs rather than a fixed NS target form that can be seen as obligatory for non-native speakers (NNSs) to acquire. Glottal variation in /t/ is especially interesting due to the fact that while it is ubiquitous in the speech of local NSs, it is uncommon in the speech of newly arrived Poles². In the process of the study, the following research questions will be addressed:

1. To what extent do NNSs exhibit an increased rate of glottal variation in /t/ having spent time in Manchester?
2. To what extent are NNSs acquiring similar patterns (in terms of linguistic constraints) of glottal variation in /t/ to those of NSs?
3. What social factors influence the degree of acquisition?

1.1 The Polish community in Manchester

Manchester is a traditionally industrial city in the North West of England, UK. The city itself has a population of 483,800, and the metropolitan area of which it is a part, the county of Greater Manchester, has a population of 2,600,100 (Office for National Statistics 2010). There is an established Polish community in the city, largely as a result of Polish migration during and following the Second World War. Manchester is in fact home to the first Polish church built in exile after the Second World War, the Polish Roman Catholic Church of Divine Mercy. The

² This tendency was found in a pilot study conducted by the author.

church, originally built in 1873 as a Welsh Methodist Chapel, was bought by the Polish people of Manchester in 1958 and is still the centre of an active Polish community in the city.

In addition to the established community, there have, over the last few years, been more recent arrivals. This latest wave of migration is generally seen as having started after the latest expansion to the European Union, in May 2004. This expansion was highly controversial due to the fact that eight of the new member countries (known as the A8) were significantly poorer than the existing EU members. This led to restrictive immigration regimes across the EU, a reaction to the fear that widespread economic migration was imminent. The UK was one of only three countries which allowed virtually unrestricted access to A8 nationals resulting in “the largest single wave of foreign in-movement ever experienced by the UK” (Baure *et al.* 2007:219).

Poles were by far the largest nationality group in this migration, accounting for 64.4%³ of the total A8 migrants to the UK. In terms of geographical distribution, the A8 migrants, and particularly the Poles, have not followed the traditional route of staying in and around London. Instead, they have moved to most parts of the UK, with the North West of England proving a popular destination.

Several types of Polish migrants and migratory patterns can be identified (Eade *et al.* 2006:10-12). Some move regularly between Poland and the UK, staying for 2 to 6 months at a time and working in low-paid jobs. Others come just the once in order to make some money, then return to Poland. Some younger and more ambitious individuals come with an open mind, following opportunities as they arise in a variety of jobs from low-paid to highly-skilled. Finally there are those who have been in the UK for a while and who intend to stay permanently. This variety maintains a cycle of migration, with the less permanent workers relying on help from the settled migrants on arrival, who in turn may be able to offer the new arrivals employment in their own businesses.

One interesting outcome of this migration, fuelled as it is by the financial imbalance between the two countries, is that it is common to find well-educated and highly-skilled migrants in relatively low-paid jobs. Eade *et al.* (2006:13) see this as relating to the “transnational construction of class”, in which the perception of social class in the UK is constructed in relation to perceived

³ This figure comes from the Worker Registration Scheme (WRS), a system whereby individuals are required to register with the Home Office when taking up employment. The UK has no means by which to accurately determine numbers of migrants at any one time. However, of the various sources of data available, the WRS is seen as providing the most complete information.

opportunities rather than an individual's actual position. This creates a contrast between people's objective class position (their occupation) and their subjective class position.

The relationship between Polish migrants and the local community is difficult to judge. Anecdotally, on a national level, one hears of resentment on the part of a certain section of English workers who feel that the migrants are 'taking their jobs'. However, this is balanced (or perhaps fuelled) by the positive reputation Polish workers have of being conscientious and reliable. During the course of carrying out the current research, there were only two or three negative stories relayed on the subject of interaction with the local community.

Among the 40 participants who took part in the study, it is fair to say that a variety of levels of integration are represented. This is not something which can be easily measured, but when considering their reasons for being in the UK there seems to be a connection between the level of integration and the types of migrants and migratory patterns described above. Of the four types of migrants described by Eade *et al.* (2006), there are examples of the last three in the participants in this study, and each can be seen as showing a greater degree of integration than the last. That is to say, those who intend to come to the UK just once in order to make money and go back to Poland seem to show the lowest level of integration, and those who plan to stay permanently seem to show the highest⁴. While this may appear obvious, it is by no means a foregone conclusion. It is perfectly possible for a Polish family (especially when there are no children) to stay in Manchester and have little contact with the local (NS) community due to the established Polish community with its various services.

1.2 Glottal variation in /t/

Glottal variation in /t/ is a well-researched phonological feature and one that continues to yield interesting sociolinguistic findings. While it is not necessary to detail all previous research (see Fabricius 2000; Straw & Patrick 2007 for detailed reviews of existing literature) it is important to clarify terminology, as certain terms have been used in different ways. In the present study, '*glottal variation in /t/*' will be used to refer to the general concept of there being some kind of variability between different realizations of /t/ and '*t-glottaling*' or '*glottal replacement*' will be used to refer to the substitution of a glottal stop for /t/. When referring to existing studies the original terminology will be used, but this will be commented on if it differs from the above. A detailed description of the /t/ variants and environments under investigation can be found below.

1.3 Gender and variation

⁴ This does not reflect an actual measurement of integration, it is simply an impressionistic view of the qualitative data from the interviews carried out for the research.

Gender has always been a central concern in studies into L1 variation and continues to be a much debated, and often controversial, theme. Early variationist research seemed to point to a consistent pattern of gender differences, with the central finding that women tended to use a higher frequency of standard and prestige forms, with men using a higher frequency of non-standard and non-prestige forms (Labov 1990; 2001).

Perhaps because the idea itself is so straightforward, this claim became widely accepted and is sometimes presented as “a fundamental tenet of sociolinguistics” (Cheshire 2002:426), with various explanations provided to explain the pattern. However, this claim has since been thoroughly questioned and investigated, and shown to be “an oversimplification” (Foulkes 2006:640). Cheshire (2002) questions the empirical basis of the generalisation, pointing out the lack of objectivity both in accepted notions of social class (particularly in the practice of assigning women to different classes) and in what constitutes a ‘standard’ or ‘prestige’ form.

Research into t-glottaling in particular has helped provide a different picture of the role of gender in language variation, particularly in relation to this generalisation that women tend to favour the prestige form of a variable. Studies in Cardiff (Mees 1987; Mees & Collins 1999), Newcastle (Milroy *et al.* 1994) and New Zealand (Holmes 1997) amongst others showed that (middle-class) women were leading the way in the spread of the glottal variant, a variant that could never be classed as ‘prestige’ in the given contexts. This is seen as evidence in support of the idea that class-based influences are secondary to gender-based influences, presenting the possibility that women do not favour prestige variants, but they in fact create them (Milroy *et al.* 1994). Milroy *et al.*’s subsequent identification of a glottal stop as a supralocal form in this context led them to argue that it is this type of change that women are instrumental in spreading, and the issue of whether or not the supra-local form also happens to be the prestige form is largely incidental.

On a similar theme, Holmes (1997) points to research showing that women tend to style-shift in their language to a greater extent than men, a tendency she relates to the increased level of interaction women have with a wide range of social contacts. This in turn leads women to accommodate their own speech to the speech of others, thus acquiring different dialectal features (Woods 1997).

Central to the development of ideas on the relationship between gender and variation is the work of Penelope Eckert (e.g. Eckert 1989; Eckert & McConnell-Ginet 1992; Eckert & McConnell-Ginet 2003). Eckert goes further than dismissing the generalisation of women using more standard forms by questioning the practice of looking for any such generalisations in the first place. Citing the “exceedingly complex” nature of gender differences, Eckert (1989:247) observes that

...there remains a tendency to seek a single social construction of sex that will explain all of its correlations with variation. This is reflected in the use of a single coefficient for sex effects in variable rule or regression analyses of variation.

She goes on to suggest that the tendency for sociolinguists to allow their survey categorisation of male and female speakers to “guide their thinking about the effects of gender in variation”(p.248) has led to men and women to be perceived as opposite in their use of linguistic variables, when in fact, such a binary opposition might not be the most effective way to look at issues of gender at all. Labov (1990) acknowledges this issue of “biological bias” agreeing that “there is little reason to think that sex is an appropriate category to explain linguistic behaviour” (p.206). He later concludes that

A biological bias is not avoided by dropping the category of men and women as independent variables, but rather by tracing the differential behaviour of men and women through a wide variety of social factors. (p.242).

These ideas are developed further in Eckert (1998) where the point is made that seeing gender as existing in binary opposition is to disassociate it from other aspects of identity, resulting in the belief that being male or female will have the same effect on people’s behaviour regardless of other factors such as age, social class etc. Linguistic gender differences arrived at in this manner are then generalised to other contexts, despite the fact that gender practices differ so widely between cultures (Eckert 1998:66).

A central theme to Eckert’s work is the concept of a Community of Practice (CofP) (Lave & Wenger 1991) : “an aggregate of people who come together around mutual engagement in an endeavor” (Eckert & McConnell-Ginet 1992:464) in which participants “develop activities and ways of engaging in those activities, they develop common knowledge and beliefs, ways of relating to each other, ways of talking” (Eckert & McConnell-Ginet 2003:57). The fundamental concept behind a CofP is that of shared practice, it focuses on what people do. In terms of gender, it forces us to rethink the idea that people can be assigned to independent categories of ‘male’ or ‘female’, and instead looks at ways in which gender and gender differences are constructed through our participation in various CofPs.⁵ After all, gender is not a property of individuals; it is not something we ‘have’ or ‘are’, but it is something that we *do* (West & Zimmerman 1987:126).

There are several notable L2 Type 2 variation studies relevant to the present study (e.g. Adamson & Regan 1991; Bayley 1996; Major 2004; Mougeon *et al.* 2004; Uritescu *et al.* 2004; Schlee *et al.* forthcoming). Of these, only two look at gender in any detail. Adamson & Regan (1991)

⁵ For a detailed account of how a CofP framework differs from other frameworks such as The Speech Community and Social Identity Theory, see Holmes & Meyerhoff (1999).

provide an insight into gender differences in the acquisition of (ing) forms by Vietnamese and Cambodian immigrants. They found that NNSs replicated the gender variation pattern of NSs, with males tending to use the alveolar form [m] more frequently than females. But interestingly, while the rate of [m] showed predictable reduction in the monitored speech of the NS males, in the monitored speech of the NNS males the rate actually increased. Adamson & Regan discuss this finding in terms of covert prestige (Trudgill 1972), with the NNS males desiring to match the NS male norm. The monitored environment simply gives them the opportunity to better achieve this variant, missing the point that for the NS males, this same environment favours a different variant.

Major (2004:172) looked at the acquisition of four widespread (in US English) phonological processes⁶ by native Japanese and Spanish speakers and asked three questions:

1. Are gender differences acquired by NNSs?
2. Are stylistic differences acquired by NNSs?
3. Which factor, gender or style, is more salient?

He found that while there was unambiguous support for the acquisition of gender differences by both groups of NNSs, the same could not be said for stylistic differences. While the Spanish group showed some significant stylistic differences, (although much less than in the NSs), the Japanese group showed no significant stylistic differences at all. Major therefore concluded that NS gender differences are more salient, and acquired more readily, than NS stylistic differences by NNSs of English.

2. Methodology

2.1 Participants

Having already defined the sampling universe as Polish people living in Manchester who grew up in Poland, potential participants were identified and selected through the approaches of social networks and judgement sampling (Milroy & Gordon 2003; Tagliamonte 2006) whereby people who represented previously identified categories were sought in order to fill an appropriate quota for each. Some categories, such as sex, were strict, in that equal numbers were sought; other categories, such as occupation and length of residence (LOR), were less so, in that a variety of job types was sought, but without a pre-defined checklist of this or that job. Age was also an important category. A pilot study had highlighted the problems of using older participants who

⁶ 1. Palatalization in four environments, e.g. *got you, did you, this year, raise your*. 2. Deletion of /v/ in *of*. 3. '-ing' pronounced as [ɪn]. 4. Assimilation of /n/ in *can* e.g. *can be, can go*.

had been in Manchester for 40 years or more, as their life experiences and their relationship with the English language was so varied it was extremely difficult to control some of the variables. It was therefore decided to concentrate on a subset of the Polish community in Manchester who fulfilled the following criteria:

1. they grew up in Poland and came to England as adults;
2. they were aged between 18 and 40;
3. they had at least a basic proficiency in English before coming to England⁷;
4. they had ideally lived nowhere else in the UK apart from in the Manchester area.

The final sample consisted of 40 individuals (see table 1).

TABLE 1 HERE

2.2 Gathering data

Meetings were arranged with individuals throughout 2009⁸. Although there were other elements to the meetings (a picture description task and a word list), all speech data presented here come from an informal conversation with each participant. The term ‘conversation’ is used intentionally here, as the idea was to replicate an informal chat. Every effort was made to elicit as much speech as possible from the participant, resulting in the conversations being desirably one-sided, but they remained conversations rather than interviews. The reason for this approach was an awareness that the participants were not using their first language, which for many would be a challenging task. It was therefore important to ensure that the meeting in no way resembled any kind of language test, where an interlocutor would ask a series of questions and offer little in return.

The purpose of the conversation was to elicit speech that was as natural as possible by accessing information, explanations, and most importantly stories, that might usually be shared between friends. Certain core topics such as the participant’s life in Poland, life in Manchester, problems faced when living in a different country and future plans were covered with each participant through leading questions. Other topics developed naturally depending on the individual. The length of the conversations varied with each speaker, with the shortest being 18 minutes and the longest 1 hour and 10 minutes (average 34 minutes). The most important factor determining length was level of English, with some speakers finding it understandably challenging to maintain a conversation in a second language for an extended period.

⁷ By its very nature this had to be self-assessed proficiency.

⁸ This paper represents part of a larger project detailed in Drummond (2011).

The conversation was recorded using a Zoom H2 Handy Recorder placed unobtrusively on a surface near the participant. Recordings were made as .wav files using a 44.1 kHz sampling rate with 16-bit precision, saved onto an SD memory card then transferred onto a PC.

The recorded conversation was also used to assess the participants' level of spoken English (LoE). This was an impressionistic score made by the researcher and a colleague (both experienced English teachers) on overall fluency, accuracy and use of vocabulary. A numerical scale from 1 to 10 was used, which relates to standard ESL labels for proficiency as outlined in table 2.

TABLE 2 HERE

In addition to the speech data, social and attitudinal data were gathered by means of a questionnaire which was completed after the conversation, but within the meeting. The questionnaire was divided into two main sections, with the first designed to gain information in the following areas:

- self-assessed English language level
- amount of English instruction
- use of English and Polish (amount)
- future plans (timescales for returning to Poland, settling in UK etc).

The second section represented the main bulk of the questionnaire, consisting of 42 questions on the aspects of attitude and motivation described below. It should be borne in mind that this study represents part of a larger research project which looked into the acquisition of additional features, some of which are more specific to the Manchester area. It is for this reason that some of the attitudinal features refer to Manchester specifically.

- anxiety about pronunciation
- attitude towards Manchester, its people, and living there
- awareness of a Manchester accent
- attitude towards a Manchester accent
- desire to lose one's Polish accent and sound like a native speaker (not specifically Manchester English)
- instrumental motivation to improve pronunciation
- integrative motivation to improve pronunciation.

The underlying format of the second section was influenced by Gardner's (1985b) Attitude/Motivation Test Battery, an established element of much of the existing research into L2 motivation. Although Gardner's own theories on integrative and instrumental motivation have been questioned (e.g. Dörnyei 2001; 2005) it was felt that these two aspects of motivation were sufficiently identifiable as to warrant their inclusion in the present study.

The 42 questions in the second section were all in the format of a statement followed by a seven point Likert scale, with 'strongly disagree' and 'strongly agree' at numbers 1 and 7, and numbers 2 to 6 remaining unlabelled in between. Multi-item scales, as described in Dörnyei (2002) were employed so that each main area under investigation was covered by more than one question. In fact, each area was assessed by six questions, although the two sections involving the awareness of, and attitude towards the Manchester accent were originally grouped together, so these areas were subsequently covered by two and four questions respectively. One 'distracter' area was included, consisting of questions on other aspects of language learning such as reading and writing. These questions were included simply to draw attention away from the real focus, that of speech and pronunciation. It was decided to have the entire questionnaire translated into Polish so as to avoid both possible misunderstanding and fatigue on the part of the speakers. The internal consistency of the questions was measured using Cronbach's Alpha, and the existence of collinearity amongst the factors was checked by examining tolerance and the Variance Inflation Factor in SPSS. As a result, the following aspects were retained:

- attitude towards Manchester, its people, and living there (ATT);
- awareness of a Manchester accent (AW);
- desire to lose one's Polish accent and sound like NS (not specifically Manchester English) (CHA);
- motivation (both instrumental and integrative) to improve pronunciation. (MOT).

2.3 Identifying and coding the linguistic variable

Each recording was transferred to a PC and the conversation element was isolated. The first 5 or first 10 minutes of every conversation (depending on overall length) was disregarded as this might be seen as a period during which participants settle into the situation and hopefully lose some of their awareness of the microphone. The remainder of the conversation was analysed in stages, depending on initial findings and taking into consideration the findings of a pilot study.

Although consonantal variables such as glottal variation in /t/ have in the past tended to be analysed auditorily, acoustic analysis is being used more and more in this area. Perhaps this is in part due to Docherty and Foulkes' (1999) comment on the scarcity of studies in which

instrumental techniques have been used on consonantal variables. While acknowledging that this state of affairs owes much to the fact that auditory discrimination between consonantal variants is often sufficiently reliable, they go on to illustrate the extent to which instrumental analysis can uncover finer relevant detail in their description of their own research into glottal and glottalised variants of Newcastle /t/. Indeed, the result is a convincing description of sociolinguistically patterned types of glottal variation that simply cannot be discriminated auditorily, even when the data is revisited (Docherty & Foulkes 1999:57). However, it was decided that auditory analysis would be sufficient for the present study. This decision was made for the same reason expressed by Fabricius (2000:80), namely that the present study “is more concerned with the sociolinguistic character of t-glottaling than with its acoustic ‘profile’”.

Previous research into glottal variation in /t/ shows a variety of approaches in terms of what constitutes the envelope of variation, with differences existing in both the linguistic environment of /t/ and in the nature of the variants themselves (see Straw & Patrick 2007 for a useful summary list of previous studies into word final glottal variation in England, showing which variants were studied). The present study follows the lead of Fabricius (2000; 2002) and Straw and Patrick (2007) by focusing on glottal replacement alone and not on any possible examples of glottal reinforcement. It is concerned with word final /t/ preceded by a vowel (V/t/#), and word medial intervocalic /t/ (V/t/V). Each word final /t/ is categorised as being either pre-consonantal (PreC) (*..that country..*), pre-vocalic (PreV) (*..that idea..*), or pre-pausal (PreP) (*..this cat.*), with the PreC category being further divided into pre-stop (PreS) /p, b, t, d, k, g, m, n/, pre-fricative and affricate (PreF) /f, v, θ, ð, s, z, ʃ, ʒ, tʃ, dʒ/, and pre-approximant (PreA) /r, l, w, j/.

In total this gives six environments under investigation:

- V/t/#S ‘hot potato’
- V/t/#F ‘about seven’
- V/t/#A ‘what would’
- V/t/#V ‘not even’
- V/t/#P ‘did it.’
- V/t/V ‘matter’

The three PreC environments were coded only for two variants – released [t] or ‘other’. This was done for two reasons: firstly, it is often very difficult to reliably discriminate auditorily between certain variants of /t/ in this context in spontaneous speech (for example, deciding whether ‘*that man*’ is in fact [ðæt^ɪ mæn] or [ðæʔ mæn] when spoken at normal speed). Of course, place of articulation is also relevant here, with some following sounds making identification more or less difficult, but the decision was made to treat all following consonants in the same way for the

present study⁹. Secondly, a pilot study had shown that a recently arrived Polish speaker appears to produce released [t] in this environment far more frequently than would a native speaker, irrespective of their level of English. It was therefore felt that a reduction in the frequency of released [t] would in itself constitute a valid sign of change. The focus therefore is on the absence or presence of released [t], not on the particular variant that might take its place.

The other two word final contexts, PreV and PreP were each coded for five possibilities, and the word medial intervocalic context was coded for four possibilities. These are summarised in table 3. Due to the fact that the primary aim here is to investigate rates of glottal replacement in these environments, the variants in PreV and PreP environments were later reduced to two possibilities: glottal replacement or ‘other’.

TABLE 3 HERE

In the first instance, 50 usable /t/ tokens were identified for each individual speaker. A usable token was deemed to be a clearly audible realisation of /t/ in any of the 6 environments outlined above. Due to the fact that glottal replacement is the primary focus of the study, the decision to continue identifying tokens was based on glottal replacement numbers. If the initial 50 tokens contained no examples of glottal replacement in PreV, PreP, and V/t/V, then no further tokens were sought. However, if the first 50 tokens contained one or more examples of glottal replacement, then a further 50 tokens were identified where possible. In all, 3450 /t/ tokens were analysed, an average of just over 86 per participant.

Although it would of course be extremely useful to be able to compare the patterns of glottal variation in /t/ in the speech of the Polish participants with those of local NSs, there is simply not the NS data at present to be able to do this effectively. The possibility of including the collection of such data in the present study was considered, but was ultimately felt to be outside its scope. This decision was informed by the fact that there is at present a much larger-scale project on variation in Manchester English taking place, so it was felt more useful to focus on the Polish data at this stage, and use the new data when available. It is anticipated that more precise comparisons between the two patterns of variation will be possible in the near future.

2.4 Statistical analysis

Where appropriate, multiple logistic regression analyses was carried out using Rbrul (Johnson 2008). Rbrul is a variable rule program in the mould of Goldvarb (Sankoff *et al.* 2005), yet which incorporates mixed-effects modelling, therefore distinguishing between (replicable) fixed effects

⁹ It would be possible to provide further detail within the ‘other’ category by means of acoustic analysis. However, for the reasons provided above, it was felt that the existing categorization would suffice.

such as male/female, linguistic context etc, and (non-replicable) random effects such as individual speaker variation. By including individual speaker as a random effect, the model is able to account for the fact that some speakers may favour a particular variant to a greater or lesser degree than their relevant fixed factors would predict. The result is a model which “can still capture external effects, but only when they are strong enough to rise above the inter-speaker variation” (Johnson 2009:365). Rbrul expresses coefficients in log-odds rather than factor weights, although both are given in the analysis presented here to enable ease of understanding for those who are more familiar with Goldvarb output.

3. Results

Table 4 shows the overall count of tokens collected. Table 5 shows the overall count and percentages for the particular variants under investigation, i.e. (lack of) released [t] in PreC and glottal replacement in PreV, PreP and V/t/V. What is immediately clear is the almost categorical absence of glottal replacement in word medial position. For this reason, no further analysis of this context will be undertaken. The rates of word-final t-glottaling in PreV and PreP environments are relatively low (compared to, for example, Fabricius (2000) which showed rates of 40% and 36% respectively amongst NSs), yet are strikingly similar to each other. Ostensibly this would appear to suggest an absence of any diffusion pattern between PreV and PreP t-glottaling, with neither environment appearing more likely than the other to favour glottal replacement. However, further analysis presents an alternative.

TABLE 4

TABLE 5

Although the mean figures for glottal replacement for all speakers are equal (17%) across the two environments (PreP and PreV) at the level of individual speakers there are differences. Figure 1 shows that while there is no preference for one environment over the other amongst the 18 speakers who display glottal replacement in both contexts (8 prefer PreV, 9 prefer PreP and 1 is equal), of the 7 speakers who display glottal replacement in one environment only, this is always PreV. This suggests that for these speakers, glottal replacement cannot exist in PreP environment without first existing in PreV, perhaps suggesting a PreV > PreP pattern of diffusion, a pattern different from the most common pattern described in Straw & Patrick (2007:390).

A word of caution should be mentioned here regarding the small number of tokens collected in PreP position for some of the speakers. However, if the speakers for whom fewer than 10 PreP tokens were collected are excluded, resulting in a modest but usable mean of just over 14 tokens

per speaker, the pattern remains. In terms of Figure 1, the following speakers would be excluded: 18, 25, 2, 31, 24, 3, 39.

FIGURE 1

3.1 Regression analysis

Three multiple regression analyses were carried out with PreV, PreP, and PreV + PreP glottal replacement as the dependent variables (with glottal replacement as the application value) and with individual speaker as a random effect. The decision to first separate the two environments was made in order to explore possible differences in their behaviour. The results can be seen in Tables 6, 7 and 8.

TABLE 6

TABLE 7

TABLE 8

Of the three significant independent variables, only LOR is directly relevant to the idea of speakers showing increased glottal replacement as a result of their being in Manchester. The log-odds and factor weights clearly show that the greater the LOR, the greater the likelihood of glottal replacement, and that two years might indicate a point at which the likelihood begins to increase. Certainly, the mean glottal replacement for PreV and PreP for speakers with an LOR of 0-24 months is very low at 2.9% compared to those with an LOR of 25-48 months where it is 12.7%.

Also of interest is the manner in which LOR and LoE interact. Clearly, both are significant in the regression analyses and both correlate positively with increased glottal replacement (*LoE* $r=0.408$ $p<0.01$; *LOR* 0.487 $p<0.01$); in addition, LoE and LOR are themselves not correlated ($r=0.019$ $p=0.908^{10}$). However, this obscures some interesting detail. Neither high LoE nor high LOR is enough to increase likelihood of glottal replacement when working alone, i.e. if one is high and the other is low, there tends to be a low level of glottal replacement; it is the combination of the two factors that is important. For example, the 12 speakers who make up the lowest three categories of LoE (elementary, pre-intermediate and intermediate) show a mean level of glottal replacement of 3.23%, yet they have a mean LOR of 40.7 months. According to Figure 2, this LOR would put them at the upper end of the category averaging 13%. Similarly, the 8 speakers

¹⁰ This lack of correlation between LOR and LoE is somewhat surprising, suggesting that an individual's proficiency in English does not improve after living in the UK. However, it is in fact highly likely that this improvement takes place, but the effect is masked by recently arrived high-level speakers (i.e. high LoE but low LOR).

who have LORs of less than 1 year show a mean level of glottal replacement of 3.6%, despite a mean LoE of 7.4 (upper-intermediate). Again, according to Figure 3 this level of English would put them in the category averaging 16% glottal replacement.

FIGURE 2

FIGURE 3

In addition to LOR and LoE, two other factors emerged as being statistically significant to differing degrees: gender and attitude. Attitude was statistically significant in just one environment: PreP, and failed to reach significance in the other two. For this reason, it is unwise to attach too much importance to this finding, especially when we recall the relatively low number of tokens for the PreP environment. There is a chance that it represents the beginning of a pattern which might become clear with more data, but at this stage it is impossible to say. This is probably unlikely, as it would be difficult to suggest reasons why a positive attitude towards Manchester would affect one environment and not another. However, the gender effect, although relatively weak, was consistent in each analysis, with females showing an increased likelihood of using the glottal variant. Possible interpretations of this gender effect will be explored in the discussion section.

One final point that needs to be made on the last of the three analyses above (PrV + PreP) is the fact that ‘following sound’ was not found to be statistically significant. This is not surprising, given the very similar rates of glottal replacement in the two environments. However, the possibility of the PreV > PreP diffusion pattern still stands, given the fact that those 7 speakers exhibited glottal replacement in PreV and not PreP. Once again, this is a question for which more data provides the greatest chance of a more definitive answer.

One further regression analysis was carried out in relation to the PreC environment. This time the dependent variable was released [t] or other (‘other’ was the application value), with individual speaker as a random effect. The results can be seen in table 9.

TABLE 9

The first thing to notice is that the LOR and LoE effects are again significant, although at a somewhat reduced strength; secondly, gender is no longer significant. However, when a subsequent regression analysis was carried out without using individual speaker as a random effect (i.e. replicating traditional VARBRUL analysis) the gender pattern of females using the ‘new’ variant was still apparent and significant, suggesting that it is a pattern which might possibly emerge more strongly with more data. The third significant factor is that of phonological environment. The log-odds and factor weights show that while PreS and PreF seem to pattern

together in slightly favouring something other than released [t], PreA disfavors it (thus favouring released [t]). This difference can be seen in figure 4, where PreS, PreF, and PreA have mean rates of 55%, 53% and 41% respectively in terms of the occurrence of something other than released [t].

FIGURE 4

This pattern presents an interesting contrast to the findings of Fabricius (2000), in which PreS and PreF also patterned together, but PreA showed a rate higher than both of them (PreS 72%, PreF 68%, PreA 83%). It should be borne in mind that Fabricius' study looked specifically at glottal replacement vs 'other' rather than 'other' vs released [t], but the comparison is still valid from a patterning point of view.

Interestingly, when the results are looked at ordered by LOR (see figure 5), a pattern begins to emerge which might suggest a move towards Fabricius' findings. Fig 5 shows that while the overall pattern of (PreS PreF) > PreA remains, the gap between PreA and the others decreases as LOR increases. If this narrowing of the gap were to continue with LORs of over 6 years, then it might be the case that PreA would eventually overtake PreS and PreF, thus reflecting the NS pattern found by Fabricius. Indeed, the rates of 'other' in the highest LOR are still lower than the rates of glottal replacement in Fabricius' study, suggesting that there is scope for more change.

FIGURE 5

4. Discussion

4.1 Length of residence

Clearly there is evidence that native Polish speakers living in Manchester are, to varying degrees, acquiring patterns of variation of [t] that differ from the patterns they used before arriving in the UK. The most important factor for determining this is LOR, which is significant in every case, showing a positive correlation between time spent in Manchester and the use of glottal replacement/something other than released [t]. Also significant is LoE, with higher level speakers showing a greater tendency to adopt the local variation patterns. The interaction between LOR and LoE has been described above. However, the point needs to be made that LOR in itself is not an explanatory factor, certainly not on anything other than a very simplistic level. It simply cannot be the case that simply spending time in a location has such a measurable effect on a person's speech; rather it is the interaction that occurs during this time. A longer LOR simply allows more opportunity for meaningful interaction in the L2. It is the nature of this interaction which then influences the extent to which patterns of variation are acquired.

4.2 Level of English

The results outlined above strongly suggest that LoE and glottal variation in /t/ are related. Until now, this finding has been discussed from the implied perspective that increased proficiency in spoken English leads to a higher rate of word final glottal replacement. However, the argument is circular. Recall that each speaker's LoE was determined by two English language teaching experts rating the speech on the basis of fluency, accuracy, and use of vocabulary. This was carried out impressionistically, with no reference to any specific phonological features (and no knowledge of any particular features on the part of the second teacher). It might very well be the case that the use of glottal variants actually played a part in the rating process. That is to say, the use of glottal stops might have been an indicator of a higher level of spoken English, albeit an indicator that was below the level of awareness in the minds of the listeners. This is certainly likely in the PreC context, where the constant use of fully released [t] would produce over-precise speech lacking in fluency. There is no answer to this question, it is simply an observation. It is possible to view the correlation as an illustration of one factor influencing another; however, it is just as likely that the two factors are simply two aspects of one and the same thing.

4.3 Gender

It is clear that there is a consistent gender effect at work, particularly in the PreV/PreP glottal replacement data. What is less clear is precisely what aspect of gender is responsible. It could be argued that the women are moving towards a supralocal variety along the lines described in Watt and Milroy (1999). This idea is strengthened if we are willing to view 'supralocal' not simply in terms of geographical space, but also in terms of distance between NS and NNS norms. This is a slightly different interpretation of the standard view of supralocalization, which tends to emphasize the geographical nature of the process, albeit with a degree of flexibility: "Supralocal conveys the desired message that what is happening is at a scale higher than that of the local, without being more precise" (Britain 2010:197). It is this imprecision that allows for the interpretation presented here, that the women are tending to acquire the supralocal NS patterns of variation, while the men are tending to retain the localized NNS patterns. This ties in with a second aspect of gender – the tendency of women to accommodate their speech to that of others more than men (Woods 1997). If women are accommodating towards the speech of NSs to a greater degree than men, it follows that they will acquire the variants more readily. A third aspect of gender is simply the result of women's social activities and jobs involving contact with a wider range of people than men's (Holmes 1997) which in this case means more contact with NSs, thus leading to a greater chance of accommodation.

The most fruitful approach would appear to be a 'gender as practice' type approach as espoused by, for example, Eckert and McConnell-Ginet (1992). It is simply not possible or desirable to

separate the different aspects of gender that might be at work here, nor is it possible to isolate gender from other social factors. This is especially true in an immigrant setting where there is the added dimension of potentially different Polish and British gender identities. It is widely accepted now, certainly in language research, that gender is a social construct, made up of a complex network of social practices which themselves are gendered (see for example Ehrlich 2004). In a migration setting, the manner in which gender is constructed through these social practices may differ between cultures, leading to a tension between two (or more) gendered identities within the same individual or group of individuals. In terms of the three aspects of gender described above, it is likely that all of them play a part in providing an explanation for the data presented here, along with several others. Furthermore, it is possible that certain other patterns have been missed due to the decision to follow standard procedure and use binary categories for gender from the very beginning. This over-simplification runs the risk of obscuring subtle differences that transcend the binary male/female distinction.

With this in mind, it is possible that the gender differences observed here are in fact better described along different lines; for example, in terms of a difference in the contexts in which English is used. Although self-reported rates of L1/L2 use were consistently insignificant in the regression analyses, it might be the case that the nature of L2 use (where, with whom, and for what purpose) plays an important role in the extent to which local patterns of variation are acquired. Indeed, this makes intuitive sense – that those speakers who use English in contexts where they are required to engage in meaningful communication with NSs from a wide range of backgrounds are more likely to acquire NS patterns. However, a glance at the types of occupations the participants have (see table 10) shows a clear division along gender lines, with females tending to be in those occupations which require a greater degree of NS contact. In other words, attempting to look at variation in relation to the context of L2 use necessarily involves looking at variation in terms of gender. The point is, context of L2 use as determined by occupation is itself an aspect of gender, as it is arguably the influence of pre-determined (be they of Polish or British origin) societal gender roles that have influenced the career choices (or lack of choices) of the participants.

TABLE 10

Obviously there are exceptions both to the idea that the participants are falling into stereotypically gender-specific occupations, and that female oriented jobs are automatically more ‘communicative’. An example of the first would perhaps be the male participant working in the canteen, an example of the second would be the bus driver. But there are exceptions to most categorizations used in sociolinguistics. It would be interesting to follow up this idea and compare the strength of patterns when the data were divided along occupational/use of L2 lines on the one

hand, and when the data were divided along gender lines on the other. However, the difficulty would be in systematically categorizing the speakers in terms of occupation and L2 use. Something similar has been achieved before by Sankoff & Laberge (1978) where they managed to categorize speakers in terms of their relationship with the 'legitimized language' in the francophone community of Montreal. In order to do this they used eight experts (both in terms of sociolinguistic variation and life in Montreal) to rank speakers on the basis of their socio-economic backgrounds. While there is as yet not enough information with which to carry out a similar task involving the Polish community in Manchester, particularly the one that has emerged since 2004, this is an area which the author intends to explore in future research.

5. Conclusion

Three research questions were introduced in relation to possible variation in the production of word final /t/ in the speech of native Polish speakers living in Manchester:

1. To what extent do NNSs exhibit an increased rate of glottal variation in /t/ having spent time in Manchester?
2. To what extent are NNSs acquiring similar patterns (in terms of linguistic constraints) of glottal variation in /t/ to those of NSs?
3. What social factors influence the degree of acquisition?

The findings of this study suggest that native Polish speakers living in Manchester are indeed showing a change in their production of word final /t/ as a result of living in Manchester, and this can be demonstrated by the increased rate of glottal replacement in PreV and PreP positions for those speakers who have been in Manchester longer. Similarly, the rate of released [t] in PreC position decreases as time in Manchester increases, suggesting a move towards glottal variants.

Although the rates of glottal replacement in PreV and PreP positions show identical means, there is an indication of a PreV > PreP pattern of distribution. This is in contrast to the standard pattern of diffusion described in Straw & Patrick (2007:390), although is similar to findings for individual localities (e.g. the Ipswich pattern described later in Straw & Patrick 2007:397). The pattern of (PreS PreF) > PreA can be seen in the PreC environment in terms of a reduction in the use of released [t]. Although different to reported NS patterns, there is the suggestion of a change towards NS patterns as LOR increases. However, this can only be a tentative suggestion due to the current lack of data from NSs in the Manchester area. This lack of NS data is intended to be remedied in a follow-up project.

Length of Residence and Level of English were found to be consistently significant factors in the acquisition glottal variants. While this is perhaps not surprising, the clear interaction between the

two factors is interesting. The appearance of attitude towards Manchester as significant in the PreP analysis is to be approached with caution, as it did not appear to be significant in either the PreV or PreP + PreV analyses. Nevertheless, the fact that attitude towards Manchester showed a positive correlation with increased glottal replacement is an indication of the potential importance of this factor, which should be explored further in future research.

The findings suggest a clear observable gender difference, with females showing a greater likelihood to acquire glottal variants. Future work will explore the various factors that might be involved in this gender effect. The most immediate need is to properly describe patterns of glottal variation in /t/ amongst NSs in Manchester; both in terms of linguistic and social factors. When this is done, a proper comparison can be made between NS and NNSs, and further insight into the reasons behind the gender difference can be gained.

References

- Adamson, H. D. and Vera M. Regan (1991). "The Acquisition of Community Speech Norms by Asian Immigrants Learning English as a Second Language: A Preliminary Study." *Studies in Second Language Acquisition* **13**(1): 1-22.
- Bauere, Viktorija, Paul Densham, et al. (2007). "Migrants from Central and Eastern Europe: local geographies." *Population Trends* **129**(1): 7-19.
- Bayley, Robert (1996). Competing Constraints on Variation in the Speech of Adult Chinese Learners of English. *Second Language Acquisition and Linguistic Variation*. R. Bayley and D. R. Preston. Philadelphia, John Benjamins: 97-120.
- Britain, David (2010). Supralocal regional dialect levelling. *Language and Identities*. C. Llamas and D. Watt. Edinburgh, Edinburgh University Press: 193-204.
- Cheshire, Jenny (2002). Sex and gender in variationist research. *Handbook of language variation and change*. J. Chambers, P. Trudgill and N. Schilling-Estes. Malden, MA, Blackwell: 423-443.
- Corder, S. Pit (1981). *Error Analysis and Interlanguage*. Oxford, Oxford University Press.
- Docherty, Gerard J. and Paul Foulkes (1999). Derby and Newcastle: instrumental phonetics and variationist studies. *Urban Voices*. P. Foulkes and G. Docherty. London, Arnold: 47-71.
- Dörnyei, Zoltan (2001). *Teaching and Researching Motivation*. Harlow, Longman.
- Dörnyei, Zoltan (2002). *Questionnaires in second language research: Construction, administration, and processing*. Mahwah, NJ, Lawrence Erlbaum.
- Dörnyei, Zoltan (2005). *The psychology of the language learner: Individual differences in second language acquisition*. Mahwah, NJ, Lawrence Erlbaum.
- Drummond, Rob (2010). Sociolinguistic variation in a second language: the influence of local accent on the pronunciation of non-native English speakers living in Manchester. Unpublished PhD thesis, University of Manchester.
- Eade, John, Stephen Drinkwater, et al. (2006). "Class and ethnicity—Polish migrants in London." *CRONEM, University of Surrey, December*.
- Eckert, Penelope (1989). "The whole woman: Sex and gender differences in variation." *Language variation and change* **1**(03): 245-267.
- Eckert, Penelope (1998). Gender and Sociolinguistic Variation. *Language and gender: A reader*. J. Coates. Malden, USA; Oxford, UK, Blackwell: 64-76.
- Eckert, Penelope and Sally McConnell-Ginet (1992). "Think practically and look locally: Language and gender as community-based practice." *Annual review of anthropology* **21**(1): 461-488.
- Eckert, Penelope and Sally McConnell-Ginet (2003). *Language and gender*. Cambridge, Cambridge University Press.
- Ehrlich, Susan (2004). Language and gender. *The handbook of applied linguistics*. A. Davies and C. Elder. Malden, MA, Blackwell: 304-327.
- Fabricius, Anne (2000). T-glottalling between stigma and prestige: a sociolinguistic study of modern RP. Unpublished PhD Thesis, Copenhagen Business School.
- Fabricius, Anne (2002). "Ongoing change in modern RP. Evidence for the disappearing stigma of t-glottalling." *English world-wide* **23**(1): 115-136.
- Foulkes, Paul (2006). Phonological variation: a global perspective. *Handbook of English Linguistics*. B. Aarts and A. McMahon. Oxford, Blackwell: 625-669.
- Gardner, Robert C. (1985b). *Social psychology and second language learning: The role of attitudes and motivation*. London, Edward Arnold
- Holmes, J. (1997). "Setting new standards: Sound changes and gender in New Zealand English." *English world-wide* **18**(1): 107-142.
- Holmes, J. and M. Meyerhoff (1999). "The community of practice: Theories and methodologies in language and gender research." *Language in Society* **28**(02): 173-183.
- Holmes, Janet (1997). "Women, language and identity." *Journal of Sociolinguistics* **1**(2): 195-223.
- Johnson, Daniel Ezra (2008). Rbrul, Version 1.9. ww.ling.upenn.edu/~johnson4/Rbrul.R.

- Johnson, Daniel Ezra (2009). "Getting off the GoldVarb Standard: Introducing Rbrul for Mixed-Effects Variable Rule Analysis." *Language and Linguistics Compass* 3(1): 359-383.
- Labov, William (1990). "The intersection of sex and social class in the course of linguistic change." *Language variation and change* 2(2): 205-254.
- Labov, William (2001). *Principles of linguistic change. Vol. 2: Social factors*. Oxford, Blackwell.
- Lave, Jean and Etienne Wenger (1991). *Situated learning: Legitimate peripheral participation*. Cambridge, Cambridge University Press.
- Major, Roy C. (2004). "Gender and stylistic variation in second language phonology." *Language Variation and Change* 16(03): 169-188.
- Mees, Inger M. (1987). "Glottal stop as a prestigious feature in Cardiff English." *English world-wide* 8(1): 25-39.
- Mees, Inger M. and Beverley Collins (1999). Cardiff: a real-time study of glottalisation. *Urban Voices: Accent Studies in the British Isles*. P. Foulkes and G. Docherty. London, Arnold: 185-202.
- Milroy, James, Leslie Milroy, et al. (1994). "Glottal Stops and Tyneside Glottalization: Competing Patterns of Variation and Change in British English." *Language Variation and Change* 6(3): 327-57.
- Milroy, Leslie and Matthew Gordon (2003). *Sociolinguistics: Method and Interpretation*. Oxford, Blackwell Publishers.
- Mougeon, Raymond, Katherine Rehner, et al. (2004). "The learning of spoken French variation by immersion students from Toronto, Canada." *Journal of Sociolinguistics* 8(3): 408-432.
- Sankoff, David and Suzanne Laberge (1978). The linguistic market and the statistical explanation of variability *Linguistic variation: Models and methods*. D. Sankoff. New York, Academic Press: 239-250.
- Sankoff, David, Sali Tagliamonte, et al. (2005). Goldvarb X: A variable rule application for Macintosh and Windows, Department of Linguistics, University of Toronto.
- Schleef, Erik, Miriam Meyerhoff, et al. (Forthcoming). "Teenagers' acquisition of variation: A comparison of locally-born and migrant teens' realisation of English (ing) in Edinburgh and London." *English world-wide*.
- Statistics, Office for National (2010). Mid Year Population Estimates 2009.
- Straw, Michelle and Peter L. Patrick (2007). "Dialect acquisition of glottal variation in /t/: Barbadians in Ipswich." *Language Sciences* 29(2-3): 385-407.
- Tagliamonte, Sali (2006). *Analysing Sociolinguistic Variation*. Cambridge, Cambridge University Press.
- Tarone, Elaine (2007). "Sociolinguistic Approaches to Second Language Acquisition Research 1997-2007." *The Modern Language Journal* 91(s1): 837-848.
- Trudgill, Peter (1972). "Sex, covert prestige and linguistic change in the urban British English of Norwich." *Language in Society* 1(02): 179-195.
- Uritescu, Dorin, Raymond Mougeon, et al. (2004). "Acquisition of the internal and external constraints of variable schwa deletion by French immersion students." *International Review of Applied Linguistics in Language Teaching* 42(4): 349-364.
- Watt, Dominic and Leslie Milroy (1999). Patterns of variation and change in three Newcastle vowels: is this dialect levelling. *Urban Voices: Accent studies in the British Isles*. P. Foulkes and G. Docherty. London, Arnold: 25-46.
- West, Candace and Don Zimmerman (1987). "Doing gender." *Gender and society* 1(2): 125-151.
- Woods, Nicola J. (1997). "The formation and development of New Zealand English: Interaction of gender-related variation and linguistic change." *Journal of Sociolinguistics* 1(1): 95-125.
- Young, Richard (1988). "Variation and the Interlanguage Hypothesis." *Studies in Second Language Acquisition* 10(3): 281-302.
- Young, Richard and Brian Yandell (1999). "Top down versus bottom up analyses of interlanguage data." *Studies in Second Language Acquisition* 21(3): 477-488.

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Table 1. Participants

	Sex	Age	LOR (m)	Occupation
1	m	19	6	Student – UG medicine
2	m	21	22	Student – UG business
3	m	22	40	Student – UG maths, part time work in office.
4	m	23	2	Student – UG economics.
5	m	23	4	Student – UG business.
6	m	24	30	Student – computer programming
7	m	24	32	Factory
8	m	24	42	Student – PG photography, part time work in café.
9	m	26	37/61*	Student – PG politics
10	m	27	53	Student – UG physics, part time work in hospital
11	m	28	20	Warehouse
12	m	28	56	Bus driver
13	m	31	46	University canteen
14	m	31	37	Office – small software company
15	m	32	41	Student – PG translation studies
16	m	32	64	Hospital – mental health nurse
17	m	33	48	Mechanic
18	m	34	61	Welder
19	m	35	65	Warehouse
20	m	37	46	Security guard – industrial estate
21	f	19	6	Student – UG languages
22	f	22	2	Student – UG business
23	f	22	6	Student – UG photography
24	f	22	42	Student/shop – PG photography, part time shop work
25	f	24	6	PG - microbiology
26	f	26	21	Café
27	f	26	59	Student – UG economics
28	f	26	31	Café
29	f	27	47	Shop manager – department store
30	f	28	72	Bar manager
31	f	28	39	Office
32	f	28	42	Bookmakers
33	f	29	8	Office
34	f	30	24/48*	Waitress
35	f	31	64	Office – hotel admin
36	f	32	63	University researcher
37	f	33	45/72*	Shop assistant - department store
38	f	34	40	Housewife
39	f	36	25	Polish office
40	f	37	46	Housewife and part time classroom assistant

*Where two LORs are given, this indicates that time was spent outside Manchester. The first value gives LOR in Manchester, the second gives LOR in the UK in total.

Table 2. Level of English scale (LoE)

1	Elementary -
2	Elementary +
3	Pre-intermediate -
4	Pre-intermediate +
5	Intermediate -
6	Intermediate +
7	Upper Intermediate -
8	Upper Intermediate +
9	Advanced -
10	Advanced +

Table 3. Details of variants coded for each environment

/t/ variant	code	PreC	PreV	PreP	V/t/V
V/t/#C other ¹¹	0	✓	✗	✗	✗
released [t] ¹²	1	✓	✓	✓	✓
glottal replacement [ʔ]	2	✗	✓	✓	✓
elided [∅]	3	✗	✓	✓	✓
flap/tap [ɾ]	4	✗	✓	✗	✓
unreleased [t̚]	5	✗	✓	✓	✗

¹¹ For the PreC environment, the ‘other’ category included anything that was not released [t].

¹² This includes any variant with an audible release, however slight.

Table 4: Total distribution of /t/ tokens for all speakers

/t/ variant	PreC				PreV	PreP	V/t/V
	PreS	PreF	PreA	Total			
V/t/#C other	55.1% (270)	53.2% (296)	41.5% (231)	49.7% (797)			
released [t]	44.9% (220)	46.8% (260)	58.5% (326)	50.3% (806)	65.5% (591)	76.8% (328)	90.3% (468)
glottal replacement [ʔ]					17.1% (154)	17.1% (73)	0.4% (2)
elided [ø]					1.2% (11)	0.7% (3)	0
flap/tap [ɾ]					16.2% (146)		9.3% (48)
unreleased [t̚]					0	5.4% (23)	
	490	556	557	1603	902	427	518

Table 5: Total count and percentages for each variant under investigation

	PreC			PreV			PreP			
	other	released [t]	total	glottal	other	total	glottal	other	total	
word final	49.7% (797)	50.3% (806)	100% (1603)	17.1% (154)	82.9% (748)	100% (902)	17.1% (73)	82.9% (354)	100% (427)	
word medial	×	×	×	0.4% (2)	99.6% (516)	100% (518)	×	×	×	
			1603			1420			427	3450

Table 6: Rbrul output for glottal replacement in PreV environment for all speakers

Application value: glottal	<i>Factor</i>	<i>Log-odds</i>	<i>Tokens</i>	<i>Response proportion</i>	<i>Factor weight</i>
Gender <i>p < 0.05</i>	f	0.561	486	0.220	0.637
	m	-0.561	416	0.113	0.363
LOR <i>p = 0.01</i>	continuous scale 1-72 months	+1 0.037	902		
Level of Eng <i>p < 0.01</i>	continuous scale 1-10	+ 1 0.841	902		
Not significant:	<i>ATT, AW, CHA, MOT, Age, Use of L1/L2, English partner, Future plans Formal English instruction.</i>				
Model	deviance 588.112 df 5		intercept -9.995		mean 0.171
	Speaker ID random standard deviation: 1.191				

Table 7: Rbrul output for glottal replacement in PreP environment for all speakers

Application value: glottal	<i>Factor</i>	<i>Log-odds</i>	<i>Tokens</i>	<i>Response proportion</i>	<i>Factor weight</i>
Gender <i>p</i> = 0.05	f	0.584	202	0.208	0.642
	m	-0.584	225	0.138	0.358
LOR <i>p</i> <0.01	continuous scale 1-72 months	+1 0.051	427		
Level of Eng <i>p</i> <0.01	continuous scale 1-10	+ 1 0.439	427		
ATT (Attitude) <i>p</i> <0.01	continuous scale 1-7	+1 1.477	427		
Not significant:	<i>AW, CHA, MOT, Age, Use of L1/L2, English partner, Future plans Formal English instruction.</i>				
Model	deviance 294.389 df 6		intercept -15.295		mean 0.171
	Speaker ID random standard deviation: 1.01				

Table 8: Rbrul output for glottal replacement in PreV + PreP environments for all speakers

Application value: glottal	<i>Factor</i>	<i>Log-odds</i>	<i>Tokens</i>	<i>Response proportion</i>	<i>Factor weight</i>
Gender <i>p</i> = 0.05	f	0.455	688	0.217	0.612
	m	-0.455	641	0.122	0.388
LOR <i>p</i> =0.01	continuous scale 1-72 months	+1 0.042	1329		
Level of Eng <i>p</i> <0.01	continuous scale 1-10	+ 1 0.727	1329		
Not significant:	<i>Following sound, ATT, AW, CHA, MOT, Age, Use of L1/L2, English partner, Future plans, Formal English instruction.</i>				
Model	deviance 882.358	df 5	intercept -9.309	mean 0.171	
	Speaker ID random standard deviation: 1.319				

Figure 1. Patterns of variation amongst the 25 speakers showing evidence of glottal replacement.

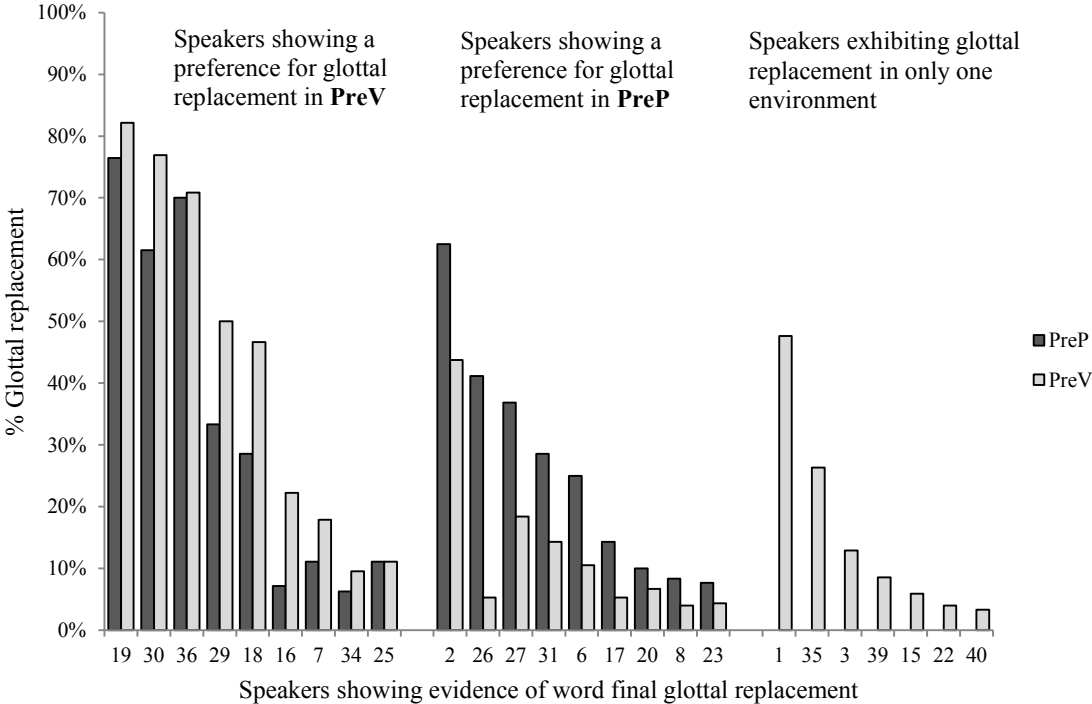


Figure 2. Bar chart showing percentage of glottal replacement ordered by LOR.

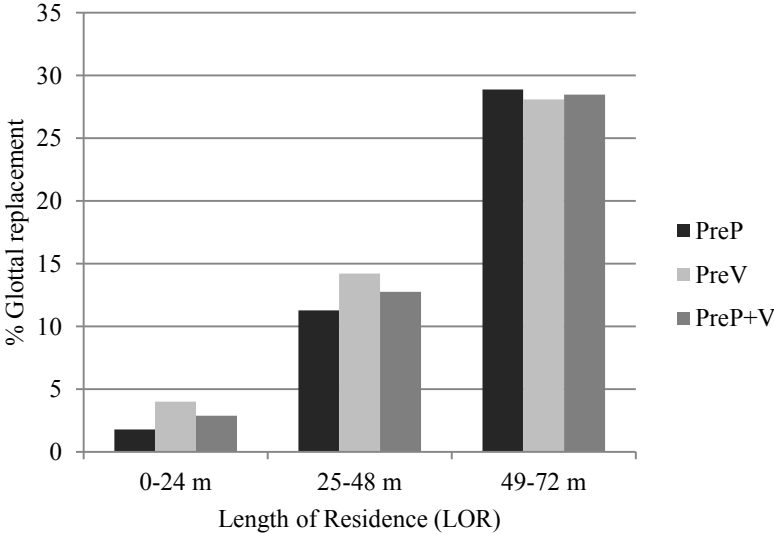


Figure 3. Bar chart showing percentage of glottal replacement ordered by LoE.

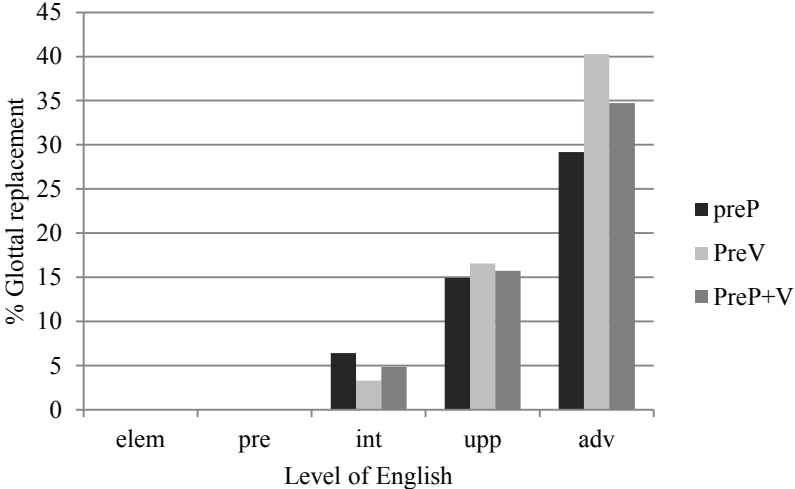


Table 9: Rbrul output for glottal replacement in PreC environment for all speakers

Application value: 'other'	<i>Factor</i>	<i>Log-odds</i>	<i>Tokens</i>	<i>Response proportion</i>	<i>Factor weight</i>
Following <i>p < 0.01</i>	Stop	0.279	490	0.551	0.574
	Fricative	0.213	556	0.532	0.553
	Approximant	-0.510	557	0.415	0.375
LOR <i>p < 0.01</i>	continuous scale 1-72 months	+1 0.029	1603		
Level of Eng <i>p < 0.01</i>	continuous scale 1-10	+ 1 0.397	1603		
Not significant:	<i>Gender, ATT, AW, CHA, MOT, Age, Use of L1/L2, English partner, Future plans Formal English instruction</i>				
Model	deviance 1875.138 df 6		intercept -4.007		mean 0.497
	Speaker ID random standard deviation: 0.864				

Figure 4. Bar chart showing percentage of 'other' in the three PreC environments.

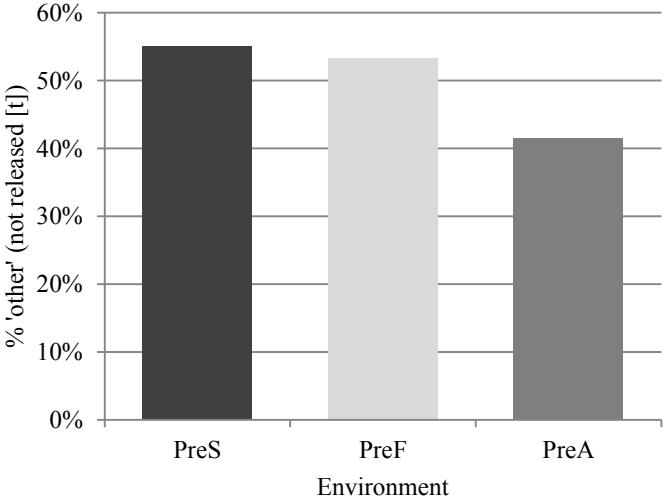


Figure 5. Bar chart showing percentage of 'other' in the three PreC environments, ordered by LOR

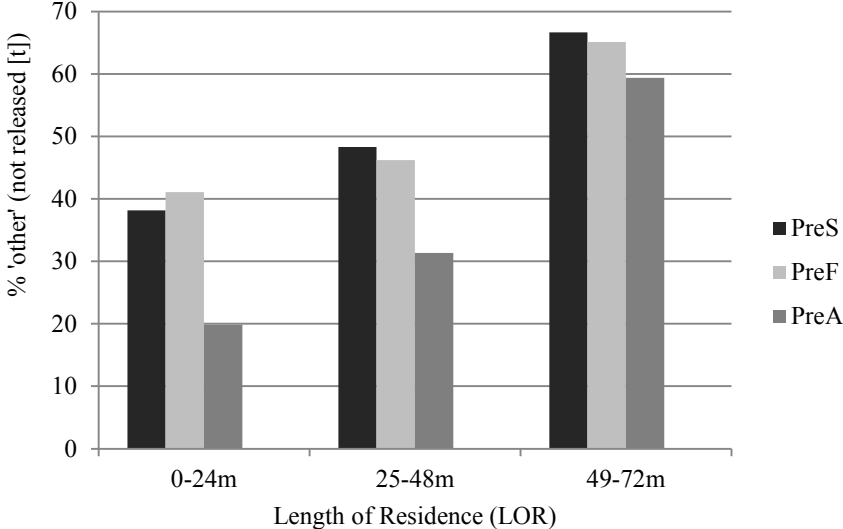


Table 10. Identifiable occupations of the participants categorized by gender

Male	Female
Factory	Café
Warehouse	Shop manager – department store
Bus driver	Bar manager
University canteen	Office - insurance
Office – small software company	Bookmakers
Hospital – mental health nurse	Waitress
Mechanic	Office – hotel admin
Welder	University researcher
Warehouse	Shop assistant - department store
Security guard – industrial estate	Housewife
	Polish office
	Housewife / Classroom assistant