Regional Variation in Panjabi-English

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Abstract

The research presented in this thesis details the linguistic patterns of two contact varieties of English spoken in the UK. Based on an analysis of recordings made in two British cities, the research assesses the influence of Panjabi on the English spoken in Bradford and Leicester. In addition, it considers what the role and influence of the respective regional 'Anglo English' variety is having on the development of the contact variety in each location. The research here focusses on variation in voice quality, the vowels FACE, GOAT and GOOSE, and the realisation of /r/.

For voice quality, a vocal profile analysis (e.g. Laver 1980) was completed for each of the speakers included in the corpus with characteristic vocal settings observed among Panjabi and Anglo English groups. The results from a dynamic vowel analysis of F1 and F2 variation across the trajectory for FACE, GOAT and GOOSE illustrated that despite the cross regional similarities which are observable in Panjabi English, local interpretations are crucial. A combined auditory and acoustic analysis of /r/ in word initial and medial position revealed divergent regional patterns in Panjabi English.

A number of arguments are put forward to account for the linguistic parallels reported here, and more widely, in contact varieties of English in the UK. The findings of the thesis contribute to a growing body of work that explores the development of contact varieties spoken in the UK, with this thesis concentrating on the development of 'Panjabi English' in two locations simultaneously. The patterns observed are accounted for by considering research from both language and dialect contact research, with the thesis drawing together ideas from these two separate fields. The claims put forward argue that the similar patterns observed can be considered to be independent innovations, with contact processes accounting for the linguistic correspondences.

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Declaration

This is to declare that this thesis is original work. All external sources are acknowledged by explicit references. This work has not previously been presented for an award at this, or any other, University. Aspects of the research which have been previously published in conference proceedings are detailed below:

Wormald, J. (2014). Bradford Panjabi-English: the realisation of FACE and GOAT. *York Papers in Linguistics: PARLAY Proceedings*. 1, 118-138

Wormald, J. (2015). Dynamic Variation in 'Panjabi-English': Analysis of F1 & F2 trajectories for FACE /eɪ/ and GOAT /əʊ/. *Proceedings of ICPhS 18,* Glasgow.

1 Introduction

This thesis will explore the linguistic variation present in a contact variety of English spoken in two locations in the UK. It will report on fieldwork carried out in the two British cities of Bradford and Leicester. It will consider a number of arguments to account for the consistent linguistic patterns observed in these contact varieties of English and assess whether these can be attributed to the influence of a particular heritage language, in this case, Panjabi. Further, the role and influence of the local Anglo English varieties will be considered throughout.

Recent research has consistently observed similar linguistic features to be characteristic of a number of contact varieties (e.g. Cheshire et al. 2008; Heselwood & McChrystal 2000; Stuart-Smith et al. 2011). Some of these studies have directly explored a relationship between the contact variety and the heritage language spoken by community members (e.g. Verma & Firth 1995), whereas others, as a consequence of the diversity of the linguistic input, have considered explanations for the variation in relation to contact (e.g. Kerswill et al. 2013). This thesis explicitly considers the influence of a single heritage language, but also examines how the consistent linguistic patterns observed in other contact varieties of English can be accounted for. These other varieties do not necessarily have a direct relationship with Panjabi or even one single heritage language.

As well as this, the relationship with the Anglo English variety is often reported to be important, with the patterns observed in the contact variety often better explained when considering the interaction between the two varieties (e.g. Alam & Stuart-Smith 2014; Stuart-Smith et al. 2011). Consequently, four main research questions will be addressed throughout the thesis:

1. What are the phonetic characteristics of Panjabi English as spoken in two English cities?

2. Are patterns observed in Panjabi English directly relatable to the heritage language, Panjabi?

3. How can we account for any cross-regional consistencies between Panjabi English in Bradford and Leicester and across many contact varieties of English spoken in the UK? In particular, are cross-regional consistencies in contact varieties evidence of independent innovations or geographical diffusion?

4. Does the role (and influence) of the Anglo English variety differ across contact communities?

The Background Chapter provides information relevant to the current thesis. It considers theories of dialect contact which have guided the arguments put forward here, with a number of predictions being made about what might be expected in the current context. The Chapter also summarises the work undertaken on contact varieties of English spoken in the UK and highlights the consistencies observed. The reasons for selecting the variables which have been investigated in the thesis are discussed in relation to this previous research. Following this, a brief contextual background is provided which details some information about the language, Panjabi, and also the history of migration from the Panjab to the UK.

Chapter 3 details the fieldwork process undertaken in the thesis. It provides information about how speakers were sampled, the resultant population in each location, and the tasks undertaken by participants.

The following three Chapters present the analysis of different linguistic variables. Chapter 4 reports on a voice quality analysis undertaken using a Vocal Profile Analysis protocol (e.g. Laver 1980). The Chapter provides a background to work which has undertaken a similar approach and highlights a number of predictions for the present work. The methodology is reviewed, with the approach adopted here reflecting Abercrombie's (1967) definition of voice quality. In this instance, it refers to the long term vocal settings adopted by a speaker. Interpretation of the results is offered, including an analysis of similarities found amongst the Panjabi English spoken in both locations, and the findings are related to the research questions above.

Chapter 5 reports on a dynamic formant analysis of F1 and F2 for three vowels: FACE, GOAT and GOOSE (Wells 1982a). Previous work on contact varieties of English has observed consistencies in the realisation of FACE and GOAT, and GOOSE-fronting is a change occurring throughout the English speaking world (e.g. Haddican et al. 2013; Sharma 2011). As with Chapter 4, relevant background literature specific to the Chapter is included, with subsequent predictions being detailed. The methodology is described with an interpretation and statistical analysis of the results following. The discussion considers reasons for the consistent patterns observed in both locations. Monophthongisation and peripheral realisations of FACE and GOAT are considered in relation to contact-induced change, with fronting of GOOSE and GOAT requiring a local interpretation.

The realisation of /r/ in word-initial (non-cluster) and word-medial contexts is considered in Chapter 6. As with the previous Chapters, an assessment of literature specifically relevant to the analysis of /r/ is included. Following this, predictions are made about what might be expected in each location based on the findings of previous research. The methodology details the approach adopted, which was a combined auditory-acoustic analysis. The results of the analysis illustrate an interesting pattern, with the two Panjabi English varieties being seemingly divergent in their realisation of /r/. The patterns reflect an interaction between the influence of the heritage language and the Anglo English variety.

The general discussion in Chapter 7 considers the findings of the earlier Chapters in relation to the research questions outlined above. Beginning by addressing research question one, the Chapter summarises the linguistic patterns described throughout the thesis and comments on how these vary by region and language background. It highlights the cross-regional consistencies present amongst contact varieties of English spoken in the UK and how the patterns observed reflect an interaction between the heritage language, the Anglo English variety and potentially predictable patterns of language and dialect contact. It addresses the possibility that geographical diffusion accounts for the linguistic similarities present, but argues that this is not sufficient or necessarily relevant. Finally, it explores whether Panjabi English can be considered a cross-regional variety of English and the role of identity in its formulation. The Chapter will conclude by highlighting areas for future work and questions which remain unanswered.

Overall, the thesis provides a descriptive characterisation of two geographically separate and developing contact varieties of British English spoken in the UK. Further, it considers a number of arguments to account for the cross-linguistic similarities observed both here and more widely across contact varieties of English spoken in the UK. The thesis contributes to our understanding of language and dialect contact by exploring the evolution of contact varieties in two separate locations simultaneously.

2 Background

2.1 Introduction

This Chapter provides background information relevant to the thesis. Section 2.2.1 considers theoretical arguments which have explored both linguistic and social factors behind the patterns observed in contact varieties. Following this, Section 2.2.2 summarises a number of studies which have examined contact varieties of English within the UK, highlighting the consistent linguistic patterns observed in a number of potentially independent varieties. Section 2.2.3 provides a justification for the variables which are considered and makes some predictions about the types of variation which might be observed. The variable selection and theoretical predictions are made based on the literature presented. The latter part of this Chapter will report some contextual information about the locations and languages relevant to this work. Section 2.3 discusses the Panjab, the Panjabi language and its presence in the UK, with Section 2.3.2.1 providing a brief history of migration and multilingualism in Bradford and Leicester specifically.

2.2 Contact

The linguistic situation in Bradford and Leicester is one of contact, with the interaction between different varieties of English and various heritage languages resulting in new varieties. It is likely that second- and future-generations are exposed to at least one heritage language in some form in various contexts. Consequently, the contribution of heritage languages as inputs alongside the English varieties may be variable and unpredictable. This Section presents a summary of dialect contact work, discussing both theoretical developments and research which has observed contact in varieties of English.

2.2.1 The development of new varieties

The formation of new dialects, or *koineization*, has been researched within sociolinguistics since the mid-1980s. One of the first works to consider dialect contact in depth was carried out by Trudgill (1986). His work discussed the linguistic patterns which can be observed when dialects come into contact and subsequently interact. Mixed intermediate forms are said to arise as a consequence of many individual accommodation events, with new dialects, or *koines*, being the end result. The research following this initial work by Trudgill (1986) has been considered within the subfield ‘dialect contact’. Within historical linguistics, ‘language contact’ research has been explored for a number of years. This research follows a similar but separate trajectory to that which explicitly focusses on dialect contact. Noted by many including Britain (2012), and particularly pertinent in the current context, is the widely acknowledged absence of a clear boundary between a *language* and a *dialect*. Thus, the following Section brings together relevant threads of research from these disparate subfields of linguistics.

The research here is focussing on what Trudgill (2004) refers to as Stage II in the new dialect formation process. This stage corresponds to the continued development of an evolving new variety by *second-generation speakers*, i.e. those first born into the new community[1]. According to Trudgill, this stage is characterised by extreme variability, both within and between speakers. This increased variability, present amongst speakers of the developing contact variety, is echoed in a considerable quantity of research. Britain (2012) develops a cake analogy to consider patterns of koineization and comments on the array of ingredients which go into any dialect contact cake. The notion of the feature pool is discussed by Mufwene (2001) whereby all of the varieties which are coming together result in an increased pool of features from which speakers can draw upon when developing the new variety. Considering language contact specifically, Matras (2009) comments on speaker repertoires. He notes that although socialisation results in speakers developing context-appropriate styles, a speaker’s repertoire is comprised of all the linguistic structures needed to effectively communicate in any of his or her varieties (be these languages or dialects).

As well as considering the increased linguistic input and subsequent variability, many authors have noted the crucial role played by social factors in contact situations. The size of speaker populations, speaker and community language ideologies, and the ethnographic context have all been noted as important and relevant in any consideration of contact (Britain 2012; Ravindranath 2015). Indeed, Ravindranath (2015) notes that in the field of language contact studies one of the main questions is the consideration of whether linguistic or social factors better predict the patterns observed. Thomason (2008) states that social relations are the most important predictors of language contact

[1] Trudgill (2004) refers to these speakers as “first-generation” as these are the first speakers born into the new community. They are referred to here as second-generation to retain consistency with the rest of the thesis; throughout this work first-generation refers to the original community members who migrated into the country.

variation. All of these social factors are said to interact with the natural and subconscious process of accommodation and thus affect the resulting variety (Britain 2012). The majority of sociolinguistic work within the variationist paradigm has been carried out in monolingual communities. Ravindranath (2015) suggests that part of the reason for this may be the added complexity when working with multilingual speakers and communities because of the increased number of social factors to consider.

2.2.1.1 Processes of new dialect formation

Trudgill (1986, 2004) introduces four diachronic processes which allow for restructuring to take place before the new variety is formed. One of these processes is *levelling*, which leads to a decline in the number of marked variants. Marked variants are those which are either stereotyped, are in a minority numerically (in the contact situation), are acquired late, or are rarely found in world languages (e.g. Britain 2012). Further, Mufwene (2001: 58) notes that markedness values are defined locally, based on variants relevant to the specific contact situation[2]. In his 2004 book, Trudgill discusses how levelling happens independently of social factors, being determined instead by the numerical frequency of a given variant (2004: 85).

A second process, *reallocation*, occurs when more than one variant remains, the levelling process being incomplete. Variants will then be reallocated so that variation between them occurs socially, stylistically or, if they are phonetic features, allophonically. The process of simplification is discussed by Trudgill in his 1986 work, but is not mentioned explicitly in his 2004 book. This third process of *simplification*, refers to an increase in morphophonemic regularity in a new dialect's formation. Britain (2002) discusses an example of this with past tense BE realisations in the Fens. He argues that the traditional three way contrast between *was*, *were* and *weren't* is being simplified to a two way contrast between *was* and *weren't* which is determined solely by polarity[3].

Finally, *interdialect forms* can emerge (Trudgill 1986, 2004). Britain comments that these are forms which arise as a consequence of 'imperfect convergence of two or more such inputs' (2012: 224). Trudgill (2004) notes that this particular process is common in

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[2] Although Mufwene's book specifically considers creole genesis, this argument can be extended to other situations of contact, be they language or dialect contact.

[3] Britain comments that although the standard exhibits a four way contrast between *was, were, wasn't* and *weren't* and is constrained by person, number and polarity there is no evidence to suggest this has ever been part of the Fens dialect (2002: 37-8).

Stage I of new dialect formation and applies mainly to first-generation speakers. The combination of these four processes ultimately results in a newly-formed dialect or 'koine'.

Although the processes described by Trudgill (1986, 2004) often assume discrete variation, it is suggested here that they may be useful when assessing the variation associated with continuous data. These terms and processes are helpful when beginning to characterising the process rather than the patterns. Thus, we may see similar linguistic patterns across locations, with the processes proposed by Trudgill perhaps providing us with a means to begin interpreting these parallels in terms of more abstract processes.

2.2.1.2 The role of identity

In more recent work, Trudgill (2008a) called into question the role of identity in new dialect formation, claiming that sociolinguists too often rely on identity as an explanation for variation. This is consistent with King (2002, cited in Ravindranath 2015) who, within the language contact framework, suggested that grammatical variation in contact varieties should be accounted for by the grammar itself and not by social factors. Considering new dialect formation, Trudgill argued that the automaticity of accommodation meant that any influence of collective identity came later, once the new dialect had been established. He presented the development of post-colonial varieties of English as evidence of this, claiming that a shared national identity would not have been present amongst new settlers; instead, automatic accommodation would have led to the processes described in new dialect formation.

The publication provoked a number of responses, generally agreeing with Trudgill's claim of the automaticity of accommodation (Mufwene 2008; Tuten 2008). However, many questioned Trudgill's dismissal of identity in its entirety and his assumption that it is only relevant on a national scale, with a number of respondents highlighting the complexity and multiplicity of identity (Bauer 2008; Holmes & Kerswill 2008; Schneider 2008; Tuten 2008). Some discussed the relationship between accommodation and identity and their dependence on one another, particularly amongst adults who cannot just disregard any effects of identity (Coupland 2008; Holmes & Kerswill 2008; Schneider 2008; Tuten 2008). Further, Holmes and Kerswill (2008) comment that identity could be used to explain the choice of a given variant over another when forms with equal frequency are present in contact situations. In cases such as these, Holmes and Kerswill argue that social factors would predict both the 'the frequency of interactions [between interlocutors] AND the direction of accommodation' (2008: 275), thus predicting the direction of change and contributing to new dialect formation.

As in a number of other studies, work undertaken in Glasgow by Lambert et al. (2007) explicitly called into question the idea that identity does not play a role in new dialect formation. Part of the research involved ethnographic work in a school with six 18-year-old second-generation female (Panjabi/Urdu English trilingual) students over a period of three months. Lambert et al. commented that:

> It seems that certain features originally derived from language interference are now being *actively deployed* as English accent features by second and later generation speakers, though with rather different realisations and distributions from those expected in the original language. (2007: 1512, emphasis added)

They comment on a fused local and ethnic identity, speakers being *Glaswasian*; the talkers' mixed 'Glaswegian' and 'Asian[4]' identities being reflected in their mixed speech. Lambert et al. (2007) follow Harris (2006), who introduced the term 'Brasian':

> The fused term Brasian overcomes the implied essentialising dichotomies of increasingly popular terms such as 'British Asian'. […] it captures the rich and elaborate interwoven enactment of ethnicities in the interstitial textures of everyday life. […] For the majority of young people of South Asian descent in Britain, Britishness is always there, deeply rooted, especially in its embodied and therefore inescapable form, as everyday language use. (Harris 2006: 13)

Trudgill's rejoinder (2008b) aimed to answer the queries raised by the responses and further justify his position: that identity does not play a fundamental role in new dialect formation. He discussed the major role that children of the second- and later-generations play in the formation of new dialects. He claimed that children's full accommodation to the local speech community is 'something like a universal human behaviour' (2008b: 277), with the lack of social baggage allowing them to form the dialect independent of identity. This is also considered in Trudgill (2004), in which he claims that third-

[4] Throughout this thesis 'Asian' is used in the usual UK sense to refer to individuals and communities who have connections or family heritage in the Indian subcontinent, namely India, Pakistan or Bangladesh.

generation[5] children are the ones who 'do the generating' (2004: 27). He states that mechanical explanations should be explored first, with social explanations coming, if necessary, later. Responding specifically to Holmes and Kerswill (2008), Trudgill remarks that numerically equivalent variants are rare, with the most common variant being the one which will survive. In rare situations when this is not the case, Trudgill claims that both survive but undergo the process of reallocation, a process which, as noted earlier, could result in social variability.

Consistent across many of the responses to Trudgill's (2008a) paper is the acknowledgement of the automaticity of accommodation. However, Trudgill's dismissal of the role of identity in its entirety is strongly disputed by the response authors. Identity, alongside more mechanical linguistic considerations, can help explore and explain the consequences of multiple accommodatory instances which result in new varieties. In line with Trudgill (2008a, b) and Ravindranath (2015), this thesis aims to consider primarily linguistic but also social explanations for variation. Although the role of identity should not be considered at the expense of a full and thorough analysis of the linguistic processes, I agree with many of Trudgill's respondents that identity often plays a role in linguistic variation; the complications come when trying to establish what role it plays and what it is indexing.

Further consideration of the role of children was made by Chambers (2002), who refers to the 'Ethan Experience': an innate-filter which blocks the perception or adoption of 'non-native' features by second-generation children in migration situations. Not only does Chambers discount the role played by children, he argues wholesale against the retention or reallocation of 'non-native' features in the speech of the children. The situation described by Chambers (2002) reflects a very specific type of migration situation: when a single family moves into a new linguistic area. The numerous studies described below illustrate that, at least with large-scale migration, the 'Ethan Experience' cannot be expected to be present (e.g. Sharma and Sankaran 2011).

Interestingly, Labov (2001: 20) does not consider dialect contact in his exploration of the social factors affecting linguistic change. Instead, he focusses on change which arises within a linguistic system. As noted by Mufwene (2001: 150), the difference between idiolects and dialects, and thus accommodation and dialect contact, is merely

[5] Trudgill (2004) refers in his book to these speakers as 'second-generation' as they are the second-generation of speakers born within the new community. For consistency they are referred to here as third-generation.

quantitative. It is surprising that Labov does not consider situations of dialect contact relevant to an understanding of the role that social factors play in linguistic variation, particularly given the mobile nature of human behaviour, which is increasingly being noted by linguists (e.g. Kerswill 2015).

2.2.2 English Contact varieties

As well as more recent work describing the development of contact varieties that have evolved as a consequence of interactions with other languages, much work has been done considering dialect contact in patterns of English in the UK. Kerswill and Williams (2005) discussed dialect levelling in the new town of Milton Keynes, Watt (2002) considers levelling to a supralocal standard in Tyneside, Dyer (2002) reports on the reallocation of traditionally Scottish features in Corby, and Britain (2002) considers how levelling, reallocation and simplification all play a role in how past tense BE is realised in the Fens. Further, Wassink and Dyer (2004) commented on the consistent linguistic processes being exhibited in contact situations in both Corby, England and Kingston, Jamaica. Reallocation of previously stigmatised variants was argued by the authors to be taking place in both locations. In addition, dialect levelling was considered by Britain (2008) in his discussion of the origins of MOUTH realisations in New Zealand English.

Recently, an increasing interest has been taken in the contact varieties of English spoken in Britain and the influence of different languages. The term *English contact variety* is used here to refer to varieties of English in the UK and around the world which have evolved through contact with other languages as well as with other dialects of English. The following Section focusses on varieties of English spoken in the UK which have developed through contact with other languages as a consequence of large-scale migration to the UK. Specifically, I focus on varieties which are spoken by large and established second-generation populations, and thus speakers who have acquired English in the UK.

2.2.2.1 London

The consecutive *Linguistic Innovators* (Kerswill et al. 2004-2007) and *Multicultural London English* (Kerswill et al. 2007-2010) projects set out to document language change in inner-city London in an attempt to account for innovative patterns consistently observed across the UK. They introduced the label ‘Multicultural London English’ (MLE) to refer to a developing variety spoken in East London by adolescents and young adults (Cheshire et al. 2011). The variety is not spoken by a single ethnic group; instead, it is employed by young people from a range of ethnic backgrounds, with friendship group being a key determining factor in its distribution (Cheshire et al. 2008). Indeed, Cheshire et al. comment that MLE is:

> [A]n ethnically neutral variable repertoire that contains a core of innovative phonetic, grammatical and discourse-pragmatic features (2013: 65)

The *Linguistic Innovators: The English of Adolescents in London* (Kerswill et al. 2004-2007) project interviewed 27 male and 22 female adolescents in the inner-London borough of Hackney, with half of these speakers being labelled as *Anglo* speakers, and the other *non-Anglo* half comprised speakers from a range of non-White ethnicities. They comment that the diversity of the borough is reflected in the diversity of their sample, and participants were recorded within friendship groups. Two male and two female Anglo adults between 65 and 80 years of age were also recorded to act as a reference point for comparison with the adolescents. However, I would note that although the older Anglo speakers are a reference point for the Anglo adolescents in Hackney, this is of potentially less relevance to the non-Anglo speakers[6].

A comparable group of speakers was also interviewed in the outer-London borough of Havering. Here, nineteen male and seventeen female Anglo adolescents were interviewed, with two male and two female older Anglos included once again to act as a reference for comparison (Cheshire et al. 2013). All speakers recorded in both locations were from similar working-class backgrounds. Although the speech of adolescents in Havering was found to pattern consistently with widespread linguistic changes observed in the South East, this pattern was not found in Hackney. Hackney adolescents exhibited a number of unexpected and innovative variants.

Within Hackney, local MLE innovations such as the new quotative *this is + subject* (e.g. *this is me "let's go now"*, from Cheshire et al. 2013: 65), first person singular pronoun *man* (e.g. *I don't care what my girl looks like...it's her personality man's looking at*, from Cheshire et al. 2013: 65), and reduction in article allomorphy (e.g. *a apple*) are reported (Cheshire et al. 2013; Gabrielatos et al. 2010). These appear alongside more widespread non-standard features such as th-fronting, /l/ vocalisation,

[6] It is not necessarily appropriate to say a regional variety has changed a certain amount if the demography and population of a given location has entirely changed. Complementing this traditional assessment of change in regional dialects with a consideration of how a variety has changed by tracking variation through direct descendants would be valuable.

and global changes affecting English worldwide, such as GOOSE-fronting (Cheshire et al. 2008, 2011). Further, /k/ backing to [q], narrow diphthongs or monophthongs for FACE and GOAT, and /h/-retention have all been reported (Cheshire et al. 2008; Cheshire et al. 2013; Kerswill et al. 2008). A more syllable timed rhythm has also been observed in the variety (Torgersen & Szakay, 2011), and recent work suggests a breathy voice quality for males and a creaky voice quality for females may also be MLE innovations (Szakay & Torgersen 2015). A number of lexical innovations are noted too:

> They include *blood* and *bredren* ('friend'), *cuss* ('defame'), *ends* ('estate' or 'neighbourhood'), *tief* ('steal') and *whagwan* ('what's up'). (Cheshire et al. 2013: 65)

The second project, *Multicultural London English: the emergence, acquisition and diffusion of a new variety* (Kerswill et al. 2007-2010) interviewed children, caregivers and adults as well as adolescents in a second London borough with a different ethnic mix to facilitate comparisons with the first project. This resulted in interviews from 127 speakers aged between 4 and 40 years of age with a mix of Anglo and non-Anglo speakers (Cheshire et al. 2013). Although older adults were not found to use many MLE features, many were present in the speech of young adults and children. Further, perception tests illustrated that the variety was not associated with any one ethnicity, as listeners were unable to distinguish speaker ethnicities (Cheshire et al. 2013).

In Cheshire et al. (2011), the authors consider possible reasons for the linguistic patterns observed in and associated with MLE. They comment that the features present in modern day inner-city London should be considered 'the result of group second-language acquisition' (2011: 189). Discussing Mufwene (2001), they comment on an increased feature pool for MLE speakers comprised of an increased number of possible variants because of the wide and divergent input varieties. They comment that selection of features from the pool is based on an interaction between the frequency of variants and social factors (Cheshire et al. 2011). Further, they note that the population of London, consistent with many European cities, has an unusually high proportion of non-local speakers. In some London boroughs more than 50% of residents speak a language or variety other than 'London English', this resulting in a particularly variable feature pool.

Ethnographic fieldwork carried out in Southall explored how the use of variants associated with Indian English and divergent speaker repertoires corresponded to changing social demographics within the area (Sharma 2011; Sharma & Rampton 2011; Sharma & Sankaran 2011). Throughout much of the work, comparisons are made between older (> 35) and younger (≤ 35) second-generation speakers. The older second-generation group grew up during a period of community hostility. Sharma (2011) reports a number of events which took place in the area during the late 1960s to the early 1980s which occurred as a result of increased inter-ethnic tension. In contrast, the younger second-generation speakers grew up in a time of community coexistence. Schools became more multiracial, and British culture increasingly celebrated and welcomed Asian influences.

Sharma (2011) reports the results from two studies, with Part I of her paper considering retroflexion of /t/, and Part II examining speaker repertoires. Part I includes results which used sociolinguistic interview data from ten older second-generation speakers and fourteen younger second-generation speakers. An auditory analysis was undertaken and anything perceived by the author to be more retracted than alveolar [t] was coded as retroflex. Sharma comments that this reflected the variability associated with retroflexion, with speakers of the heritage language often varying between retraction of the tongue tip to full retroflexion involving sub-laminal contact (2011: 469). Focussing on gender variation over time, Sharma (2011) observes that males and females do not differ in the older second-generation group, with both groups using retroflex /t/ just under 16% of the time. In contrast, the younger group do vary by gender, the younger males exhibiting 14% retroflexion compared to the younger females, who use the form only 1% of the time. She notes that this pattern is consistent with much previous research, citing Labov who states that 'in stable sociolinguistic stratification, men use a higher frequency of non-standard forms than women' (Labov 1990: 205).

A further auditory analysis of this data is undertaken by Sharma and Sankaran (2011), who, in addition, also include sociolinguistic interview data from eighteen (nine male, nine female) first-generation community members. Sharma and Sankaran (2011) explore how retroflexion of /t/ interacts with glottalling of /t/ in word-medial and word-final position. Two word-initial variants were considered ([t ʈ]), and five word-medial and word-final variants were coded ([t ʈ d ʔ ø]).

The results illustrate that first-generation speakers exhibit [ʈ] 35% of the time overall, with this dropping to 16% for the older second-generation, and to 8.4% for the younger second-generation speakers. However, the authors note that the results illustrate ‘delayed restructuring’ (2011: 417), with younger second-generation speakers seeming to reallocate retroflexion. For these younger speakers it occurs primarily in word-initial position. Further, for younger females the variant is rarely found in interview speech but is present in home recordings. Regarding glottalling of /t/, no delay is observed. Although older second-generation speakers use this variant less, it is present in the speech of all second-generation speakers. Further, it always conforms to conditioning posited for glottalling, such that it occurs primarily in syllable-final position, and preceding a consonant (Sharma and Sankaran 2011: 421).

Part II of Sharma (2011) considers intra-speaker variation between a number of Indian English and British English variants. The variants explored are /t/ (Indian English [ʈ]; British English [t ʔ]), coda /l/ (Indian English [l], British English [ɫ]), FACE (Indian English [e]; British English [eɪ]), and GOAT (Indian English [o]; British English [əʊ])[7]. The data reported are from four participants who self-recorded when interacting with different familiar speakers. The results illustrate how older women and younger males exhibit less variation in their repertoires than do younger women and older males, with these last two groups showing more diverse repertoires. Sharma (2011) argues that these results force a reinterpretation of the gender patterns observed in Part I of Sharma (2011). The averaged proportions of retroflexion suggest older and younger males exhibit a similar amount, whereas Part II illustrates that the frequency of retroflexion varies for the older males depending on their interlocutor. Similarly, younger females exhibit hardly any retroflexion in the interview results from Part I, but Part II highlights that this does not mean that these forms are always absent from the speech of young females. As noted in Sharma and Sankaran (2011) these variants are present among these speakers in recordings made in the home.

The unexpected gender patterning of younger females and older males together and older females and younger males being similar is considered by Sharma (2011) to reflect changing social demographics. Although older second-generation speakers all grew up during the same hostile community period, the males were much more present in the wider community. Many retained close contacts with family back in India and were active in the local area. Thus, they needed to exhibit clear and diverse dialectal styles. In contrast, the older females were much more home oriented, both growing up

[7] For FACE and GOAT, Sharma (2011) comments that Cockney diphthongal variants were also coded and for coda /l/, vocalised tokens were noted. These additional variants were counted as examples of ‘British English’ variants.

and in their adult lives. Thus, their networks were much less diverse, and their repertoires reflected this. The younger speakers all grew up during a much more cohesive phase; the younger males retained strong, local, Asian ties but did not need to exhibit the diverse dialectal styles deployed by the older males. In contrast, the younger females were not as restricted in their network and family obligations. Thus, their repertoires reflected these more diverse networks (Sharma 2011).

Further exploration into what diverse speaker repertoires might mean to speakers and the subsequent indexical value of specific variants was further explored by Sharma and Rampton (2011). They report on a metric devised to assess whether intra-speaker variation corresponds to automatic accommodation or agentive identity-based work. This will be considered further in the General Discussion

Fox (2007) explored the speech of adolescents in Tower Hamlets, the London borough traditionally associated with Cockney speech. Fox was specifically assessing the impact of immigration from Bangladesh and how this has affected the accent of the area. In total, 39 adolescents were interviewed as part of the ethnographic fieldwork. This group was comprised of eleven White British males, seventeen Bangladeshi males, nine White British females and two mixed-race males. Over 5000 tokens of the PRICE vowel were auditorily analysed, with six variants being identified: [æ aɪ ɐɪ ɑ̟ɪ ɑɪ ɑː]. Of these, Bangladeshi boys used the newer variants [æ aɪ ɐɪ] almost all of the time. White British adolescents used these newer variants at a rate of around 60%, the traditional variants [ɑ̟ɪ ɑɪ ɑː] accounted for the rest of their tokens. Boys of mixed ethnic origin favoured variants with centralised onsets [ɑ̟ɪ ɐɪ], and White British girls favoured the traditional [ɑɪ] (Fox 2007; Fox et al. 2011).

As for FACE, Fox identified five possible realisations on the basis of an auditory analysis of 3083 tokens of the vowel: [e̞ɪ eɪ ɛɪ æɪ aɪ]. Less than 1% of the Bangladeshi boys' realisations were the traditional variants [æɪ aɪ]. For the White British group, variants were split between the traditional [æɪ aɪ] and newer variants [e̞ɪ eɪ ɛɪ]. For the White British boys, newer variants were more common, specifically [ɛɪ], which accounted for 55% of their tokens. In contrast, the White British girls, again, overwhelmingly favoured the traditional variants [æɪ aɪ]. The mixed-race boys showed a similar trend to the white British boys (Fox 2007; Fox et al. 2011).

As well as reporting on vowel variants, Fox explores hiatus resolution patterns amongst the adolescents (Britain & Fox 2009; Fox 2007). Simplification in article allomorphy is reported for both the indefinite and definite articles. Indefinite article *a* is consistently observed in prevocalic contexts, contrary to standard patterns which would predict *an* (e.g. *a apple* rather than *an apple*). Similarly, with the definite article, the unstressed [ðə] is maintained in prevocalic positions (e.g. [ðə] *apron* rather than [ði] *apron*). The Bangladeshi boys exhibit this pattern most frequently, 76% of cases having *a* rather than *an*, and over 80% having [ðə] rather than [ði]. White British girls consistently maintain the standard pattern, with over 90% of cases being *an*, and 100% [ði]. Although the white British and mixed race boys also show a greater proportion of *an* over *a* and [ði] over [ðə], they exhibit a greater proportion of 'non-standard variants' compared to the girls (25% *a*, 35% [ðə]). In all non-standard cases, glottal stops are inserted to resolve hiatus (Britain & Fox 2009: 189; Fox 2007: 230, 238).

Britain and Fox (2009) comment on the consistent hiatus resolution patterns observed in linking /r/ and V#V contexts (e.g. *three*[^{j}]*apples*; *two*[^{w}]*oak trees*). Although less marked, in all of these contexts Bangladeshi males are more likely to insert a glottal stop as a hiatus marker than are other speakers in the community. Similarly, they report on the increased retention of the full forms of vowels in small function words for the Bangladeshi males (e.g. [ɒv] for *of*), all features which they comment are associated with the contact nature of the variety (Fox 2007).

For all features, Fox repeatedly notes that friendship groups and networks are the best predictors of variation. The similarities between the White British boys and Bangladeshi boys reflect this, with patterns of contact accounting for the innovative patterns observed. Britain and Fox (2009) comment that, for the hiatus resolution patterns at least, this could reflect a 'vernacular universal'. They cite the consistency of these in patterns of child language acquisition and presence in the Englishes spoken around the world.

McCarthy et al. (2011, 2013) consider the realisation of a number of features in the speech of first- and second-generation London-Bengali speakers from Tower Hamlets and Camden. Tokens of interest were elicited using pictures, with participants uttering the word in the carrier phrase *say* ___ *again*. McCarthy et al. (2013) included six different speaker groups: Sylheti controls (5 speakers); Late arrivals (11 speakers); Early arrivals (9 speakers); Second-generation (6 speakers); and Standard Southern

British English controls (SSBE; 6 speakers). In addition to these groups, McCarthy et al. (2011) included a group of standard Bengali speakers.

For English stops, McCarthy et al. (2013) found that early arrivals and second-generation speakers did not exhibit any voicing lead in English, their patterns being consistent with those found in SSBE. However, they did vary from the Sylheti controls when speaking Sylheti: here they were observed to regularly exhibit longer VOT patterns. Both early arrivals and second-generation groups exhibited native-like vowels in both English and Sylheti. Late arrivals consistently manifested a Sylheti influence on their English for all phonological variables examined.

McCarthy et al. (2011) considered realisations of /l/, /r/, and a number of monophthongal vowels. Both /l/ and /r/ were auditorily coded for place and manner of articulation. Place was coded on a five-point alveolar-to-retroflex scale for both /r/ and /l/. Manner was marked on a five-point tap-to-approximant scale for /r/ and a nine-point clear-to-vocalised (via dark) scale for /l/. Sylheti controls and standard Bengali speakers were consistently observed to realise word-initial /r/ with taps and trills and word-medial /r/ as approximants. Other groups realised /r/ as an approximant in all contexts. For /l/, second-generation and SSBE speakers exhibited dark or vocalised /l/ in word-final position, in contrast to the other groups who 'used a variety of clear-dark variants' (2011: 1355).

Reporting on the monophthongal vowels, McCarthy et al. (2011) note that early first-generation, second-generation and SSBE speakers all exhibit a similar vowel space. In contrast, the standard Bengali, Sylheti controls and late first-generation speakers all have a vowel space for English which reflects their Indic language L1. Along with many others, they highlight the increased variability in the input for children growing up in immigrant communities.

Also considering the English spoken in London, Evans et al. (2007) reported the variation in vowel realisations for first- and second-generation Gujarati immigrants in Wembley. Participants were recorded reading words from cards to gather examples of the monophthongs of English. In total, ten first-generation speakers aged between 50 and 63 (balanced for gender) and ten second-generation speakers aged between 25 and 40 years (balanced for gender) were recorded. With the exception of the FOOT vowel, second-generation speakers consistently realised English monophthongs much as other

SSBE speakers did. In contrast to the more fronted FOOT among the SSBE speakers, this vowel remained retracted for the second-generation speakers. The first-generation speakers all exhibited a vowel space more similar to that observed for their L1, Gujarati. The authors note that the lack of difference between the second-generation and SSBE speakers is at odds with observations made of MLE (see above). They suggest that sociolinguistic factors may be the reason for this disparity, noting that many speakers commented that they felt it was important to ‘use a standard rather than an 'ethnic' accent’ (2007: 1743).

The studies described above illustrate how contact with another language is contributing to the evolution of English as spoken in the capital. Innovative realisations of FACE, GOAT, and PRICE are explicitly related to contact, with the retraction of /t/, and the realisations of /l/ and /r/ also considered to be evidence of heritage language influence. Although Evans et al. (2007) observe no influence of the heritage language on the speech of their second-generation speakers in Wembley they note that this may be as a consequence of social factors. The majority of work reported above highlights a number of innovative features found throughout the capital amongst speakers of contact varieties. Where innovations appear to be taking hold, it is consistently non-Anglo speakers who are most advanced (e.g. Fox et al. 2011).

2.2.2.2 The Midlands

In Leicester, Rathore-Nigsch (2015, 2011) and Rathore-Nigsch and Schreier (2016) comment on patterns observed in the speech of Indian-English speakers. Rathore-Nigsch and Schreier (2016) reports results from 23 male and female speakers: nine first-generation, fourteen second-generation speakers, all aged between 17 and 80, with primarily Gujarati linguistic heritage. Reporting on acoustic analysis from spontaneous conversations they note that for first-generation speakers who came to Leicester from India via East Africa, the NURSE and STRUT vowels are merged with central values for both. This pattern is consistent with Indian English. Conversely, second-generation speakers show distinct NURSE and STRUT phonemes, consistent with East Midlands English.

Rathore (2011, 2014) included two additional first-generation speakers and reports on patterns of rhoticity in the same community. An auditory analysis was adopted with ‘any kind of audible consonantal constriction’ (e.g. approximant, trill, r-coloured vowel) in coda /r/ contexts coded as rhotic (2014: 64). Tokens coded as rhotic were later broken down to explore relationships to East Midlands English, Indian English and East African English. Overtly realised coda /r/ was present in the English of the first-generation speakers (19%), whereas it was barely present among the second-generation group (0.7%). Further, the /r/ variant adopted by speakers when coda /r/ was realised varied; for the first-generation group taps and trills were common, while for the second-generation group approximants were common.

With specific reference to Birmingham speech, Fox et al. (2011) report results from Khan (2006). In total, 100 adolescents were recorded taking part in a sociolinguistic interview. Of these, 29 made up a White English group, 30 a Black Caribbean group, and 41 a Pakistani group. A further six older White English speakers (balanced for gender) were recorded. Four main variants of GOAT were noted: [oː ɔʊ ʌʊ əʊ]. The traditional Birmingham variant [ʌʊ] was used infrequently by the White English group, who used mostly [əʊ], and hardly at all by any other speakers. The [oː] variant was used primarily by the Pakistani group, with [ɔʊ] also being common. The Caribbean group also used the two innovative forms [oː ɔʊ], but produced a higher proportion of [əʊ] than the Pakistani groups.

For PRICE, Fox et al. (2011) comment on three main variants: [aɪ ɑɪ ɔɪ]. As with GOAT, the traditional variant [ɔɪ] is most often found amongst the White English group, but even here it is infrequent. The White English group use both [aɪ] and [ɑɪ] to similar degrees. Both the Pakistani and Caribbean groups use primarily [aɪ], with [ɑɪ] accounting for the majority of the remaining variation (c. 10-20%).

As in London, the research summarised from the Midlands highlights how innovations can be present in contact varieties of English and may be related to a heritage language. Further, the work discussed by Fox et al. (2011) is consistent with that discussed above for MLE in illustrating how non-Anglo speakers exhibit innovative patterns, with networks predicting the diffusion of the variants. However, as reported above, Evans et al. (2011) suggest that heritage language and first-generation features cannot necessarily be expected to persist, with Rathore-Nigsch's work in Leicester revealing how the second-generation speakers pattern more closely with non-contact speakers from the East Midlands.

2.2.2.3 Northern England

Drummond (2013a) reports on the possible development of a Multicultural Manchester English (MME) variety on the basis of preliminary data from four male speakers. He comments that a number of features characteristic of MLE are present in the speech of the Manchester adolescents. Extreme GOOSE-fronting, monophthongisation of FACE, GOAT, PRICE and MOUTH, th-stopping and simplification in article allomorphy are all attested. Both this study and Drummond and Dray (2015) consider language ideology and identity to be explanations for the distribution of these features amongst the adolescents. Although they cannot straightforwardly generalise across Manchester, the consistencies with MLE are noteworthy, with the effect of contact seemingly resulting in similar linguistic patterns in each location.

An undergraduate dissertation by Zara (2010) reported on an auditory analysis assessing the presence of retroflexion in the speech of ten British Asian and seven British White speakers in Blackburn. She observed that retroflexion of /t/, /d/, and /r/ was variably present in the speech of all the British Asian participants, but not in the speech of the British White speakers. Zara considers a number of reasons for the variability within the British Asian group, commenting that use of retroflexion highlights their ethnic identity and is something which speakers are aware of.

Work carried out by Heselwood and McChrystal (1999, 2000) in Bradford considered the influence of both Panjabi on English and English on Panjabi in the speech of bilingual speakers in the city. The 1999 study explored the realisation of stop consonants in Panjabi and considered the effects of age and place (Pakistan or UK) of L1 Panjabi acquisition. The authors note that speakers under the age of 25 who learnt Panjabi in Bradford are 'collapsing the three VOT categories of Panjabi into two categories, and that the two favoured categories are short lag and long lag' (1999: 60).

A later paper by Heselwood and McChrystal (2000) considered the influence of Panjabi on the English spoken by Group D from Heselwood and McChrystal (1999) (ten male, nine female 10 to 11 year old L1 Panjabi speakers). An additional control group of ten monolingual English speakers (five males, five females) from the same area was also recorded. Overall, bilingual males were perceived to exhibit more features with Panjabi influence than were bilingual females, based on impressionistic listening by 45 trained phoneticians. 'Non-English' features commonly reported to have contributed to the scores given by phoneticians were retroflex/postalveolar articulations, clear coda /l/ and backed /a/ or /aː/.

A close auditory analysis revealed that retroflex / postalveolar articulations were much more widespread amongst the male speakers (39% versus 21% for the females). This difference between males and females was also present for the backing of /a/ and /aː/, where the proportion of backed variants was 74% for the males and 58% for the females. Clear coda /l/ and epenthetic vowel insertion (e.g. *cand*[ə]*le*) were consistently observed for many bilingual speakers. Realisation of postvocalic /r/, deaspiration of voiceless stops and FOOT-tensing were not frequently observed, although these were salient to trained phoneticians as 'non-English' features. Acoustic analysis of prevoicing of voiced stops in English revealed a great deal of variability. Most bilingual speakers exhibited some prevoicing.

Considering rhythm, Rathcke and Smith (2015) compared the perceptual salience of timing patterns to trained phoneticians with speakers from Bradford and Leeds. Three male and three female middle-class speakers of each variety were recorded reading nursery rhymes. Ten native English phoneticians were then asked to rate the speakers along a scale from "strongly syllable-timed" to "strongly stress-timed". Their results illustrate that a syllable-timed rhythm in the speech of Bradford Panjabi-English bilinguals was significantly more salient when compared to Leeds monolinguals.

Kirkham and Wormald (2015) discussed results from an ultrasound tongue imaging study of Bradford English speakers. Reporting findings from midsagittal tongue shapes, they demonstrated that the realisations of /l/ and /r/ in the speech of five Asian females were more anterior than those produced by three Anglo females. The results were based on word list realisations with tokens included in the carrier phrase *It uttered* ___. The ultrasound tongue imaging results were consistent with an acoustic analysis of steady-state formants which accompanied the analysis. Asian English females were found to have a significantly higher F2 for /l/ and /r/ than the Anglo English females.

A number of studies undertaken in Sheffield by Kirkham (2011, 2013, 2015, in press) have consistently highlighted linguistic variation between speakers of different ethnicities. In total, 23 adolescent females and 28 adolescent males were interviewed in small groups over a period of fifteen months during ethnographic research undertaken by the author. The works aim to specifically consider phonetic variation and its interaction with social practice by examining a number of features in each study. Regarding /t/ affrication, Kirkham (2013) notes that for girls, affrication is predicted by community of practice but for boys, ethnicity is a better predictor, with Yemeni and Somali boys exhibiting a higher degree of frication than White boys.

The realisation of the happY vowel has also been considered by Kirkham (2013, 2015). 'Pro-school' girls in Sheffield produce 'tenser' [i] realisations of this vowel than do 'anti-school' girls, who tend towards the [ɛ̈] variant, which is traditionally associated more with working-class speakers. He notes that whether the girls are pro- or anti-school is not correlated in a one to one way with that speakers' class. Thus, Kirkham argues that the pattern observed:

> [R]epresents an ideological restructuring of citywide class associations in terms of the local social dynamics of the school. In this way, binary oppositions such as 'working-class' and 'middle-class' recur at a more local level, such as 'anti-school' and 'pro-school'. (2015: 647)

For the boys, Kirkham (2013) comments that the variation is better predicted by ethnicity than school orientation, but emphasises that any variation must be interpreted alongside a consideration of preceding segment, in that preceding /l/ and /r/ affects different speakers' realisations of happY in different ways.

This variation in liquid realisation was further explored by Kirkham (in press) using a subset of speakers. Four Anglo and four Asian (balanced for gender) adolescents were recorded reading single words in the carrier phrase *It uttered*___. The F2-F1 results suggest that Asian speakers realise /l/ significantly clearer than Anglo speakers do in both word-initial and -medial position, with all speakers exhibiting a dark /l/ word-finally. For /r/, no differences between Asian and Anglo speakers were observed when comparing F2-F1 measures across the trajectory.

The results from an analysis of the speech of four Sheffield Anglo and four Sheffield Asian (balanced for gender) adolescents were reported in Kirkham (2011). Word-initial /t/ and /d/ were elicited in words embedded in the carrier phrase *say* ___ *again*. No differences were observed between Asian and Anglo speakers in the realisation of /d/, based on a number of measures. However, the results illustrated that word-initial /t/ is significantly longer in duration, more retracted and has greater burst intensity for the Asian than it is for the Anglo speakers.

A study undertaken by Verma and Firth (1995) explored the presence of regional and 'mother tongue' features in the speech of bilingual (Panjabi/Urdu and English) children in Dewsbury (West Yorkshire) and Edinburgh. In Dewsbury boys and girls aged five and seven were recorded in free conversation at regular intervals over one year. A number of features were attributed to the influence of Panjabi and Urdu. The NURSE vowel was shorter in duration, and happY was realised as closer and fronter. Three voicing contrasts were retained for plosives (unaspirated, aspirated and increased aspirated), th-stopping was common, /w/ and /v/ were realised as [ʋ] intervocalically, and speakers realised coda /r/ with rhotic realisations being 'rolled' (trilled) in initial position and tapped [ɾ] in clusters. Epenthetic schwa insertion in some word-initial clusters was also attributed to the influence of the mother tongue in Dewsbury. Features such as monophthongal FACE and GOAT, unstressed happY, intervocalic glottal stops, Yorkshire assimilation and the realisation of /ŋ/ as [n] were all attributed to the influence of the regional Anglo variety. The reason for simplification of word-final clusters was not clear, with the authors commenting that it could be related to the mother tongue influence but could also be developmental, given the age of the participants. Little evidence of retroflexion was observed among any of the speakers.

Speakers of contact varieties in Northern England have then been found to exhibit a similar collection of innovative features as those reported for elsewhere in England. Monophthongal FACE and GOAT, clear /l/, retracted /t/ and th-stopping are just a few of the features regularly reported above to be characteristic of contact varieties spoken in this region.

2.2.2.4 Scotland

As mentioned earlier Verma and Firth (1995) also considered the speech of boys and girls in Edinburgh. Their participants were aged between five and eight years old. As in Dewsbury, the children were recorded at intervals over one year in free conversation. Patterns attributed to the influence of Panjabi and Urdu were consistent across the locations (see above). However, the epenthetic schwa insertion argued to be as a consequence of mother tongue influence in Dewsbury, was in Edinburgh said to be the result of the influence of an old Gaelic rule. Once again, little retroflexion was found among any of the speakers. As in Dewsbury, word final simplification of clusters observed in the speech of the Edinburgh children could have been either mother tongue influence or developmental. In Edinburgh, vowel realisations of FLEECE, KIT, LOT, THOUGHT, GOOSE, NURSE, the presence of word-final glottal stops, /s/ as [ʂ], word-internal /v/ as [f], and final /z/ as [s] were attributed to the influence of the regional variety.

As well as an accent judgement task, Lambert et al. (2007) report on an auditory and acoustic analysis of /l t p b/ using reading passage data from six Panjabi / Urdu bilinguals and four monolinguals in Glasgow. They report that retroflexion of /l/, prenasalisation of /b/, and avoidance of glottalised final /t/ with occasional ejectives were more common amongst Asian bilinguals than among the monolingual group. A second study by the same authors reported on the increased auditory salience of retracted /t d/ amongst female Asian adolescents, but they note that this interacts with conversation topic and social identification. As well as these acoustic and auditory reports, they comment on the perceptual salience of these accents to both phoneticians and lay listeners.

Alam and Stuart-Smith (2011, 2014) and Alam (2015) considered the realisation of /t/ to be indexing both a local and an ethnic identity. Different communities of practice illustrated nuanced variation which corresponded to speakers' identifications. In these papers they report on the results of an acoustic analysis of /t/ produced by six adolescent girls. Considering spectral moments, they commented that mean burst energy for the 'messabouts' was lower than for the 'conservative' community of practice. These communities of practice reflect different social attitudes and ideologies. The conservatives 'strongly adher[e] to traditional Pakistani cultural values' (2011: 217), by contrast to the messabouts, who despite socialising within the Asian community participate in activities which would be frowned upon by that group (e.g. smoking). The messabouts exhibit an auditorily laminal-dental articulation with a lower spectral mean, which is consistent with the speech of Glasgow non-Asian males. In contrast, the auditorily apico-postalveolar and higher spectral means among the conservatives are consistent with the speech of Glasgow Asian males. The authors suggest that the results show that the variation serves to index a local ethnic identity.

This consideration of local ethnic identity is further explored in another paper by the same authors. Stuart-Smith et al. (2011) report the results of an acoustic analysis of the FACE and GOAT vowels and syllable-initial /l/. When comparing between six Glasgow Asian (English dominant, Panjabi bilinguals) and four Glasgow non-Asian speakers both FACE and GOAT were closer and fronter for the Asian group. They also note that variation depends on social network, with one Glasgow Asian male patterning with the non-Asian group and this speaker having the lowest proportion of Asian friends. In addition, there is more marked separation between the groups based on the realisations of the GOAT vowel. A second dataset compared variation in these vowels between three communities of practice within a group of six Glasgow Asian (English dominant, Panjabi/Urdu trilinguals) female adolescents. The largest differences were observed between the two speakers from the conservative community of practice (defined above). These differences were considered to individually reflect two subgroups: a conservative cultural and a conservative religious group.

Considering /l/, they report an interaction between local and ethnic identity. For the first dataset, /l/ was realised with a higher F2 for Glasgow Asian speakers, suggesting a clearer realisation. However, the authors note that although the Glasgow Asian variant is clearer than the Glasgow non-Asian speakers' /l/, it is still much darker than that observed in many varieties of English. In the second dataset they again report variation by community of practice. The conservative cultural speaker has the highest F2, and the conservative religious speaker the lowest F2. They comment that ethnicity is important to the interpretation of all the patterns, with the interaction with local identity being strongly relevant.

In Alam & Stuart-Smith (2014) the authors comment that the two speakers who are part of the Modern community of practice are split. The Moderns are characterised by their trendy clothes and the wearing of make-up, although neither member of this group acts outside of community norms. With regards to /t/ realisation, the first speaker in this group patterns acoustically with the Messabouts, and the other with the Conservatives. However, in 2011 Stuart-Smith et al. observed the opposite pattern when looking at /l/. Here, the first speaker patterned with the Conservatives, and the other with the Messabouts. The authors suggest that this may be an indication that membership of a community of practice is comprised of characteristic patterns in a number of features, not just one.

Alam (2015) expands upon much of this work and highlights how Glasgow Asian adolescent females reflect their complex and nuanced ethnic, regional, personal, cultural and social identities through fine-grained phonetic variation across a number of phonetic features. Regarding /t/ realisation, Alam comments that it is tongue shape which corresponds to social factors, with differences corresponding to apical or laminal realisations. She notes that although members of the Conservative community of practice exhibit the most retracted articulations, no evidence of retroflex /ʈ/ is found for any speakers.

In addition to commenting on /t/ realisation, Alam (2015) also reports on an automatic formant analysis of F1 and F2 for six vowels. Characterisations of the vowels /i e a ɔ o ʉ/ were all presented (FLEECE, FACE, CAT, COT/CAUGHT, GOAT and BOOT, respectively). The results illustrated that linguistic factors accounted for much of the within ethnicity variation, but different communities of practice exhibited slight variation in their realisations of FLEECE and BOOT. In contrast to the results discussed in Stuart-Smith et al. (2011), no separation by community of practice is observed for FACE and GOAT within the Asian adolescent female group.

Between Asian and non-Asian speakers a number of differences were observed, with GOAT patterning differently across all phonetic contexts. In Glasgow, Alam reports that GOAT is 'significantly fronted and qualitatively lower in Asian speakers' (2015: 210). No differences were observed between Asian and non-Asian speakers' realisations of FACE. More nuanced variations between ethnic groups were also observed with FLEECE, CAT, COT/CAUGHT and BOOT. For BOOT, Asian speakers were observed to show more fronted variants than non-Asian speakers, with variation in F2 also accounting for within Asian differences between different communities of practice. Alam comments that this is different to the variation which is reported amongst non-Asian Glaswegians, with Alam noting that Glaswegians are reported to show variation in F1 (BOOT lowering), rather than F2 (see also Stuart-Smith et al. forthcoming).

The work discussed above reports a number of linguistic features which have been consistently described as characteristic of contact varieties of English spoken in Scotland and corresponds to the patterns described in other UK regions. Clear /l/, th-stopping and qualitative variation in FACE and GOAT have all been mentioned in previous studies in other locations. The work undertaken in Scotland also highlights the importance of considering the interaction between local and ethnic identity in any interpretation of the patterns observed (e.g. Stuart-Smith et al. 2011).

2.2.2.5 English in the Indian subcontinent

Characterisations of Indian and Pakistani Englishes have also been made, with the varieties in question said to be a reflection of the interaction between English (spoken as either an additional L1 or L2) and an Indic language. Amongst others, Wells (1982c), Gargesh (2008) and Mahboob and Ahmar (2008) all provide illustrative characterisations of these varieties. These studies will be referenced in more detail where relevant throughout the thesis.

2.2.3 Implications for the current work

Much work on contact varieties of English has commented on the role of ethnicity in understanding any variation. Furthermore, consistent linguistic patterns have been observed despite the appreciable geographical distances between the locales where the varieties are spoken. Clear coda /l/, monophthongal FACE and GOAT, and retracted articulations of alveolar consonants are just a few commonly-reported characteristics of English contact varieties with an Indic language influence. The selection of variables to be investigated in this thesis was based on a consideration of the consistent patterns which have previously been observed, and also the patterns which have been reported in the respective Anglo English varieties. As Stuart-Smith et al. (2011) make clear, the important thing is not that the variants observed in each location are necessarily the same, but that the relationship between the contact and non-contact variety is consistent. As they note, clearer /l/s are consistently observed in contact varieties with an Indic heritage language, but that does not mean that these /l/s will all be as clear as one another.

The realisation of FACE and GOAT in Bradford and Leicester was considered to be a variable of particular interest. These two vowels have been shown to pattern similarly in the contact varieties of English spoken in London (e.g. Cheshire et al. 2008; Sharma 2011), Glasgow (Stuart-Smith et al. 2011), Birmingham (Fox et al. 2011) and Manchester (Drummond 2013a). Reports on the Anglo English spoken in Bradford and Leicester indicate quite divergent realisations for these vowels (e.g. Hughes, A. et al. 2012). By including them in this study the findings further contribute to our knowledge of contact patterns. In the current context, direct cross regional comparisons can be made to further explore the relationship between language contact and regional variation in locations which exhibit markedly different realisations. In addition to these two vowels, the realisation of GOOSE in each location is explored. Although this is not as frequently considered in the studies reported, and thus we do not have as much of an understanding of how this patterns in contact situations, the fronting of vowels traditionally thought to occupy the back of the vowel space is increasingly commonplace (e.g. Labov 2010).

As well as vocalic realisations, a number of the studies reported above have remarked upon /r/ in contact varieties of English. Some have focussed on the articulatory realisation of /r/ (e.g. Kirkham & Wormald 2015; Zara 2010), whilst others have explored the patterns in terms of the phonology (e.g. Britain & Fox 2009 on /r/-sandhi and hiatus resolution). Work by Rathore (2011) in Leicester considered both, with her study exploring the presence of non-prevocalic coda /r/ and the articulation of any realisation. Given the diversity in the type of work which has been undertaken in respect of /r/, this thesis provides a grounding for future research by characterising the realisation of /r/ in two contact varieties of English and assessing the relationship to both the heritage language and the local Anglo English variety.

As well as the segmental patterns described above, the characteristic voice quality profiles exhibited by speakers of the two contact varieties will be presented. There is little comprehensive work in sociolinguistics which characterises speakers and varieties by their long term vocal settings (e.g. Thomas 2013). This is despite research which demonstrates the variability which is present (e.g. Stuart-Smith 1999) and also the value attributed to this variable in forensic contexts (e.g Gold & French 2011). Accordingly the analysis of voice quality was included to provide a complement to the segmental analysis, to deliver a descriptive account of voice quality in the varieties being considered, and to bring to the fore voice quality as a potential variable in sociolinguistic research.

Although these reflect only a few of the potential variables which could be examined, they were judged to be the most pertinent in the current context and those which best enable me to address the research questions outlined in Chapter 1. Any number of additional variables could be fruitfully explored but these are currently reserved for future research, with a number of suggestions being made in Chapter 7.

More detailed predictions about the specific patterns which might be expected for each of the above variables are considered in subsequent Chapters. However, a number of suggestions can be made about the type of variation which might be anticipated among the speakers of Panjabi English being considered here. Researchers from both language and dialect contact recurrently comment on the diversity of repertoires amongst speakers of contact varieties (e.g. Britain 2012; Matras 2009; Trudgill 2004). As such, increased linguistic variability amongst the Stage II (Trudgill 2004), second-generation Panjabi English speakers in Bradford and Leicester is expected.

In addition, much research has noted the importance of the relationship between any heritage language and the non-contact variety within a given region when attempting to interpret and understand the patterns observed in contact varieties (e.g. Stuart-Smith et al. 2011). In this case, we would expect the two regional Anglo English varieties to be playing a role in the development of each respective Panjabi English variety. Consequently, any linguistic patterns described for Panjabi English in Bradford and Leicester will need to be addressed in relation to the Anglo English variety, as well as being considered independently and compared to one another.

As discussed above, Trudgill (1986, 2004) details a number of diachronic processes which would be expected in contexts such as the one being investigated here. In addition to the increased variability then, we would expect to find evidence of some of the processes which have been reported to take place in dialect contact situations. Thus, the subsequent Chapters consider whether these processes can help to account for any linguistic variation observed in the Panjabi English spoken in Bradford and Leicester.

The reasons for the cross-regional consistencies which have been observed in contact varieties of English spoken in the UK are only beginning to be comprehensively addressed. It could be that geographical diffusion accounts for the similarities. Traditionally, it is assumed that innovative linguistic patterns evolve in large economic and urban centres and then spread outwards with smaller cities and larger towns adopting the variant before intermediate rural locations (e.g. Britain 2013; Kerswill 2003). However, recent work in London (e.g. Kerswill et al. 2008) observed that, contra to expectations, linguistic patterns in the capital were *not* more advanced than those in periphery locations. Instead, different patterns were observed. It is predicted here that it may not be geographical diffusion in and of itself which accounts for the cross-regional consistencies observed in contact varieties of English spoken in the UK. Instead, the consistent sociolinguistic situation of contact which exists in these locations is contributing to the consistent linguistic patterns: similar contexts may be leading to similar output. Thus, given the similar linguistic environments in which Panjabi English is developing in Bradford and Leicester, we might expect that the same processes to be taking place, with subsequently comparable linguistic outputs observed in each location.

All of these predictions will be considered more fully in Chapter 7 (Section 7.8) when each of the variables have been investigated, and the results presented and discussed.

There is a lack of agreement in the dialect and language contact literature about the role and relevance of identity in new dialect formation (e.g. Thomason 2008; Trudgill 2008a). The primary aim of this thesis is to describe the patterns of Panjabi English in two separate locations and explore reasons for any similarities or divergences. As such, considering the influence of identity - a fluid, local, and individual construct - will not play a fundamental role in this thesis. However, I do not believe that any influence of identity is completely absent and it will likely account to some degree for patterns of variation which are observed within a community. Although this does not form a major part of the thesis, the role of identity is considered further in Chapter 7 in relation to the findings of the current study.

2.3 The Panjab, Panjabi and the UK

The first of the following two Sections will consider the diversity in and use of Panjabi in the Panjab and the UK. Subsequently, a brief overview of the historical circumstances which led to large-scale migration from the Panjab into the UK, and specifically Bradford and Leicester, will be described.

2.3.1 Panjabi

Panjabi is an Indo-Aryan language of the Panjab region, a region of five rivers in North East and central Pakistan and North West India, and is one of several national languages in both countries (Bhatia 1993; Breton 1997). According to Breton (1997), 1991 census figures suggest that there are around 24 million speakers in India and 70 million in Pakistan. Although the language originated in this area, Panjabi is spoken widely throughout the world. There are no official statistics for the number of speakers worldwide, however, and estimates vary greatly between the 45 million quoted by Bhatia (1993: xxv) to more than 92 million in the online *Ethnologue* (Lewis et al. ed. 2015). Shackle (2003) highlights a number of problems in calculating the size of the population of Panjabi speakers in India and Pakistan. Further, there is great linguistic diversity both within the Panjab and within varieties labelled as ‘Panjabi’, as this comment from Shackle’s illustration of Panjabi emphasises:

> These [complications] include often blurred linguistic frontiers; widespread diglossia and bilingualism with influential languages of high cultural prestige; a

> degree of internal dialectal variation sufficient to call the unicity of ‘Panjabi’ into serious question; historical patterns of divergent religious and cultural traditions; and the sociolinguistic consequences of the political partition of the Panjab in 1947 between India and Pakistan. (2003: 583)

Moreover, Stubbs (1985) comments that in the *Linguistic Minorities Project* carried out in the UK, interpretation of data and language labelling was at its most complicated for participants who had origins in the Panjab. He continues to discuss the primary differences between the communities originating in the Panjab, noting that Pakistani Panjab migrants are likely to regard Pakistan’s national language Urdu more highly but speak a dialect of Panjabi at home. This variety may have only a spoken form. In contrast, Indian Panjab migrants are likely to be Sikh and thus tend to use a variety of Panjabi written in the Gurmukhi script and strongly associated with the religion. These comments are echoed by Mobbs (1985). Figure 1 and Figure 2 below exemplify this variation associated with Panjabi. Figure 1 is a map of India and Pakistan detailing the Indo-Aryan languages spoken. The Panjabi linguistic area is in the north west of the region, straddling both India and Pakistan. Figure 2 is taken from Shackle (2003) and details the different varieties of Panjabi in bold. Locations in the Panjab are included in non-bold text, and language regions marking the boundaries of the Panjabi linguistic area are included in square brackets.

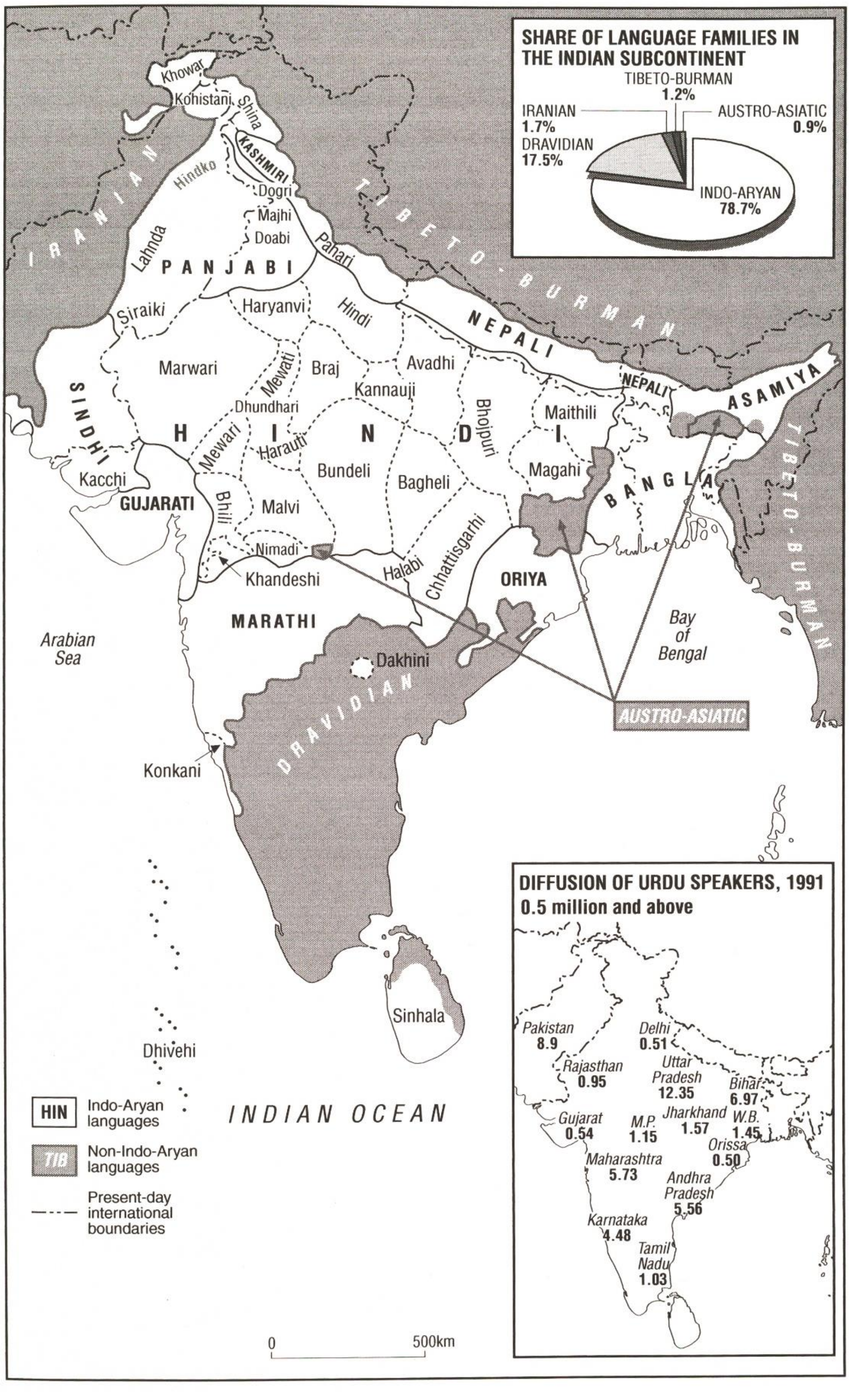

Figure 1: Map of showing the languages of India and Pakistan. Panjabi is spoken in the North West of the Indo-Aryan language region (Map from Cardona & Jain 2003: 3).

Figure **2**: Dialect areas in the Panjab region (Map from Shackle 2003: 584).

As mentioned by Shackle (2003), reasons for these linguistic differences are said to be partly related to partition. After this, ideological and linguistic identity became increasingly important, with communities further establishing boundaries between themselves (e.g. Mobbs 1985; Stubbs 1985). Although I know of no studies which have specifically considered the effects of partition, this period no doubt resulted in significant sociolinguistic changes in the Panjabi language. Despite literature preceding this period commenting on linguistic diversity within the Panjab region, partition has added to the complexity associated with this language, in both linguistic and ideological terms.

2.3.1.1 Panjabi in the UK

Panjabi was chosen as the heritage language in the thesis due to its widespread use across the UK. According to the 2011 UK census, Panjabi is the third most widely-spoken main language in England and Wales and the most widely-spoken Indic language (ONS 2013b). The census reports that there are 273,000 speakers who consider Panjabi their main language (0.5%), following English (c. 50 million; 92.3%) and Polish (546,000; 1%). However, it is likely that these census statistics represent a conservative estimate of the total number of people who speak Panjabi. The data do not include information on second or other languages spoken, meaning that if Panjabi is spoken, but not classed by an individual as their 'main language,' it is not included in the results[8]. The online *Ethnologue* estimates the number of Panjabi speakers in the UK to be at 681,000 (Lewis et al. ed. 2015). Reynolds and Verma (2007: 307) comment that speakers of the main Indic languages in Britain (Panjabi, Hindi, Urdu, Gujarati and Bangla) outnumber speakers of indigenous minority languages, and Mobbs (1985) states that of the former set, Panjabi has the highest number of speakers in Britain. Hansard reports suggest that with up to 1.3 million speakers, Panjabi is the second most widely-spoken language after English in the UK (Hansard 2000, 2001, 2006). Despite the wide-ranging reports on the numbers involved, it is clear that Panjabi speakers represent a large proportion of Britain's minority language community.

[8] An initial question in the 2011 census asked 'What is your main language?' with answering options as 'English' or 'Other'. If 'Other', individuals were required to write in their 'main' language. 'Main language' was not further specified so it is not known how it was intended or how it was interpreted. It is also not known whether individuals could have written multiple main languages. For those who did not speak English as a 'main' language a further question was included asking individuals how well they spoke English with four possible responses: 'Very well', 'Well', 'Not well', 'Not at all'.

Moreover, communities who speak (or used to speak) Panjabi are well established in the UK. Indian and Pakistani individuals make up the largest ethnic minority community in England and Wales, accounting for 4.5% of the population (ONS 2013a). Consequently, not only do Panjabi communities form part of Britain's largest minority language population, they are also one of the best-established, with growing second- and third-generation (British born) communities. Panjabi communities in the UK are made up of two sub-communities. One Panjabi community is comprised of predominantly Sikhs from the Indian Panjab, with the other being mostly Muslims from the Pakistani Panjab.

Participants interviewed for the present thesis often commented upon the linguistic diversity associated with Panjabi and discussed a range of differences within the language. In Bradford, all Panjabi English speakers had family origins in the Pakistani Panjab, an area of particular linguistic diversity (Shackle 1979). As well as Panjabi, speakers frequently used alternative labels to name their heritage language. These included Pihari, Mirpuri, Hindko and Pushto. The linguistic similarity of these varieties to Modern Standard Panjabi is not clear, with some commentators suggesting they are wholly separate languages from Panjabi (Lothers & Lothers 2010, 2012; Shackle 2003). In Leicester, all Panjabi English speakers had family origins in the Indian Panjab, with all of these participants specifically referring to Panjabi as their heritage language.

Modern Standard Panjabi contains ten contrastive vowel phonemes (e.g. Bhardwaj 2012; Bhatia 1993; Shackle 2003). Quality is more important than length for vowels, with the system contrasting a set of centralised (/ɪ ə ʊ/) and peripheral (/i e ɛ ɑ ɔ o u/) vowels. According to Shackle (2003: 587), the open realisation of /ɛ/ can act as a shibboleth for Panjabi speakers compared to Hindi or Urdu speakers. All peripheral vowels can be nasalised with the exception of /i e o/ in word-initial position. Diphthongs are all rising with a combination of centralised and peripheral vowel (Bhatia 1993; Shackle 2003).

	Glottal	Velar	Palatal	Retroflex	Dental	Labial
stops:						
vcls.		*k*	*c*	*ṭ*	*t*	*p*
vcls./asp.		*kh*	*ch*	*ṭh*	*th*	*ph*
vcd.		*g*	*j*	*ḍ*	*d*	*b*
nasals				*ṇ*	*n*	*m*
flaps				*ṛ*	*r*	
laterals				*ḷ*	*l*	
vcls.fric.		(*χ*)	*š*		*s*	(*ʃ*)
vcd.fric.	*h*	(*γ*)			(*z*)	
semivwls		*y*				*v*

Figure 3: Panjabi consonant phonemes. Taken from Shackle (2003: 589)

Figure 3 is taken from Shackle's (2003) illustration of Panjabi and shows the 31 contrastive consonant phonemes in the language. The primary distinguishing characteristic of Panjabi as compared to other Indic languages such as Hindi or Urdu is the absence of the voiced aspirates (/bʰ dʰ ɖʰ ɟʰ ɡʰ/), these instead are replaced before a stressed syllable by voiceless unaspirated consonants (/p t ʈ c k/) with accompanying low tone on the vowel. After a stressed syllable these occur as voiced aspirates with the vowel exhibiting a high tone (Bhatia 1993; Shackle 2003; Stuart-Smith & Cortina-Borja 2012)[9]. Geminate consonants can occur in word-medial and word-final position for all except /ɳ ɭ r ɽ ɦ j/ and there are a large number of permissible consonant clusters (Bhatia 1993).

Along with the variation associated with the Panjabi spoken in the Panjab, there is also evidence to suggest that British Panjabi is changing (Heselwood & McChrystal 1999; Stuart-Smith & Cortina-Borja 2012). Further work on the regional differences of Panjabi as spoken in the UK would be very fruitful. Throughout this thesis, more detailed consideration of reported differences between Panjabi varieties is made where relevant. Within the Voice Quality, Vowels and /r/ Chapters relevant characterisations of Panjabi and related varieties are reported. Further, the implications of the dialectal diversity in the sample are considered more generally in the General Discussion

[9] Shackle (2003: 590) remarks that some varieties of Panjabi, particularly Hindko varieties in north-west Panjab retain the voiced aspirates. Further, Siraiki, a variety spoken in the south-west of the region and described by Shackle as the most distinct from Modern Standard Panjabi, retains the voiced aspirates and also contains four contrastive implosives: /ɓ ɗ̠ ʄ ɠ/.

2.3.2 A brief history of migration: from the Panjab to the UK

The end of the Second World War saw severe labour shortages in the UK. A combination of this and the Indian Independence Act of August 1947 triggered large-scale migration into the UK from India and Pakistan. The Indian Independence Act (UK Parliament, 1947) divided India into two new independent countries: India and Pakistan. The division allocated predominantly Sikh and Hindu areas to India and predominantly Muslim areas to Pakistan, with the previously united Panjab region being divided into 'East' and 'West' (UK Parliament, 1947).

The division of the Panjab region along religious lines as a consequence of the Indian Independence Act resulted in large demographic changes and significant unrest in what was previously a peaceable home for Sikhs, Hindus and Muslims. The partition of India was effected to create a Muslim state in Pakistan (e.g. Mobbs 1985). Figure 4 below is a table taken from Hill et al. (2008) and draws attention to the change in population demographics triggered by the Independence Act over a ten-year period in districts of the Panjab. They note that between 2.3 and 3.2 million people in the Panjab region were left unaccounted for as a consequence of partition, either through mortality or unrecorded migration.

Table 3 Per cent composition by religion for all Punjab and for each district, 1941 and 1951 censuses

	Hindu		Sikh		Muslim	
District	1941	1951	1941	1951	1941	1951
Districts that remained part of India						
Hissar	64.8	91.3	6.0	7.7	28.3	0.3
Rohtak	81.6	98.5	0.2	0.7	17.4	0.2
Gurgaon	66.2	82.1	0.1	0.7	33.8	16.9
Karnal	67.0	90.3	2.0	8.9	30.6	0.3
Ambala	48.4	72.2	18.5	24.6	31.7	2.4
Simla	76.4	80.8	2.7	16.1	18.2	1.4
Kangra	93.2	96.0	0.5	2.0	4.8	0.7
Hoshiarpur	49.9	72.8	16.9	26.0	32.4	0.1
Jullundur	27.6	40.7	26.5	54.0	45.2	0.2
Ludhiana	20.4	37.3	41.6	61.6	37.0	0.4
Ferozepur	19.6	38.1	33.7	58.8	45.1	0.4
Amritsar	[17.7]	[27.7]	[35.2]	[70.6]	[45.4]	[0.3]
Gurdaspur	[25.9]	[49.6]	[18.8]	[41.7]	[50.2]	[1.3]
Districts that became part of Pakistan						
Lahore	[16.3]	[1.0]	[18.4]	[0.0]	[61.0]	[94.7]
Sialkot	19.4	1.0	11.7	0.0	62.1	93.8
Gujranwala	11.8	0.1	10.9	0.0	70.5	94.3
Sheikupura	9.1	0.0	18.9	0.0	63.6	95.0
Gujrat	7.7	0.0	6.4	0.0	85.6	99.9
Shahpur/Sargodha	10.1	0.0	4.8	0.0	83.7	99.2
Jhelum	6.5	0.0	3.9	0.0	89.4	99.8
Rawalpindi	10.5	0.0	8.2	0.0	80.0	99.6
Attock	6.4	0.0	3.0	0.0	90.4	99.9
Mianwali	20.3	0.0	1.2	0.0	78.4	99.9
Montgomery	14.4	0.0	13.2	0.0	69.1	98.5
Lyallpur	7.2	0.0	19.8	0.0	66.0	97.0
Jhang	15.9	0.0	1.5	0.0	82.5	99.9
Multan	20.5	0.0	5.2	0.0	72.4	99.3
Muzaffargarh	12.7	0.0	0.8	0.0	86.4	100.0
Dera Gazi Khan	10.9	0.0	0.2	0.0	88.9	100.0
Total, all Punjab	27.8	26.4	13.2	12.1	55.9	59.9

Note: Bracketed values are for districts the geography of which was fundamentally changed by partition.
Source: Censuses of India 1941, 1951 and Census of Pakistan 1951.

Figure 4: Table from Hill et al. (2008: 165) illustrating population demographics before and after Indian independence (1941 and 1951, respectively).

Large numbers of Panjabis, predominantly males, migrated to the UK in a response to the labour shortages after the Second World War. However, immigration legislation was changed during the 1960s and 1970s, which began to restrict the right of entry to the UK for Commonwealth citizens. Thus, many wives and families of the young men also came out to the UK during this period to ensure that they could remain together (Stubbs 1985: 35).

Questions referring to ethnicity were not included in the UK National census until 1991. If data on place of birth are used, in the 1981 census 378,712 people stated that they were born in India, and 179,723 stated they were born in Pakistan. This accounts for just over 1% of the total population of England, which was 45.8 million in 1981 (Stubbs 1985).

According to the UK Census, since 1991 ethnic minority populations have increased. However, developments in the ethnicity question mean that direct comparisons across censuses are problematic. Extra categories have been added across the years, leading to a more detailed picture in later censuses, but also to a lack of clarity when comparing the data from different censuses[10] (ONS 2006). In 1991, 5.9% of individuals in England and Wales identified themselves as non-white. By 2001, those identifying as 'non-white' rose to 8.7% ('White Irish' and 'White Other' counted as part of the majority). If only those who defined themselves as 'White British' are counted as the majority, the ethnic minority population can be considered to be 12.5% in 2001 (ONS 2006: 42). In 2011, if the majority population is considered to be only those who indicated 'White English / Welsh / Scottish / Northern Irish / British' (i.e. white UK) the minority population in England and Wales increased to 19.5%, a rise of 7% from 2001 (ONS 2012a: 4).

The 2011 census data indicate that, when combined, Indian and Pakistani Asians make up the largest ethnic minority group in England and Wales. Indian and Pakistani Asians account for 4.5% of the population, a rise of 1.2% since 2001 (ONS 2012b).

2.3.2.1 From the Panjab to Bradford & Leicester

Migration to Bradford from India and Pakistan took place largely between the late 1950s and early 1960s. Initially, migrants came to Bradford to work unpopular night-shifts in the textile mills. The majority of migrants to the city during this period were from the Mirpur region of Pakistan. The completion of the Mangla Dam in 1966 resulted in the displacement of around 100,000 residents of the Mirpur region, as many villages were flooded (e.g. Lothers and Lothers 2012). Since this period of migration, Bradford, once known as the wool capital of the world (e.g. Hird 1968), has lost its industrial infrastructure, partly as a consequence of cheap overseas production costs (Stubbs 1985). Although this period of migration is perhaps the one with which Bradford is most commonly associated, it was by no means the largest or the first. Bradford has long been a home to new migrants coming to the UK and a place associated with multilingual communities; since the mid-19th century, incomers have arrived in Bradford from many countries and spoken many languages. As Hird notes, 'truly Bradford in 1968 is a city of many tongues' (1968: 221). In 2001, riots took place

[10] In 1991 a single 'white' category was included with seven additional ethnicity categories and an 'other' option. In 2001 'British', 'Irish' and 'other' subgroups were added within the 'White' category, with a mixed category (e.g. White and Asian) included separately alongside two additional ethnicity categories (Asian or Asian British, and Black or Black British), and an 'other' category. In 2011 UK countries were reflected within a single white subgroup with additional White subgroups being included for 'Irish' or 'Gypsy/Irish traveller'. Once again there were different categories for individuals with mixed, Asian and Black ethnicities, each with slightly different subgroups. An 'other' category was also retained.

in the Manningham area of the city, with a negative legacy still remaining. Bradford is consistently turned to by the popular press when issues of integration or multiculturalism are in the public eye (e.g. Channel 4 2012; Pidd & Arnett 2016).

A combination of voluntary labour migrants from India and political refugees from East Africa are responsible for the composition of Leicester's Asian population. Many Asians moved to Leicester during the late 1960s and early 1970s to work in Leicester's textile industry (Vidal-Hall 2003). As in Bradford, the arrival of migrants during this period coincided with a downturn in the city's industries, as a consequence of cheaper overseas options. This resulted in increased tensions in the city and ultimately led to a racial confrontation in 1979 and Leicester being labelled 'the UK's most racist city' (Vidal-Hall 2003: 136). However, concerted efforts by community members and a substantial injection of money have meant that the city is now regarded as a community characterised by cohesion and successful integration (Addley 2001; Brown 2006; Vidal-Hall 2003). Unlike Bradford, no riots occurred in Leicester in 2001. The subsequent Cantle Report (2003) specifically noted that Leicester had successfully developed a more cohesive and united community, something which Bradford could learn from.

The 2011 census (ONS 2012b, 2013b) reported that 63.9% of Bradford's 528,155 residents identified as white UK, with an Indian or Pakistani population of 23%. This is well above the national average for England and Wales of 4.5%. Linguistically speaking, 4.2% of the city's population reported Panjabi as their main language. In Leicester, 30.7% of 337,653 residents identified as either Indian or Pakistani, with a white UK population of 45.1%. In the 2011 UK census, 2.4% of Leicester's population reported Panjabi as their main language, although, as noted above, this is likely to be a conservative estimate of the total number of Panjabi speakers. The proportion of Panjabi speakers in both Bradford and Leicester is above the average for England of 0.5%.

2.4 Summary

The literature presented above provides a broad, contextual background to the thesis. The following Chapters will report results for a number of phonological variables and their patterning in two contact varieties of English spoken in Leicester and Bradford. The influence of the heritage language, in this case, Panjabi, will be considered throughout, as will consistencies between other contact varieties of English spoken in the UK.

3 Fieldwork: Sampling & Methods

3.1 Introduction

The thesis aims to assess the impact of language contact on the English spoken in two British cities, with specific reference to Panjabi. This Chapter will discuss how the fieldwork process enabled the aims of the thesis to be fulfilled, beginning with information about the sampling choices made in Sections 3.2 and 3.3. These will detail the criteria used to select participants, the recording equipment used, and the storage and anonymisation of recordings after the event. These Sections will be followed by a discussion of the data elicitation methods in Section 3.4. A sociolinguistic interview which included several tasks was developed so as to gather appropriate data.

3.2 Participants

The criteria presented below represent those that were used to select and categorise speakers. Participants were selected based on their language background, region, age, and gender, representing a stratified random sample. These factors will be discussed in turn, in Sections 3.2.1 to 3.2.4 and will be followed by a discussion of class in Section 3.2.5.

3.2.1 Language background

As discussed in the Background Chapter, Panjabi language communities represent a large and diverse sector of the UK's minority language population. Second-generation (British-born) participants with Panjabi language heritage were sought. ‘Panjabi language heritage’ is here used to refer to individuals who have at least one parent who is a native Panjabi speaker, where that parent is a first-generation migrant from the Panjab region (see Section 2.3 for more on the Panjab region). Although this thesis is considering the potential impact of language contact between Panjabi and the varieties of English spoken in Bradford and Leicester, it was not a requirement for participants in the current study to be speakers of Panjabi themselves.

Previous research has observed no correlation between fluency in or use of a heritage language and the presence of contact-induced features in an individual's speech (e.g. Kirkham 2011; Sharma & Sankaran 2011). Nonetheless, information on speakers' perceived knowledge and patterns of use of Panjabi (and any other language) was gathered, even though it was not a limiting criterion on their participation (see Section

3.4.3.1 below). Two language-background criteria were established, with participants being:

- EITHER Second-generation (British-born) individuals with at least one parent who is a native Panjabi speaker and who migrated to the UK from the Panjab region,
- OR British-born individuals with no heritage language other than English and both parents and all grandparents born in the UK.

Participants falling into the first of these categories will be referred to throughout as 'Panjabi English' or 'PE' speakers. The term 'Panjabi English' is here considered most appropriate as it refers to speakers who use a language variety that is evolving as a consequence of contact between Panjabi and English. Although previous research suggests that five per cell is the minimum number of participants necessary when carrying out sociolinguistic fieldwork (e.g. Feagin 2013), only four PE speakers per cell were initially aimed for. Due to the other criteria and the method of paired participation (see Section 3.4.2), four speakers per cell was considered sufficient and corresponded to a total of thirty-two PE speakers being sought during the fieldwork. To reach the minimum suggested by Feagin (2013) would have meant undertaking an additional interview for each group, which would have substantially increased the minimum number of speakers required. When undertaking the fieldwork, the opportunity arose to interview more speakers. As a consequence, all PE cells contain at least five speakers, with a total of forty-seven PE speakers being included in the corpus. The spread of participants is illustrated in Table 2. Here, the minimum number of PE speakers within each cell is eight. This is due to the fact that I initially intended to divide speakers into two age groups. However, developments during the fieldwork meant that these were conflated, with age being considered continuously (see Section 3.2.3). As such, there is no distinction within each cell between the two age groups, with each cell in Table 2 now being limited by language background, region and gender.

Participants falling into the second category listed above will be referred to as 'Anglo English' or 'AE' speakers. This term is used to refer to speakers whose language variety has not been in direct or long-term contact with any language other than English[11]. Speech from AE speakers was collected in part to provide a reference sample from

[11] I acknowledge that this is somewhat of an idealisation. Many speakers, especially those living in large urban centres, are likely to come into superficial contact with a number of languages. More nuanced considerations of what constitutes language contact would be an interesting area for future research.

speakers who were not a part of the heritage language community. Assessing differences between AE and PE speakers will form a crucial part of the thesis, and will enable a better consideration of the regional similarities and differences between the two PE groups. Only two speakers per cell were sought within the AE group[12], as the primary goal of the thesis is to characterise PE in each region. This meant collecting data from a minimum of sixteen AE speakers, but with seventeen being ultimately included in the thesis (Table 2).

A decision was made to categorise speakers based on language background rather than by ethnicity, despite the latter being common practice in research on contact varieties of English (e.g. Kirkham 2011; Stuart-Smith et al. 2011). Ethnicity is a subjective, identity-based category which is fluid and defined by the speakers, in a similar way to gender. In contrast, language background is arguably more objective than ethnicity and, given the aims of the thesis, it makes sense to categorise speakers in this way. This thesis explicitly considers whether the influence of one language can be directly identified in another. The written questionnaire (see Section 3.4.3.1), allowed speakers to self-identify their ethnicity without the inclusion of pre-defined categories. In total, twenty-six different ethnicities were recorded, seven from the AE speakers and nineteen from the PE speakers. Consequently, it would seem remiss to use an overly-generalised researcher-defined ethnicity to categorise and label speakers, when the speakers themselves would not categorise themselves in such a way.

3.2.1.1 Panjabi in Leicester vs. Panjabi in Bradford

The PE data from each location are from different sub-communities within the British Panjabi population. Despite the fact that all of the speakers fall into the above category specified for PE, there is a confounding factor in the data. In Leicester, all PE speakers are from the Indian Panjab and all identified as Sikh. It is likely that they speak a variety of Panjabi close to Modern Standard Panjabi (e.g. Bhardwaj 2012). In contrast, all of the Bradford PE speakers are from the Pakistani Panjab and all identified as Muslim. It is likely that these speakers use a variety of the language which is different from Modern Standard Panjabi (Lothers & Lothers 2012). Although all of the speakers interviewed for the thesis explicitly identified their heritage language as Panjabi, some of those from Bradford referred to this more specifically as Mirpuri, Pahari, or Hindko and this was often a topic for conversation in the interview (see Section 3.4.3).

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[12] Based on two separate age groups.

As is widely acknowledged, there is insufficient literature available at present which describes the degree of phonetic variation within Panjabi. Some authors have suggested that varieties such as Mirpuri are entirely different languages from Panjabi (e.g. Lothers & Lothers 2010, 2012; Shackle 2003). Moreover, in addition to any linguistic differences, the ideologies of the communities, in terms of the value given to and the use of Panjabi, are quite different. In Leicester, the PE speakers value Panjabi very highly, it has a written form in which their religious texts are transcribed, and many participants commented on the Panjabi schools which were run by the Gurdwara (Sikh temple). In Bradford, Panjabi was a home or community language in which the participants interviewed had received no formal instruction. Here, the language was valued less highly than the national language of Pakistan, Urdu, and the language of their religion, Arabic. This confound sets up a problem when addressing research question 2 which seeks to assess the degree to which the patterns observed in each respective PE variety are directly relatable to a single heritage language, Panjabi. Further, it complicates any interpretation of the data if divergent linguistic patterns are observed in each PE variety. It is unclear what the level of internal linguistic variability is between varieties which fall under the umbrella label of 'Panjabi' and although it is beyond the scope of the thesis to directly address this question, it of course raises issues for the current project.

Literature detailing the phonetic characteristics of Panjabi and related varieties will be discussed where relevant throughout the subsequent Chapters which focus on the realisation of specific variables in PE. Throughout the thesis, direct connections with Panjabi will have to be made with this confound in mind, with future work required before a more confident link can be ascertained. Further, it is possible, if not probable, that both the ideological and phonetic differences between the two Panjabi varieties could contribute to differences between the two PE varieties considered here.

This confounding factor does not have any major implications for the theoretical predictions made in Chapter 2. We would still expect increased linguistic variability amongst speakers of the contact variety, and we would anticipate there to be an interaction between the heritage language and the local AE variety. Further, we might still envisage seeing evidence of some of Trudgill's (1986, 2004) processes. However, any divergences in linguistic output will be difficult to comprehensively address. It will be unclear whether the differences are as a consequence of the different interactions with the respective local AE varieties, or because of differences in the heritage language. Similarly, the ideological differences towards Panjabi in each community are likely to contribute to differences in the local PE variety, and how this interacts with the phonetics of respective Panjabi varieties, and the local AE variety will not be clear. Further consideration of the implications this has on the interpretation and results are made throughout the following Chapters.

Ideally, the thesis would have interviewed members of both Panjabi communities in each location. However, this would have significantly increased the size of the corpus required and also the time necessary to analyse all the data. This would not have been feasible. Within each location I have interviewed members from the largest Panjabi community. Thus, in Bradford, the Panjabi community is made up of primarily Pakistani Panjabis who are Muslim, with most being from the Mirpur region. In Leicester, the Panjabi community is made up primarily of Indian Panjabis who are Sikh. Although there are other Panjabi communities in each region, those interviewed reflect the largest Panjabi community in a given location, and are thus more reflective of the communities in which the fieldwork was undertaken.

The thesis will characterise PE in two locations. As well as considering the reasons for the patterns observed, it also aims to provide a descriptive account of these varieties with reference to the variables being considered. If I had focussed on only one PE community this would have resulted in problems of a different kind. Thus, although the confounding factor is present, the data provide a somewhat more comprehensive picture of PE as a whole, something which would perhaps be missing if the two PE communities were more similar.

3.2.2 Region

Previous research into contact varieties of English in the UK has often focussed on single communities within a given location (e.g. Heselwood & McChrystal 2000; Rathore-Nigsch and Schreier 2016). Despite this, remarkable parallels have been observed across studies (see Chapter 2). Two regional data sets were recorded here using comparable methodologies and analyses and represent contemporaneous data. This thesis is one of the first to directly compare the impact of contact of one language (Panjabi) onto another (English) across two locations as part of a single study.

As discussed in the above Background Chapter, and illustrated in Table 1, Bradford and Leicester both have sizeable Indian and Pakistani populations. They also both have

Panjabi main language communities above the average for England (ONS 2013b, Table 1). Although it has a sizeable Panjabi main language community, Leicester's largest minority language community is Gujarati, with 11.4% of the city's residents citing it as their main language in the most recent census (ONS 2013b). The size of Leicester's Gujarati population is likely to impact upon assertions relating to the origin of contact features identified in Leicester PE, a factor which will be discussed in greater detail in Chapter 7. Despite this added complexity, Leicester's minority language population is less diverse than many other places which were considered as potential fieldwork sites.

In Bradford, there is a sizeable Urdu main language population (3%). It is possible that those who consider Urdu to be their main language would also have some knowledge of Panjabi, and could therefore be considered PE speakers. Urdu is the national language of Pakistan (e.g. Stubbs 1985), meaning that those who have family origins in the Panjab region of northern Pakistan may potentially speak both Urdu and Panjabi. To account for any intra-speaker linguistic diversity the questionnaire included a section on 'Language' (see Section 3.4.3.1). Neither location has any other major ethnic minority or main language community from outside of South Asia, increasing the chances of identifying heritage language features and attributing them to a single language (here, Panjabi).

Region	**Indian & Pakistani %**	**Panjabi main language %**
Bradford	23%	4.2%
Leicester	45%	2.4%
England	5%	0.6%

Table 1: Relative proportions of the Indian and Pakistani populations, and size of the Panjabi main language communities in Bradford and Leicester, with accompanying average proportions for England (ONS 2012b, 2013b).

The geographical separation between Bradford and Leicester means that the AE varieties are substantially different from one another, with Leicester being in the East Midlands and Bradford in West Yorkshire (e.g. Hughes A. et al. 2012). Bradford and Leicester are around 85 miles apart, with Figure 5 showing the position of the two cities. The M1 provides a reasonably direct road route between the two locations. However, there are no major rail routes connecting the two locations, with a train journey requiring the traveller to take three separate trains. Furthermore, there is no evidence to suggest that there has been much contact between Bradford and Leicester directly, with contact to local urban centres (such as Leeds and Birmingham, respectively) more likely. Thus, the two locations are fairly distinct linguistically, geographically separate, and residents have little face-to-face contact with one another.

Figure 5: Map of the UK illustrating the location of the two field sites: Bradford and Leicester

Despite the potential issues relating to other Indic languages spoken in each location, these field sites were considered most suitable. They are geographically separate, with the regional AE varieties of Bradford and Leicester being notably different. Further, they are less heterogeneous than other potential locations of interest, and although not without complexity, are reasonably dichotomous. The populations of both cities are made up of primarily English and / or Indic language speaking communities. The linguistic diversity of the UK's major cities means that attribution of contact features to a specific heritage language is problematic, a factor which has been noted for both Multicultural London English and Multicultural Manchester English (Cheshire et al. 2011; Drummond 2013a, respectively). This thesis aims to consider the origins of selected contact features and to assess whether they can be related to the heritage language. As with the language background criteria outlined above, two regional conditions were devised:

- EITHER **Bradford** resident: was born and has always lived in the city.
- OR **Leicester** resident: was born and has always lived in the city.

Based on four speakers per cell for the PE groups, and two speakers per cell for the AE groups[13], twenty-four participants in each location were sought (see Table 2 for a further breakdown).

3.2.3 Age

Differences in apparent-time have consistently been observed in sociolinguistic studies (e.g. Cukor-Avila & Bailey 2013), and studies considering the development of English contact varieties are no exception (see Section 2.2.2). As such, two age groups were initially devised, allowing for the collection of apparent-time age data for comparison.

As discussed in Section 2.3.2 of the Background Chapter, large scale migration to the UK from South Asia began after the Second World War, which also coincided with India's partition. As the current thesis is interested in the native English spoken by British-born individuals, there is a ceiling for older participants. Large numbers of second-generation speakers over the age of fifty are difficult to find. As a consequence of this, the two age groups originally defined were not overly distinct from one another:

- EITHER 18-25 years old.
- OR 35-45 years old.

Based on four speakers per cell, a minimum of sixteen PE participants in each age group were sought. With the two speakers per cell AE requirement, eight AE participants for each age group were sought. During the fieldwork process, adjustments were made to the age group boundaries to facilitate data collection. Further, Leicester's PE community is younger than that in Bradford (see Section 2.3.2.1 in Chapter 2) and, as such, older speakers were increasingly hard to locate. Consequently, the age ranges after fieldwork were not distinct enough to justify the categorical analysis initially aimed for. Unless otherwise specified, age is considered a continuous variable in the following analysis due to the absence of any gap between the final ranges. Speakers were evenly distributed between 19 and 54 years of age.

[13] Based on two separate age groups.

3.2.4 Gender

As with age, considering gender differences is standard practice in sociolinguistic studies. All groups were balanced for gender, with a minimum of sixteen PE males and sixteen PE females, and eight AE males and eight AE females, sought (see Table 2).

3.2.5 A note about class

The speaker sample was not stratified by class. This was partly because of the other variables being considered. Given the different regions and language backgrounds of the speakers, and the desire to have at least four speakers per cell, any consideration of class would have substantially increased the number of participants. Thus, although it was not included as a variable predictor, class was controlled for, all speakers having similar *upper working class* to *lower middle class* backgrounds. Speaker occupations are detailed in Appendix 5.

3.3 Sampling

In total, 78 speakers were interviewed. Of those, fourteen were discounted for various reasons after the interview had taken place[14]. The speech of the 64 remaining speakers has been analysed in the thesis. Table 2 includes details for the proposed and actual number of speakers per cell. It was often possible to interview more participants than originally planned. Following Table 2, Figure 6 and Figure 7 illustrate the spread of participants within each location based on the first part of participants' postcodes (see Section 3.4.3.1 below). These are included to illustrate how all of the participants included in the current study were from similar areas in each location. In Bradford, participants were concentrated around the north west of the city, in BD8 and BD9. In Leicester, the participants interviewed were from either the south east in LE2 and LE5, or the west in LE3. In both locations, there is no clear split between areas from which AE speakers were recruited and areas from which PE speakers were interviewed.

[14] Upon arriving at the interview discoveries were often made about participants but it was too late to cancel the session. This was often as a consequence of allowing contacts within the community to set up interviews. One Bradford PE female had lived in Glasgow until she was nine and retained a strong Scottish accent. A Bradford PE male had been born and lived in Pakistan until he was 11. A Bradford AE female had only just moved to Bradford, having grown up in the south east. Two Leicester AE females were older than the upper limits of the older age group (59). A Bradford PE male had a heritage language of Bengali (his partner was also discounted). A Leicester AE male had been privately educated and had a markedly RP accent. A Leicester PE female had spent a long time living in the United States and this was noticeable in her accent. Two Leicester AE males lived in Loughborough, with one having grown up in Derby and another having spent 12 years in the military. Another Leicester AE male lived in Ashby de-la-Zouch; a market town outside of Leicester. Two further Bradford AE males were interviewed but were not included as there was no time to analyse the recordings. None of these speakers was included in the analysis and they are not counted in Table 2.

	Panjabi English		Anglo English		Totals	
	Min	**Actual**	Min	**Actual**	Min	**Actual**
Bfd Males	8	**11**	4	**4**	12	**15**
Bfd Females	8	**11**	4	**5**	12	**16**
Lei Males	8	**14**	4	**4**	12	**18**
Lei Females	8	**11**	4	**4**	12	**15**
Totals	32	**47**	16	**17**	48	**64**

Table 2: Minimum target number and actual number of participants interviewed for the thesis.

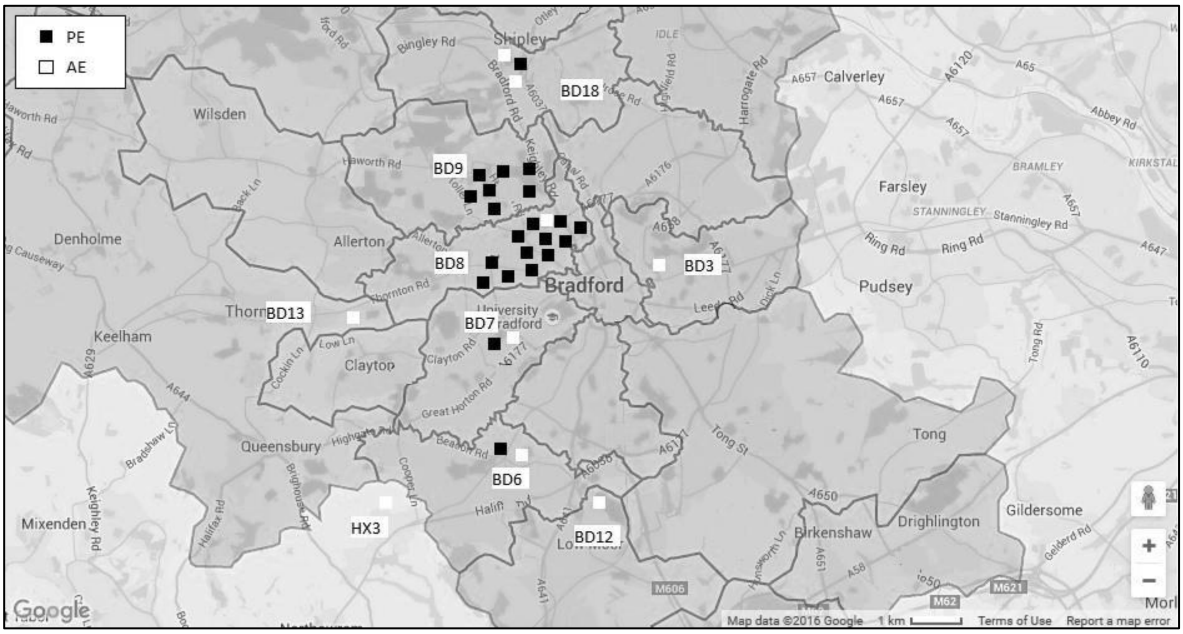


Figure 6: Map illustrating spread of participants in Bradford by first part of current postcode. Black squares correspond to Panjabi English participants, white squares to Anglo English participants.

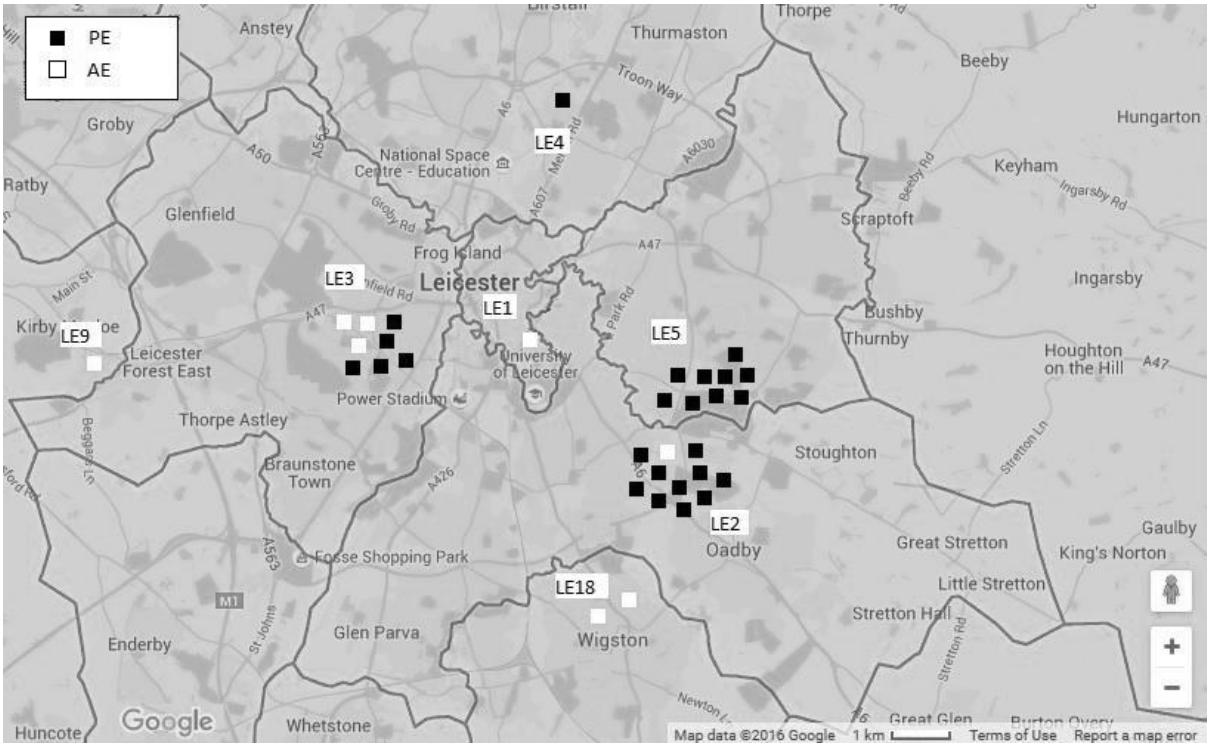


Figure 7: Map illustrating spread of participants in Leicester by first part of current postcode. Black squares correspond to Panjabi English participants, white squares to Anglo English participants.

3.3.1 Sampling Methods

Universities and local councils were the first points of contact within each location. This allowed for primary contacts to be made, but also for council members and university staff to suggest other participant sources. Contacts were also made through the internet, with various community associations having an online presence. The ‘friend of a friend’ technique was then used to source participants (e.g. Feagin 2013; Milroy 1987).

In Bradford, council contacts identified a number of participants, as well as putting me in touch with a number of community centres in areas of the city where I would find suitable participants. Two community centres proved to be especially useful in identifying participants and helping with participant recruitment. Not only did they encourage staff and volunteers from the centres to take part, they also invited me to community events and helped to publicise the study to potential participants. I also contacted local supermarkets, one of which allowed me to come in and talk to staff during their breaks and undertake interviews in their training room.

In Leicester, council contacts pointed me towards local Gurdwaras. Individuals from the Gurdwaras then invited me along to community events and helped immensely with identifying and recruiting participants. My appearance on local radio did not drum up as much interest as was hoped, but luckily other routes sourced enough participants.

As well as undertaking interviews, a level of participation within the community was maintained throughout the fieldwork process to build relationships and develop contacts. Further, through this engagement a better understanding of the communities was gleaned, something which has contributed to the evaluation of the results and subsequent discussions presented in the following Chapters. The unflagging desire of both the community centres in Bradford and Gurdwaras in Leicester to assist was remarkable, without which the fieldwork would not have been possible.

3.3.2 Recording Equipment

All interviews were recorded onto a SanDisk 8GB SDHC card using a Zoom H4n Handy Recorder set to record at a 16-bit 44.1 kHz sampling rate. As well as the microphones on the Zoom recorder, each participant was recorded with a Beyerdynamic TG H54c neck-worn microphone which hooks over speakers' ears. By using this microphone, a consistent distance between a speaker's lips and the microphone was maintained. However, many of those interviewed wore headscarves or turbans, meaning that it was not possible for the microphone to be hooked over the ears. In cases such as these, participants either held the microphone, or wore it around their necks.

3.3.3 Data Management

After the interview, recordings were transferred from the memory card onto a Dell Inspiron 15R laptop PC where they were anonymised and backed up onto a 1TB external hard drive. As well as the audio data, completed questionnaires and consent forms were stored in a locked drawer in a restricted access room requiring key card entry. All participants were given a pseudonym and codename, the key to which was stored with the questionnaires and consent forms in a separate location to the audio data. All participants mentioned in this thesis are referred to by their pseudonym.

3.4 Methods

In order to collect data for analysis, a sociolinguistic interview was used. This type of interview allowed for a large amount of recorded speech to be collected from participants within a single session, and as such was deemed more appropriate than, for example, rapid and anonymous or online approaches (e.g. Feagin 2013). Further, it allowed for qualitative information to be gathered alongside quantitative speech data.

The sociolinguistic interview has been subject to various developments over the years. It initially took the form of a one-to-one interview, a reading passage, word list, and sets of minimal pairs (e.g. Feagin 2013; Labov 1972). Additional modifications were made in the current project. Each interview was completed in a single session, and will be discussed in detail in the following Sections. All of the tasks included in the interview were approved by the departmental ethics committee of the department of language and linguistic science at the University of York. A written questionnaire and four spoken tasks were completed by each participant and will be discussed in turn. First, my role as a fieldworker and the resulting decision to pair participants throughout the interview process will be explained.

3.4.1 My role as the fieldworker

The completion of all of the fieldwork, including sourcing participants and undertaking the interviews, was done by me. Not being from either Leicester or Bradford, and not being a PE, or Panjabi speaker means that I was truly an outsider. I am a white, monolingual English female from the North West of England. This has no doubt affected the type of data that I have collected, and it is likely that if (additional) interviews had been done by a community insider the results would be different as a reflection of this (e.g. Alam 2015; Martin et al. 1998; Martin & Stuart-Smith 1998; Rickford & McNair-Knox 1994). I have captured only one aspect of speakers' repertoires in the data reported here (e.g. Sharma 2011).

In many ways, my being a complete outsider has afforded me a level of control. By undertaking interviews in two locations in both Panjabi and Anglo communities I could never have been a part of all of them. As such, the fact that I am an outsider to all of the communities means that any effect that I have had on the data has probably been consistent across all of the interviews. It is possible that this may have affected the types of topics which were focussed upon, with some speakers potentially avoiding topics and others maybe approaching them as a consequence of my being an outsider. Ideas about changes which could be made in future fieldwork ventures are proposed in Chapter 7.

3.4.2 Paired participation

Although it was not a main focus of the thesis itself, variability triggered by the interviewer was a concern from the outset. Not being from either Leicester or Bradford, and not having Panjabi language heritage, I made an extra effort to reduce potential 'interviewer' or accommodatory effects caused by the increased linguistic differences between myself and participants. One of the ways in which this was done was to pair participants throughout the interview.

Accommodation towards or away from interlocutors is a natural and normal process in conversation. A number of studies highlight the potential variability in the speech of both interviewer and interviewee depending on the interlocutor's (perceived) linguistic background (e.g. Llamas et al. 2009; Rickford & McNair-Knox 1994; Watt et al. 2010). Indeed, in the discussion of the methodological processes adopted when looking at Indian English in Southall, Sharma comments that: 'both interviewers had similar 'cosmopolitan' Indian English accents, helping to minimise distinct interviewer effects' (2011: 469). Participants were consequently paired to reduce accommodatory effects caused by the interviewer. Further, the interview was designed to include very little interviewer involvement, with this lack of input from the interviewer a feature of paired interviews noted by Llamas (2007). Pairing participants during an interview has been used in a number of sociolinguistic studies (e.g. Docherty et al. 1997; Haddican 2008; Stuart-Smith 1999).

Pairs were always matched for gender, region, and the language background criterion discussed in Section 3.2 (e.g. both speakers were either PE or AE). Participants were matched along these dimensions to reduce any further chances of variability caused by linguistic differences in social categories. In most cases participants were also matched for age, although this was not always possible and a few interviews were undertaken with participants' ages ranging across the spectrum. The largest difference was between two Bradford PE males; brothers Nadeem (aged 36) and Irfan (aged 22) were recorded together.

Participants self-selected a friend or family member with whom to take part. Allowing participants to choose with whom they took part increased the chances that both speakers were part of the same speech community. Matching pairs with respect to researcher-defined social categories does not necessarily mean the members of the pair will be linguistically comparable. However, by interviewing self-selected speaker pairs who were also matched according to social categories it was hoped that both a representative and categorisable sample would be provided.

3.4.3 The Interview

Traditional Labovian sociolinguistic research has focussed upon accessing the 'vernacular', where the least attention is paid to the way of speaking by the speaker, and is described by Labov as 'the style which is most regular in its structure and in its relation to the evolution of the language' (1972: 112). The observer's paradox makes it difficult to access this form of speech in an interview, with the vernacular being a completely un-monitored style (Labov 1972: 113). Although many of the tasks included in the current study were designed to be informal, allowing for participant control and an increase in conversational style, accessing the 'vernacular' was not the primary aim. As noted by Schilling, 'there is no such thing as non-observed language data, and hence no such thing as one single 'most important' type of language for linguistic theory.' (2013: 112). Additionally, the idea that there is one single type of vernacular could also be questioned. Here, the focus was upon identifying correlations between the heritage language and speakers' linguistic patterns, and addressing linguistic variation arising as a consequence of the different tasks.

A core aim of the whole methodological process was for it to be participant-led. The sampling population was precisely defined, with the matched pairings adding a further level of control. The interview was structured in such a way as to facilitate the gathering of information on issues and topics relevant to participants, not just answers to questions which I, as an outsider, considered to be relevant. Although being an outsider could provide me with a degree of objectivity, it also meant there was a possibility I would not appreciate or understand what was relevant to speakers. Consequently, the five tasks were structured but flexible, allowing participants to respond to them in ways they felt were most appropriate and relevant to them. In that way, the data remains comparable and consistent throughout, but the responses are individual. The research is then more representative of the participants and the communities who took part.

The interview undertaken here involved five separate tasks which are presented in detail below. The ordering of these was as appears in the text, such that the written questionnaire was completed first (Section 3.4.3.1), this was followed by the spot-the-difference task (Section 3.4.3.2), then the paired interview was undertaken (Section 3.4.3.3), the fieldworker interview followed this (Section 3.4.3.4), and the interview was concluded with the reading passage (Section 3.4.3.5). An initial pilot was conducted in Leeds with a pair of young PE males. This pilot was used as a means of testing the methodology, rather than to gather data for analysis. Several small changes were made to the interview after the pilot was undertaken. Each of these will be discussed where relevant below.

3.4.3.1 Written Questionnaire

Before the spoken tasks were completed, each participant completed a written questionnaire (see Appendix 1 for the full questionnaire). This was used to gather biographical information about participants, and also information on their language usage and the importance of ethnic identity. After the pilot, a further section on networks was added into the questionnaire to gather a small amount of information about participants' friendship groups. As pointed out by Dörnyei (2007), questionnaires are an effective way to ask a number of factual questions, but care must be taken in their construction to ensure that questions are not misinterpreted by participants.

Following the principles discussed above, the questionnaire was designed to be flexible. In line with the University of York's ethics guidelines, participants were informed that the questions had been specifically designed to allow them to answer in a way they felt was most appropriate, and further, that they did not have to answer any of the questions if they did not feel comfortable doing so. In total there were four sections to the questionnaire.

The first section was used chiefly to provide a written record confirming that speakers fell into the defined categories. Speakers were asked their age, and the first part of their current postcode. Speakers were also asked where their parents and grandparents were from originally, and if they (the participants) had ever lived anywhere else in the UK. After the pilot, a question asking participants to detail whether their parents had ever lived anywhere else in the UK was added. It was thought that this information could be useful when it came to appraising speakers' linguistic patterns, which might vary depending upon how mobile their parents had been within the UK.

The second section dealt with accent and language. Speakers were asked to self-identify their own accents. A number of participants found this question particularly difficult, with many responding with '*normal*' or '*I don't have an accent*'. By leaving the question open, a better picture was gained of speakers' self-awareness of their accents and how they considered these in relation to other speakers' accents. Many participants further discussed this topic as part of the paired conversation (see below), and their responses will be considered in later Chapters.

Participants were then asked to provide detailed information about their 'native' and 'other' languages, how well they felt they spoke them, how often they used them, and with whom the participants used them with. Asking participants to rate their competence in a language does not necessarily reflect their true capabilities, with some potentially under- or over-reporting their linguistic skills. However, the information provided is still of value and will be discussed in more detail in later Chapters.

Following the pilot, an additional question was added which asked participants to list their 'native language' separately from any other languages they spoke. This was intended to act as a written record that participants had learned English as an L1. However, participants differed in their interpretation of 'native' language, with some considering it to mean their mother tongue or heritage language, and others considering it to be the language(s) which they spoke fluently. Rampton (1990) notes that the term *native* speaker is not useful and discusses a number of problems with its use, many of which arise as a consequence of this diversity in interpretation, while Kerswill et al. (2013) observe that it is not helpful to attempt to label languages in this way for multilingual speakers. Despite alternative interpretations of the question by participants, and the problems associated with the question, the responses have still proved useful. Further, the need for this information for its original purpose was deemed unnecessary once fieldwork was properly underway. Establishing that speakers had acquired English 'fluently' in the UK was done before participants arrived at the interview, with only one exception[15].

Questions relating to language competence and use in this section were answered along Likert scales, with a selection of judgements given as points along the scale. For example, the question asking speakers how often they used the languages they spoke included the options:

- Never
- Less than once a year (please specify)
- Several times a year
- Once/twice a month
- Once/twice a week
- Every day

[15] A Bradford PE male had been born and lived in Pakistan until he was 11. This speaker was not included in the analysis and he is not counted in Table 2.

Space was left after each option for participants to list a given language by the most suitable phrase. By using phrases rather than a six-point numerical Likert scale a level of consistency in interpretation was maintained. This allowed for comparisons across participants when considering responses to these questions.

The final question in this section asked speakers to detail with whom they used the languages listed. However, given the very open nature of this question, participants often failed to group interlocutors by language, instead just listing the range of people they used any language with (eg, '*friends, family, colleagues, children*' rather than '*Panjabi: family, elders; English: family, colleagues, friends*'). Consequently, this was often a topic for conversation in the fieldworker interview (see Section 3.4.3.4).

No questions were included on the questionnaire which asked participants about the complex linguistic phenomena of code-switching (e.g. Romaine 1995). A number of participants often commented during the interview that they would 'mix bits of Panjabi' into their English, and vice versa. Sometimes this was done for effect, other times because one language did not have a suitable term or phrase. A number of participants commented that although this happened they did feel like it was a bad thing, and that they should separate their languages when speaking. There were also rare occasions when code switching took place in the paired conversation (Section 3.4.3.3). It is probable that my presence as a monolingual English speaker and interest only in the English that they spoke reinforced the idea that these two codes were entirely separate and should be treated as such. This would be an interesting area for future work as despite this thesis focussing only on English, the speakers interviewed and the communities of which they are a part are multilingual. A deeper understanding of how these languages are used and their interaction and relationship with one another in each community is necessary for a comprehensive understanding of the linguistic context.

The third section in the questionnaire contained open questions asking participants to list and then rank their ethnic, national and local identities. Participants were given the option to list multiple ethnic identities if they wished. The use of magnitude continua (e.g. Redinger & Llamas 2009) was initially considered, to allow for less constrained judgements. Whereas Likert scales allow for ordinal judgements, magnitude continua include only a scale on which individuals mark their identification from '-' at one extreme to '+' at the other, illustrated in (1):

(1) Please state how important your ethnic identity is to you using the scale below

Likert Scale	-3 -2 -1 +1 +2 +3
Magnitude Continuum	- +

As the interpretation of magnitude continua would be much more subjective and thus result in less comparability between speakers, Likert scales were used. Responses were ranked on a six-point numerical Likert scale (-3 to +3), meaning that speakers had to show a preference one way or the other (if they chose to answer).

Network make-up and patterns of contact have often been shown to be important in the interpretation of speakers' linguistic patterns (e.g. Milroy 1987). Although these factors were not initially included, the pilot highlighted the need to explicitly include questions about them in the questionnaire. For this reason, section four was added for the fieldwork undertaken in Bradford and Leicester. This section, based on the fieldwork instrument used by Cheshire et al. (2011), asked speakers how many 'close friends' they had, how many were from either Bradford or Leicester, how many were from the same ethnic background as the participant, and, if from different ethnic backgrounds, which one(s). It would perhaps have been useful to gather more detailed information on participant networks. No information on daily contact patterns was gathered, and it is likely that the term 'close friends' was interpreted differently by different participants. However, given the number of tasks which were already included in the interview, and the length of the questionnaire, only a small amount of information of this type was gathered.

Initially it was hoped that the questionnaire would be sent to and completed by participants before the recorded interview, however, this was often not the case. Participants regularly had to complete the written questionnaire after they had arrived to take part in the interview, but before the recorded tasks began. There were also rare occasions when, due to time constraints, participants completed the written questionnaire as part of the paired conversation (see below). In such cases, participants asked each other the questions on the questionnaire, thus providing a spoken answer to each question. In all cases, the questionnaire was the first task to be completed, whether it resulted in written or spoken responses. The four sections which comprised the written questionnaire, then, provided detailed information about participants and their patterns of language use. Further, questionnaire responses were often accompanied with further discussions throughout the paired conversation or fieldworker interview. This qualitative information has proved valuable throughout the analysis.

3.4.3.2 Spot-the-difference task

The first of the recorded tasks was a spot-the-difference. This took less than five minutes to complete. The aim was to gain specific realisations of lexical items from participants, without having to use a word list. The use of a word list was avoided, in an attempt to reduce the chances of accessing a 'reading register' rather than a more natural spoken style (e.g. Milroy 1987). Using a spot-the-difference in order to access a more spontaneous type of conversational speech is consistent with that described by Van Engen et al. (2010) and Baker and Hazen (2011). Both of these studies report on the development of diapix which are used in spot-the-difference tasks. In the current study, participants were provided with an image to talk about, their partner being given a slightly different image. Participants could not see their partner’s image. Figure 8 includes the images used for the main fieldwork in Bradford and Leicester (please see Appendix 2 for the images used during the pilot). Features of interest are highlighted, with additions or changes from the pilot included in red. The features selected as potentially interesting were identified based on previous research into contact varieties of English, and the regional AE varieties. Although the fieldwork process highlighted other features of interest, those included in the spot-the-difference allow for direct comparison with previous work.

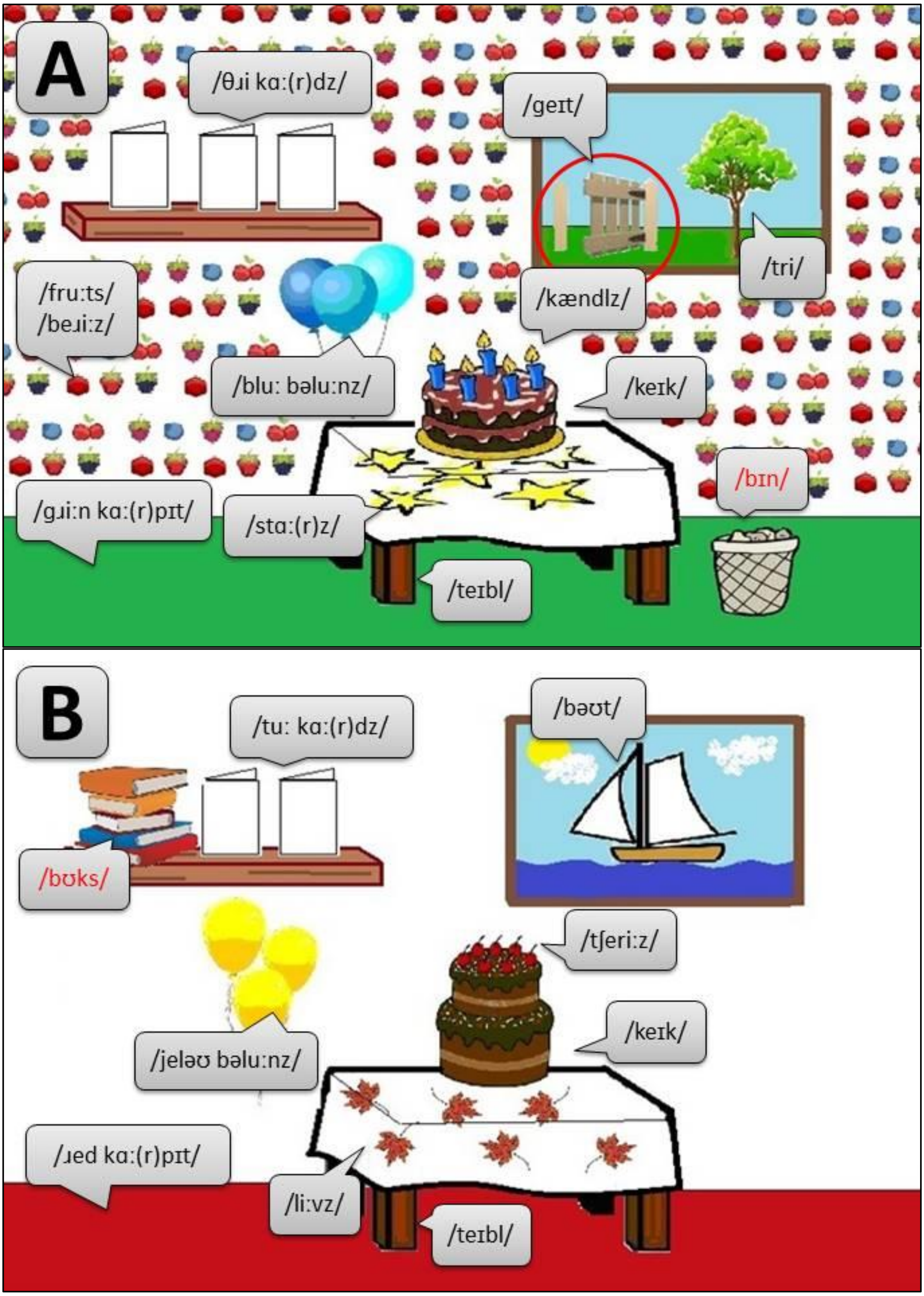


Figure 8: Spot-the-difference images used for the main fieldwork in Bradford and Leicester. Tokens of interest are indicated by phonemic transcriptions. Image A appears at the top, Image B at the bottom. Additions/changes from the pilot are included in red.

Asian Englishes have been found to be variably rhotic, even when spoken in otherwise non-rhotic areas (Hirson & Sohail 2007; Heselwood & McChrystal 2000).

Consequently, items were included on the spot-the-difference which would elicit coda /r/ if this were licensed in speakers' phonologies. This includes the item '*stars*' in image A, and '*cards*' and '*carpet*' in images A and B. The realisation of /r/ in general was also considered to be of potential interest, so items containing intervocalic /r/ and initial clusters containing /r/ were also included (Image A: *'three', 'tree', 'fruits', 'green'* and '*berries*'; Image B: *'red', 'cherries'*).

The realisation of /l/ in Asian Englishes is often reported to be clear in all positions (Kirkham in press; Kirkham & Wormald 2015; Stuart-Smith et al. 2011). A number of items were selected to explore this variable with the current participants (Image A: *'blue', 'balloons', 'candles', 'table'*; Image B: *'yellow', 'balloons', 'leaves', 'table'*). Further, /l/ is frequently vocalised in coda position in Leicester AE (Hughes, A. et al. 2012), so it was considered of potential interest to explore the interaction between these two alternative variants.

Tokens including the vowels FACE and GOAT (Wells 1982a) were included as these have been found to be monophthongal, or to have shorter trajectories, in contact varieties of English in the UK (Drummond 2013b; Fox et al. 2011; Sharma 2011; Verma & Firth 1995). In areas which already have monophthongal FACE and GOAT in the AE variety, these vowels have been observed to be closer and fronter for speakers of contact varieties (Stuart-Smith et al. 2011). Bradford AE features monophthongal FACE, which is typically realised as [ɛː] and GOAT as [ɔː] (Hughes, A. et al. 2012: 105), with fronting to [ɵː] reported by Watt and Tillotson (2001). Leicester AE has wide diphthongs for FACE and GOAT, at [ɛ̞i] and [əʉ] respectively (Hughes, A. et al. 2012: 101). Consequently, the realisations of these vowels were considered to be of interest, with the tokens *'gate', 'table'* and '*cake*' included in Image A, and *'boat', 'cake'* and '*table*' in Image B.

GOOSE-fronting is a commonly-reported feature of Englishes around the world (e.g. Haddican et al. 2013; Mesthrie 2010; Cheshire et al. 2008). Tokens including GOOSE (Image A: *'blue', 'balloons', 'fruits'*; Image B: '*balloons'*), were included so as to assess the degree of fronting in the two regions. After the pilot, tokens including KIT and FOOT vowels were added (Image A *'bin'*; Image B: *'books'*). Given the closer realisation of (monophthongal) FACE and GOAT, the qualities of KIT and FOOT were included to assess any potential overlap.

Participants were asked to each describe their image to their partner and to work together in identifying the differences. The use of a spot-the-difference rather than a word list allowed participants to work together on a task, thus diverting their attention away from their speech whilst retaining control over target words. Labov comments that reading word lists is at the 'extreme formal end of the stylistic continuum' (1994: 157). Further, the orthographic effect of seeing words written down which potentially affects production (Silverstein 2003: 219) was reduced by using images.

Despite prior testing on my friends and family members, one of the images included was identified as ambiguous during the pilot. The picture of a '*gate'* in the original Image A was misidentified as '*castle*' (see Appendix 2 for pilot images used). Consequently, the image was changed for the main fieldwork in Bradford and Leicester, and the new '*gate*' is circled in red in Figure 8. The image of a '*boat*' included in Image B was often described as a '*ship*' during the main fieldwork. However, to maintain consistency throughout the main fieldwork this was not changed again.

The spot-the-difference enabled me to collect realisations of specific variables which were deemed of interest. The results reflect an analysis of only a few variables, with the analysis having been undertaken only on the paired conversation and reading passage data (see below). The variables selected for analysis were introduced in Chapter 2, with the analysis of more variables currently reserved for future work. This will be discussed in more detail in Chapter 7.

3.4.3.3 Paired Conversations

The second of the recorded tasks was an informal conversation between the paired participants, with no involvement from the interviewer. Participants were provided with a selection of prompt sheets featuring questions on a range of topics. Figure 9 shows the prompt sheet for Local Community (see Appendix 3 for all of the prompt sheets), with the topics included listed below.

- Heritage
- Culture
- Local Community
- Popular Culture
- Work
- Family & Friends
- Hometown
- Language
- Faith
- Sport

Speakers were asked to use these as a guide in a discussion about things they felt contributed to their identity. They were informed that they could discuss anything, and not just the topics suggested on the prompt sheets. Further, if they did not feel comfortable talking about the suggested topics, they were not expected to do so.

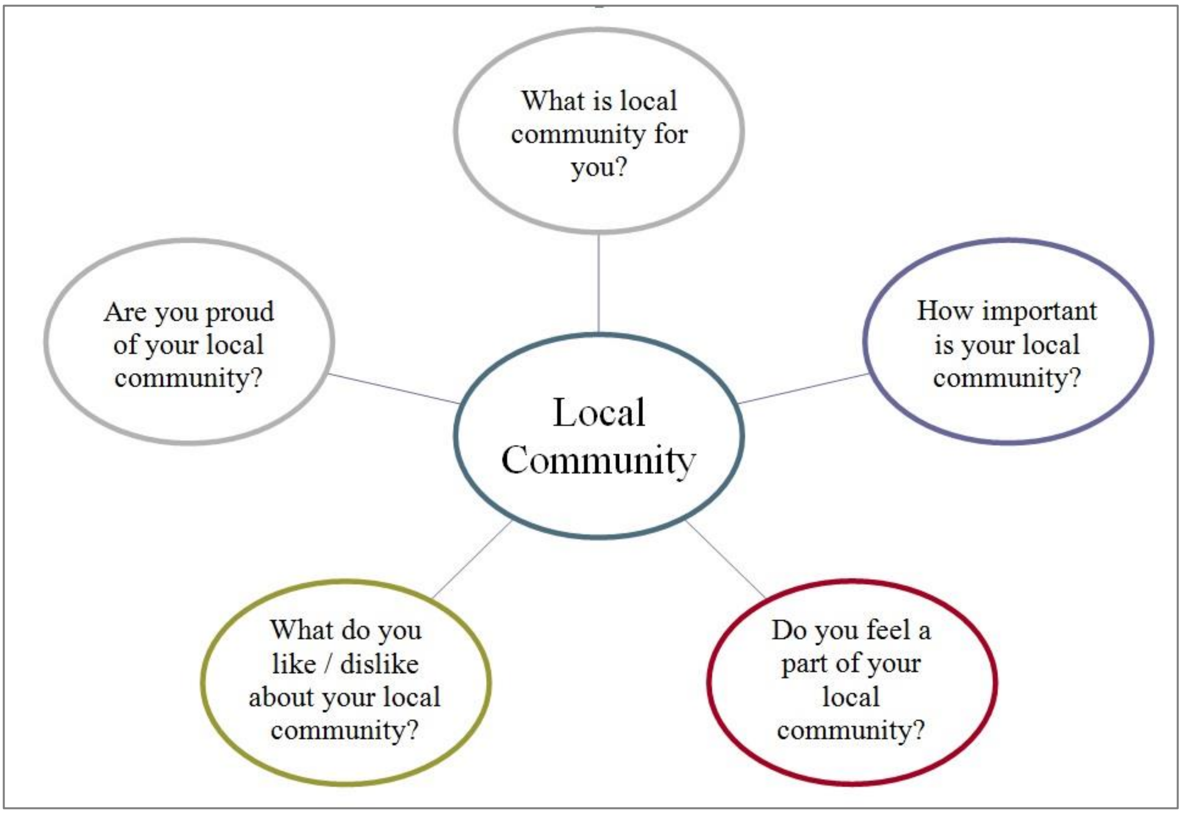


Figure 9: Prompt sheet on 'Local Community' given to participants during the paired conversation.

Using prompt sheets to guide the paired conversation was an idea developed from the recent ESRC project '*A Comparative Study of Language Change in Northern Englishes*' (Haddican 2008). Despite not being involved in the conversation, the inclusion of prompt sheets afforded me some control over the topics discussed, as would be the case in a traditional one-to-one sociolinguistic interview. However, it also allowed for participant control in the interviews, enabling participants to focus on topics which they felt were more relevant and to discuss them in appropriate ways. The prompt sheets gave speakers a starting point, providing them with a range of questions on a given topic which they could discuss further and expand upon if they chose to.

Participants responded well to this part of the interview, often making use of all of the prompt sheets, and discussing their answers with one another. On a few occasions, conversations seemed stilted, with quieter or more reserved participants becoming nervous when wearing a microphone. However, all participants spoke for at least twenty minutes. The fieldworker interview which followed the paired conversation (see Section 3.4.3.4) was then used to discuss certain topics in further detail, and was particularly useful when participants had perhaps held back during the conversation. The paired conversation was expected to take twenty to thirty minutes, leaving time for expansion and development on the topics in the following part of the interview.

3.4.3.4 Fieldworker Interview

The next recorded task was the fieldworker interview, which included the fieldworker as an interviewer. Topics raised in the paired conversations were discussed further with participants. No set questions were devised for this part of the interview. As discussed above, I was keen to keep the interviews participant-led, with participants defining the interesting and crucial topics. Although this might have resulted in there being less direct comparability it is hoped that the data are more representative, with the communities having defined themselves, rather than having been defined.

The questions asked in this section were formulated during the paired conversation. Through reading participants’ questionnaire responses, and listening to the topics which they discussed (and did not), questions were noted and discussed in this part of the interview. This helped to clarify points the participants had made and also to expand upon topics which had been discussed, but had perhaps been moved on from in the course of the conversation. The length of this section and the paired conversations varied, usually depending on the time available to the participants. At least twenty to thirty minutes’ worth of ‘informal’ spoken data was gathered from participant pairs, with some being happy to sit and talk for over an hour.

3.4.3.5 Reading Passage

The final recorded task was a reading passage. Although I was initially reluctant to include any reading task as part of the interview, the passage has proved useful by being the one part of the interview which was directly comparable for all participants. However, there was great variability in reading ability and styles, with some speakers varying little from the paired conversation, and others being notably less comfortable and fluent when reading.

During the pilot, the passage ‘Comma gets a Cure’ was chosen. It provided a sizeable quantity of data, being longer than passages such as ‘The North Wind and the Sun,’ whilst providing more engaging content than passages such as ‘Arthur the Rat’. However, given the improbable and occasionally comical nature of the narrative of ‘Comma gets a Cure’ (the story involves a veterinary nurse having to deal with an incontinent goose in a practice waiting room, see Appendix 4), some participants found it difficult to read the text without laughing. Consequently, the passage ‘Fern’s star turn’ was instead chosen for the main fieldwork in Bradford and Leicester (see Appendix 4). This text was written specifically as an alternative to ‘Comma gets a Cure’, in that it incorporates many of the same keywords from Wells (1982a) and Hughes, A. et al. (2012), but as a story is more readable and considerably more plausible than the older text. It follows the square dancing exploits of a nurse from Harrogate.

3.5 Conclusion

The tasks employed during the interview provided a range of linguistic information with which the analysis could be completed. The balance between researcher-constructed and speaker-defined categories is felt to be a positive one, with the data being more reflective of the speakers and communities themselves. With the benefit of hindsight, more information could have been gathered on networks. The experience was nonetheless a positive one, with a great deal of varied information being gathered from a large number of participants.

Although a wide range of data has been collected, only a subset have been analysed for the thesis. Only the Paired Conversation and Reading Passage recordings have been analysed, with the inclusion of the spot-the-difference task data and a more detailed interrogation of the fieldworker interviews currently being reserved for future research.

4 Voice Quality

4.1 Introduction

The in-depth study of voice quality is not often undertaken in sociophonetics. Thomas (2013), Foulkes (2002) and Wells (1982a) have all lamented the relative absence of comprehensive voice quality analyses in the field of sociolinguistics. This is despite the acknowledged dialectal variation present, as well as settings which reflect more individual patterns (Abercrombie 1967; Laver 1994). This Chapter considers voice quality under Abercrombie's definition, whereby the term will be used to refer to the long-term postures and settings of the whole vocal tract, from the vocal folds in the larynx to the lip postures at the edge of the oral cavity:

> 'Voice quality', though it is a traditional term, is possibly a misleading one. It does not mean the quality of 'voice' in its well-defined technical phonetic sense ('sound resulting from phonation, i.e. vibration of the vocal cords' [...]); it has a much more general meaning than that. [...] The term 'voice quality' refers to those characteristics which are present more or less all the time that a person is talking: it is a quasi-permanent quality running through all the sound that issues from his mouth. (1967: 91)

The analysis of voice quality provides a complementary analysis in this instance to the otherwise segmental characterisation of PE in Bradford and Leicester. The most comprehensive works undertaken to enable objective quantification of voice quality are those by John Laver (2000, 1994, 1991, 1980, 1975). Over the past forty years Laver and colleagues have worked to provide definitions of voice quality as well as designing and developing the Vocal Profile Analysis (VPA) protocol form which is adopted in this work (Mackenzie Beck 2005). This was originally designed to assist in speech and language therapists' characterisation of vocal pathologies (e.g. Laver et al. 1991; Wirz & Mackenzie Beck 1995). It has been used in sociolinguistic studies (e.g. Stuart-Smith 1999; Esling 1978), and is regularly used by forensic phoneticians who often consider voice quality to be a particularly useful speaker characterisation in casework (e.g. Gold & French 2011; Nolan 2005). This Chapter focusses on an auditory analysis of voice quality variation within and between different groups speaking a single language. This is in contrast to work which has considered voice quality variation in phonation at the phonemic level (e.g. Gordon 2001; Gordon & Ladefoged 2001; Keating & Esposito

2007) or long-term settings as characteristic of a given language (e.g. Honikman 1964). Few sociolinguistic studies have comprehensively analysed voice quality based on Abercrombie's (1967) definition shown above.

The following Section (4.2) will discuss relevant background literature which has considered voice quality variation within a variationist sociolinguistic paradigm. Section 4.4 will introduce and fully define the methodological approach adopted in this thesis to characterise voice quality in Bradford and Leicester Panjabi English (PE) and Anglo English (AE). The results of this characterisation will be presented in Section 4.5, with the following Section (4.6) discussing how these results address the research questions.

4.2 Background

The previous research presented below reflects the different types of voice quality research which have been undertaken. Section 4.2.1 considers previous sociolinguistic studies which have examined voice quality through a componential approach comparable to that adopted here. Following this, Section 4.2.2 reports on more recent and relevant work which has explored social variation in voice quality by focussing on acoustic measures of different phonatory settings.

4.2.1 Componential voice quality research

Honikman (1964) was one of the first to use the term 'settings' to refer to long-term postures of the vocal tract which may characterise the speech of an individual, small groups, or, in her case, entire languages. She does not discuss auditory or articulatory correlates of specific settings using a particular database of speech material, but remarks instead on the characteristic settings of a number of languages. The work reported on Honikman's efforts to assist those learning English or French as a foreign language, and she argues that through learning about the long-term postures and settings of a language, learners will be able to articulate more like native speakers. Honikman (1964) highlights that differences between languages' settings are likely to be determined by the most common sounds in that language, with segmental and setting characteristics interacting with one another. This relationship between settings and segments is echoed throughout much of the research on voice quality and long-term settings (e.g. Abercrombie 1967; Laver 1994; Trudgill 1974).

The description of English given by Honikman (1964) refers primarily to the tongue and jaw settings. The tongue has a *tethered* anchor point, with the sides of the tongue often resting along the upper inner gums and teeth, and an *untethered* moving part, the tongue tip, which exhibits the greatest degree of movement (1964: 76). With reference to the tethering, she comments that it is variable to facilitate the realisation of all English phonemes. For jaw posture she notes that in English 'the jaws are, for the most part, held loosely together but not clenched.' (1964: 80) and the lips are described as fairly neutral. Honikman also considers the jaw settings of the languages of India and Pakistan. She comments that the jaws are loosely apart and *rather inert*. This results in the distinguishing *timbre* of these languages, enables the realisation of retroflex consonants, and also accounts for 'the lack of pressure in bilabial stops' (1964:80)

Learning about settings as a means to assist in language learning was also the core aim of Esling and Wong (1983). They provide a voice quality model for American English to enable non-native speakers to improve their pronunciation. Their model describes American English as having spread lips, an open jaw, a palatalised tongue body position, retroflex articulations (retracted apical articulations), nasal voice, lowered larynx and creaky voice (1983: 91). Although they acknowledge that there will be dialectal variation across speaker groups they comment that through understanding and adopting some of these postures, pronunciation can be improved. As in Honikman (1964), Esling & Wong (1983) comment on settings characteristic of other languages, but this is beyond the scope of the current Chapter.

In Edinburgh, Esling (1978) describes a number of voice quality settings characteristic of speakers in the city. The speech of fifty-two speakers was analysed, with participants from two city wards, one of the most and one of the least affluent. Included among the fifty-two speakers were nineteen eight-year-old boys from two primary schools (one from each ward) and fourteen of their fathers. Esling comments that the successful implementation of auditory analysis using Laver's scheme relies upon adequate training and the ability of the phonetician making the judgements, something which perhaps accounts for the relative lack of comprehensive research on voice quality. However, Thomas suggests that despite the difficulties associated with carrying out an analysis, it is often a 'lack of familiarity' with both theory and methodology which inhibits researchers (2013: 120).

Esling (1978) notes a number of settings which characterise speakers along both the age and class dimensions. For adults, creaky voice, tongue-tip articulations and a close jaw are characteristic of higher-status speakers from more affluent areas. In contrast, harsh voice, tongue blade articulations, raised larynx, protruded jaw and 'habitually faucalized and pharyngealized configurations' (1978: 21) are features common in the lower-status group. The boys were found to exhibit slightly different settings: creaky and falsetto phonation were characteristic of the higher-status boys, in contrast with the whispery and harsh phonation used by the boys from less affluent areas. Esling comments that the voice quality differences he observes between boys and adults could be related to physical development, language change or his 'technique of auditory judgement by imitation' (1978: 20).

Esling's (1978) study provides information on the characteristic long-term settings which vary along socioeconomic scales in Edinburgh. He comments that the analysis and interpretation of the auditory results could be improved by using instrumental techniques, particularly for phonation, and he mentions the use of the laryngoscope. Indeed, Esling (1984) reports on the articulatory vocal fold correlates of different acoustic and auditory phonation types. Through assessing the relationship between these factors using a relatively invasive procedure with a phonetician as a participant, Esling suggests that the results can be extrapolated to assist with the characterisation of phonation for sociolinguistic research. This assessment of the relationship between articulatory, acoustic and auditory information is an area in which further developments could be made. Increasingly, non-invasive techniques such as ultrasound are being used by researchers to assess articulatory postures. This means we can better understand and explore the precise acoustic and auditory correlates of different articulations (e.g. Wormald & Kirkham 2015).

In his work on Norwich English, Trudgill (1974) provides a description of the settings characteristic of working-class (WC) Norwich speakers. He explores how these settings can distinguish WC from middle-class (MC) speakers, and also between Norwich speakers who appear similar in terms of their segmental productions. Laryngeal settings described for WC speakers include creaky voice, a high pitch range for both males and females, and a wide dynamic range. Commenting on the supralaryngeal settings, Trudgill reports that speakers exhibit raised larynx, fronted and lowered tongue body, a generally tense vocal tract and auditory nasality. Trudgill comments that overall there is a 'tendency to high muscular tension,' which could be the predominant over-riding quality giving rise to individual settings, particularly auditory nasality. Trudgill relates this to the fact that the walls of the pharynx have high muscular tension (1974: 188). Further, he comments on the fundamental relationship between the segmental patterns discussed throughout the book and the relationship these have to long-term settings. He claims that some segmental phonetic patterns may be related to changes in setting, and notes that by examining settings, rules about sound change can be generalised to account for the variation observed:

> […] it is clear that perhaps the single socially most significant feature of linguistic differentiation in Norwich is the type of voice quality produced by the particular type of setting employed by a speaker. It is in any case this feature which most clearly distinguishes WC from MC speakers. (1974: 190-1)

In his study of Liverpool English, Knowles (1978) also comments on the importance of settings in any description of a variety. He reports that the characteristic *adenoidal* (1978: 89) quality of Liverpool English is related to the interaction of a number of settings: tongue body raising and retraction, narrowing of the faucal pillars, a tense or 'tightened' pharynx, raised larynx, and close jaw. The tongue setting results in velarisation across segments, and Knowles (1978) comments specifically on the consistent realisation of velarized /l/ and /r/. Further, the close jaw posture which restricts tongue movement coupled with this velarisation means that articulations usually made with the tongue tip are here made with the tongue blade. In consideration of the relationship between long-term settings and phonological requirements, Knowles discusses the realisation of /s/. Canonically this requires a grooved tongue tip to make the articulation, in contrast to the setting, which posits a velarized laminal articulation. He suggests that although grooving may have priority for most speakers, for those with what Knowles describes as a *thick* accent the setting may result in a more retracted and less grooved tongue posture, resulting in a sound similar to [ʃ] (1978: 90).

Stuart-Smith (1999) used a modified VPA protocol based on that presented in Laver (1980) to analyse the speech of thirty-two Glaswegians. Equal numbers of males and females were recorded, with adults aged between 40 and 60 and children aged between 13 and 14 years old included. Participants were from both WC and MC backgrounds. Conversational speech and read word lists were analysed separately, with differences in terms of voice quality being observed between these speech tasks. Stuart-Smith notes that females use more whispery voice during the word list, that MC speakers have a more fronted tongue body, and that all adults exhibit a greater degree of supralaryngeal tension during this task. She suggests that these effects could be related to the unfamiliarity of reading a word list. Stuart-Smith notes that the difference between the tasks is particularly evident for MC females, who have a slightly raised larynx and spread lips throughout their word list readings, commenting that for these speakers this is a ‘separate linguistic activity’ (1999: 219).

Similarly to Esling and Trudgill, Stuart-Smith found the greatest differences were between WC and MC speakers. She identifies a WC Glasgow voice quality characterised by an open jaw setting, a variably retracted tongue root with a raised and backed tongue body, supralaryngeal laxness and whispery voice, the MC speakers being characterised by ‘the *absence* of WC traits’ (1999: 215). This is discussed in relation to Johnston (1983), who argued that because there is no clear standard variety in locations such as Scotland or Northern England, ‘the editing out of dialect features’ is the strategy adopted by MC speakers (1983: 11). Stuart-Smith (1999) comments on only a small number of potentially characteristic MC features, these including fronted tongue body for females and advanced tongue root for males. As the results are based on just four speakers per cell, and features were only considered characteristic if they were present in the speech of three or all four speakers per cell, it is clear that MC voice quality features are indeed more variable than those used by WC speakers.

Stuart-Smith goes onto discuss more nuanced and complex interactions between age and gender groups: nasalisation and creak are more extreme for males, with females instead using whispery voice. Further, she comments that despite the differences in degree or presence of certain settings, there are features common to all Glaswegian speakers: raised tongue body, nasalisation, advanced tongue tip/blade, and tense, whispery voice. Stuart-Smith also reiterates the point made by many who have looked in depth at voice quality: considering long-term postures enables segmental variation to be ‘expressed more satisfactorily’ (1999: 205), with, for example, the lack of labiodentalisation as a setting correlating with the lack of labiodental /r/ in Glasgow and advanced tongue tip/blade relating to the realisation of alveolar consonants as dental in Scottish English.

Comparing voice quality among adolescents in Inverness, Aberdeen and Dumfries, Beck and Schaeffler (2015) note a number of gender differences. They report results from a VPA analysis of 31 boys and 45 girls between twelve and eighteen years of age.

Speakers were evenly distributed across the three locations. Overall, females were found to have spread lips, a more advanced tongue tip and body, a slightly raised larynx, and creaky and harsh phonation. In contrast, males were reported to have rounded lips, a slightly advanced tongue tip, a retracted tongue body, a lowered larynx, marked creaky voice and slightly harsh phonation. Comparing across locations, Dumfries was the location with the greatest degree of lingual fronting. Lingual raising was also present to the highest degree here, with a slightly lowered larynx. In Aberdeen, slight pharyngeal constriction and laryngeal tension were accompanied by a raised tongue body and fronted tip. Voice quality in Inverness deviated the least from the neutral position (see Section 4.4), with less lingual fronting than was observed in Dumfries and Aberdeen.

With forensic applications specifically in mind, Stevens and French (2012) also used a VPA analysis in their characterisation of Standard Southern British English (SSBE), for which they used conversation data from 100 males aged between 18 and 25. Profiles were made using both telephone and studio-quality recordings. The second profile was completed using the studio-quality recordings two weeks after the first profile was done with the telephone-quality recordings. Over 80% of speakers were found to share a number of settings: fronted tongue body, advanced tongue tip/blade, sibilance, breathy voice, and creaky voice. As well as noting these settings which they suggest may be associated with SSBE, they highlight that it is the combination of settings which is often of interest, particularly when assessing the distinctiveness of a speaker's voice.

Further comments are often made about individual accent or language characteristics in the reference literature. For example, Wells (1982a) comments on the lowered larynx exhibited in the speech of Texan or Canadian males, tense voice for lowland Scottish speakers, and lax voice[16] in the American South. Both Wells (1982a) and Laver (1994) comment on velarization in New York and the West Midlands of England and the presence of nasalisation in many varieties of English in Australia, England and the US. Laver (1994) also comments on the commonness of whispery voice, particularly in older speakers of all varieties, and the extended lingual range of many Scots English varieties. Reference is often made to Received Pronunciation (RP), with Wells (1982b) commenting on the lowered larynx and widened oro-pharynx. Hughes, A. et al. (2012)

[16] Lax voice appears in the current VPA presented in the Methodology as *lax larynx*.

state how creaky voice is a common feature of the variety, and Laver (1994) reports a narrow labial, lingual and mandibular range with lax voice.

The research described above demonstrates how variation in voice quality profiles can be observed in the same way that we see variation at other linguistic levels. Much of this work has emphasised the relationship between segments and settings and illustrates how the examination of long term settings can help to more concisely account for segmental variation (e.g. Stuart-Smith 1999; Trudgill 1974). The combination of settings which comprises the characteristic profiles and qualities of each of the varieties described differs but a number of settings are consistently observed to be non-neutral in varieties of English. Lingual fronting, raised larynx, nasalisation and the phonation settings of harsh, whispery voice and creaky voice are all regularly noted as forming part of the characteristic profile of a given variety of English.

4.2.2 Variation in phonation

More recently, a number of studies have considered social variation in voice quality through focussing on acoustic analyses of short-term phonation. Podesva (2007) discussed contextual variation in the use of falsetto by a single speaker. He analysed the speech of Heath, a gay man, in three different contexts which reflected different aspects of Heath's identity: a barbecue with friends, a phone call with his father, and a formal work meeting. An auditory analysis of phrases was undertaken, rather than focussing on specific segments or isolated vowels. Podesva comments that the varying acoustic correlates of falsetto make it difficult to categorically distinguish it acoustically from modal voice. Blind checking of a sample of utterances was undertaken by a trained listener, with 94% agreement obtained between analysts. Further, although perceptual analysis was used as the method of identification for falsetto segments, the relevant segments were subsequently subjected to a range of acoustic measures. These included generating a pitch trace, examining the waveform and spectrogram, and calculating maximum and minimum f0 for each utterance.

Podesva observes the highest amount of falsetto from Heath when Heath is at a friend's barbecue, commenting that, 'Heath's falsetto is longer (in duration), higher (in f0), and more variable (in f0 range)' (2007: 487). As well as this, falsetto also alternates with creaky voice, resulting in an increased pitch range for Heath. Podesva provides a thorough discussion of the ways in which Heath uses falsetto, arguing that it is not simply a way for him to 'perform gayness' (2007: 494). Instead, he considers that falsetto is a means by which Heath can perform expressiveness, which Podesva views as a non-normative male behaviour. Consequently, through using falsetto to perform this function, Heath is not conforming to ‘heteronormative masculinity’ (2007: 495). Podesva’s study demonstrates intra-speaker variability in voice quality and how it can be used as an indexical feature of speech in the same way that segments can.

Henton and Bladon (1985) consider segmental acoustic variation in their analysis of breathiness in the speech of females. Their corpus was comprised of thirty-six speakers of RP (twenty females, sixteen males), and twenty-five ‘Modified Northern’ (MN) speakers (twelve females, thirteen males). MN was defined as the accent of those who were educated in and around Leeds but who had lived away for a number of years and ‘have thus modified their native features.’ (1985: 224). They quantified the presence of breathiness based on the difference in amplitude between the first and second harmonics in steady-state vowels. They consistently found the first harmonic to be higher in amplitude than the second harmonic for females, thus indicating greater breathiness. Although they lament the decision of females to employ breathy voice as a phonatory setting due to its inefficiency (both in production and perception), they comment that it may be a strategic move:

> If a woman can manage to sound as though she is sexually aroused, she may be regarded as more desirable or with greater approbation by a male interlocutor than if she speaks with an ordinary, modal voice. [...] A breathy woman can be regarded as using her paralinguistic tools to maximise the chances of her achieving her goals, linguistic or otherwise. (1985: 226)

A later paper explores the use of creaky voice, taking both gender and regional variation into consideration (Henton & Bladon 1988). The analysis was undertaken on an expanded version of their 1983 corpus, including forty RP speakers (balanced for gender), and forty MN speakers (balanced for gender). They carried out an auditory analysis on the presence of creaky voice in read sentences. Henton and Bladon comment that creak is more common for all speakers in syllable-final contexts, with males using considerably more than females. Male MN speakers use the most creak, with female RP and MN speakers using the least, and not differing significantly from one another. The male RP speakers occupy the middle ground. The increased presence of this creak in the speech of the males is interpreted by Henton and Bladon as corresponding to masculinity, with MN males wanting to sound ‘hyper-masculine’ and increase the difference between themselves and the MN females. RP males instead attempt to reduce the gender differences and sound ‘hypo-masculine’ (1988: 22). It appears that men’s adoption of creak as a ‘masculine strategy’ attracts fewer subjective judgments than does the use of breathiness by female speakers.

Szakay (2012) analysed segmental breathy and creaky voice in New Zealand English using acoustic measures. She calculated H1-H2 (the second harmonic minus the first) spectral tilt measures for each vowel from two minutes of spontaneous speech from thirty six speakers. H1-H2 is often used as a measure of creaky and breathy phonation variation, with higher values being indicative of increased breathiness. Exploring ethnic variation, Szakay included six male and six female Pakeha speakers (speakers of European descent), and twelve male and twelve female Maori speakers. Maori speakers were found to have lower H1-H2 values, reflecting the increased presence of creaky voice amongst this group relative to the Pakeha speakers. With the exception of Maori males, it appears that overall, older speakers exhibited more creaky voice than younger speakers. Within the Pakeha group a gender difference was also observed, with females exhibiting higher degrees of creak than males.

More recently, Szakay and Torgersen (2015) used the H1-H2 measure alongside f0 calculations to characterise innovative voice quality and pitch patterns in London English. They found that Inner London Multicultural London English speaking males had a lower pitch and more breathy voice quality than did Outer London males. For females the opposite pattern was observed: Outer London females conformed to the traditional pattern of being more breathy, inner London females exhibited less breathy voice, and Inner London Anglo females used the highest amounts of creak.

Recent work by Simpson (2012) discusses how the H1-H2 measure may not be the best way to calculate breathiness in speech. He comments that ‘sex-specific differences in the harmonic expression of nasality combined with the high likelihood of nasality being present in the open vowels’ (2012: 477) could result in the H1-H2 measure giving the impression of increased breathiness amongst female speakers, despite this not being articulatorily true. Szakay and Torgersen (2015) comment that this means that their Inner London results show that voice quality is being used sociolinguistically, as men here were found to be more breathy than the women.

As well as variation within and between speakers, research has been undertaken which considers the conversational role of various phonatory settings (e.g. Grivičić & Nilep 2004; Ogden 2001). A number of perceptual studies have highlighted the salience of certain voice quality features to lay listeners (e.g. Keating & Esposito 2007; Newman & Wu 2011; Pittam 1987; Szakay 2012; Walton & Orlikoff 1994; Yuasa 2010). Although it is beyond the scope of the current study to discuss the results of these studies in detail, in conjunction with those presented throughout this Section they emphasise the relevance and necessity of considering voice quality in any characterisation of a given variety and the potential levels of variability involved.

4.3 Predictions

The studies discussed above demonstrate the complexity and variability in voice quality. Although more recent works have focussed on the acoustic analysis of specific phonatory settings, the adoption of an auditory VPA approach in this thesis allows for an initial exploration of characteristic settings in PE, with a holistic picture of vocal tract postures gleaned and overall group patterns identified.

As a consequence of the lack of comprehensive research on long term vocal settings it is difficult to make any specific predictions about what might be expected in the current context with regard to either the heritage language or regional influences on PE. No research currently exists which details what voice quality patterns might be expected in Bradford, Leicester or even Yorkshire or the East Midlands. Additionally, aside from Honikman's characterisation of the languages of India and Pakistan, there are no descriptions available of the long term vocal settings of any variety of Panjabi. In spite of this, the research presented above in Section 4.2.1 frequently reported on a number of characteristic settings which are observed in varieties of English. As such, we might expect to see at least some of these settings exhibited by some groups. These included the phonation settings of harsh, whispery voice and creaky voice in addition to lingual fronting, raised larynx and nasalisation. Reasons behind any presence of these features will be addressed in Section 4.6.

One of the principal benefits of including a voice quality analysis which considers long term settings is that segmental patterns can be better understood. Any profiles and settings identified as typical could be useful in an interpretation of the segmental patterns which are presented in subsequent Chapters. It may be that the settings described here more succinctly account for the segmental variation reported later.

4.4 Methodology

Figure 10 shows the modified Vocal Profile Analysis (VPA) protocol adopted in this analysis. This form varies from the original protocol introduced by Laver et al. (1991) (Figure 11), but is fairly consistent with the most recent iteration from Beck and Schaeffler (2015) (Figure 12). The protocol in Figure 10 is the VPA protocol employed at J P French Associates, with the lingual tip setting of retroflexion added to contrast directly with the existing lingual tip setting of retraction. Retroflexion directly refers to the curling back of the tongue tip, which results in sub-laminal rather than apical approximation or contact at the alveolar ridge. Research into Asian Englishes has suggested that retroflexion may be segmentally present (e.g. Kirkham 2011; Sharma & Sankaran 2011; Lambert et al. 2007). By including retroflexion in the VPA protocol, its presence as a long-term setting in PE can be explored. As with Beck and Schaeffler (2015), but in contrast to Laver et al. (1991), the form used for the current project (Figure 10) considers only vocal quality features and does not consider temporal and prosodic characteristics which were included on the original form.

Participant name: Analyst:

Participant code: Date:

[MODIFIED] VOCAL PROFILE ANALYSIS PROTOCOL

	FIRST PASS		SECOND PASS				Notes
				Slight	Mark.	Extr.	
	Neutral	Non-Neutral	SETTING	1	2	3	
A. VOCAL TRACT FEATURES							
Labial			Lip rounding/protrusion				
			Lip spreading				
			Labiodentalisation				
			Extensive labial range				
			Minimised labial range				
Mandibular			Close jaw				
			Open jaw				
			Extensive mandibular range				
			Minimised mandibular range				
Lingual tip/blade			Advanced tongue tip/blade				
			Retracted tongue tip/blade				
			Retroflexion				
			Sibilance				
Lingual body			Fronted tongue body				
			Backed tongue body				
			Extensive lingual range				
			Minimised lingual range				
Pharynx			Pharyngeal constriction				
Velopharyngeal			Audible nasal escape				
			Nasal				
			Nasal w/o full release				
			Denasal				
Larynx height			Raised larynx				
			Lowered larynx/pharyngeal expansion				
B. OVERALL MUSCULAR TENSION							
Vocal tract tension			Tense vocal tract				
			Lax vocal tract				
Laryngeal tension			Tense larynx				
			Lax larynx				

C. PHONATION FEATURES		Present		Scalar Degree			
				Slight	Mark.	Extr.	
	SETTING	Neutral	Non-neutral	1	2	3	
Voicing type	Voice						
	Falsetto						
	Creak						
	Creaky						
Laryngeal frication	Whisper						
	Whispery						
	Breathy						
	Murmur						
Laryngeal irregularity	Harsh						
	Tremor						

Figure 10: Vocal Profile Analysis protocol adopted in the current analysis

I. VOCAL QUALITY FEATURES

CATEGORY	FIRST PASS			SECOND PASS						
	Neutral	Non-neutral		SETTING	Scalar Degrees					
		Normal	Abnormal		Normal			Abnormal		
					1	2	3	4	5	6
A. Supralaryngeal Features										
1. Labial				Lip Rounding/Protrusion						
				Lip Spreading						
				Labiodentalisation						
				Extensive Range						
				Minimised Range						
2. Mandibular				Close Jaw						
				Open Jaw						
				Protruded Jaw						
				Extensive Range						
				Minimised Range						
3. Lingual Tip/Blade				Advanced						
				Retracted						
4. Lingual Body				Fronted Body						
				Backed Body						
				Raised Body						
				Lowered Body						
				Extensive Range						
				Minimised Range						
5. Velopharyngeal				Nasal						
				Audible Nasal Escape						
				Denasal						
6. Pharyngeal				Pharyngeal Constriction						
7. Supralaryngeal Tension				Tense						
				Lax						
B. Laryngeal Features										
8. Laryngeal Tension				Tense						
				Law						
9. Larynx Position				Raised						
				Lowered						
10. Phonation Type				Harshness						
				Whisper(y)						
				Breathiness						
				Creak(y)						
				Falsetto						
				Modal Voice						

II. PROSODIC FEATURES

CATEGORY	FIRST PASS			SECOND PASS						
	Neutral	Non-neutral		SETTING	Scalar Degrees					
		Normal	Abnormal		Normal			Abnormal		
					1	2	3	4	5	6
1. Pitch				High Mean						
				Low Mean						
				Wide Range						
				Narrow Range						
				High Variability						
				Low Variability						
2. Consistency				Tremor						
3. Loudness				High Mean						
				Low Mean						
				Wide Range						
				Narrow Range						
				High Variability						
				Low Variability						

Figure 11: Vocal Profile Analysis protocol from Laver et al. (1991: 268-9)

VOCAL PROFILE ANALYSIS PROTOCOL

Speaker: Dumfries female 11

	FIRST PASS		SECOND PASS						
				moderate			extreme		
	Neutral	Non-neutral	SETTING	1	2	3	4	5	6
A. VOCAL TRACT FEATURES									
1. Labial		x	Lip rounding/protrusion	x					
			Lip spreading						
			Labiodentalization						
	x		Extensive range						
			Minimised range						
2. Mandibular	x		Close jaw						
			Open jaw						
			Protruded jaw						
	x		Extensive range						
			Minimised range						
3. Lingual tip/blade		x	Advanced tip/blade		x				
			Retracted tip/blade						
4. Lingual body		x	Fronted tongue body		x				
			Backed tongue body						
			Raised tongue body	x					
			Lowered tongue body						
	x		Extensive range						
			Minimised range						
5. Pharyngeal	x		Pharyngeal constriction						
			Pharyngeal expansion						
6. Velopharyngeal			Audible nasal escape						
		x	Nasal		x				
			Denasal						
8. Larynx height		x	Raised larynx	x					
			Lowered larynx						
B. OVERALL MUSCULAR TENSION									
10. Vocal tract tension	x		Tense vocal tract						
			Lax vocal tract						
11. Laryngeal tension	x		Tense larynx						
			Lax larynx						

C. PHONATION FEATURES

		Present		Scalar Degree					
		Neutral	Non-neutral	Moderate			Extreme		
	SETTING			1	2	3	4	5	6
12. Voicing type	Voice		x						
	Falsetto								
	Creak								
	Creaky		i		i				
13. Laryngeal frication	Whisper		x						
	Whispery					x			
	(Breathy)								
14. Laryngeal irregularity	Harsh								
	Tremor								

Figure 12: Example of a completed Vocal Profile Analysis protocol from Beck & Schaeffler (2015: 3).

The completion of the VPA is primarily an auditory task, with acoustic inspection made of spectrograms and waveforms, but no specific acoustic measures being taken. Defining the neutral setting is necessary for the accurate completion of a VPA protocol. Any assumption of non-neutrality made with any version of the VPA is made with reference to this neutral posture. The neutral setting is most comprehensively defined by Laver (1980), in which he describes a ‘constellation of co-occurring settings’ (1980: 14) which comprise the neutral posture:

- the lips are not protruded
- the larynx is neither raised nor lowered
- the supralaryngeal vocal tract is most nearly in equal cross-section along its full length
- front oral articulations are performed by the blade of the tongue
- the root of the tongue is neither advanced nor retracted
- the faucal pillars do not constrict the vocal tract
- the pharyngeal constrictor muscles do not constrict the vocal tract
- the jaw is neither closed nor unduly open
- the use of the velopharyngeal system causes audible nasality only where necessary for linguistic purposes
- the vibration of the true vocal folds is regularly periodic, efficient in air use, without audible friction, with the folds in full glottal vibration under moderate longitudinal tension, moderate adductive tension, and moderate medial compression
- overall muscular tension throughout the vocal apparatus is neither high nor low.

(Laver 1980: 14-15)

Laver (1980) defines the acoustic correlates of the first three formants for an adult male speaker with a vocal tract of 17cm in neutral posture as 500Hz, 1500Hz and 2500Hz, female correlates being more complex to identify (Laver 1994). Thus, many of the characteristics presented here are often identified with specific reference to this male average. For each setting on a VPA, a speaker is considered first in terms of a binary neutral or non-neutral dimension. If non-neutral, the setting is marked by assigning the setting a scalar degree. Both Laver et al. (1991) and Beck and Schaeffler (2015) use six scalar degrees for each setting, as opposed to three on the modified VPA in Figure 10. Three is considered sufficient for characterising non-pathological speech for sociolinguistic purposes, with 1 corresponding to slight, 2 to marked, and 3 to extreme deviations from neutral (Laver 1994: 153).

4.4.1 Vocal Tract Features

The main section of the VPA in Figure 10 corresponds to supralaryngeal settings. The following Section considers each of the settings within this portion of the VPA in turn.

4.4.1.1 Labial and Mandibular settings

The first subsection of vocal tract features on the VPA in Figure 10 refers to lip postures. This is the same as the protocols in Laver et al. (1991) (Figure 11), and Beck and Schaeffler (2015) (Figure 12). Rounding or protruding the lips serves to increase the length of the vocal tract and consequently lowers all formant frequencies, particularly the higher formants (Laver 1980; Lindblom & Sundberg 1971). Lindblom and Sundberg (1971) comment that the degree of formant lowering associated with lip rounding varies for F1, F2 and F3 depending upon the combined tongue body posture. Rounding is auditorily perceivable in vowels such as [i], which are phonologically spread, and consonants [s z] often have a perceptually lower pitch when they are produced with lip rounding (Laver 1994). Both rounded and protruded lips have the same auditory and acoustic correlates and these postures often co-occur (Laver 1994: 407). Consequently, these settings are conflated in the VPA protocol adopted here to the single setting, *Lip rounding/protrusion* (Figure 10). *Lip spreading* raises formant frequencies, by contrast, and is particularly noticeable on coronal consonants which, as a result, could have a higher perceived pitch (Laver 1994). *Extensive labial range* refers to the extreme and varied movement of the lips over and above that generally used to distinguish between segments. In contrast, *Minimised labial range* refers to a more stable and less variable lip posture, with the lips exhibiting little movement across stretches of speech.

Labiodentalisation refers to the long-term adoption of a posture with a retracted or raised lower lip or protruding upper front teeth. Laver (1980) comments that it is particularly audible in the production of oral or nasal stops which are usually bilabial, with dental and alveolar fricatives being 'subject to a very prominent auditory modification' (1980: 33). As with lip rounding or protrusion, labiodentalisation results in lowered formant frequencies (Laver 1980). There is evidence that segmental labiodentalisation (/θ ð ɹ/ to [f v ʋ]) is increasingly common in urban British varieties (Foulkes & Docherty 2000), and its inclusion on the VPA will facilitate correlations between settings and segmental patterns.

Following the labial section is the part of the VPA that deals with mandibular settings. *Close* and *Open jaw* refer to counterpart non-neutral settings in the vertical dimension. Laver et al. (1991) and Beck and Schaeffler (2015) include protruded as well as open and close jaw (Figure 11 and Figure 12). Similar acoustic correlates are noted as for the labial settings discussed above: a more open jaw results in all formants rising, most noticeably for F1, with a close jaw lowering formants (Laver 1980; Lindblom & Sundberg 1971). The realisations of the PRICE and MOUTH vowels (Wells 1982a) can indicate a non-neutral jaw posture, with reduced or extended formant (F1~F2) trajectory lengths corresponding to a potentially close or open jaw, respectively (Laver 1994: 408). Laver (1980) comments that labial settings should be considered alongside mandibular settings as 'each can magnify or diminish the other's effect' (1980: 67).

The VPA protocol form in Figure 10 also includes *Extensive* and *Minimised mandibular range*. This is similar to that described above for labial settings, but refers to jaw posture. Minimised mandibular range corresponds to a reduced amount of jaw movement; extensive mandibular range refers to an increased amount.

4.4.1.2 Lingual settings

Considering settings of the lingual tip/blade, both Laver et al. (1991) (Figure 11) and Beck & Schaeffler (2015) (Figure 12) include only advanced or retracted as non-neutral options. In addition to these, Figure 10 also includes sibilance and retroflexion. Laver (1980) comments that lingual tip/blade settings should be interpreted in relation to the overall lingual posture, with the tongue body being the largest mass.

Advanced tongue tip/blade refers to the fronting of the tongue tip, with Laver (1994) noting that the susceptible segments [θ ð] could be interdental and that [t, d, n, l, s, z] may be articulated with the blade, perhaps in the dental region. Acoustically, advanced tip/blade corresponds to an increased distance between F1 and F2 and, an overall high F2 and F3, with F2 becoming less high the fronter the tongue tip is (Laver 1980). In his description of retracted tongue tip/blade settings, Laver (1980) distinguishes between two different types, the first being a retracted apical setting whereby alveolar consonants are articulated at the back edge of the alveolar ridge with either the tip or blade of the tongue and a lowered F4 close to F3. Figure 10 includes this as *Retracted tongue tip/blade*. The second configuration discussed by Laver (1980) is retracted sub-laminal articulations, here considered separately as *Retroflexion*, where the tongue is curled back leading to sub-laminal contact and a low F3 close to F2.

Sibilance is not a setting defined in Laver (1980), Laver et al. (1991) or Beck & Schaeffler (2015) (see Figure 11 and Figure 12), but it is included on the VPA protocol adopted here (Figure 10). Sometimes considered as a property of individual segments, it refers to the lengthening and strengthening of apical fricatives with high-frequency acoustic energy being visible in the spectrogram. Although noticeable in other coronal sounds this setting is primarily associated with fricative realisations (Clark et al. 2007; Ladefoged & Johnson 2015). It reflects the long-term adoption of a posture with a narrow articulatory constriction, which forces the air through a smaller space, thus increasing the amplitude of higher frequencies. Figure 13 below is a spectrogram from a Leicester PE female (Harbeer) who exhibited marked to extreme sibilance. This spectrogram is followed by Figure 14, which is from a Bradford PE female (Adeena) who exhibited no sibilance as a long term setting. The cursor on each figure is at 5055Hz, above which there is a great deal of energy in Figure 13, but not in Figure 14[17].

Lingual body posture refers to the long-term position of the main body of the tongue, something which Laver (1980) considers to have an acoustic bearing on all segments, particularly vowels. Both Laver et al. (1991) and Beck and Schaeffler (2015) include raised and lowered tongue body settings in addition to the horizontal postures included here (see Figure 11 and Figure 12, respectively). These were not present on the VPA protocol form which I used which is the one employed at J P French Associates and as such deviations along this dimension were not noted. It is suggested that the inclusion of these on any VPA would be worthwhile, and, in the current context, could help to further address some of the patterns observed.

As Laver (1980) considers lingual posture as a whole, the acoustic correlates of *Fronted tongue body* are the same as those presented above for advanced tip/blade, with F2 close to a very high F3, and F2 becoming less high as the tongue body becomes fronter (1980: 55). This characterisation of F2 becoming lower in frequency as the tongue moves through palatalised, alveolarised and dentalised voice, is contrary to the acoustic expectation of F2 raising with lingual fronting.

[17] It must be noted that the differences between these spectrograms are not solely as a consequence of the presence or absence of sibilance. These two speakers exhibit markedly different vocal profiles, with the presence versus absence of sibilance being only one of the settings which contributes to this difference.

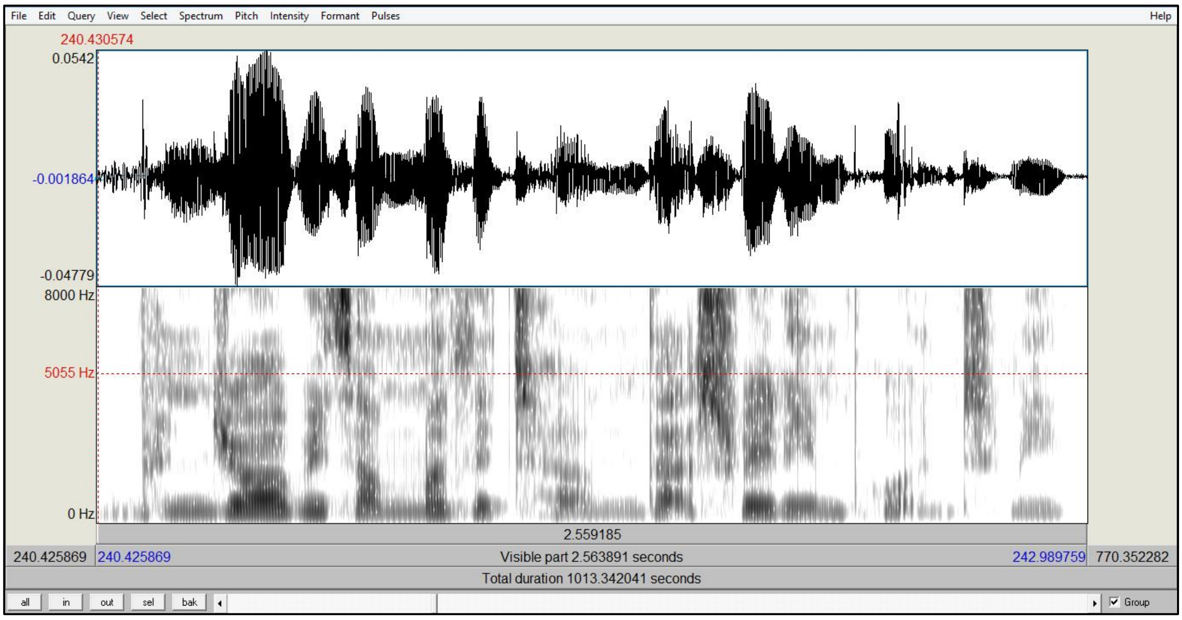


Figure 13: Leicester Panjabi English female (Harbeer) with marked sibilance. Excerpt from Paired Conversation: *Panjabi's our mother tongue, that's really important to me*. [Dynamic Range at 40dB; View Range 0-8000Hz; Window Length 0.003]

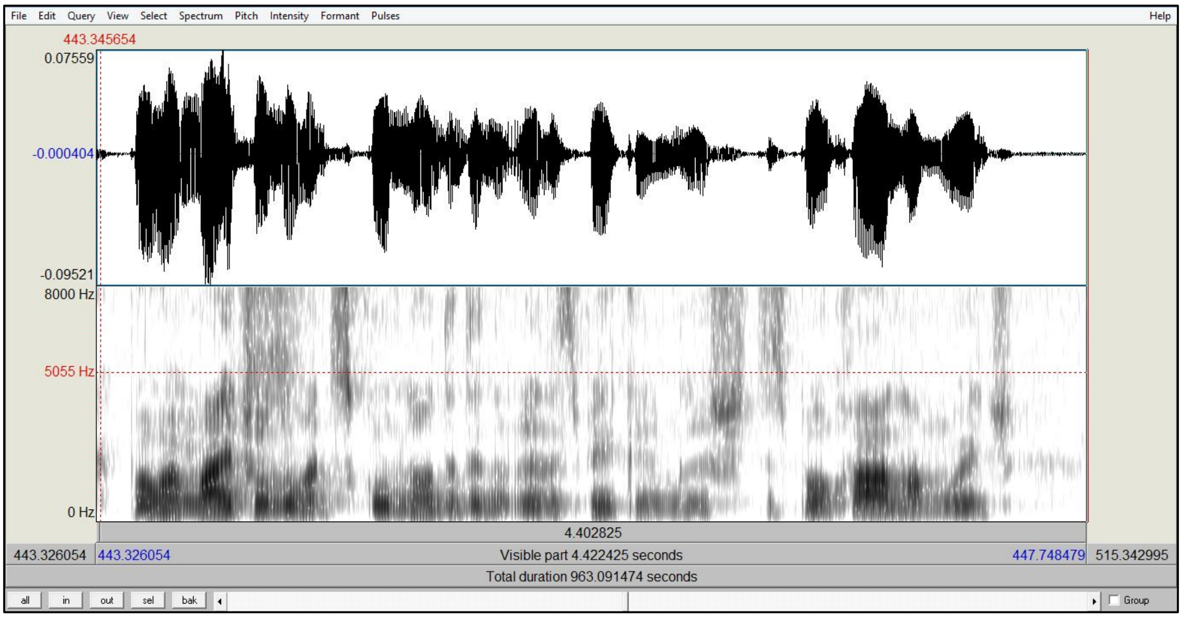


Figure 14: Bradford Panjabi English female (Adeena) with no sibilance. Excerpt from Paired Conversation: *but when my children went to school, no they didn't really speak English, they spoke our language*. [Dynamic Range at 50dB; View Range 0-8000Hz; Window Length 0.003]

Laver (1994) considers lingual body posture separately from tip/blade settings. Fronted tongue body leads to a compression of the 'vocoid space' in the front of the oral cavity, and *Backed tongue body* corresponds to compression towards the pharynx (1994: 410). Laver notes that the same segments, [k, g, ŋ, l, ɹ, w, j, ʃ, ʒ, tʃ, dʒ, n, s, z], are susceptible to both fronting or backing with their places of articulation being correspondingly fronter or more retracted. As expected, F2 lowering is reported as an acoustic component of lingual backing, while F1 raises slightly, thus reducing the difference between the two formants. F3 is raised (Laver 1980). Lindblom & Sundberg (1971) comment that palatal [fronted] postures have a lower F1 and a higher F2 than retracted postures, although the degree of formant variation is smaller than that associated with jaw closing.

4.4.1.3 Pharynx and Larynx settings

The pharynx, as defined by Laver, 'extends from the soft palate to the hyoid bone' (1980: 59) and is represented by a single setting on the modified version of the VPA currently being used here: *Pharyngeal constriction* (Figure 10). This is consistent with Laver et al. (1991) (Figure 11), but is represented in Beck and Schaeffler (2015) (Figure 12) with both constricted and expanded options. A constriction in the pharynx caused by tensing of the pharynx muscles or tongue root retraction will result in a rise in F1 and a lowering of F2. Consequently, by referring solely to the scalar degree of pharyngeal constriction, no assumptions are made about the exact articulatory posture. Laver (1994) provides a description of the auditory quality of advanced and retracted tongue root:

> Impressionistically, a setting which involves an advanced tongue root tends to sound rather 'hollow', whereas one with a retracted root sounds rather 'muffled'. (1994: 411)

In Figure 10, pharyngeal expansion is considered alongside lowered larynx using the single setting *Lowered larynx/pharyngeal expansion*. Both settings share acoustic and auditory correlates. Pharyngeal expansion (either through tongue-root fronting or relaxing of the pharynx muscles) could lead to a lower F1, narrower formant bandwidths, decreased high-frequency energy and broader glottal pulses (Halle & Stevens 2002; Laver 1980). Halle and Stevens (2002) further comment that F2 will also vary in relation to the segmental context when the pharynx is expanded. They report that F2 lowers for back vowels and rises for front ones, with all vowels having a *dull* quality (2002: 39). Acoustically, both Lindblom and Sundberg (1971) and Laver (1980) note that the increased vocal tract length resulting from lowered larynx lowers all formants as well as the F0, with F3 being least affected and F2 the most. Laver describes the impressionistic quality of lowered larynx as 'sepulchral' (1994: 406). In contrast to lowered larynx, *Raised larynx* is often described as sounding *strained* with an accompanying rise in F0 and all formant frequencies (Laver 1980; Laver 1994).

4.4.1.4 Velopharyngeal settings

The literature describing non-neutral velopharyngeal settings, particularly nasality, is wide and varying, and a full consideration of all the various physiological possibilities cannot be discussed here. The reader is referred instead to Laver (1980: 68-92) for a comprehensive discussion. The complexity associated with characterising and defining the *Nasal* setting is partially due to individual anatomical differences and is partly the consequence of the varied articulatory postures which can correspond to auditory and acoustic ‘nasality’. According to Laver, a consistently slightly open velum with no audible nasality is fairly common, with nasal airflow ‘not itself a necessary or sufficient condition for the production of audible nasality’ (1980: 79). Laver argues that nasality is primarily an auditory concept, the definition of an articulatorily neutral setting in this case being a ‘convenient fiction’ (1980: 70).

The presence of a nasal formant reflecting nasal resonances at around 200-300Hz is common. ‘Anti-resonances’ or ‘anti-formants’ which result from the excitation of side cavities in the vocal tract have also been discussed, with Laver (1980) reporting on an array of studies citing values between 500Hz to 1800Hz, depending on the segmental articulation. A general attenuation in amplitude, broadening of formant bandwidths, and flattening of spectral peaks between 800Hz and 2300Hz are further acoustic correlates of nasality. F1 is damped, partly as a consequence of the presence of these nasal resonances, with a general drop in intensity of all formants above F3 (Laver 1980).

With respect to the *Denasal* setting, this is said to correspond to the absence of nasality where it would be phonologically predicted, resulting in, for example, /m/ as [b]. The denasal setting is often considered to have a similar auditory quality to the voice of a speaker with a head cold although the exact articulatory postures are likely to be different (Laver 1994, 1980). Laver (1994) comments that denasality does not need to be considered in terms of scalar degrees, with remarks about its presence or absence being considered sufficient. The VPA adopted here (Figure 10) considers denasality with reference to three scalar degrees, something which has proved useful in characterising PE speakers who often exhibit denasality, although to varying degrees.

Figure 10 illustrating the VPA protocol adopted here has a further non-neutral velopharyngeal setting not included or discussed by Laver et al. (1991) or Beck and Schaeffler (2015) (Figure 11 and Figure 12, respectively); *Nasal w/o [without] full release*. This refers to a setting whereby speakers have a degree of nasal airflow, but there is a blockage somewhere in the cavity inhibiting the air exiting through the nose. Thus, nasal resonances are auditorily partly present but nasal airflow is not fully released.

4.4.2 Overall Muscular Tension

Vocal tract and laryngeal tension comprise the section on overall muscular tension in Figure 10 and Figure 12 (Beck & Schaeffler 2015). They appear, although in a slightly different format, in Laver's original protocol (Figure 11); vocal tract tension is considered as 'supralaryngeal tension' under supralaryngeal features, and 'laryngeal tension' appears under laryngeal features. These settings provide a holistic measure of overall supralaryngeal and laryngeal tension.

Lax vocal tract refers to a general undershoot or reduced articulatory effort throughout speech. Segments are shorter with less lingual, mandibular and labial movement. Acoustically, attenuation of information is a common feature (Laver 1994). In contrast, *Tense vocal tract* corresponds to extensive movement of the supralaryngeal articulators and longer segment durations.

Lax larynx corresponds to a phonatory setting whereby the vocal folds are not brought completely together and are not as tense as would be required for a modal or neutral setting. In contrast, *Tense larynx* refers to the increased tension and closing of the vocal folds, with a shorter glottal opening (Laver 1994).

4.4.3 Phonation Features

The literature describing phonation types and their variability is more extensive than that for any other aspect of the VPA. Indeed, most research into 'voice quality' actually considers only phonatory variation (Foulkes 2002). Despite this, there is still a great deal of variation in the descriptions given and the number of terms used. Although an in-depth discussion is beyond the scope of the current Chapter, this Section will provide an overview and a brief description of the phonation features on the VPA in Figure 10.

Four voicing types are included in the VPA employed here. *Voice* refers specifically to modal voicing or the neutral phonation setting with regular and periodic vocal-fold vibration (Catford 1964; Clark et al. 2007; Laver 1994, 1980). None of the speakers in the current corpus exhibited exclusively neutral phonation. *Falsetto* also refers to periodic pulsing, this time with a much higher fundamental frequency. The glottis is described as being slightly apart with the vocal folds in a long, thin position (Clark et al.

2007; Laver 1994, 1980; Podesva 2007). *Creak* refers to the very low-frequency vibration of the vocal folds with individual pulses often being visible on the spectrogram. These can appear irregularly and were famously described by Catford as having the auditory quality of 'a rapid series of taps, like a stick running along a railing' (1964: 32). Creak is marked on the VPA as either present or absent; no scalar degrees are used here. The final voicing type included in Figure 10 is *Creaky* voice, which is a combinatory setting of creak with voicing. When exhibited, this setting is assigned a scalar degree which reflects the balance of creak and voice (Mackenzie Beck 2007). Figure 15 exemplifies marked creaky voice from a Leicester AE male (Simon) during the Reading Passage task.

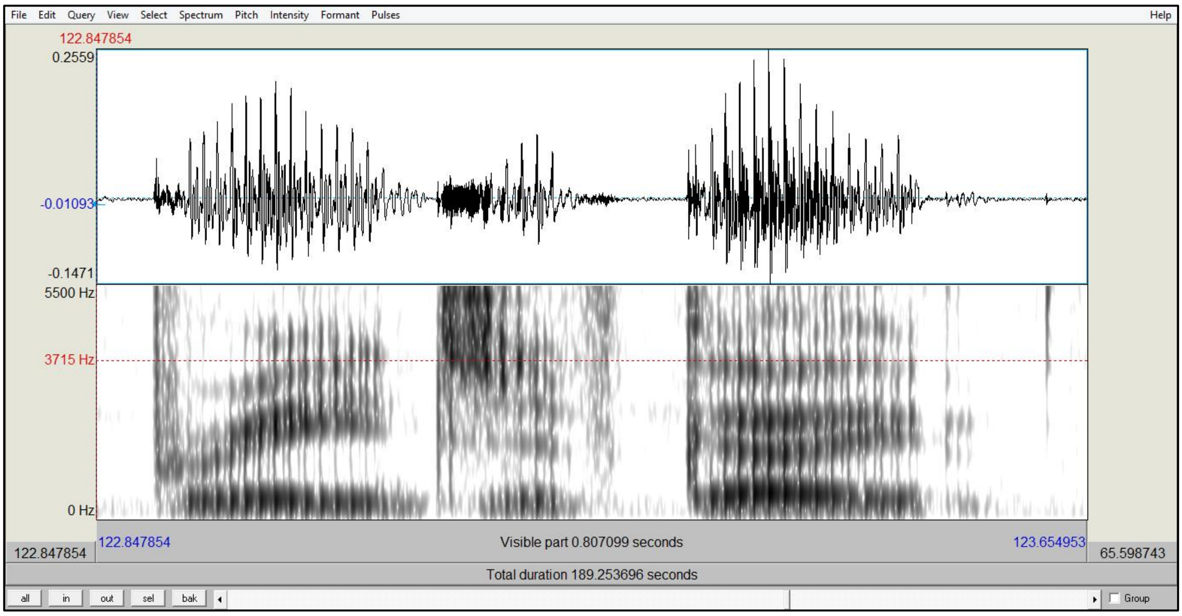


Figure 15: Leicester Anglo English male (Simon) with marked creaky voice. Excerpt from Reading Passage: *breeds of goat*. [Dynamic Range at 45dB; View Range 0-5500Hz; Window Length 0.004]

Four different types of laryngeal frication are also included in Figure 10. *Whisper* refers to a constricted glottis, with only a triangular opening comprising around one third of the glottis being open (Laver 1994, 1980). This leads to turbulent and fricated airflow described as a 'rich hushing' by Catford (1964: 31). He describes the acoustic output as being similar to normal breathing but with energy more focussed into formant-like bands. As with creak, this is marked as simply present or absent. *Whispery* voice is similar to the combination setting described above for creaky voice. This setting also has a small opening at the glottis, but voicing is present, and there is an increase in the degree of 'interharmonic noise' (Laver 1980: 121). *Breathy* refers to a more open glottis than with whisper and a resultant increased airflow rate. Again, turbulent airflow is audible, along with a reduced degree of laryngeal effort, increased formant bandwidths, and a lower F0 (Clark et al. 2007; Esling 1984; Gordon 2001; Laver 1994, 1980). Murmur is not a phonation term used by Laver (1980). In defining Ladefoged's (1971) use of the term, Catford (1977) comments that murmur differs from whisper because of the inclusion of voice. For the approach adopted here, Catford's articulatory description defines murmur in a way that is consistent with whispery voice. Here, *Murmur* refers to a setting which is similar to breathy voice but involves decreased tension in the vocal folds.

The final pair of phonation features included in Figure 10 are *Harsh* and *Tremor*, corresponding to two types of laryngeal irregularity. Harsh, sometimes known acoustically as 'jitter' (Clark et al. 2007; Laver 1980) or 'ventricular voice,' refers to increased tension in the larynx resulting in waveform irregularity and increased spectral noise (Laver 1980). *Tremor* refers to a setting normally found among older speakers, with significant irregularity in pulsing resulting in pitch and / or amplitude vibrato. According to Mackenzie Beck, the rate of irregularity can 'often arise from inconsistency or incoordination of the respiratory and phonatory processes.' (2007: 19). Tremor is shown below in Figure 16, with the highlighted area in the spectrum illustrating an example of amplitude vibrato from a Bradford AE female.

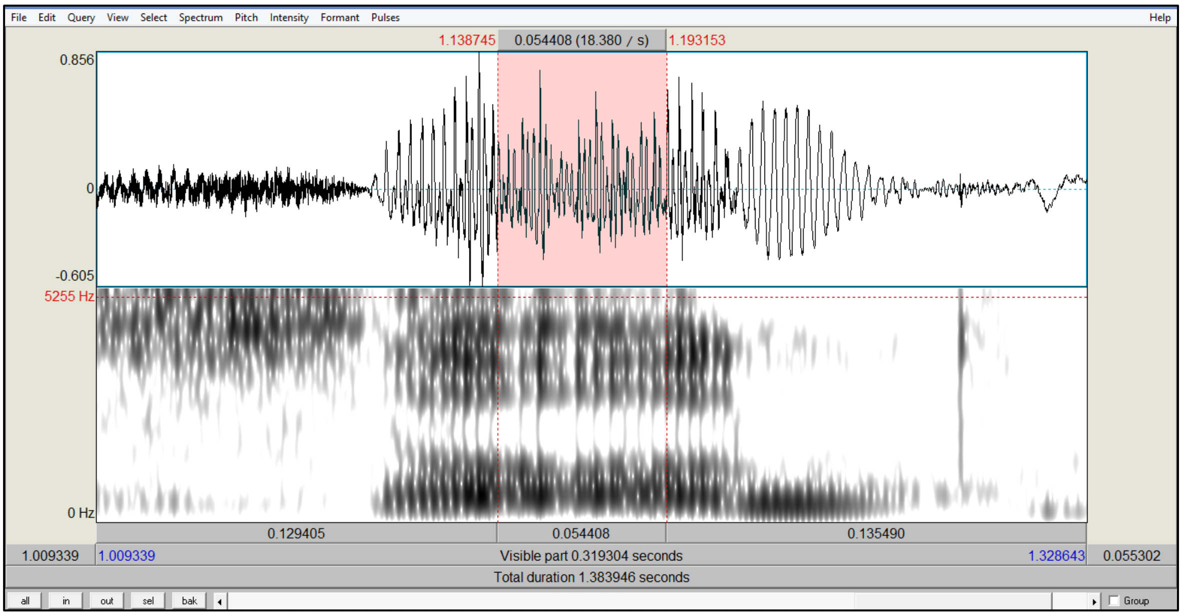


Figure 16: Bradford Anglo English female (Rachael) with slight tremor. Excerpt from Paired Conversation: *your son*. [Dynamic Range at 30dB; View Range 0-5500Hz; Window Length 0.003]

4.4.4 Completing the VPA protocols

In parallel to my reviewing the literature described above, I received training from speech analysts who frequently use the VPA protocol scheme. Two forensic phoneticians who use the protocol regularly for casework guided me in how to approach the analysis, and training sessions involved the completion of practice VPA protocols. This training was invaluable and was instrumental in the completion of speaker VPAs for the thesis. Two VPA protocol forms were completed for each speaker, one for the Reading Passage task, and one for the Paired Conversation task. This, as per Stuart-Smith (1999), means comparisons can be made to assess whether speakers' long-term postures and settings vary across tasks.

A subset of speakers (n=18; 14%) was also profiled by the two phoneticians by whom I was trained, with these phoneticians acting as checkers. Nine Reading Passage profiles were completed by both checkers and nine Paired Conversation profiles were completed by just one checker. They followed the same procedure in completing the VPAs, which was primarily auditory with visual inspection of the spectrogram and waveform. They profiled the speakers with no interaction from me. These profile results were compared, and agreement of 70% to 90% was reached for each speaker profiled. Agreement was calculated between the results for myself and both checkers and, for the Reading Passage profiles, between checkers. Where lower levels of agreement were found, group listening was arranged to discuss the speaker or setting in question so as to reconcile the result.

All profiles were transferred to a spreadsheet, with each setting representing a single column and speakers on individual rows. Settings which were neutral were given a value of zero. Paired Conversation and Reading Passage data were analysed separately, with a qualitative comparison being carried out by interrogating the profiles for each speaker and considering group and task consistencies. Qualitative descriptions are provided below which summarise the results observed. These are supported with correspondence analysis plots. This descriptive statistic facilitates visualisation of the profiles, thus enabling the identification of both speaker and setting clusters.

4.5 Results

VPA results for female speakers are presented in Section 4.5.1, with male results subsequently reported in Section 4.5.2. Males and females were analysed separately to ensure that speaker sex differences did not inhibit the identification and interrogation of within-group patterns. Results from a correspondence analysis are also presented, but no further statistical analysis has been undertaken on these multidimensional data. A qualitative comparison of male and female patterns is made below in Section 4.5.3 with a full discussion of the results in Section 4.6.

4.5.1 Female Voice Quality

Voice quality patterns for the females were remarkably consistent, both within and between speakers. Little variation was observed between the Paired Conversation and Reading Passage tasks, with all speakers, irrespective of region or language background, exhibiting a similar constellation of core settings. Table 3 summarises the female voice quality (VQ) patterns in Bradford, and Table 4 summarises those for Leicester. Italicised comments highlight any variation which occurred between tasks (e.g. increased presence of extensive lingual range in the Reading Passage). These characteristic profiles are examined in more detail below. Individual variation which accounts for the majority of differences is visible in the output of the Correspondence Analyses (CA) in Figure 17 and Figure 18. These are discussed within this Section and a comparison to male VQ patterns is presented in Section 4.5.3.

Beginning with vocal tract features (see Section 4.4.1 above), several settings are of interest. Lingual fronting was observed for both PE and AE females in Leicester and PE females in Bradford. Although slight tip or body fronting was found for some Bradford AE speakers in some tasks, it was variable and not as consistently observed as the marked lingual fronting found for the other groups. Sibilance was observed for almost every speaker consistently across the Paired Conversation and Reading Passage.

Bradford PE and Leicester AE and PE females exhibited an extensive lingual range to a slight or marked degree in the Reading Passage but not in the Paired Conversation, where neutrality was common. For the Bradford AE females, no variation by task was observed, all speakers having a neutral lingual range in both the Paired Conversation and Reading Passage tasks. Labiodentalisation was rarely found as a long-term setting characterising speakers. Further, no evidence of retroflexion as a long-term lingual posture was found for the female speakers.

<table>
<tr><th></th><th colspan="2">Bradford females</th></tr>
<tr><th></th><th>Anglo English</th><th>Panjabi English</th></tr>
<tr><td>Vocal Tract Features</td><td>Neutral larynx height
Non-neutral velopharyngeal settings (slight)
Lingual fronting occasionally observed for a few speakers; lingual retraction for others
Sibilance</td><td>Raised larynx
Non-neutral velopharyngeal settings (slight for younger speakers; marked for older)
Lingual fronting for all but one speaker
Sibilance
Extensive Lingual Range in Reading Passage</td></tr>
<tr><td>Overall Muscular Tension</td><td>Tense vocal tract (exhibited by more speakers in the Reading Passage)
Lax larynx common for older females
Individual patterns of variation not patterning by group in Reading Passage</td><td>Tense vocal tract (exhibited by more speakers in the Reading Passage)
Tense larynx (exhibited by fewer speakers in the Reading Passage)</td></tr>
<tr><td>Phonation Features</td><td>Breathy
Creaky voice
Harsh</td><td>Breathy
Creaky voice
Harsh</td></tr>
</table>

Table 3: Summary of VQ settings for Bradford females. Where variation occurred between tasks, Reading Passage settings are shown in italics.

	Leicester females	
	Anglo English	**Panjabi English**
Vocal Tract Features	• Neutral larynx height • Neutral velopharyngeal settings • Lingual fronting (especially tongue body) • Sibilance • *Extensive Lingual Range for older speakers in Reading Passage*	• Raised larynx • Non-neutral velopharyngeal settings (slight) • Lingual fronting • Sibilance • *Extensive Lingual Range in Reading Passage*
Overall Muscular Tension	• Tense vocal tract	• Tense vocal tract • Tense larynx for some
Phonation Features	• Breathy • Creaky voice • Harsh	• Breathy • Creaky voice • Harsh

Table 4: Summary of VQ settings for Leicester females. Where variation occurred between tasks, Reading Passage settings are included in italics.

Almost all PE females exhibited a raised larynx in both the Reading Passage and Paired Conversation; this was most marked in Leicester, but was consistently observed in Bradford too. Larynx raising was only found occasionally for the AE speakers in both Bradford and Leicester across tasks, and could not be said to characterise these groups.

Non-neutral velopharyngeal settings varied by region, non-neutrality (both nasal and denasal) being common for many AE and PE females in Bradford but in Leicester, only being observed for the PE females. The degree of non-neutrality was greatest among the older PE females in Bradford. The CA plots in Figure 17 and Figure 18 illustrate this variation in non-neutral velopharyngeal settings in more detail.

Figure 17 is the CA plot illustrating the Reading Passage results for the females from both Bradford and Leicester. Figure 18 is the CA plot of the results from the Paired Conversation task. The names in black correspond to individual Bradford females, with the names in red corresponding to individual Leicester females. The blue text overlaid on this plot corresponds to individual settings (e.g. *den* = denasal; *tns lx* = tense larynx). For a full list of which settings are which please see Table 5.

Setting (as appears on VPA protocol)	**Label on CA plots**
Labiodentalisation	labd
Ext. labial range	extlab
Open jaw	opj
Extensive Mandibular range	extman
Advanced tip/blade	frtip
Retracted tongue tip/blade	rettip
Retroflexion	ret
Sibilance	sib
Fronted tongue body	frtb
Backed tongue body	btb
Extensive Lingual range	extlr
Minimised lingual range	minlr
Pharyngeal const.	phc
nasal	nas
nasal w/o full release	now
denasal	den
Raised larynx	railx
Lowered larynx / pharyn. Expansion	lowlx
Lip rounding / protrusion	lipr
Tense vocal tract	tnsvt
Lax vocal tract	lxvt
Tense larynx	tnslx
Lax larynx	lxlx
Creaky voice	cr
Whispery voice	wh
Breathy voice	br
Murmur	mu
Harsh	ha
Tremor	tr

Table 5: Voice quality setting abbreviations in the correspondence analysis plots

A correspondence analysis is a descriptive statistic which considers relationships within the data along many dimensions. Two distance matrices are calculated using the chi-squared distance measure, one for the rows (settings) and another for the columns (speakers). Settings and speakers which appear further away from one another on the plots are those with larger chi square distances between them. Thus, the clusterings on the plot correspond to speaker clusterings, such that speakers who share similar non-neutral settings cluster together, with those settings which they share overlaid on top of the speakers. The axes of the CA plot reflect Factors 1 and 2, these being similar to principal components in a principal components analysis. In contrast to principal components analysis, however, only the first two of these are plotted and higher factor dimensions are rarely considered (Baayen 2008: 131). The factor values given on the x-axis and y-axis roughly correspond to the proportion of variance accounted for by that factor.

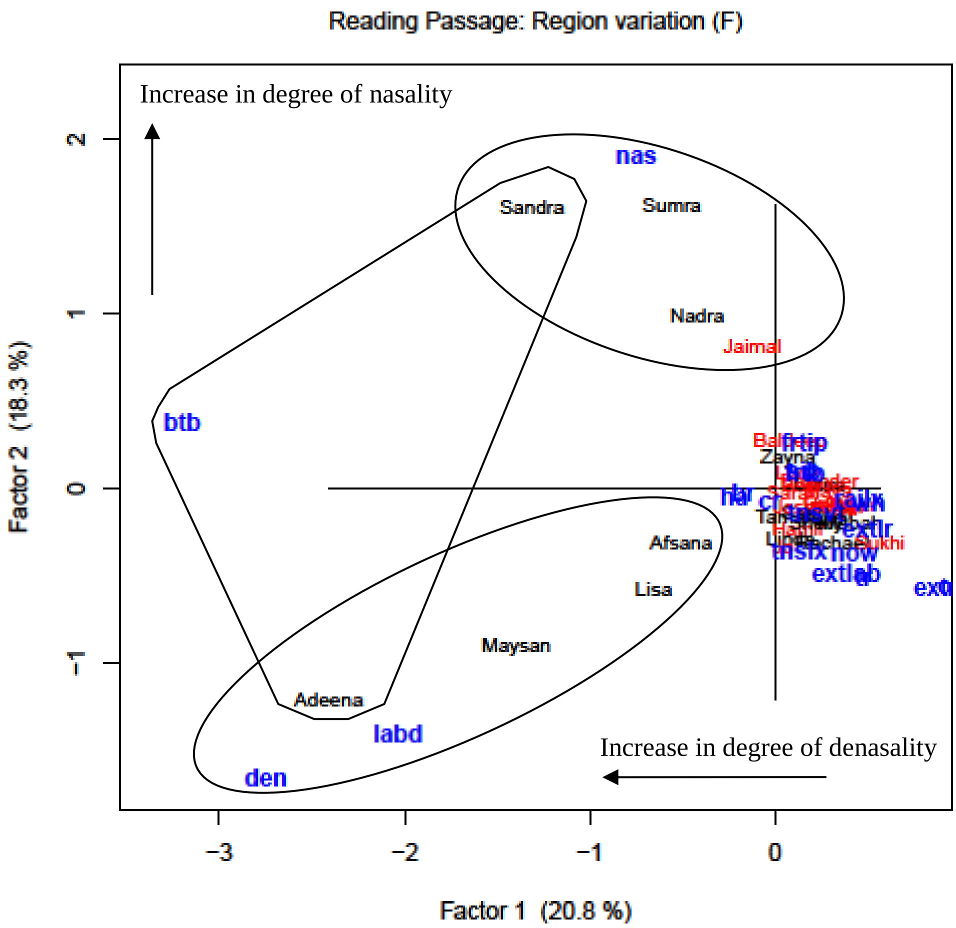


Figure 17: Reading Passage results for females. Bradford females' names are in black, Leicester females' names are in red. Individual settings are represented in blue (please refer to Table 5 for details on which settings are which)

Non-neutral velopharyngeal settings account for the factor variation along both the x- and y-axes in the Reading Passage CA plot (Figure 17). Along the x-axis, Adeena, Maysan, Lisa and Afsana appear away from the main cluster of speakers. These are the only four speakers who exhibit denasality as a long-term setting in the Reading Passage, and this accounts for 20.8% of the variance in the female Reading Passage results. Along the y-axis, four speakers appear separate from the main cluster. Sandra, Sumra, Nadra and Jaimal are the only females to exhibit marked or extreme nasality in the Reading Passage. This variation accounts for 18.3% of the variance. Thus, denasality and marked nasality are responsible for the largest amount of variation in the female Reading Passage results, with both the first and second factors corresponding to variation of this type. As well as velopharyngeal settings, *btb* (backed tongue body) appears some distance from the main cluster. Only Adeena (who also exhibits extreme denasality), and Sandra (who exhibits marked nasality) have a backed tongue body posture in the Reading Passage.

The variance accounted for along the x- and y-axes for the Paired Conversation data (Figure 18) does not as easily correspond to a particular setting as was the case in the Reading Passage (Figure 17). Instead, the x- and y-axes correspond to variations in a number of settings, with speakers deviating in one or more of these settings such that they are positioned away from the main cluster. There are a number of uncommon settings which appear to characterise groups of speakers at a distance from the main cluster but reflect individual patterns of variation, rather than group characterisations. For example, *opj* (open jaw) is a long-term setting exhibited by only one speaker, Sukhi. The increased variation in the Paired Conversation data accounts for this added complexity in the interpretation. These more idiosyncratic patterns account for 16.6% of the variance reflected along the x-axis (Factor 1) and highlight the need to refer back to the original data when interrogating multi-dimensional information.

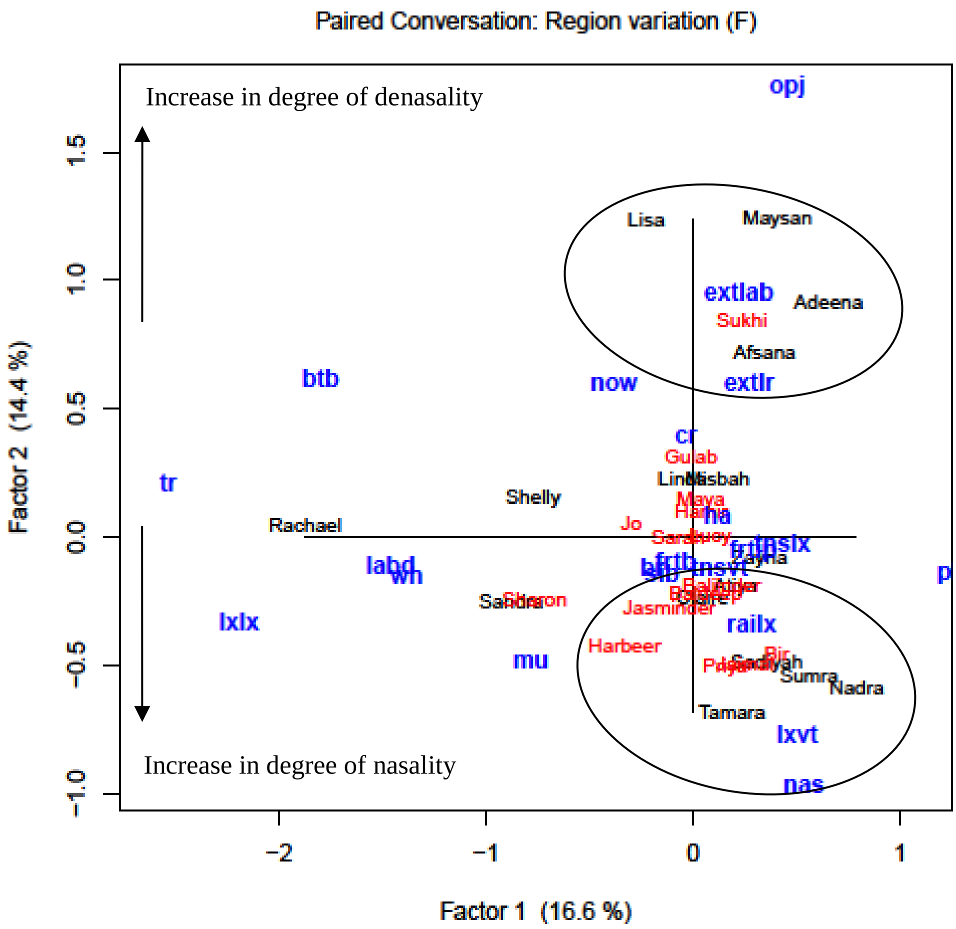


Figure 18: Paired Conversation results for females. Bradford females' names are in black, Leicester females' names are in red. Individual settings are represented in blue (please refer to Table 5 for details on which settings are which)

Non-neutral velopharyngeal settings account for 14.4% of the variance in Factor 2 in Figure 18. Those appearing at the lower end of the y-axis away from the main cluster all exhibit nasality, and those away from the cluster at the top of the y-axis are denasal. Thus, despite the additional variation in the Paired Conversation it appears that the non-neutral velopharyngeal settings account for much of the variance in these VPA results.

The next section on the VPA corresponds to overall muscular tension (see Section 4.4.2). Tense vocal tract is the most consistently observed setting, being present for many speakers in all groups at least some of the time. This is most marked in the Reading Passage, during which all but one of the Leicester speakers and most of the Bradford speakers exhibit at least slight vocal tract tension. Laryngeal tension is more variable; tense larynx is occasionally observed for all PE females, while lax larynx is intermittently exhibited for the Bradford AE females.

Little variation was observed in the phonation patterns of the females (see Section 4.4.3). All speakers consistently exhibited breathiness to a slight or marked degree, with harsh and creaky voice also being common for many. Settings such as tremor or murmur were much more individual and did not characterise any one group.

4.5.1.1 Summary: Female voice quality

The results above highlight a number of settings which are characteristic of all PE females irrespective of the location in which PE is spoken. PE speakers in both Bradford and Leicester consistently exhibit a raised larynx, lingual fronting and non-neutral velopharyngeal settings (both nasal and denasal). The degree to which the lingual fronting and velopharyngeal settings deviates from neutral are best understood in relation to the local AE variety. In Bradford, AE speakers exhibit a more neutral larynx height and lingual posture, with slight non-neutral velopharyngeal settings (nasal and denasal). Amongst the PE speakers in Bradford the non-neutral velopharyngeal settings are more marked than in Leicester PE. Similarly, Leicester AE speakers are characterised by a neutral larynx height and velopharyngeal settings, but all exhibit a consistently fronted lingual posture. Accordingly, the Leicester PE speakers demonstrate more marked lingual fronting than the Bradford PE speakers.

All females in both Bradford and Leicester display similar non-neutral phonatory settings of creaky, harsh, and breathy voice. Sibilance is also observed to a slight or marked degree for all speakers. We see more inter-speaker variation in the Paired Conversation than the Reading Passage for the females, with an increase in the presence of extensive lingual range and tense vocal tract in the latter task.

4.5.2 Male Voice Quality

Turning to the males, a greater amount of inter-speaker variation was observed. Although there was little difference across tasks, a larger degree of variation was found when comparing between speakers. Characteristic voice quality features for Bradford and Leicester males are presented in Table 6 and Table 7, respectively. Any variation observed between the Paired Conversation and Reading Passage is included in italics. Typical profiles are then discussed in detail within this Section, with the CA plots of Figure 19 and Figure 20 more clearly illustrating the inter-speaker variation.

	Bradford males	
	Anglo English	**Panjabi English**
Vocal Tract Features	• Slightly lowered larynx for younger males • Varied lingual posture (slight deviations from neutral) • Sibilance • Non-neutral velopharyngeal settings	• Lowered **or** raised larynx • Lingual retraction **or** fronting • Denasal **or** nasal velopharyngeal settings
Overall Muscular Tension	• Lax larynx for some speakers • Lax vocal tract for some speakers	• Tense **or** lax larynx • Tense **or** lax vocal tract
Phonation Features	• Harsh • Breathy • Creaky voice	• Harsh • Breathy • Creaky voice

Table 6: Summary of VQ settings for Bradford males. Where variation occurred between tasks, Reading Passage settings are included in italics.

	Leicester males	
	Anglo English	**Panjabi English**
Vocal Tract Features	• Neutral larynx height • Lingual fronting • Sibilance • Non-neutral velopharyngeal settings (slight)	• Lowered **or** raised larynx • Fronted lingual posture **or** intermittent lingual retraction • Sibilance • Denasal **or** nasal velopharyngeal settings • *Extensive Lingual Range for younger males in Reading Passage*
Overall Muscular Tension	• Tense larynx for most	• Tense **or** lax larynx • Tense **or** lax vocal tract
Phonation Features	• Harsh • Breathy • Creaky voice	• Harsh • Breathy • Creaky voice

Table 7: Summary of VQ settings for Leicester males. Where variation occurred between tasks, Reading Passage settings are included in italics.

Starting with vocal tract features (see Section 4.4.1), lingual posture varied both across and within groups. Leicester AE males were the most consistent, all exhibiting a slightly fronted posture. The Leicester PE males were more variable, slight lingual fronting being common for almost all speakers, with intermittent tip and body retraction exhibited by some speakers in some tasks. In Bradford, both AE and PE speakers varied in their degree of fronting. Fronting was again the most common lingual posture for the AE speakers, but neutrality and slight retraction were also observed. For the Bradford PE speakers there was a split between the group, half exhibiting a retracted lingual posture, and half a fronted lingual posture. As reported above for the females, almost all males exhibited slight or marked sibilance.

Larynx height varied by region and language background. In Bradford, younger AE speakers exhibited a lowered larynx, older speakers having a neutral larynx height. In Leicester, one AE male speaker (Simon) exhibited a slightly raised larynx, but all other

AE males exhibited a neutral larynx height. Among the PE speakers, both Bradford and Leicester groups were split, some exhibiting a raised larynx, and others a lowered larynx. This is in contrast to the AE speakers in each location, the pattern being raising or neutral in Leicester, in Bradford AE there being a preference for lowering or neutral. PE speakers in both locations were split, some speakers exhibiting a raised larynx, others a lowered larynx.

Variation in velopharyngeal settings was more marked for the PE speakers in both locations. In Bradford, some AE males exhibited non-neutral velopharyngeal settings (both nasal and denasal), but this was not a consistent characteristic of this group. In Leicester, the same pattern was found, all but one speaker exhibiting slight non-neutral velopharyngeal settings. These settings were not, however, sufficiently consistent to characterise the group as a whole. It is not clear at present whether this lack of consistency in velopharyngeal settings amongst the AE males is because within this group there is a great deal of variation, or whether the sample is not truly reflective of wider group patterns. Additional data would be required to further address this.

For the PE speakers in Leicester and Bradford, all speakers exhibited non-neutral velopharyngeal settings. Some of these were denasal, others nasal or nasal without full release. Interestingly, many of the speakers who exhibited denasal velopharyngeal settings were also those who exhibited a lowered larynx and retracted lingual posture. These speakers appear clustered together in the CA plots in Figure 19 and Figure 20. In both plots an ellipse has been added around those speakers who consistently exhibit a lowered larynx, denasality and retracted lingual posture. These speakers are similar across both tasks, with three Leicester PE males (Aanand, Jaipal and Dalbir), and four Bradford PE males (Halim, Hamza, Quadir and Zafir) clustering together. One Bradford PE male exhibits this profile only in the Paired Conversation (Irfan), and another only in the Reading Passage (Wafiq). No AE speakers from either location exhibit this collection of settings. The presence of this characteristic profile accounts for the majority of variance of Factor 1 in both Figure 19 and Figure 20. Factor 2 in both figures seems to relate more specifically to velopharyngeal settings, denasal speakers appearing further up the y-axis than nasal or nasal-without-full-release speakers.

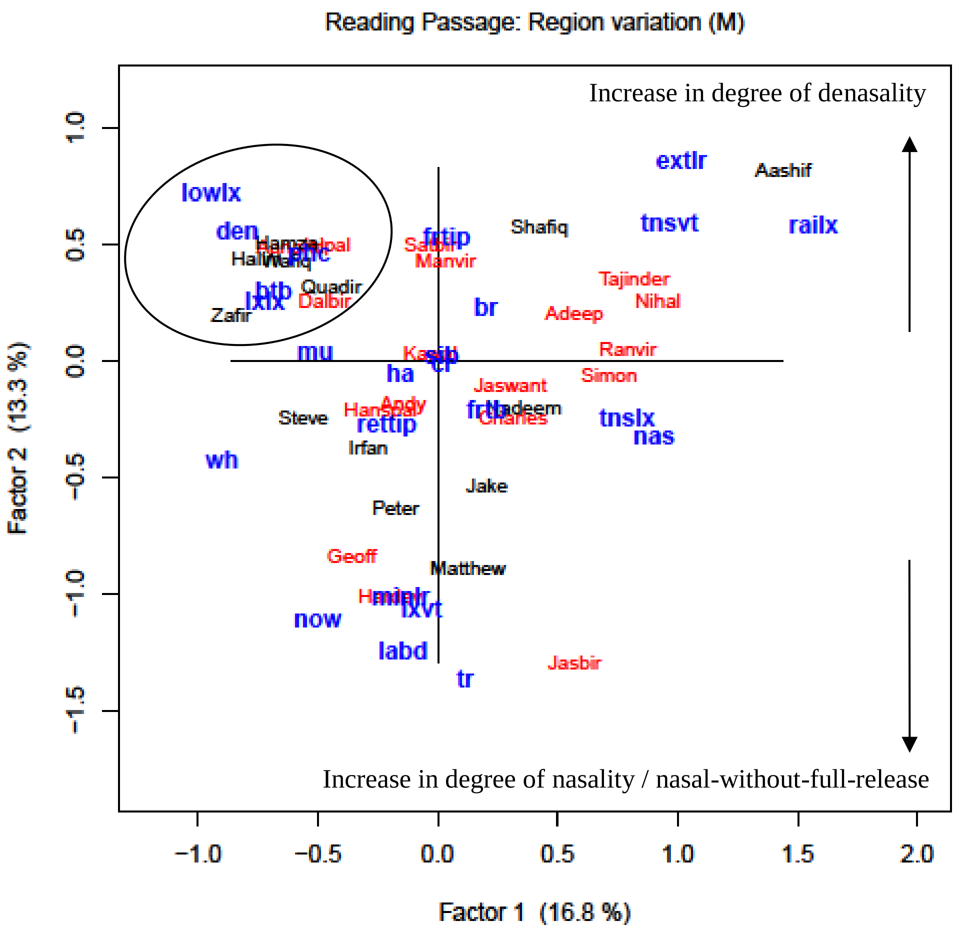


Figure 19: Reading Passage results for males. Bradford males' names are in black, Leicester males' names are in red. Individual settings are represented in blue (please refer to Table 5 for details on which settings are which)

As noted above for females' voice quality (Section 4.5.1), little evidence of either labiodentality or retroflexion as a long-term setting was observed in the speech of the males considered here. The increase in extensive lingual range during the Reading Passage was not found as often among the males as it was for the females. Only the young Leicester PE males exhibited this variation between tasks. Similarly, there was little evidence of tense vocal tract for any male speakers when considering overall muscular tension.

Bradford AE speakers were found to exhibit a consistently lax larynx, in contrast to the Leicester AE males, who tended towards a tense larynx. One Leicester AE male was an exception to this (Andy), with a slightly lax larynx and vocal tract. This young male Leicester AE speaker also patterned differently from the others with respect to his velopharyngeal settings and more advanced lingual fronting.

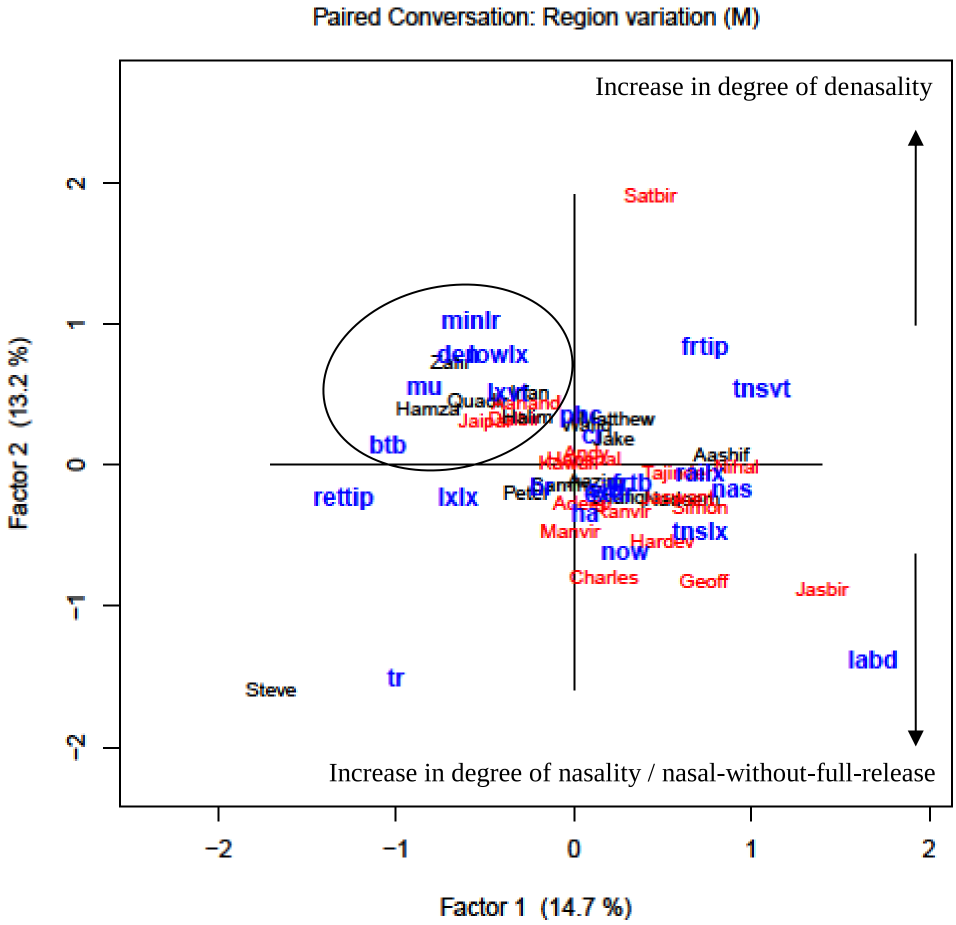


Figure 20: Paired Conversation results for males. Bradford males' names are in black, Leicester males' names are in red. Individual settings are represented in blue (please refer to Table 5 for details on which settings are which)

For the PE speakers a split is once again observed, some speakers exhibiting overall muscular tension in either the larynx or vocal tract, and others exhibiting laxness. Those who exhibited lax larynx or lax vocal tract were also those mentioned above whose speech features denasal velopharyngeal settings, a retracted lingual posture and a lowered larynx. Those PE speakers with a tense larynx or vocal tract do not as consistently use the same constellation of other non-neutral settings.

Finally, despite the variation noted above for most voice quality features, phonation features (see Section 4.4.3) were consistent across all males. As with the females, harsh, breathy and creaky voice were regularly observed. A change over time is apparent in the data for creaky voice and breathiness. Creaky voice increases as age decreases, the opposite pattern being found with breathy voice. This is reflected in Figure 21 and was confirmed with two highly statistically significant Spearmans correlations. The first showed how the presence of breathy voice significantly decreases as age increases (r_s =

0.3884, p=0.002), the second how the presence of creaky voice significantly increases as age decreases (r_s = -0.5292, p<0.001).

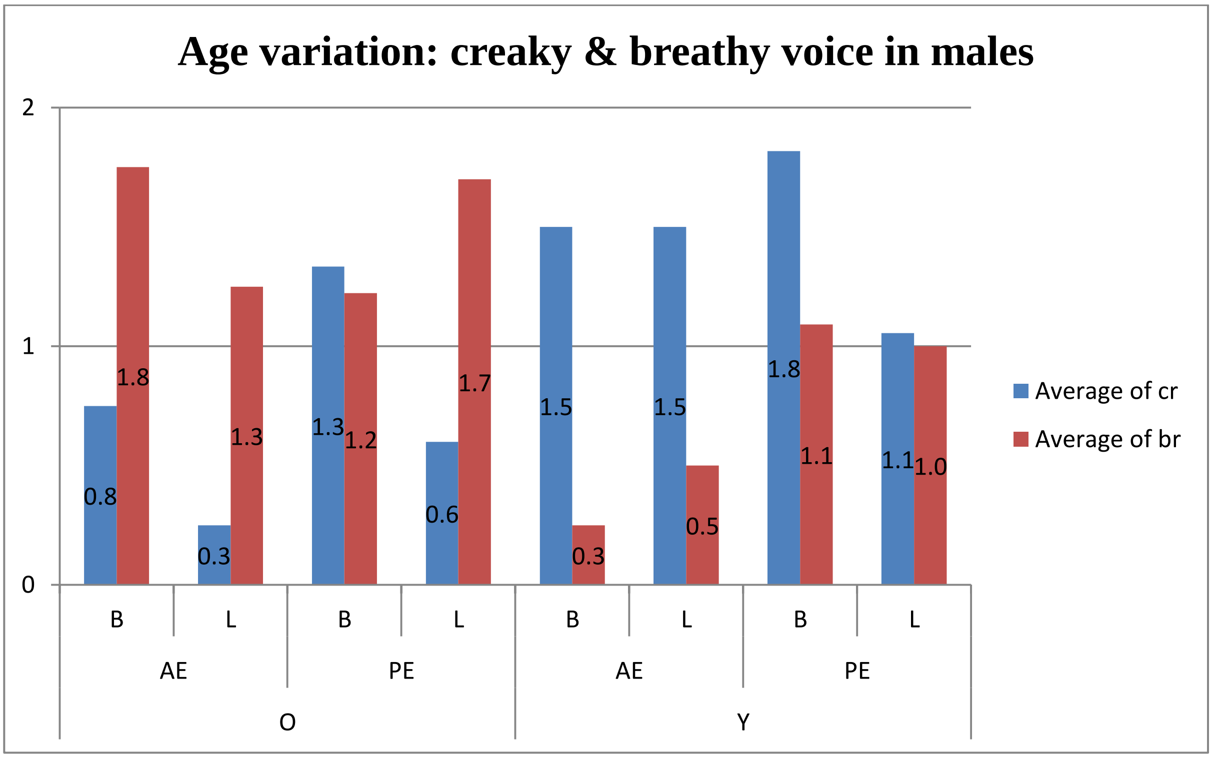


Figure 21: Average scale value for creaky voice (in blue) and breathy voice (in red) for males from Bradford (B) and Leicester (L). Older speakers (O ≥30) are on the left, younger speakers (Y <30) are on the right. Age groups are further broken down by language background (Panjabi English or Anglo English) and region (Bradford or Leicester).

4.5.2.1 Summary: Male voice quality

For the males a number of settings are found to be characteristic of the PE speakers. As with the results for the females presented above, raised larynx, lingual fronting and non-neutral velopharyngeal (nasal or nasal without full release) settings are common amongst the PE males. There is also a profile comprised of retracted lingual posture, lowered larynx denasality, and a lax larynx and vocal tract. This profile is only exhibited by PE males but it is observed in both Bradford and Leicester.

Once again, despite the cross-regional similarities which are observed in PE, the patterns require a local interpretation. Bradford AE males show evidence for a neutral larynx height and lingual posture, with slightly non-neutral velopharyngeal settings (nasal and denasal). Leicester AE males exhibit a neutral larynx height, slight non-neutral velopharyngeal settings (nasal and denasal), and slight to marked lingual fronting. Leicester PE males correspondingly demonstrate more marked lingual fronting than the Bradford PE males.

Sibilance is displayed by almost all males, irrespective of language background and region. Further, phonation patterns are consistent across all groups, with harsh, breathy and creaky voice all consistently observed. In contrast to the females, however, there is a difference between older and younger speakers, with creaky voice increasing as age decreases, and breathiness increasing as age increases. Contra to the patterns observed with the females, the males demonstrate more inter-speaker variation in the Reading Passage than the Paired Conversation task. During the Reading Passage there is no evidence for an increase in the presence of tension in the vocal tract or an extensive lingual range, both of which were found to increase in this task for the females.

4.5.3 Comparing male and female voice quality

Considering the vocal tract features for males and females simultaneously, it appears that lingual fronting is an increasingly common setting for many speakers. This setting appears to be most advanced in Leicester, with many groups containing speakers with either tongue tip or body fronting. The speakers who do not exhibit lingual fronting are AE speakers in Bradford and the PE males circled in Figure 19 and Figure 20. With the exception of the Leicester AE females, non-neutral velopharyngeal settings are also characteristic of many speakers within the corpus, but are more extreme for the PE speakers. Group and individual patterns account for the specific variation associated with these non-neutral velopharyngeal settings and have been discussed in the above Sections. Sibilance is exhibited by almost every speaker. With respect to the PE speakers, larynx raising is the only setting consistently associated with these speakers and not the AE speakers.

For the PE group, both males and females in Bradford and Leicester consistently exhibit tense larynx and tense vocal tract. Only male PE speakers were found to exhibit lax vocal tract or lax larynx. Less consistency was observed within the AE group. Females show more variability than males with respect to overall muscular tension. Among the AE males, Leicester males tend toward tension, and Bradford males towards laxness, but more speakers would need to be analysed to assess whether group patterns exist here.

All speakers across the corpus exhibit the same phonation features. Harsh, breathy and creaky voice are consistently and regularly exhibited, irrespective of a speaker’s language background or region. Breathy and creaky voice for the males varies across apparent time, but this pattern was not observed among the females.

Thirteen speakers from the corpus were found to exhibit non-neutral mandibular or labial settings, with no evidence of any speakers having minimised mandibular or labial range, close jaw or lip spreading. Eight of these speakers exhibited labiodentality as a long-term posture. These settings were not considered characteristic of speaker groups, instead forming one element of sets of individually characteristic settings.

4.6 Discussion

The results presented above highlight a number of long term vocal settings which are characteristic of PE. These results have also illustrated how the characteristics of PE vary depending on the regional AE which results in a local variety of PE in Leicester and Bradford. The completion of the VPA profiles has provided a great level of detail about the typical settings found amongst these speakers, with a correspondence analysis helping to pick apart the nuanced variation and a qualitative interpretation of the results serving to emphasise the key patterns.

The following Section first defines the long term vocal settings which can be considered characteristic of PE based on the results presented above (Section 4.5). The following discussion will then explore whether the cross-regional consistency in PE is in any way related to Panjabi (4.6.2) and what influences the regional AE varieties may be having on PE (4.6.3). As well as considering the presence of particular settings, this Section will also consider a number of arguments as to why certain patterns are repeatedly observed for the PE speakers (Sections 4.6.4 and 4.6.5).

4.6.1 Voice quality in Panjabi English

Although a number of settings are described above in Section 4.5 in relation to PE in Bradford and Leicester, three settings are repeatedly observed across PE irrespective of the region in which it is spoken. A raised larynx, marked non-neutral velopharyngeal settings (nasal and denasal), and lingual fronting are consistently found amongst male and female PE speakers in both Bradford and Leicester. A raised larynx is not regularly observed for any AE speaker in either location. There is also the additional profile of lowered larynx, retracted lingual posture, marked to extreme denasality, and lax overall muscular tension which distinguished a number of PE males in both Bradford and Leicester. This latter profile gives the auditory impression of what might be described as a *big* or *heavy* voice.

Despite the cross-regional similarities, both of the PE varieties under consideration here display a local positioning. In Bradford, the AE speakers exhibit slight non-neutral velopharyngeal settings (nasal and denasal), whereas in Leicester AE we only see this pattern for the males. The Bradford PE speakers demonstrate more marked non-neutral velopharyngeal settings than the Leicester PE speakers. Likewise, the Leicester AE speakers show much more marked lingual fronting than the Bradford AE speakers, with the Leicester PE speakers exhibiting more marked lingual fronting than the Bradford PE speakers. Thus, although there are cross-regional similarities in the settings which are characteristic of PE, these must be considered in relation to the patterns of the AE within a given location.

A number of settings were also regularly realised by almost all speakers in the current corpus. The lingual setting of sibilance and the non-neutral phonatory settings of harsh, breathy and creaky voice were all frequently noted for many speakers, irrespective of their language background or region.

4.6.2 The influence of Panjabi

As mentioned in the Background Section, few voice quality descriptions of different varieties and languages exist based on Abercrombie’s (1967) definition. Panjabi is no exception to this. To the author’s knowledge, there exists no comprehensive description of the long-term postures and settings common to any variety of Panjabi. The only source of information is Honikman (1964), who describes the characteristic settings of the languages of India and Pakistan. She comments that these languages have an open, loose jaw which facilitates the realisation of the segments present in the languages. In the present dataset, an open jaw is exhibited by only one speaker, an older Leicester PE female (Sukhi). This setting combines with other non-neutral settings from this speaker to create a careful, precise and considered profile. Indeed, she is a speaker who maintains an extensive lingual range through both the Reading Passage and Paired Conversation tasks.

No other speakers exhibit any of the settings listed by Honikman as characteristic of the languages of India and Pakistan. However, this does not mean that the PE settings are not in some way related, either directly or indirectly, to Panjabi. There is simply not enough documentary literature available to ascertain this one way or the other. One setting which could have been related directly to Panjabi would have been retroflexion. Segmental retroflexion is found in Panjabi (Shackle 2003; Bhatia 1993) and has long been associated with Indian English (Wells 1982c). More recently, segmental retroflexion has been reported as characteristic of the speech of British Asians (e.g. Zara 2010; Heselwood & McChrystal 2000). However, this was not observed as a long-term setting for any of the 47 PE speakers included in this corpus. Neither setting nor segmental retroflexion have been repeatedly observed amongst PE speakers here (see Chapter 6 for retroflexion of /r/). This will be discussed further in Chapter 7, where I consider whether the absence of retroflexion may be evidence of levelling, with a stereotyped and salient feature having been dropped by younger PE speakers.

Settings which were consistently found only amongst the PE speakers were raised larynx and marked non-neutral velopharyngeal settings. Panjabi has contrastive nasalised vowels (Shackle 2003), but this would not clearly relate to the presence of both nasality and denasality as long-term postures in PE. These long terms postures affect all speech rather than individual segments and correspond to both increased and decreased nasal airflow. Additionally, the differences between the PE communities in both Bradford and Leicester as discussed in Chapter 3 (see Section 3.2.1.1) might mean that any influence of Panjabi could be different. Here, the Bradford PE speakers have family roots in the Pakistani Panjab, Leicester PE speakers in the Indian Panjab, and Panjabi is valued and used differently within each community.

The lack of research currently available means it is difficult to fully assess the relationship of the voice quality patterns in PE to Panjabi, and to properly appraise how this might vary across the two locations. Thus before further work is undertaken to explicitly address this a relationship cannot be ruled out. However, the other arguments presented here and throughout the thesis are considered more compelling when assessing what accounts for the cross-regional similarities and differences in PE.

It is suggested here, and throughout the thesis, that the patterns observed may be evidence of general processes which take place when English and another language come into contact with one another. This other language may be specifically Panjabi, or Indic languages more generally, but it is more likely that it is the contact which is the most important predictor of the patterns reported here, and not Panjabi specifically. This idea is similar to those put forward about the origins and development of MLE (e.g. Kerswill et al. 2013). MLE is a variety characterised by multilingual input, with no single language influence identifiable. However, this idea goes a step further, the suggestion being that it also does not matter what the language is, because the resulting processes are likely to be the same. Both Bradford and Leicester are characterised by multilingual communities, and while this thesis is focussing on one sub-section of this, it should be remembered that both regions have other Indic language-speaking populations.

Thus, there is little evidence at present to suggest a direct link between Panjabi and PE. Attempts to identify the effect of Panjabi on the voice quality of PE have not yielded any convincing results which is largely as a consequence of the absence of work on the characteristic long term settings of Panjabi and related varieties. General processes of contact may be the reasons for the consistent cross-regional patterns which are observed, but further work is required before any direct influence of Panjabi can be ruled out.

4.6.3 The influence of AE

As well as considering the influence of Panjabi, there is evidence in the voice quality profiles that the AE variety in each region is contributing to the patterns observed in PE. The lingual fronting is more advanced in Leicester PE than in Bradford PE, and non-neutral velopharyngeal settings are more consistent and marked in Bradford PE as compared to Leicester PE. The presence of these settings corresponds with their presence in the AE variety: lingual fronting is present in Leicester AE but not Bradford AE, and slight non-neutral velopharyngeal settings are more common in Bradford AE than in Leicester AE. It is perhaps expected that the regional AE and PE varieties are interacting with one another, and PE may be influencing AE in addition to the AE influences on PE considered here. The interaction and reaffirming of regionally characteristic settings, alongside those associated more widely with PE, further contributes to the development of localised contact varieties. As noted by Stuart-Smith et al. (2011) in Glasgow, speakers of contact varieties often exhibit patterns of variation that reflect the complex interaction between local and ethnic identity.

All speakers were found to exhibit similar non-neutral phonation settings. These do not have a clear or direct relationship with either Panjabi or the regional AE varieties. Henton and Bladon’s 1985 and 1988 papers suggest that in both RP and ‘Modified Northern’ (MN), breathiness is used more by females and creak more by males. They comment that creak occurs most commonly amongst the MN males but do not note any further regional variation. The results reported here find both creaky and breathy voice to be regularly exhibited by both males and females in both locations, irrespective of language background. This variation from Henton and Bladon's (1985, 1988) results is perhaps not entirely unexpected given that their results are now thirty years old.

Although younger males in the current corpus use more creaky than breathy voice, this tendency appears to be one which has changed, with older males exhibiting breathy voice more often than younger ones. For females, creaky voice is more common than breathy voice for all age groups.

These phonation patterns are consistent with the findings of Szakay and Torgersen (2015), who considered acoustic measures of breathy and creaky voice in the contact variety MLE. They observed greater breathiness in males, and increased creakiness in females. An argument could be made here that the consistent phonation patterns observed are evidence of geographical diffusion, in that London has long been considered to be a source of linguistic innovation from which these changes spread. However, I believe that this cross-regional similarity in phonation may be further evidence that it is the process of contact between languages or varieties which is the reason behind these consistencies. Like Bradford and Leicester, London is a large urban conurbation characterised by a diverse and multilingual population. This similar demographic could account for the consistent patterns reported for phonation, the same ingredients going into each city's dialect 'cake' (e.g. Britain 2012). Additionally, the increasing salience of creaky voice or 'vocal fry' among non-linguists is frequently noted in the popular press (e.g. Wolf 2015). Thus, it may be that this pattern is related to more global ongoing linguistic changes, and not solely as a consequence of the contact situation.

It appears, then, that there is evidence of an interaction between the PE and AE varieties within each location, with a number of within-region consistencies reported. It is proposed here that the cross-regional consistencies observed in PE and more widely in terms of the phonatory settings are not *necessarily* as a consequence of the geographical diffusion of characteristic settings from one location to another. Instead, the similar contexts in which the language contact is taking place may be resulting in contact varieties across the UK patterning similarly to one another.

4.6.4 Variation within PE

As well as observing similarities and differences between the AE and PE speakers, male and female PE speakers behave differently. In contrast to the inter-speaker consistencies reported for the PE females, the PE males in both Bradford and Leicester are more variable. There are a small number of PE males in both Leicester and Bradford who consistently exhibit a similar profile. This profile is comprised of lowered larynx, lingual retraction, lax overall muscular tension and denasal velopharyngeal settings, and it only occurs amongst the PE males; it is not present for any PE females or any AE speakers. This characteristic profile gives the auditory impression of a 'big' voice. All the males who exhibit this profile express a similar attitude when talking about their hometown and local community. They say that although they do not dislike being from the region they are not especially proud of the community, each identifying a number of things they would change.

The shared attitude expressed by the PE males who exhibit this similar voice quality profile may suggest that identity is beginning to play a role. Despite Trudgill's (2008a) claim that identity does not have any influence early on in new dialect formation, the pattern reported here suggests that it may, and that it may also help to account for some of the extreme variability present. Although this is not considered in any further detail here, it is something which could be explored in later work and is discussed further in Chapter 7.

The rest of the PE males (and indeed the AE males) exhibit a variety of different profiles. Some (e.g. Aashif or Nihal), more closely reflect the profile described for PE females, with raised larynx, lingual fronting and only slight non-neutral velopharyngeal settings. Others, (e.g. Wafiq or Jaswant), exhibit a mixed profile, with raised or neutral larynx, marked non-neutral velopharyngeal settings, and variable lingual posture. The patterns observed among the PE males seem to indicate an interaction between linguistic and social factors. These patterns are entirely consistent with Stage II of Trudgill's (2004) processes of dialect formation. They reflect extreme linguistic variability which occurs as a consequence of the increased input and enlarged feature pool that speakers are exposed to (Mufwene 2001). Trudgill suggests that despite this apparent variability it is likely that some levelling has already taken place, second-generation speakers having begun to reduce the amount of linguistic variability present amongst the speech of first-generation speakers. Networks, frequency and patterns of interaction then drive the particular combination of features selected by individuals in the second-generation, with idiosyncratic and apparently random patterns emerging. In the context being considered here, it is difficult to determine with any certainty whether there *is* less variability in the speech of the second-generation speakers as no first-generation speakers have been recorded. There is, however, evidence for the emergence of socially variable patterns despite the large amount of seemingly idiosyncratic behaviour found.

For the PE females, there is little variation between the speakers, with all females exhibiting a similar cross-regional profile characterised by raised larynx, lingual fronting, slight non-neutral velopharyngeal settings, sibilance and an overall tense larynx and vocal tract. The variation for these speakers occurs as a function of task, with the Reading Passage resulting in a more extensive lingual range for almost all females. This variation by task is consistent with Stuart-Smith's (1999) findings for MC women in Glasgow. She reports more tongue body fronting and supralaryngeal tension in word list data than is found in the conversational speech for MC females. This leads her to suggest that for these speakers this task was a 'separate linguistic activity' (1999: 219). Indeed, this seems to be the case here, the profile being exhibited in the Reading Passage seeming to be a more extreme and 'tense' realisation of the primary pattern exhibited for the PE females in the Paired Conversation. This variability is also consistent with part of Trudgill's (2004) second stage of new dialect formation, in which increased variability is expected, both between and *within* speakers. It would be interesting to further explore this point, taking a similar ethnographic approach to that adopted by Sharma (2011).

4.6.5 Lingual fronting

The presence of lingual fronting found amongst many of the speakers in the corpus could be related to the globally widespread segmental changes observed in a number of varieties of English. GOOSE- and GOAT-fronting are present amongst a host of varieties of English. Segmental patterns contribute to the voice quality profiles derived, and segmental fronting of the GOOSE and GOAT vowels is found for some speakers (see Chapter 5 for more details). The lingual fronting observed here for many speakers is also similar to that described by Trudgill (1974) in Norwich, Stuart-Smith (1999) in Glasgow, Beck and Schaeffler (2015) in Dumfries, and Stevens and French (2012) in SSBE. All report lingual fronting as one of a number of settings characterising the voice quality of a given region.

I would argue that this lingual fronting, which is consistently characteristic of many PE speakers, may be evidence of an *off-the-shelf* setting. The term *off-the-shelf* has been in existence for a number of years. In 2003 Eckert commented that we should seek to distinguish between linguistic changes which only occur and spread through communities through sustained and regular interactions with changes which could ‘be taken right off the shelf’ (2003: 395). Milroy defines *off-the-shelf* features as linguistic forms which are ‘freely available to appropriately positioned social actors as a stylistic resource regardless of the structure and location of their primary social networks’ (2007: 157). These forms, Milroy suggests, can be adopted throughout a given community. Subsequent considerations of forms traditionally assumed to be *off-the-shelf* have highlighted a level of localised complexity not incorporated in Milroy’s definition. Buchstaller (2008), Buchstaller and D’Arcy (2009), and Stuart-Smith et al. (2013) have all demonstrated that the use of widespread forms such as the quotatives *be like* and *go*, th-fronting and l-vocalisation all varied in idiosyncratic and localised ways despite their presence throughout a number of varieties. Further, they note that these forms have not been adopted throughout a community. Thus, they argue, that although they are globally widespread, these forms cannot necessarily be considered *off-the-shelf*:

In this context, the definition of *off-the-shelf* is refined and is perhaps more similar to the definition provided by Eckert (2003). Here, the term *off-the-shelf* is used to refer to a feature (or process) which can be adopted by speakers who may not have sustained and regular contact with other speakers who have been reported to exhibit the feature, and as such, the feature in its abstract form does not have any ‘baggage’ (social or linguistic). Once it has been adopted into the community it may then become associated with social or linguistic factors resulting in a locally positioned realisation of the feature or process. Here, lingual fronting in Bradford is only observed amongst the PE speakers, not the AE speakers, and in Leicester we have a more complex pattern. Almost all Leicester PE speakers show some evidence of lingual fronting, and it consistently occurs in conjunction with larynx raising and sibilance. Lingual fronting is also found amongst the Leicester AE speakers and for these speakers we do see the patterning with sibilance, but we do not see additional larynx raising.

This lingual fronting, then, is available to speakers and is not regionally or socially conditioned in its abstract form. Milroy notes that if a community structure breaks down in some way, highly localised norms are less common. In the current context, entire communities have been established in new locations, with ‘local norms’ needing to be completely redefined, and thus it makes sense that *off-the-shelf* features would be an apt choice for new speakers of a developing variety, with subsequent reinterpretation of this potentially global form already observable in both Bradford and Leicester.

This fronted lingual setting reflects a supralocal form which can be adopted by many and which patterns with segmental changes which appear to be taking place globally. The question remains of why this specific lingual setting is available and salient enough to many PE speakers that it can be readily adopted, and similarly why the particular combination of settings exhibited by some PE males is favoured. It may be that engagement with the media or other global institutions is in some way contributing (e.g. Stuart-Smith & Ota 2014), although future work would be required to explore this further. There is little evidence to suggest that these profiles are present in Panjabi, although additional work is required to explore this more fully. The variability found amongst the PE males and the patterns from the AE speakers suggest that the feature pool to which all speakers are exposed is diverse and inconsistent. Further research into characteristic voice quality profiles would help to address these questions and could identify whether the profiles observed in the present study are predicted by frequency or other mechanical, linguistic processes which are still not properly understood.

4.7 Conclusion

This Chapter has provided a description of characteristic voice quality profiles in PE from two different locations and shown that consistencies are present between the two PE groups despite geographical separation. Although the factors which underlie the origins of the observed profiles are unclear, the patterns described follow what might be expected in situations of dialect contact, with increased variability amongst the PE speakers being observed. Further work providing descriptive accounts of voice quality profiles of a wider variety of dialects would be worthwhile if we are to be able to address the remaining questions raised in the discussion. Additionally, future work including lingual variations in the vertical dimension (raised and lowered tongue body) should seek to address whether lingual raising is concurrent with lingual fronting, these two settings potentially occurring together (e.g. Coadou 2007).

The analysis of voice quality facilitates a more comprehensive examination of a given variety, and enables a more thorough interpretation of segmental patterns. The findings of this Chapter have provided a componential impression of PE in Bradford and Leicester, something which complements the segmental analysis which follows.

5 Vowels

5.1 Introduction

This Chapter reports results from an analysis of F1 and F2 trajectories for three vowels considered to be cross-regionally characteristic of Panjabi English (PE): FACE, /eɪ/; GOAT /əʊ/and GOOSE /uː/ (Wells 1982a). Background research relevant to the discussion will be presented in Section 5.2, with FACE and GOAT considered together due to the phonetic symmetry often observed between these 'paired' vowels (e.g. Watt 2000). Then, relevant literature on GOOSE-fronting will be discussed, with a consideration of GOAT-fronting made where relevant. A number of predictions will be proposed in Section 5.3 following the background Section which will outline what might be expected in the contexts being considered here.

The methodology in Section 5.4 will outline the dynamic formant approach adopted, the normalisation process used and the resultant statistical analysis which was carried out to support and illustrate the key findings. The results will be detailed in Section 5.5, and Section 5.6 will then discuss these and assess how they address the research questions and their contribution to our understanding of contact varieties of English.

5.2 Background

The following Sections will provide an overview of the variation in FACE, GOAT and GOOSE in Bradford Anglo English, Leicester Anglo English (AE), contact varieties of English in the UK, and will also provide a brief overview of relevant phonological patterns in Panjabi. The fronting of GOAT in English is increasingly common, with its relationship to both FACE and GOOSE being complex and with interesting variation often being observed (e.g. Haddican et al. 2013). The following Section will discuss research which has considered FACE and GOAT, with Section 5.2.2 considering fronting of GOOSE specifically, and with reference made to GOAT where appropriate.

5.2.1 FACE and GOAT

The realisation of FACE and GOAT is incredibly variable, with a vast array of monophthongal and diphthongal variants having been described. This Section details work which has characterised FACE and GOAT in the two AE varieties being considered here (Section 5.2.1.1), more widely in contact varieties of English spoken in the UK

(Section 5.2.1.2), and similar vowels found in Panjabi and related varieties (Section 5.2.1.3).

5.2.1.1 FACE and GOAT in Bradford and Leicester AE

Traditionally, northern English FACE and GOAT are monophthongal, with southern (or perhaps, 'non-northern') locations reported to have diphthongal realisations. These non-northern locations are said to have gone through *long mid diphthonging,* which involves a closing offglide being added to the historically long mid monophthongs [eː] (FACE) and [oː] (GOAT) (Beal 2008; Hughes, A. et al. 2012; Wells 1982a). Diphthongisation of FACE and GOAT is, however, being reported in northern cities (e.g. Haddican et al. 2013; Watt 2000). Recently, Haddican et al. (2013) explored this diphthongisation in the English spoken in York. Younger speakers in York were found increasingly to realise both vowels as diphthongs, despite monophthongs being traditional both in the local area and widely across the north of England. The authors comment that this reflects the 'northward diffusion of more prestigious southern forms' (2013: 371). However, it could also be said to reflect the continuing process of *long mid diphthonging*. Wells suggests this can only happen after the *long mid merger* has completed (1982a: 211). This process involves the merging of previously distinct sets, with speakers having previously distinguished between *pane* and *pain,* and *toe* and *tow* (1982a: 193).

In Bradford AE, monophthongal FACE and GOAT are regarded as typical in the variety, although research suggests that the *long mid merger* may be ongoing. In 1985, Petyt identified two separate lexical sets for FACE: /ɛɪ/ and /eː/, with the incidence of /ɛɪ/ decreasing. The same is noted by Petyt (1985) for the back of the vowel space, with /ɔʊ/ and /oː/ making up two separate sets for modern-day GOAT with the incidence of the diphthongal set decreasing. Although Petyt (1985) suggests that both of these pairs may be undergoing mergers, recent reports from Hughes, A. et al. (2012) suggest that the *long mid merger* (Wells 1982a) may not yet be complete. They comment on [ɛː] for FACE, but note that for some speakers, words with *eigh* in the spelling are realised with a diphthong. For GOAT, the authors describe a complex pattern, with monophthongal [ɔː] being the most common variant, but they note again how some words with *ow* or *ou* in the spelling have a diphthong, and further, that fronting of the monophthong increasingly leads to qualities such as [əː] and [ɵː] (2012: 105). The fronting of monophthongal GOAT in Bradford AE is also discussed in Watt & Tillotson (2001). They comment on a consistently fronted monophthongal GOAT in word list data from seven speakers. They report qualities ranging from [ɔː] to [ɵː], with the fronted variant [ɵː] being most common amongst female speakers. They suggest that this variant is a reflection of an increasingly common supra-local Northern norm, with many speakers having contacts in nearby urban centres. This finding is consistent with work on Tyneside English, in which similar vowel qualities were reported for FACE and GOAT, and provides further evidence for the development of a supra-local northern norm (Watt 2002).

Little published work has been carried out on the AE spoken in Leicester, or more widely in the East Midlands. Hughes, A. et al. (2012: 101) suggest that speakers in Leicester have wide diphthongs relative to Standard English, with [ɛ̞i] reported for FACE, and [əʉ] for GOAT.

5.2.1.2 FACE and GOAT in contact varieties of English

A number of studies considering contact varieties in the UK have commented upon variation between Anglo and non-Anglo speakers with respect to the realisation of FACE and GOAT. In Glasgow, Stuart-Smith et al. (2011) observed closer and fronter FACE and GOAT for Asian as compared to non-Asian speakers in the city. Reporting acoustic results from word list and reading passage data, speech from five bilingual (English dominant and Panjabi) and two monolingual Glaswegian males was compared. Clear differences between the two groups were observed when comparing their realisations of the GOAT vowel. Asian and non-Asian speakers appeared separately from each other on vowel plots. One Asian male did realise GOAT similarly to the non-Asian speakers, and this speaker was found to have the lowest proportion of Asian friends (Stuart-Smith et al. 2011: 9).

A second study discussed in Stuart-Smith et al. (2011) reported the results from ethnographic interviews with six trilingual (English dominant, Panjabi and Urdu) eighteen year-old girls in Glasgow. They were considered representative of three Communities of Practice (CofP). The two 'Moderns' were characterised by their identification with Western cultural practices and norms, including wearing make-up, dating, and educational aspirations. A contrasting 'Conservative' group of two speakers was split to reflect the girls' differing identities. The 'Conservative-Religious' speaker identified closely with traditional Muslim values such as marrying young and educational equality. The 'Conservative-Cultural' was a speaker for whom traditional Pakistani values, including dressing modestly with a headscarf, and favouring marriage over relationships, were important. The final group, the ‘Inbetweens’, fell somewhere between the Moderns and Conservatives.

For FACE, the individual speaker variable was found to be a stronger determining factor than CofP. The Moderns showed fronter realisations than the Conservatives, with the Inbetweens somewhere in between. The Conservative-Religious speaker had the closest realisation, differing from the Conservative-Cultural female who had a more open realisation. For GOAT, CofP was found to be a stronger determining factor. The height of this vowel was similar for all speakers, with the exception of the Conservative-Religious speaker who had a much closer realisation than the others. Her realisation was also the most fronted, but was similar to one of the Moderns. As with the males, Stuart-Smith et al. (2011) found greater separation between speakers with their realisations of GOAT. The authors suggest that this may be indicative of greater weight being carried by GOAT and its relationship to ethnicity and identity construction, although they highlight that this assertion is based on a small amount of data. They also introduce the notion of ‘Glaswasian’ which relates to Harris’ (2006) discussion of ‘Brasian’ identity and highlights the complex identities of speakers who index both local and ethnic identity (see Section 2.2.1 in the Background Chapter).

An extended analysis of FACE and GOAT realisations in Glaswasian was presented in Alam (2015). Here, no differences between Glaswasian adolescent female communities of practice were observed for FACE and GOAT, with all speakers showing similar patterns. This is in contrast to the results reported above from Stuart-Smith et al. (2011) which only reported results from a selection of speakers included in Alam’s corpus. When comparing between Asian and non-Asian speakers, differences in the realisation of GOAT were observed. Glaswasian adolescents were reported to exhibit a fronted and more open realisation of this vowel compared to non-Asian speakers.

In their work with multilingual children (English, Panjabi and Urdu), Verma and Firth (1995) note that speakers in West Yorkshire have adopted local monophthongal FACE and GOAT, but they do not further discuss the specific realisations of the vowels in question. Verma and Firth (1995) also consider realisational variation amongst multilingual children in Edinburgh. However, the authors do not comment on the realisation of FACE and GOAT amongst this group, which would perhaps suggest that speakers’ realisations do not differ from those of monolingual English speaking children in the area. Although the monophthongal realisations reported by Verma and Firth are attributed to the adoption of local features, further variation may also be present, as evidenced above for Glasgow. All speakers in Glasgow exhibit monophthongal realisations, but Glaswasian speakers have still variable realisations to non-Asian speakers (Stuart-Smith et al. 2011).

The analysis discussed by Sharma (2011) reports on fieldwork carried out in Southall, London, with four second-generation bilingual (Panjabi and English) speakers. Each participant took part in ethnographic interviews and self-recorded themselves in different contexts with different interlocutors. Two age-groups are represented, with both males and females included (one speaker per cell; further supporting results are included in the article's appendix). The presence of monophthongal FACE or GOAT was considered to be an Indian feature, differing from the diphthongal Anglo realisations of the area. The use of monophthongal FACE and GOAT varied across both speaker and context, but all used these Indian variants at least some of the time with some interlocutors. Sharma notes that the monophthongal Indian variants occurred most commonly with Asian interlocutors, and remarks that there were interlocutors with whom the speakers used no monophthongal FACE and GOAT. This result highlights the consistency with which FACE and GOAT are monophthongal in Asian English varieties, but also emphasises intra-speaker variability, with participants here clearly varying their realisations of these vowels based on the identity of the interlocutor.

Sharma (2011) does not provide further information on the monophthongal quality of FACE and GOAT, so it is difficult to determine whether the Indian-English monophthongs in Southall are as close in quality as the monophthongal variants posited for Glaswasian. However, there is unlikely to be a one-to-one correspondence between these cross-regional contact varieties in spite of the parallel relationships observed within given locations when comparing the speech of Anglo and Asian communities. Stuart-Smith et al. (2011) discuss the realisation of syllable-initial /l/ in Glaswasian. Laterals are regularly reported to be clear in Asian Englishes (e.g. Heselwood & McChrystal 2000; Kirkham forthcoming; Kirkham & Wormald 2015) and this was observed in Stuart-Smith et al's (2011) acoustic analysis of /l/ in Glasgow: Glaswasian speakers realised a clearer /l/ as compared to Glasgow non-Asian speakers. However, they note that despite this, the quality of Asian English /l/ in Glasgow was still much darker than in many varieties of English, with the relationship between Asian and non-Asian articulations reflecting an interaction between local and ethnic identity. Asian-English speakers retained the local 'dark' /l/ but it was still clearer than that used by non-Asian speakers in the area. The *relationship* between Asian and non-Asian Englishes is therefore consistent, but the actual realisations of Asian English /l/ are regionally variable.

The *Linguistic innovators* and *Multicultural London English* projects (Kerswill et al. 2007-2010, 2004-2007) have examined innovative variation in one inner-London and one outer-London borough (Hackney and Havering, respectively).[18] Focussing on Hackney, they describe the emergence of a new, urban variety: 'Multicultural London English' (MLE). MLE is characterised by multilingual input and is spoken by adolescents of all ethnicities. Raised onsets of FACE [eɪ ~ e] and raised and retracted GOAT [oʊ] with resultant shorter trajectories[19] have been described as innovative features of MLE (Cheshire et al. 2011; Cheshire et al. 2008; Fox, et al. 2011). Fox et al. (2011) comment that non-Anglo speakers are leading these innovative changes, with Anglo speakers with multi-ethnic friendship groups following. They also note the general absence of gender effects with regard to FACE and GOAT, but note that males have more advanced raising of FACE.

Considering data from five male adolescents of Multicultural Manchester English (MME), shorter trajectories, raised onsets and more peripheral articulations of FACE and GOAT were also noted by Drummond (2013a, 2013b). As with MLE, MME is defined as a multi-ethnic variety which reflects the multilingualism and diversity of the city.

Raised onsets and shorter trajectories for FACE are also found in the London borough of Tower Hamlets (Fox et al. 2011). Five variants of FACE were identified through auditory analysis of over 3,000 tokens spoken by 39 adolescents: [ẹi], [ei], [ɛi], [æi] and [ai]. Of these, Bangladeshi boys use [ei] more than any other variant, doing so over 50% of the time, with other raised variants [ẹi] and [ɛi] also being common amongst this group. White British boys favour the more open variant in this subset, [ɛi], with mixed race boys and White British girls favouring a variant more commonly associated with the traditional 'Cockney' of the area: [ai]. The authors argue that friendship groups and social networks are vital to understanding the spread of the innovative contact variants through the community.

[18] For more details on this project, please see section 2.2.2 in Chapter 2.
[19] Throughout this Chapter *shorter trajectories* is used to refer to a qualitatively shorter diphthong which shows less movement through the vowel space across a vowel. *Shorter trajectories* as used here is not in any way related to the duration of a vowel.

Also discussed in Fox et al. (2011) are the realisations of PRICE and GOAT in Birmingham. Considering only GOAT here, the most common variant for English ("Anglo") adolescents is transcribed as [əʊ], although the authors note that this 'is a variant with a central mid onset and an offset ranging in the area of the back /ʊ/ and the central /ʉ/, thus between [əʊ] and [əʉ].' (2011: 36). The most common variant for Pakistani adolescents is [oː], with males using this 56% of the time, and females using it slightly less, this group using more of the [əʊ] variant. Caribbean adolescents use [əʊ] the majority of the time, but less frequently than the English speakers. They also use the [oː] variant, and a final variant [ɔʊ] which was used commonly by many non-English ("non-Anglo") speakers. Fox et al. (2011) also note a further infrequent variant used by younger speakers (particularly females), namely [əʏ]. Once again, the authors comment on the importance of multi-ethnic social networks to facilitate the diffusion of innovative linguistic patterns into the Anglo group, those without mixed networks being significantly more likely to retain the 'traditional' regional variants.

Considering the origins of this variation in MLE, Kerswill et al. (2013) note that the close onsets common among speakers of MLE are also found in the English spoken by many incoming migrants. They suggest that the frequency of these forms in the English spoken by migrants has contributed to their presence in MLE. Despite MLE not being relatable to one single language influence, the similarities in the English spoken by incomers potentially accounts for the consistencies observed. Wells (1982c) reports that speakers of Singaporean English and some Caribbean Englishes realise monophthongal FACE and GOAT as [eː] and [oː], respectively. More recently, Hickey (2004b) reported that the Englishes of Malaysia and Singapore have monophthongal FACE with a quality of [ɛ], while monophthongal GOAT is more variable, with [ɔ] and [o] being noted.

The monophthongal realisations of FACE and GOAT are frequently discussed as characteristic of the Indian English varieties spoken in India (e.g. Hickey 2004a). Wells (1982c) comments that the realisations of FACE and GOAT in both Anglo-Indian English and Indian English are monophthongal [eː] and [oː], respectively. Anglo-Indian English refers to the L1 English used in India by speakers of mixed British and Indian origin, whereas Indian English refers to the L2 English accent of (educated) Indians who have an Indic language as their L1. Wells suggests that the reasons for monophthongs in Anglo-Indian English could be related to the realisations of these vowels when English first began to be established in India.

Maxwell and Fletcher (2009) report the results from an acoustic analysis of midpoint vowel formants and durations in Indian English. They note that many early studies of Indian English oversimplified the complexity in the variety, with more recent work highlighting the variation present, some of which relates back to the L1 of the speakers. Using word list data from four Panjabi L1 and three Hindi L1 speakers aged between 21 and 29, they note that six of the speakers realise FACE as a monophthong which often occupies the same F1/F2 space as either KIT or FLEECE. Only one Panjabi L1 speaker realises this vowel as a diphthong [ei]. For GOAT, the authors comment that monophthongal [oː] is the most common variant, with some speakers having overlap in the vowel space between GOOSE, FOOT or THOUGHT.

Following Maxwell and Fletcher (2009), Maxwell and Fletcher (2010) reported on a dynamic acoustic analysis of English diphthongs as spoken by the same three L1 Hindi and four L1 Panjabi speakers. They report realisations of [eː] or [ei] for FACE and [oː] for GOAT from both L1 Hindi and L1 Panjabi speakers. However, they note that the L1 Panjabi speakers are more variable in their realisations than the L1 Hindi speakers and tend towards monophthongisation of both FACE and GOAT. Maxwell and Fletcher (2010) comment that despite consistencies observable across varieties of Indian English, the number of L1s spoken by speakers of Indian English means that 'no single phonemic inventory will necessarily capture this [variation]' (2010: 43).

This research highlights the prevalence of monophthongal FACE and GOAT across contact varieties of English spoken in the UK and around the world. Although the qualities reported vary, close and peripheral realisations are common.

5.2.1.3 Panjabi

Given the aims of the thesis discussed in the Introduction, any patterns observed will be considered in relation to the heritage language Panjabi. Furthermore, where descriptions of Panjabi are presented in this thesis literature available on the phonology of Hindko, Pahari, Pushto and Mirpuri will also be discussed along with information referring to Modern Standard Panjabi (MSP), with these additional varieties / languages being those reported by participants[20].

[20] Please see Appendix 5 for information about which speakers spoke which varieties and refer to Chapters 3 and 0 for a more comprehensive discussion of these issues and their relevance to the thesis.

Early work by Bailey (1914) comments only on the peripheral and central monophthongs of Panjabi, /e o ɪ ʊ/, and no mention is made of the quality of any diphthongs. All diphthongs in Panjabi are rising with a central nucleus and peripheral glide (Shackle 2003: 588). The closest vowel to the RP /eɪ/ diphthong is a rising /əi/. Panjabi also has a front-mid /e/ and a central high-mid /ɪ/ (Shackle 2003; Bhatia 1993; Tolstaya 1981). This is mirrored at the back of the vowel space, by the diphthong /əu/ and the monophthongs /o/ and /ʊ/. The distinction between central and peripheral monophthongs is shown in Figure 22 taken from Shackle (2003).

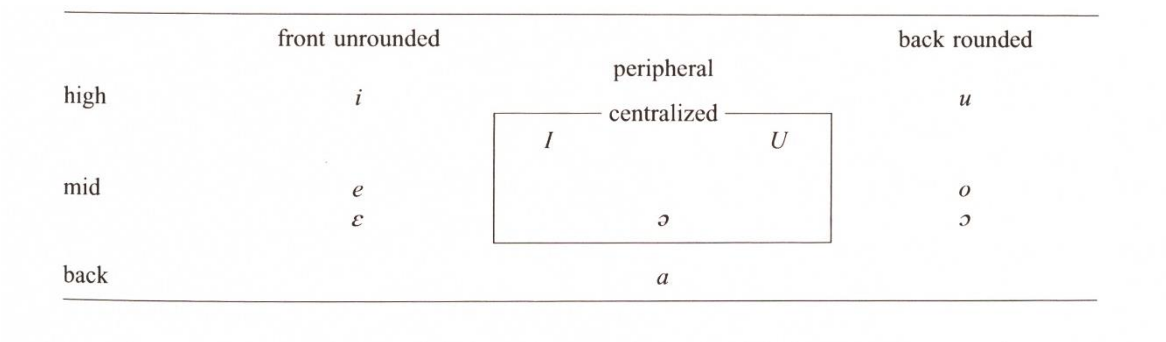


Figure 22: Monophthongal vowel phonemes in Panjabi. Figure taken from Shackle (2003: 587) [Henceforth I = /ɪ/; U = /ʊ/]

Western Pahari and Lahnda (Hindko and Pothwari) varieties have short counterparts for the long and peripheral /e/ and /o/ (Zograph 1982), although, Shackle (1983) comments in a review of Zograph's work that, 'caution is […] required in using the book as a guide of linguistic facts' (1983: 372). It is thus difficult to know how much value to give to the comments made by Zograph. Bhardwaj (2012) comments in a book for learners of Panjabi that the long vowels *e* and *o* should be pronounced as 'the Scottish pronunciation of gate [and] go' (2012: 7-8). Scottish monophthongal FACE and GOAT are traditionally close (Stuart-Smith 1999), so this might suggest that Panjabi /e/ and /o/ are also relatively close[21]. No clear description of Pashto exists to suggest this variety patterns differently from MSP in any way. Shackle (2003) notes that the Pashto speaking area marks the Western linguistic boundary of the Panjabi speaking area.

5.2.2 The fronting of GOOSE

As well as investigating qualitative variation across the trajectories of FACE and GOAT, the fronting of GOOSE has been considered. The fronting of back vowels is common in

[21] Although note research by Stuart-Smith et al. (2011), which reports on the varying realisation of GOAT for some Glaswasian speakers.

English and a number of languages (e.g. Harrington et al. 2011a), with Labov (1994) considering it to be a major principle of phonological variation:

> PRINCIPLE III
> **In chain shifts, back vowels move to the front** (1994: 116)

The fronting of GOOSE is a change spreading throughout the English-speaking world, with Labov proposing that GOAT-fronting follows GOOSE-fronting. Haddican et al. (2013) and Fridland (2008) suggest that it may even be an *off-the-shelf* feature (Eckert 2003, Milroy 2007), as GOOSE-fronting is characteristic of many varieties of English and is not socially indexed in places where the fronting is observed. Phonetic context is a main driver of change, with coarticulation with preceding coronals or palatals predicting fronting, and a following /l/ inhibiting it (e.g. Sóskuthy et al. 2015; Labov 2010; Wells 1982a). Fridland comments that post-palatal and pre-lateral conditions reflect the extremes of GOOSE realisations (2008: 442). Recent work by Harrington et al. (2011b) suggests that the fronting consistently observed is due to tongue fronting, rather than to changes in lip posture. Additionally, recent work from Stuart-Smith et al. (forthcoming) illustrates how the local dialect context is important and GOOSE cannot always be assumed to front. In Glasgow, this vowel is now lowering, with the authors suggesting that for this location this may be involved in a chain shift.

5.2.2.1 GOOSE-fronting in AE

Labov (1994) suggests that GOAT-fronting follows GOOSE-fronting. However, when Watt & Tillotson (2001) observed the fronting of GOAT in Bradford AE they were reluctant to associate it directly with the fronting of GOOSE. Although they observed the fronting of both vowels, their results suggested that GOAT could front without GOOSE. In Manchester, fronting was found to pattern in the expected way, with GOAT-fronting following GOOSE-fronting (Hughes, V. et al. 2012). In York, Haddican et al. (2013) comment on a more complex relationship, with the fronting of diphthongal GOAT increasing amongst the younger speakers, but the fronting of monophthongal GOAT being disfavoured because of its association with lower socioeconomic groups. However, they do find that GOAT-fronting follows GOOSE-fronting, as suggested by Labov (1994).

Although the work by Watt & Tillotson (2001) considers the fronting of GOAT, no work has explicitly focussed on GOOSE-fronting in Bradford AE. Wells (1982b) and Beal

(2008) consider Bradford to be within the *middle north* region, in which GOOSE is realised as [uː ~ ʊu], although Wells notes that the dialect of West Yorkshire traditionally also includes the diphthongal variant [ʊɪ] (e.g. [gʊɪs] for *goose*) (1982b: 360). Hughes, A. et al. (2012) comment on a retracted realisation of GOOSE, [uː], in Bradford AE, but no mention of the realisation of this vowel is made for Leicester AE.

Wells (1982b) does not suggest that the realisation of GOOSE in the *midland* region, of which Leicester is a part, would differ from that provided for the *middle north*, with [uː ~ ʊu]. Trudgill (2004: 58) reports that the centralisation of GOOSE is recorded in Leicestershire in the SED data. Recently, Sóskuthy et al. (2015) commented on the interaction between GOOSE-fronting and yod-dropping in Derby. They comment that GOOSE has fronted in Derby in all but pre-/l/ environments, with the fronting most advanced in yod-ful words (e.g. *cube*). These results might suggest that contrary to Wells (1982b), GOOSE-fronting in Leicester would also be expected, given its geographical proximity to Derby and the findings from the SED.

The fronting of GOOSE has been reported in a range of other AE dialects in the UK at locations including Milton Keynes (Kerswill & Williams 2005; Williams & Kerswill 1999), Reading (Williams & Kerswill 1999), Manchester (Hughes, V. et al. 2012; Hughes et al. 2011), Carlisle (Jansen 2010) and also in RP (Ferragne & Pellegrino 2010; Hawkins & Midgley 2005). In York , Haddican et al. (2013) consider variation across the trajectory and showed fronting to occur throughout the whole of GOOSE.

Ferragne and Pellegrino (2010) and Hawkins and Midgley (2005) both comment on the relationship of FOOT-fronting to GOOSE-fronting. Both studies observe FOOT-fronting following GOOSE-fronting in a number of UK dialects. In Carlisle, Jansen (2010) considers fronting of FOOT and GOAT relative to GOOSE, but finds no evidence of fronting for either of these former vowels, with fronting only observed with GOOSE. Kerswill & Williams (2005) observed both GOOSE and GOAT-fronting in Milton Keynes, and suggested that GOOSE-fronting was a change which had been completed, with GOAT-fronting still ongoing.

GOOSE-fronting in the US is even more widespread than in the UK. Labov suggests that it occurs in 90% of North American Englishes (2010: 103) and Thomas (2001: 30-34) remarks on a number of varieties which exhibit some degree of GOOSE- and / or GOAT-fronting. Locations in which it has been attested include Charleston, South Carolina

(Baranowski 2008), Reno, Nevada (Fridland 2008), Philadelphia, Pennsylvania (Labov 1994), and Houston, Texas (Koops 2010). In Houston, Koops (2010) identifies two different types of GOOSE-fronting: a monophthongal Southern variant, and a mainstream fronting diphthong. He suggests that fronting in the US may have arisen in a number of locations independently of any inter-variety contact, thus leading to the variable realisations of the change.

5.2.2.2 GOOSE-fronting in contact varieties of English

Extreme fronting of GOOSE has been reported in the UK contact variety MLE (Cheshire et al. 2008). The authors highlight the importance of multi-ethnic networks in the diffusion of this extreme fronting, but note that this global change is present amongst adolescents in Havering as well as those in inner-city Hackney. Currently, it does not seem that GOAT-fronting is following fronting of GOOSE. As described in Section 5.2.1 above, GOAT was found to be more retracted for the non-Anglo MLE speakers. Further, they note that the continuation of this global change of GOOSE-fronting provides evidence for incrementation in acquisition (Labov 2007), the fronting peak being among the 16-19 year old groups. Cheshire et al. (2008) note that incrementation is not evident in any other innovative vowel patterns observed in MLE (e.g. FACE and GOAT), the new patterns are not found amongst older (Anglo) speakers.

Kerswill et al. (2013) comment that despite the frequency of raised onsets in FACE and raised and retracted GOAT in the Englishes of many of the migrants coming to London, a fronted GOOSE is not found in these varieties. As such, they do not consider the fronting observed in MLE as evidence of contact, but instead discuss its comparability with other global changes in English such as quotative *be like* and also the commonality of GOOSE-fronting amongst younger speakers across the region. These global changes highlight the need to consider internal language-driven innovations as potential sources of new variants, with communities independently innovating similar patterns.

Work by Drummond (2013a) reporting on the speech of five male adolescents suggests that GOOSE-fronting is present in Manchester Multicultural English. In Glasgow, Alam (2015) reports that Glaswasian adolescent females exhibit more marked fronting for BOOT (FOOT, GOOSE) than Glasgow non-Asian speakers. This variation is in contrast to that increasingly observed in Glaswegian such that BOOT is becoming more open (e.g. Stuart-Smith et al. forthcoming). Other work on contact varieties of English in the UK has not to the author's knowledge, looked at GOOSE-fronting directly, so it is not known whether they pattern similarly to the contact varieties considered here in exhibiting more fronting than that observed for non-contact speakers.

Hall-Lew (2011) and Fought (1999) observed GOOSE-fronting across different ethnic communities in San Francisco and Los Angeles, respectively. Hall-Lew comments on the lack of difference between 16 Asian (predominantly Chinese) and 14 European Americans in their degrees of fronting. The results suggested that it may be young Asian Americans leading the change (2011). Further, in contrast to the findings for York noted above (Haddican et al. 2013), Hall-Lew comments that in San Francisco it is only the onset which fronts, the offset of GOOSE remaining retracted. Fought (1999) identified complex interactions between gender, social class and gang affiliation which predicted the degree of GOOSE-fronting amongst Chicano English speakers in Los Angeles. This is an example where GOOSE-fronting is subject to social stratification:

> In the case of /u/-fronting in Los Angeles, use of the variable is associated more with middle class membership and non-gang speakers. Non-use is more often associated with working class membership and gang-affiliated speakers. (1999: 19)

Outside of the US, research suggests that GOOSE-fronting is taking place in both Australia (Cox 1999) and New Zealand (Easton & Bauer 2000). Further, in 2010, Mesthrie commented on the fronting of GOOSE in South African English and noted that it has become deracialised. Fronting was historically associated with white speakers, but it is now being used by young middle-class speakers irrespective of their race.

As well as reporting on characteristic FACE and GOAT realisations, Maxwell and Fletcher (2009) provide information on the realisation of GOOSE for speakers of Indian English in India. They observe the vowel to be realised as a close, back [uː] for both L1 Panjabi and L1 Hindi speakers. Given the widespread occurrence of GOOSE-fronting, it is perhaps surprising that it is not observed in the Indian English reported by the authors.

5.2.2.3 Panjabi

As noted above, where descriptions of Panjabi are presented in this thesis, literature available on the phonology of the other varieties / languages will also be discussed based on the responses given by participants in the questionnaire (see 5.2.1 and Chapter 2). Figure 22 (see page 153) includes the monophthongal vowel phonemes of Panjabi reported by Shackle (2003: 587). Panjabi contrasts three centralised (historically short), and seven peripheral (historically long) vowels, with quality being more important than length in contrasting between vowels. The description of back vowels by Tolstaya (1981) is consistent with those of Shackle (2003) and Bhatia (1993). Of relevance here is the peripheral back rounded vowel /u/ in the top right of Figure 22 above. Bhardwaj compares this to English GOOSE, describing Panjabi's long /u/ as 'like the *oo* in f*oo*d' (2012: 7).

Pashto has fewer vowels than Panjabi, with Zograph's (1982) work suggesting only the presence of a back rounded vowel /u/, and not a centralised /ʊ/. Aside from the differences reported for Pashto, I know of no further differences between the phonological inventories of Panjabi and Hindko, Pahari, Mirpuri Panjabi or Pothwari. However, the absence of information about differences does not mean that they do not exist. Further, even if phonological similarity is consistent across these varieties / languages, phonetic similarity cannot and should not be assumed. There is currently no evidence to suggest fronting of back vowels occurs in Panjabi or any related varieties. However, research into this would be of great value, Harrington et al. (2011a) comments on back vowel fronting in German and notes its commonality across a variety of unrelated languages, with this global fronting pattern clearly not restricted to English.

5.3 Predictions

Based on the literature presented above, and the results discussed earlier in Chapter 4 a number of predictions can be made about what realisations we might expect in Bradford and Leicester AE and PE.

For Bradford AE, we might expect to see monophthongal realisations of FACE and GOAT. There may be some evidence of occasional diphthongs because of the incomplete *long mid merger*, but overall, monophthongal realisations would be predicted for both of these vowels. There is little evidence to suggest that GOOSE-fronting is currently taking place in Bradford, and both monophthongal and diphthongal variants are suggested for this vowel by previous authors. The increasing presence of back vowel fronting across varieties of English and the reported fronting of monophthongal GOAT (Watt & Tillotson 2001) means that although not expected, observing fronting of both GOOSE and GOAT in Bradford AE would perhaps not be entirely surprising. It may be that the presence or absence of lingual fronting (see Chapter 4) can help us to predict back vowel fronting, such that those with a more fronted lingual posture would exhibit more marked vowel fronting. Given the absence of lingual fronting as a long term setting for the Bradford AE speakers this might suggest that segmental fronting would not be present, or at least not as advanced as among the PE speakers in this region who consistently exhibit this setting as a long term feature.

In Leicester AE, both FACE and GOAT might be expected to be realised as diphthongs. Further, the recent work undertaken in Derby (Sóskuthy et al. 2015), and the characterisation of GOAT as a centralised diphthong (Hughes, A. et al. 2012) might suggest that fronting of both GOAT and GOOSE is underway in Leicester. Additionally, the presence of lingual fronting as a long term setting reported in Chapter 4, would also lead us to expect the fronting of back vowels.

Making any claims about PE in each location needs to take a number of additional factors into consideration in addition to the predicted local AE patterns described above. Modern Standard Panjabi includes corresponding close, peripheral monophthongs and a closing diphthong at the front and back of the vowel space, which might suggest that either monophthongal or diphthongal FACE and GOAT could be predicted. Research on Indian English, however, has consistently observed both FACE and GOAT to be realised as monophthongs. For both Panjabi and Indian English, there is no evidence to suggest that back vowels are fronting. There is currently insufficient evidence available which fully details the variation which may be present within Panjabi, however, the research available does contribute to the predictions about PE.

In addition to the patterns reported in Panjabi and Indian English, a number of consistencies are observed throughout contact varieties of English spoken in the UK. FACE is regularly closer and fronter for contact variety speakers than speakers of a non-contact variety in a given location. Similarly GOAT is consistently found to be closer in its realisation. In some locations GOAT is fronter for speakers of the contact variety, and in others GOAT is more retracted. For both FACE and GOAT, where diphthongs are observed in the non-contact variety, speakers of the contact variety exhibit either monophthongs or shorter diphthongal trajectories. In locations which have monophthongs in the non-contact variety, monophthongs are found amongst speakers of the contact variety. Less work has been undertaken on the realisation of GOOSE in contact varieties of English spoken in the UK, but in locations where it has been considered, speakers of the contact variety have been reported to exhibit markedly fronted realisations compared to speakers of the non-contact variety.

Thus, for PE we might expect to see similar relationships to the AE across both Bradford and Leicester, but with actual realisations which are related to the AE in each case meaning different PE vowels. In Bradford PE, we would expect monophthongal realisations for both FACE and GOAT, with these perhaps being closer than those exhibited by Bradford AE speakers. For Leicester PE, monophthongs or shorter trajectories for both FACE and GOAT might be predicted, with these once again being closer than those from the AE speakers in this region. It might be expected that FACE would be fronter among the PE speakers than the AE speakers within each location. These predictions are consistent with what would be expected in contact varieties of English, and also what would be expected based on the descriptions of Panjabi and Indian English.

The fronting of both GOAT and GOOSE is more difficult to predict. Descriptions of Panjabi and Indian English might suggest that both of these vowels should occupy the back of the vowel space. Regarding GOAT, the findings from work on contact varieties of English spoken in the UK are not cohesive, some finding speakers of the contact variety front this vowel, and others observing a retracted variant. For GOOSE, the few studies which have characterised this vowel in contact varieties have commented that it is fronted. It is useful at this point to consider the lingual fronting pattern described in Chapter 4. Given the contrasting findings in the literature it makes sense to use these findings to make predictions about segmental back vowel fronting in this context. Speakers of PE in both Bradford and Leicester all exhibited lingual fronting, thus we might predict that segmental fronting of GOOSE, and potentially GOAT, would also be observed. Thus, although there are conflicts in the literature, the characteristic long term setting of lingual fronting which is consistently observed among PE speakers in this corpus might suggest that back vowel fronting would be expected.

5.4 Methodology

This Section details the methodology employed in this analysis. Observing formant trajectories, rather than static midpoints, is becoming more common in phonetic research (e.g. Haddican et al. 2013; McDougall & Nolan 2007; Stuart-Smith et al. 2015). The increased availability of accurate methods facilitates dynamic approaches, which have been found to be preferable to target approaches. Studies have illustrated that by considering dynamic information, more variation is accounted for than with target approaches, which potentially miss important speaker patterns. Sociophonetic work aiming to fully understand group patterns, as well as more forensically oriented approaches looking to distinguish between speakers, have commented that dynamic approaches should be more widely adopted by all phoneticians (e.g. Docherty et al. 2015; McDougall 2006; Van der Harst et al. 2014).

5.4.1 Counting and coding

Reading Passage and Paired Conversation recordings were analysed for each of the 64 speakers included in the corpus. The Formant Editor program (Sóskuthy 2014) was used to extract formant measurements, but preparatory segmentation was undertaken before files were imported into the program. For the Reading Passage data, TextGrids created during forced alignment[22] were used as the basis for vowel extraction rather than marking out intervals manually. Figure 23 shows the forced aligned output, the TextGrid underneath the waveform and spectrogram including individual intervals for each phoneme. Modifications were made to an extraction script (Lennes 2002) which created individual .wav files for vowels based on specific interval boundaries. As well as the vowel segment, one second of speech either side was extracted and the vowel interval was saved as an accompanying TextGrid to facilitate its importation into Formant Editor.

[22] The Reading Passage files were forced aligned by Georgina Brown at the University of York who used a bespoke aligner created using the HTK toolkit. These were used for another project assessing the success of automatic accent recognition systems (Brown & Wormald 2014; Watt et al. 2014). The TextGrids derived through the forced alignment were used in the thesis for the extraction of specific vowel tokens for analysis in Formant Editor.

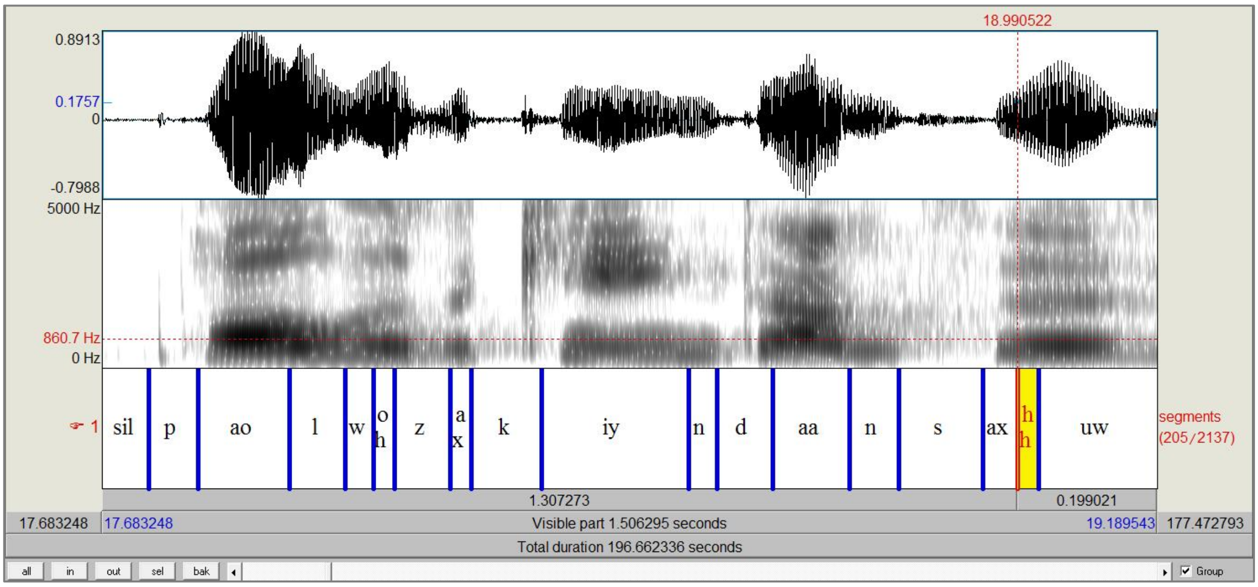


Figure 23: Uncorrected TextGrid derived through forced alignment of Reading Passage data for a Bradford PE female (Shelly). Speech uttered in this extract: "*Paul was a keen dancer*". The dashed vertical red line at 18.99 illustrates an error in segmentation. Here, the forced alignment has mis-identified the unstressed second syllable of *dancer* as the following word *who*.

For the Paired Conversation data, individual tokens were marked out in a TextGrid for FACE, GOAT and GOOSE, and also FLEECE, TRAP and LOT (included for normalisation purposes). The modified script mentioned above was then used to extract individual .wav files and accompanying TextGrids. These data were then imported into the Formant Editor. This programme interfaces through Praat (Boersma & Weenink 2015) and allows for the manipulation of the LPC (linear predictive coding) output within a predefined interval. This enables more accurate measurements to be taken, with both boundaries and formant measurements being checked and modified where necessary. A screenshot of Formant Editor is shown in Figure 24. As well as the waveform and spectrogram, additional metadata can be added to accompany each soundfile. The metadata then form part of the .csv file exported from Formant Editor after the analysis is complete.

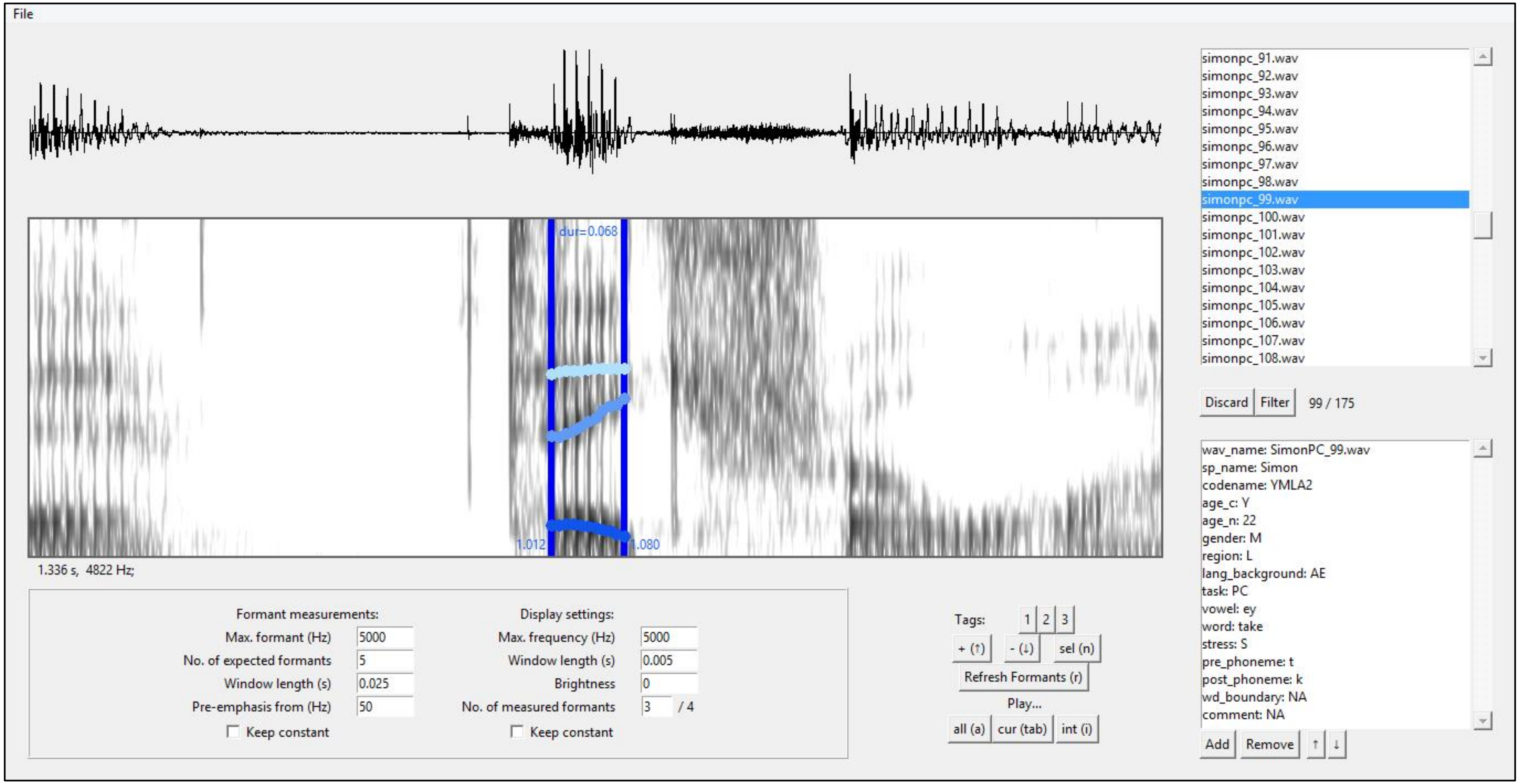


Figure 24: Screenshot of Formant Editor from Paired Conversation of a Leicester AE male (Simon). The interval reflects the time within which formant measurements will be taken. The interval here shows corrected boundaries for a FACE token from the word *take*. Soundfiles are listed along the top right. Metadata can be defined in the bottom right menu. Individual LPC dots can be moved or formant settings can be adjusted in the bottom left menu.

The current analysis measured 11 points across the trajectory within each vowel, as is consistent with other dynamic research (e.g. Sóskuthy et al. 2015). For each token, metadata detailing word, preceding and following phoneme and whether the vowel was at a word boundary were noted (see Figure 24). The onset of the vowel was marked at the onset of the second full pulse of periodicity. The offset of the vowel was marked at the offset of F2 or the end of periodicity, whichever came first. This approach ensured that the whole vowel was included in the dynamic analysis. The Formant Editor programme does not currently have an option to move the cursor to the nearest zero crossing. For the Paired Conversation, boundaries were identified and marked at zero crossings in Praat before importing into Formant Editor. For the Reading Passage, boundaries were only checked in Formant Editor, and thus zero crossings were aimed for but were not always identifiable with certainty. In tokens where the vowel was preceded or followed by a periodic approximant, formant movements and auditory quality were assessed to enable the identification of boundaries.

For GOOSE and GOAT, tokens in syllables with onset yod or coda lateral were excluded. The coarticulatory effects of these consonants have substantial effects on vowel realisations and the degree of fronting or retraction (see Section 5.2.2 above). Further, the presence of yod-dropping and /l/ vocalisation in Leicester complicate the picture (Braber & Flynn 2015; Hughes, A. et al. 2012; Sóskuthy et al. 2015). FACE measurements were taken from all vowels in stressed contexts. At least five tokens of FLEECE, TRAP and LOT were also measured for each speaker. These vowels were included for normalisation purposes and were taken from stressed contexts not preceded or followed by an approximant or nasal consonant. Table 8 details the token counts for groups based on region, language background, and gender.

	FACE	GOAT	GOOSE	FLEECE	LOT	TRAP	Total
Bradford AE F	308	238	131	164	189	45	**1075**
Bradford AE M	188	142	97	48	43	28	**546**
Bradford PE F	704	500	293	292	353	110	**2252**
Bradford PE M	573	458	251	189	217	109	**1797**
Leicester AE F	256	212	120	67	76	39	**770**
Leicester AE M	208	182	122	45	39	42	**638**
Leicester PE F	632	485	259	210	215	100	**1901**
Leicester PE M	729	556	305	222	235	139	**2186**
Total	**3598**	**2773**	**1578**	**1237**	**1367**	**612**	**11165**

Table 8: Total number of tokens per vowel per group based on speaker language background, region and gender.

5.4.2 Normalisation

After all vowels were measured, the raw Hz values were normalised using the modified Watt & Fabricius (modW&F) method (Fabricius et al. 2009) in R using the *vowels* package (Kendall & Thomas 2009-2014). When applied to sociolinguistic research, normalisation aims to reduce the effects of physiological differences between speakers but to retain sociolinguistically-relevant information, thus facilitating between-speaker comparisons. Some normalisation methods also aim to model the human perceptual system (Thomas 2013), but this is not something being aimed for here as the thesis is focussed on production. An array of different normalisation methods are available, with a number of studies comparing between these (e.g. Flynn 2011; Adank et al. 2004). Flynn (2011) comments that vowel-extrinsic, formant-intrinsic and speaker-intrinsic methods perform best, of which Lobanov and modW&F are available through the NORM suite used here through R's *vowels* package (Kendall & Thomas 2009-2014). Fabricius et al. (2009) stated that the modW&F method was specifically developed with sociophonetic analysis in mind.

The modW&F method uses an *S*-centroid approach, which first calculates maximum and minimum F1 and F2 values for each speaker. Three points are identified: (*i*), (*a*), and (*u'*). The position of (*i*) is defined as the closest (lowest F1) and frontest (highest F2) position in the vowel space. The average F1 and F2 of vowel measurements for FLEECE are included to calculate this. The point vowel (*a*) derived from TRAP and LOT corresponds to the most open (highest F1) position in the vowel space. Finally, (*u'*) is derived from the values used to calculate (*i*) and reflects the closest (lowest F1) and hypothetical most back vowel. The F2 value for (*u'*) is equal to the F1 for (*i*), based on the premise that F2 could be equal to but cannot be lower than the lowest F1. After these are derived, a mathematical formula is applied to identify the centre of the vowel space, *S*, with vowel measurements then re-expressed relative to this centroid calculation (Fabricius et al. 2009; Watt & Fabricius 2002).

As well as considering segmental variation and developments in PE, this thesis also investigates variation in voice quality settings (see Chapter 4). Throughout the thesis I will be relating the segmental patterns to the characteristic settings described earlier. As noted above, one of the primary aims of normalisation is to reduce differences between speakers caused by physical or anatomical variation (such as variation in vocal tract length), while retaining differences caused by sociophonetic variation. However, voice quality settings such as larynx raising or lip protrusion can alter the length of the vocal tract. As illustrated in Chapter 4, settings are sociolinguistically relevant and thus, the removal of these patterns through normalisation adds complexity to the comparison. The implications the normalisation has for these comparisons will be discussed further in Section 5.6 below, and also in Chapter 7. It is suggested that this is an area in which further work would be worthwhile.

5.4.3 Statistical analysis

Linear mixed effects regression analysis was carried out using the *lme4* and *lmerTest* packages in R (Bates et al. 2014; Kuznetsova et al. 2014). Although previous research analysing dynamic vowel data has reported the outputs of SSANOVAs and fitted polynomial regressions (e.g. Docherty et al. 2015; McDougall 2006; Sóskuthy et al. 2015; Wassink & Koops 2013) a linear approach was employed here. This is consistent with other work exploring formant trajectories (e.g. Lennon et al. 2015; Stuart-Smith et al. 2015) and accounts for the variation observed. The assessment of alternative statistical methods is reserved for future analyses, and is briefly discussed in Section 5.7.

For each formant for each vowel, a basic initial model was run, including fixed effects of Language background, Region, and Measurement point (along the trajectory). Two- and three-way interactions were considered for each of these predictors:

- Language background and region
- Measurement point and language background
- Measurement point and region
- Measurement point, language background and region

The inclusion of the interactions with Measurement point facilitates statistical observations which account for variation across the trajectory. The fixed main effects do not reflect patterns of variation across the trajectory, which is what this Chapter is interested in. Consequently, the results Section which follows focusses mainly on the significant interactions with Measurement point, particularly the three way interaction between Measurement point, Language background and Region. A significant result with this three way interaction would reflect the fact that regional differences are further related to language background, with different vowel realisations being present for PE and AE speakers within each location.

Random intercepts were included for speaker and word, with by-speaker random slopes for measurement number, and by-word random slopes for measurement number, language background and region. Additional models were run with the inclusion of extra fixed effects one by one. Gender, Age and Task were added consecutively, both as main effects and as interactions with measurement number. These were only retained in the model if they were found to be significant predictors of the variation or did not significantly decrease the fit of the model in ANOVA comparisons. This approach to assessing model fit is consistent with Field et al. (2012: 867-8). The final fixed effects included in each model are detailed below in Section 5.5.

Preliminary visualisations of distributions varying by place and manner of articulation of the preceding and following sound were interrogated to determine whether these should be added to the model. The exceptions to this were GOAT F2 and GOOSE F2, where Preceding place of articulation was included in addition to the predictors of the basic model defined above. This was to assess whether preceding coronals led to significantly more fronted realisations, as would be expected from previous research (see Section 5.2.2). However, if these were not significant or significantly decreased the fit of the model, they were removed in future iterations.

Although it was measured, duration was not included in the mixed effects linear regression model. Any inclusion of duration would have been as a means to consider whether vowels with more trajectory variation were longer in duration than more monophthongal realisations. To assess this relationship, a single measure for each token would need to be determined with a correlation between this measure and duration then calculated. Inclusion of duration in the model with the data in their current format would not account for this.

As well as carrying out statistical analysis on the data, individual speaker and group vowel plots were visualised using both the normalised and raw Hertz data. This enabled patterns to be identified, with statistical modelling being used to complement and support the observations.

5.5 Results

The results for each vowel will be presented below, with a discussion of their relationships to one another considered in Section 5.6. For each vowel, separate statistical models were run on F1 and F2, and as such the results for each formant will be presented in turn for each vowel. Selected statistical results are reported with a general characterisation of each vowel accompanying the results. Full summary tables from the final iteration of each mixed effects linear regression model are included in Appendix 6

5.5.1 FACE

5.5.1.1 F1

The boxplots in Figure 25 illustrate the normalised F1 values across the trajectory for speakers grouped by region, language background and gender. It is clear from these plots that Leicester speakers exhibit much more F1 variation across the trajectory of FACE compared to the Bradford speakers, irrespective of language background. The final model iteration includes a number of additional fixed effects from the basic model defined above in Section 5.4. Fixed effects of Gender, Age, and Task were included in addition to those defined in Section 5.4, with further interactions of Measurement point * Gender, and Measurement point * Age also included. Random effects were the same as those defined in the methodology, with random intercepts being included for Speaker and Word. By-subject random slopes are included for Measurement point, and by-word random slopes for Measurement point, Language background and Region. Significant model outputs are detailed in Table 9 with full summary tables included in Appendix 6. These results are discussed in further detail in the text.

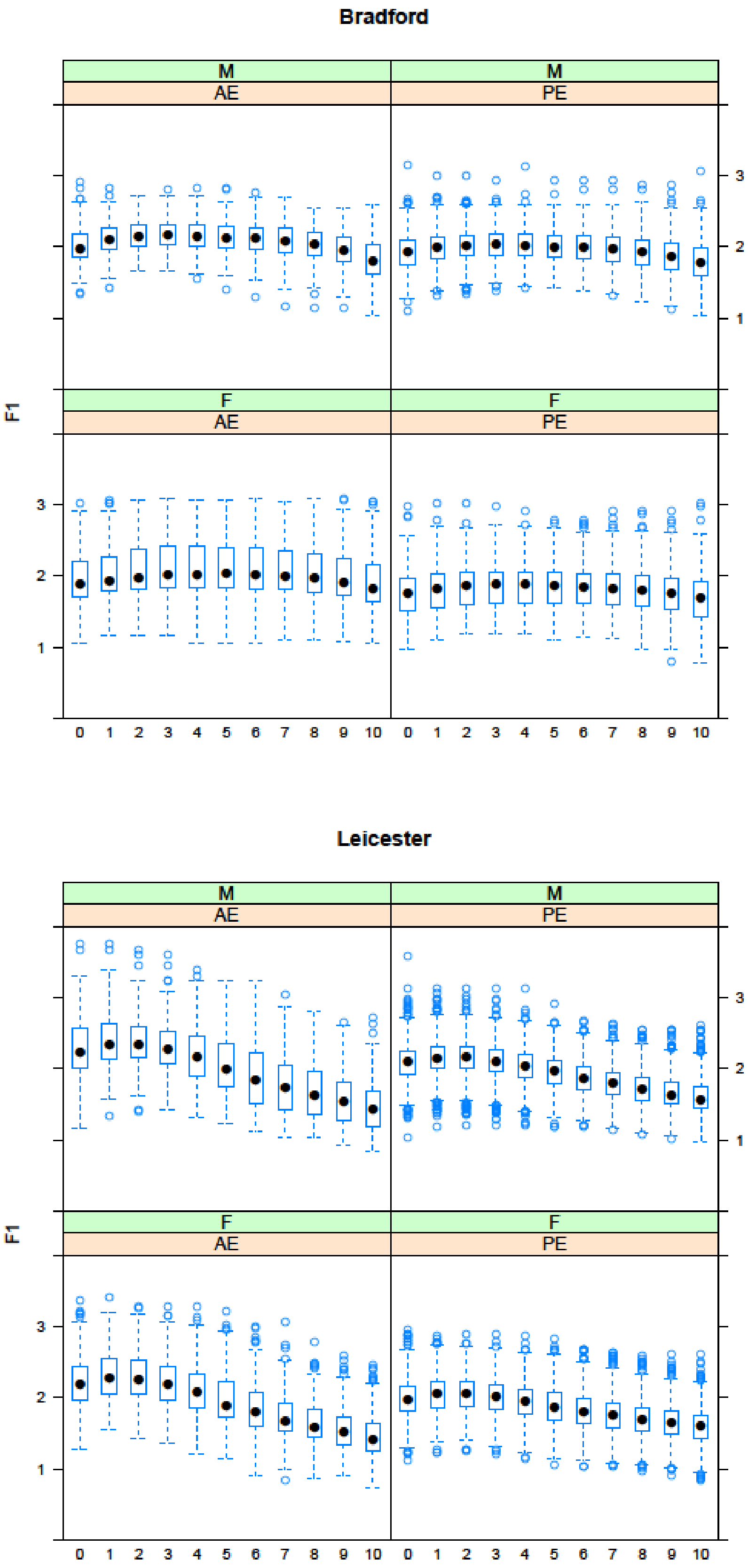


Figure 25: Normalised F1 variation across measurement point for FACE by region, language background and gender. The plots illustrate the distribution of values within each point of the trajectory for each group. Bradford appears at the top of the page, Leicester at the bottom. Within each region, males are on the top, females on the bottom. AE speakers appear on the left, PE speakers on the right.

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.733	0.108	66	16.10	< 2e-16
M-point	0.020	0.008	65	2.42	.018
Region	0.306	0.095	65	3.22	.002
Gender	0.118	0.049	64	2.41	.019
Age	0.009	0.003	64	3.40	.001
Task	0.055	0.004	35840	14.19	< .001
M-point : Region	-0.081	0.007	62	-11.21	< .001
M-point : Gender	-0.008	0.004	63	-2.01	.048
M-point : Age	-0.001	0.0002	63	-4.17	< .001
M-point : Lang-bgd : Region	0.036	0.008	62	4.32	< .001

Table 9: Significant effects from the final model iteration for FACE F1.

As well as exemplifying the increased variation across the trajectory in Leicester as compared to Bradford, Figure 25 also shows the differences within Leicester based on language background. The Leicester PE speakers exhibit less trajectory movement than the Leicester AE speakers. These results were found to be statistically significant in the output of the mixed effects regression model. The significant two way interaction between Measurement point and Region reflects the increased trajectory variation in Leicester as compared to Bradford. Within Leicester, the shorter trajectories[23] found amongst PE speakers is accounted for by the significant three-way interaction between Measurement point, Language background and Region.

The significant three-way interaction between Measurement point, Language background and Region is illustrated in the predictive interval plots in Figure 26. These plots are visualisations of the significant three-way interaction. The coloured lines on each plot correspond to the regression coefficient and these are surrounded by 95% confidence intervals. Although non-overlapping confidence intervals indicate a significant difference, overlapping confidence intervals do not necessarily correspond to a non-significant difference (e.g. Sóskuthy et al. 2015). The plots in Figure 26 reflect the Paired Conversation results, with the corresponding predictive interval plots for the Reading Passage included in Appendix 7.

[23] Note here that ‘shorter trajectories’ corresponds to the distance travelled across the vowel space and not duration. Thus, speakers with ‘shorter trajectories’ use diphthongs which show less dynamic movement across the vowel space throughout the vowel. They are not necessarily shorter in duration.

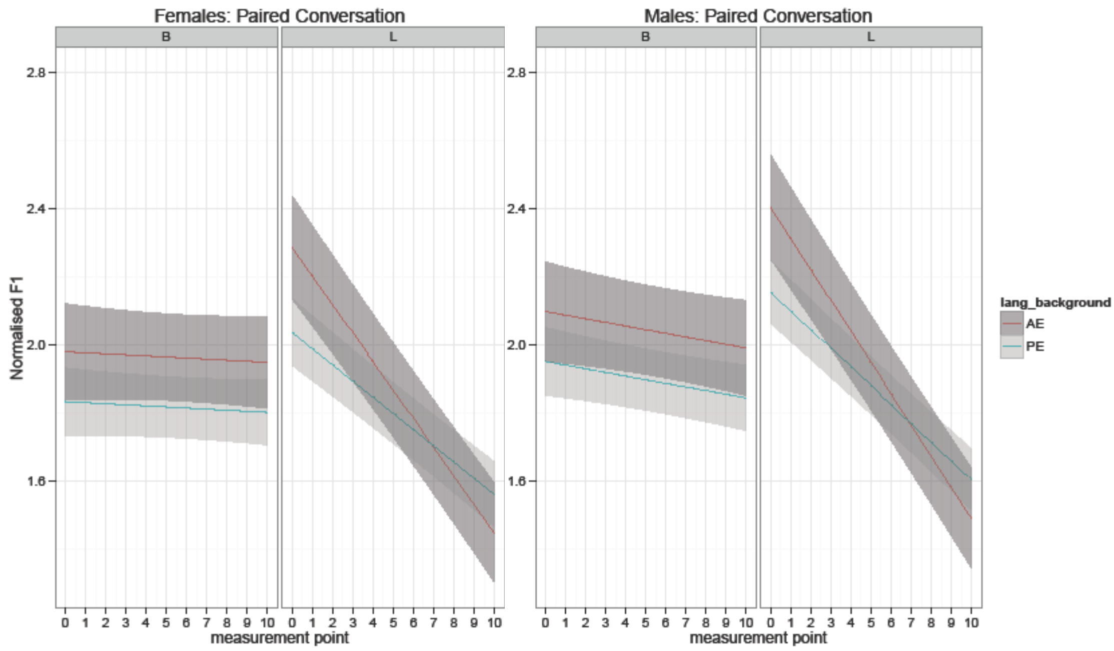


Figure 26: Predictive interval plots illustrating variation in normalised F1 across the trajectory for FACE. Data for females is shown in the plot on the left, those for males on the right. Within each plot, Bradford appears on the left, Leicester on the right. The coloured lines correspond to regression coefficients: Anglo English speakers are in red, Panjabi English speakers are in blue. Regression lines are surrounded by 95% confidence intervals.

These plots emphasize the increased trajectory variation in Leicester compared to Bradford, but also the within Leicester variation. PE speakers in Leicester demonstrate a smaller amount of trajectory variation than Leicester AE speakers. Also visible in Figure 26 is the within-region variation in the height of F1. In both Bradford and Leicester the PE speakers have a lower regression coefficient than the AE speakers. This is not retained throughout the trajectory for the Leicester speakers. This consistently lower coefficient is indicative of a lower F1 for the PE speakers and corresponds to a closer articulation. These results are consistent with the previous work discussed above (see Section 5.2) and will be considered in further detail below.

Overall, males show more variation across the F1 trajectory, with the model output reporting a significant interaction between Measurement point and Gender. A significant interaction between Measurement point and Age emphasises how as age increases trajectory variation increases, such that older speakers exhibit falling F1 trajectories which are longer than those for younger speakers

For all speakers, F1 was higher across the trajectory in the Reading Passage as compared to the Paired Conversation. Thus, FACE was more open amongst AE and PE speakers in both locations throughout the Reading Passage task. Place and manner of articulation for preceding and following sounds were not included in the model. Initial visualisations suggested there was little to no variation in F1 trajectory patterns for speakers as a function of these predictors.

5.5.1.2 F2

The F2 of FACE in Bradford is stable across the trajectory amongst both PE and AE speakers. Trajectory variation is found in Leicester, although as with F1 there is less variation for the PE as compared to the AE speakers. The boxplots in Figure 27 illustrate this variation for the F2 of FACE. As with F1, additional fixed effects were included in the final linear mixed effects regression model as compared to the basic model described above. Fixed effects of Age, and Task were included with interactions of Measurement point * Task, and Measurement point * Age also included. The random effects were the same as those defined in Section 5.4 and as included in the final F1 model. Random intercepts were included for Speaker and Word, with by-speaker random slopes for Measurement point, and by-word random slopes for Measurement point, Language background and Region included. Significant results from the model are detailed in Table 10 with full summary tables included in Appendix 6.

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.731	0.044	70	39.17	< 2e-16
Lang-bgd	0.101	0.032	71	3.10	.003
Region	-0.103	0.039	69	-2.61	.011
Age	-0.003	0.001	64	-3.32	.001
M-point : Region	0.034	0.004	64	8.96	< .001
M-point : Age	0.0005	0.0001	64	4.42	< .001
M-point : Task	0.003	0.001	36180	4.80	< .001
M-point : Lang-bgd : Region	-0.010	0.004	64	-2.14	.036

Table 10: Significant effects from the final model iteration for FACE F2.

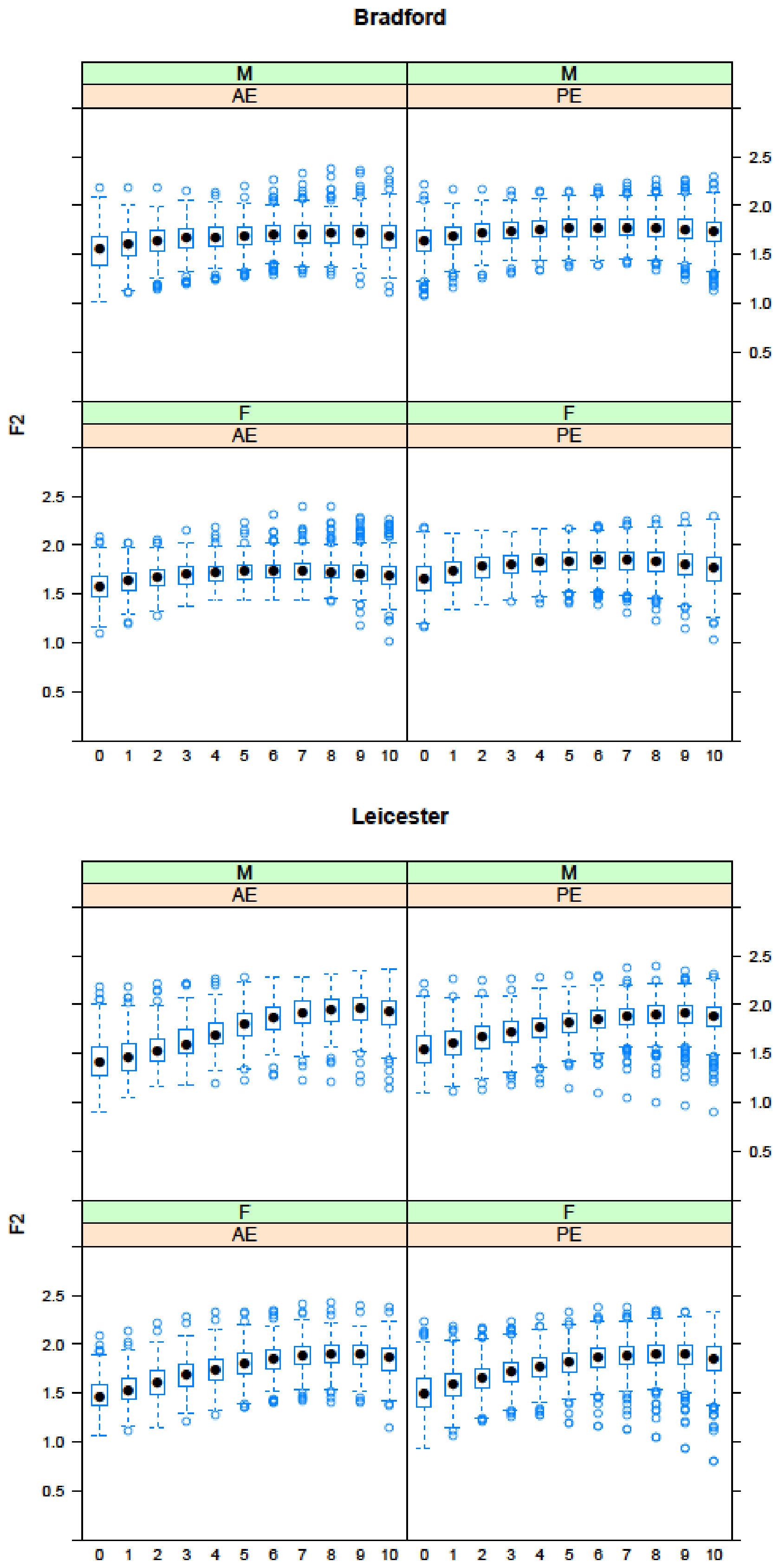


Figure 27**:** Normalised F2 variation across measurement point for FACE by region, language background and gender. The plots illustrate the distribution of values within each point of the trajectory for each group. Bradford appears at the top of the page, Leicester at the bottom. Within each region, males are on the top, females on the bottom. AE speakers appear on the left, PE speakers on the right.

The greater dynamic variation found in Leicester as compared to Bradford was reflected in a significant interaction between Measurement point and Region. The shorter trajectories among the PE speakers in Leicester relative to the AE speakers was reflected in a significant three-way interaction between Measurement point, Language background and Region. These patterns are exemplified in the predictive interval plots of Figure 28.

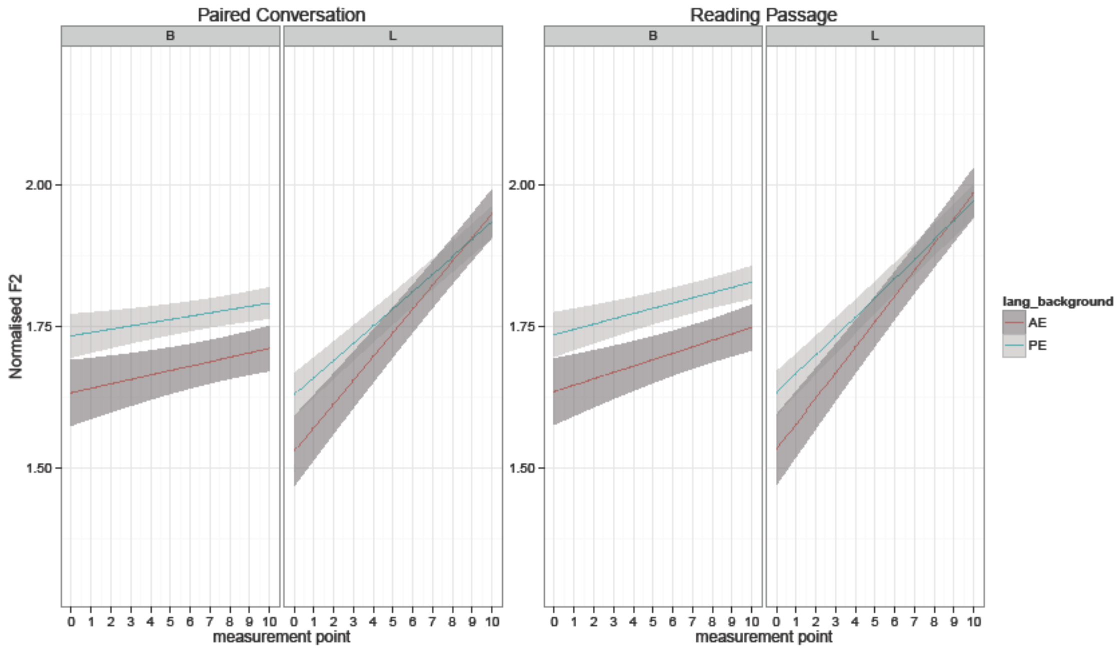


Figure 28: Predictive interval plots illustrating variation in normalised F2 across the trajectory for FACE. Data for the Paired Conversation is shown in the plot on the left, that from the Reading Passage on the right. Within each plot, Bradford appears on the left, Leicester on the right. The coloured lines correspond to regression coefficients: AE speakers are in red, PE speakers are in blue. Regression lines are surrounded by 95% confidence intervals.

The predictive interval plots in Figure 28 clearly reveal the difference between the Bradford PE and AE speakers throughout the trajectory, with PE speakers exhibiting a higher F2 than the AE speakers. This difference is only present in Leicester at the start of the F2 trajectory.

A significant interaction between Measurement point and Age was observed, which reflected how an increase in age corresponds to greater trajectory variation. Older speakers have rising F2 trajectories which are longer than those found amongst younger speakers. Greater trajectory variation was also observed in the Reading Passage as compared to the Paired Conversation task for F2, with a significant interaction in the model between Measurement point and Task. As highlighted in the boxplots of Figure 27, no Gender differences were observed for the F2 of FACE. Speaker gender was not found to be a significant predictor of the variation associated with the F2 of FACE when included in the model. Preliminary visualisations of the place and manner of articulation of the preceding and following sounds suggested no variation along these variables, and as such these were also not included in the linear regression model.

5.5.1.3 Summary: FACE

Overall for FACE, monophthongal realisations are retained for all speakers in Bradford. A close, front monophthongal vowel similar to [eː] is found for the PE speakers, with a more open [ɛː] monophthong for the AE speakers. In Leicester, all speakers retain a diphthong, but PE speakers have shorter trajectory lengths. This results in a vowel with [ɛi]-like qualities for the AE speakers but the shorter [ei] for the PE speakers. Consistent with previous research, PE speakers have a closer and fronter realisation of FACE relative to AE speakers in a given location, with a lower F1 and higher F2.

For all groups, younger speakers exhibit less variation across the trajectory than older speakers. Additionally, diphthongal realisations are more common in the Reading Passage than the Paired Conversation task.

5.5.2 GOAT

5.5.2.1 F1

For the F1 of GOAT, there are only slight within-region differences between the PE and AE speakers as compared to FACE. In Bradford, all speakers exhibit little movement across the trajectory; this contrasts with Leicester, where all speakers in the sample retain a degree of movement. As with FACE, this degree of trajectory variation in F1 is reduced for the PE speakers in Leicester. These patterns are reflected in the boxplots of Figure 29 below which illustrate the trajectory variation in normalised F1 for speakers grouped by language background, region and gender.

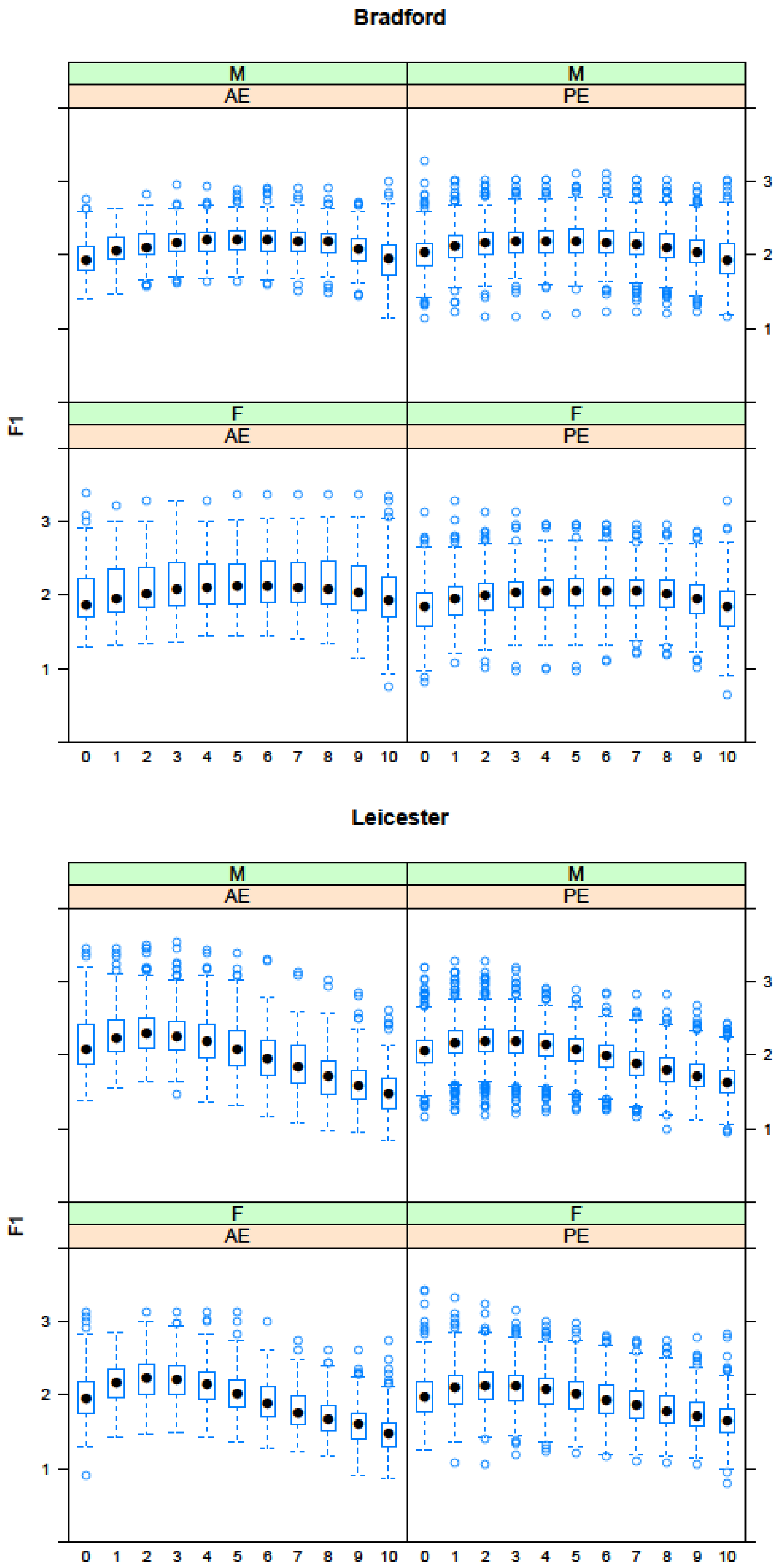


Figure 29: Normalised F1 variation across measurement point for GOAT by region, language background and gender. The plots illustrate the distribution of values within each point of the trajectory for each group. Bradford appears at the top of the page, Leicester at the bottom. Within each region, males are on the top, females on the bottom. AE speakers appear on the left, PE speakers on the right.

Additional fixed effects were included in the final iteration of the linear mixed effects model from those defined in the methodology (Section 5.4). These additional effects are Gender, Age, and Task, with further interactions included of Measurement point * Gender, Measurement point * Age, and Measurement point * Task. Random slopes and intercepts were consistent with those defined for the basic model. Significant results from the model are detailed in Table 11. Random slopes and intercepts were the same as those defined for the basic model.

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.829	0.106	67	17.28	< 2e-16
M-point	0.020	0.007	69	2.82	.006
Region	0.241	0.094	67	2.57	.012
Gender	0.111	0.048	64	2.32	.024
Age	0.006	0.002	64	2.37	.021
M-point : Region	-0.077	0.006	63	-12.85	< .001
M-point : Gender	-0.008	0.003	63	-2.50	.015
M-point : Age	-0.001	0.0002	64	-3.12	.003
M-point : Task	-0.003	0.001	10300	-2.04	.041
M-point : Lang-bgd : Region	0.035	0.007	63	4.93	< .001

Table 11: Significant effects from the final model iteration for GOAT F1.

The increased trajectory variation found in Leicester as compared to Bradford was reflected in a significant interaction between Measurement point and Region. The shorter F1 trajectories observed within Leicester amongst the PE speakers was manifested by a significant three-way interaction between Measurement point, Language background and Region. The predictive interval plot in Figure 30 highlights these patterns, with little variation present across the trajectory in Bradford (and also no difference between the PE and AE speakers) and more variation across the F1 trajectory for Leicester speakers. The shorter F1 trajectory of the Leicester PE speakers is also visible. The plots in Figure 30 reflect the results from the Paired Conversation. The predictive interval plots for the Reading Passage are included in Appendix 8

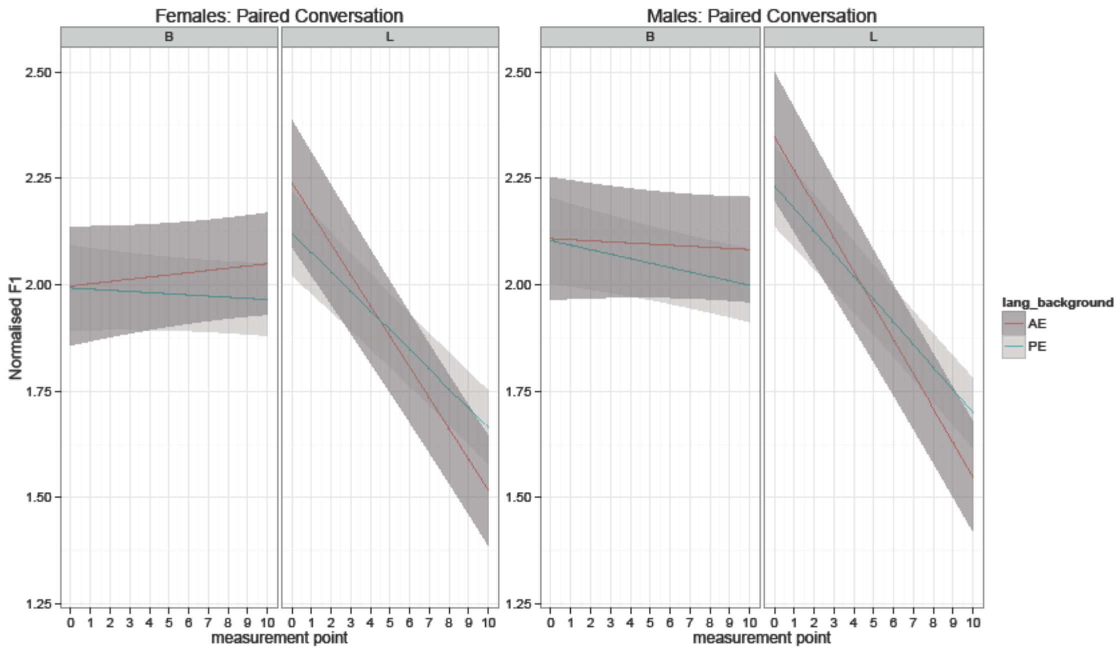


Figure 30: Predictive interval plots illustrating variation in normalised F1 across the trajectory for GOAT. Data for females is shown in the plot on the left, those for males on the right. Within each plot, Bradford appears on the left, Leicester on the right. The coloured lines correspond to regression coefficients: AE speakers are in red, PE speakers are in blue. Regression lines are surrounded by 95% confidence intervals.

As age increases, variation across the F1 trajectory increases, with older speakers exhibiting a falling F1 with a steeper slope than that of the younger speakers. This is reflected by a significant interaction between Measurement point and Age. A significant interaction between Measurement point and Gender suggests that overall, males and females show different shaped trajectories. This interaction is plotted in Figure 31.

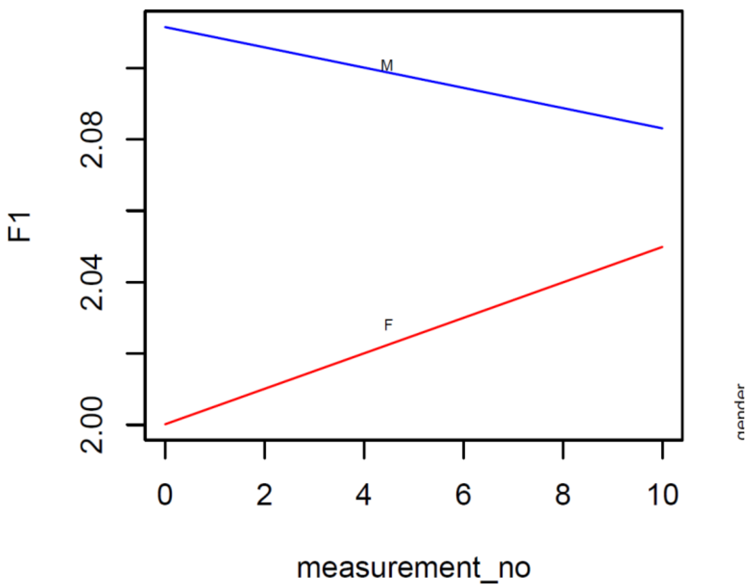


Figure 31: Plot of the significant interaction between measurement point (x-axis) and gender (coloured regression lines: blue = males, red = females). Normalised F1 values are along the y-axis.

The output of the mixed effects regression analysis also revealed a significant interaction between Measurement point and Task. Plotting of the output suggests that this corresponds to increased trajectory variation in the Paired Conversation as compared to the Reading Passage, with the Paired Conversation exhibiting a more marked F1 rise.

Preliminary visualisations found no evidence to suggest that the place and manner of articulation of the preceding or following sounds was contributing to the variation observed, and thus these were not included in the final model.

5.5.2.2 F2

The variation in F2, which corresponds to the degree of GOAT-fronting, varies both within and between each region. Differences in F2 are found between locations, with Leicester speakers showing more marked fronting than Bradford speakers. Within each region, AE speakers exhibit more fronting than PE speakers. These patterns are reflected in the boxplots of Figure 32. Normalised F2 values are shown across the trajectory with speakers grouped by language background, region and gender. The final iteration of the mixed effects model includes additional fixed effects to those defined in the methodology (Section 5.4).

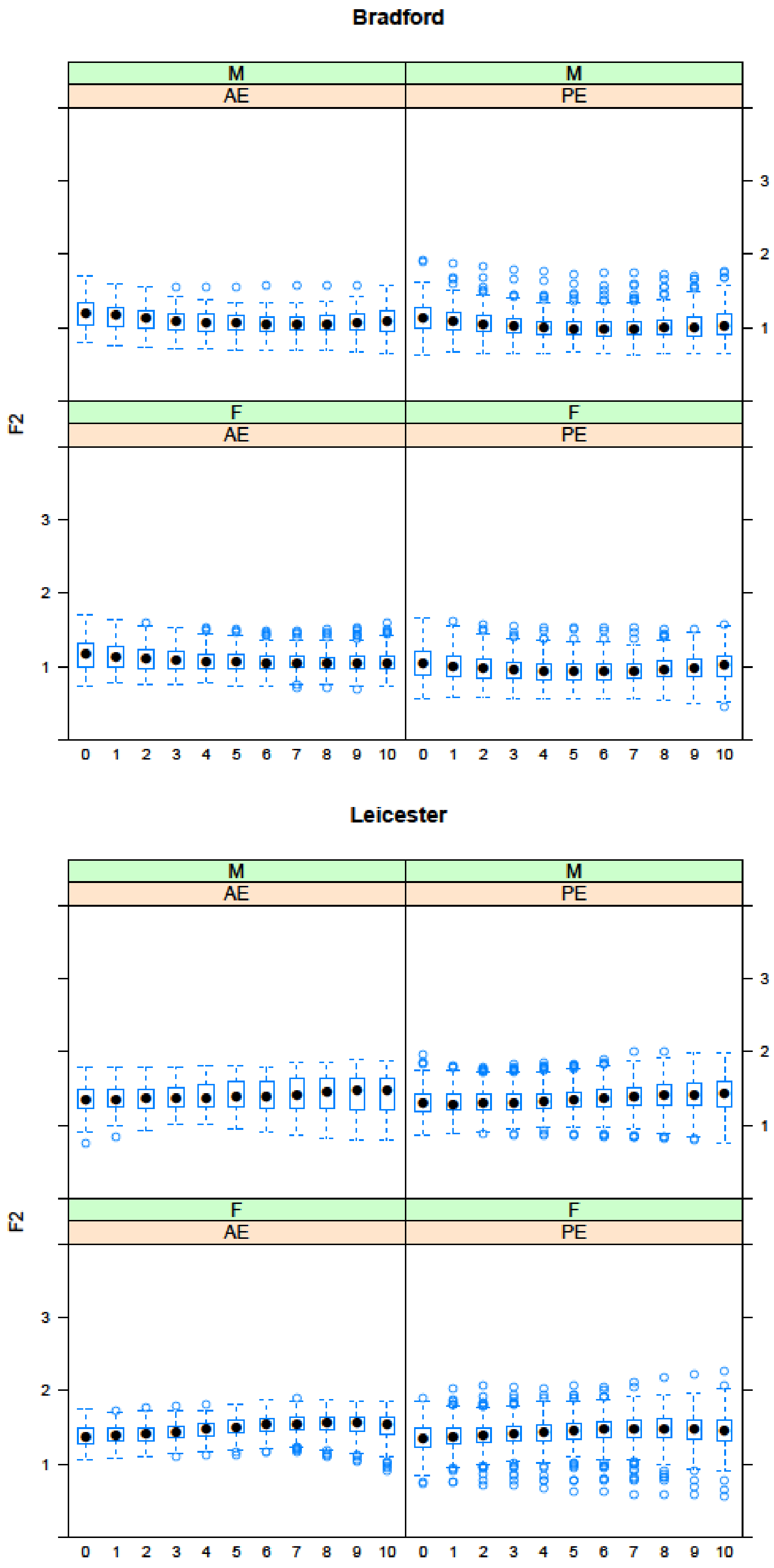


Figure 32: Normalised F2 variation across measurement point for GOAT by region, language background and gender. The plots illustrate the distribution of values within each point of the trajectory for each group. Bradford appears at the top of the page, Leicester at the bottom. Within each region, males are on the top, females on the bottom. AE speakers appear on the left, PE speakers on the right.

The additional fixed effects included in the final model iteration for GOAT F2 were Preceding place (pause, labial, coronal, velar, glottal or vowel), Age, and Task, with additional interactions of Measurement point * Preceding place, and Measurement point * Age also included. The significant results from the model are detailed in Table 12 along with other results which will be discussed in the text. Full summary tables are included in Appendix 6.

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.082	0.053	91	20.36	< 2e-16
Lang-bgd	-0.121	0.036	70	-3.33	.001
Region	0.233	0.045	71	5.20	< .001
Pre-coronal	0.064	0.019	9033	3.33	.001
Pre-labial	-0.060	0.022	2781	-2.68	.007
Pre-velar	0.136	0.025	3079	5.51	< .001
Pre-vowel	0.109	0.020	14580	5.36	< .001
Task	0.029	0.005	22320	5.75	< .001
M-point : Region	0.024	0.004	63	6.64	< .001
M-point : Pre-coronal	-0.008	0.003	6761	-2.40	.016
M-point : Pre-glottal	-0.017	0.005	253	-3.21	.001
M-point : Pre-labial	0.007	0.004	2165	2.08	.037
M-point : Pre-velar	-0.014	0.004	2107	-3.50	< .001
M-point : Pre-vowel	-0.007	0.003	11950	-2.26	.024
M-point : Age	-0.0003	0.0001	64	-2.94	.005
M-point : Task	0.002	0.001	18260	2.52	.012
M-point : Lang-bgd : Region	-0.008	0.004	63	-1.89	.064

Table 12: Selected output from the final model iteration for GOAT F2.

Fronting is most advanced in Leicester. Speakers in this region exhibit a higher F2 across the trajectory compared to the Bradford speakers. Further, the Leicester speakers exhibit variation throughout the trajectory, with F2 rising further during the articulation. This pattern is reflected in a significant interaction between Measurement point and Region. The three way interaction between Measurement point, Language background and Region was approaching significance. As visible in the boxplots of Figure 32 this corresponds to the slight within region variation, such that AE speakers exhibit more advanced fronting than PE speakers. This pattern is also made clear when plotting the regression output and is included here in Figure 33. In both Bradford (left), and Leicester (right) AE speakers demonstrate a higher F2 across the trajectory.

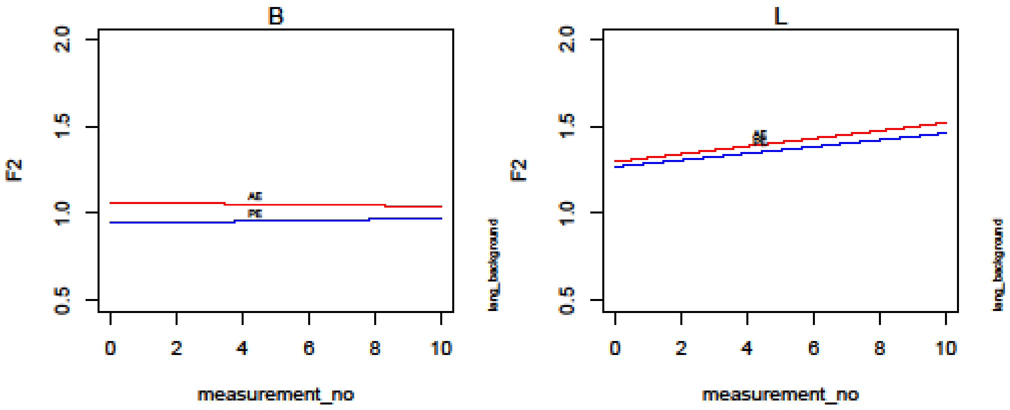


Figure 33: Interaction between language background and measurement number by region. Bradford appears on the left, Leicester on the right. Within each plot, the red regression line corresponds to AE speakers, and the blue regression line to PE speakers. Normalised F2 appears along the y-axis.

Preceding place of articulation was found to be a significant predictor of the variation. The mixed effects model assessed the difference between preceding pause and each other place of articulation in turn. All preceding places of articulation were reported to be significantly different to the F2 trajectory in preceding pause contexts. The regression output is summarised in Table 12.

The significant differences here correspond primarily to variation in the shape of the trajectory. Plotting the output of the model did not suggest that F2 was higher when the preceding sound was a coronal. Inspection of the raw data revealed that the effect of preceding place of articulation on the overall value of F2 varied by region. In Leicester, no differences are observable across the trajectory based on the preceding place of articulation. In contrast, amongst the Bradford speakers, GOAT-fronting is most advanced in contexts with preceding coronals, this context showing a trajectory which has a consistently higher F2 than the others. Although not reflected in the model output, this regional variation is exemplified in Figure 34 (Bradford) and Figure 35 (Leicester).

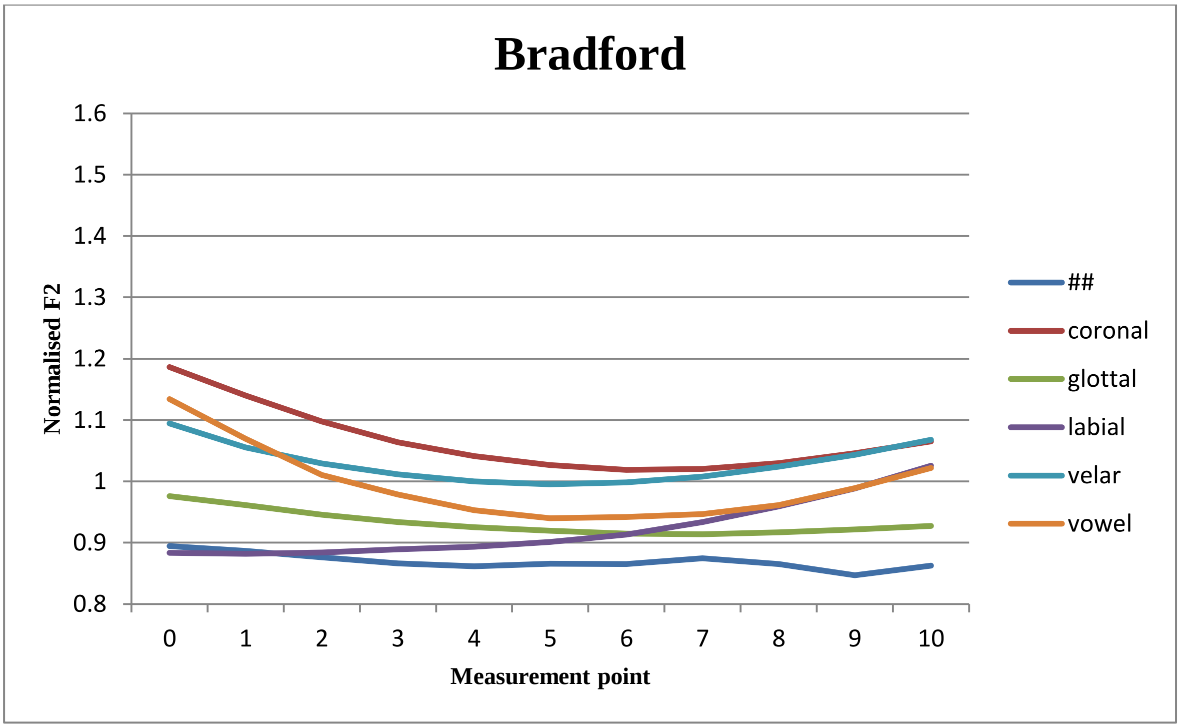


Figure 34: Variation in F2 of GOAT by preceding place of articulation in Bradford. Measurement point appears along the x-axis, with normalised F2 along the y-axis. Mean trajectories are included for each context.

For all speakers, GOAT-fronting was significantly more advanced in the Reading Passage as compared to the Paired Conversation task. A significant interaction between Measurement point and Age reflected a tendency for F2 to increase as age decreases. F2 variation was not predicted by gender. This predictor was not found to be significant when included in earlier model iterations. Visualisations of the data also gave no indication that speaker gender would account for the variation observed.

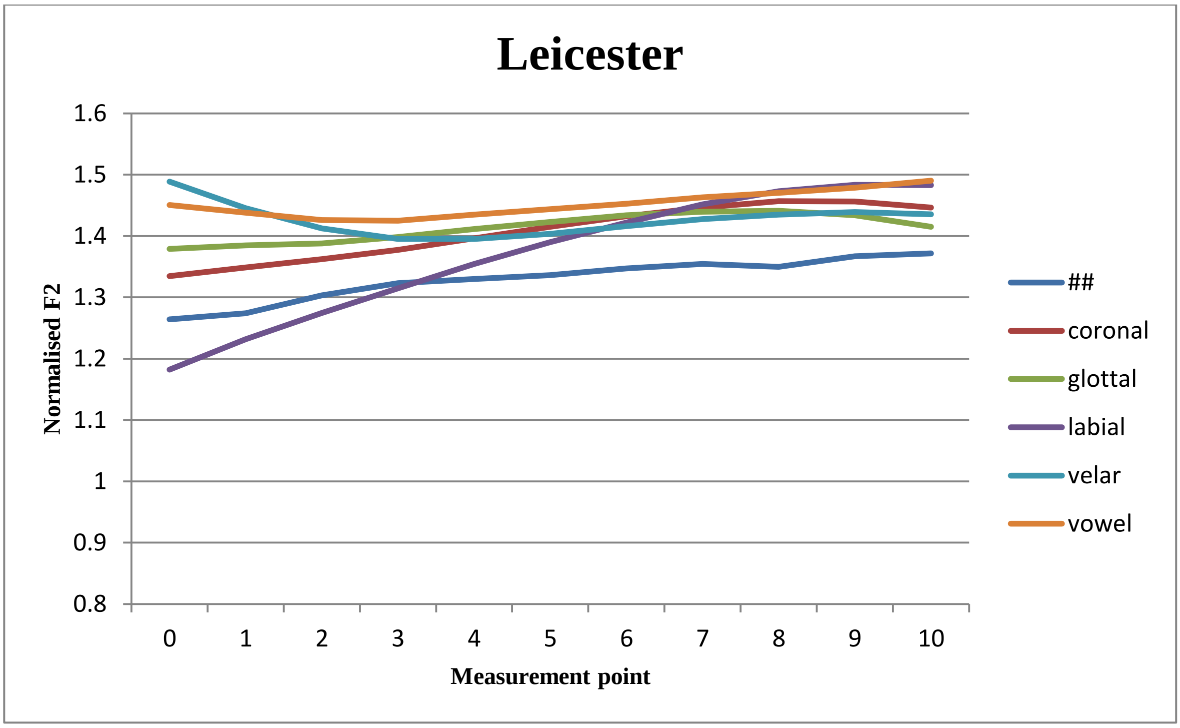


Figure 35: Variation in F2 of GOAT by preceding place of articulation in Leicester. Measurement point appears along the x-axis, with normalised F2 along the y-axis. Mean trajectories are included for each context.

5.5.2.3 Summary: GOAT

For GOAT, all Bradford speakers retain a monophthong, whereas those in Leicester retain a diphthong. As with FACE, there is evidence that Leicester PE speakers have shorter trajectories for GOAT than the Leicester AE speakers. No variation in height was found for GOAT between AE and PE speakers, the primary differences being in the degree of fronting. Leicester speakers front the most, particularly the AE speakers. Bradford PE speakers exhibit the most retracted variants. In Bradford, PE speakers exhibit an [oː]-like variant, and AE speakers a more centralised [o̟ː]. In Leicester, for PE speakers [əʉ̞] is observed, with [ɜʉ̞] being most common among the AE group. Fronting is more advanced amongst younger speakers, and more likely in the Reading Passage task. Advanced GOAT-fronting as predicted by a preceding coronal sound is only found in Bradford.

5.5.3 GOOSE

5.5.3.1 F1

Regarding F1, all speakers exhibited consistency across the trajectory. Both PE and AE speakers in Bradford and Leicester maintained a stable F1 throughout the measurement points. Further, there was little difference between any of these groups in the height of

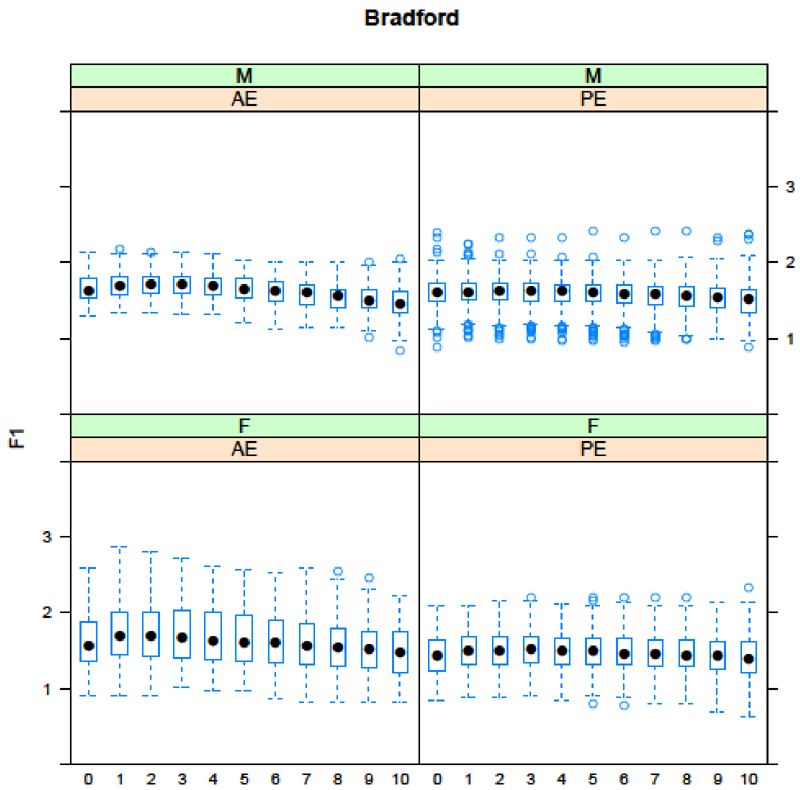
GOOSE. These patterns are reflected in the boxplots of Figure 36 which shows normalised F1 trajectories for speakers grouped by language background, region and gender. Once again, the final model iteration included a number of additional fixed effects to those defined in Section 5.4. In this instance these were Age, and Task with additional interactions with Measurement point for both of these main effects. Significant results from the model are listed in Table 13 with full summary tables included in Appendix 6.

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.554	0.096	69	16.19	< 2e-16
Task	0.036	0.006	9299	5.63	< .001
M-point : Lang-bgd	0.012	0.003	64	4.34	< .001
M-point : Age	-0.0004	0.0001	66	-4.51	< .001
M-point : Task	-0.002	0.001	6333	-2.29	.022

Table 13: Significant effects from the final model iteration for GOOSE F1.

The main result from the model was a significant interaction between Measurement point and Language background. This corresponds to the differing trajectory shapes exhibited by the AE and PE speakers. AE speakers in both locations have an F1 which falls across the trajectory. This is visible in the boxplots in Figure 36

An increase in age leads to a significantly longer trajectory, with older speakers showing a longer and falling F1 as compared to younger speakers. F1 was found to have a significantly longer trajectory in the Reading Passage task as compared to the Paired Conversation task. Visualisations of the raw normalised values provided no evidence that place or manner of articulation of the preceding or following sound were affecting F1, thus they were not included in a mixed effects linear model.



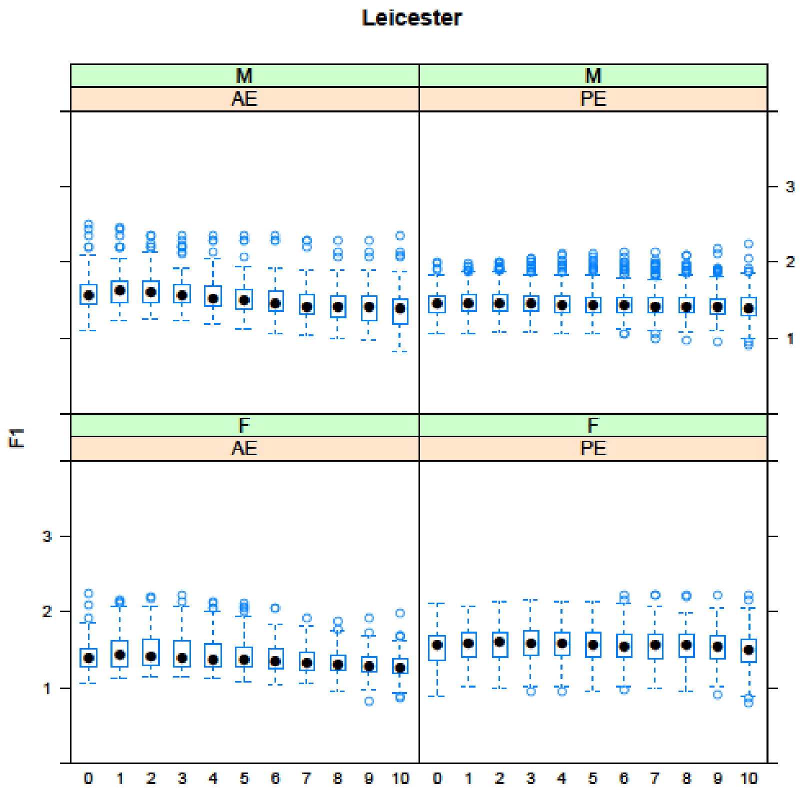


Figure 36: Normalised F1 variation across measurement point for GOOSE by region, language background and gender. The plots illustrate the distribution of values within each point of the trajectory for each group. Bradford appears at the top of the page, Leicester at the bottom. Within each region, males are on the top, females on the bottom. AE speakers appear on the left, PE speakers on the right.

5.5.3.2 F2

The pattern of GOOSE-fronting is consistent with that described for GOAT, such that region is a better predictor of F2 value than language background. All Leicester speakers once again show more marked fronting of GOOSE than speakers in Bradford. PE speakers within each region, particularly Bradford, show less fronting than AE speakers. This pattern is exemplified in the boxplots of Figure 37. Additional fixed main effects of Preceding place (labial, coronal, velar, glottal), Age and Task were included in the final model iteration with each of these also included in an interaction with Measurement point. Random slopes and intercepts were the same as those defined in Section 5.4. The significant results for the F2 of GOOSE are included in Table 14, along with all of the results for Preceding place of articulation.

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.542	0.067	79	22.87	< 2e-16
M-point	-0.013	0.005	83	-2.85	.006
Lang-bgd	-0.295	0.050	83	-5.88	< .001
Pre-labial	-0.130	0.039	76	-3.36	.001
Lang-bgd : Region	0.324	0.066	63	4.88	< .001
M-point : Lang-bgd	0.009	0.003	62	2.72	.009
M-point : Region	0.027	0.004	60	7.13	< .001
M-point : Pre-glottal	0.018	0.011	86	1.64	.104
M-point : Pre-labial	0.019	0.005	92	4.28	< .001
M-point : Pre-velar	-0.001	0.009	126	-0.07	.945
M-point : Age	-0.0005	0.0001	64	-4.30	< .001
M-point : Task	0.009	0.001	16230	7.39	< .001
M-point : Lang-bgd : Region	-0.012	0.005	61	-2.65	.01

Table 14: Significant effects from the final model iteration for GOOSE F2.

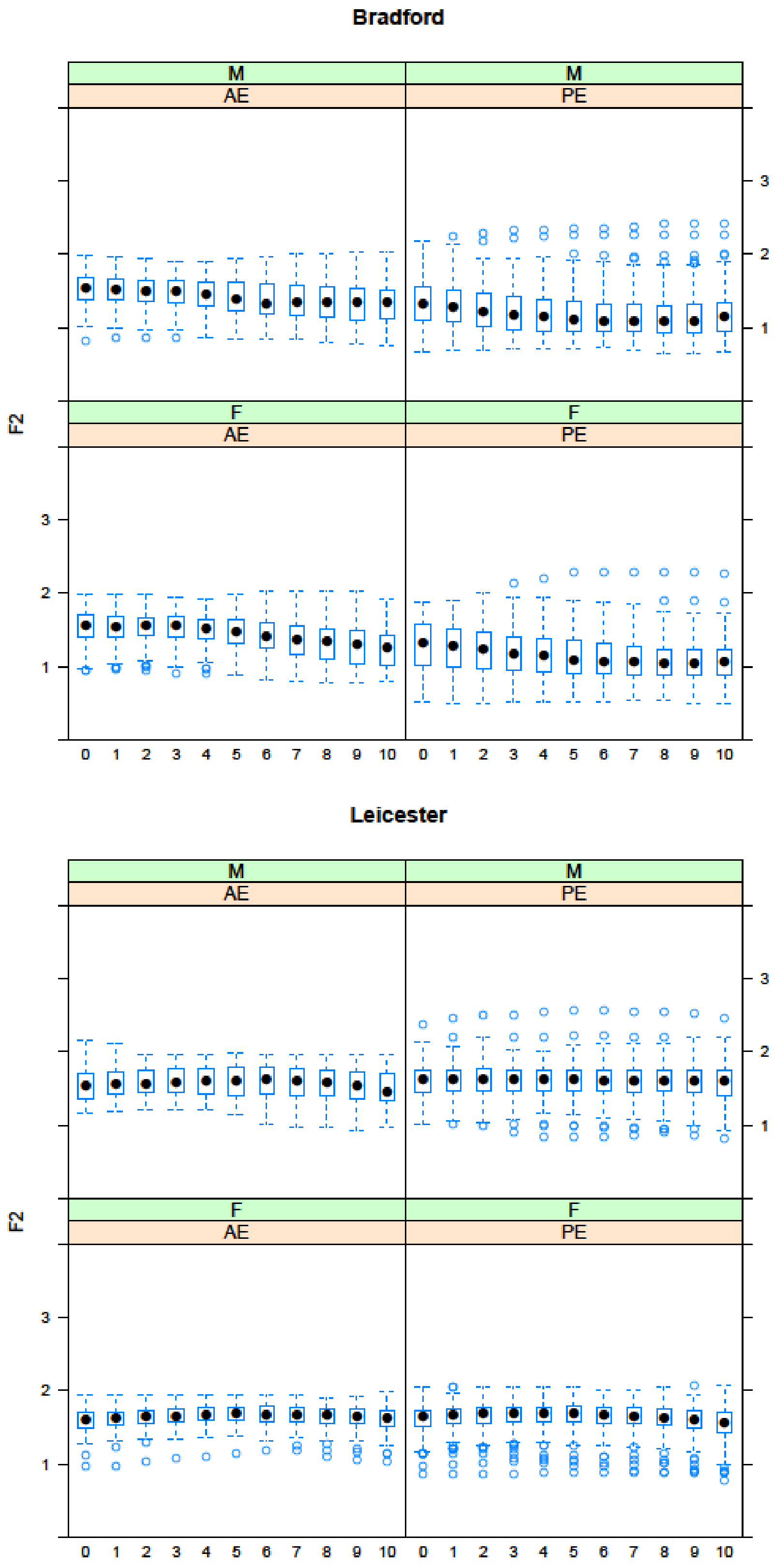


Figure 37: Normalised F2 variation across measurement point for GOOSE by region, language background and gender. The plots illustrate the distribution of values within each point of the trajectory for each group. Bradford appears at the top of the page, Leicester at the bottom. Within each region, males are on the top, females on the bottom. AE speakers appear on the left, PE speakers on the right.

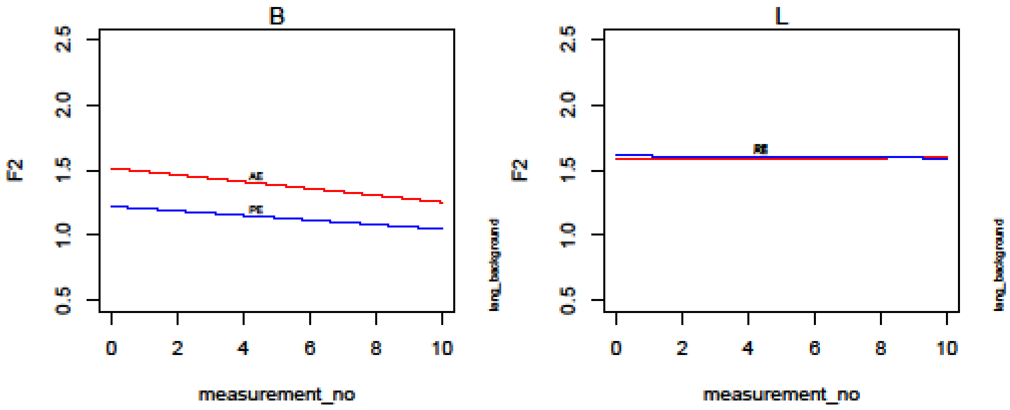


Figure 38: Interaction between language background and measurement number by region. Bradford appears on the left, Leicester on the right. Within each plot, the red regression line corresponds to AE speakers, and the blue regression line to PE speakers. Normalised F2 appears along the y-axis.

Leicester speakers exhibit significantly more fronting than Bradford speakers. As well as the degree of fronting being significantly different between regions, the slope of F2 is different in each location. For the Bradford speakers, F2 varies across the trajectory, with the onset fronting but not the offset. This is not the case in Leicester, where a high F2 is maintained across the trajectory. A significant interaction between Measurement point and Region confirmed these observations. Within Bradford, speakers of PE have a lower F2 as compared to speakers of AE, with PE speakers retaining a retracted GOOSE vowel. This pattern was reflected in a significant three-way interaction between Measurement point, Language background and Region. This interaction is illustrated in Figure 38 which highlights the within region difference between the PE and AE speakers in Bradford.

Parallel to this findings reported above for GOAT, preceding place of articulation was found to be a significant predictor of F2 variation. The model compared the difference between preceding coronal and each other place of articulation[24]. Only preceding labial places of articulation were reported to pattern significantly differently to preceding coronal place of articulation. The regression output for preceding place of articulation is illustrated in Table 14.

Visualisation of the model output revealed that these significant differences corresponded to variation in the shape of the F2 trajectory. Plotting the raw data demonstrated that any effects of preceding place of articulation on the degree of GOOSE-

[24] For GOOSE, tokens occurred in a reduced number of contexts. This accounts for the reduced number of preceding places of articulation in Table 14

fronting need to be considered within each location. In Leicester, few differences are observable across the trajectory based on the preceding place of articulation. Contexts with a preceding velar are those with the most advanced GOOSE-fronting. Amongst the Bradford speakers contexts with preceding coronals show the greatest degree of GOOSE-fronting. The regional variation is exemplified in Figure 39 (Bradford) and Figure 40 (Leicester).

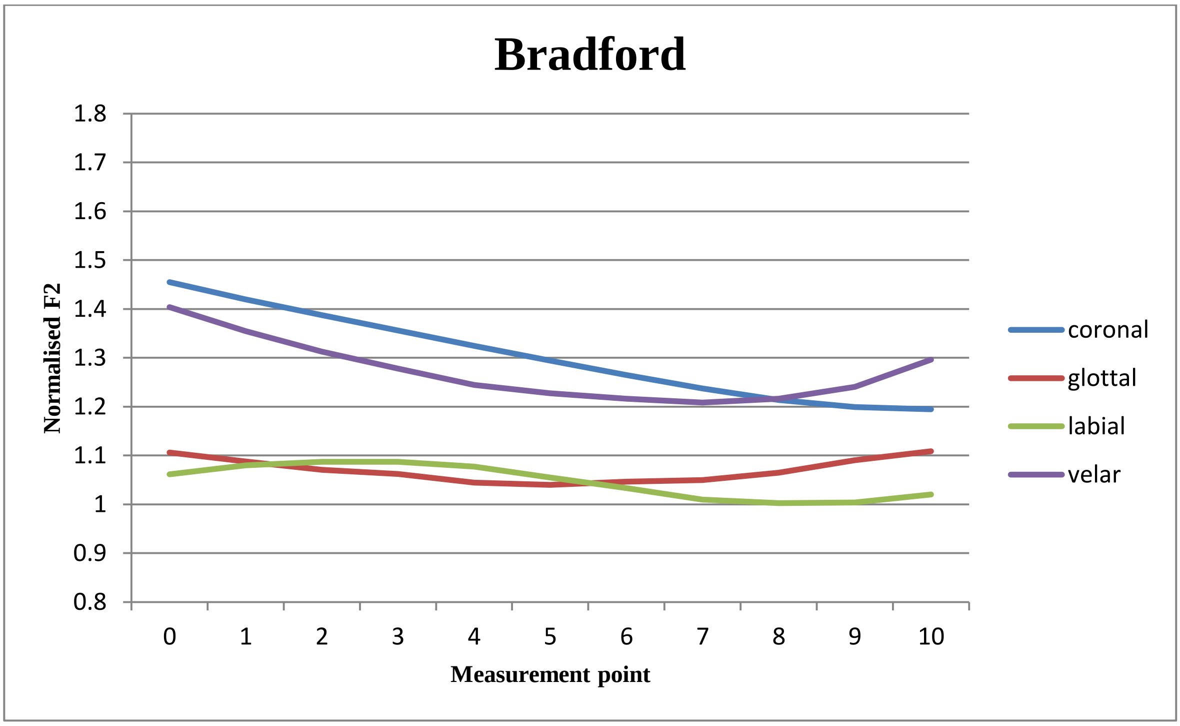


Figure 39: Variation in F2 of GOOSE by preceding place of articulation in Bradford. Measurement point appears along the x-axis, with normalised F2 along the y-axis. Mean trajectories are included for each context.

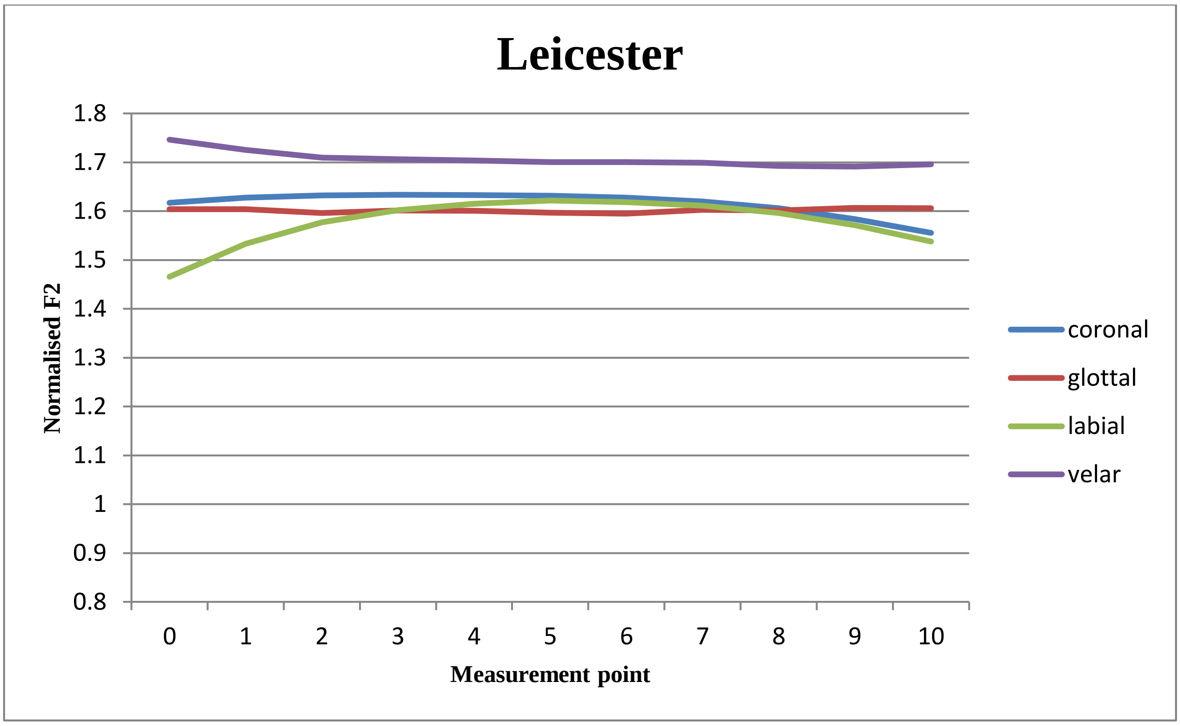


Figure 40: Variation in F2 of GOOSE by preceding place of articulation in Leicester. Measurement point appears along the x-axis, with normalised F2 along the y-axis. Mean trajectories are included for each context.

F2 trajectories in the Paired Conversation were reported to show more variation than those in the Reading Passage. A significant interaction between Measurement point and Task reflects the more steeply falling F2 in the Paired Conversation as compared to the Reading Passage. Consistent with many of the results detailed above, older speakers were found to exhibit more variation across the trajectory than younger speakers. A significant interaction between Measurement point and Age reflects a more sharply falling F2 as age increases. The degree of GOOSE-fronting was not predicted by Gender. This was not significant when included in the mixed effects model, nor did visualisation suggest any variation in F2 which would be predicted by speaker gender.

5.5.3.3 Summary: GOOSE

Overall, Leicester speakers have a close, front monophthong for GOOSE, with Bradford speakers using a retracting diphthong. PE speakers within each location front less. Thus, Leicester AE speakers exhibit an [ʏ]-type variant, whereas the Leicester PE speakers vary between [ʏ] and [ʉ̟]. In Bradford, PE speakers have the diphthong [ʉʊ], whereas AE speakers vary between this and a more fronted diphthong [ʏ̠ʉ ~ ʉʊ].

5.5.4 Summary of results

The characteristic realisations of each vowel for each group are summarised in Table 15 below. The IPA transcriptions presented in Table 15 serve to provide typical characterisations to exemplify the similarities and differences between the groups, although they do transform the continuous data into more abstract, discrete entities.

In Leicester, all speakers retain a diphthong for FACE and GOAT. For the PE speakers in this region a shorter trajectory is observed for both vowels, with the distance travelled across the vowel space being shorter than that observed for the AE speakers. For GOOSE, all speakers in Leicester use a fronted monophthong, with the PE speakers varying between the markedly front variant common amongst the AE speakers and a more centralised variant. In Bradford, all speakers retain a monophthong for both FACE and GOAT. FACE is closer and both FACE and GOAT are more peripheral for the PE speakers. GOOSE is realised as a backing diphthong for all speakers in this region, with this sometimes being more fronted for AE speakers. The following Section discusses the results in relation to the research questions outlined in Chapter 1.

	FACE	GOAT	GOOSE
Leicester AE	[ɛi]	[ɜʉ̞]	[ʏ]
Leicester PE	[ei]	[əʉ̞]	[ʏ ~ ʉ̝]
Bradford AE	[ɛː]	[o̝ː]	[ʏ̠ʉ ~ ʉʊ]
Bradford PE	[eː]	[oː]	[ʉʊ]

Table 15: Characteristic realisations of FACE, GOAT and GOOSE by language background and region groups.

5.6 Discussion

This Section will summarise the characterisations above of FACE, GOAT and GOOSE in Bradford and Leicester AE and PE. It will go on to consider explanations for the similar patterns found in the two PE varieties, and also attempt to account for the consistencies with other contact varieties of English. The relationship of vowel realisations to the voice quality patterns described in Chapter 4 will also be discussed.

5.6.1 The realisation of FACE, GOAT and GOOSE

As demonstrated above, within each region PE and AE speakers exhibit different realisations of each of the vowels considered here. In Bradford, all speakers have a monophthongal realisation for FACE and GOAT, and a diphthongal realisation for GOOSE.

PE speakers show closer and fronted variants for FACE and retracted variants of GOAT and GOOSE compared to the AE speakers. In Leicester, all speakers exhibit a diphthongal realisation of FACE and GOAT, with a monophthong being used for GOOSE. Compared to the AE speakers in this region, PE speakers exhibit a closer and fronter realisation of FACE, and slightly more retracted realisations of GOAT and GOOSE. Further, for the diphthongal FACE and GOAT, Leicester PE speakers show less variation across the trajectory as compared to the Leicester AE speakers. These patterns were consistently reflected above with significant three way interactions between Measurement point, Language background and Region.

In each location, the PE varieties differ qualitatively from the realisations in respective AE varieties in similar ways. FACE is observed to be closer and fronter among PE speakers, with GOAT and GOOSE found to be slightly more retracted. However, this does not mean that the two PE varieties realise these vowels in similar ways. This pattern is evidenced by the use of monophthongs for FACE and GOAT in Bradford PE in contrast to the diphthongs in Leicester PE, and the use of diphthongal GOOSE in Bradford PE compared to the monophthong of Leicester PE. These results demonstrate that despite any similarities, these contact varieties are clearly locally positioned. The patterns described are discussed in more detail below with specific consideration of the influence of Panjabi (5.6.2), the similarities with other contact varieties of English spoken in the UK (5.6.3) and the influence of the AE (5.6.4). Further, the fronting of GOAT and GOOSE is discussed (5.6.5) with reference being made to the fronted lingual posture frequently observed among many speakers (see Chapter 4).

5.6.2 The influence of Panjabi

When assessing any potential influence of Panjabi on PE, an argument can be made in favour of an influence when considering the realisation of FACE. In Bradford PE, a close, front, peripheral monophthong [eː] is observed, and in Leicester PE, a close, front peripheral narrow diphthong [ei] is found. Both of these are consistent with the close, front, peripheral vowel phonemes described in Panjabi and reported above (see Section 5.2.1, 5.3 and Figure 22).

As noted in Section 5.2.1, there is no evidence to suggest that fronting of back vowels is currently taking place in Panjabi or any related variety. Further, characterisations of Indian English suggest close, back monophthongs for both GOAT and GOOSE, reiterating the idea that fronting would not be predicted by the influence of Panjabi (Maxwell &

Fletcher 2009). This may be the reason why realisations of these vowels by PE speakers in this corpus are consistently found to be less fronted than AE speakers within a given region, although it is not that the PE speakers exhibit backed variants: all speakers in Leicester exhibit some fronting for both GOAT and GOOSE. Fronting patterns are considered in more detail below in Section 5.6.5.

The influence of the heritage language may potentially help to account for the variable patterns observed in PE in Bradford and Leicester, but additional work would need to be done exploring the linguistic variation present in Panjabi and related varieties before this claim could be made with any certainty. Further, before a link can be made it is important to consider and acknowledge the consistent patterns observed in contact varieties of English spoken in the UK. These varieties do not have a clear and direct relationship with Panjabi.

5.6.3 The cross-regional similarities

For FACE, closer and fronter realisations have been found for speakers of contact varieties in Tower Hamlets (Fox, et al. 2011), and Hackney in London (Cheshire et al. 2008). In varieties where Anglo speakers traditionally have diphthongs, speakers of the contact variety are reported to have shorter trajectories or monophthongs (Cheshire et al. 2011; Fox, et al. 2011; Sharma 2011). These patterns are identical to those reported above for Bradford and Leicester, although we should note that they are identical relative to their relationship with the AE speakers of a given region: this does not mean that the speakers of the contact variety exhibit exactly the same variants.

For GOAT, lowered and fronted monophthongs are observed among speakers of contact varieties in Glasgow (Alam 2015), with raised and retracted variants being found in Birmingham (Fox et al. 2011), and Hackney (Cheshire et al. 2008). Further, where diphthongs are associated with the AE variety, shorter trajectories or monophthongs are once again reported for speakers of the contact variety (Fox, et al. 2011; Sharma 2011). The PE speakers here pattern with contact variety speakers in Birmingham and Hackney in exhibiting retracted variants of GOAT. Although the raised quality is not observed in the present study, the monophthongal and shorter trajectories found across the UK are consistent with patterns reported here for Bradford and Leicester. The fronting patterns appear to be more regionally variable, and as suggested by Kerswill et al. (2013) may not be a result of the contact itself (see below).

It is curious that despite the differing heritage languages spoken in each instance, and the varying regional AE variety, a consistent pattern is observed across contact varieties. Kerswill et al. (2008) consider the process of *Diphthong Shift reversal* to account for the shorter trajectories found among speakers of MLE in FACE and GOAT. The pattern of *Diphthong Shift* discussed by Wells (1982b) refers to how traditional Cockney FACE [aɪ] and GOAT [aʊ] had shifted from the RP FACE [eɪ] and GOAT [əʊ]. The shorter trajectories found in MLE are said to be a reversal of this pattern. Diphthong Shift reversal could be said to be taking place in Leicester, with the AE variety exhibiting wider diphthongs than those found in PE.[25] Kerswill et al. (2013) comment that for MLE in Hackney, the presence of Diphthong Shift reversal could be triggered by the English spoken by incoming migrants, with an increased frequency of raised and peripheral FACE and GOAT vowels in the input contributing to the advancement of Diphthong Shift reversal.

However, these studies still do not address the question of why there are such consistencies in the Englishes spoken around the world. Although the increased presence of peripheral and monophthongal FACE and GOAT as spoken by incoming migrants in London may trigger diphthong shift reversal, this still does not address why these peripheral, monophthongal vowels are so prolific in the first place. I suggest that there may be a tendency towards monophthongisation and peripheralisation in new dialect formation. Peripheral, monophthongal vowels which occupy the edges of the acoustic (and potentially perceptual) vowel space may be evidence for a type of *simplification* which is regularly observed. Thus, it is not contact with Panjabi specifically which predicts these patterns (although similarities are evident) but more that the process of language contact may trigger some kind of simplification and result in more peripheral vowels with shorter trajectories. This argument then, would account for the patterns observed in PE in both Bradford and Leicester, and also the consistent patterns observed across contact varieties of English spoken in the UK, and perhaps more widely throughout the world. In this instance, the effects of this simplification could also interact with any impact of Panjabi, whereby both the process of simplification and the influence of Panjabi would predict peripheral, monophthongal/shorter FACE and GOAT. This argument does not, however, address the fronting of back vowels which is reported to be taking place in Leicester, although to a lesser degree for the PE speakers as compared to the AE group. Fronting is considered

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[25] It cannot be said that Diphthong Shift reversal is taking place in Bradford. All speakers in this location use monophthongs for both FACE and GOAT.

in more detail below where it is argued not to be occurring as a consequence of contact, but is instead related to the lingual fronting which is considered to be an *off-the-shelf* change.

5.6.4 The influence of AE

The influence of respective AE varieties on the PE spoken in Bradford and Leicester is apparent. Although the arguments put forward above aim to account for the similar relationships PE exhibits to AE in each location, each PE variety is clearly a local one. In Bradford, despite any qualitative variation, all speakers retain monophthongs for FACE and GOAT, and a diphthong for GOOSE. In Leicester, speakers of both PE and AE all retain diphthongs for FACE and GOAT and a monophthong for GOOSE. It seems to be that the AE is playing a role and contributing to the development of PE in each location resulting in regionally situated contact varieties in each case.

Additionally, in order to account for the fronting of GOAT and GOOSE, consideration must be made of the interaction between Panjabi and the regional AE variety. The heritage language, Panjabi, and the above proposed process of simplification might predict the retraction of both GOAT and GOOSE, whereas any fronting that takes place in the current context seems to be regionally constrained. In Bradford, only AE females show any fronting of GOAT, with the PE speakers and the AE males all retaining retracted monophthongs. For GOOSE in Bradford, evidence of fronting is observed among the AE speakers, who variably exhibit the more fronted diphthong with a closing offglide [ʏ̠ʉ]. PE speakers, however, retain a more retracted diphthong [ʉʊ]. In Leicester, all speakers (AE and PE) exhibit a central diphthong for GOAT, and a central or front monophthong for GOOSE.

Considering a potential feature pool (Mufwene 2001), the input for PE speakers from the AE in Bradford is retracted GOAT and central GOOSE variants, and the potential input from Panjabi may be the retracted /o/ and /u/. In Leicester, the input from the AE is central GOAT and fronted GOOSE variants, with the possible Panjabi input perhaps the same retracted variants. Thus, an interaction between the AE variety and Panjabi is evident. Where marked fronting takes place, the PE speakers pattern with the AE speakers, as in Leicester. This is perhaps a reflection of the degree of difference between Panjabi and AE variants. This was suggested as a possible reason for the extreme fronting observed in MLE: Cheshire et al. (2011) noted that the contrast between retracted variants at home with fronted local norms may be salient to children.

However, in Bradford, where less marked fronting is exhibited by all speakers, PE speakers use more retracted variants.

An interaction between AE and PE varieties in each location is argued here to be apparent. This interaction and relationship between the AE and PE is consistent with patterns observed throughout the thesis and reported for many contact varieties of English spoken in the UK.

5.6.5 Fronting of GOAT and GOOSE

All groups pattern in line with Labov's postulate that GOAT-fronting follows GOOSE-fronting: GOOSE is consistently fronter than GOAT. In Bradford this is particularly interesting, as Watt and Tillotson (2001) reported monophthongal GOAT-fronting without advanced GOOSE-fronting amongst the AE speakers they recorded. The results here suggest the opposite pattern: there is some GOOSE-fronting but hardly any GOAT-fronting. Although some AE females in Bradford are found to front the GOAT vowel, this is not consistent across the AE speakers. Given the small population size sampled for the AE speakers here, further work to explore this phenomenon is needed. Further, Watt and Tillotson (2001) measured only midpoints, while the results here suggest that the fronting in Bradford GOOSE is restricted to the onset of the vowel. Thus, by measuring variation across the trajectory, variation which might otherwise have been missed has been observed.

In contrast to Cheshire et al. (2008) and Hall-Lew (2011), the results from Leicester and Bradford indicate that AE speakers exhibit more advanced fronting for both GOAT and GOOSE than do the speakers of the contact variety, PE, although there is little difference between AE and PE speakers in Leicester. Kerswill et al. (2013) comment that advanced GOOSE-fronting in MLE is a reflection of speakers' participation in global sound changes affecting the English-speaking world. In contrast to the patterns they describe for FACE and GOAT, they argue that fronting does not correspond to frequency of input based on the English of incoming migrants. I would suggest that although in the current context the frequency of input from incoming migrants does not contribute to the presence or absence of fronting *per se*, the language background of a speaker may help to explain why he or she is not as advanced in the change within a given region.

In this instance, the influence of Panjabi and the potential process of simplification are resulting in more retracted variants for the PE speakers than those observed among the

AE speakers in each location. Although overall, the degree to which fronting occurs is better predicted by region than by language background, within a region a speaker's language background can help understand why they might not GOAT- and GOOSE-front to the same degree as other speakers, this being consistently confirmed by the significant three way interaction between Measurement point, Language background and Region.

Both the work presented here and previous research into contact varieties of English have suggested that it is not the process of contact itself which triggers back vowel fronting, but rather a reflection that speakers' are participating in more widespread linguistic changes (Kerswill et al. 2013). Some have argued that GOOSE-fronting is an *off-the-shelf* change (e.g. Haddican et al. 2013; Fridland 2008), whereby fronting can occur throughout different groups of speakers because of the absence of social constraints associated with the change. However, others have reported on patterns which suggest that GOOSE-fronting is socially indexed in certain locations, and therefore this pattern could not be *off-the-shelf* in terms of Milroy's (2007) definition (e.g. Fought 1999). Moreover, some have argued that there are different types of GOOSE-fronting which can develop independently (e.g. Koops 2010). In York, Haddican et al. (2013) argue that GOOSE-fronting is an *off-the-shelf* change, but that GOAT-fronting is socially conditioned. The interaction between monophthongal GOAT-fronting and diphthongisation in York was said to reflect attitudes towards variation, with fronted GOAT monophthongs being perceived as 'chavvy' (2013: 394).

It is pertinent at this point to explore interactions with the voice quality patterns described in Chapter 4. A consistent setting characterising many speakers across the corpus was lingual fronting, with this being most advanced in Leicester. Most Leicester speakers (AE and PE), and most Bradford PE speakers exhibited some degree of lingual fronting. Bradford AE speakers and several PE males spread across the two locations were found to exhibit a neutral or retracted lingual posture. I suggested in Chapter 4 that lingual fronting was an *off -the-shelf* vocal setting, whereby lingual fronting could be adopted by speakers without any social baggage in its abstract form, with social factors becoming associated with the form once it began to be used in a community. Lingual fronting may more succinctly account for the segmental fronting patterns observed here, particularly in Leicester.

In Leicester, both lingual fronting and back vowel fronting are most advanced among the AE speakers, with the PE speakers also demonstrating fronting of both the setting and the segments but to a lesser degree. Thus, perhaps lingual fronting has been adopted, with the vowels GOAT and GOOSE fronting as a consequence of this lingual advancement. This argument is consistent with the assertions of Trudgill (1974), who suggested that a consideration of settings can help to account for segmental variation more comprehensively. The long term setting of lingual fronting may also account for why GOOSE-fronting is most advanced in velar contexts among Leicester speakers (see Figure 40). For these speakers, velar consonants are realised with a fronted lingual posture which results in potentially palatalised variants (e.g. /k/ as [c]). An underlying assumption to this argument is that the raised F2 observed in the back vowels corresponds to lingual fronting and not unrounding of the lips. An investigation of the lip postures associated with these vowels in these locations would be of great interest, but work by Harrington et al. (2011b) suggests that, for SSBE at least, it is lingual fronting and not lip unrounding to which the higher F2 corresponds.

Although some of the fronting associated with GOAT and GOOSE could be explained in this way, speakers can exhibit a fronted lingual posture but retracted segmental variants of GOAT and GOOSE. This is most clear for the Bradford PE females, all of whom exhibit at least slight lingual fronting but retain retracted realisations for both GOAT and GOOSE. Although further work aims to assess the reliability of comparing normalised vowel data with voice quality patterns, preliminary comparisons with Hz data suggest that the results hold. Thus, maybe the *off-the- shelf* lingual fronting can predict segmental fronting, as is observed in Leicester. The interaction with pre-existing, localised patterns can lead to segmental deviation from predicted setting patterns, as is observed with the Bradford PE females. In this location the process of *simplification* defined above, along with the influence of Panjabi are potentially having a stronger impact on GOAT and GOOSE realisations than lingual fronting.

It is suggested here, then, that GOOSE- and GOAT-fronting in Leicester are a reflection of the *off-the-shelf* lingual fronting which is taking place, with these two vowels fronting *in response* to this. I would argue that it may not be the vowel changes themselves which are *off-the-shelf*. This can also be related to Labov's (1994) claim that GOAT-fronting follows GOOSE-fronting. If the vocal setting of lingual fronting is the *off-the-shelf* change, then it makes sense that GOOSE would front first, then, as the lingual fronting advances, GOAT will front too. Thus, in contexts where this is not the case (e.g.

Bradford PE females exhibit lingual fronting but retain retracted GOAT and GOOSE), it might suggest that the influence of Panjabi and the *simplification* process defined above may be having a stronger effect on vowel realisations. I would also agree with Koops (2010) that there are different types of fronting. Just because a similar pattern is observed across multiple locations, this does not mean that the two processes are exactly the same. In Bradford, the onset to GOOSE fronts, whereas in Leicester, the whole of GOOSE fronts. It cannot be assumed *a priori* that these are the same processes. Future work exploring linguistic triggers behind these global changes would be of substantial interest.

5.7 Conclusion

This Chapter has illustrated the consistent patterns observed in FACE and GOAT variation in Bradford PE, Leicester PE and more widely in contact varieties of English spoken in the UK. It is suggested here that these patterns are a reflection of a *simplification* process which takes place when different languages come into contact with English. Considering the fronting of GOAT and GOOSE, patterns are better understood through consideration of voice quality patterns. The fronted lingual posture characteristic of many speakers in the corpus can be argued to be an *off-the-shelf* feature, with the fronting of back vowels then occurring in response to this. Localised patterns account for deviation from the expected fronting.

It is hoped that a reanalysis of the data will be undertaken in the future to more comprehensively account for the dynamic variation reported. This would follow an approach similar to that of Fox and Jacewicz (2009) and recent work by Farrington et al. (2015). The analysis undertaken by the authors in these two studies considers F1 and F2 together using the measurements *vector length* and *trajectory length* to consider both the overall length of the trajectory and the degree of movement through the vowel space.

6 /r/

6.1 Introduction

This Chapter reports results from auditory and acoustic analyses of /r/ in Bradford and Leicester. Three contexts are considered: word-initial in non-cluster (singleton) contexts (e.g. *read, remember*); word-medially in trochaic words (e.g. *berry*); and word-medially in iambic words (e.g. *bereave*).

It is widely acknowledged that /r/ is variable, both in its phonetic realisation and phonological distribution (e.g. Ladefoged & Maddieson 2007). No single acoustic correlate or articulatory configuration characterises the phonological set of sounds labelled as /r/ (e.g. Lindau 1985). This Chapter prioritises a set of key contexts with a view to capturing variation of a kind related to the interaction between language background and region in Bradford and Leicester Panjabi English (PE). Considering only intervocalic and word-initial singleton contexts facilitates the examination of both individual and group patterns and allows for the assessment of what could be considered 'typical' /r/ realisations for different speakers.

Both Bradford and Leicester Anglo English (AE) are non-rhotic varieties. There is no evidence to suggest that AE speakers in either of these locations realise non-prevocalic coda /r/ (see Section 6.2.1). Further, although realisation of non-prevocalic coda /r/ is frequently reported as a characteristic of contact varieties of English, it is rarely found to a substantial degree amongst second-generation speakers (see Section 6.2.2 below). Additionally, preliminary listening to the interviews suggested that there were hardly any occurrences of non-prevocalic coda /r/ for any PE speakers. Consequently, the analysis and results presented in this Chapter will not explore non-prevocalic coda /r/ contexts.

The Chapter will begin with a review of relevant literature in Section 6.2, considering reported variation in /r/ in Bradford and Leicester Anglo English (AE), contact varieties of English spoken across the UK and around the world, and also a description of rhotics in Panjabi. This is followed in Section 6.4 by a discussion of the methods employed to assess the variation in /r/ and the statistical modelling used to explore the results. Section 6.5 will present the results, with a discussion of these in Section 6.6 which considers how they have addressed the research questions put forward in Chapter 1.

6.2 Background

The following background Section describes research which has explored realisations of /r/ in AE varieties (Section 6.2.1) as well as reporting on work which has considered /r/ in contact varieties of English (Section 6.2.2). In addition, Section 6.2.3 will describe rhotic patterns reported for Panjabi as well as making note of several other relevant consonantal patterns.

6.2.1 /r/ in Anglo English

The canonical form of /r/ in British English is the post-alveolar approximant [ɹ], though the actual realisation of /r/ is highly variable, with a great deal of complexity observed (see e.g. Watt et al. (2012) on border communities in the UK). In English, the use of the term *rhotic* refers specifically to speakers who realise coda /r/ in pre-pausal and pre-consonantal contexts, and is contrasted with *non-rhotic* speakers who only realise /r/ in prevocalic, syllable-onset or sandhi contexts (e.g. Hughes et al. 2012).

Bradford AE is a non-rhotic variety with post-alveolar taps [ɾ] as well as the approximant [ɹ] attested as variants of /r/ within the region (Broadbent 1991; Hughes, A. et al. 2012; Wells 1982b). Hughes, A. et al. (2012) note that some Bradford AE speakers retain a schwa offglide despite being non-rhotic, meaning that words such as *pore* and *paw* are distinguished. This is an example of pre-R breaking, and is defined by Wells (1982a) as the 'epenthesis of a schwa between any of the vowels /iː eː oː uː/ and a following /r/' (1982a: 214). Wells (1982a) discusses a number processes which have taken place in varieties of English and affected the vowels /iː eː oː uː/ in pre-/r/ contexts since the Early Modern period. This pre-R breaking occurs before subsequent monophthonging. Thus, in many varieties of English the [ɔə] in *pore* has now changed to [ɔː], the equivalent to that in *paw*. This monophthongisation has not yet taken place in Bradford for this vowel, with the distinction between *pore* and *paw* being retained.

Hughes, A. et al. (2012) report that Leicester AE is non-rhotic, with [ʋ] occurring occasionally. Labiodental [ʋ] is gaining currency across many regions of the UK. Foulkes and Docherty (2000) trace the history of this variant back as far as 1844, and comment on its modern-day presence in both Derby and Newcastle. They note that the presence of this variant in Derby and Newcastle suggests that levelling from the South East may have taken place. Taps occur as intervocalic variants of /t/ in Leicester AE (e.g. *at about*), but not as variants of /r/.

6.2.2 /r/ in contact varieties of English

Focussing on contact varieties of English in the UK, Heselwood and McChrystal (2000) report the occasional realisation of non-prevocalic coda /r/ amongst bilingual Panjabi-English children in Bradford. Following a close auditory analysis of word list data for 19 children, they observed that non-prevocalic coda /r/ occurred only three times out of a possible 38. They suggest that the realisation of non-prevocalic coda /r/ is a feature of Panjabi and not a feature associated with the monolingual English of the region. They do not further comment on the quality of /r/ and whether this differed between the bilingual Panjabi-English and monolingual English children.

In Leicester, Rathore-Nigsch (2015, 2011) observed a shift between first- and second-generation speakers in terms of whether they realised non-prevocalic coda /r/ and, if they did so, the phonetic realisation they used. Eleven first-generation and fourteen second-generation speakers were recorded, all aged between 17 and 80 years old. The speakers were balanced for gender and most had Gujarati as an L1. All of the first-generation speakers had come to the UK from India via East Africa. Rathore-Nigsch commented that first-generation speaker patterns were consistent with Indian English; speakers variably realised non-prevocalic coda /r/, with taps and trills being common. In contrast, the speech of the second-generation speakers was similar to that of the English of the East Midlands. They did not realise non-prevocalic coda /r/ often, but post-alveolar approximants were the most common form when they did. She also notes that both the first- and second-generation speakers use approximants in linking /r/ contexts.

Hirson and Sohail (2007) also considered the presence of non-prevocalic coda /r/ realisations and found it patterned with identity. They report results from an auditory and acoustic analysis of 24 bilingual (Panjabi and English) second-generation speakers from London who took part in a picture-naming task. The authors found that speakers who identified themselves as ‘Asian’ were more likely to realise non-prevocalic coda /r/ than those who identified themselves as ‘British-Asian’. Further, the phonetic realisations of /r/ among the Asian group were much more variable, with retroflex and labiodental places of articulation being common, as well as taps and trills. A single token of the labiodental approximant [ʋ] was observed, the speaker who exhibited this form being from the British Asian group. Among a set of monolingual Panjabi controls included in the dataset, post-alveolar trills and flaps were found to be the most common form of /r/.

Hirson and Sohail note that F3 was significantly higher in the Asian than in the British-Asian group, this seeming to contradict the idea that Asian speakers were more rhotic. However, this could be related to the increased variability in /r/ variants for the Asian speakers, with a lower F3 corresponding mainly to a retracted tongue tip in approximant articulations, or reflect the fact that for these speakers rhotic articulations are uvularised or pharyngealised, a high F3 having been reported as characteristic of these articulations (e.g. Lawson et al. 2016).[26] The authors suggest that speakers' identifications as either 'Asian' or 'British Asian' predict the degree of transfer between Panjabi and English, with those identifying as Asian being more likely to employ Panjabi features in English. They comment that there may be a slight interviewer effect. The experimenter in this instance wore a headscarf, but they do not discuss what effect they believe this may have had.

With regard to the London Bengali community, McCarthy et al. (2011) suggest that second-generation Sylheti speakers were more likely to use native English-like variants of /r/ than first-generation immigrants, for whom Sylheti-like variants were more common. They used a picture identification task to elicit word-initial and word-medial tokens of /r/ within the carrier phrase *say ___ again* from forty subjects aged between 18 and 65 from six language background groups (Standard Bengali speakers; Sylheti controls; late first-generation Sylheti speakers; early first-generation Sylheti speakers; second-generation Sylheti speakers; monolingual SSBE controls). They noted place of articulation on a five-point alveolar-to-retroflex scale, and manner on a five-point tap-to-approximant scale, with trills being noted separately. Tokens that did not fit into these characterisations were discounted. They do not specify how many tokens of this type there were. They suggest that the difference between groups could be to do with the late acquisition of English by some of the first-generation speakers, which has affected their L2 categories. They note that their research provides further evidence that the English of children in immigrant communities is likely to be different from that of their monolingual peers.

An unpublished dissertation by Zara (2010) looked at the speech of second-generation British Asians in Blackburn. Zara observed that retracted variants of /r/, including the retroflex [ɻ], were present in the speech of all ten British Asian adolescents, particularly young males. Although always observed, there was substantial inter-speaker variation,

[26] It would also be interesting to know whether the Asian speakers exhibit a lower F3 overall as compared to the British Asian group, with the F3 difference they mention potentially not restricted to /r/.

with some speakers retracting only 20% of their variants, whilst others exhibited 100% retroflexion. Retracted variants were not found amongst the seven British White ('Anglo') adolescents, who only used the post-alveolar approximant [ɹ]. Further, she notes that the post-alveolar variant is different for each group, the complexity not being reflected in the results she discusses.

Zara comments that retroflexion is also used by listeners who were asked to determine the ethnicity of speakers in an accent judgement task, a result which concurs with the findings of Heselwood and McChrystal (2000). They too commented that retroflexion of /t d/ and /n/ was a salient and present characteristic of the Panjabi-English bilingual children included in their study, being present 21% of the time for girls and 39% for boys. In Heselwood and McChrystal's accent judgement task, 60% of respondents mentioned that this retroflexion was a salient feature of Asian English.

To summarise, it seems that Asian English speakers may be more likely to realise non-prevocalic coda /r/ but do not do so frequently or consistently. Further, Asian Englishes spoken in the UK may contain variants of /r/ that can be related back to an Indic heritage language, with retroflexion, taps and trills being reported in different locations.

No published work appears to exist that details the variation associated with /r/ in Multicultural London English (e.g. Cheshire et al. 2013), Multicultural Manchester English (Drummond 2013a), Glaswasian (e.g. Stuart-Smith et al. 2011), Indian English in Southall (e.g. Sharma 2011), or the contact Englishes spoken in Birmingham or Tower Hamlets (Fox et al. 2011). Kirkham (In press) reports on liquid polarity[27] patterns amongst four Asian and four Anglo adolescents in Sheffield (balanced for gender). Although the paper does not focus on the realisation of /r/ specifically, Kirkham notes the presence of labiodental approximants for both Anglo (28/96 tokens; 29%) and Asian (15/96 tokens; 16%) speakers, with the feature most commonly occurring in word-initial position. Additionally, Kirkham notes that some tokens spoken by the Asian females have devoiced or fricated onsets, with retroflexion also being audible.

In Indian English, Wells (1982c) notes that post-alveolar [ɹ], fricative [ɹ̝] and also taps or trills [ɾ~r] are all possible variants of /r/. Gargesh (2008) reports that trilled [r] is the

[27] Liquid polarity refers to the relationship between /l/ and /r/. In varieties which have dark /l/, /r/ is expected to be clearer, whereas in varieties which have clear /l/, /r/ is expected to be darker (e.g. Carter & Local 2007; Kelly & Local 1989).

most common realisation of /r/ in Indian English. Both Gargesh and Wells state that non-prevocalic coda /r/ is always realised. In Pakistan, reports on non-prevocalic coda /r/ realisation are mixed. Mahboob and Ahmar (2008) report that the realisation of non-prevocalic coda /r/ varies by individual. Hickey (2004b) suggests that Pakistani English is similar to that of Indian English, in that non-prevocalic coda /r/ is always realised. Neither Mahboob and Ahmar nor Hickey comment on the specific realisations of /r/ in Pakistani English.

6.2.3 Rhotics in Panjabi

As noted throughout this thesis (see Section 2.3.2), the participants interviewed for the present study do not share the same variety of Panjabi. Thus, as well as discussing the /r/ variants present in Modern Standard Panjabi, literature which suggests variation across different varieties of Panjabi will also be considered.

Research suggests two contrasting rhotic phonemes in Panjabi: a retroflex [ɽ] and dental [ɾ̪] flap (Shackle 2003; Bhatia 1993; Tolstaya 1981; Bailey 1914). Shackle (2003) also comments on the contrastive aspirated variants [ɽ^{h}] and [ɾ̪^{h}] in Siraiki, a variety that he comments is the most different from Modern Standard Panjabi. A labial semivowel often transcribed as *v* is also included in the phonemic inventories reported. In Shackle's illustration this phoneme occurs alongside a velar semivowel *y*. These are not rhotic variants. The consonant inventory defined by Shackle is included here in Figure 41. The rhotic variants and additional semivowels of Modern Standard Panjabi are included but the additional aspirated rhotic variants noted for Siraiki are not illustrated in this figure.

	Glottal	Velar	Palatal	Retroflex	Dental	Labial
stops:						
vcls.		*k*	*c*	*ṭ*	*t*	*p*
vcls./asp.		*kh*	*ch*	*ṭh*	*th*	*ph*
vcd.		*g*	*j*	*ḍ*	*d*	*b*
nasals				*ṇ*	*n*	*m*
flaps				*ṛ*	*r*	
laterals				*ḷ*	*l*	
vcls.fric.		(*χ*)	*š*		*s*	(*f*)
vcd.fric.	*h*	(*γ*)			(*z*)	
semivwls		*y*				*v*

Figure 41: Panjabi consonant phonemes. Taken from Shackle (2003: 589)

Tolstaya (1981) does not report the existence of a labial semivowel, but a labial fricative is noted, *v* again being used to transcribe this phoneme. Zograph (1982) does not suggest any additional variants in his descriptions of a number of different varieties spoken in the Panjab that are relevant to this thesis. Shackle (2003) and Bhatia (1993) state that retroflex flaps do not occur initially and that the labial semivowel *v* does not occur finally. Bhardwaj provides comparisons with English to facilitate the acquisition of these sounds for learners of Modern Standard Panjabi:

> '**r** is lightly trilled as in the Scottish **r**. But you can pronounce it like **r** in London English. But do not pronounce it in the American style. Moreover, it should not be omitted in any position. […] **v** can be pronounced like the English **v** or **w**. Both are equally acceptable. […] [**ṛ**] is a ***flap*** sound like **ṇ**. So it does not occur word-initially in Panjabi.' (Bhardwaj 2012: 11)

Thus, it seems that despite some dialectal variation, rhotics in Panjabi are fairly consistent; all varieties realise non-prevocalic coda /r/ and have contrastive retroflex and dental articulations. Rhotic articulations are consistently made with the tongue tip, with either apical or sub-laminal contact being required. In addition to these rhotic variants, labial and velar semivowels are reported.

6.3 Predictions

Based on the literature described above, a number of predictions can be made about what /r/ realisations might be expected in each region, and within each language background group.

There is evidence to suggest that in addition to the post-alveolar approximant, a post-alveolar tap is present in Bradford AE. Thus, we might expect this to be reflected in the data here. Further, given the presence of taps as rhotic variants in Panjabi we might also expect to see this form in the speech of the PE speakers as well. Additionally, given the increasing presence of labiodental [ʋ] among urban varieties of British English we might expect to find some evidence of this in Bradford.

In Leicester, both labiodental and post-alveolar approximants are attested within the region for AE speakers and as such we might expect to observe both of these variants here. For the PE speakers, it may be that they too adopt this variant, with the potential for other rhotic variants from Panjabi possibly being reflected (e.g. taps). Although not a rhotic variant in Panjabi, the labial semivowel may lead to interesting interactions between Panjabi and AE given the presence of labiodental [ʋ] as a rhotic variant in Leicester AE.

Much of the work on contact varieties of English has reported on variability associated with /r/, as realised by the contact variety speakers. Further, Trudgill's stage II of new dialect formation posits that there will be increased variability amongst second-generation speakers. Given this, we might expect to find more variation present among the PE speakers in this corpus. The voice quality results described in Chapter 4 found no evidence of retroflexion as a long term setting amongst the PE speakers included here. As such, we might not expect to find segmental retroflexion among the speakers included in this analysis.

6.4 Methods

A combined auditory and acoustic analysis of word-initial (singleton) /r/, and word-medial /r/ was carried out using the Paired Conversation and Reading Passage data. Identification and characterisation of the post-alveolar[28] approximant [ɹ] is well documented, with numerous authors reporting on expected formant trajectories and protocols for identifying boundaries (e.g. Machač & Skarnitzl 2009; Stevens 2000). As well as the post-alveolar approximant there are numerous potential variants associated with /r/, some of these expected, others more innovative and individual. A detailed layering approach to coding was adopted here as a means to identify and characterise overall group patterns but also to examine more nuanced variation in realisation. Thus, a number of categories were defined, for both place and manner of articulation, with secondary information on height and voicing also noted. Acoustic qualities of all categories identified in the current data are discussed, with accompanying spectrograms to illustrate their acoustic output. Where possible, auditory characteristics are also described.

6.4.1 Places of articulation

There are a number of acoustic cues which correspond to the production of the post-alveolar approximant [ɹ]. A dip in F3 with spectral peaks between 1300Hz to 2000Hz is said to reflect the creation of the additional front cavity resonance, with formant structure being maintained throughout the articulation (Harrington 2013; Machač & Skarnitzl 2009; Espy-Wilson et al. 2000; Stevens 2000) . Some authors suggest that the

[28] No distinction is made here between alveolar and post-alveolar articulations; these will be referred to solely as *post-alveolar*.

dipped F3 is actually an extra resonance created as a result of any additional cavity being created in the vocal tract (e.g. Heselwood & Plug 2011; Stevens 2000). Indeed, Lindau (1985) remarks that a lowered third formant could correspond to either lip rounding or a constriction in the lower pharyngeal region, as well as a post-alveolar constriction, this F3 lowering being indicative of a particular type of constriction rather than a specific place of constriction.

As a consequence of the research described, a lowered F3 with spectral peaks between 1300Hz to 2000Hz was considered in this analysis to be suggestive of the post-alveolar approximant [ɹ], with the additional auditory analysis used to complement and corroborate the acoustic inspections. Figure 42 illustrates a word-medial (trochaic) post-alveolar approximant produced by a Leicester AE speaker (Charles). Approximant boundaries are marked at the midpoint of the transitions, as is consistent with Machač and Skarnitzl (2009). The marking of boundaries facilitated the identification of segment duration.

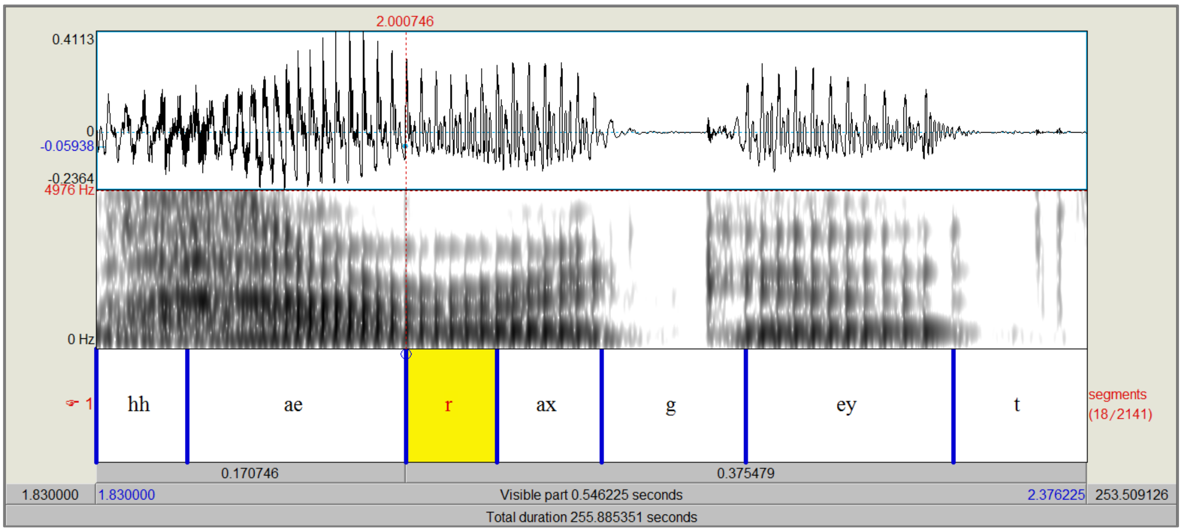


Figure 42: Word-medial (trochaic) post-alveolar approximant in Harrogate. Token spoken by Charles, a 45 year-old Leicester AE male (task - Reading Passage).

Two additional categories were included to reflect variations in lingual posture often associated with /r/ realisations: retroflex and palatal. For retroflex approximants, acoustic correlates are similar to but more extreme than those described for a post-alveolar approximant, with F3 lowered further and close to F2. This corresponds to the sub-laminal retraction of the tongue tip behind the post-alveolar ridge. The palatal approximant [j] was intermittently observed, with acoustic correlates including a lowered F1 and raised F2, corresponding to a fronted tongue but with no apical retraction (Machač & Skarnitzl 2009).

As well as single lingual articulations, two further place categories were included to take into account gestures with multiple places of articulation: labiodental and labial-palatal. In a description of the labiodental approximant [ʋ] in Isoko, a language of southern Nigeria, Ladefoged and Maddieson (2007) comment on less formant movement and very little attenuation of amplitude compared with [ɣʷ]. The lowering of all formant frequencies has also been noted, both for segmental labiodentalisation (Foulkes & Docherty 2000) and also as a long-term setting (Laver 1980). Although the term labiodental is adopted here and reference is made specifically to [ʋ], it can be unclear without visual information whether segments are bilabial or labiodental (Ladefoged & Maddieson 2007). Figure 43 reflects a labiodental realisation of word-medial (trochaic) touristy by a Leicester AE female (Jo).

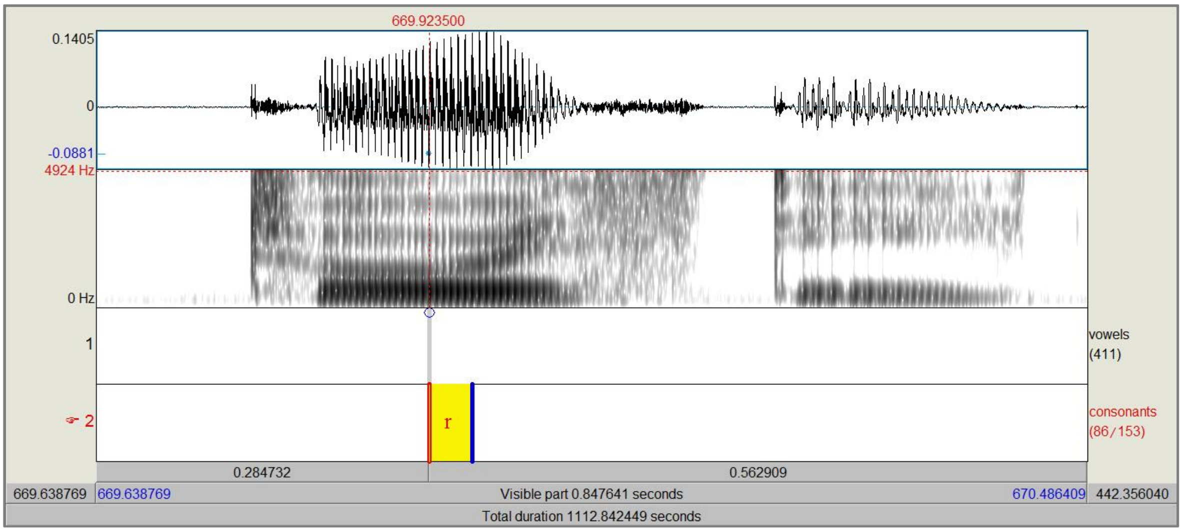


Figure 43: Word-medial (trochaic) labiodental approximant in touristy. Token spoken by Jo, a 39 year-old Leicester AE female (task - Paired Conversation).

Labial-palatal is used here to refer to an articulatory gesture with both a labial and a lingual articulation. The lingual articulation involves the raising and possible retraction of the tongue body. The degree of lingual retraction in the data collected for the present study varied, with some speakers exhibiting [w]-like variants on occasion, but most exhibiting a more [ɥ]-like articulation. In spite of this, labial-velar and labial-palatal differences were collapsed into a single labial-palatal category, this being the more common of the two categories. Future work into the degree of difference between these two sub-categories to assess whether the variation is socially or linguistically meaningful would be worthwhile. For [w], a constriction at both the lips and the back of the oral cavity results in the lowering of both F1 and F2 and a decrease in acoustic energy above these frequencies (Stevens 2000). For a labial-palatal articulation, the lingual articulation is fronter in the oral cavity, and thus no drop in F2 is observed, but a lowered F1 is consistent across both labial-lingual gestures described here.

6.4.2 Manners of articulation

Although all of the above examples reflect variation in place of articulation for approximants, realisations also varied in their manners of articulation. Stopping was noted on several occasions; an example of which is included in Figure 44. Boundaries were marked at the onset of the closure and then the release, with the full duration including the release being noted separately. Where multiple releases were observed, as in Figure 44, boundaries were marked at the first release pulse. These are traditionally distinguished from taps primarily by duration, taps being characterised as quicker realisations of full stops (Esling 2013; Laver 1994). Laver comments that all three phases - onset, closure and release - are quicker. Esling notes that:

> Tapped [ɾ] implies a quicker oral articulation than stopped [d], and the flap [ɽ] is a faster dynamic action than stopped [ɖ]. (2013: 692)

However, all stops recorded in the current corpus were labial, which differs from [ɾ] in both place and manner of articulation. Although Ladefoged and Maddieson (2007) and others distinguish between taps and flaps, no distinction was made here between these two manners of articulation; apical versus sub-laminal contact was defined by the place of articulation. Thus, a retroflex tap assumes that contact is made as the active articulator strikes the alveolar ridge or front of the hard palate with sub-laminal contact. A post-alveolar tap refers to an articulation with apical contact made at the alveolar ridge as the tongue tip moves directly towards the roof of the mouth. Tap boundaries were identified acoustically by identifying the break in formant structure and attenuation in acoustic energy (Machač & Skarnitzl 2009). An example is included in Figure 45. Often, speakers did not exhibit full closure of a tap, but auditory information gave the strong impression of a tapped articulation. These cases were coded as taps but were additionally marked as lowered. The process of lowering is discussed in more detail in later paragraphs.

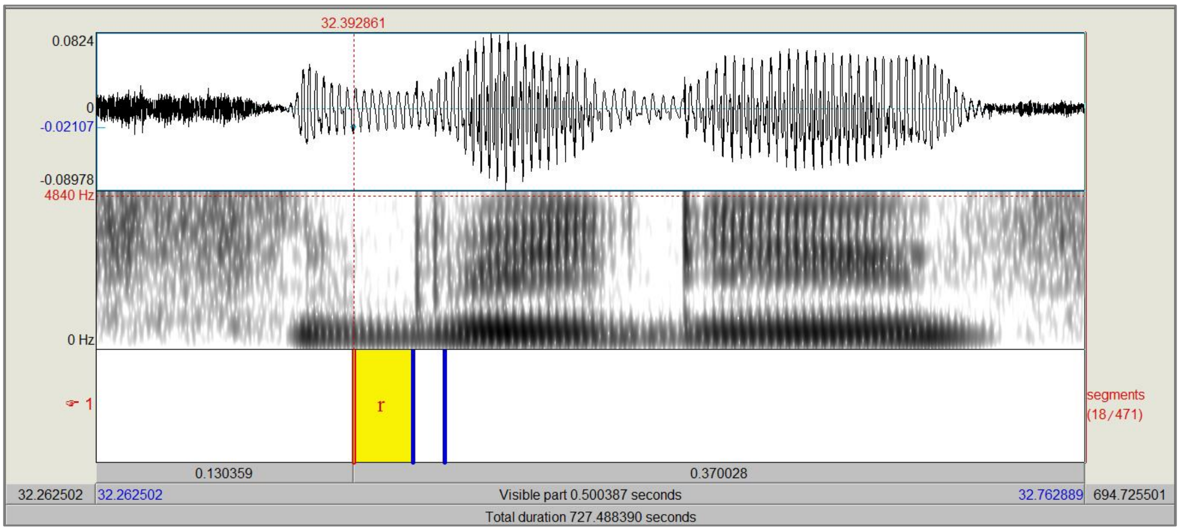


Figure 44: Word-initial stop in really easy. Token spoken by Bir, a 23 year-old Leicester PE female (task - Paired Conversation).

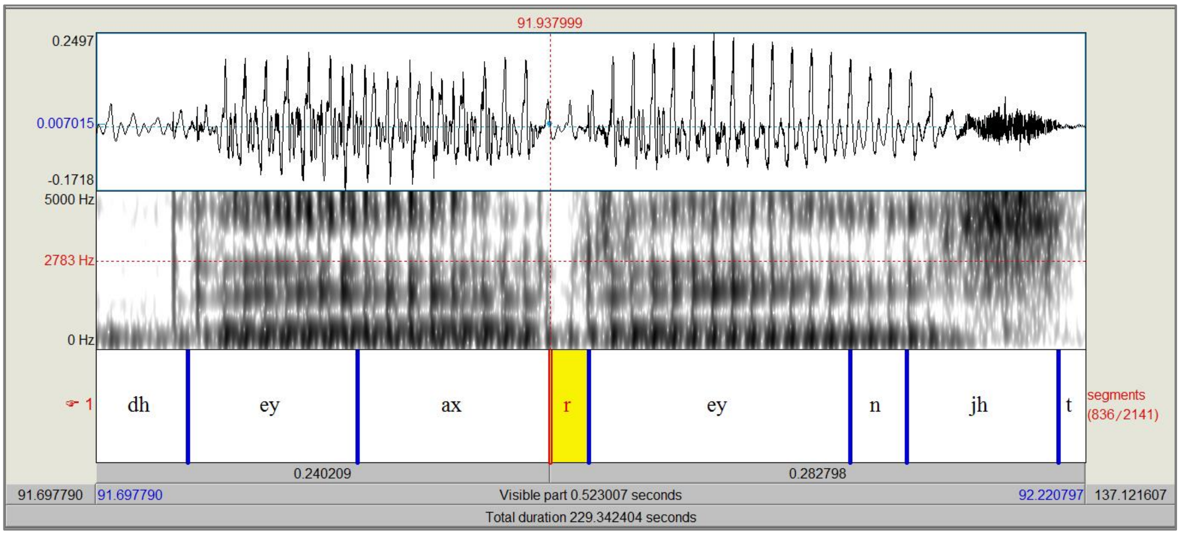


Figure 45: Word-medial (iambic) post-alveolar tap in they arranged. Token spoken by Quadir, a 32 year-old Bradford PE male (task - Reading Passage).

Affricates and fricatives were also noted. Affricates are defined as a combinatory articulation incorporating a stop and a fricative (Ladefoged & Maddieson 2007; Stevens 2000). Acoustically, an affricate includes a release similar to that of a stop, but slower lowering of the articulator means that frication is audible as well as being visible on the spectrogram. Affricates were observed in only a subset of contexts: word-initially following a consonant, where the rhotic was affricated into the preceding consonant release; and word-initially following an unstressed vowel, where the preceding unstressed vowel was elided and /r/ was affricated with the preceding stop. An argument could be made that these should have been discounted from the analysis as they did not form a major category and can be explained by coarticulatory effects.

However, by discounting these tokens prior to any analysis it assumes that affrication of /r/ in these contexts would pattern similarly across speakers. Although affrication was observed, not all of the realisations in the above contexts were affricated. Thus, by retaining the affricated tokens in the analysis a more detailed picture of the spread of variance was gained, with later visualisation and statistical analysis exploring whether this variation is in any way predictable by speaker group, or whether it is simply an occasional effect of co-articulation. Full fricatives were also occasionally observed, with increased turbulence relative to approximants being both audible and visible (Laver 1994). Figure 46 includes an example of a fricated /r/.

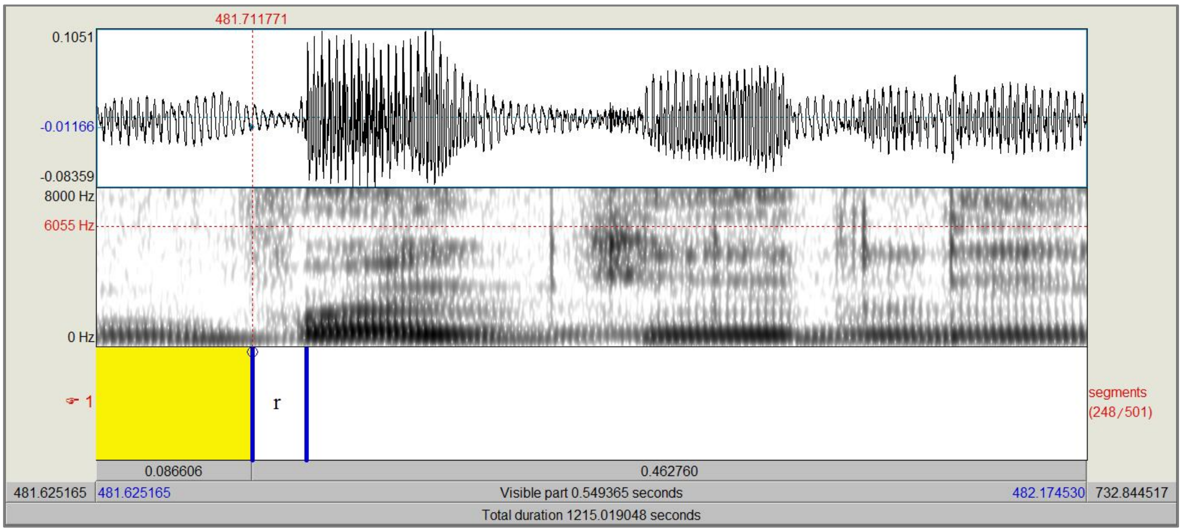


Figure 46: Word-initial labiodental fricative in regularly. Token from Maya, a 20 year-old Leicester PE female (task - Paired Conversation). Note that the view range is extended to 8000Hz and that the cursor is placed at 6055Hz to highlight fricative energy.

In addition to the segments defined above, syllabic approximants, also known as schwar, were also observed (e.g. [hɹ̩tɪdʒ] *heritage*, as spoken by Aashif, a Bradford PE male). Syllabic approximants are often associated with American English (Ladefoged & Maddieson 2007; Wells 1982a) and refer to the realisation of an approximant in the syllable nucleus (Laver 1994). Almost all examples found in the current data were post-alveolar approximants. Finally, some /r/ tokens were completely elided, either through diphthongisation of the preceding and following vowels, or as a result of complete syllable elision[29]. An example of a completely elided token is given in Figure 47.

[29] The type of elision (syllable deletion or diphthongisation) was noted but will not be considered further in the thesis.

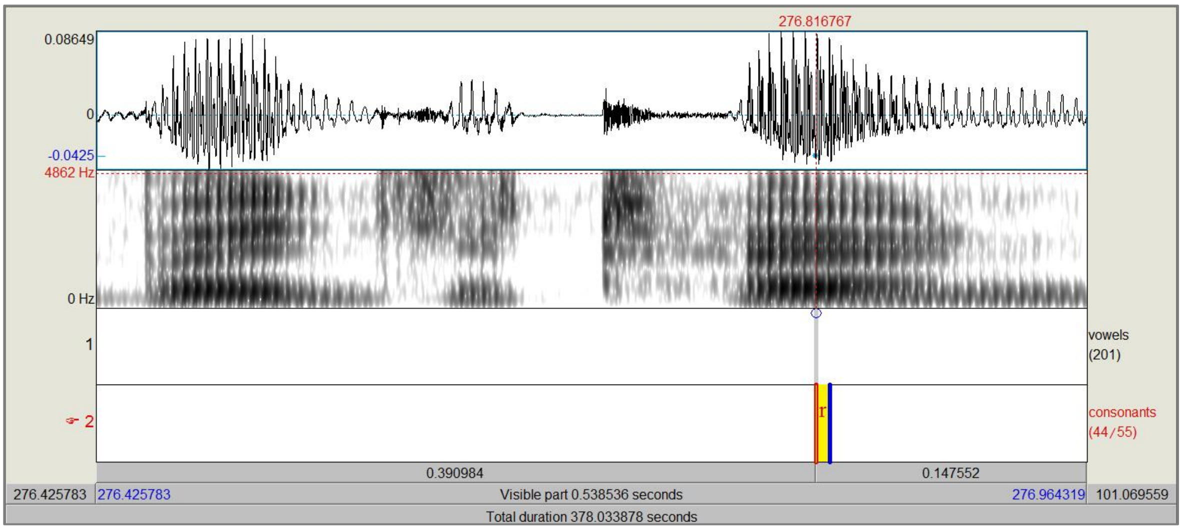


Figure 47: Word-medial (iambic) elision in vegetarian. Token spoken by Hamir, a 47 year-old Leicester PE speaker (task - Paired Conversation). Cursor placed in the syllable where /r/ should occur [vedʒətən]

Although the boundaries between some of these are not clear-cut (e.g. palatalisation of /r/ versus elision by diphthongisation), the postulation and maintenance of this many categories was deemed necessary as a way to begin to account for and explore reasons behind the increased variability believed to exist in PE as compared to AE in Bradford and Leicester.

Note was made of three further articulatory details to assess whether these accounted for the perceptual variability in /r/ associated with the PE speakers. These were not included alongside the principal variation in place and manner, with separate analyses being run in order to explore any structured variation. The raising of approximants was coded, with this referring to segments which were more approximant-like than fricative-like, but with an increased amount of spectral noise than that visible in approximants such as the one shown in Figure 42. Figure 48 includes word-initial /r/ in *read* as spoken by a Bradford PE female (Shelly), illustrating what is meant here by a ‘raised’ approximant. Similarly, lowering of taps was also noted, whereby speakers did not exhibit a full closure and there was little acoustic evidence that a tap had occurred. This phenomenon is exemplified in Figure 49.

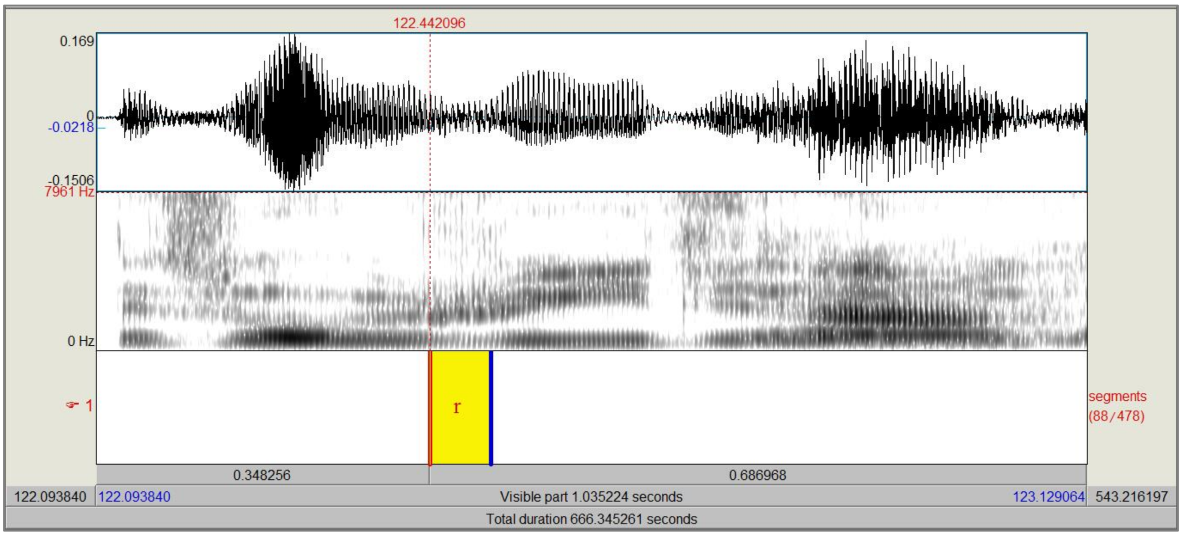


Figure 48: Word-initial raised approximant in it's what we read. Token spoken by Shelly, a 24 year-old Bradford PE female (task - Paired Conversation). Note the increased window range (0-8kHz) to illustrate high frequency energy.

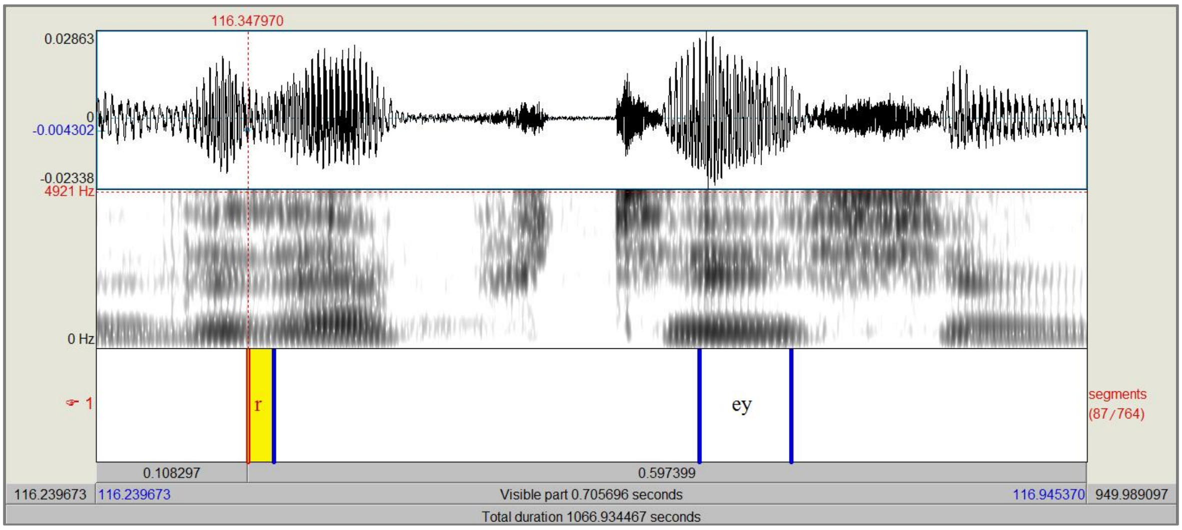


Figure 49: Word-initial lowered tap in the reputation. Token spoken by Zayna, a 24 year-old Bradford PE female (task - Paired Conversation).

Finally, variation in voicing was noted. Some speakers exhibited slightly devoiced (Figure 50) or completely voiceless (Figure 51) tokens. Although the main analysis did not include voicing as a predictor, a separate analysis was undertaken to assess whether voicing patterns were predicted by language background or region.

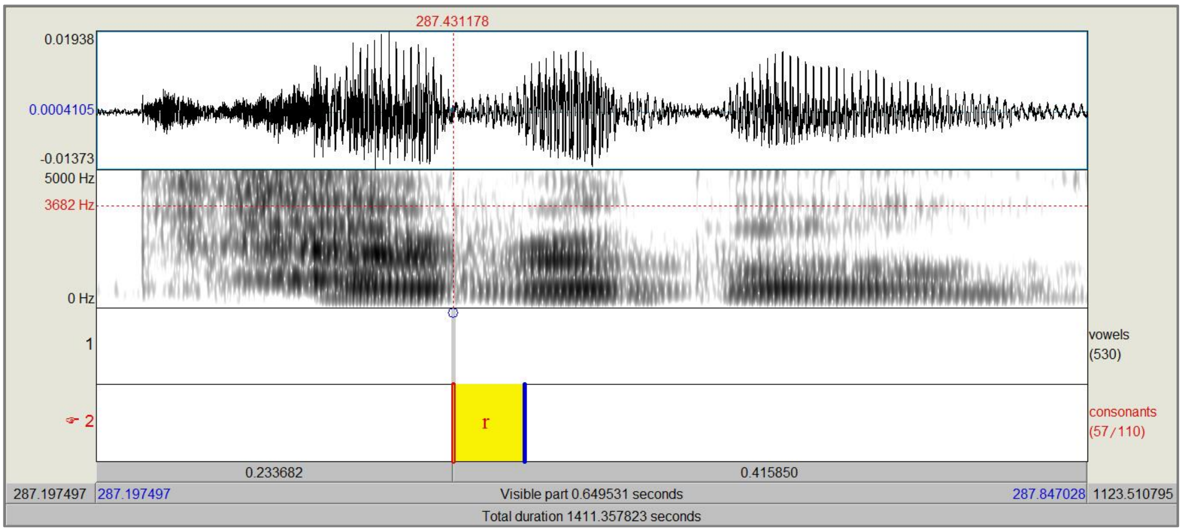


Figure 50: Word-medial (trochaic) devoiced approximant in terrible. Token spoken by Claire, a 23 year-old Bradford AE female (task - Paired Conversation).

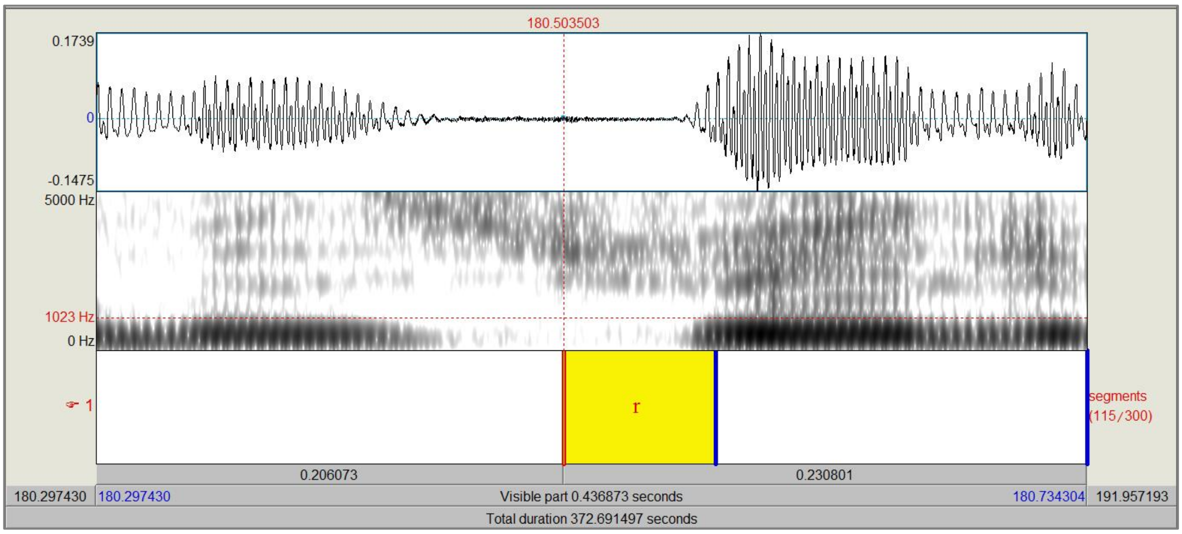


Figure 51: Word-initial voiceless approximant in was really. Token spoken by Misbah, 24 year-old Bradford PE female (task - Paired Conversation).

Although there is a great level of detail reflected here, layers in the coding methods mean that different levels of granularity can be explored, some of which still remain for future research. Preliminary analysis suggested that there was increased variability in the rhotic realisations for the PE speakers relative to the AE speakers. Thus, although the measurement process is arguably more detailed than is strictly necessary, it has facilitated the extraction of a great deal of information, with analysis and interrogation of the results revealing what is important. I did not want to discount potentially relevant variability because of the lack of clear and simple categoricity. This would have come at the expense of missing important differences between groups of speakers. Moreover, the detail provided above illustrates the diversity of acoustic and auditory correlates of what phonologically is defined simply as /r/.

6.4.3 Coding, counting and statistical analysis

Five contexts were specified: word-initial following a pause (WI_#, e.g. *resident*); word-initial following a consonant (WI_C, e.g. *called Rhonda*); word-initial following a vowel (WI_V, e.g. *how religious*); word-medial iambic (WM_I, e.g. *bereave*); and word-medial trochaic (WM_T, e.g. *berry*). Some WM_I contexts involved the elision of the unstressed vowel preceding the /r/, with the rhotic then forming part of a cluster onset (e.g. *incorporates* /ɪŋkɔːpəɹeɪts/ → [ɪŋkɔːpɹ̥eɪts], spoken by Kawal in his Paired Conversation). These tokens were discounted as they were not considered to be adequate exemplars of word-medial intervocalic contexts. As well as noting characteristics of the segment itself, information about the preceding and following phoneme was noted.

At least fifty tokens were coded for each speaker from the Paired Conversation. If fifty tokens were measured before the end of the sample, the final 100 seconds were also analysed with additional tokens included. This meant that tokens were taken from points throughout the Paired Conversation, rather than all from the beginning or end. Tokens were discounted if speech overlapped with that of the interlocutor or when a single lexical item dominated (>10 tokens, e.g. *really*). Only fifteen tokens from the Reading Passage were taken for each speaker, this being the total number of tokens of /r/ available in the contexts defined (see Appendix 4 for the Reading Passage). Table 16 includes the total number of tokens for each group.

Bfd AE F	315	Lei AE F	261
Bfd AE M	237	Lei AE M	222
Bfd PE F	646	Lei PE F	646
Bfd PE M	563	Lei PE M	769
Bradford Total	1761	Leicester Total	1898

Table 16: Total number of /r/ observations. Overall total from both locations: 3659

The results were visualised and separate multinomial logistic regression analyses were run for place and manner of articulation. Multinomial logistic regression is similar to traditional logistic regression, but it permits a dependent variable (in this case, either place or manner of articulation) that has multiple, non-ordered categories (Field et al.

2012). As with logistic regression, a series of comparisons are made. With multinomial logistic regression these are between a pre-defined base category and all subsequent categories of the dependent variable. Given the multiple, unordered categories included within each dependent variable (place or manner of articulation), this method of statistical analysis was considered appropriate to analyse the data.

The base category for place of articulation was defined as *post-alveolar*; separate comparisons were then made for post-alveolar compared to labiodental, post-alveolar compared to elision, etc. For manner the base category was specified as *approximant*; comparisons were then made between approximant and tap, approximant and elision, etc. These base categories were selected as they reflect the most typical place and manner of articulation for /r/: post-alveolar and approximant. The multinomial logistic regression was carried out in R using the *mlogit* package (Croissant 2013). This package does not include a random effects function. Consequently, all of the results were also carefully inspected to ensure there were no outliers which were disproportionately affecting the statistical output.

Although Table 16 reports that 3659 tokens were recorded in total, this total was reduced in the statistical modelling. A large number of variants were noted, but some of these were rare and thus led to empty cells in the dataframe for analysis. These were included in the visualisations and will be discussed below, but they were not included in the statistical analysis itself. If a category had fewer than 100 tokens it was not included in the statistical analysis. This was considered a reasonable minimum as it meant that the tokens which were more individual and intermittent were excluded (like stops or retroflexion), but a level of detail was retained in the statistical analysis which reflected the diversity in the sample. Table 17 illustrates the categories that were retained (left) and those that were discounted (right) for place and manner of articulation with their token counts, and the total number of observations then included and discounted from the model.

Tokens retained		Tokens omitted	
Place of articulation			
Post-alveolar	1991	Palatal	65
Labiodental	743	Retroflex	17
Labial palatal	450		
Manner of articulation			
Approximant	2652	Fricative	46
Affricate	133	Stop	14
Tap	399	Syllabic approximant	89
Elision	241		
New total	**3425**	**Total discounted**	**228**

Table 17: Breakdown of tokens coded with details of omissions from the statistical model

For both place and manner of articulation the same fixed effects were included in each model. Main effects of Language background, Region, Gender, Age, Task and Context (WI_#, WI_V, WI_C, WM_I, WM_T) were all included, with a number of additional interactions:

- Language background and Region
- Language background and Gender
- Language background, Region and Gender
- Language background and Age

Additional models were run to consider whether Language background, Region or Gender predicted raising (of approximants), lowering (of taps), or variation in voicing. The three predictors were included as main effects along with context, and an additional interaction between Language background and Region. These further analyses were run on a subset of the statistical data including only approximants and taps (3051 tokens, 84% of total observations).

The following Section will present the results based on visualisation of the data and interpretation of the statistical model. Significant results will be discussed in the text with accompanying tables, and full summary tables are included in Appendix 9**.**

6.5 Results

The results for place and manner of articulation are presented separately, in accordance with the analysis that was undertaken. Results for place are considered first in Section 6.5.1 which is followed by a treatment of manner in Section 6.5.2. Overall characterisations of /r/ variants will be presented in Section 6.5.4, with Section 6.6 considering possible reasons for the patterns observed.

6.5.1 Place of Articulation

Figure 52 illustrates the variability in place of articulation by region, language background and gender. Token counts are included immediately below it in Table 18. It is clear from both Figure 52 and Table 18 that post-alveolar is the primary place of articulation in Bradford, accounting for around 75% of the variants from PE males and females and AE males. The Bradford AE females are more diverse, with a higher proportion of labial (labiodental and labial-palatal) variants being used. In Leicester, there is a greater proportion of labial tokens used by all groups, particularly females. Significant results from the multinomial logistic regression are included in Table 19. Full summary tables are included in Appendix 9 and significant results are considered in more detail below.

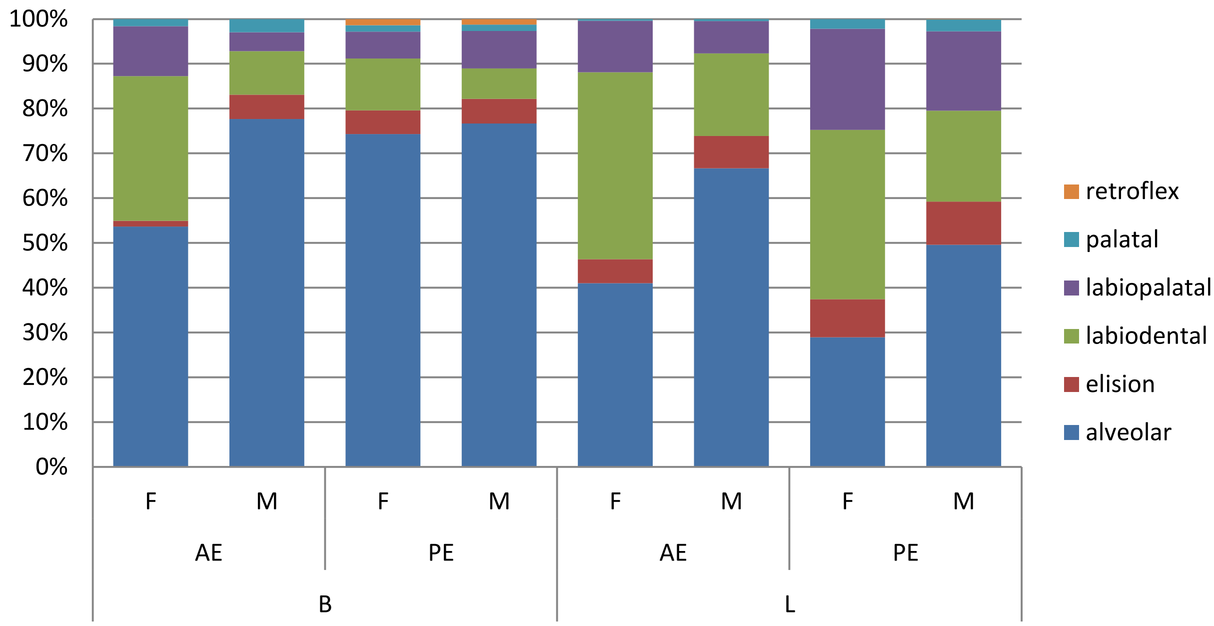


Figure 52: Proportion of the total number of tokens at each place of articulation. Speakers are grouped by region (B or L), language background (AE or PE) and gender (F or M).

	Alv.	Retro.	Lab-dental	Lab-palatal	Pal	Elision	Totals
Bfd Females AE	168	0	101	35	5	4	**313**
Bfd Males AE	184	0	23	10	7	13	**237**
Bfd Females PE	480	9	75	39	9	34	**646**
Bfd Males PE	431	7	38	47	8	31	**562**
Lei Females AE	107	0	109	30	1	14	**261**
Lei Males AE	148	0	41	16	1	16	**222**
Lei Females PE	187	0	244	146	14	55	**646**
Lei Males PE	380	1	155	136	20	74	**766**
Totals	**2085**	**17**	**786**	**459**	**65**	**241**	**3653**

Table 18: Corresponding token counts for place of articulation illustrated in Figure 52.

			95% CI for odds ratio				
Elision vs. post-alveolar	Est.	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-3.71	0.80	0.01	0.02	0.12	< .001	-4.67
Context (WM_T)	1.56	0.53	1.70	4.78	13.48	.003	2.96
Gender	1.32	0.60	1.17	3.74	11.98	.026	2.22
Lang-background:Gender	-1.25	0.65	0.08	0.29	1.02	.054	-1.93
Region	1.72	0.59	1.77	5.60	17.73	.003	2.93
Task	-1.11	0.21	0.22	0.33	0.49	< .001	-5.38

Labiodental vs. post-alveolar	Est.	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-1.20	0.35	0.15	0.30	0.60	.001	-3.45
Context (WM_I)	-0.67	0.29	0.29	0.51	0.90	.020	-2.32
Context (WM_T)	-0.94	0.25	0.24	0.39	0.64	< .001	-3.69
Gender	-1.82	0.27	0.10	0.16	0.28	< .001	-6.63
Lang-background:Age	-0.05	0.01	0.94	0.96	0.98	< .001	-4.32
Lang-background:Gender	1.20	0.35	1.67	3.33	6.62	.001	3.43
Lang-background:Region	1.65	0.26	3.13	5.18	8.57	< .001	6.41
Region	0.48	0.20	1.10	1.61	2.35	.015	2.44
Task	-0.30	0.11	0.59	0.74	0.93	.009	-2.60

Labial-palatal vs. post-alveolar	Est.	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-2.62	0.50	0.03	0.07	0.19	< .001	-5.26
Gender	-1.65	0.40	0.09	0.19	0.42	< .001	-4.12
Lang-background:Age	-0.04	0.01	0.93	0.96	0.99	.002	-3.05
Lang-background:Gender	2.00	0.46	2.97	7.37	18.26	< .001	4.31
Lang-background:Region	2.09	0.35	4.05	8.06	16.05	< .001	5.94
Lang-background (PE) : Region : Gender	-1.06	0.28	0.20	0.35	0.60	< .001	-3.81
Task	-0.52	0.14	0.46	0.60	0.78	< .001	-3.81

Table 19: Significant results from the multinomial logistic regression for place of articulation with /r/. Full summary tables are included in Appendix 9.

This increased presence of labial variants in Leicester was reflected in the output of the multinomial logistic regression. The odds of a variant being labiodental rather than post-alveolar were significantly higher in Leicester as compared to Bradford. Similarly, the significant interaction between Language background and Region for both labiodental and labial-palatal variants compared to post-alveolar ones reflects how these labial variants are not only more likely in Leicester, but increasingly so for the PE speakers . The higher proportion of labial tokens in Leicester is visible in Figure 52.

Also illustrated in both Figure 52 and Table 18 is the low number of retroflex tokens in both Bradford and Leicester for the PE speakers. Only 17 retroflex tokens were recorded in the whole dataset (these being retroflex taps and approximants), and only one of these was from a Leicester PE speaker. As mentioned in Section 6.4, retroflex tokens were not included in the statistical model. Figure 52 and Table 18 include these variants for Bradford PE speakers, and the one Leicester PE speaker.

Comparing Bradford and Leicester, the only other major difference is the higher proportion of elision in Leicester. This is illustrated in Figure 52 and Table 18 and was also reflected in a significant main effect of Region for post-alveolar compared to elision. Leicester speakers were significantly more likely to elide a segment than Bradford speakers.

Speakers from both Bradford and Leicester patterned similarly across the tasks, all using more post-alveolar tokens in the Reading Passage than the Paired Conversation. This was reflected in a significant main effect of Task for post-alveolar compared to elision, post-alveolar compared to labiodental, and post-alveolar compared to labial-palatal. A significant interaction between Language background and Age reflected the increased likelihood of labial variants (both labiodental and labial-palatal) as age decreases: younger speakers use labial variants more than older speakers.

Some speakers, particularly PE speakers, exhibit tokens with a palatal place of articulation. This is visible in Figure 52. The small token counts mean that these palatal variants were not included in the multinomial regression. The use of these variants was most common amongst the Leicester PE speakers, as illustrated in Table 18.

Overall, little variation was found across different contexts, with the patterns described stable across each one. Elision was observed to be significantly more likely in word-medial trochaic contexts, particularly for Leicester PE speakers. Labiodental compared to post-alveolar was significantly less likely in word-medial trochaic position.

Within the Bradford sample, there is little difference between the PE males and females and AE males. With the exception of the small amount of retroflexion observed for the

PE speakers, these three groups pattern similarly. All speakers use chiefly post-alveolar places of articulation with a small number of labial tokens accounting for the majority of the remaining variation.

The Bradford AE females pattern differently from the rest of the speakers in this region, with a higher proportion of labial tokens in their sample than for other speakers in Bradford. When examining individual patterns, it becomes clear that the apparent preference for labials may be being driven by one speaker: Rachael. Figure 53 illustrates the distribution of variants for the Bradford AE females, with speakers increasing in age from left to right. Although Linda also has a large number of labial tokens, labialisation for Rachael is the most common place of articulation, accounting for 80% of her tokens. This is consistent with her voice quality, Rachael being one of only eight speakers in the whole corpus to exhibit labiodentality as a long-term setting.

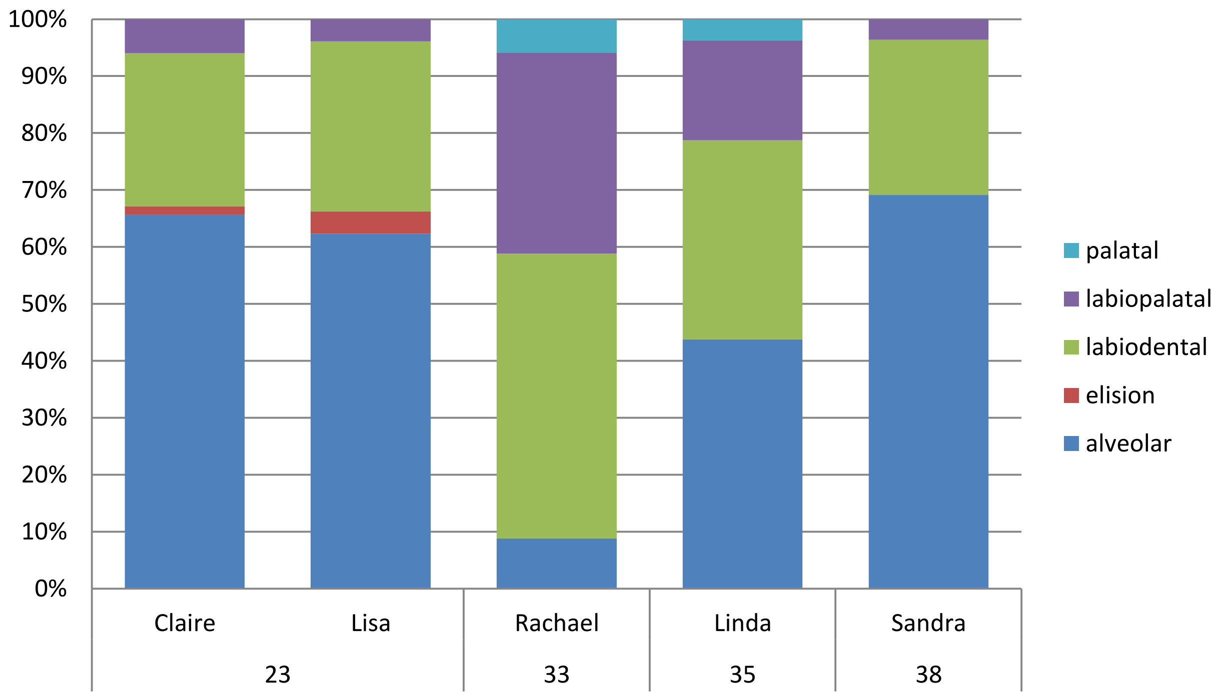


Figure 53: Distribution of Bradford AE females' individual place of articulation. Speaker names are listed with speaker ages.

In Leicester, Figure 52 and Table 18 highlight how overall the PE speakers here use more labial tokens than do the AE speakers, with interactions in evidence between gender and language background. The younger AE speakers use the smallest proportion of labial tokens. These speakers have post-alveolar as their main place of articulation, with the post-alveolar tokens accounting for 68% - 70% of their sample. The older AE females, and all of the PE females, have a similarly high proportion of labial tokens. For these speakers, labial is either the predominant place of articulation for /r/, or occurs at a similar frequency to the post-alveolar place of articulation. Labial tokens appear to be more common amongst the PE speakers. Within language background groups, females have more labial tokens than males. This result was reflected in both the significant main effect for Gender, such that women exhibit more labiodental and labial-palatal variants, and also the significant interaction between Language background and Gender in the multinomial regression. For both labiodental and labial-palatal as compared to post-alveolar, the likelihood of labial forms was greater for females than males, with this pattern reflected within AE and PE groups.

6.5.1.1 Summary: Place of Articulation

For Bradford, the post-alveolar place of articulation is most common. Retroflexion is found for some PE speakers but is a minor variant in all cases. Labial articulations are more common amongst the AE females, and particularly for Rachael.

Overall, in Leicester the post-alveolar place of articulation is much less common than it is in Bradford. Many females have labial (labiodental or labial-palatal) as either their main place of articulation for /r/, or this is part of a pair of predominant places of articulation along with post-alveolar. With respect to speaker gender effects, the females use labial tokens to a higher degree, but PE speakers exhibit greater degrees of labialisation overall. Only one example of retroflexion was recorded in Leicester, for a male PE speaker (Tajinder) in the word *carried*. Also present for the PE speakers were a small number of tokens with a palatal place of articulation.

6.5.2 Manner of Articulation

Variability in manner of articulation of /r/ variants is reflected in Figure 54, with token counts shown below in Table 20. As in Section 6.5.1, the results are grouped by language background, region and gender. In Leicester, the principal manner of articulation for all groups is approximant, with this accounting for at least 80% of the tokens of /r/ in this region. In Bradford, however, there is more variation. Significant results are included in Table 21 with full summary tables in Appendix 9.

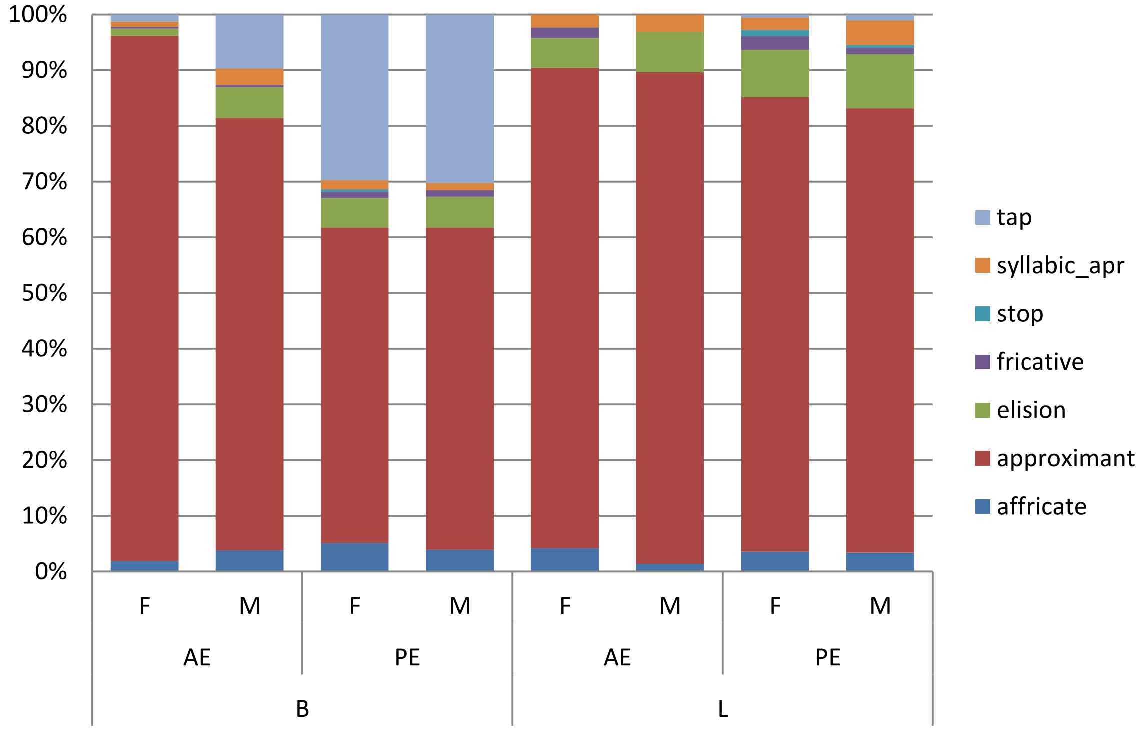


Figure 54: Proportion of tokens at each manner of articulation. Speakers are grouped by region (B or L), language background (AE or PE) and gender (F or M).

	Appr	**Tap**	**Affr**	**Fric**	**Stop**	**Syll. Appr**	**Elision**	**Total**
Bfd Females AE	295	4	6	1	0	3	4	**313**
Bfd Males AE	184	23	9	1	0	7	13	**237**
Bfd Females PE	366	192	33	7	3	11	34	**646**
Bfd Males PE	325	170	22	7	0	7	31	**562**
Lei Females AE	225	0	11	5	0	6	14	**261**
Lei Males AE	196	0	3	0	0	7	16	**222**
Lei Females PE	527	4	23	16	7	14	55	**646**
Lei Males PE	611	8	26	9	4	34	74	**766**
Totals	**2729**	**401**	**133**	**46**	**14**	**89**	**241**	**3653**

Table 20: Corresponding token counts for manner of articulation illustrated in Figure 54

Affricate vs. Approximant	Est.	Std. Error	95% CI for odds ratio 2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-23.51	12651.00	0	0	Inf	1	0
Lang-background : Region	-1.59	0.61	0.06	0.20	0.68	.010	-2.59
Lang-background (AE) : Region : Gender	-2.09	0.88	0.02	0.12	0.69	.017	-2.39
Task	1.19	0.19	2.26	3.30	4.81	< .001	6.21

Elision vs. Approximant	Est.	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-4.33	0.79	0.00	0.01	0.06	< .001	-5.47
Age	-0.03	0.01	0.95	0.97	1.00	.021	-2.31
Sex	1.88	0.59	2.05	6.52	20.74	.001	3.18
Lang-background : Gender	-1.78	0.65	0.05	0.17	0.60	.006	-2.74
Lang-background : Region	-1.55	0.63	0.06	0.21	0.73	.014	-2.45
Lang-background (AE) : Region : Gender	-1.37	0.71	0.06	0.25	1.01	.052	-1.94
Region	1.51	0.58	1.45	4.53	14.19	.009	2.60
Task	-0.93	0.20	0.27	0.40	0.59	< .001	-4.53

Tap vs. Approximant	Est.	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-9.59	1.80	0.00	0.00	0.00	< .001	-5.32
Context (WM_I)	1.39	0.48	1.55	4.01	10.35	.004	2.87
Context (WM_T)	1.61	0.46	2.04	5.00	12.27	< .001	3.51
Lang-background	7.47	1.77	54.32	1748.65	56289.63	< .001	4.22
Lang-background : Age	-0.12	0.05	0.81	0.89	0.98	.020	-2.33
Region	-19.61	8138.10	0	0.00	Inf	1.0	0.00

Table 21: Significant results from the multinomial logistic regression for manner of articulation with /r/. Full summary tables are included in Appendix 9.

In Bradford, the PE males and females and AE males all exhibit taps (10% for the AE males, 30% for the PE speakers). No regional differences were reflected in the output of the multinomial logistic regression, with no significant main effect of Region reported for tap compared to approximant. Although some PE speakers in Leicester did exhibit taps, only 12 occurrences were observed, as highlighted in Table 20. A significant main effect of Language background was observed when calculating the likelihood of taps over approximants: taps were more likely for PE than AE speakers overall.

The other main difference between Leicester and Bradford is the slightly higher incidence of elision in Leicester. It is unsurprising that this is consistently found for both place and manner: if a segment is elided, both place and manner were coded as such. Thus, we would expect the same findings for elision in both place and manner of articulation. As for place of articulation, the output of the multinomial logistic regression model found elision compared to approximants to be significantly more likely in Leicester than Bradford, with Region as a main effect.

Little variation was observed by context, with most patterns being stable across each context for each group. However, for Bradford AE males, taps occurred almost exclusively in word-medial trochaic contexts (e.g. *berry, parents*). Further, as noted above for place of articulation, elision was also most common in the word-medial trochaic context.

Elision was significantly less likely than approximant in the Reading Passage. The likelihood of affricated articulations compared to approximants increased in the Reading Passage task. Although the effects of Task were consistent across all groups, in that AE and PE speakers from both locations behaved similarly, there was not the same pattern as observed with place. For place of articulation, post-alveolar articulations were always more likely than other options in the Reading Passage. In this case, approximant articulations were not always more likely in the Reading Passage.

In Bradford, the tapping pattern described above interacts with speaker gender, language background and age. Of the AE females, only two speakers (Lisa and Sandra) tap at any point. These taps make up a minority of their tokens, with approximants accounting for at least 80% of their articulations. Among the AE males, the older speakers (Peter and Steve) have the largest proportion of taps, whereas the younger males (Matthew and Jake) use none. It seems, then, that for the Bradford AE speakers tapped /r/ is becoming infrequent, only being observed in the speech of older speakers, particularly males. Approximants are the main place of articulation for the majority of AE speakers in Bradford considered here.

By contrast, all Bradford PE speakers exhibit some taps. Individual speaker patterns for the PE speakers are illustrated in Figure 55. As well as the higher overall proportion of tapped /r/ among PE speakers as compared to AE speakers, a small number of stopped articulations were also observed. There were too few tokens for these to be included in the regression model (see Table 17), but these were in any case only found in the speech of PE speakers.

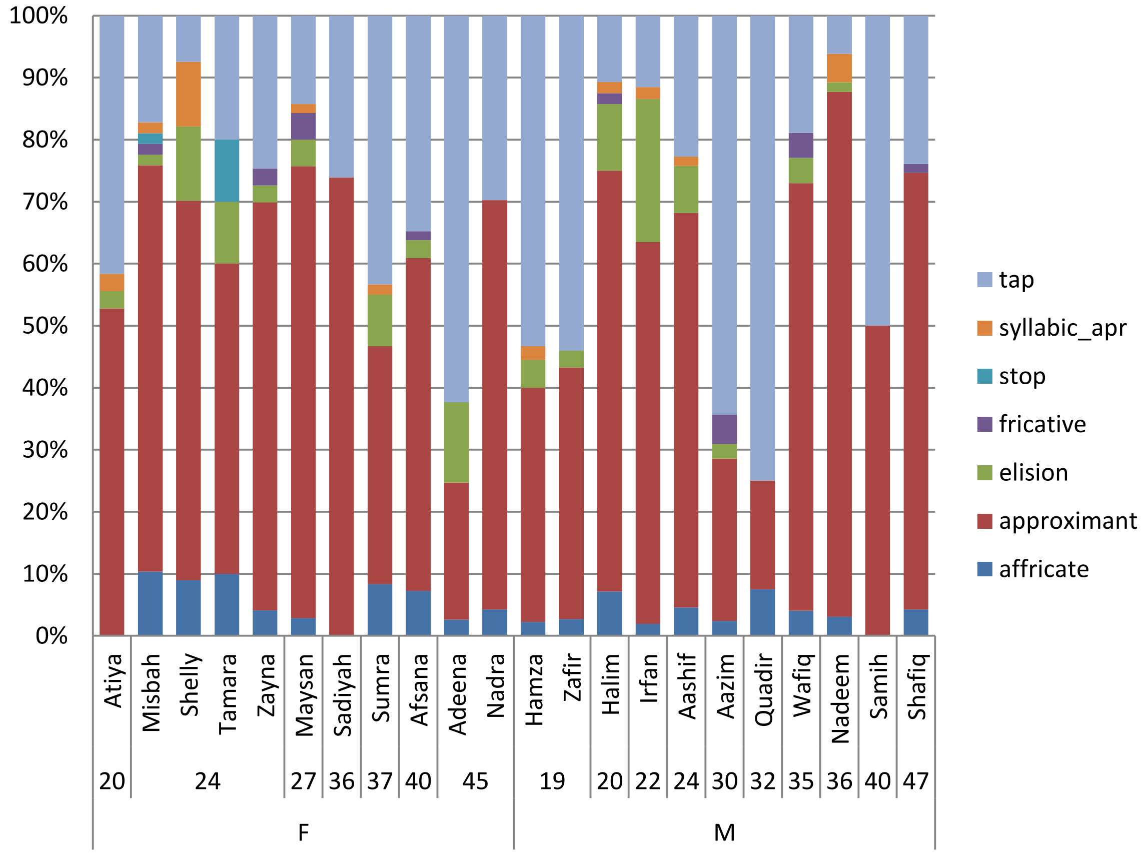


Figure 55: Proportion of each manner of articulation for individual Bradford PE speakers. Speaker names and ages are included on the x-axis.

Within Leicester, there was little difference between any of the speakers in terms of manner of articulation. Both AE and PE groups exhibited chiefly approximant articulations, but all groups exhibit some degree of variability. Table 20 reflects the nature of the variability which accounts for the main differences between the PE and AE speakers. Among the PE speakers there are a few examples of tapped or stopped articulations, but these are not found for any of the AE speakers. The low token counts for the stops means that these were not included in the multinomial logistic regression, but, as in Bradford, they were only ever observed for PE speakers. Little variation according to speaker age was observed in Leicester.

6.5.2.1 Summary: Manner of Articulation

Overall, in Bradford the AE speakers consistently exhibit approximants as the principal manner of articulation, with older males retaining a substantial proportion of taps. By contrast, the PE speakers do use approximants but all exhibit taps in their speech to varying degrees (between 10% and 70% per speaker). Potential explanations for this variation are proposed in Section 6.6. Within Leicester, there is little evidence to suggest differences in manner of articulation, with all speakers exhibiting predominantly approximant articulations. PE speakers in this location do show more variability, with taps and stops infrequently observed.

6.5.3 Voicing & height variation

As well as the primary variation discussed above, quantification was also made of voicing and raising patterns (see Section 6.4 above). Multinomial logistic regression models were run separately to assess whether PE speakers exhibit more devoicing of rhotic segments, and whether PE speakers, particularly in Leicester, exhibit lingual raising in /r/ realisations. As noted in Section 6.4.3, a reduced number of predictors was included for these additional models. Main effects of Language background, Region, Gender and Context were entered in the model, with an interaction between Language background and Region also being included. The significant results from the logistic regression for voicing are included below in Table 22. Full summary tables are included in Appendix 9.

			95% CI for odds ratio				
Devoiced vs. Voiced	Est	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-4.88	0.84	0.00	0.01	0.04	< .001	-5.82
Context (WM_T)	-1.56	0.53	0.07	0.21	0.60	.003	-2.93
Sex	-1.20	0.20	0.20	0.30	0.45	< .001	-5.96
Lang-background	3.16	0.72	5.74	23.59	96.90	< .001	4.39
Lang-background : Region	-3.15	0.77	0.01	0.04	0.20	< .001	-4.07
Region	2.53	0.75	2.89	12.54	54.42	.001	3.38

Voiceless vs. Voiced	Est	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t
(intercept)	-2.92	0.55	0.02	0.05	0.16	< .001	-5.31
Context (WI_V)	-1.49	0.50	0.08	0.22	0.60	.003	-2.96
Context (WM_I)	-2.05	0.71	0.03	0.13	0.51	.004	-2.91
Context (WM_T)	-2.93	0.60	0.02	0.05	0.17	< .001	-4.86
Sex	-0.74	0.27	0.28	0.48	0.81	.007	-2.71
Lang-background	1.35	0.45	1.60	3.87	9.37	.003	3.00

Table 22: Significant results from the multinomial logistic regression for voicing with /r/. Full summary tables are included in Appendix 9

Figure 56 reflects the voicing patterns for approximant and tapped /r/, with speakers grouped by language background, region and gender. Although voiced segments are clearly predominant for all speakers in all contexts, there is variability. Overall, females are significantly more likely to use devoiced or voiceless /r/ tokens compared to males. Comparing regions, Leicester speakers are more likely to devoice segments than in Bradford, with a significant main effect of region observed. Further, PE speakers are significantly more likely to use devoiced or completely voiceless /r/ than are AE speakers. Thus, female PE speakers have the most devoiced or voiceless segments, with AE males in each location most likely to retain voicing.

Variation in voicing was also observed across different contexts, with devoicing being significantly less likely in word-medial trochaic contexts than word initial following a pause. Voiceless tokens were significantly less likely in both word-medial contexts.

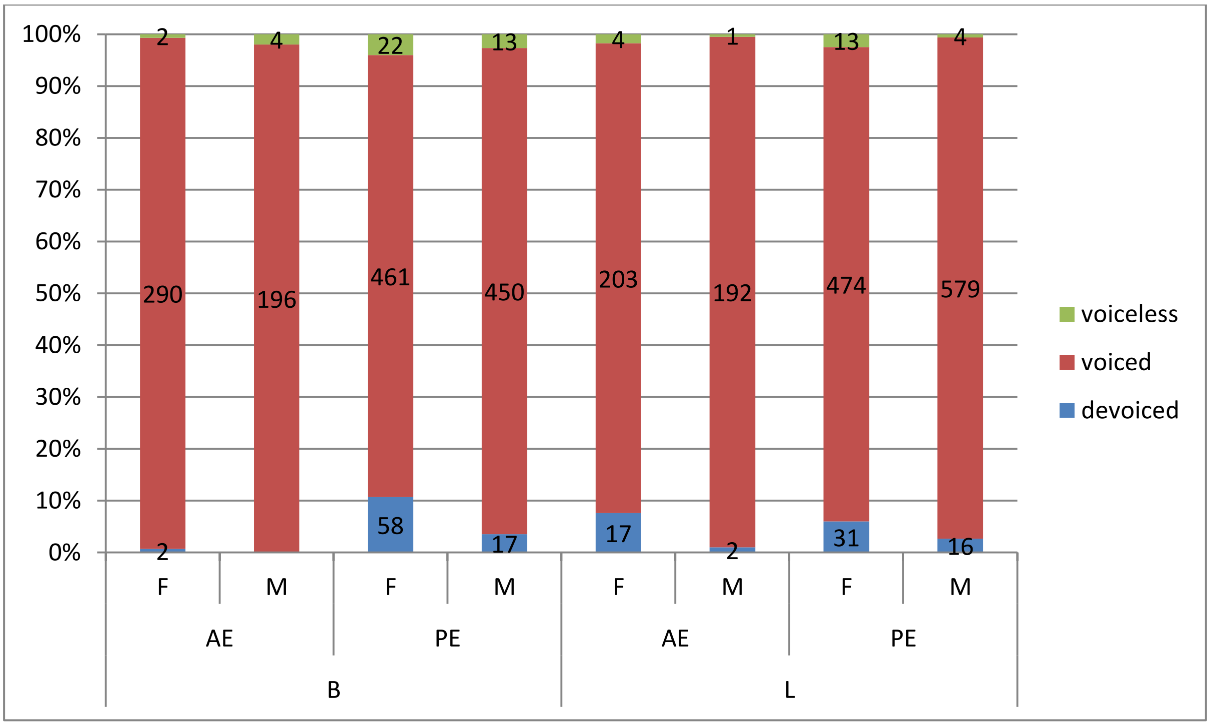


Figure 56: Voicing patterns for /r/. Only approximants and taps are included. Speakers are grouped by region, language background and gender.

Regarding height, Figure 57 illustrates a similar pattern. PE speakers in Bradford and all speakers in Leicester raise approximants to a similar degree. PE speakers in Bradford also consistently lower taps. Leicester AE speakers also raise a substantial proportion of approximants, although to a lesser degree than the PE speakers in the region do. These patterns were reflected in a multinomial logistic regression with the significant results detailed in Table 23. As with the other results presented in the Chapter, full summary tables are included in Appendix 9.

			95% CI for odds ratio				
Lowered vs. neutral	Est	Std. Error	2.50%	Odds Ratio	97.50%	Pr(>|t|)	t
(intercept)	-5.45	1.07	0.00	0.00	0.04	< .001	-5.08
Lang-background	2.05	0.37	3.75	7.78	16.16	< .001	5.50

Raised vs. neutral	Est	Std. Error	2.50%	Odds Ratio	97.50%	Pr(>|t|)	t
(intercept)	-2.42	0.30	0.05	0.09	0.16	< .001	-8.13
Context (WM_I)	-0.82	0.29	0.25	0.44	0.78	0.005	-2.81
Context (WM_T)	-2.23	0.28	0.06	0.11	0.19	< .001	-7.93
Sex	-0.19	0.10	0.68	0.82	1.00	0.052	-1.94
Lang-background	1.68	0.21	3.53	5.35	8.10	< .001	7.90
Lang-background:Region	-0.90	0.26	0.24	0.41	0.68	0.001	-3.39
Region	1.08	0.24	1.83	2.94	4.71	< .001	4.48

Table 23: Significant results from the multinomial logistic regression for height with /r/. Full summary tables are included in Appendix 9.

Significant main effects were yielded for both Language background and Region for raising, and a significant main effect of Language background for lowering. Both word-medial contexts (iambic and trochaic) were significantly less likely to favour raised approximants than neutral ones. Thus, PE speakers are more likely to exhibit intermediate-type articulations, with raised approximants, lowered taps and devoicing being common amongst these speakers.

6.5.4 /r/ in Leicester and Bradford

The Figures on the following pages (Figure 58 to Figure 61) illustrate the distribution of /r/ variants in Bradford and Leicester for PE and AE speakers. These are accompanied with Table 24 which summarises the predominant and subsidiary variants amongst AE and PE speakers in Bradford and Leicester. These are included to highlight what might be expected from speakers of each of the groups, but they do reduce the complexity associated with /r/, particularly for the PE speakers who are in part characterised by increased variability and less ‘canonical’ variants.

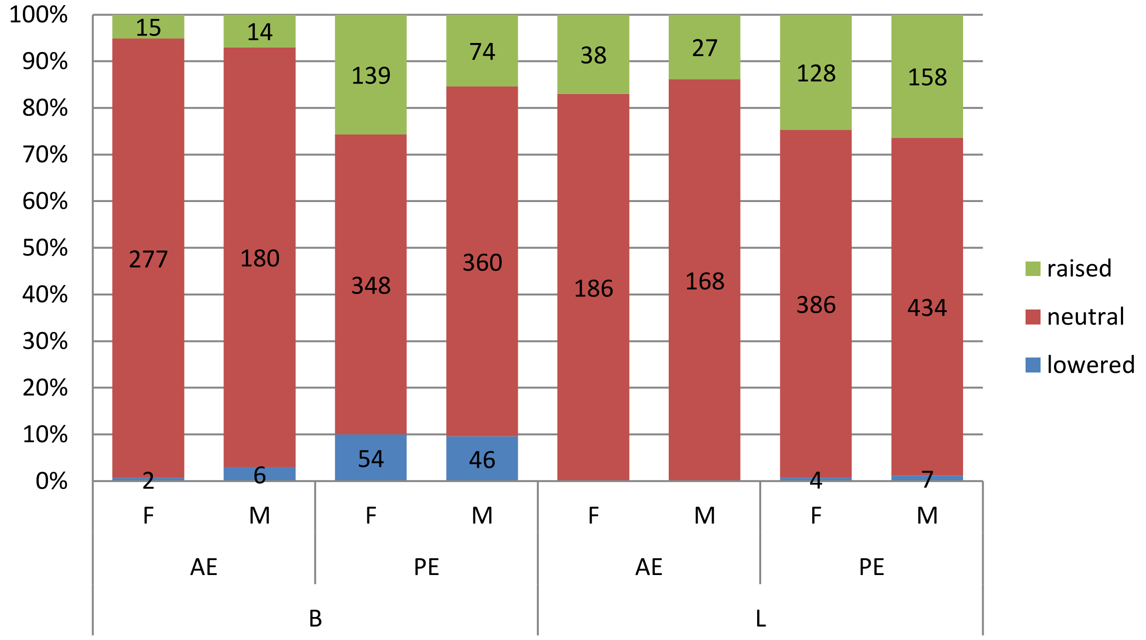


Figure 57: Raising patterns for /r/. Only approximants and taps are included. Speakers are grouped by region, language background and gender.

In Bradford, there is evidence for intra-speaker variation in the PE group, with both post-alveolar taps and approximants [ɾ ɹ] being the predominant variants amongst the speakers. All PE speakers in Bradford use both the approximant and tapped /r/, with these being frequently raised (approximants) or lowered (taps), and devoicing also common. Labial approximants are infrequently present, with realisations such as labiodental [ʋ] and labial-palatal [ɥ] being observed occasionally. There is a very small amount of palatal approximants [j] and retroflex approximants [ɻ] and taps [ɽ], although these are not favoured by any speakers and do not occur regularly. For Bradford PE speakers then, although there are primary variants which can be identified (see Table 24), these speakers are in fact characterised by a great deal of variation, both in terms of the number of rhotic variants they exhibit, and also in terms of the degree of phonetic variation associated with each ‘variant’.

For the Bradford AE speakers, there are a small amount of post-alveolar taps [ɾ], but these are restricted to the speech of older males. Labiodental [ʋ] and labial-palatal [ɥ] are observed to a higher degree than was the case for the PE speakers, but this is primarily the result of usage of these forms by the AE females. For the Bradford AE speakers the main variant is a post-alveolar approximant [ɹ]. The Bradford AE speakers do exhibit phonetic variation in their /r/ realisations (both in terms of the number of variants, and the degree of phonetic variation), although to a lesser degree that that associated with the PE speakers.

Turning to Leicester, the PE speakers exhibit variation between the post-alveolar approximant [ɹ] and labial approximants [ʋ] and [ɥ]. Elision of /r/, the palatal approximant [j], and syllabic approximants [ɹ̩] also occur. The variation here is not in manner of articulation, but in the degree of labialisation and lingual dorsum posture. As with the Bradford PE speakers, raising of approximants is common, as is devoicing of segments. The Leicester PE speakers are also characterised by increased variation in their /r/ realisations. A number of variants are defined and this is reflective of a large amount of intra-speaker phonetic variation which is not captured by referring to the variants in terms of IPA symbols.

The Leicester AE speakers are similar to the PE speakers, but exhibit a smaller number of variants. The post-alveolar approximant [ɹ] is the main variant, but labial approximants [ʋ] and [ɥ] occur regularly. Elided segments, the palatal approximant [j], and syllabic [ɹ̩] are found, but rarely. As with the PE speakers, raising and devoicing are common, but to a lesser degree.

For all speakers then there is a degree of variation associated with the realisations which is not captured by describing them in IPA terms. However, these serve to illustrate the principal differences between the groups. Further, PE speakers in each region consistently exhibit more phonetic variation in their realisations than the AE speakers.

	Predominant variants	**Subsidiary variants**
Bradford AE	[ɹ]	[ʋ ɥ] (females)
Bradford PE	[ɾ ɹ]	[ʋ ɥ] (rare)
Leicester AE	[ɹ]	[ʋ ɥ]
Leicester PE	[ɹ ʋ]	[ɥ Ø]

Table 24: /r/ variants for Bradford and Leicester speakers

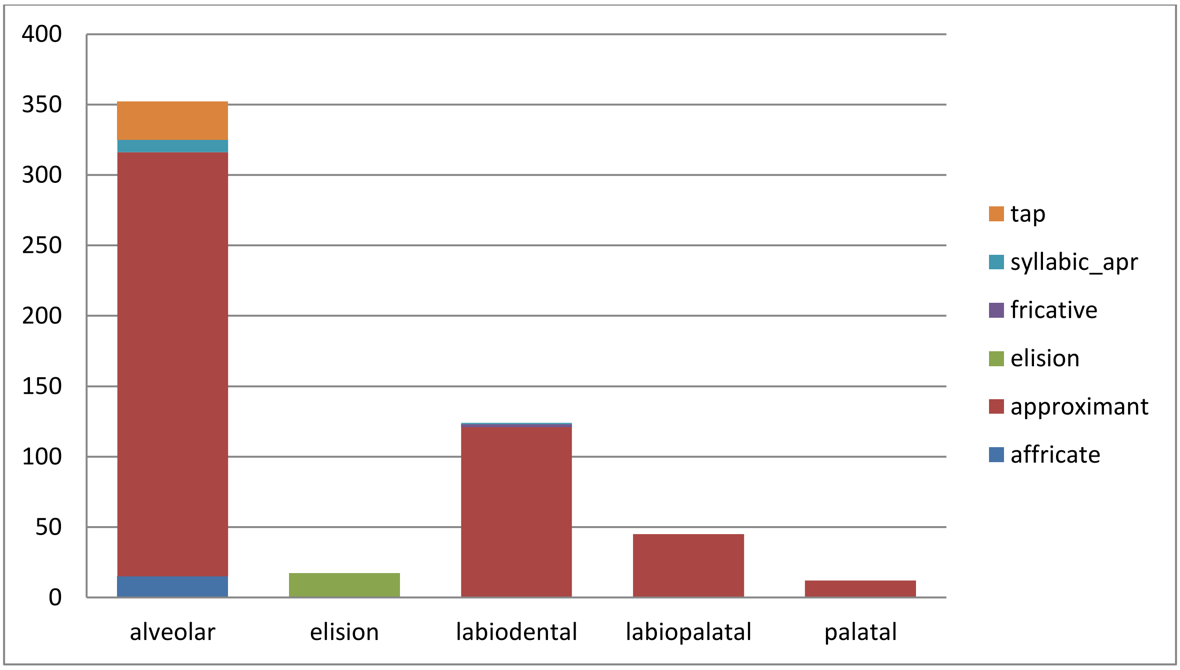


Figure 58: /r/ realisations for Bradford AE speakers. Place of articulation appears along the x-axis, with token counts along the y-axis. Colours correspond to variation in manner of articulation

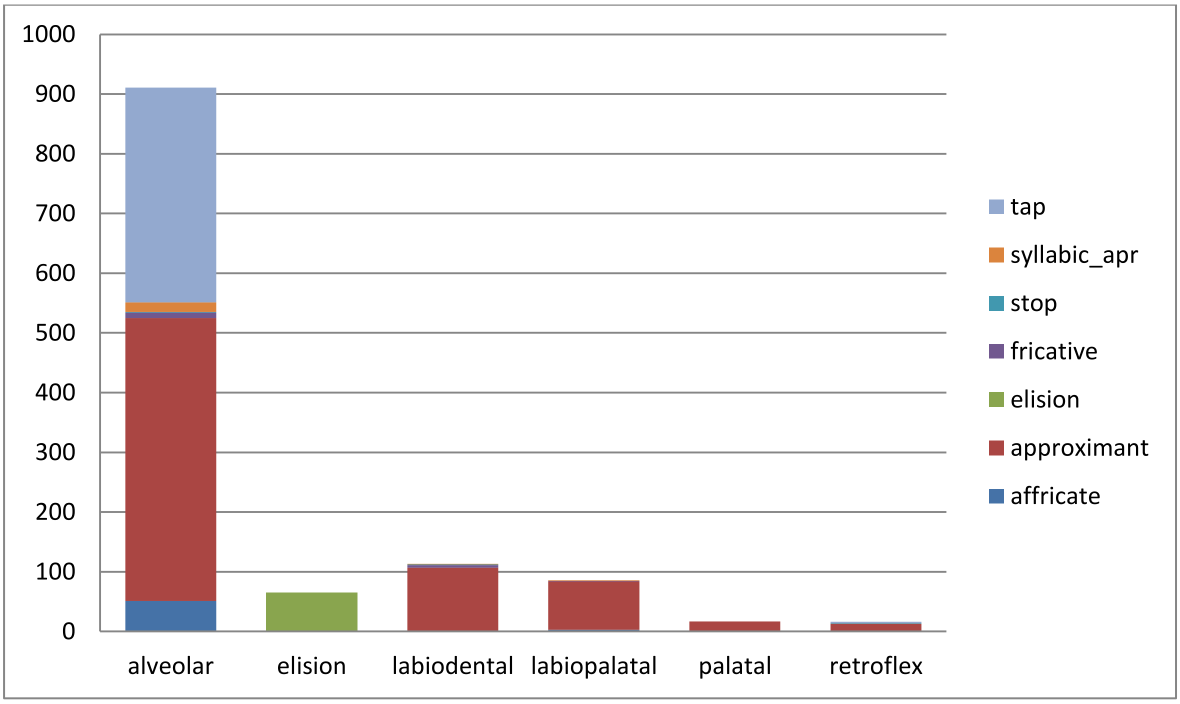


Figure 59: /r/ realisations for Bradford PE speakers. Place of articulation appears along the x-axis, with token counts along the y-axis. Colours correspond to variation in manner of articulation

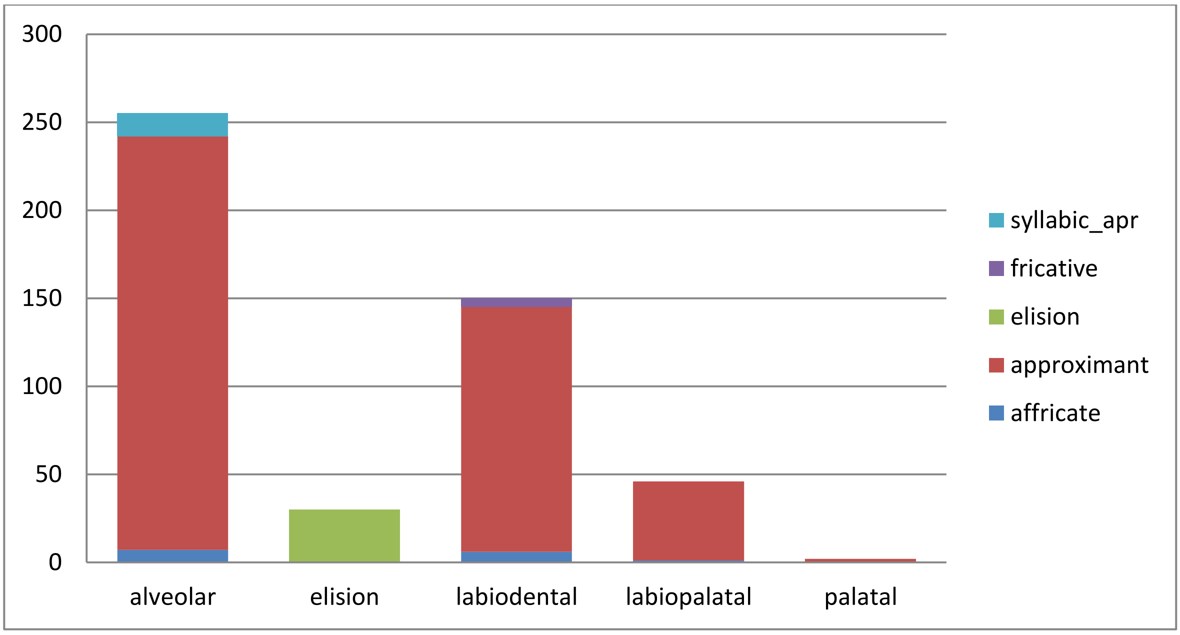


Figure 60: /r/ realisations for Leicester AE speakers. Place of articulation appears along the x-axis, with token counts along the y-axis. Colours correspond to variation in manner of articulation

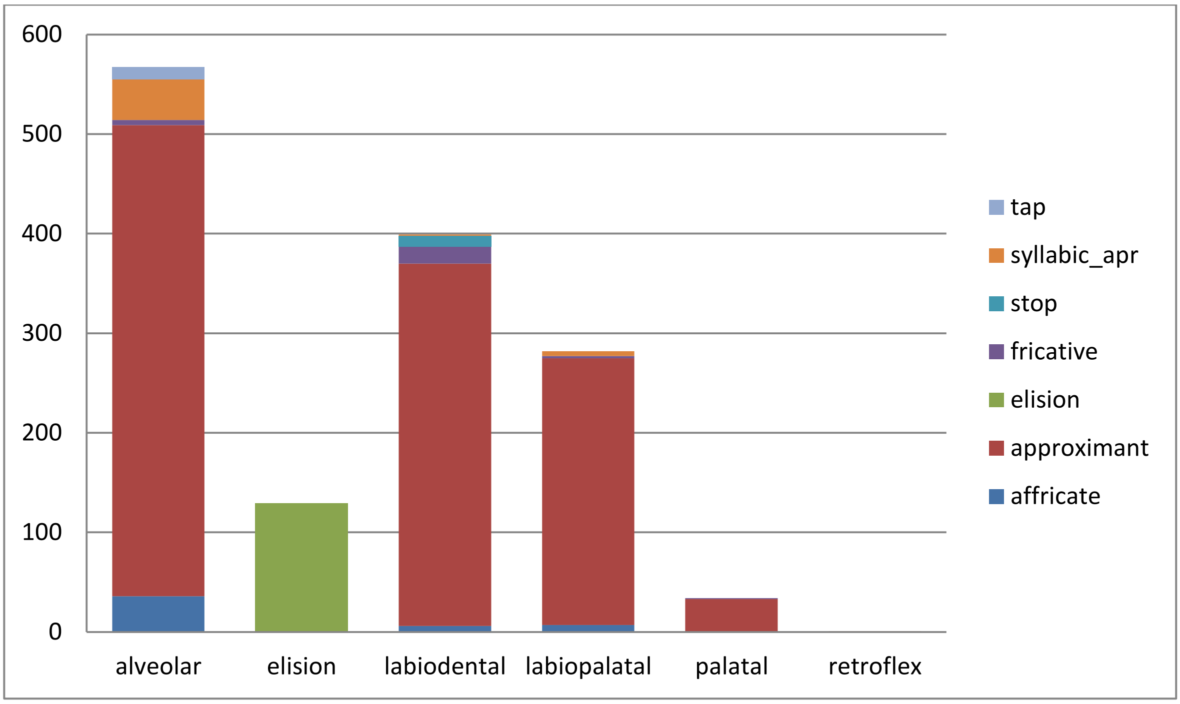


Figure 61: /r/ realisations for Leicester PE speakers. Place of articulation appears along the x-axis, with token counts along the y-axis. Colours correspond to variation in manner of articulation

6.6 Discussion

PE speakers in Bradford and Leicester exhibit different types of /r/ realisations in the contexts considered here. Although on the surface this suggests different patterns, this Section will argue that there are in fact consistencies in the processes involved, with logical explanations for the divergent patterns.

6.6.1 Characterising /r/

The results presented above highlight both the degree of phonetic variation associated with /r/ realisations, and also patterns which are observable and subsequent characterisations which can be made.

For Braford, all speakers exhibit primarily post-alveolar realisations, with taps and approximants observed for many. The proportion of taps to approximants is much higher amongst the PE speakers, with this type of realisation less common for the AE speakers. Further, the PE speakers demonstrate a much greater degree of phonetic variation in their realisations of /r/. A larger number of variants are identified to characterise their realisations which corresponds to this increased variation, with a much higher proportion of realisations which cannot be clearly categorised as one variant or another.

Approximants are the main realisation noted for all Leicester speakers, with variation in this location being primarily associated with lingual position and labialisation. The PE speakers exhibit a greater proportion of labialised tokens, and similarly to Bradford, the degree of phonetic variation associated with /r/ realisations is greater for the PE than the AE speakers.

PE speakers in both locations show evidence for a wider variety of /r/ realisations. Although not consistently present to the same degree in Bradford and Leicester, taps, labial variants, stops and elision are all noted as variants of /r/ for PE speakers. The possible reasons behind these patterns will be considered below with reference made to the possible influence of Panjabi, the interaction with the AE, and cross-regional similarities and differences.

6.6.2 The interaction between Panjabi and AE

It is clear that the influence of Panjabi is not consistent across locations. As discussed in Section 2.3.2, the speakers included in this corpus are not from a homogeneous group of

‘Panjabi’ speakers, with different varieties being spoken by the speakers (see Chapter 3, Section 3.2.1.1). The PE speakers from Bradford all have family roots in the Pakistani Panjab and all identify themselves as Muslim. In contrast, all the PE speakers from Leicester identify as Sikh and have family roots in the Indian Panjab. It is difficult to determine the exact level of phonetic diversity present in ‘Panjabi’, but a great deal is reported to be present (e.g. Shackle 2003). Thus, it could be that the differences in rhotic articulations in the two PE varieties are as a consequence of this variation in the actual heritage language. Speakers from Bradford and Leicester deviate because of differences in their respective heritage languages which often fall under the umbrella label ‘Panjabi’.

Whilst this variation in the heritage variety is a possible argument, I consider it more likely that the divergent patterns reflect the relationship between Panjabi and the regional AE variety, both of which are contributing to an enlarged feature pool for the PE speakers (Mufwene 2001). In Bradford, taps have long been attested in AE (Hughes, A. et al. 2012; Broadbent 1991; Wells 1982b), but the results here highlight how these are becoming less common. For PE speakers the opposite is true, with more speakers using taps. Their presence in Panjabi predicts their potential inclusion: they are part of the feature pool, with their additional presence in AE contributing to the adoption and reallocation of these forms.

In contrast, there are few taps in Leicester PE, but there is more evidence for labial approximants (labiodental and labial-palatal). These are also present in Bradford PE but are much less common and their distribution seems to be related to individual patterns (just as taps are for Leicester PE speakers). As discussed in Section 6.2, Panjabi includes both a labial and velar semivowel, but these are not rhotic variants in Panjabi (e.g. Shackle 2003). Thus, as with the situation in Bradford, PE speakers in Leicester have an increased feature pool of /r/ variants, only this time the local AE variant going into the feature pool is not [ɾ], but [ʋ] or [ɥ]. Characteristic PE variants are then reallocations of already existing AE segments, with the influence of Panjabi reaffirming and contributing to their presence.

The Panjabi labial semivowels which are phonetically similar to those in Leicester PE are not rhotic variants in the heritage language. However, the phonetic realisations of these tokens are consistent with the [ʋ] and [ɥ] reported in Leicester AE as variants of /r/. Thus, [ʋ] and [ɥ] are present in the feature pool of the PE speakers, only their phonological associations are different in Panjabi and English. The fact that these forms are in the feature pool, and used as variants of /r/ in Leicester AE, may be a factor which favours the increased presence of [ʋ] and [ɻ] as variants of /r/ in PE in Leicester. I am not suggesting that this means that in Panjabi generally, or as spoken by these PE speakers, [ʋ] will now be a rhotic variant. Instead, perhaps its presence in the feature pool which was made up of variants from both Panjabi and AE means that it can be used in PE as a variant of /r/. This is consistent with Mufwene's (2001) definition of the feature pool:

> [F]eatures which are similar but not necessarily identical came to reinforce each other, regardless of their sources, and produced modified variants of the originals in the emergent varieties. (2001: 4-5)

There is anecdotal evidence, at least from Leicester, that PE speakers are aware of an 'Indian'-sounding accent. Two Leicester PE males (Ranvir and Tajinder), discuss the existence of a *'freshie'* accent, used to describe newly-arrived migrants from the Indian subcontinent. Another Leicester PE female (Gulab) talked to her partner (Bir) about how the accent spoken in Southall is really 'Indian'-sounding. Other speakers, like Manvir and Jaswant, speak of how their speech has 'bits of Panjabi mixed in'. In Bradford, many PE speakers comment that their local accent is different from that of other parts of (West) Yorkshire because of the slang that the PE speakers have added. It seems, then, that speakers are aware of and may try to avoid sounding like first-generation speakers. Thus, if a feature is not in the AE it is unlikely to be retained by the PE speakers; retroflexion and coda /r/ realisations are potential examples of this (see Chapter 7 for a further consideration of this).

6.6.3 Cross-regional consistencies

Consistent across locations for the PE speakers is the raising and devoicing of approximants (and lowering of taps in Bradford). These realisations lead to slight deviations from the more categorical /r/ variants defined above for PE ([ɹ ɾ] in Bradford, [ɹ ʋ] in Leicester), and contribute to an increased sense of variability amongst the PE speakers. These realisations are consistent with impressionistic remarks made by Kirkham (in press) and comments by Ladefoged and Maddieson (2007), who note the presence of fricated /r/ in some languages of the world. The increased variability reported here also patterns similarly to that observed with the voice quality (see Chapter

4). Once again, Trudgill's (2004) stage II is reflected, whereby second-generation speakers exhibit an increased amount of both intra- and inter-speaker variability.

This increased variability is further reflected by the presence of innovative but rare stops and syllabic approximants. Syllabic approximants are observed infrequently in the speech of the AE speakers, so it is difficult to say whether these are a PE innovation. In contrast, stops are only found among the PE speakers. Too few tokens of these variants are observed in the current dataset, but it would be interesting to explore whether these variants persist in the speech of future generations, or simply reflect the increased variability of Trudgill's stage II. Interestingly, stopping and tapping of laterals in *really* was also observed: [b̠ɪdiːzɪ] for *really easy* (Bir, Leicester PE female); [ɹ̩ɪːɾi] for *really* (Halim, Bradford PE male). This consistency across the liquids is worthy of further investigation.

To summarise so far, it seems that the AE variety in each location is contributing to PE speakers' increased feature pools and helping to predict which features might arise in PE. In Bradford, the presence of taps in both Panjabi and the local AE has increased the likelihood of these also being present in PE. By contrast, in Leicester the presence of labial forms in the local AE and Panjabi varieties can be used to explain their presence in PE. Further, both PE varieties exhibit increased variability consistent with Trudgill's stage II of new dialect formation.

6.6.4 Evidence for reallocation?

The use of taps in Bradford may be in the process of *reallocation* (Trudgill 2004, 1986). According to Trudgill, this happens when multiple variants of a single contrastive phoneme remain after levelling has taken place:

> Where this happens, reallocation will occur, such that variants originally from different regional dialects will in the new dialect become social class variants, stylistic variants or, in the case of phonology, allophonic variants. (Trudgill 2004: 88)

Tapped /r/ is now associated with the PE variety, with its use in the speech of the AE community decreasing. Further, within PE, the proportion of tapping seems to be related to the degree of contact a speaker has with the non-PE-speaking community. Shelly and Nadeem show the lowest levels of tapping of all of the Bradford PE speakers, at less than 10%. Shelly lives and grew up outside of the Asian community in which she now works. Although still part of Bradford, the area in which she grew up and lives has a much smaller Asian population and is a majority White British area. Indeed, during the Paired Conversation Shelly talks to her partner, Zayna, about how she feels she has two communities: one based on ethnicity and the area where she works, and another where she lives. For Nadeem, although he always comes back to Bradford and it is where he grew up, he has spent time outside of the city for months at a time. None of the close friends he lists on the questionnaire are from Bradford or share the same ethnicity as him.

In contrast, Adeena, Aazim and Quadir all have very stable, local and small networks, and all live, work and have grown up in a predominantly Asian area of the city. These three speakers have the highest proportion of taps, at over 60%. Thus, it seems that networks and contacts are currently the primary predictor of tapping within PE, tapped /r/ now being associated with PE speakers.

This pattern is reflective of Sharma's (2011) discussion of repertoire types amongst British-born Asians in Southall, London. She comments that older males and younger females have more diverse and mixed repertoires, in contrast to the younger males and older females who have more stable repertoires. Sharma argues that the reasons for these differing patterns and the groupings she describes reflect social changes that have taken place between the two generational groups. These demographic and social changes have resulted in speakers having different types of networks (see Section 2.2.2 in Chapter 2 for more details).

Although the speakers here do not group as neatly as those in Sharma's study, the same pattern is observed: speakers with more contacts outside the community and wider patterns of engagement manifest a lower use of forms associated specifically with the PE community. It may be that the presence of a non-PE interviewer affected the presence of taps amongst the Bradford PE speakers, such that speakers shifted their usage patterns. However, without further ethnographic research in the community such as that undertaken by Sharma (2011), it would be difficult to ascertain whether [ɾ] is socially salient, or whether the patterns reported here merely reflect frequencies of exposure.

Within Leicester the use of labial approximants [ʋ ɥ] seems to be related to both language background and speaker gender. Overall, PE speakers use more of these variants than the AE speakers, but within each language background group, females use a higher proportion of labial approximants. It is possible that once again reallocation is taking place, although in this case there appears to be an interaction with gender, in contrast to Bradford, where tapping is predicted by language background.

It seems, then, that the rhotic realisations exhibited by PE speakers in both locations reflect complex interactions between Panjabi and AE, with the differing feature pools in each region contributing to the apparently divergent patterns. It appears that there is something of a continuum of variation for many PE speakers, with categorical variants being problematic to identify and many tokens not clearly corresponding to a single variant.

6.7 Conclusion

This Chapter has reported on the characteristic realisation of /r/ in Bradford and Leicester AE and PE, highlighting the diverse and increased variability in the pronunciation of /r/ amongst PE speakers. It finds that, in spite of apparent differences, the same process appears to be taking place in both Bradford and Leicester PE, with an interaction between Panjabi and AE potentially predicting the patterns observed. Further work exploring a greater number of contexts will be undertaken in the future, with preliminary work into /r/-sandhi patterns in Bradford PE suggesting interesting correlations with hiatus patterns observed in other contact varieties (Wormald 2014; Gabrielatos et al. 2010; Britain & Fox 2009).

More phonologically-oriented work will also be done to further explore the variability reported in previous work into contact varieties of English which has considered non-prevocalic coda /r/ realisations, and further statistical analyses such as a multidimensional cluster analysis will also be undertaken. The increase in labial approximants, elision and syllabic approximants is perhaps suggestive of continued derhoticisation, with affrication in clusters being worthy of further consideration (e.g. *trees* [tʃiːz]). However, ultrasound tongue imaging work by Scobbie & Stuart-Smith (2006) suggests that the auditory and acoustic non-appearance of /r/ does not necessarily mean this is articulatorily absent. I also hope to explore the relationship any continued derhoticisation has to patterns observed more widely in liquids and glides, particularly those based on the presence of /l/-vocalisation, yod-dropping and labial approximants as realisations of /r/ in Leicester and the East Midlands.

7 General Discussion

7.1 The research questions

The aim of this thesis has been to describe characteristic patterns of two geographically separate contact varieties of Panjabi English (PE) spoken in the UK and to assess what might account for any similarities observed. An analysis of the voice quality patterns, realisation of the FACE, GOAT and GOOSE vowels, and an exploration of characteristic /r/ realisations has been presented in order to address the research questions which were set out in Chapter 1 and are repeated here:

1. What are the phonetic characteristics of PE as spoken in two English cities?

2. Are patterns observed in PE directly relatable to the heritage language, Panjabi?

3. How can we account for the cross-regional consistencies between PE in Bradford and Leicester and across many contact varieties of English spoken in the UK? In particular, are cross-regional consistencies in contact varieties evidence of independent innovations or geographical diffusion?

4. Does the role (and influence) of the Anglo English (AE) variety differ across contact communities?

The research questions posited above have each been considered throughout the earlier Chapters. The following discussion will consider all of the results together and assess how they have addressed the research questions and what the results here can tell us about new dialect formation and the cross-regional similarities consistently observed in contact varieties of English spoken in the UK. Research question one will be considered in Section 7.2, question two in 7.3, question three in 7.4, and question four in 7.5. As well as addressing the research questions, the role of identity will be assessed, something which has not been considered in this thesis but which has been the subject of dispute in the contact literature. This will be followed by a consideration of whether PE can be considered a new cross-regional contact variety of English and an outline of areas in which future work could be undertaken.

7.2 Linguistic patterns in PE

A number of patterns have been described throughout this thesis which characterise speakers of PE in the two cities of Bradford and Leicester.

For voice quality, a componential approach was adopted following Abercrombie's (1967) definition of the term. A vocal profile analysis (e.g. Laver 1980) was completed for each of the speakers included in the corpus with characteristic long term settings observed for all PE and AE groups. The results of this multidimensional approach were interpreted qualitatively, with a correspondence analysis undertaken to complement this interpretation. In Bradford, all speakers exhibited a degree of non-neutral velopharyngeal settings (both nasal and denasal), with these being more marked for the PE speakers. In Leicester, marked lingual fronting was observed for many speakers, both PE and AE. Most PE speakers, irrespective of region, exhibit non-neutral velopharyngeal settings, lingual fronting and larynx raising. Several male PE speakers demonstrate a divergent pattern with lowered larynx, retracted lingual posture and denasality giving the overall auditory impression of a 'big' voice. See Section 4.6.1 in Chapter 4 for more details.

The results from a dynamic vowel analysis of F1 and F2 variation across the trajectory illustrated that despite the cross regional similarities which are observable in PE, local interpretations are always crucial. A mixed effects linear regression analysis was undertaken on normalised measurements for all 64 speakers. For FACE and GOAT, monophthongs were retained for all speakers in Bradford, with a qualitative difference observed between PE and AE groups. In Leicester, all speakers retained a diphthong and once again, a qualitative difference served to distinguish between the PE and AE speakers. Within a given region, FACE was found to be closer and fronter for the PE speakers as compared to the AE speakers. Further, in Leicester, the PE speakers exhibited shorter trajectories, such that less movement across the vowel space was observed. For GOAT, PE speakers were found to exhibit more retracted variants than AE speakers within a given region, and once again Leicester PE speakers demonstrated less variation across the diphthong's trajectory.

Regarding the GOOSE vowel, fronting of this was most advanced overall in Leicester, with all speakers exhibiting more consistent fronting than in Bradford. Further, Leicester speakers adopt a fronted monophthong, whereas the Bradford speakers use a slightly retracting diphthong. Within a region, PE speakers were more retracted in their realisations of this vowel. These findings were discussed further in Chapter 5.

A combined auditory and acoustic analysis of /r/ in word initial and medial position revealed divergent regional patterns in PE. The interpretation of the results was complemented with a multinomial logistic regression analysis. Although all speakers used primarily post-alveolar approximants, additional variants were observed in each location. In Bradford, all PE speakers demonstrated some use of alveolar taps. This variant was also observed among the older AE speakers, particularly males. In Leicester, all PE speakers used a number of labial approximants (labial-palatal and labiodental) in addition to the post-alveolar approximant. Many of the Leicester AE speakers also adopted these variants, although to a lesser degree than the PE speakers. Within each language background group in Leicester, females exhibited more labial variants than males. It was argued in Chapter 6 that although PE in Bradford and Leicester demonstrated different phonetic outputs with regards to /r/, the process which had taken place in each location was the same. In each case, an interaction between Panjabi and the regional AE had led to the linguistic patterns observed, with the regional divergence possibly caused because of the regionally different AE varieties (see Section 6.6.2, Chapter 6).

7.2.1 Summary: Research Question 1

The previous Chapters have all highlighted that across these two contact varieties, which each have regionally divergent AE varieties, cross-regional parallels are observable. Likenesses between the two PE varieties are reliably observed for each of the variables which have been explored here. Further, the patterns reported throughout this thesis are also consistent with other work which has been carried out looking at the linguistic patterns of contact varieties spoken in the UK. We consistently see similar linguistic patterns across contact varieties of English spoken in the UK despite geographical separation.

It has been suggested throughout this thesis that the consistent patterns observed are evidence of similar processes which take place in each location which are triggered by the comparable contact situations in each case. In this way, linguistic divergences do not necessarily correspond to different processes, as was proposed for the /r/ patterns observed here. Additionally, any similarities in terms of either the abstract processes or the resultant linguistic patterns must be considered in terms of other local varieties. For each of the variables considered here, it is the relationship that the PE has to the AE which is often consistent, and not that the linguistic realisations are exactly the same across different locations. These points will be addressed in more detail below in addition to a final consideration of the influence of the heritage language, Panjabi.

7.3 Panjabi: the influence of the heritage language

Any influence of Panjabi cannot be considered independently of other factors when looking at patterns of variation in any of the variables analysed in this thesis. Regarding the voice quality patterns reported in Chapter 4, the lack of comprehensive voice quality research into the characteristic profile of Panjabi inhibits a fuller consideration of any relationship. In this case, it is not that a relationship cannot be identified but more that future work would need to be done to ascertain the presence of one. Interestingly, no retroflexion was observed as a long-term setting. This was consistent with segmental /r/ patterns observed in the current thesis, but appears to stand in contrast to some previous work on Asian Englishes in the UK (e.g. Heselwood & McChrystal 2000; Sharma & Sankaran 2011). Retroflexion, and the absence of this feature, is considered in more detail below. The cross-regional consistencies in PE with respect to a number of different vocal settings suggest that any influence of Panjabi may be the same. However, without further research on voice quality patterns in a number of different languages and varieties, this influence cannot be assumed.

Regarding the vowels (see Chapter 5), the cross-regional regularities in the peripheral quality of FACE for all PE speakers and the shorter trajectories for both FACE and GOAT in Leicester PE could be interpreted as reflecting the influence of Panjabi. Their qualities are consistent with those reported for Panjabi and there is no evidence at present to suggest that these vary by dialect in Panjabi (e.g. Shackle 2003; Bhatia 1993; Tolstaya 1981). Although this stable patterning of peripheral, monophthongal qualities for FACE and GOAT could be interpreted as influence from Panjabi, Chapter 5 argued against this possibility, referring to the similarities shared with other contact varieties of English both in the UK and around the world. The fronting patterns associated with GOAT and GOOSE also do not appear to be a reflection of influence from the heritage language. Thus, it seems that, as with voice quality, patterns observed here in PE vowels may not be directly attributable to the influence of the heritage language. Further work exploring patterns of variation in Panjabi would need to be undertaken before any influence could be ruled out, there being at present too little literature available to make any strong claims either way.

Finally, for /r/, there could be a clear but variable influence of Panjabi in each location (see Chapter 6). Variants that are present in the heritage language have been adopted in PE, but the variants which occur are predicted by an interaction between Panjabi and the regional AE variety. Thus, it is not the influence of the heritage language itself which accounts for the patterns, but the way that it interacts with the AE variety. This interaction is reiterated to a certain extent by the general absence of retroflexion and non-prevocalic coda /r/ realisations; neither of these patterns are present in the AE variety of Bradford or Leicester, with this potentially accounting for their absence in both PE varieties. This is discussed in more detail below.

Overall, then, any influence of Panjabi on PE is not conclusively identifiable, nor can it be assumed to pattern similarly in each location or across variables. There is simply not enough research available at present to be able to confidently identify a direct link between Panjabi and PE. Further, it is unlikely that this in and of itself would account for all the patterns succinctly. The additional interaction with regional AE varieties and processes of contact perhaps facilitate a more compelling interpretation of the patterns, with the role of Panjabi not being consistent or clearly identifiable.

7.3.1 Other Indic languages

It was noted in the Fieldwork Chapter that Leicester has a sizeable Gujarati main language population. Just over 11% of the city's residents identified it as their main language in the 2011 census (ONS 2013b), with the total number of speakers likely to be much higher than this, as a consequence of the question which was included on the census form[30]. Although the influence of Panjabi has been considered in this thesis, with groups having been defined by parents' native languages, a number of PE speakers in Leicester commented that they spoke a small amount of Gujarati, with others likely to have been exposed to the language in some way.

[30] An initial question in the 2011 census asked 'What is your main language?' with answering options as 'English' or 'Other'. If 'Other', individuals were required to write in their 'main' language. 'Main language' was not further specified so it is not known how it was intended or how it was interpreted. It is also not known whether individuals could have written multiple main languages. For those who did not speak English as a 'main' language a further question was included asking individuals how well they spoke English with four possible responses: 'Very well', 'Well', 'Not well', 'Not at all'.

In Bradford, although the influence of Panjabi is being considered here, speakers are not strictly bilingual. The national language of Pakistan is Urdu, and many commented that they spoke this language alongside Panjabi. Additionally, a large proportion of the participants interviewed for the thesis knew a little formal Arabic, with this being the language of their religion, Islam.

The multilingual environment in which the participants live suggests that not only are the patterns observed here perhaps not clearly related directly to the heritage language of Panjabi, but any link between PE and Panjabi must take into account the other languages spoken by participants. Phonological similarities between Urdu, Gujarati and Panjabi mean that the features described here as characteristic of PE could have wider currency and be part of an Indic-language feature pool. Both Gujarati and Urdu have peripheral fronted and retracted vowels, and contrastive (labio-) dental and palatal semivowels. Urdu has contrastive dental taps and postalveolar flaps, while Gujarati has a postalveolar tap (Cardona & Suthar 2003; Schmidt 2003). Not enough is yet known about the fine grained phonetic variation both within and between these languages to make any strong claims about the role they may play.

7.3.2 Dialectal variation and contrasting language roles

Although cross-regional consistencies are observed, there are differences between the two PE varieties as spoken in Bradford and Leicester. The degree of lingual fronting is more advanced in Leicester and variants of /r/ are different in each location. Throughout this thesis a number of arguments have been put forward that aim to account for any differences, and although it has necessarily been acknowledged, dialectal variation in the heritage language has not been considered an appropriate interpretation at any point. It is perhaps probable that the differing roles and ideologies associated with the language in each location are also likely to be contributing to linguistic differences in PE, in addition to any dialectal variation in Panjabi. These ideological differences may be more likely to account for any divergent linguistic patterns between different PE varieties than diversity in Panjabi itself. However, this is not something which has been addressed in the thesis as other arguments have been considered to account for regional divergences observed here.

In Bradford, the variety of Panjabi spoken is regarded as a home or community language, with speakers having learnt this language from parents. The national language of Pakistan, where all of the Bradford PE speakers have family origins, is Urdu and the language of their religion is Arabic, with all PE participants in Bradford being Muslim. With one exception, all Bradford PE speakers report speaking this variety of Panjabi fluently, and many identify it as a native language. Atiya, the one speaker who does not claim to speak Panjabi fluently, comments that this is because she was not surrounded by the language when growing up. Many of the speakers use this language regularly, not just at home, but also at work and in the community. Despite this, Urdu and Arabic are regarded more highly than Panjabi, although community initiatives in the city are trying to encourage residents to value and use the home language as a way to retain the linguistic heritage of different communities (e.g. Conteh 2012).

In Leicester the variety of Panjabi spoken is highly valued. All of the Leicester PE participants identified themselves as Sikhs, and all had family origins in the Indian Panjab. Many commented that knowledge of the language was important so that they would be able to access Holy Scriptures which are written in Panjabi. Almost all of the participants that were interviewed talked about their reluctant attendance at Panjabi classes provided by the Gurdwara when they were growing up. Although many acknowledged using the language daily, reported competence was lower than that observed in Bradford. Many were hesitant to say that they were completely fluent and instead reported that they could hold a conversation or felt comfortable in most situations in which the use of Panjabi was required. The demonstrated use of Panjabi by PE speakers in Leicester was thus higher than that suggested by their questionnaire responses.

In both locations the ability to know the language in order to communicate with elders was considered highly important, particularly as a sign of respect. Further, both communities were clearly multilingual, with speakers regularly switching between two or more languages. Thus, it was not competence or use which varied between the two, but language attitudes and ideology.

In the same way that heritage language competence and proficiency do not predict the presence of heritage language features in English (Kirkham 2011; Sharma & Sankaran 2011), it is suggested here that linguistic variation in Panjabi dialects might not be the sole predictor of any within PE variation. Instead, the interaction this has with language roles and ideologies is likely to contribute to any variation that occurs. Much research into language contact has explored how the functions and uses of a language are centrally implicated in the degree of language shift in a multilingual community (e.g.

Ravindranath 2015). Within the dialect contact sphere, Watt (2002) has argued that attitudinal factors are more important than system-internal factors in dialect levelling.

The importance of exploring speaker attitudes and ideologies is reflected in work by Alam (2015), Kirkham (2013), and Sharma and Sankaran (2011), who all highlight the importance of social networks, communities of practice and ideology when attempting to understand linguistic variation in contact varieties of English. In the same way, this thesis is suggesting, that those functions and uses can also help us to understand patterns of variation and the presence of heritage language features in the new variety of English. These considerations could then help to account for any variation in the contact variety, particularly when accompanied by a better understanding of dialectal variation in Panjabi. Further ethnographic work would need to be undertaken before this could be properly considered here, with a consideration of diverse PE communities within a single location being of particular interest (see Sections 7.7 and 7.9.2).

Thus, it is considered unlikely that any dialectal variation in Panjabi would be the sole or primary reason for any differences between PE speakers. Further work is required before any claims can be made as a consequence of the aforementioned problems associated with identifying a convincing and direct relationship between PE and Panjabi. However, a language is more than its linguistic realisations, and understanding the associated ideologies and attitudes are crucial to the identification and consideration of any relationship between Panjabi and PE.

7.3.3 Summary: Research Question 2

The results reported in the thesis and the discussion presented above suggest that any direct relationship between PE and Panjabi cannot be confidently identified or assumed for any of the variables investigated here. Differing language dialects and ideologies, complex Indic-language communities, the interaction with regional AE varieties, and general processes of contact also need to be considered. Crucially, additional work on the phonetics of Panjabi and any related varieties needs to be undertaken before this question can be more comprehensively appraised.

The complexity associated with multilingual communities means that a direct link between one heritage language and a resultant contact variety is unlikely to be identifiable. This is especially true here where several pieces of the puzzle are currently missing. A broader spectrum of possible influences must be taken into consideration if we wish to account for the observed variation at an appropriate level of detail.

7.4 Cross-regional consistencies

Similarities between the linguistic characteristics of PE spoken in Bradford and Leicester have been reported throughout the thesis. Furthermore, parallels with work on other UK contact varieties of English have also been found. For voice quality, it was argued above in Section 7.3 that the comparable settings associated with PE in Bradford and Leicester could not confidently be related to the influence of Panjabi without further work. In Chapter 4 it was suggested that the consistent lingual fronting found in both PE varieties could provide evidence for a voice quality setting that speakers could adopt *off-the-shelf*. In this instance the term *off-the-shelf* is used to refer to a feature which can be adopted without any linguistic 'baggage' associated with it (see Section 4.6.5, Chapter 4).

There is no existing literature which uses a VPA-type analysis to characterise individuals who speak contact varieties of English in the UK. However, the phonation patterns reported here in PE are consistent with recent work by Szakay and Torgersen (2015) on MLE. For PE speakers in Leicester and Bradford, and MLE speakers in Hackney, creaky voice is found amongst females and breathy voice amongst males. It was argued in Chapter 4 that the presence of these phonation patterns in multiple locations was not necessarily a consequence of geographical diffusion from London. Instead, it was suggested that these patterns could be reflective of contact processes, with each location independently innovating similar patterns because of the comparable sociolinguistic environment in each place.

For the vowels, the shorter, monophthongal trajectories of FACE and GOAT and the raised onset of FACE are present in both Bradford and Leicester PE. The Leicester PE speakers pattern similarly to other contact varieties following what Kerswill et al. (2008) refer to as *diphthong shift reversal*, although this cannot be said to be happening in Bradford. All speakers in Bradford exhibit monophthongal realisations of both vowels. For MLE, Kerswill et al. (2008) note that it is the non-Anglo, and specifically Afro-Caribbean speakers, who are in the lead with this diphthong shift reversal, with networks also predicting the spread of the reversed variants. Kerswill et al. (2008) comment that the innovative patterns are likely to be the result of contact processes taking place in the capital, thus leading to a different linguistic situation from that in peripheral locations such as Milton Keynes and Reading.

The findings of this thesis are in line with comments by Kerswill et al. (2013; 2008) that contact can help to account for the variation observed in the FACE and GOAT vowels. It was noted by Kerswill et al. (2013) that the high frequency of peripheral, monophthongal realisations in L2 English varieties must contribute to their presence in MLE and other contact varieties of English, such as PE. Additionally, it was argued here that this pattern of *Diphthong Shift reversal* in Leicester PE and peripheralisation of FACE and GOAT in both Bradford and Leicester PE could be evidence of *simplification*, one of the processes that Trudgill (1986) argues can take place in new-dialect formation. In this case, contact varieties favour peripheral, monophthongal realisations, potentially because of increased perceptual difference between vowels, although perception experiments would be required to test these claims (see Section 5.6.3, Chapter 5).

Fronting patterns in GOAT and GOOSE were found to be geographically divergent, with region being a better predictor of fronting than language background. All speakers in Leicester were reported to exhibit more fronted realisations than speakers in Bradford, and within each region, PE speakers fronted less than the AE speakers (see Chapter 5). Interactions with voice quality settings were argued to more succinctly account for the variation. In Leicester, lingual fronting was more advanced than in Bradford, and within Leicester PE speakers exhibited less lingual fronting than the AE speakers. This regional variation in the degree of fronting observed with GOAT and GOOSE is reflected in other research on contact varieties of English spoken in the UK, with less uniformity reported (see Section 5.2.2.2 in Chapter 5). The inconsistent patterns in contact varieties of English suggest that GOOSE- and GOAT-fronting is not a contact driven change, but in fact, as suggested by Kerswill et al. (2013), is a global linguistic change. The lingual fronting described in Chapter 4 is possibly the global change, with back vowels fronting in response to this (see Section 5.6.5, Chapter 5).

For /r/, cross-regional similarities were not directly observed. Rather, the same process, *reallocation*, was argued to have taken place in Bradford PE and Leicester PE, with the resultant patterns being divergent from one another. Differences in the variants present in respective feature pools corresponded to differences in the output. In Bradford, the presence of alveolar taps in the AE was contributing to their retention in PE. By contrast, in Leicester, the presence of labiodental and labial-palatal variants in the AE was contributing to their retention in PE. Previous work on contact varieties of English spoken in the UK has commented upon the increased variability associated with /r/, and has often focussed on the realisation of non-prevocalic coda /r/. Retroflex and labiodental approximants, taps and trills have all been noted by various authors in different locations. However, there is a lack of sufficient evidence at present to permit an assessment of whether the reallocation argument suggested here can account for the specific variation in /r/ realisations in other contact varieties of English spoken in the UK. The lack of specificity given when describing the different variants employed means that it is not clear what role the AE and the heritage language may be playing in each context. However, the results of Chapter 6 concurred with previous work, in that it too reported on the increased variability associated with the realisation of /r/ in contact varieties.

To summarise, the realisations of FACE and GOAT and the phonation patterns described here for PE in Bradford and Leicester are consistent with those reported for other contact varieties of English spoken in the UK. The fronting of GOAT- and GOOSE- is variable and requires a local interpretation. This segmental fronting is perhaps a reflection of the more global linguistic change of lingual fronting. The lingual fronting reported here is consistent across Bradford and Leicester PE but it is not known whether this is present in other contact varieties of English. Realisations of /r/ are different in the two PE varieties, but the same process is argued to be taking place.

7.4.1 Geographical diffusion or independent innovations?

The arguments made throughout this thesis to account for the similar patterns observed in contact varieties of English spoken in the UK have not considered geographical diffusion as a satisfactory explanation. It is possible that the patterns observed in PE had innovated in larger urban centres such as Manchester, Leeds, Birmingham, or London and then diffused outwards to smaller urban locations like Bradford and Leicester. This would be consistent with a *gravity model* analysis (e.g. Britain 2013).

Indeed, the qualities of FACE and GOAT, the variation in phonation, and the increased variability associated with /r/ are all features which have been reported in contact varieties of English from different locations across the UK. Thus, perhaps these changes innovated in large urban centres such as Manchester or London. Many of the participants commented on having family and friends around the UK. In Bradford, participants regularly travelled to Leeds, and in Leicester, contact with Birmingham and occasionally London was not unusual. Few participants, AE or PE, had networks entirely confined to the city in which they lived.

However, I am unconvinced by the argument that these innovations take place in large urban centres and diffuse outwards from there. The recent work undertaken in London on the development of MLE specifically revealed that, contrary to expectations, the patterns observed in the capital were not more advanced than trajectories of change noted outside the city (e.g. Cheshire et al. 2013). Further, Kerswill et al. (2008) noted that the pattern of *diphthong shift reversal* observed in MLE and reported here in Leicester by the present study was not observed in the peripheral locations of Milton Keynes and Reading. Thus, if we are to assume that innovations from London and other large urban centres are diffusing outwards, one has to ask: why Leicester and Bradford, and not Milton Keynes and Reading? It is possible that the non-Anglo speakers who exhibit the *diphthong shift reversal* are in contact with other non-Anglo speakers around the UK, and thus the pattern diffuses not only from location to location, but specifically within non-Anglo communities, something speculated by both Stuart-Smith et al. (2011) and Kerswill (2015).

This research has found no evidence to suggest that the regional mobility patterns and face-to-face interactions of PE speakers in Bradford and Leicester are restricted to other PE or non-Anglo speakers. Further, MLE is a new urban variety not associated with a single ethnic group. Consequently, if one was to assume that the similar patterns observed in contact varieties of English have arisen as a result of geographical diffusion and face-to-face interaction, this should surely apply to both the Anglo and non-Anglo speakers of MLE in Hackney, and thus would potentially be expected in intermediate locations.

I also believe it is entirely possible that these patterns could spontaneously innovate in multiple locations, and further, that these locations do not need to be large urban centres. When discussing the global change of GOOSE-fronting, Koops (2010) notes that in Houston, Texas, there is evidence for two types of fronted variant. He argues that this is suggestive of multiple locations independently innovating in similar ways. Further, Schilling-Estes (2002) illustrates how two isolated US communities (Smith Island, Maryland and the Lumbee Native American community in Robeson County, North Carolina) are still linguistically innovative. I would suggest that the similar social demographics of many cities in which contact varieties are spoken predict a number of similar processes, some of which have been observed here. These can result in consistent cross-regional linguistic patterns (e.g. closer and fronter FACE), but can also result in divergent phonetic outputs (e.g. /r/ in Bradford and Leicester PE). We should perhaps not be surprised that similar linguistic changes are occurring, but we should attempt to account for what it is about these linguistic features which makes them so prevalent. This is something that the present thesis has attempted to do.

I am not attempting to discount geographical diffusion as a sensible and logical explanation for many patterns of linguistic change which are observed. However, I am calling into question the assumption that large urban centres are the places of innovation from which change diffuses in a one-way trajectory. As Kerswill et al. (2008) note, large urban centres such as London, Manchester and Birmingham have long attracted people from other cities and other countries, acting like magnets. The bringing together of so many varieties and linguistic forms means that large urban centres perhaps behave like ‘linguistic ovens’, with linguistic innovations being more likely to come to fruition in these places. To continue Britain’s (2012) analogy, it is large urban centres where the cakes may be baked, but the ingredients can come from a number of locations.

Foulkes (1997) discusses the decrease in linking /r/ in Newcastle, where a glottal stop is being used as a potential alternative to the alveolar approximant [ɹ]. This pattern is consistent with that noted in contact varieties of English spoken in London (Gabrielatos et al. 2010; Britain & Fox 2009). It is probable that these /r/-sandhi patterns have developed independently of one another, with the glottal stop present as a minority variant in any number of locations. Similarly, the linguistic parallels observed in contact varieties of the UK are argued here to have arisen independently of one another. Interactions between large urban centres and smaller peripheral locations reaffirm and establish innovations, with the large urban centre influencing smaller locations, and vice versa. Thus, it is neither hierarchical nor counter-hierarchical diffusion (e.g. Britain 2013), it is both. In a way, these innovative forms are truly supra-local. It is not that innovative features are more likely to originate in large urban centres, *per se*. Rather, it may be the case that if there are minority variants present, the chances are they will become established as innovations in large urban areas because of the diversity and variation present. Innovative patterns are *reaffirmed* through contact with big cities; these places are not necessarily the hubs of innovation.

7.4.2 Summary: Research Question 3

In order to account for the cross-regional consistencies found in PE, and more widely in contact varieties of English spoken in the UK, it is necessary to consider a number of explanations. Similar linguistic outputs may be observed in contact varieties of English but that does not necessarily mean that these realisations are exactly the same, nor that they have originated in the same place. Instead, the similar linguistic context may predict similar processes which often, but not always, have similar linguistic outputs. The interaction between these independently innovated patterns and multi-directional diffusion both need to be considered when accounting for the cross-regional linguistic consistencies observed in contact varieties of English spoken in the UK.

7.5 AE: The influence of the regional variety

In each location the influence of AE was always reported to be relevant, with a consideration of the role it plays facilitating a better understanding of the variation. The voice quality profiles described for PE speakers in Chapter 4 were found to exhibit some cross-regional similarities. However, the differences which were present could often be explained by considering the local AE variety. In Leicester, lingual fronting was more advanced for all speakers as compared to those in Bradford, and in Bradford, non-neutral velopharyngeal settings were more marked amongst all speakers than they were in Leicester. Correspondingly, Leicester PE speakers exhibited more marked lingual fronting than Bradford PE speakers, and non-neutral velopharyngeal settings were more marked in Bradford PE than Leicester PE (see Section 4.6.3, Chapter 4).

For the vowels, an interaction between the AE and PE varieties was reported in Chapter 5. The fronting of GOAT and GOOSE was better understood when assessing the regional situation. Simply recognising the heritage language influence or identifying parallels with other contact varieties of English would have resulted in an incomplete interpretation. The shorter trajectories in FACE and GOAT among PE speakers in Leicester needed to be evaluated in relation to the wider trajectories of the AE speakers in this region. The process of simplification that is argued to be taking place in both PE varieties needs to be locally interpreted: it is not that the two PE varieties exhibit exactly the same linguistic variants, but that their relationship to the AE in each location is consistent with what would be predicted by contact processes.

The interaction between AE and PE is perhaps most clearly evidenced by looking at the variation in the realisation of /r/ in Chapter 6. The increasing presence of labial tokens in Leicester PE versus the high frequency of taps in Bradford PE is a reflection of the differing feature pools in each location (Mufwene 2001). However, in the present context it is not necessarily the properties of the relevant varieties of Panjabi that would best explain the difference, but the nature of the variation in the local variety of AE. In Leicester, labiodental and labial-palatal tokens were present in AE, and similar tokens are part of Panjabi (although in Panjabi these are not rhotic variants, see 6.2.3). In Bradford, taps are present in AE (although decreasing in use) and are found in Panjabi. The feature pool for PE speakers in each location differs because of regional differences in the AE variety. These differences in the feature pool are reflected in the resultant output. The low presence of features such as retroflexion and non-prevocalic coda /r/ realisation in PE suggests that these marked and salient forms are avoided, in some conversational contexts at least, potentially because they are not present in either of the AE varieties (see below).

The relevance of variation in the AE variety to the patterns of variation in the corresponding variety of PE is clear. Previous work on contact varieties has noted that the interaction between local and ethnic features results in variation which indexes a blended local and ethnic identity (e.g. Alam 2015; Stuart-Smith et al. 2011). In London, the development of MLE is not restricted to the speech of one particular ethnic or language group, with the interaction between Anglo and non-Anglo patterns important (e.g. Cheshire et al. 2008). Similarly, work undertaken by Fox (2007) in Tower Hamlets highlighted that speaker networks best predicted the variable linguistic patterns. Here, the relationships to, and influences of, AE are helping us to understand the linguistic outcomes of contact processes.

7.5.1 Summary: Research Question 4

The influence of AE on PE is consistently observed in each location. Consideration of the relationship between AE and PE has facilitated a better understanding of the processes at play, particularly when differences between the two PE varieties were observed. These findings are consistent with previous work and illustrate the importance of framing any interpretation of contact patterns in a local setting.

7.6 The research questions

Although each research question has been considered separately throughout the thesis, the results presented in earlier Chapters and the discussions above all highlight the complexity associated with accounting for the patterns we see in contact varieties of English. No single predictor can account for the patterns observed; it is how these factors interact which is important. The lack of research currently available on the phonetic variation in Panjabi highlights that pieces of the puzzle are still missing and the results presented here cannot yet be fully appraised. However, the results and subsequent discussions have illustrated the important interactions which can be argued to take place in situations of contact.

7.7 Ethnicity and the role of identity

Assessing the role of identity has not been addressed in this thesis. The primary explanations have focussed principally upon arguments which could account for the consistent cross-regional linguistic patterns present in PE and other contact varieties of English. Through addressing the research questions outlined in Chapter 1, and reiterated here in Section 7.1, this thesis has identified a number of linguistic processes which are taking place simultaneously across contact varieties spoken in the UK. Identity is a fluid, locally-oriented, individual construct. It is not something which is consistent within an individual, across a community, or across communities in different locations. Thus, the indexical value of a given variant cannot be assigned with any certainty to groups defined by macro-level social categories (e.g. ‘Panjabi’, ‘female’) with little exploration of intra-speaker variation, particularly when one is comparing speakers across different regions. As noted by Sharma and Rampton,

> [P]ure inferential extrapolation of meanings from quantitative variationist patterns can risk ascribing the wrong meaning to variants (‘masculine’, ‘Asian’), which leads to inaccurate description of the motivation of change. (2011: 20)

Although consistent linguistic characterisations have been reported in this thesis which have generalised across PE speakers, there was both inter- and intra-speaker variation. Considerations of where identity may be being indexed were suggested. For voice quality, the profile involving lowered larynx, denasality, lax overall muscular tension and retracted lingual posture was exhibited only by male PE speakers. It was noted in Chapter 4 that the speakers who exhibited this profile all shared a similar view, namely an ambivalent attitude towards the local area. For vowels, Bradford PE females retain a retracted GOAT and GOOSE vowel despite exhibiting lingual fronting, this perhaps being a reflection of social variation. And with /r/, the within-PE variation in each location may be socially variable. In Bradford it was noted that the proportion of taps exhibited by PE speakers quite closely corresponded to the amount of contact individuals had with non-PE speakers. And in Leicester PE, the proportion of labial forms was significantly higher for females.

More in depth ethnographic fieldwork would need to be carried out in each location to ascertain what indexical values are associated with the PE variants reported here (see Section 7.9.2 below). Irrespective of any future work, I do not necessarily believe that the linguistic differences between AE and PE groups are accounted for by assuming that the PE speakers are indexing an ethnic identity, shared or otherwise. Not only does this fail to account for the variation in an appropriately nuanced way, it also misrepresents speakers' identities and linguistic patterns.

Ethnicity is interpreted here as referring to the status or label given to individuals which is often used to signify the shared identity of a particular group. This label may reflect a shared culture, tradition, national heritage and / or race. What the limits of this group are and whether there is consensus amongst speakers who form part of the group or between speakers of different groups is not clear. Moreover, it cannot necessarily be assumed that ethnicity is a static part of an individual's identity, with its definition and expression varying both between and within individuals. The term 'Asian' provides a good example of this variation. In the UK, the term Asian is commonly used to refer to individuals with family heritage in the Indian subcontinent. However, in the US the term 'Asian' refers to not only those from the Indian subcontinent but also those with family heritage in east or South East Asia. Within the UK, the term Asian assumes a level of homogeneity in identity which may not be present. This thesis has highlighted the linguistic and ideological variation amongst individuals from the Panjab, with these speakers reflecting only a sub-group of the wider Asian diaspora in the UK.

The complexity associated with ethnicity is the main reason this thesis explicitly categorised speakers by language background and not ethnicity. In the same way that sociolinguistic work exploring gender would not automatically assume that any difference between men and women had come about because women were indexing their gender identity, so work on ethnicity should not automatically assume that differences between, for example, AE and PE speakers arise because PE speakers are seeking to index their ethnic identities. Speakers may not necessarily be indexing an ethnic identity by deploying the linguistic variants considered here, the speakers and the associated variants *are* the ethnic identity. The forms that speakers use may become associated with the group by outsiders, but not necessarily by within-group members.

The PE participants in this study self-reported nineteen different ethnic identities. To suggest that it is ethnicity which is being indexed when observing differences between PE and AE speakers would suggest that this was the difference which speakers identified as distinguishing between these groups. Further, it would assume that ethnicity was the thing which was most important to the group described as exhibiting a given feature over other identities which may unite speakers. This idea is particularly pertinent here.

In Leicester, twelve of the twenty-five PE speakers gave Sikh as their ethnic identity. A number of this subgroup of participants commented that having the ability to identify Sikh as an ethnic identity was something they felt strongly about. These individuals discussed how they were often frustrated when they did not have the opportunity to report Sikh as their ethnicity in questionnaires or census forms. This variation in ethnic identification did not account for any of the within-group PE variability among the Leicester PE speakers based on the variables considered in this thesis. Whilst I am not suggesting that these within-group patterns are not related to identity – it is likely that they are – I am suggesting that they are not necessarily or directly related to ethnicity in this case.

In respect of intra-speaker variation, Shafiq, a Bradford PE male, exhibited an essentially Bradford AE-type repertoire featuring few linguistic indicators of his language background and ethnicity. However, during the Paired Conversation he spends some time discussing his childhood in Bradford. Whilst discussing games and local hangouts his variants shift dramatically; the presence of features associated with 'Asian-ness' increase. There are, amongst other things, numerous instances of tapped /r/, segmental retroflexion of coronal consonants, and peripheral realisations of FACE and GOAT. To suggest that during this period Shafiq is indexing his ethnicity is too simple an interpretation. It misrepresents what Shafiq is doing, and implies that the way to index ethnicity is uniform across speakers. This is a suggestion that is countered by Sharma and Rampton in their consideration of the lectal variation demonstrated by Anwar, a second-generation Asian in Southall, London. Reflecting on the linguistic variation exhibited by Anwar with regard to a number of features the authors note that, ‘These variants do not have any default values for Anwar, at least not values that transcend context’ (2011: 14). Comments by Alam (2015) further exemplify this point:

> [E]ach variable patterned differently. This suggests that different features function symbolically in different ways in particular contexts for different social groups and individuals in constructing ethnic identities. This shows that these are not just Glasgow-Asian girls, but particular types of Glasgow Asian girls. (2015: 214)

In a similar way to how Sharma and Rampton (2011) argue that Anwar’s use of different variants do not correspond to specific default values, and how Alam (2015) highlights the fluidity of speakers’ identities and the variants which correspond to these, I am suggesting here that perhaps Shafiq’s use of PE forms when discussing his childhood does not necessarily correspond to him indexing his ethnic identity. His use of these forms in these contexts could be related to the kinds of forms which he used more frequently when growing up, with his adoption of the forms in this context possibly forming part of a nostalgic reflection.

Claiming that it is ethnicity which speakers are indexing in our comparisons between Asian and Anglo speakers assumes that ethnicity is more important than other non-linguistic differences which may exist, be they cultural, religious, or of some other sort. Further, it assumes that variants have only a single meaning which is maintained both within- and between-speaker repertoires. Alam (2011) illustrated that within-group variation was present amongst the Asian adolescents that she interviewed, with the variation being related to communities of practice. These communities of practice were comprised of speakers who took part in a variety of activities and identified themselves in different ways. Similarly, Sharma and Rampton (2011) explored how varying the interlocutor and conversational topic resulted in linguistic variation, with an increase in Asian features not solely or clearly indexing ethnicity. The varieties of MLE and MME are not associated with a particular ethnicity, but the linguistic patterns found within them are explained by processes that are known to be typical in situations of language and dialect contact. The distribution of variants is explained by speaker networks, something which may account for the patterns observed here.

It makes sense to suggest that by considering both the linguistic and social predictors of variation more carefully we can be confident in the patterns that we identify and the connections that we make. Moreover, we better account for the variation and appropriately represent the speaker patterns being reported. In accordance with comments by both Harris (2006) and Stuart-Smith et al. (2011), many of the speakers here exhibit blended ethnic identities, with speakers being both British or English, and Indian or Pakistani or Sikh or Muslim or Asian. However, this blending does not end here, with both PE and AE speakers reflecting complex blends of local, ethnic, religious, cultural, class, and gender identities, with the differing levels of value and importance being placed on these varying by individual speakers, and by specific contexts (e.g. Alam 2015; Kirkham 2015). Future work might explore these interactions more closely (see Section 7.9.2).

7.7.1 'Levelling' of retroflexion and non-rhoticity

It was noted in both Chapter 4 and Chapter 6 that retroflexion was not a characteristic component of either the long-term settings or segmental /r/ realisations associated with PE in Bradford and Leicester. This appears to be at odds with some of the research into contact varieties of English which have an Indic language as a heritage language (e.g. Hirson & Sohail 2007; Sharma 2011; Heselwood & McChrystal 2000). Some of this work has focussed on retroflexion of /t/, /d/ and /n/ (e.g. Heselwood & McChrystal 2000), and some has remarked upon retroflexion with /r/ (e.g. Hirson & Sohail 2007).

The findings reported here are, however, consistent with findings from Alam (2015) and Verma and Firth (1995), both of whom comment on the absence of retroflexion amongst their speakers. Further, even within the previous work which has observed retroflexion it has been noted as variable. Sharma (2011) noted that retroflexion varied across speaker groups by both age and gender. Additionally, she commented that the degree of retraction was variable. Not all 'retroflexion' corresponded to full sub-laminal retraction (2011: 469).

Perhaps the presence of retroflexion in contact varieties reflects an *interdialect* form of Stage I of Trudgill's (2004) new dialect formation. These are described as forms which reflect partial accommodation, not being present in either language. Retroflex articulations in many Asian Englishes would perhaps be consistent with this description, with variants which are coded as such often being said to vary between retracted alveolars and full retroflex articulations (e.g. Sharma 2011). Indeed, Alam (2015) comments that for /t/ there is no evidence for auditory retroflexion corresponding to sub-laminal articulations, with auditory apical retraction more common. Thus, first-generation speakers may exhibit retroflexion in the English that they speak. However, because of the feature being infrequent and being overtly stereotyped it is being levelled out, with only apical retraction consistently observed (e.g. Alam 2015, Alam & Stuart-Smith 2014). This could account for its absence from the data reported here.

Levelling is one of the processes which Trudgill (1986, 2004) associates with new dialect formation. It refers to the loss of marked forms (e.g. Trudgill 2004). Britain (2012) suggests three ways in which a feature could be described as 'marked':

> [M]arked in the sense of being in a minority in the ambient linguistic environment after the contact 'event', marked in the sense of being overtly stereotyped, or marked in the sense of being found rarely in the languages of the world and/or acquired late in first language acquisition. (2012: 224)

In their accent judgement task, Heselwood and McChrystal (2000) reported that 60% of their respondents used retroflexion as a cue when determining the presence of features 'not associated with monolingual varieties of British English' (2000: 46). However, close auditory analysis revealed that retroflexion was only present in the speech of participants at a rate of 20% to 40% for /t d n/. Thus, when present, retroflexion was consistently associated with being a non-monolingual feature, but use of the feature was not particularly high.

Retroflexion is not found in varieties of AE spoken in Bradford and Leicester. Thus, it is in a minority in the input for PE and potentially other Indic-language contact varieties. Further, both Heselwood and McChrystal (2000) and Sharma (2011) demonstrate that there is an awareness of the feature, both within the community and among outsiders. Sharma notes that some interviewees in Southall specifically referred to retroflexion as 'characteristic of either Indian English or Southall speech' (Sharma 2011: 470).

However, levelling would not account for the findings reported in both Sharma (2011) and Sharma and Sankaran (2011). They argued that although results from sociolinguistic interviews suggested that retroflexion of /t/ among second-generation speakers was becoming less common as speaker age decreased, this was a misleading picture. Sharma and Sankaran (2011) noted how the younger speakers had structurally reallocated retroflexion, by using it primarily in word-initial position. Importantly, both studies demonstrated that use of retroflex variants was also variable by interlocutor and context. Younger females, who had the lowest reported proportion of retroflexion in sociolinguistic interviews, were consistently found to use the variant at home.

This thesis has reported only on data gathered in a sociolinguistic interview. Although a number of other tasks were completed and the results of two have been reported here, they were all undertaken as part of the interview in a controlled environment with the researcher (a non-PE speaker) always present. Thus, the absence of retroflexion observed in this dataset may be a reflection of the type of data gathered and not clearly an indication that this form is not present at all. It is possible that I did not gain access to a repertoire where retroflexion would be used, as consistent with comments made by Sharma when explaining the intra-speaker variation of two second-generation Asian females:

> The first conclusion tentatively proposed in Part I was that younger women avoid use of the Asian retroflex variant. However, Namrita's (and Guddi's) repertoires showed an Asianized style reserved for home interactions, a context which appears to be a core conduit for retention of traits for both women. […] standardness in interviews is therefore *not* indicative of a rejection, total absence, or non-acquisition of Indian style. (2011: 482).

Perhaps it is precisely because this feature has become associated with Asian-ness that its use has become restricted to 'inter-Asian' interactions. Thus, although it may be being used to index an aspect of speakers' identities it may not necessarily be that it is being used to index an *Asian* identity. Rather, it may be being used to consistently affirm and establish in-group patterns and relationships in contexts where speakers have access to the same feature pool. This would concur with Sharma and Rampton (2011) who demonstrated context-dependent indexicality amongst second-generation Asian males in Southall.

Additionally, the work by Alam (2015) highlights that fine phonetic detail is crucial when assessing any retraction amongst Asian speakers, with nuanced differences between speakers in their degree of retraction with /t/. Comments by Sharma (2011) which suggested that retroflexion is now associated with an Indian English or Southall English accent are particularly intriguing, with the distinction between what is 'Indian' and what is 'Southall' being of particular relevance.

Although further work would be needed, a similar argument may account for the low frequency of non-prevocalic coda /r/ realisations among PE speakers here. No comprehensive quantitative analysis of this was undertaken. Impressionistically, PE speakers do not appear to have non-prevocalic coda /r/. However, there is intra-speaker variation. Halim, a Bradford PE male, did not realise non-prevocalic coda /r/ at any point throughout the Paired Conversation, but as soon as he commenced the Reading Passage, non-prevocalic coda /r/ was consistently realised.

Heselwood and McChrystal (2000) comment that non-prevocalic coda /r/ realisations provide evidence of Panjabi influence, yet there are hardly any tokens in the results from the wordlist data they report. Rathore-Nigsch (2015, 2011) observed a substantial decrease in realisation of non-prevocalic coda /r/ from first- to second-generation speakers on the basis of her analysis of recordings of spontaneous speech in Leicester. Hirson and Sohail (2007) commented that non-prevocalic coda /r/ realisations corresponded to speaker identity, which suggests that there may be an awareness of the variation. Few varieties of English spoken in England realise non-prevocalic coda /r/ and in those that do, it is a marked and salient feature of the variety. Thus, the realisation of non-prevocalic coda /r/ is not frequent or consistent amongst speakers of contact varieties. However, when it is present it is salient to listeners in the same way that retroflexion is. It might then be expected that this would pattern similarly to retroflexion.

7.8 Is PE a new cross-regional variety?

The similar patterns observed in two geographical locations might suggest that PE is a new and developing cross-regional variety, or koine. However, the discussion above in Sections 7.3 and 7.4 illustrates that connections to a single heritage language are both incomplete, in that they fail to account concisely for the consistencies observed in other contact varieties of English in the UK, and also problematic to confidently identify, given the dearth of literature currently available on Panjabi and related varieties. Further, considerations about geographical diffusion in Section 7.4.1 and the influence of AE in Section 7.5 argued that the processes reported to be taking place in each location are developing independently of one another. These processes are taking place and interacting with AE in each location, with this interaction resulting in a locally-positioned contact variety. This sometimes results in similar linguistic patterns (e.g. FACE, see Chapter 5), but can result in divergent linguistic realisations (e.g. /r/, see

Chapter 6). Thus, it would seem that PE is not a new *cross-regional* contact variety, but the consistent processes observed do suggest that Bradford PE and Leicester PE may be new dialects (Trudgill 2004, 1986).

As predicted in Chapter 2, evidence for a number of processes of new dialect formation are argued to be taking place in Bradford and Leicester PE. The pattern of *reallocation* was reported in Chapter 6 to account for the variation observed in realisations of /r/. Reallocation occurs when multiple variants of a single variable remain after the dialect contact process has taken place (Britain 2012; Britain & Trudgill 2005; Trudgill 1986). Socio-stylistic reallocation was argued to have taken place in both locations, with variants which were present in the AE variety now being increasingly present in the PE variety. In Bradford, taps are increasingly present in PE with decreasing usage found for the AE speakers. In Leicester, labial variants are frequently observed amongst PE speakers, with these also exhibited by some AE speakers.

Simplification is often defined in relation to morphemic regularity, with the potential outcome being that minority variants could win out if they increase regularity or reduce the number of categories involved (Britain 2012; Trudgill 1986). This process was argued to have taken place for FACE and GOAT in Chapter 5, with the shorter trajectories and peripheralisation of these vowels leading to an increase in phonemic regularity, with clearer structure and simplicity emerging in the vowel space.

Lingual fronting was also argued to be taking place in both locations, but it was not thought to exemplify one of Trudgill's (1986) processes of new dialect formation. Instead, it was suggested that this reflected an *off-the-shelf* (e.g. Eckert 2003; Milroy 2007) articulatory setting. Although not considered by Trudgill, the characteristics of *off-the-shelf* features as defined in the current thesis would perhaps be expected in situations of new dialect formation. In this context, the term *off-the-shelf* is used to refer to a feature which can be employed by speakers who may not be in contact with other speakers who exhibit the feature, and as such, the feature in its abstract form does not have any 'baggage' (social or linguistic) (see Section 4.6.5 in Chapter 4). As discussed in Chapter 4, the absence of social baggage which accompanies *off-the-shelf* features, coupled with the fact that new dialect contexts require speakers to redefine local norms, make such features favourable adoptions in new dialect situations, particularly when these new dialects are being developed alongside already existing speech communities. Unlike the contexts in which new dialect formation is often described, the situations in

Bradford and Leicester do not constitute contexts in which everyone in the community is a newcomer. These varieties are emerging alongside pre-existing speech communities.

In addition to finding evidence for a number of processes which take place in new dialect formation, the thesis also concurs with much work on language and dialect contact in that it too has reported on increased variability amongst speakers of the contact variety. The characteristic voice quality profiles of PE speakers (see Chapter 4) and variable realisations of /r/ (see Chapter 6) both exemplify the increased inter- and intra-speaker variation expected at Trudgill's Stage II of new dialect formation (2004).

Trudgill (2004) comments that it is not until Stage III that the new dialect can be considered fully formed, noting that:

> The third stage in the development of colonial Englishes is represented by the arrival at the final, stable, relatively uniform outcome of the new-dialect formation process. (2004: 113)

This thesis has considered only the speech of second-generation speakers and the development of a variety at Stage II. Thus, perhaps we shall have to wait to see how these regionally specific contact varieties end up. However, this idea would presuppose a linear trajectory where age correlated with generation. A connection of this kind is often absent, particularly in the contact situations considered here. The younger second-generation speakers recruited for this thesis are contemporaneous with the third-generation children of some of the older second-generation speakers. Further, migration is ongoing in both locations and throughout the UK. Although the major waves of migration from India and Pakistan took place in the 1950s and 1960s, people are still arriving from these countries, and other waves of migration from other parts of the world are continuing to change the demographic profiles of the cities. Changes in demography and social context are potentially more relevant to the progress of linguistic changes than the generational group being considered, as is highlighted by Sharma (2011). In many ways, the varieties of English spoken in these cities are in a constant state of Stage II evolution, never reaching the stability which might be associated with Stage III, but always with the established native English speaking populations which distinguish them from Stage I.

To sum up, PE is not considered here to be a homogeneous, cross-regional, supra-local variety. Instead, consistent linguistic processes are argued to recur in each location as a consequence of the similar ingredients that are contributing to the mix. These often result in similar linguistic realisations, but variability may occur. To truly understand the processes which take place, the contact variety must be assessed in relation to the local AE variety (and any other variety spoken in the region). A consideration of this interaction enables us to both understand and perhaps even predict the patterns observed.

7.8.1 A continuum of variation

Although it is suggested that the two PE varieties under consideration here are independently-developing contact varieties of English, it would of course be premature to suggest that they were entirely separable from any other varieties spoken in either of the cities under consideration here. All speakers of PE are likely to exhibit a continuum of variability. At one extreme, PE could be argued to have a phonology and phonetic realisations that are indistinguishable from those in a given region's AE, and at the other extreme, a phonological and phonetic system perhaps similar to that of Panjabi (or another heritage language). This idea of a continuum is similar to Benor's (2010) idea of an ethnolinguistic repertoire. I am hesitant to characterise any continuum as specifically *ethno*linguistic, however, as it is unclear what the limits of PE variability are associated with and how these interact with other aspects of individuals' identities. Establishing the limits of this variability and what the constraints on realisation are (be they linguistic or identity-related) are topics for future research.

Moreover, 'regional varieties' cannot be considered single, homogeneous entities. During the participant recruitment phase of the present study, I attended a community event in Bradford and spoke to a number of people. I had with me some flyers which I was distributing to people, in which I detailed some information about the project. The title of this flyer was '*The Bradford Accent*'. The community organiser suggested that I should add an '*s*' to the title, the city being a place of many accents, not a single one. In the same way that one could identify the extremes of PE variation, one could attempt to define the extremes of variation within a given region, variation within the region being predictable from interactions between an array of linguistic and social factors. It is considered that the results presented here highlight that, *contra* to Labov (2001: 20), dialect contact is of crucial importance when attempting to understand linguistic variation, with dialect contact, in a sense, being the macro-level variation to more micro-level accommodation. This idea is summed up neatly by Mufwene (2001):

> Contact, which has been dealt with primarily at the level of dialects or languages, really begins at [the] level of idiolects. Since the locus of dialect or language contact is the mind of the individual speaker, the difference between idiolect contact and language or dialect contact is more quantitative than qualitative. (2001: 150)

7.9 Future work

7.9.1 British Panjabi

Although research exploring variation in British Panjabi has previously been carried out (Stuart-Smith & Cortina-Borja 2012; Heselwood & McChrystal 1999), further work examining British Panjabi in more detail would be worthwhile. It would facilitate a better interpretation of the patterns described here in PE and would help to address some of the issues discussed in the Background Chapter that are associated with the ideological and linguistic variation associated with the language.

It is probable that the patterns observed here would be different if national language ideologies were different, as such it would be informative to compare the situation in the UK with that in the US, Canada, Australia, or even a non-Anglophone country. The UK, and more specifically England, is not a place which encourages and appreciates multilingualism, particularly amongst migrant communities (e.g. Doyle 2015). Thus, if heritage languages were more widely accepted beyond the communities of speakers who use them, the patterns might be different. Little value is given to these heritage languages beyond the communities who use them, and often within the communities English is considered more valuable. In many ways, it would perhaps make more sense for children in Bradford and Leicester to be taught an Indic language at school than a modern European one. This would encourage cross-community communication and help with the maintenance of community languages. The children in these cities would be learning a language which they could use every day in the city in which they live. One role of linguists should be to encourage and contribute to the wider debate about language maintenance.

7.9.2 Ethnographic fieldwork

Future work will seek to more fully explore the relationship between the linguistic features identified here as characteristic of PE and what indexical value these might have for the speakers. This will involve the undertaking of more ethnographic fieldwork, with further recordings being made of speakers in each location, and closer attention being paid to social networks and communities of practice. Future work would also expand upon the current sample by including recordings of participants from different PE communities in both Bradford and Leicester. As discussed above in Section 7.7, the focus of this thesis has been to investigate the cross-regional development of two contact varieties of English spoken in the UK with a shared heritage language. The values associated with any of the linguistic variants are likely to be locally variable, with the arguments here having focussed on linguistic explanations behind the parallels reported.

Previous work which has examined the development of contact varieties in English has often taken a more ethnographic approach (e.g. Cheshire et al, 2008; Kirkham 2013; Sharma 2011; Stuart-Smith et al. 2011). Within these studies, non-Anglo speakers are frequently reported to exhibit an innovative variant, with friendship groups and ideology then predicting how this variant will spread through the community. This thesis has focussed on why these innovative variants arise, with future work hoping to more closely explore their spread through a community and the values associated with them.

7.9.2.1 My role as a fieldworker

Not being a community member probably inhibited the degree to which I could fully access speakers' repertoires, this being further affected by the fact I undertook only one interview with each informant. I also do not speak Panjabi, the heritage language which has played a central role throughout this thesis.

To fully appreciate the variation and contact which is present within multilingual communities, future work will seek to explore it with fieldwork being carried out by both myself and multilingual speakers. Although I did not record any, codeswitching of course occurs, with the relationship this has to style-shifting likely to be relevant. In many ways, my presence in the community and interest solely in English perpetuates the idea that English is separate and distinct from any other languages spoken. Panjabi itself is a language characterised by language and dialect contact, and the variation within the language reflects this. As Matras (2009: 4-5) notes, multilingual speakers do not demarcate between languages, as the distinctions between languages are arguably socially-constructed rather than linguistically ‘real’ ones. Thus, the data I have recorded reflect only one aspect of speakers’ repertoires.

7.9.3 Variable analysis

Considering the voice quality results here, future work will more comprehensively explore the problems associated with making comparisons between vocal settings and segmental vowel results. Further, I would encourage any investigator undertaking sociolinguistic fieldwork to consider a voice quality analysis in accordance with Abercrombie’s (1967) definition in order to more rigorously account for any variation observed. Future work into voice quality patterns will also explore alternative statistical methods which could be used to more fully account for the data reported.

Perception tests and further statistical analysis will be undertaken on the vowels. It was suggested that the patterns observed in PE were an example of simplification, these contact-induced changes potentially increasing the perceptual differences between the vowels and resulting in more simiplicity in the vowel space. Thus, perceptual tests would explore whether any increased perceptual distance is salient when comparing the vowel spaces of PE and AE speakers. Statistical analysis consistent with that used by Fox and Jacewicz (2009) could more thoroughly account for the patterns than a linear analysis is capable of.

With regard to rhotics, future work aims to more comprehensively characterise variants that occur in all phonological contexts and explore the phonology of /r/ more closely. The inclusion of /r/-sandhi contexts and a consideration of other liquid and glide realisations alongside hiatus patterns would be of primary interest and would enhance the understanding of the /r/ patterns presented here.

Additional features could also be explored to further characterise PE in these two locations and complement other work which is being carried out on contact varieties of English spoken in the UK. Exploring the retraction of /t/ and /d/ would serve to address whether retraction or retroflexion is present in the data amongst any segments. Additionally, the inclusion of more vowel descriptions would also provide a more comprehensive illustration of these varieties.

7.10 Summary

This Chapter has related the research findings to each of the research questions in turn. In assessing research question 1 a number of characteristic patterns of PE have been described. In answer to research question 2, this Chapter has demonstrated that there is no clear or direct link between PE and Panjabi for any of the variables considered here. In answering research question 3, it has argued that cross-regional consistencies are most likely to be related to independent innovations, rather than geographical diffusion. And, finally, with respect to research question 4, it has highlighted that the local AE variety must be considered in any interpretation of the development of a contact variety spoken in the UK. The patterns of a given contact variety require interpretation against the backdrop of the existing local varieties.

In the discussion I put forward in Section 7.7 I was hesitant to ascribe any definite correlations to entire groups defined by macro-social categories. I do not believe that PE is a cross-regional contact variety, but I do believe that within each region, PE is a new and developing variety, or koine. A number of areas have been outlined for future research with a great deal of questions still remaining.

8 Conclusion

Throughout this thesis, consistent linguistic patterns have been observed in two regional varieties of Panjabi English (PE). In both Bradford and Leicester, a consideration of the heritage language, the local Anglo English (AE) variety and potentially predictable processes of contact have all been shown to interact and play a role in the development of contact varieties. For voice quality, non-neutral velopharyngeal settings, lingual fronting and raised larynx were exhibited by speakers of PE in both Bradford and Leicester. Regional differences between the PE varieties corresponded to interactions with the AE in each location (see Chapter 4).

For FACE, GOAT and GOOSE, PE speakers showed qualitative differences to AE speakers in a given region. In Bradford, all speakers retained monophthongs for FACE and GOAT, with diphthongs observed for GOOSE. In Leicester, diphthongal realisations of FACE and GOAT were found for all speakers, with a monophthongal GOOSE used in this region. PE speakers showed closer and fronter realisations of FACE relative to the AE speakers in a given region. GOAT and GOOSE were less fronted amongst PE speakers than AE speakers within a given region. In addition, PE speakers in Leicester showed less movement across the trajectory for FACE and GOAT than Leicester AE speakers (see Chapter 5).

Considering the realisation of /r/, once again the interaction with AE was of relevance. In Leicester, PE speakers varied primarily between labial and post-alveolar approximants, and in Bradford PE speakers fluctuate between the post-alveolar approximant and alveolar tap. In this instance, the two PE varieties exhibit divergent patterns which were argued to be a reflection of differences in the two regional AE varieties. In both locations, PE speakers are in part characterised by increased phonetic variability associated with their realisations of /r/ (see Chapter 6).

The data were interpreted according to theoretical models designed to account for what happens in both dialect-contact and language-contact scenarios, and thus brought together ideas from disparate fields. The results reported in the thesis concur with previous research by demonstrating that speakers of a developing contact variety show increased variability (both inter- and intra-speaker). The importance of the relationship between AE and PE has been consistently demonstrated, although many questions still remain unanswered. Future work aims to address a number of these remaining questions (see Section 7.9, Chapter 7).

This thesis has proposed a number of explanations to account for the linguistic similarities reported in PE. The same processes are argued to be taking place in both Bradford and Leicester PE, with these often, but not always, resulting in the same linguistic output. The characterisation of two geographically separate contact varieties in this thesis provides further evidence of the linguistic parallels present amongst contact varieties of English spoken in the UK. This thesis has exemplified how contact varieties must be considered in the local context in which they are developing, with cross-regional similarities potentially reflecting independent innovations triggered by comparable linguistic contexts.

Appendices

Appendix 1: Questionnaire used during fieldwork.

This questionnaire is split into four sections. The first asks you for some information about yourself. The second asks for information about your language knowledge and use. The third section contains questions about identity and the fourth asks questions about your friendship group. The questions have been designed to allow you to answer in whatever way you feel most appropriate. You do not have to answer any of the questions if you do not feel comfortable doing so. Feel free to leave additional comments in the spaces provided. Please contact the researcher if you have any questions about any part of the questionnaire.

<u>Section One - Biographical Information</u>

1. Full Name: …………..……………………………………………………………

2. Date of Birth: …………..…………………………………………………………

3. Occupation: ...……………..…………………………………………………………

4. City of residence: …………..……………………………………………………….

5. First part of current postcode: ……………………………………………………

6. Have you ever lived anywhere else? *If yes, please specify where and for how long.*

…………………………………………………………………………………………

………………………………………………………………………………………

7. Where are your parents from originally?

…………………………………………………………………………………………

………………………………………………………………………………………

8. Have your parents ever lived anywhere else in the UK? *If yes, please specify where and for how long.*

…………………………………………………………………………………………

………………………………………………………………………………………

9. Where are your grandparents from?

…………………………………………………………………………………………

………………………………………………………………………………………

Section Two: Language

10. How would you describe your accent?

……………………………………………………………………………………………

……………………………………………………………………………………………

11. What is/are your native language/s?

……………………………………………………………………………………………

……………………………………………………………………………………………

12. Can you speak any other languages? *If yes, please specify*

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

The following questions allow you to rank your responses on a specified scale. You may leave additional comments in the space provided if you wish. Please contact the researcher if you have any questions.

13. Write the languages you listed for question **12** against one or more of the statements below depending upon your knowledge of that language

- I only know individual words ………………………………………………………
- I know a few general phrases ...…………………………………………………..
- I can get by with certain topics ……………………………………………………..
- I can hold a conversation …………………………………………………………
- I feel comfortable in most situations ………………………………………………..
- I am completely fluent ……………………………………………………………

Any other comments

……………………………………………………………………………………………

……………………………………………………………………………………………

14. Write the languages you listed for questions **11** & **12** depending on how regularly you use those languages

- Every day …………………………………………………………………………
- Once/twice a week ………………………………………………………………..
- Once/twice a month ………………………………………………………………
- Several times a year ………………………………………………………………
- Less than once a year (please specify)……………………………………………
………………………………………………………………………………………
- Never ………………………………………………………………………………

Any other comments

…………………………………………………………………………………………
………………………………………………………………………………………

15. Who do you use the languages listed in questions **11** & **12** with (family, friends, teachers, etc)?

…………………………………………………………………………………………
…………………………………………………………………………………………
………………………………………………………………………………

Any other comments

…………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………

Section Three: Identity

16. How would you describe your ethnicity? (If you feel you have multiple ethnicities please include them all)

…………………………………………………………………………………………
……………………………………………………………………………………

17. List the ethnicit(ies) you gave for question **16** and then state how important these are to you (+3 = Very Important; -3 = Not important at all)

Ethnicity:	-3	-2	-1	+1	+2	+3
………………….	☐	☐	☐	☐	☐	☐
………………….	☐	☐	☐	☐	☐	☐
………………….	☐	☐	☐	☐	☐	☐
………………….	☐	☐	☐	☐	☐	☐

Any other comments

…………………………………………………………………………………………
……………………………………………………………………………………

18. Using the scale below, please add your local identity (e.g. Northern / Mancunian etc) and indicate how important it is to you (+3 = Very Important; -3 = Not important at all). If you do not feel this is relevant to you, leave this question blank.

	-3	-2	-1	+1	+2	+3
………………….	☐	☐	☐	☐	☐	☐

Any other comments

…………………………………………………………………………………………
……………………………………………………………………………………

19. Using the scale below, please add your national identity (e.g. British / English etc) and indicate how important it is to you (+3 = Very Important; -3 = Not important at all). If you do not feel this is relevant to you, leave this question blank.

	-3	-2	-1	+1	+2	+3
………………….	☐	☐	☐	☐	☐	☐

Any other comments

…………………………………………………………………………………………
……………………………………………………………………………………

Section Four: Friendship group

20. How many close friends do you have?

…………………………………………………………………………………………………
……………………………………………………………………………………………

21. Of the friends you listed for question **20**, how many are also from [Bradford or Leicester]?

…………………………………………………………………………………………………
……………………………………………………………………………………………

22. Of the friends you listed for question **20**, how many are from the same ethnic background as you?

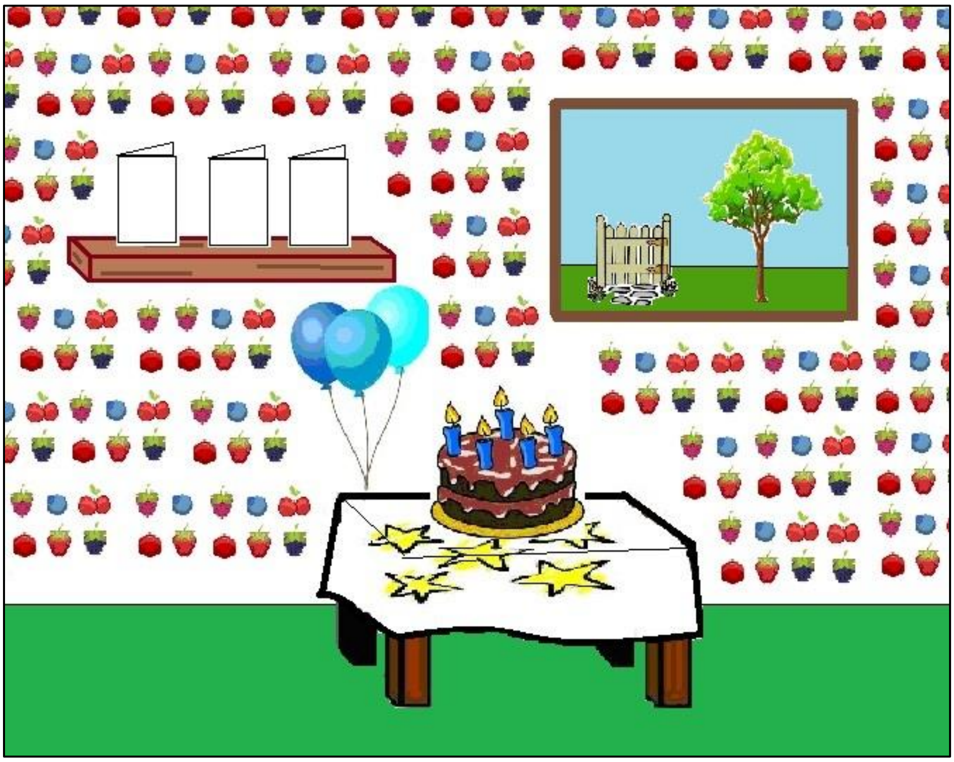
…………………………………………………………………………………………………
……………………………………………………………………………………………

23. Of the close friends you listed for question **20**, how many are from different ethnic backgrounds? *Please specify*

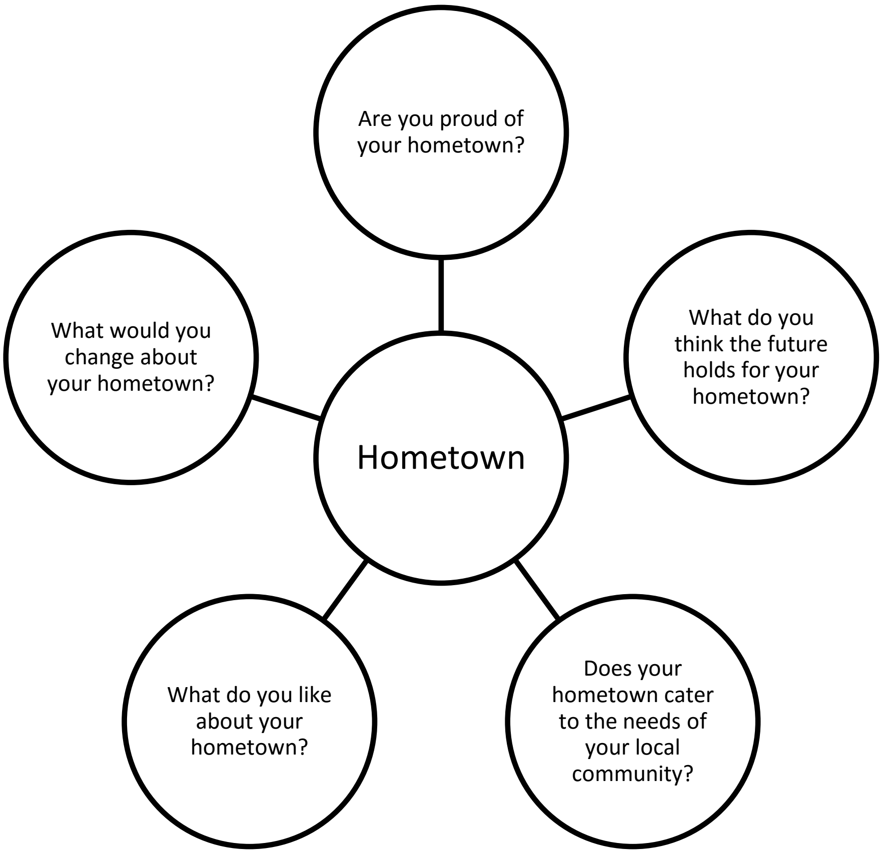
…………………………………………………………………………………………………
…………………………………………………………………………………………………
…………………………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………………

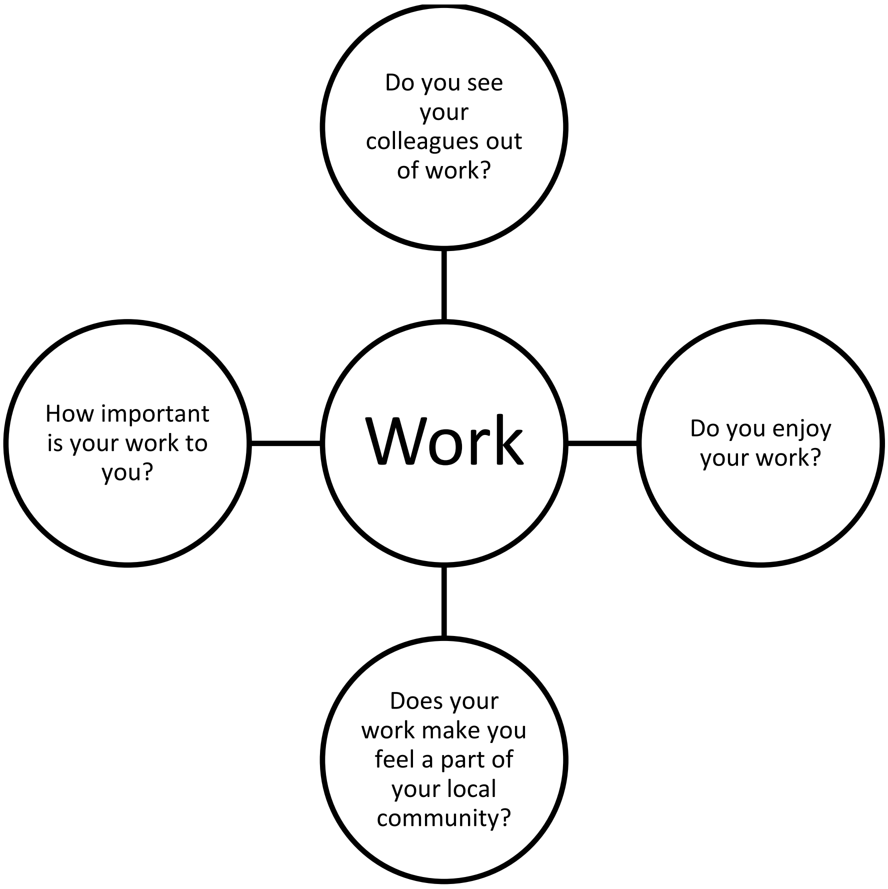
This is the end of the questionnaire, thank you for completing it. Please return this to the researcher when you attend the recording session.

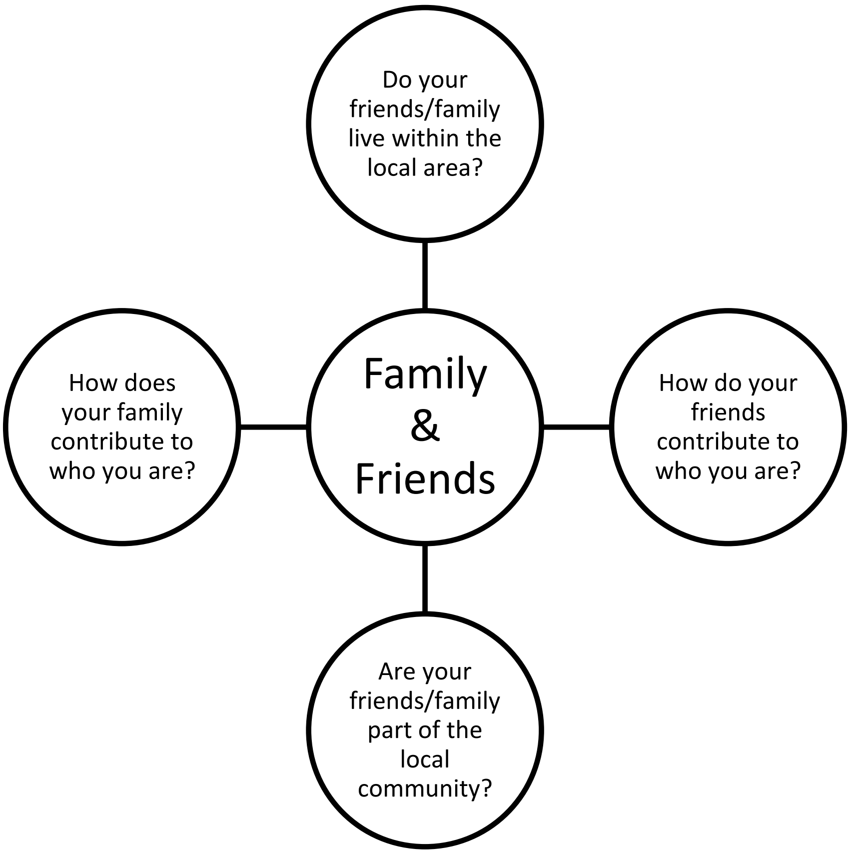
Appendix 2: Spot-the-difference images used during the pilot study.

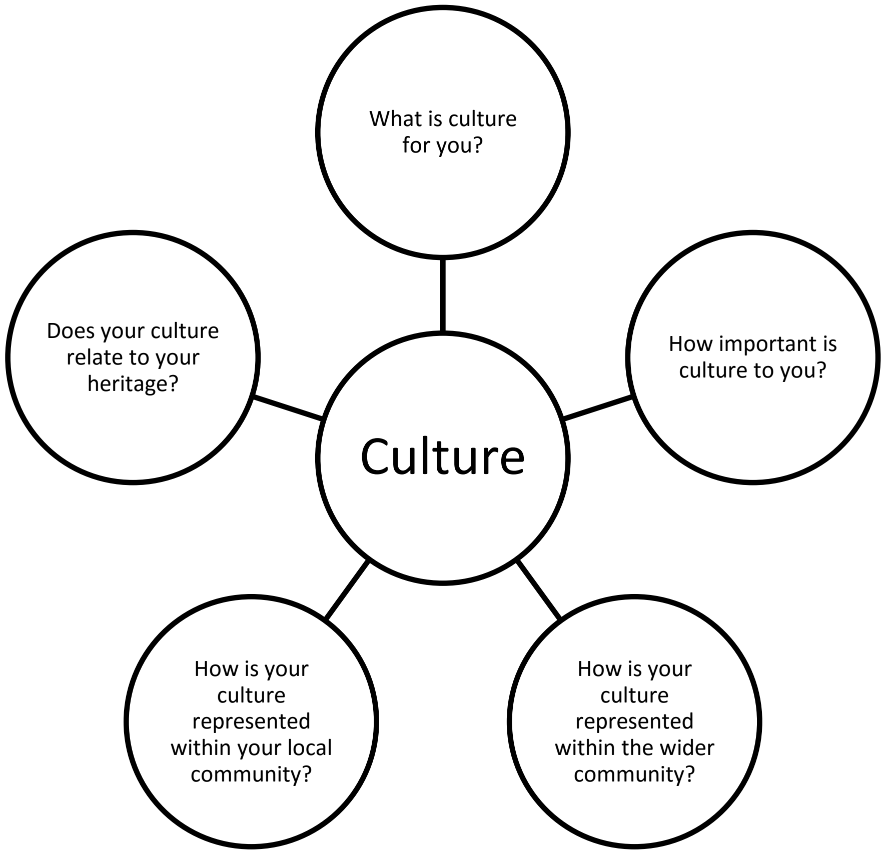


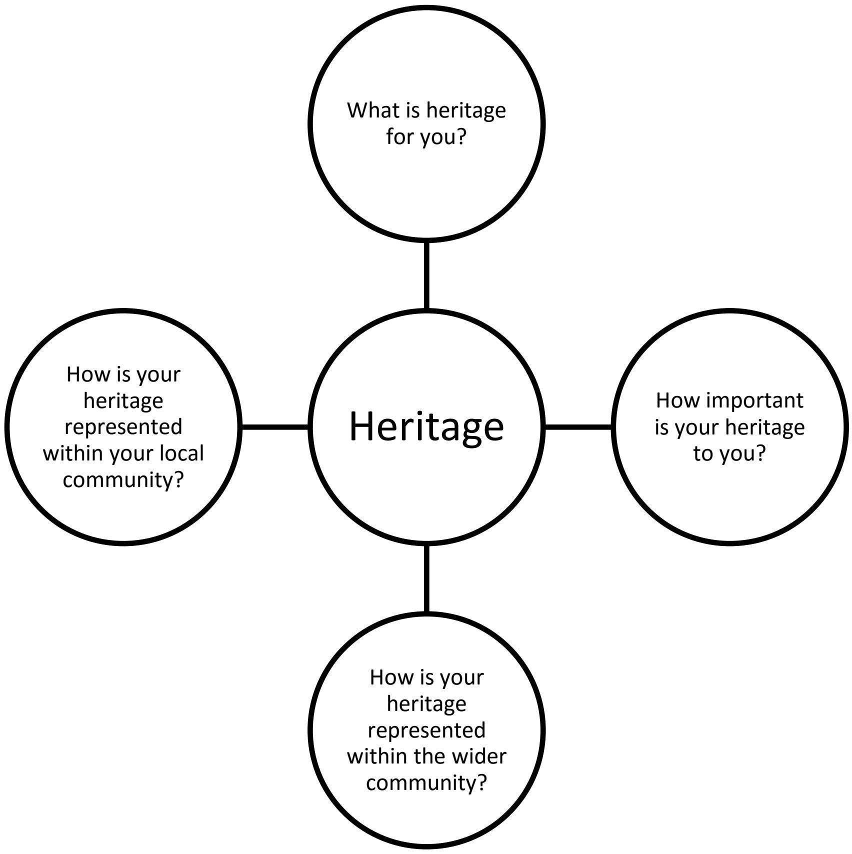
Appendix 3: Prompt sheets used during the paired conversation task of the interview.



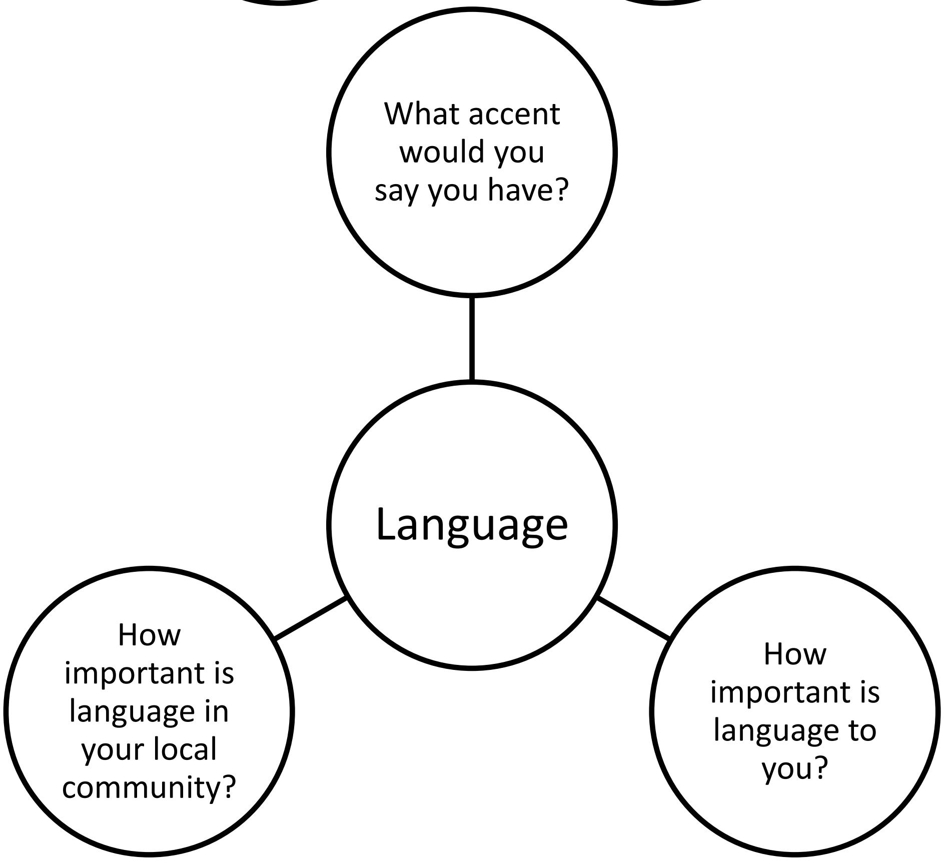

Do you see your colleagues out of work?
How important is your work to you?
Work
Do you enjoy your work?
Does your work make you feel a part of your local community?

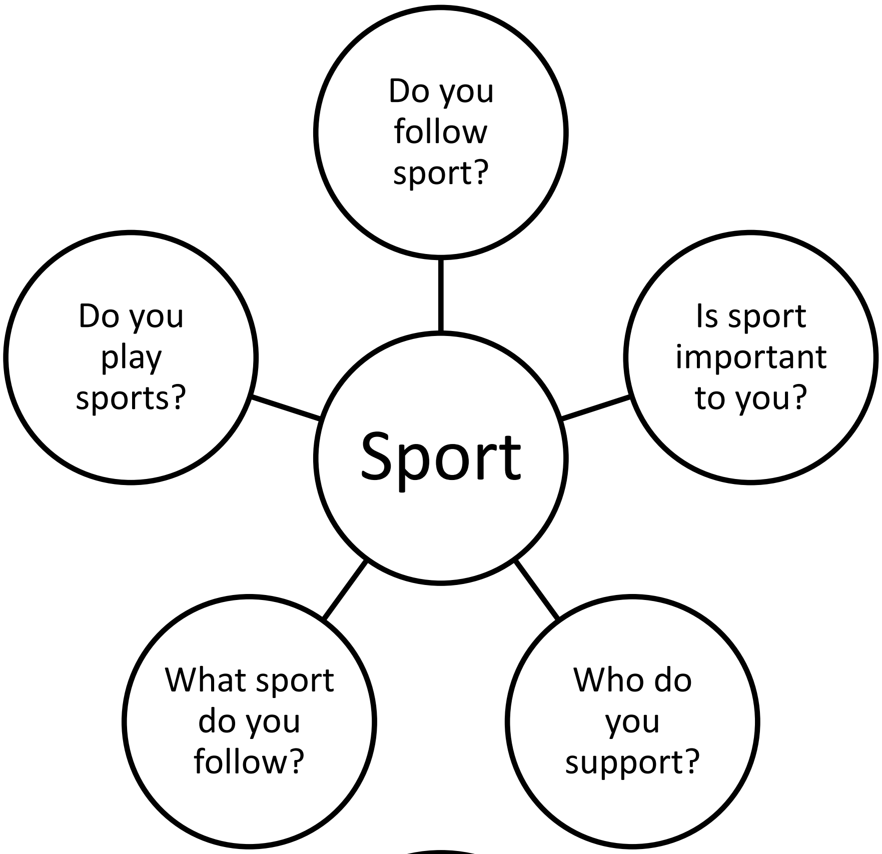

Do your friends/family live within the local area?
How does your family contribute to who you are?
Family & Friends
How do your friends contribute to who you are?
Are your friends/family part of the local community?

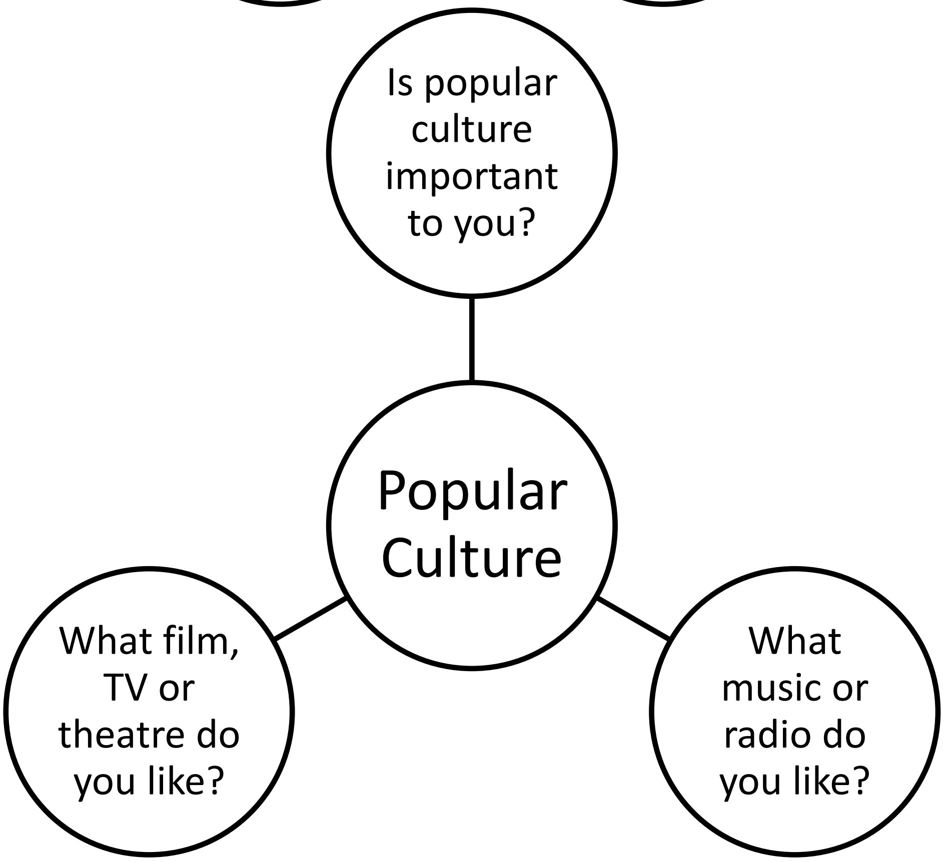

Culture
What is culture for you?
How important is culture to you?
How is your culture represented within the wider community?
How is your culture represented within your local community?
Does your culture relate to your heritage?


Heritage
What is heritage for you?
How important is your heritage to you?
How is your heritage represented within the wider community?
How is your heritage represented within your local community?


Faith
What is faith for you?
Is faith a part of your culture?
How important is your faith?
Is faith a part of your heritage?
Is faith a part of your community?


Language
What accent would you say you have?
How important is language in your local community?
How important is language to you?


Do you follow sport?
Do you play sports?
Sport
Is sport important to you?
What sport do you follow?
Who do you support?


Is popular culture important to you?
Popular Culture
What film, TV or theatre do you like?
What music or radio do you like?

Appendix 4: Reading passages used in the pilot and main fieldwork.

Comma gets a cure

Well, here's a story for you: Sarah Perry was a veterinary nurse who had been working daily at an old zoo in a deserted district of the territory, so she was very happy to start a new job at a superb private practice in North Square near the Duke Street Tower. That area was much nearer for her and more to her liking.

Even so, on her first morning, she felt stressed. She ate a bowl of porridge, checked herself in the mirror and washed her face in a hurry. Then she put on a plain yellow dress and a fleece jacket, picked up her kit and headed for work.

When she got there, there was a woman with a goose waiting for her. The woman gave Sarah an official letter from the vet. The letter implied that the animal could be suffering from a rare form of foot and mouth disease, which was surprising, because normally you would only expect to see it in a dog or a goat. Sarah was sentimental, so this made her feel sorry for the beautiful bird.

Before long, that itchy goose began to strut around the office like a lunatic, which made an unsanitary mess. The goose's owner, Mary Harrison, kept calling, "Comma, Comma," which Sarah thought was an odd choice for a name.

Comma was strong and huge, so it would take some force to trap her, but Sarah had a different idea. First she tried gently stroking the goose's lower back with her palm, then singing a tune to her. Finally, she administered ether. Her efforts were not futile. In no time, the goose began to tire, so Sarah was able to hold onto Comma and give her a relaxing bath.

Once Sarah had managed to bathe the goose, she wiped her off with a cloth and laid her on her right side. Then Sarah confirmed the vet's diagnosis. Almost immediately, she remembered an effective treatment that required her to measure out a lot of medicine. Sarah warned that this course of treatment might be expensive — either five or six times the cost of penicillin. I can’t imagine paying so much, but Mrs. Harrison — a millionaire lawyer — thought it was a fair price for a cure.

Fern's Star Turn

Fern was a nurse from Harrogate who was always a happy-go-lucky person. One winter morning she was drawing a bath and washing her face with a cloth, when she saw a letter come through the door. She got a lot of letters, but when she went to look, this one caught her eye. It was from Paul, her father.

Paul was a keen dancer who had won many competitions in the past with his partner Pam. Their speciality was square dancing. In the letter, Paul explained that the International Square Dancing Championships were being held in New York City the following week, but unfortunately, Pam had just been admitted to hospital. She had managed to trap her foot in a bus door and had broken her leg and her nose when the bus moved off.

"Poor Pam", Fern thought, "what a daft thing to do! She won't be able to strut her stuff with Dad next week. They'll have no choice but to pull out, and it's too near to the competition to get the price of their tickets back."

Just then Fern had a fantastic idea and said, "I'm not half the dancer Pam is, but maybe I could stand in for her." Straight away she got on the phone to the travel agent and booked her flight, and then rang Paul to tell him what she had decided to do. She could tell her father was really happy. He suggested that they arrange to stay with friends on their farm outside the city, as the only hotels he could afford in New York looked rather seedy.

On Thursday the following week she got up at the crack of dawn to make a start on packing her kit for the trip. She knew that the north wind in New York could be very cold in winter, so she grabbed her fleece jacket and her fur hat. She also packed the beautiful gold dress that Pam had made for the competition, but it was quite bulky and she had to force her case closed by pressing down on the lid with the palm of each hand.

Paul and Fern drove south to the airport and shortly after checking in they boarded the plane. Their flight passed quickly and it seemed like no time before they were being greeted by Paul's friends Don and Sarah, who drove them to their pretty farmhouse surrounded by fir trees. On their farm there were horses neighing, sheep baa-ing, pot-bellied pigs, a pet goose called Rhonda and eight breeds of goat. That evening they were treated to a great feast of cured meats and fish, which Sarah served out on large white plates. "Boy", thought Fern filling her fork, "I'll need to watch my weight if I'm going to fit into Pam's gold dress."

The day of the competition it was pouring with rain, but Paul and Fern were too excited to care. They got dressed and made their way downstairs to Don's car. But disaster struck when the car wouldn't start. "What's wrong with it?" shouted Sarah from the house. "Have you got a toolkit in the boot?" Paul suggested to Don. "It's no good," Don sighed. "We'll have to call a cab, but it'll take a while to get to the city. It's a lot farther than you might think."

Fern and Paul made it to the competition with only seconds to spare. They were out of breath and found it hard to remember the steps. However, they danced like champions and the judges were bowled over. They had no choice but to award them the first prize: a thousand dollars. Against the odds they had achieved their goal. Fern had made her pa a proud man. What a shame that half the prize money went on the taxi fare home!

Appendix 5: Participants' occupations, postcodes and languages spoken

Code	Pseudonym	Age	Region	Postcode	AE or PE	Occupation	Native Languages	Other Languages
OFBA1	Linda	35	Bradford	BD12	AE	Training Manager	English	French
OFBA2	Sandra	38	Bradford	BD13	AE	Grocery Code Checker	English	No
OFBA3	Rachael	33	Bradford	BD7	AE	Sales Assistant	English	German French
OFBP2	Sadiyah	36	Bradford	BD8	PE	Self-employed	Pushto (main) & Hinko (minor)	Basic Urdu/Panjabi, Spanish
OFBP3	Sumra	37	Bradford	BD8	PE	Advice worker	English	Urdu/Punjabi
OFBP4	Afsana	40	Bradford	BD8	PE	Housewife	Punjabi (English first language)	Urdu
OFBP5	Adeena	45	Bradford	BD9	PE	Interpreter	Mirpiri Panjabi (*English*)	No
OFBP6	Nadra	45	Bradford	BD6	PE	Market trader	Urdu	Panjabi
OFLA3	Jo	39	Leicester	LE2	AE	Pharmacy Dispenser	English	GCSE French
OFLA4	Sharon	39	Leicester	LE3	AE	Mental health nurse	English	GCSE French
OFLP1	Hamir	47	Leicester	LE2	PE	Teaching assistant	Punjabi	English Hindi
OFLP2	Jasminder	31	Leicester	LE5	PE	Teacher (secondary)	Punjabi	English
OFLP3	Priya	32	Leicester	LE3	PE	Housewife	Punjabi/English	Punjabi
OFLP4	Sukhi	31	Leicester	LE2	PE	Operations analyst	Punjabi/English	
OFLP5	Jaimal	42	Leicester	LE4	PE	Solicitor	Panjabi ?English	Panjabi Hindi
OMBA1	Steve	53	Bradford	BD18	AE	Unemployed	English	No

OMBA2	Peter	51	Bradford	BD18	AE	Unemployed	English	No
OMBP1	Shafiq	47	Bradford	BD8	PE	Senior HR Manager	Hindko English	Hindko, Urdu
OMBP2	Nadeem	36	Bradford	BD8	PE	University Lecturer	Pahari	Urdu Arabic (Intermediate)
OMBP4	Samih	40	Bradford	BD8	PE	Unemployed	Pakistani English	None
OMBP5	Quadir	32	Bradford	BD8	PE	Specialist Welfare Rights worker	English	Punjabi Urdu
OMBP6	Wafiq	35	Bradford	BD7	PE	Adviser	Henko [*Hindko*?] Punjabi English	Urdu
OMLA1	Geoff	53	Leicester	LE3	AE	Unemployed	English	Swahili; Chinese
OMLA2	Charles	45	Leicester	LE18	AE	Not specified	English	French
OMLP1	Jaswant	40	Leicester	LE3	PE	Accountant	English Panjabi	Hindi Gujarati
OMLP2	Kawal	38	Leicester	LE2	PE	Civil servant	Panjabi ?English	Hindi
OMLP3	Dalbir	46	Leicester	LE2	PE	M.T.M	Panjabi, English	Gujarati, Hindi
OMLP4	Aanand	36	Leicester	LE2	PE	Manager	Panjabi	
OMLP5	Jaipal	45	Leicester	LE2	PE	Programme manager		English, Panjabi

YFBA1	Claire	23	Bradford	BD3	AE	Admin volunteer	English	Romany French Urdu Arabic
YFBA2	Lisa	23	Bradford	BD8	AE	Kitchen Assistant	English	No
YFBP1	Zayna	24	Bradford	BD8	PE	Finance officer / admin	Urdu Punjabi	English Hinko Pushto Arabic
YFBP2	Shelly	24	Bradford	BD18	PE	Activities Co-ordinator	Urdu Punjabi English	Urdu Punjabi Arabic German
YFBP3	Tamara	24	Bradford	BD8	PE	SEN Escort	Punjabi & English	No
YFBP4	Maysan	27	Bradford	BD8	PE	Clerical assistant	Punjabi	Urdu English
YFBP5	Misbah	24	Bradford	BD9	PE	Advice worker	Punjabi & English	Urdu
YFBP6	Atiya	20	Bradford	BD9	PE	Working receptionist	Punjabi/English	Punjabi
YFLA1	Lucy	24	Leicester	LE18	AE	Unemployed	English	French
YFLA2	Sarah	23	Leicester	LE18	AE	Student	English	French
YFLP1	Harbeer	21	Leicester	LE3	PE	Student nurse	Panjabi English	French
YFLP2	Maya	20	Leicester	LE2	PE	Student	Panjabi English	No (Just a little French)

YFLP3	Baldeep	24	Leicester	LE5	PE	Teaching assistant	English + Punjabi	French (GCSE level - very broken!)
YFLP4	Baljinder	29	Leicester	LE3	PE	Accountant	Punjabi/English	No
YFLP5	Bir	23	Leicester	LE5	PE	Student	English	Punjabi (poor)
YFLP6	Gulab	21	Leicester	LE5	PE	Student	English Punjabi	Hindi
YMBA1	Matthew	20	Bradford	HX3	AE	Student	English	French
YMBA2	Jake	20	Bradford	BD6	AE	Student	English	French, German
YMBP1	Irfan	22	Bradford	BD8	PE	Accountant / Student	English	Punjabi / Urdu
YMBP2	Aazim	30	Bradford	BD8	PE	Builder	Arabic, Urdu, Punjabi, English	Czech, Slovakian
YMBP3	Aashif	24	Bradford	BD9	PE	Student/Admin	Panjabi	Urdu English
YMBP4	Halim	20	Bradford	BD9	PE	-	Panjabi	Urdu English
YMBP5	Zafir	19	Bradford	BD9	PE	University Student	Panjabi, English, Urdu	-
YMBP6	Hamza	19	Bradford	BD9	PE	Business	Urdu, Panjabi, Hindko, Mirpuri, English	
YMLA1	Andy	20	Leicester	LE3	AE	Student	English	French
YMLA2	Simon	22	Leicester	LE9	AE	Police officer	English	No
YMLP1	Tajinder	20	Leicester	LE5	PE	Student	Panjabi	English
YMLP2	Ranvir	28	Leicester	LE3	PE	Gas Engineer	Panjabi - mother tongue	"Ali G language"

							English	
YMLP3	Nihal	27	Leicester	LE2	PE	Investments officer	English Punjabi	Punjabi Spanish
YMLP4	Jasbir	23	Leicester	LE2	PE	Accounts assistant & distance learning student	Punjabi English	Punjabi French
YMLP5	Hanspal	25	Leicester	LE2	PE	Police Officer	English	Punjabi
YMLP6	Satbir	21	Leicester	LE5	PE	Student	English Punjabi	No
YMLP7	Adeep	27	Leicester	LE5	PE	Web developer	English Punjabi	
YMLP8	Hardev	29	Leicester	LE5	PE	Teaching assistant	English Punjabi	
YMLP9	Manvir	28	Leicester	LE5	PE	Project manager/account manager	English Punjabi	

Appendix 6: Final model iteration summaries for vowels.

FACE F1

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.733	0.108	66	16.10	< 2e-16
M-point	0.020	0.008	65	2.42	0.018
Lang-bgd	-0.147	0.078	68	-1.87	0.066
Region	0.306	0.095	65	3.22	0.002
Sex	0.118	0.049	64	2.41	0.019
Age	0.009	0.003	64	3.40	0.001
Task	0.055	0.004	35840	14.19	< 0.0001
Lang-bgd : Region	-0.103	0.110	64	-0.93	0.356
M-point : lang_bdPE	-0.00005	0.006	63	-0.01	0.994
M-point : Region	-0.081	0.007	62	-11.21	< 0.0001
M-point : Gender	-0.008	0.004	63	-2.01	0.048
M-point : Age	-0.001	0.0002	63	-4.17	0.0001
M-point : Lang-bgd : Region	0.036	0.008	62	4.32	0.0001

FACE F2

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.731	0.044	70	39.17	< 2e-16
M-point	-0.005	0.004	69	-1.16	0.250
Lang-bgd	0.101	0.032	71	3.10	0.003
Region	-0.103	0.039	69	-2.61	0.011
Age	-0.003	0.001	64	-3.32	0.001
Task	0.002	0.004	37790	0.54	0.588
Lang-bgd : Region	-0.001	0.045	64	-0.02	0.988
M-point : Lang-bgd	-0.002	0.003	64	-0.66	0.509
M-point : Region	0.034	0.004	64	8.96	< 0.0001
M-point : Age	0.0005	0.0001	64	4.42	< 0.0001
M-point : Task	0.003	0.001	36180	4.80	< 0.0001
M-point : Lang-bgd : Region	-0.010	0.004	64	-2.14	0.036

GOAT F1

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.829	0.106	67	17.28	< 2e-16
M-point	0.020	0.007	69	2.82	0.006
Lang-bgd	-0.005	0.077	68	-0.06	0.952
Region	0.241	0.094	67	2.57	0.012
Sex	0.111	0.048	64	2.32	0.024
Age	0.006	0.002	64	2.37	0.021
Task	-0.016	0.009	11360	-1.82	0.069
Lang-bgd : Region	-0.114	0.108	64	-1.05	0.298
M-point : Lang-bgd	-0.008	0.005	64	-1.61	0.112
M-point : Region	-0.077	0.006	63	-12.85	< 0.0001
M-point : Gender	-0.008	0.003	63	-2.50	0.015
M-point : Age	-0.001	0.0002	64	-3.12	0.003
M-point : Task	-0.003	0.001	10300	-2.04	0.041
M-point : Lang-bgd : Region	0.035	0.007	63	4.93	< 0.0001

GOAT F2

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.082	0.053	91	20.36	< 2e-16
M-point	0.006	0.005	164	1.17	0.245
Lang-bgd	-0.121	0.036	70	-3.33	0.001
Region	0.233	0.045	71	5.20	< 0.0001
Pre-coronal	0.064	0.019	9033	3.33	0.001
Pre-glottal	0.020	0.036	253	0.55	0.580
Pre-labial	-0.060	0.022	2781	-2.68	0.007
Pre-velar	0.136	0.025	3079	5.51	< 0.0001
Pre-vowel	0.109	0.020	14580	5.36	< 0.0001
Age	-0.001	0.001	64	-0.53	0.597
Task	0.029	0.005	22320	5.75	< 0.0001
Lang-bgd : Region	0.092	0.051	64	1.81	0.075
M-point : Lang-bgd	0.005	0.003	64	1.70	0.093
M-point : Region	0.024	0.004	63	6.64	< 0.0001
M-point : Pre-coronal	-0.008	0.003	6761	-2.40	0.016
M-point : Pre-glottal	-0.017	0.005	253	-3.21	0.001
M-point : Pre-labial	0.007	0.004	2165	2.08	0.037
M-point : Pre-velar	-0.014	0.004	2107	-3.50	0.0005
M-point : Pre-vowel	-0.007	0.003	11950	-2.26	0.024
M-point : Age	-0.0003	0.0001	64	-2.94	0.005
M-point : Task	0.002	0.001	18260	2.52	0.012
M-point : Lang-bgd : Region	-0.008	0.004	63	-1.89	0.064

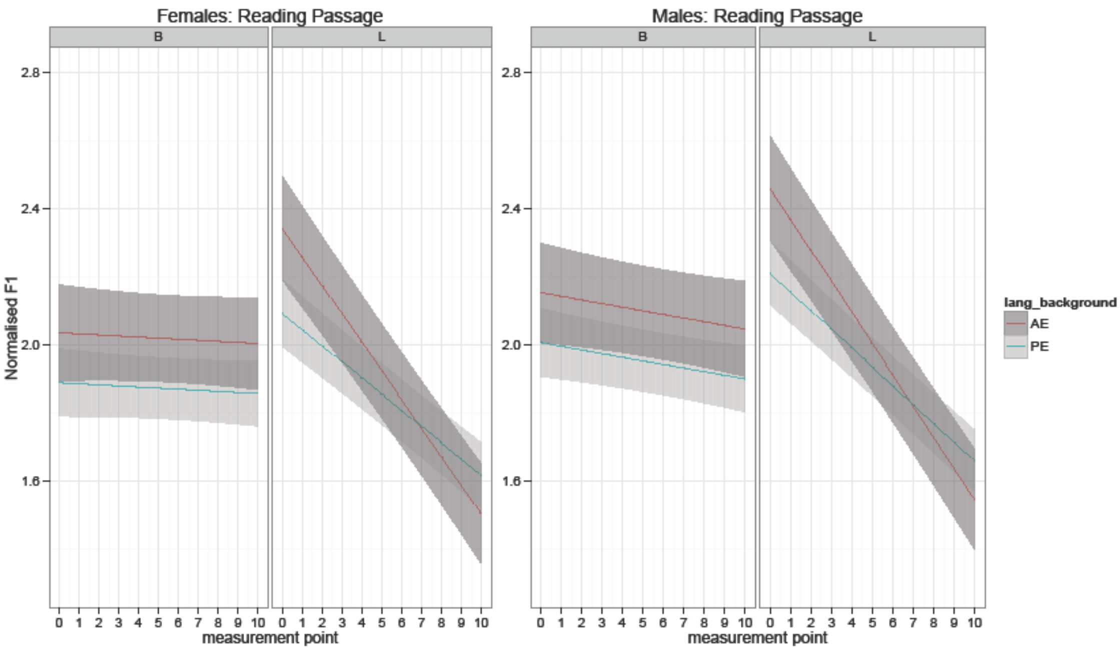
GOOSE F1

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.554	0.096	69	16.19	< 2e-16
M-point	-0.008	0.004	74	-1.93	0.057
Lang-bgd	-0.123	0.070	69	-1.76	0.084
Region	-0.139	0.086	68	-1.62	0.109
Age	0.004	0.002	64	1.87	0.066
Task	0.036	0.006	9299	5.63	< 0.0001
Lang-bgd : Region	0.115	0.099	64	1.16	0.250
M-point : Lang-bgd	0.012	0.003	64	4.34	< 0.0001
M-point : Region	-0.001	0.003	62	-0.38	0.703
M-point : Age	-0.0004	0.0001	66	-4.51	< 0.0001
M-point : Task	-0.002	0.001	6333	-2.29	0.022
M-point : Lang-bgd : Region	0.004	0.004	63	1.04	0.304

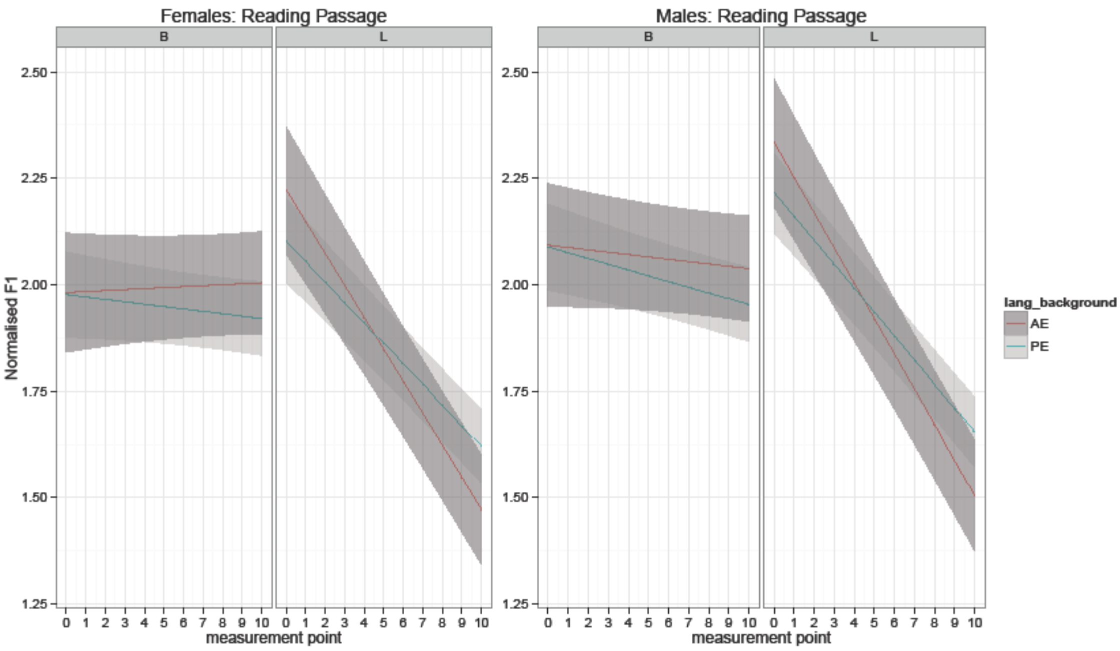
GOOSE F2

	Estimate	Std Error	df	t value	Pr(>|t|)
(Intercept)	1.542	0.067	79	22.87	< 2e-16
M-point	-0.013	0.005	83	-2.85	0.006
Lang-bgd	-0.295	0.050	83	-5.88	< 0.0001
Region	0.065	0.061	82	1.06	0.293
Pre-glottal	-0.060	0.088	54	-0.68	0.498
Pre-labial	-0.130	0.039	76	-3.36	0.001
Pre-velar	0.069	0.073	90	0.94	0.350
Age	-0.001	0.002	64	-0.64	0.522
Task	0.005	0.007	16730	0.70	0.484
Lang-bgd : Region	0.324	0.066	63	4.88	< 0.0001
M-point : lang_bdPE	0.009	0.003	62	2.72	0.009
M-point : Region	0.027	0.004	60	7.13	< 0.0001
M-point : Pre-glottal	0.018	0.011	86	1.64	0.104
M-point : Pre-labial	0.019	0.005	92	4.28	< 0.0001
M-point : Pre-velar	-0.001	0.009	126	-0.07	0.945
M-point : Age	-0.0005	0.0001	64	-4.30	< 0.0001
M-point : Task	0.009	0.001	16230	7.39	< 0.0001
M-point : Lang-bgd : Region	-0.012	0.005	61	-2.65	0.010

Appendix 7: Predictive interval plots of the Reading Passage data for FACE F1.



Appendix 8: Predictive interval plots of the Reading Passage data for GOAT F1.



Appendix 9: Final model iteration summaries for /r/.

Place of Articulation

			95% CI for odds ratio				
Elision vs. post-alveolar	Estimate	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t-value
(intercept)	-3.71	0.80	0.01	0.02	0.12	< .001	-4.67
Age	-0.02	0.01	0.95	0.98	1.00	0.074	-1.79
Context (WI_C)	-0.17	0.55	0.28	0.84	2.50	0.757	-0.31
Context (WI_V)	-0.13	0.57	0.29	0.88	2.69	0.825	-0.22
Context (WM_I)	-0.45	0.67	0.17	0.64	2.36	0.499	-0.68
Context (WM_T)	1.56	0.53	1.69	4.78	13.48	0.003	2.96
Gender	1.32	0.59	1.17	3.74	11.98	0.026	2.22
Lang-background	1.05	0.72	0.70	2.85	11.61	0.145	1.46
Lang-background : Age	0.00	0.02	0.97	1.00	1.04	0.758	0.31
Lang-background : Gender	-1.25	0.65	0.08	0.29	1.02	0.054	-1.93
Lang-background : Region	-0.31	0.64	0.21	0.73	2.56	0.628	-0.48
Lang-background (AE) : Region : Gender	-1.27	0.71	0.07	0.28	1.13	0.074	-1.78
Lang-background (PE) : Region : Gender	-0.45	0.34	0.33	0.64	1.24	0.186	-1.32
Region	1.72	0.59	1.77	5.60	17.73	0.003	2.93
Task	-1.11	0.21	0.22	0.33	0.49	< .001	-5.38

			95% CI for odds ratio				
Labiodental vs. post-alveolar	Estimate	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t-value
(intercept)	-1.20	0.35	0.15	0.30	0.60	0.001	-3.45
Age	0.04	0.01	1.02	1.04	1.06	< .001	4.88
Context (WI_C)	-0.14	0.25	0.53	0.87	1.42	0.582	-0.55
Context (WI_V)	-0.05	0.25	0.58	0.96	1.57	0.859	-0.18
Context (WM_I)	-0.67	0.29	0.29	0.51	0.90	0.020	-2.32
Context (WM_T)	-0.94	0.25	0.24	0.39	0.64	< .001	-3.69
Gender	-1.82	0.27	0.09	0.16	0.28	< .001	-6.63
Lang-background	0.02	0.38	0.49	1.02	2.14	0.955	0.06
Lang-background : Age	-0.05	0.01	0.94	0.96	0.98	< .001	-4.32
Lang-background : Gender	1.20	0.35	1.67	3.33	6.62	0.001	3.43
Lang-background : Region	1.65	0.26	3.13	5.18	8.57	< .001	6.41
Lang-background (AE) : Region : Gender	0.36	0.35	0.72	1.44	2.87	0.305	1.03
Lang-background (PE) : Region : Gender	-0.47	0.26	0.37	0.63	1.05	0.074	-1.78
Region	0.47	0.19	1.10	1.61	2.35	0.015	2.44
Task	-0.30	0.11	0.59	0.74	0.93	0.009	-2.60

			95% CI for odds ratio				
Labiopalatal vs. post-alveolar	Estimate	Std. Error	2.5%	Odds Ratio	97.5%	Pr(>|t|)	t-value
(intercept)	-2.62	0.50	0.03	0.07	0.19	< .001	-5.26
Age	0.04	0.01	1.01	1.04	1.06	0.001	3.20
Context (WI_C)	0.12	0.32	0.60	1.13	2.13	0.713	0.37
Context (WI_V)	-0.07	0.34	0.48	0.93	1.79	0.824	-0.22
Context (WM_I)	-0.49	0.38	0.29	0.61	1.30	0.202	-1.28
Context (WM_T)	0.19	0.32	0.64	1.21	2.27	0.552	0.59
Gender	-1.65	0.40	0.09	0.19	0.42	< .001	-4.12
Lang-background	0.30	0.50	0.50	1.35	3.60	0.553	0.59
Lang-background : Age	-0.04	0.01	0.93	0.96	0.98	0.002	-3.05
Lang-background : Gender	2.00	0.46	2.97	7.36	18.26	< .001	4.31
Lang-background : Region	2.09	0.35	4.05	8.06	16.05	< .001	5.94
Lang-background (AE) : Region : Gender	0.51	0.51	0.61	1.66	4.52	0.319	1.00
Lang-background (PE) : Region : Gender	-1.06	0.28	0.20	0.35	0.60	0.0001	-3.81
Region	0.23	0.28	0.72	1.26	2.19	0.420	0.81
Task	-0.52	0.14	0.46	0.60	0.78	< .001	-3.81

Manner of Articulation

Affricate vs. Approximant	Estimate	Std. Error	2.50%	Odds Ratio	97.50%	Pr(>|t|)	t-value
			95% CI for odds ratio				
(intercept)	-23.51	12651	0	0	Inf	1	0
Age	-0.03	0.02	0.94	0.97	1.01	0.18	-1.34
Context (WI_C)	20.97	12651	0	1278219000	Inf	1	0
Context (WI_V)	19.68	12651	0	353317400	Inf	1	0
Context (WM_I)	-0.14	14252	0	0.87	Inf	1	0
Context (WM_T)	0.43	12954	0	1.54	Inf	1	0
Gender	0.68	0.56	0.66	1.98	5.92	0.22	1.23
Lang-background	0.64	0.85	0.36	1.89	10.03	0.46	0.75
Lang-background : Age	0.02	0.02	0.98	1.02	1.07	0.31	1.01
Lang-background : Gender	-1.03	0.63	0.10	0.36	1.24	0.11	-1.62
Lang-background : Region	-1.59	0.61	0.06	0.20	0.68	0.01	-2.59
Lang-background (AE) : Region : Gender	-2.09	0.88	0.02	0.12	0.69	0.02	-2.39
Lang-background (PE): Region : Gender	0.30	0.43	0.58	1.35	3.17	0.49	0.69
Region	0.99	0.53	0.94	2.68	7.64	0.07	1.84
Task	1.19	0.19	2.26	3.30	4.81	< .001	6.21

Elision vs. Approximant	Estimate	Std. Error	2.50%	Odds Ratio	97.50%	Pr(>|t|)	t-value
			95% CI for odds ratio				
(intercept)	-4.33	0.79	0.00	0.01	0.06	< .001	-5.47
Age	-0.03	0.01	0.95	0.97	1.00	0.02	-2.31
Context (WI_C)	-0.07	0.55	0.32	0.93	2.73	0.90	-0.13
Context (WI_V)	-0.02	0.56	0.33	0.98	2.93	0.97	-0.04
Context (WM_I)	-0.10	0.66	0.25	0.90	3.30	0.88	-0.15
Context (WM_T)	1.90	0.52	2.42	6.70	18.59	< .001	3.65
Gender	1.88	0.59	2.05	6.52	20.74	0.001	3.18
Lang-background	1.59	0.71	1.21	4.89	19.83	0.03	2.22
Lang-background : Age	0.02	0.02	0.99	1.02	1.05	0.28	1.09
Lang-background : Gender	-1.78	0.65	0.05	0.17	0.60	0.01	-2.74
Lang-background : Region	-1.55	0.63	0.06	0.21	0.73	0.01	-2.45
Lang-background (AE) : Region : Gender	-1.37	0.71	0.06	0.25	1.01	0.05	-1.94
Lang-background (PE) : Region : Gender	0.01	0.34	0.53	1.01	1.95	0.97	0.04
Region	1.51	0.58	1.45	4.53	14.19	0.01	2.60
Task	-0.93	0.20	0.27	0.40	0.59	< .001	-4.53

Tap vs. Approximant	Estimate	Std. Error	2.50%	Odds Ratio	97.50%	Pr(>|t|)	t-value
			95% CI for odds ratio				
(intercept)	-9.59	1.80	0	0	0	< .001	-5.32
Age	0.13	0.05	1.04	1.14	1.26	0.01	2.67
Context (WI_C)	-0.09	0.47	0.36	0.91	2.31	0.85	-0.19
Context (WI_V)	0.85	0.47	0.94	2.34	5.86	0.07	1.82
Context (WM_I)	1.39	0.48	1.55	4.01	10.35	0.004	2.87
Context (WM_T)	1.61	0.46	2.04	5.00	12.27	< .001	3.51
Gender	0.35	1.02	0.19	1.42	10.36	0.73	0.34
Lang-background	7.47	1.77	54.32	1748.65	56289.63	< .001	4.22
Lang-background : Age	-0.12	0.05	0.81	0.89	0.98	0.02	-2.33
Lang-background : Gender	-0.27	1.03	0.10	0.77	5.72	0.80	-0.26
Lang-background (AE) : Region : Gender	-1.61	11457	0	0.20	Inf	1	0
Lang-background (PE) : Region	15.35	8138.10	0	4628615	Inf	1	0
Lang-background : Region : Gender	0.39	0.63	0.43	1.48	5.11	0.54	0.62
Region	-19.61	8138.10	0.00	0.00	Inf	1.00	0.00
Task	0.16	0.15	0.87	1.17	1.58	0.29	1.06

Voicing **Devoiced vs. Voiced**	Estimate	Std. Error	95% CI for odds ratio 2.50%	Odds Ratio	97.50%	Pr(>|t|)	t-value
(intercept)	-4.88	0.84	0.00	0.01	0.04	< .001	-5.82
Context (WI_C)	0.19	0.49	0.47	1.21	3.13	0.696	0.39
Context (WI_V)	0.12	0.49	0.43	1.13	2.98	0.801	0.25
Context (WM_I)	-0.84	0.59	0.13	0.43	1.37	0.154	-1.43
Context (WM_T)	-1.56	0.53	0.07	0.21	0.60	0.003	-2.93
Sex	-1.20	0.20	0.20	0.30	0.45	< .001	-5.96
Lang-background	3.16	0.72	5.74	23.59	96.90	< .001	4.39
Lang-background : Region	-3.15	0.77	0.01	0.04	0.20	< .001	-4.07
Region	2.53	0.75	2.89	12.54	54.42	0.001	3.38

Voiceless vs. Voiced	Estimate	Std. Error	95% CI for odds ratio 2.50%	Odds Ratio	97.50%	Pr(>|t|)	t-value
(intercept)	-2.92	0.55	0.02	0.05	0.16	< .001	-5.31
Context (WI_C)	-0.63	0.43	0.23	0.53	1.24	0.145	-1.46
Context (WI_V)	-1.49	0.50	0.08	0.22	0.60	0.003	-2.96
Context (WM_I)	-2.05	0.71	0.03	0.13	0.51	0.004	-2.91
Context (WM_T)	-2.93	0.60	0.02	0.05	0.17	< .001	-4.86
Sex	-0.74	0.27	0.28	0.48	0.81	0.007	-2.71
Lang-background	1.35	0.45	1.60	3.87	9.37	0.003	3.00
Lang-background : Region	-1.07	0.69	0.09	0.34	1.31	0.117	-1.57
Region	0.15	0.61	0.35	1.16	3.88	0.806	0.25

Raising

Lowered vs. neutral	Estimate	Std. Error	2.50%	Odds Ratio	97.50%	Pr(>|t|)	t-value
			95% CI for odds ratio				
(intercept)	-5.45	1.07	0.00	0.00	0.04	< .001	-5.08
Context (WI_C)	1.16	1.03	0.42	3.18	24.10	0.264	1.12
Context (WI_V)	1.58	1.04	0.64	4.88	37.16	0.126	1.53
Context (WM_I)	1.62	1.05	0.65	5.05	39.36	0.122	1.55
Context (WM_T)	1.43	1.02	0.56	4.19	31.14	0.162	1.40
Sex	0.10	0.19	0.75	1.10	1.61	0.617	0.50
Lang-background	2.05	0.37	3.75	7.78	16.16	< .001	5.50
Lang-background : Region	15.20	2563.15	0	3975269	Inf	0.995	0.01
Region	-17.55	2563.15	0	0	Inf	0.995	-0.01

Raised vs. neutral	Estimate	Std. Error	2.50%	Odds Ratio	97.50%	Pr(>|t|)	t-value
			95% CI for odds ratio				
(intercept)	-2.42	0.30	0.05	0.09	0.16	< .001	-8.13
Context (WI_C)	0.25	0.24	0.80	1.28	2.05	0.307	1.02
Context (WI_V)	0.32	0.25	0.85	1.38	2.24	0.190	1.31
Context (WM_I)	-0.82	0.29	0.25	0.44	0.78	0.005	-2.81
Context (WM_T)	-2.23	0.28	0.06	0.11	0.19	< .001	-7.93
Sex	-0.19	0.10	0.68	0.82	1.00	0.052	-1.94
Lang-background	1.68	0.21	3.53	5.35	8.10	< .001	7.90
Lang-background : Region	-0.90	0.26	0.24	0.41	0.68	0.001	-3.39
Region	1.08	0.24	1.83	2.94	4.71	< .001	4.48

Abbreviations

AE	Anglo English
PE	Panjabi English
VQ	Voice quality
CA	Correspondence Analysis

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