Intra-ethnic variation in the English spoken by Iraqi Arabs in London and Glasgow: A sociophonetic study

Ebtehal Ali Al-Asiri

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School of Critical Studies
College of Arts
University of Glasgow

Abstract

Over the last two decades, the UK has received a massive influx of immigrants who are diverse not only in terms of their ethnic and religious backgrounds but also in their migration routes and experience (Vertovec, 2007). Such differences play a key role in the socio-economic and demographic stratification within and across ethnic communities, and by implication, the speakers' sociolinguistic behaviour. However, little attention has been given to the possible impact of migration routes and experience on sociophonetic variations within and across ethnic communities. Most of the related research on ethnic communities has been largely concentrated on South-Asian and Afro-Caribbean communities that came to the UK through similar channels of migration. Additionally, little work on ethnic accents of English has directly examined ethnic regional varieties of English (though cf. Wong and Hall-Lew, 2014; Wormald, 2016).

The Iraqi community in the UK exhibits waves of migration, with different migration routes to different locations. This thesis explores the sociophonetic variation within forcibly displaced (refugees) and professional Iraqi- Arab migrants in London and Glasgow, who despite commonalities, are socioeconomically stratified. It focuses on the patterns of variation in the production of English laterals and positive voice onset time (VOT) of stops, which are produced differently in London and Glaswegian English as well as Iraqi Arabic (Al-Ani, 1970; Stuart-Smith, 2004; Wells, 1982b). Using a variationist sociolinguistic framework, 44 first-generation Iraqi Arab speakers, aged 40-70 and stratified by migration experience, dialect and gender, were recorded reading target words in a carrier phrase and completed an acculturation questionnaire. English positive VOT durations and laterals' degree of clearness/darkness were measured and analysed acoustically. The effects of linguistic, macro- and micro-social factors on English stops' VOT duration and F2-F1 Hz of the laterals were statistically analysed.

Iraqi English variation was conditioned by regional dialect and migration experience. These factors also interact, and with gender, to affect VOT and lateral production patterns. Moreover, Iraqi speakers who reported integration attitudes and behaviour within and outwith the community showed monolingual-like production patterns, highlighting the importance of considering speakers' identification and involvement with both their ethnic and national communities to better understand and interpret their sociolinguistic behaviour.

Dedication

To my parents, Asim and Juri

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Declaration

With the exception of chapters 1, 2 and 3, which contain introductory material, all work in this thesis was carried out by the author unless otherwise explicitly stated.

Chapter 1

Introduction

1.1 Research Motivation and Context

Language variations according to speakers' social characteristics and behaviour are well-documented. The interplay between social patterns and linguistic variation is evident at different language levels, ranging from obvious differences in word choice to small phonetic details in the production of sounds. The study of the latter is of particular interest in the field of sociolinguistics, where variations in the phonetic realisation of particular sounds have been investigated through a social lens. Broad social categories, such as age, gender and social class, gained considerable attention in early sociolinguistic studies, as they have been found to correlate with individuals' linguistic choices (e.g., Labov, 1966; Wolfram, 1969). Likewise, individuals' social practices and identities have been linked to their linguistic behaviour (Fought, 2006, p.12). Although recent sociophonetic research prioritises individuals' social practices as a major factor in the construction of their sociolinguistic identity, macro-social categories (e.g., age and gender) are still inescapable when examining the language of any speech community (Fought, 2006, p.7)(Kiesling, 2013, p.456).

The existence of migrant and minority ethnic communities in English-speaking countries, and more specifically in the UK, has brought to the fore the link between phonetic variation and ethnicity in research. By examining the effects of first-language interference, language use, ethnic attitudes and identity on English production patterns, it was demonstrated that members of ethnic communities behave differently (Fought, 2013). While most existing sociophonetic work focused on the phonetic variations across different ethnic groups and related it to the ongoing English language change (e.g., Khan, 2003; Labov, 1963, 1972; McCafferty, 2001), only a few studies have focused on intra-ethnic variation to better understand the relationship between individuals' linguistic behaviour and ethnic identity (e.g., Alam, 2015; Mendoza-Denton, 2008; Sharma, 2011).

Despite the growing body of sociophonetic research on migrant and ethnic communities, surprisingly little attention has been devoted to the effect of migration experience on individuals' sociolinguistic identity and behaviour, a factor that plays a major role in the socio-economic differentiation within and across minority ethnic communities, as well as their formation. In fact, until recently, this factor has been overlooked in the broader social research of ethnic communities that is largely concentrated on well-established communities rather than recent waves of migration with different migration routes and experiences. As Vertovec (2007) noted, the last two decades have witnessed a massive influx of immigrants in western countries, including the UK, whose migration history and experience are totally different from the previous ones. Currently, minority ethnic communities in the UK are diverse not only in terms of ethnic origins, culture and religion but also in migration experience and civil status, a situation which Vertovec (2007) refers to as *superdiversity*. Although superdiversity in terms of migration history and experience may differently impact the sociolinguistic identity and behaviour of members of minority ethnic communities, it has been overlooked in sociolinguistic research.

Whilst much of the existing sociolinguistic research on ethnic communities in the UK has been conducted with South-Asians and Afro-Caribbeans, there are relatively few studies on sociolinguistic variation in other ethnic communities, such as British Arabs. Arabs in the UK comprise a large diaspora that dates back to the nineteenth century (Nagel and Staeheli, 2008, p.269). However, far too little attention has been paid to their sociolinguistic behaviour. While Arab communities in the UK share identity aspects such as heritage language, history and culture, they are diverse in terms of religious and political affiliations, as well as national and geographical background (El-Solh, 1992). This diversity extends to other social aspects: in addition to the pre-migration social-class variation, different waves of migration resulted in socio-economic stratification between the established and the recent communities. This pattern is clearly observed within the Iraqi Arab community in the UK (Al-Rasheed, 1992), which is the focus of the present study.

The different waves of Iraqi Arab migration, starting from the 1950s to the present day, represent what Vertovec refers to as superdiversity of the community (Vertovec, 2007). Early Iraqi Arab migrants had different migration motivations, experiences and status compared to their recent counterparts, leading to socio-economic and demographic variations within the community (Al-Rasheed, 1992). While early waves of Iraqi Arab migrants settled in the UK as professionals and merchants, subsequent Iraqi immigrants came to the UK as refugees and asylum seekers. Unlike their predecessors, recent Iraqi migrants 'did not have the luxury of choosing their place of settlement' (Ali, 2018, p.137) but were mainly part of the dispersal programme. Although most of them are educated middle-class Iraqis, they experience downward social mobility due to their migration status in the UK. The situation of Iraqi communities in the UK is similar to that of other ethnic communities with successive waves of migrants. However, despite this factor's major role in the formation of ethnic communities and identities, it has received little attention in previous sociolinguistic studies.

For the Iraqi community, migration experience and history are closely related to the geographic location in the UK. The present thesis focuses on Iraqi Arab communities in London and Glasgow, as they illustrate regional demographic, linguistic and socio-economic differences between recent and established Iraqi migrants. Regarding London, the Iraqi community is the second largest Arab community after the Egyptians (Al-Rasheed, 1992, p.537). Well-established middle-class Iraqis reside in London, but also considerable numbers of recent Iraqi refugees live in certain areas of the city. In contrast, the Iraqi community in Glasgow is a small recent community that became visible after the dispersal programme policy in 1999. The regional differences in the size and composition of ethnic communities have received little attention in the sociolinguistic investigation (though cf. Wong and Hall-Lew, 2014; Wormald, 2016) despite being central to our understanding of the construction of regional ethnic identity and more generally the outcomes of English regional variation and change.

Moreover, much of the existing research on Arab bilingual speakers focuses on English language acquisition in foreign language contexts (EFL), code-switching and language shifts across generations (e.g., Alanazi, 2018; Bichani, 2015; Ferguson, 2013; Flege, 1981). Only a handful of studies recently investigated the sociophonetic behaviour of members of the Arab diaspora (Clothier, 2019, on Australian Lebanese and Samant, 2010, on US Arabs). To date, sociophonetic research on ethnic communities has not investigated the English production patterns of UK Arabs, and more specifically Iraqis. Thus, one aim of the present study is to document the phonetic characteristics of Iraqi English spoken in London and Glasgow.

The role of gender in the construction of the sociolinguistic identity has been shown in Arabic communities (See Bassiouney, 2009, for details). Nonetheless, whether gender differences persist in the sociolinguistic behaviour of Arabs in the West is still unclear. While the Arab diaspora in the UK is generally viewed as similar to other Muslim communities regarding gender practices and roles, there are actual cultural differences among them. Thus, the gender effect on Iraqi Arabs' sociolinguistic behaviour in the UK is another factor considered in the present study.

Additionally, the effects of speakers' social practices and attitudes on their production patterns have been widely considered in previous English research on ethnic communities but largely conducted with second-generation speakers. With a few exceptions (e.g., Hoffman and Walker, 2010; Nagy and Kochetov, 2013; Ryan, 2018), most of the research on first-generation migrants neglected the possible impact of speakers' social behaviours and attitudes on second language variation. Therefore, acknowledging their importance, this thesis explores the effects of speakers' social practices and attitudes on phonetic variation.

The present study seeks to contribute more broadly to sociolinguistic research by investigating English speech patterns in the overlooked community of Arab and Iraqi Arab bilinguals in the UK. Notably, it seeks to contribute to our understanding of the motives behind intra-ethnic phonetic variation by: 1) accounting for different migration routes and experiences; 2) investigating regional variation in the English spoken by Iraqi Arabs; 3) considering the effects of social practices and attitudes on the sociolinguistic behaviour of first-generation Iraqi Arabs.

1.2 Overall Research Questions

The overall aim of this study is to determine the factors that motivate phonetic variation within a single migrant community- UK Iraqi Arabs-, thus, providing further understanding of the formation of the sociolinguistic identity in minority ethnic communities. Specifically, sociophonetic variations in the speech of 44 first-generation Iraqi Arab bilinguals were examined by analysing their English production patterns considering their migration experience, dialect, gender, and other sociolinguistic aspects related to their behaviours and attitudes.

The present thesis focuses on variation in the phonetic realisation of positive voice onset time (VOT) in word-initial English stops, and word-initial and final /l/. These phonological variables were chosen because they are produced differently in London and Glasgow English as well as Iraqi Arabic (Al-Ani, 1970; Stuart-Smith, 2004; Wells, 1982a). Hence they are more likely to reveal socially-based variation in Iraqi English, as shown in previous studies on other ethnic communities (e.g., Alam, 2015; Kirkham, 2013). Consequently, three main research questions are addressed in the thesis:

1. What are the phonetic characteristics of Iraqi English stops' positive VOT and /l/ as spoken by first- generation Iraqi Arabs in London and Glasgow? Do Iraqis share patterns of Arabic accented English in the production of these sounds?

2. How are Iraqis' phonetic realisations conditioned by linguistic factors?

3. Do Iraqis' production patterns vary according to macro-social factors, namely migration experience, dialect and gender as well as micro-social factors?

1.3 Structure of the Thesis

This thesis is composed of nine chapters. Chapter 2 lays out the theoretical dimensions of the research, explaining how sociolinguistic research has perceived and interpreted linguistic variation in different speech communities. Chapter 3 provides a comprehensive background of the Iraqi Arab community in the UK, focusing on their migration history and experience.

Chapter 4 presents the general methodology used in this study. It details the fieldwork process, material design, samples and data collection. It also discusses the methods and techniques used for data analysis.

Speakers' social practices and attitudes elicited from the acculturation questionnaire are explored in Chapter 5. First, a general background on individuals' ethnic orientation and linguistic behaviour is provided. Then the data are examined through the correlation analysis, before explaining the reasons why certain variables were chosen for subsequent statistical analyses.

Chapter 6 focuses on stop consonant VOT production. It introduces VOT as a main feature of stops and reviews previous literature on its production patterns in Glaswegian and London English, as well as Arabic. Specific research questions are outlined, followed by the methods, results and discussion of the analysis.

Chapter 7 delves into the realisation of laterals by reviewing previous literature on London and Glaswegian /l/, as well as Iraqi Arabic /l/. Similar to Chapter 6, specific research questions are provided before presenting the findings of the analysis.

Chapter 8 provides a detailed discussion of the findings of the present study. It refers to the existing research on ethnic communities and Arab bilinguals to explain and interpret the findings. Future perspectives of research on UK Arab communities, in general, and the collected corpus specifically are also provided.

Finally, Chapter 9 concludes the thesis by summarising the main findings and contributions of the present study.

Chapter 2

Theoretical Background

2.1 Overview

Based on the assumption that languages do not vary randomly, but are conditioned by internal and external factors, variationist sociolinguistics developed as a subfield of study in the 1960s (Labov, 1963). Since then, different approaches have been employed to explore and explain language variation and change. Since the present study aims to investigate patterns of phonological variation in the English spoken by Iraqi Arab community in the UK and to explain the motives behind them, variationist sociolinguistic framework is used to analyse and interpret variation.

This chapter provides a theoretical background to variationist sociolinguistics research relevant to the present study. It begins with a brief overview of the development of variationist sociolinguistics as a field of study. Then a review of social factors, known to play a role in speakers' linguistic behaviour, and ways of examining them in previous research are presented. Finally, a detailed examination of ethnicity as a key social factor in sociolinguistic research and previous studies on ethnic communities are provided.

2.2 Sociolinguistic Research: Origins and Approaches

Sociolinguistics is a broad field of study which views language through social lenses. Variationist sociolinguistics started to flourish as a subfield of study after noting the fact that variation, a fundamental aspect of any language, is not random but highly structured by linguistic, and more importantly, social constraints (Tagliamonte, 2012, p.2). Focusing on the actual language use in society, early sociolinguistic research showed that both the linguistic environment and speakers' social characteristics influence linguistic variation (e.g., Fishman, 1989; Gumperz, 1982; Hymes, 1972; Labov, 1963, 1972). One of the first notable studies that examined language use in a social context was Labov's (1963) study on Martha's Vineyard. His investigation of (ay) and (aw) among different age groups of speakers showed clear differences in the pronunciation of these vowels among members of the community. Considering social factors such as attitudes towards the island and the participants' identity, Labov (1963) found that the fishing community in the island, which was threatened by tourist industries, retained the local centralized variant in (ay) and (aw) whereas other islanders tended to have a lowered nucleus to [a] in these variants. According to Labov (1963), the fishing community's preference for the local centralized variant was interpreted as a way of showing authenticity towards the island (Labov, 1963). On the other hand, other islanders who preferred to use the new variant [a] were shown to have negative attitude towards the island. Labov's (1963) ground-breaking study as well as his following studies (Labov, 1966, 1972) were the cornerstone of the study of language variation and change in social contexts. With the exception of his study in Martha's Vineyard (Labov, 1963), early sociolinguistic work or what Eckert referred to as "the first wave in variationist studies" focused mainly on the effects of macro-social categories such as age, social class, and gender on linguistic variation and change in speech communities (Eckert, 2012, p.82). Adopting this approach, the linguistic behaviour of women was found to be different from men (e.g., Trudgill, 1974; Wolfram, 1969), middle-class speakers tended to use variants which are different from those used by working-class speakers (e.g., Labov, 1966), and ethnic groups were shown to use distinctive linguistic features (e.g., Labov, 1972).

This approach, however, has been criticized for having limited access to the community and depending only on broad social categories such as age, gender and social class to explain linguistic variation and change (Eckert, 2000; Milroy, 1987; Romaine, 1995). One of the first attempts to understand linguistic variation from a different angle was Milroy's (1980) study in Belfast (Tagliamonte, 2012, p.36), which shows a correlation between the speakers' social network and their linguistic behaviour. Adopting ethnographic approach, Milroy (1980) found that only individuals who have strong network ties with the local community exhibited similar linguistic variants (Milroy, 1980, p.175). Milroy's (1980) study was important, as it provided a different understanding of phonological variation and change in speech communities and led to the establishment of the "second wave of variationist studies" (Eckert, 2012). Unlike first wave studies, this approach emphasized the importance of accessing and understanding the speech community to better interpret the motives behind linguistic variation. Moreover, this approach paid closer attention to individuals' linguistic behaviour rather than the community as a whole unit. Inspired by the work of Milroy (1980), subsequent studies investigated the relation between the use of certain linguistic features and social networks (e.g., Edwards, 1985, 1992). Since this approach focused on linguistic variation at the individual level (Tagliamonte, 2012, p.37), later studies shifted the attention to variation among speakers in smaller groups. One of these was Cheshire's (1982) notable study on the use of non-standard morpho-syntactic features in the speech of a group of teenagers who used to meet regularly at two local parks in Reading, England. In her study, Cheshire (1982) found that boys who participated in similar practices tended to use the same variables, a result which situated individuals' community of practice in the centre of subsequent research.

Treating a school as a speech community, Eckert (2000) conducted an ethnographic study on white adolescents in a Detroit high school. The focus of Eckert's (2000) study was on the influence of students' social practices on their linguistic behaviour. Specifically, Eckert (2000) investigated the social and linguistic behaviour of two distinct communities of practice in the school, known as the Jocks and Burnouts, and found a strong correlation between their social and linguistic behaviour. Jocks, who participated in the school activities and had good relations with teachers and other students, tended to avoid the use of non-standard features as well as vowel innovations, known as the Northern Cities Chain Shift. On the other hand, Burnouts, who did not show interest in the school community and were involved in drugs and alchohol use, tended to use innovative variables more frequently. Eckert's (2000) study paved the way for further investigation into the correlation between the speakers' social behaviour and their linguistic choices (Tagliamonte, 2012, p.37). This approach, described as "the third wave" of variationist studies (Eckert, 2012), focuses on the individual's stylistic practice and how linguistic variables are used to "serve a social purpose" (Tagliamonte 2012, p.38). Moreover, third-wave studies pay a close attention to different patterns of identity and their correlation with the individual's stylistic practice (Kirkham, 2013, p.30).

Additionally, recent investigation showed that individuals' stylistic practice is not fixed and can cary different meanings (e.g., Podesva, 2004, 2007). For example, Podesva (2004, 2007) investigated the link between linguistic variation and stylistic practice in the speech of a gay medical school student, named Heath. While Heath tended to aspirate the intervocalic [t] in general to index his gay identity, his aspirated [t] had longer bursts with his friends at the barbecue than during other situational interactions (e.g., at the clinic) (Podesva 2007). Podesva (2007) argues that such long burst of [t] aspiration is consistent with his "diva" persona that he adopted with his friends at the barbecue. Podesva's (2007) study shows how linguistic variables are used to index certain social and stylistic practices of individuals depending on the situation.

Notably, the methodologies and approaches used in the 'three-waves' variationist studies (Eckert, 2012) also proved useful in explaining linguistic variation in the speech of bilingual speakers and ethnic groups (e.g., Alam, 2015; Fought, 1999; Khan, 2006; Kirkham, 2013; Labov et al., 1968; Wolfram and Dannenberg, 1999). While speakers' use of accented features was attributed to interference of the first-language or ethnicity in early studies, the speakers' social network, social practices and attitudes, ethnic orientation and identity were also important factors that determine variation within and across ethnic groups.

The overall framework of the present study is largely based on first-wave approach, in that it examines English phonetic variation in the Iraqi community according to macro-social factors. However, the present study also considers the possible effects of micro-social factors, such as social practices and attitudes, on intra-ethnic phonetic variation as well as the relationship between linguistic variation and identity, thus making use of second- and third-wave approaches.

The following sections shed light on how social factors have been viewed and investigated differently in previous variationist studies.

2.2.1 Social Class

The relationship between speakers' socioeconomic status and linguistic variation was first introduced by Labov (1966) in his foundational work on New York City. In his investigation of variation in the production of post-vocalic [r] in three socially stratified department stores (i.e. by *prices, locations*), a strong correlation between [r] production patterns and employees' socioeconomic class was observed, with consonantal realisations being produced by middle-class speakers and vocalic realisations by working-class speakers. Following Labov (1966), subsequent studies paid considerable attention to social class as a key social factor in linguistic variation across different speech communities (e.g., Cedergren, 1973; Macaulay, 1976; Modaressi-Tehrani, 1978; Trudgill, 1974; Wolfram, 1969). Despite using different methods for measuring and classifying social class, most early studies found similar observations, in which more frequent use of local, less prestigious variables was observed among speakers with low socioeconomic status and vice versa, thus providing evidence for a clear linguistic stratification across groups according to social class.

However, differences in speakers' linguistic behaviour according to their social class were not always consistent or straightforward, as subsequent studies found intersections between speakers' social class and other social categories in different ways. For example, Guy et al. (1986) study on the use of a high-rising intonation in Australian English, an innovative feature at the time of the study, revealed frequent use of this feature only by working- class female speakers. Likewise, Labov (1966) found a clear association between social class and ethnicity, with frequent use of less-prestigious English variants among working-class African American speakers. These correlations showed that the effect of social class on linguistic behaviour might not be uniform within social groups.

Examination of speakers' social network as a possible cause of linguistic variation and change in subsequent studies yielded important insights into the inconsistent effect of social class on groups (e.g., Labov, 2001; Milroy, 1980). For example, Milroy (2001, p.374) found that working-class speakers showed more frequent use of local features as they were more engaged in dense and multiplex social networks with members of their local speech community, and that these network structures served to maintain non-standard forms as solidarity markers for these lower prestige communities. Further investigation of social network and linguistic variation and change supported Milroy (1980) findings, whereby a strong link between the nature and type of speakers' network and their linguistic behaviour was observed (e.g., Cheshire, 1982; Winford and Romaine, 1997).

Shifting the focus to individuals' linguistic choices as part of their stylistic practices, less attention is given to macro-social categories, including social class. However, speakers' stylistic practices were found to be, to some extent, shaped by their socioeconomic status. Eckert's (1989) notable study on high school students found that their linguistic and social practices are partly determined by their social-class background and may also predict their socioeconomic status in the future (Guy, 2012, p.177).

Extant research on Arabic sociolinguistics has paid little attention to social class as an independent variable, partially due to the difficulty in defining and measuring this factor and the more dominant role of other social factors, such as tribal and religious affiliation on the social stratification of Arab communities than social class (Bassiouney 2009, p.115-116). Thus, in contrast to sociolinguistic research on western communities, little is known about the role of class as a social variable in language variation in Arab communities.

In the present study, Iraqis' social class is closely related to their migration experience. Despite being mostly middle-class educated Iraqis, the Iraqi refugees experienced downward social mobility upon migration to the UK as a result of their migration status and /or job constraints. This is not the case for Iraqi professionals who maintained their socioeconomic status as members of a middle-class community after settlement in the UK (Al-Rasheed, 1992).

2.2.2 Age as a Social Variable

Because the speech of older generations tends to be different from younger generations, age was examined as a factor in sociolinguistic studies to understand and interpret the motives behind linguistic variation and change. This approach, referred to as apparent-time construct, was first used and validated in Labov's (1963, 1966) work in Martha's Vineyard and in New York City. While most studies which adopted the apparent-time approach reported a change in progress, a few studies showed a different kind of language change, referred to as age-grading. As Tagliamonte (2012, p.47) states, age grading refers to the situation in which people use certain linguistic features appropriate for their age (e.g., adolescence) and avoid other features which are commonly used by other age groups (e.g., old people). This phenomenon has been observed mostly in the speech of adolescents (Bailey, 2013, p.253) who tend to use innovative features more frequently than old speakers. Labov suggests that the distinctiveness of adolescents' speech either by the preference for innovative features or the avoidance of certain features is " the leading edge of a change in progress" (Tgliamonte 2012, p.49), a process which Labov called incrementation. Based on Labov's suggestion, much subsequent work starts to focus on adolescents' speech in order to understand how a linguistic change starts and spreads in a speech community (e.g., Cheshire, 1982; Eckert, 2000).

With regard to sociolinguistic research on ethnic communities, most ethnographic studies that adopted third-wave approach focused on adolescents' speech and examined the relationship between individuals' linguistic behaviour and their social practices in order to understand the motives behind linguistic variation among speakers of this age group (e.g., Alam, 2015; Kirkham, 2013). On the other hand, other studies adopted apparent-time construct to observe and interpret linguistic change in progress within ethnic communities. For example, Sharma (2011); Sharma and Sankaran (2011) notable studies on London Punjabi community provided a valuable explanation for the gradual change in the speech of this community. Observing [t] production patterns among three age groups of speakers, a clear change in the use of the Punjabi retroflexed [t] and British glottalised [t] was observed, accompanied with the emergence of a new reallocated retroflexed [t] variant among the younger generation. According to Sharma (2011); Sharma and Sankaran (2011), such linguistic change among different generations of the same ethnic group of speakers is a result of demographic and social change in the community over the last fifty years. Sharma (2011); Sharma and Sankaran (2011) study is relevant to the present study in that it considers the effect of the social and demographic differences on linguistic variation within the community.

In Arabic, age has been found to be a crucial factor in the study of language variation and change; however, it mostly intersects with other factors such as gender and ethnicity. While most studies adopted the apparent-time approach to examine change and variation in a speech community (e.g., Al-Wer, 2007; Alqahtani, 2015), only a few studies used the real-time approach to observe a linguistic change in a speech community (e.g., Al-Wer, 1991, 2007). Nevertheless, despite constituting the majority of Arab population, variation in the speech of adolescents and its relation to identity and behaviour remain understudied (Bassiouney, 2009; Miller, 2004, p.117).

2.2.3 Gender

Gender is one of the main social factors investigated in the present analysis. It has been considered a critical independent variable in sociolinguistic studies due to its importance in the construction of individuals' identity (Queen, 2013, p.368). Thus, investigating the role of gender in speakers' linguistic choices has been crucial in all three waves of variationist studies even though it has been defined and examined differently.

In the first wave studies, gender is often used to refer to the sex of speakers, whereby the language spoken by males and females is examined and compared. Labov's (1972) study in New York City as well as other studies (e.g., Trudgill, 1974; Wolfram, 1969) showed that women use certain variants more frequently than men and vice versa. Notably, regardless of their social class, women were found to prefer prestigious variants more than men (e.g., the preference for postvocalic /r/ in Labov's (1972) study as well as the (ing) variant in Trudgill's (1974) study). Moreover, women were found to contribute to the sound change due to their frequent use of innovative variables (e.g., Labov, 1966; Wolfram, 1969). Such findings have been widely observed in subsequent sociolinguistic research (Queen 2013, p.374), leading to the establishment of some assumptions on gender and language in first wave studies. While some linguists, such as Chambers (2003, p.149-153), think that women's language differs from men's language simply because men and women's nature is different, others think that women's preference for prestigious variants is to index their social status in the community (e.g., Trudgill, 1974) and men's preference for local forms is a way of showing masculinity (e.g., Cheshire, 2002, p.427).

The interpretations reported in early studies were, however, not valid in other sociolinguistic contexts (e.g., Al-Wer, 1991; Bakir, 1986; Chambers, 1992; Kiesling, 1998; Milroy, 1980). In her study on language variation and social network, Milroy (1980) showed that it was not gender so much as participation in different kinds of social networks which accounted for the differences in phonological variation between men and women. Similarly, in a study conducted by Chambers (1992), women were found to prefer innovative variants more than men due to their greater range of social contacts in the investigated community. According to Chambers (1992), women's social relationships mainly accounted for variation between men and women. Moreover, Kiesling (1998) found that the frequent use of non standard /n/ variant among male students did not index masculinity and has a much more complex social meaning. Such findings lead to the suggestion that there is no fixed reason that explains linguistic variation between men and women (Cheshire 2002, p.427). Instead, gender differences are constructed through social and cultural values in different communities as well as other economical opportunities available to men and women (James, 1996).

The recent change in gender roles and behaviour in western countries led third-wave sociolinguists to define and investigate gender differently (Cheshire 2002, p.424). While gender was used to refer to the biological sex of speakers in first-wave studies, third-wave studies treat gender as a socially constructed complex variable (Eckert, 1989, 2000). Linguists in third-wave studies shift the focus to men's and women's social and stylistic practices to understand and interpret linguistic variation, which may or may not correlate with their gender identity (Cheshire 2002; p.424).

Compared to English, little sociolinguistic research has been devoted to gender variation in different Arab communities. Despite this scarcity of research, two interesting insights were provided in the existing literature on gender variation in Arabic. First, unlike English, the standard variety in Arabic (MSA) has a different status from the spoken prestigious variety, each of which reveal distinct use and social significance between male and female speakers. For example, early Arabic sociolinguistic studies- which are largely based on the first-wave variationist approach- found that male speakers prefer to use standard variants, whereas female speakers prefer to use spoken prestigious variants due to women's low-level of education compared to men (e.g. Bakir 1986, Al-Wer 1992). However, more recent studies assert that even among Arab women who are highly educated and more exposed to Standard Arabic, they tend to prefer the urban prestigious variants to the standard ones as a means of indexing a modern, urban identity (Bassiouney, 2009, p. 161). Second, the interplay between gendered identity and other factors—such as cultural traditions, social contact and exposure as well as social roles and responsibility—is more complex and highly significant in Arab communities compared to those in the West. Thus, as highlighted in recent studies on different Arab communities (e.g., Al-Essa, 2008; Al-Wer, 2014; Ismail, 2007), considering the impact of these factors on the linguistic behaviour of Arab male and female speakers is essential to better understand and interpret the motives underlying gendered-based variation.

The social and cultural differences between the Iraqi community in the UK and the larger community in terms of gender roles and identity poses the question of whether gender plays an important role in phonetic variation among Iraqi Arabs. Therefore, the present study considers gender as a social variable that may affect Iraqis' sociolinguistic behaviour.

2.2.4 Style

Style, which refers to intra-speaker variation, has been explored differently in the three waves of variationist studies (Coupland, 2007, p.1). The term was first introduced by Labov (1972) to describe speakers' shift from formal to informal speech in different situations. According to Labov (1972), people tend to use more formal linguistic variants when they pay more attention to their speech, a process that can be noticed in formal situations. By contrast, the most natural speech is produced in informal situations or during spontaneous conversations (Labov 1972). Therefore, Labov emphasized the importance of eliciting data using different methods (e.g., interview, reading passage, word list) to 'identify each individual's least self-conscious style- the vernacular' (Schilling, 2013, p.311). Such methodology has been widely adopted in the first-wave studies to elicit stylistic variation among speakers in speech communities.

Although Labov's approach, which is referred to as 'attention to speech approach' (Schilling 2013, p.330) established the notion of stylistic variation in sociolinguistic studies, it has been criticised for considering speakers' attention to speech as the only reason for style shifting (Schilling 2013, p.330). However, Labov's attention to speech approach aligns with the general purpose of first-wave studies, which aims to provide an understanding of the linguistic variation and change at a community level rather than focusing on the social meaning of linguistic interaction among speakers (Coupland, 2007, p.7).

Results of subsequent studies (e.g., Cheshire, 1982; Hewitt, 1982) played a significant role in introducing a different stylistic approach to sociolinguistic research, which is referred to as Audience Design model (Schilling 2013, p.334). The Audience Design model, which is based on Speech Accommodation theory proposed by Giles (1973), interprets style shifting as resulting from accommodation with the speaker's audience (Schilling 2013, p.334). Unlike Labov's attention to speech model, this approach provides wider range of explanations for stylistic variation in individuals' speech, thus brought to the forefront the important role of style in third-wave studies (Alam, 2015, p.17). While first-wave studies examine style in relation to external social variables such as gender and social class, third-wave studies focus on how stylistic variation carries social meanings, and is used as part of speaker's identity (Coupland 2007, p.21; Schilling 2013, p.339). Thus, focusing on speakers' ability to construct identity through stylistic variation is central to third-wave studies (Schilling, 2013, p.339). Third-wave studies expand their understanding of style to include individuals' appearance and habits and link these stylistic practices to their identity.

2.2.5 Identity

One of the well-established notions in sociolinguistic studies is the fact that individuals' linguistic choices are closely related to their social identity (Kiesling, 2013, p.464). Labov's (1963) fundamental study in Martha's Vineyard is one of the first studies that focused on the social meanings of linguistic variation and their role in constructing identities. In his study, some speakers' preference for local variants was a sign of their strong identification with the island and its people. Although Labov's (1963) study showed how linguistic behaviour constitutes a major part of identity, little attention has been paid to the relationship between linguistic variation and identity in subsequent first-wave studies, in general, and Labov's later work, more specifically (Labov, 2001, p.191).

By contrast, third-wave variationist studies realize the significance of the social meanings of linguistic variation as a major element of speakers' identity. With the growing interest in third-wave approach, it has become clear that identity is a complex process that encompasses different levels and domains (Kiesling 2013, p.452). These levels include: Macro-level social categories, local positions and stances (Bucholtz and Hall, 2005, p.592). While first-wave studies focus mainly on how speakers identify themselves with macro-level social categories, such as gender, social class and ethnicity, third-wave studies concentrate on local levels of identity in order to understand the motives behind individuals' linguistic choices in different situational interactions. Moreover, instead of viewing identity as a stable and fixed process, third-wave studies assert that speakers tend to activate some aspects of identity through speech depending on the situation and context they are in (Kiesling 2013, p.453). These levels of identity extend to include fleeting interactional moments, which Moore and Podesva (2009, p.450) refer to as stances. Although stances are not considered to relate directly to social identity (Kiesling 2013, p.453), the repeated stances across interactions may result in a more enduring level called a persona; e.g., 'Valley Girl', 'nerd' etc.

Importantly, although examination of the link between social meanings of individuals' linguistic behaviour and identity in different situations is informative, Kiesling (2013, p.456) asserts that "no matter how local our focus is, we can not escape the importance of society wide structures". This was examplified in Eckert's (2000) notable study, showing that even though jocks and burnouts identifed themselves with the school's local groups, the group's general values corresponded to middle- and lower-class's values in the larger community (Kiesling 2013, p.456). Thus, as they will be here, the wider social categories are still important to consider even when examining local and situational levels of identity.

2.3 Ethnicity

Although the term ethnicity has been commonly used in social science studies in general and sociolinguistic research in specific, giving one fixed definition for ethnicity is hard to do (Fought, 2006, p.4). While certain physical differences among people such as skin colour and eye shape can help us predict their race, ethnicity is socially constructed and is different from race (Fought 2006, p.4). Similar to gender, ethnicity is not something we are born with, but is something individuals and groups develop and maintain to reflect identity within a particular context. Ethnic identity has been perceived through groups of people who share certain social features such as race, culture and language. According to Barth (1998) any group of people who have the same race, share a culture and/or a language and identify themselves as a group can be called an ethnic group. This leads to the fact that ethnic identity of any ethnic group cannot be constructed without the existence of shared social elements such as culture or language and consequently cannot be understood on its own. Moreover, considering other social variables along with ethnicity such as gender and social class is important in understanding identity construction in general (Fought 2006, p.20). Therefore, it can be said that ethnicity is constructed through the existence of shared social elements such as language or culture and may incorporate or conflict with other social factors such as gender and social class to form groups' identity.

2.3.1 Sociolinguistic Approaches to Ethnicity

Since language is perceived as one of the major elements in the construction of ethnic identity (Fought 2006, p.7), ethnic minority population in different English speaking countries has received considerable attention in sociolinguistic research. Labov's (1962) work in New York City was pioneering as it was one of the first to reveal a link between ethnicity and linguistic variation. In his well-known New York City department stores study, Labov (1962) found that variation in the production of /r/ is determined mainly by the social-class of the speakers, with rhotic /r/ being produced by middle-class speakers and vocalic /r/ being produced by working-class speakers. However, Labov (1963) found a link between speakers' social class, their ethnicity and their production patterns, as African American employees worked mostly in the low-income department stores at that time (Labov, 2006, p.48). Although Labov's (1962) study did not focus on ethnicity as a main social variable, it paved the way for subsequent studies on African American Vernacular English (e.g., Labov, 1972). For example, in his study of European, Latino and African American speech patterns, Labov (1972) found clear ethnic differences, with the latter group exhibiting ethnically-marked, non-standard variants in their speech. Additionally, some studies examined the accent features of African American English in other regional varieties (e.g., Wolfram, 1969, in Detroit) whereas others described African American linguistic features in general (e.g., Rickford, 1999). Labov's work was later extended to other ethnic communities such as Latino speakers in the USA (e.g., Fought, 2003), as well as Afro-Caribbean and South Asian communities in the UK (e.g., Hewitt, 1986; Rampton, 1995).

While Labov's (1962, 1972) work is considered a milestone in sociolinguistic research, it has been criticized for overlooking intra-ethnic variation (e.g., Kirkham, 2013, p.21). By shifting the focus to individual-level linguistic behaviour, subsequent research on minority ethnic communities revealed intra-ethnic linguistic variation (e.g., Fought, 2003; Milroy and Muysken, 1995). For example, Milroy and Muysken (1995) examined patterns of code-switching among members of a Chinese community in Tyneside-UK. They found significant variation in the frequency of language use and code-switching, which was explained by individuals' social ties with members of their ethnic community. Similar observations were reported in Fought (2003) study on young Mexican Americans in Los Angeles, in which she noticed that Mexican-American speakers who were born in the USA have tense relationship with Mexican Americans who were born in Mexico. Such division in the community resulted in the existence of language variation between the two groups in terms of the amount and frequency of code-switching.

Moreover, subsequent studies showed that ethnic accent features can be adopted by speakers who do not belong to the same ethnic community (e.g., Hewitt, 1986; Rampton, 1995). Through exploring youth culture of Black and White teenagers in South London, Hewitt (1986) found that white teenagers use some features of English Creole, which is typically spoken by Black teenagers. Similarly, Rampton (1995) investigated the speech of Indian, Pakistani, Afro-Caribbean and Anglo speakers who live in a neighborhood of the South Midlands and noted that some ethnically marked linguistic features are observed in the speech of all speakers regardless of their ethnic background (e.g., the use of stylistic Indian English by Punjabi, Afro-Caribbean and Anglo speakers). Rampton (1995) referred to the use of ethnically marked linguistic features by people who belong to another ethnic group as language crossing.

With speakers' social practices recently receiving considerable attention in sociolinguistic research, studies on ethnic communities showed variation within and across ethnic groups according to their social and stylistic behaviour (e.g., Alam, 2015; Kirkham, 2013; Sharma, 2011; Stuart-Smith et al., 2011). For example, Kirkham's (2013) investigation of students' linguistic behaviour and community of practice in a multiethnic secondary school in Sheffield showed that speakers' linguistic behaviour is largely determined by their social practices. Similarly, Alam (2015) and Stuart-Smith et al. (2011) found that differences in the social and religious practices of female Pakistani teenagers in Glasgow '*Glaswasians*' played a significant role in the existence of phonetic variation among them. Thus, these studies provided an evidence for the strong link between speakers' social and linguistic practices not only across but also within ethnic communities (Eckert, 2000, 2008).

Urban Dialects and Ethnic Diversity

The existence of large-scale migrant and ethnic communities in European urban cities, including the UK, has resulted in high-level contacts among different languages and dialects, a situation described as linguistic diversity (Wiese, 2013). Such ethnic and linguistic diversity have been suggested to be one of the main driving forces behind the emergence of innovative linguistic features in different multicultural cities in Europe, such as Berlin (e.g., Wiese, 2013), Copenhagen(e.g., Quist, 2000), London (e.g., Cheshire et al., 2011), and Helsinki (e.g., Lehtonen, 2011).

The growing body of sociolinguistic research on multicultural urban dialects has reported two major findings in 'multicultural urban varieties'. First, there is a strong association between the use of innovative features and age, as adolescent speakers are mostly leaders of the linguistic change (Cheshire et al., 2011; Wiese, 2013). Second, the linguistic innovators are members of the most diverse speech communities and are part of multilingual settings (Wiese, 2013). Moreover, in her investigation of *'Kiezdeutsch'*, a new urban dialect spoken in Germany, Wiese (2013) noted that the linguistic diversity is not only observed at the community level but also at the level of individuals, with speakers of *'Kiezdeutsch'* being exposed to and speaking different languages and/ or dialects. According to Wiese (2013, p.240), individuals' high degree of exposure to linguistic diversity results in greater tolerance to linguistic variation, necessary for the spread of linguistic innovations.

While studies on multicultural urban varieties have provided important insights on language variation and processes of language change in multicultural communities, a number of these studies (e.g., Cheshire et al., 2011) have been criticized for neglecting the social meanings of linguistic variation and change (e.g., an urban youth identity as suggested in Eckert, 2008, p.26). Moreover, other researchers think that these studies overlook inter-ethnic linguistic variation and downplay the important role of ethnic identity on variation (e.g., Gates, 2019; Kirkham, 2013; Wong and Hall-Lew, 2014). For example, in a recent ethnographic study on linguistic variation and ethnicity in a multicultural school community in London, Gates (2019) found a significant correlation between group membership, gender and ethnic identity, with all playing an important role in adolescents' sociolinguistic behaviour. Specifically, among different ethnic backgrounds, Gates (2019) found that multicultural London English (MLE) innovative features are largely affected by ethnicity, gender and school orientation, as they were frequently used by ethnically White Anglo and Black African British girls as well as anti-school boys. Gates (2019) demonstrated the significant role of ethnic identity on linguisitc variation in multicultural settings.

Ethnic Regional Varieties of English

Despite the growing body of English research on ethnic communities, most studies tend to focus on the speech of ethnic communities in one geographical location. To date, there have been very few studies that directly investigated regional variation in ethnic English (cf. Wong and Hall-Lew, 2014; Wormald, 2016). Comparative analysis of regional variation and ethnic identity is particularly interesting when ethnic communities are different in terms of their sociohistorical background in each geographical area, as is the case for London and Glasgow Iraqi community. This difference can inform how members of a single ethnic community construct their ethnic identity in different contexts and how it affects their acquisition of regional variety. For example, Fought (2006, p.13) asserts that the clear differences between US Latino communities in the south-west and south-east in terms of their size and migration history are likely to result in intra-ethnic linguistic variation.

A key recent study on English regional variation and ethnic identity is that by Wong and Hall-Lew (2014) who investigated variation in BOUGHT vowel across Chinese Americans in New York and San Francisco, USA. New York city, characterised as having a small invisible Chinese community compared to the ‘white’ communities, has a raised BOUGHT vowel quality, a realisation which is usually associated with ‘white’ speakers (Wong and Hall-Lew, 2014). This raised vowel realisation is, however, recently reported to be undergoing a change as a result of ethnic diversity in the city. By contrast, San Francisco, which has a well-established visible Asian community, is reported to lag behind other Western cities in merging BOUGHT-BOT vowel realisations (Wong and Hall-Lew, 2014).

To observe patterns of variation and change across the two communities, Wong and Hall-Lew (2014) investigated BOUGHT realisations across different age groups and found an interplay between BOUGHT vowel variation across age groups and the social meanings of ethnic and regional identity. Specifically, Wong and Hall-Lew (2014) found that older Chinese Americans in San Francisco are producing different BOUGHT vowel realisations than their white conterparts. They also differ from younger Chinese Americans in that they do not show a BOUGHT-BOT merger in their production. Wong and Hall-Lew (2014) explained the significant age difference among San Francisco Chinese Americans as resulting from a change in the community and city demographic status. Specifically, older Chinese grew up at a time when the community was large, but socially segregated, thus producing different BOUGHT realisations from their white counterparts. With the significant increase in multi-ethnic population in San Francisco, accompanied with upward mobility of Chinese families to more ethnically diverse areas, younger Chinese in San Francisco constructed a multicultural identity, linguistically indexed by the merged BOUGHT-BOT vowel realisations.

By contrast, New York Chinese speakers showed less age difference, but a strong effect of ethnic orientation on their realisations. While Chinese who identified themselves as New Yorkers and lived in the majority ‘white’ areas produced a raised BOUGHT vowel quality, similar to ‘white’ New Yorkers, other speakers who showed a strong identification with Asian culture produced a low back BOUGHT vowel realisation, similar to older Chinese in San Francisco. At first glance, the Chinese in the two cities seemed to follow the regional sound changes previously reported in both cities. However, a closer look at the individuals’ behaviour and communities’ sociohistorical contexts revealed that Chinese in both cities convey different social meanings in their BOUGHT vowel production patterns (Wong and Hall-Lew, 2014).

While Wong and Hall- Lew (2013) highlight the interplay between the ethnic regional identity construction and generational sound change, their results may also indicate a more complex sociolinguistic behaviour of individuals. For example, the variation observed in the production of BOUGHT vowel according to age in San Francisco was interpreted as an adherence of multicultural identity by younger generation who, unlike their older counterparts, grew up in multi-ethnic areas and therefore showed a BOUGHT-BOT merger in their production, an ongoing change observed in other US western cities. Nevertheless, it is also possible that, because younger Chinese Americans live in multi-ethnic settings, they have developed more diverse accent repertoires than their parents as part of their multicultural identity, and consequently use multiple BOUGHT vowel realisations depending on the context and identity of the interlocuters (e.g., home vs. work; Chinese American vs. non-Chinese American). The relationship between diversity of accent repertoires and multilingual identity was not addressed in Wong and Hall-Lew's (2013) study, but was evident in recent studies on ethnic communities in multicultural settings (e.g., Sharma and Sankaran 2011 on Punjabi community in London; Wiese 2013 in Germany).

In the UK, Wormald (2016) investigated regional variation in the production of FACE, GOAT, GOOSE vowels and /r/ across Bradford and Leicester Punjabi communities. Considering speakers' heritage language features and Anglo English varieties, Wormald (2016) found significant regional differences between Bradford and Leicester Punjabi speakers in the production of these sounds. However, the Punjabi speakers in the two cities showed different realisations from their Anglo counterparts. Specifically, Leicester Punjabi speakers produced diphthongal realisations for FACE and GOAT vowels whereas Bradford Punjabi speakers produced monophthongal realisations, patterns which are typically produced in their dialect areas. Nevertheless, they produced different vowel qualities for these vowels in comparison to Anglo speakers (i.e., closer and fronter realisations by Punjabi speakers). Similar observations were reported for GOOSE vowel, with clear regional variations in Punjabi English despite being different from their Anglo counterparts. Wormald (2016) could not identify a clear effect of speakers' heritage language (Panjabi) on their production patterns. Instead, Panjabi English speakers in each regional variety exhibited a linguistic behaviour similar to that reported on other multiethnic contact varieties in the UK (e.g., Multicultural London English), indicating a possible effect of other factors on Panjabi English speakers, such as a construction of hybrid local identity (i.e, British Asians).

Although Wormald (2016) study provided useful insights into patterns of similarity and difference in ethnic regional varieties, she did not look at the possible impact of social, religious and historical contexts of Punjabi communities in both cities on their linguistic behaviour, fundamental in understanding the construction of regional variation in the speech of a single ethnic community (Wong and Hall-Lew, 2014).

2.3.2 Minority Ethnic Communities in the UK: An Overview

Vertovec (2007, p.1027) notes that waves of migration to the UK started notably after the World Wars when large and well-organised migrants from former colonial regions in Africa and South-Asia settled in the UK. The existence of ethnic minority communities in the UK triggered the attention of social science research, resulting in a growing body of social science studies on ethnic minorities in the UK. Similarly, the UK government and policy makers responded to such change by setting up strategies for what came to be called multiethnic and multicultural communities in the UK (Vertovec 2007, p.1027). However, according to Vertovec (2007), the government and social science research have mainly focused on the country of origin of ethnic minority communities and neglected other elements that play an important role in the formulation of ethnic communities. Moreover, social science studies have always concentrated on large well-established communities as the main source of change in British community and did not catch up with recent waves of migration which, despite being different from the former ones, play a significant role in the transformation of British community (Vertovec 2007, p. 1025).

During the past two decades, large numbers of migrants who are socially and demographically different from the earlier wave of migrant communities started to flow to the UK (Vertovec 2007, p.1028). These migrants are mostly refugees and asylum seekers who are diverse in terms of country of origin and less organized than the former waves of migration. Such change in migration status is suggested to result in diversity within and across ethnic communities in the UK, a process that Vertovec (2007) called ‘super-diversity’. Super-diversity is a term that explains different categories of migrants not only in terms of country of origin, language and religion, but also in terms of migration experience, time of migration, socio-economic and demographic status of ethnic communities (Vertovec 2007). According to Vertovec (2007, p.1026), such social differences within and across ethnic communities in the UK have been neglected in social science research.

Since Vertovec’s (2007) study, a growing number of studies on ethnic communities from different disciplines started to consider less studied social variables such as individuals’ religious practice, motives and time of migration. However, to date, these factors have received little attention in sociolinguistic research on ethnic communities (cf. Alam, 2015; Sharma, 2011).

2.3.3 Linguistic Variation Within and Across UK Minority Ethnic Communities

Over the last thirty years, sociolinguists have taken some interest in the English spoken by Afro-Caribbean and South-Asian communities due to their large size and long existence in the UK. Apart from language contact, bilingualism, language change and language shift studies, previous research either examined English variation and change across different ethnic communities compared to the majority language or focused on patterns of variation within a single ethnic community.

One of the first sociophonetic studies that investigates variation across different ethnic groups is Khan's (2006) work in Birmingham. Khan (2006) examined variation in the production of GOAT, PRICE vowels and TH/ DH-variation among second-generation Pakistani, Afro-Caribbean and White Anglo teenagers. Khan (2006) found significant effects of ethnic/ national orientation and attitudes on Pakistanis' and Afro-Caribbeans' linguistic behaviour, with frequent use of ethnic features among those who showed strong ethnic orientation (i.e., [o:] for GOAT), and frequent use of innovative features as they reported stronger identification with British culture (i.e., /f, d/ for /θ, ð/). By contrast, Anglo speakers' linguistic behaviour was predicted by social network. Khan (2006) study is remarkable as it was one of the earliest studies in the UK that explore the complexity of social and linguistic behaviour among speakers of different ethnicities.

Highlighting the significant role of the social and stylistic practices on the speakers' linguistic behaviour, more recent research investigated linguistic variation within and across ethnic groups using ethnographic fieldwork (e.g., Alam, 2015; Kirkham, 2013). Kirkham's (2013) study in a multiethnic high school in Sheffield investigated the production patterns of word-final /i/ (e.g., *happy*) as well as word initial /t/ among Anglo, Somali, Yemeni and Pakistani students. Notably, Kirkham (2013) found that variation in the realization of /t/ and /i/ by female teenagers is determined by their community of practice whereas variation in the realization of these variables by male speakers is largely influenced by their ethnic identity.

Work on multiethnic urban cities, such as London and Manchester, adopted an ethnically neutral approach to examine patterns of variation and change resulting from ethnic and linguistic diversity in these cities (e.g., Cheshire et al., 2011; Drummond, 2013; Kerswill et al., 2008). Kerswill et al (2010) and Cheshire et al. (2011) introduced the term Multicultural London English (MLE), a variety spoken not only by ethnic minority speakers but also by Anglo speakers. Cheshire et al. (2011) and Kerswill et al. (2008) noted that Multicultural London English includes the use of non-standard features, such as th-fronting and /l/ vocalization as well as features observed in other English dialects such as GOOSE-fronting and narrow diphthongal or monophthongal variants of FACE, GOAT, PRICE and MOUTH vowels. Drummond (2013) conducted a similar investigation to see whether London innovative features diffused into other multicultural cities like Manchester. By examining the speech of adolescents from different ethnic backgrounds, Drummond (2013) found that many MLE features are present in their speech. However, Drummond (2013) noted that there exists individual variation in the realization of these features, which may correlate with the speakers' ethnic identity and language ideology (Drummond and Dray, 2015). The significance of ethnic identity in explaining variation in multicultural settings was later confirmed in Gates (2019) study in London (See 2.3.1).

Other sociolinguistic work in the UK focused on South-Asian accent features and their use among members of the community (e.g., Alam, 2015; Harris, 2006; Heselwood and McChrystal, 1999; Lambert et al., 2007; McCarthy et al., 2011, 2013; Sharma, 2011; Sharma and Sankaran, 2011; Stuart-Smith et al., 2011; Wormald, 2016; Zara, 2010). Retroflexion, clear lateral realisations, rhoticity, monophthongal vowel realisations, negative voiced and short-lag voiceless stop VOT, were among the salient features identified in the English spoken by South Asians in these studies. However, investigation of the use of accented features within the community revealed intra-ethnic variation. For example, Heselwood and McChrystal (1999) investigated English speech patterns among Bradford Pakistani speakers and found significant age and gender differences. Specifically, their results showed that retroflex /t/ and pre-voiced VOT were more frequently observed in the speech of older speakers whereas younger and female speakers exhibited the least British-Asian accent features (Heselwood and McChrystal 1999).

Age of arrival in the UK and input were also found to contribute to variation in the use of ethnic features among South-Asian speakers. McCarthy et al. (2011, 2013) investigated phonetic variation in the production of English /l/, /r/, stops' VOT and English monophthongs among Sylheti-English bilinguals who are stratified according to age of arrival to the UK: late arrivals who migrated to the UK after the age of 18, early arrivals who migrated to the UK before the age of 10, and second-generation Sylheti-English bilinguals. Detailed auditory and acoustic analysis revealed significant differences between groups of speakers, with late arrivals producing phonetic realisations similar to their first-language (Sylheti) on the one hand and early arrivals and second-generation speakers producing SSBE-like patterns on the other hand. For example, in the VOT analysis, McCarthy et al. (2013) found a significant positive correlation between positive VOT duration and groups' age of arrival, with longer voiceless VOT amongst early arrivals and second-generation speakers than late arrivals. McCarthy et al. (2011, 2013) interpreted the different linguistic behaviour between late arrivals and early arrivals/ second generation speakers as resulting from the intersection between age of arrival and speakers' social network. In addition to acquiring English at a later age, late arrivals were more involved with their ethnic community, work in local businesses and had little contact outside of the London Bengali community. By contrast, both early arrivals and second-generation speakers had full-time education in the UK and established social ties with people outside of their local community. Overall, McCarthy et al. (2011, 2013) studies demonstrate the significant impact of age of arrival in the host country on the sociocultural and linguistic behaviour of members of ethnic communities.

Additionally, Sharma (2011); Sharma and Sankaran (2011) examined the use of ethnic (i.e., retroflex /t/) and local features (i.e., glottalisation) among London Punjabi speakers in different interactional settings. Interestingly, Sharma (2011); Sharma and Sankaran (2011) found significant stylistic variation in the use of these features, which were also modulated by age and gender. Unlike old female speakers and young male speakers, Sharma (2011) found that female young speakers and male old speakers tend to use ethnically-marked variants in certain domains (e.g., home domain) but shift to British prestige variant in other interactional contexts. To understand the unexpected gender and age patterning, Sharma (2011) investigated the social and historical development of the Punjabi community in Southall, the research site. She found that while both male and female old speakers grew up during the same period, their social practices and responsibilities were different from each other. At that time, old female speakers were mostly domestic oriented and had limited access to the Anglo variety whereas old male speakers had to work and develop relationships with others in the wider community. This resulted in the existence of variation in the stylistic practice of old male speakers. With regard to young speakers, home orientation is not an obligation for women as before, which resulted in the existence of diverse networks among them and consequently variation in stylistic repertoire. This social change is in line with a demographic change in the ethnic composition of the area, whereby Southall South-Asian community become a majority after being a minority in the area. Sharma (2011); Sharma and Sankaran (2011) studies highlight the importance of considering the social, demographic and networks patterns of ethnic communities in order to better understand and interpret variation.

Recently, an ethnographic study carried out by Alam (2015) investigated the role of community of practice on the linguistic behaviour of second-generation Punjabi Muslim teenager girls in Glasgow. Her study focused on the phonetic variation in the realization of /t/ as well as FLEECE, FACE, CAT, COT, GOAT, and BOOT vowels. Importantly, Alam (2015) found that the girls' production patterns varied depending on their social practice (e.g., girls who do not follow the Pakistani culture traditions (Messabouts) produced similar variants to those of non-Asian male speakers, while those who follow the Pakistani traditions (conservatives) produced variants that are comparble to Asian male speakers). Alam (2015) study highlighted the important role of stylistic and religious practices in the existence of intra-ethnic variation.

2.4 Acquisition of Phonetic Categories by Late Bilinguals

Much of the existing research on bilinguals' speech has been devoted to the study of acquisition of second language (L2) sounds, thereby resulting in the existence of different theories on second-language phonetic and phonological acquisition. One of the early theories proposed on this topic is the contrastive analysis hypothesis (CAH) by Lado (1957), who argued that first language (L1) interference occurred as a result of phonemic dissimilarities between L1 and L2 sounds and that the sounds that exist in learners' first language (L1) are easier to acquire than those which do not exist in learners' L1. However, this hypothesis was not supported by numerous subsequent studies (e.g., Dickerson, 1975; Nemser, 1971), which found that the acquisition of L2 sounds cannot be solely explained by differences between L1 and L2, but is attributed to other factors, such as experience and age. Moreover, the CAH was criticised for ignoring the important role of speakers' perception on the similarities and differences between L1 and L2 sounds and, more importantly, overlooking phonetic-level differences between L1 and L2 sounds (e.g., cross-language differences in the production of phonetic cues of oral stops).

More influential theories on the acquisition of L2 sounds have been developed over the last 30 years, such as the speech learning model (SLM) by Flege (1995), the perceptual assimilation model (PAM) by Best (1995), and, more recently, the speech learning model revisited (SLM-r) by Flege et al. (2021). Flege's models (SLM and SLM-r) are among the theories that were widely adopted in second language acquisition (SLA) studies, as they provide a comprehensive explanation of the acquisition of L2 phonemic and phonetic categories. Based on the belief that the phonetic details of sounds play a significant role in identifying foreign-accented speech (Flege et al., 2021), the SLM and SLM-r are largely concerned with the acquisition of phonetic categories (Flege et al., 2021). Moreover, central to the SLM and SLM-r is the role of speakers' perception of the similarities and differences between L1 and L2 sounds, as L1 and L2 are perceptually related to each other (Flege et al., 2021). Thus, according to Flege (1995); Flege et al. (2021), when a phonetic realisation of L2 sound is perceived as similar to the one existing in the speakers' L1, it is more likely for L1 interference to occur. In contrast, a new phonetic category is formed when L2 sound is perceived to be phonetically different and is thus more likely to be successfully acquired (Flege, 1995).

Importantly, unlike most theories on L2 acquisition, Flege (1995) highlights the important role of external factors, such as quality and quantity of L2 input as well as experience, in the acquisition of phonetic categories in the speech of bilinguals. For example, Flege (1992) investigated the production of word-final /t/ and /d/ in spoken English by Mandarin and Spanish bilinguals who differed in terms of length of residence (LOR) in the US. An analysis of a number of phonetic cues (i.e., F1 offset frequency, closure and preceding vowel duration, and amount of voicing during closure (VDC)) in the production of /t/ and /d/ within each group did not show a significant difference according to LOR . Instead, speakers in both language groups varied according to the type or amount of L2 input (Flege et al., 1992). Thus, according to the SLM-r, variation in the acquisition of phonetic categories by bilinguals is not only attributed to the speakers' LOR or age but also to the quality and quantity of L2 input and experience (Flege, 1995).

Recently, a growing body of research has begun to address and highlight the relationship between SLA and socially based variation in the speech of late bilinguals (e.g., Drummond, 2010; Nagy and Kochetov, 2013; Ryan, 2018), thereby providing evidence that—in addition to input and experience—the SLA of speech sounds is highly conditioned by social factors such as dialect, social network, and a sense of identity. While the present study is more concerned with socially-based variation in the speech of first-generation bilingual Iraqis, SLA theories are also considered to help interpret and understand the results of the present analysis.

2.5 Summary

This chapter has provided background information on the origins and approaches of variationist sociolinguistic research. It has also explored the significant role of social categories in shaping speakers' sociolinguistic identity and discussed their relevance to the present study. Given that ethnicity is a central theme to the present thesis, this chapter has presented the main relevant areas of sociolinguistic research on minority ethnic communities. It also briefly explored the most notable theories on adult bilinguals' acquisition of phonetic categories.

Overall, previous sociolinguistic research in the UK provided a better understanding on the link between ethnic identity and linguistic behaviour. However, due to the large concentration on South-Asian and Afro-Caribbean communities which came to the UK through similar migration routes, little is known about the effect of migration experience on the construction of ethnic identity and its impact on language variation. Therefore, the present study is designed to fill this gap by examining patterns of similarities and differences in the production of English by Iraqi Arabs who have different migration history and experience in the UK. The following chapter provides a sociohistorical and linguistic review on the UK Arab communities, in general, and Iraqis, more specifically.

Chapter 3

The UK Arab Communities: Context and Language

3.1 Overview

Arabs are one of the rapidly growing minority communities in Europe, and more specifically in the UK. Despite their visible presence in the UK, especially in London, they have not received much attention in social science research until recently, thus were described as one of the UK hidden minorities (Nagel, 2001, p.267) . The term 'Arab' is generally used as an ethnic classification for citizens of any Arab state. Politically, Arabs are those who originate from one of the Arab league countries which include: Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Palestine, Qatar, Saudi Arabia, Somalia, Sudan, Syria, Tunisia, United Arab Emirates and Yemen. However, the term 'Arab' actually refers to people whose mother tongue is Arabic, which may exclude some Arab League countries speaking Arabic as a second language such as Somalia, Djibouti and Comoros as well as minority communities such as Kurds in Iraq and Syria. Since the main focus of this study is on Iraqi Arabs whose first language is Arabic, the language-based definition is adopted when referring to Arab communities in the UK.

This chapter provides a sociohistorical and linguistic background to the Arab community in the UK. It charts UK Arabs, in general, and Iraqis, more specifically, in terms of historical, demographic, sociological and linguistic context, followed by a review of linguistic work on Arabic-English bilinguals as well as work on Arab diaspora in English context.

3.2 British Arab Community

3.2.1 Historical and Sociological Background

The establishment of Arab communities in the UK dates back to the nineteenth century (El-Solh, 1992; Nagel and Staeheli, 2008, p.269). According to Halliday (1992, p.4), the first settlement of Arabs was in the 1860s when a number of Lebanese and Syrian merchants came to Manchester. This was followed by larger number of Arabs, mainly from Yemen, who came from the British former colony, Aden, as workers in British ships (El-Solh, 1992; Halliday, 1992, p.4). By the early twentieth century, Yemeni seafarers established the first noticeable Arab communities in different port cities such as Cardiff and South Shields (ibid). Unlike earlier Arab merchants, it was hard for Yemenis to integrate into the British society even though many got married to local women. The hostility towards Yemeni communities was a common attitude among British people to all ethnic minorities that had colonial links with Britain (Vickers, 2016, p.58), but was well-documented against the South Shields Yemeni community during the Yemenis-led riots in 1930s (BBC Online, 2014). After World War II, many Yemenis moved to industrial cities such as Birmingham and Sheffield to work in steel industry (Halliday, 1992).

A similar Arab chain migration took place during the 1960s when thousands of Moroccans were recruited to work in London hotels (El-Solh, 1992; Halliday, 1992, p.5). By the end of 1960s, Moroccans had established their own community in North Kensington-London (ibid). However, Moroccans were not the only Arabs who came to Britain during that time. In fact, it was during the 1960s when Arab communities from diverse national origins such as Lebanese, Iraqis, Sudanese, Egyptians settled in Britain. Most of them were educated middle-class Arabs who came to the UK as students but then had the chance to settle there. Moreover, a considerable number of educated middle-class Palestinians came to Britain after being persecuted by the Zionists (Nagel, 2001, p.268). While educated middle-class Arabs were scattered in different British cities, Yemenis and Moroccans were mainly working-class communities, thus congregated in certain areas (e.g., Moroccan community in North Kensington) (El-Solh, 1992, p.240).

The following years witnessed an increased flow of Arab migrants who came to Britain under different circumstances. During the 1970s, many Arabs from the Gulf countries started to invest in London due to the economic benefits of the oil boom, which allowed them to come to London on a regular basis. By contrast, many political Arabs settled in the UK to practice their political activities freely (Al-Rasheed, 1994). Moreover, the upheaval unstable situation in the Arab World (e.g., Lebanon civil war, Iran-Iraq war, the Gulf war) triggered further migration of educated middle-class Arabs who could secure professional jobs in the UK or who already had established businesses in London.

The continuous political developments in the Arab World (e.g., US invasion of Iraq, Syria civil war, conflicts in Sudan) resulted in a recent wave of migrants from affected countries. However, unlike earlier Arab migrants, later migrants suffered from downward social mobility. In other words, recent Arab refugees and asylum seekers have been through different migration routes compared to their earlier counterparts, resulting in the existence of socio-economic stratification within and across Arab communities in the UK (Flynn, 2013, p.23).

Although Arab communities are one of the largest well-established communities in Britain, they have received little academic as well as governmental attention (Nagel, 2001, p.267). In fact, it was not until 2001 when they were listed as a separate ethnic group in the UK Census. This was accompanied by lack of academic studies on Arab communities. Moreover, for a long time, Arab communities have been undifferentiated from larger South-Asian Muslim communities by local British people. Therefore, Nagel and Staeheli (2008, p.416) and Nagel (2001, p.267) refer to Arab communities as "Britain's hidden or invisible minorities", a description that ironically shows how their actual and increasing presence in the UK is overlooked. While it was estimated that the number of Arabs in the UK in 1980 is 250,000 (El-Solh, 1992), this number increased significantly in the following years to reach 700,000 Arabs living in the UK (UK Government, 2018). These figures, however, are not precise, as they are not up to date and do not include Arabs who were born in the UK (i.e., second and third generations), or Arabs who moved to the UK from other EU countries.

3.3 The Scottish Arab Community

3.3.1 History and Demography

Unlike British Arabs, the Scottish Arab community was considerably small until recently, a fact that explains the dearth of information on the history of Arab settlement in Scotland. However, Scottish merchants have had early contacts with Arabs from North Africa since the eighth century (Bonino, 2016, p.9). During the seventeenth century, it was reported that Moroccan Arabs lived in Scotland but did not settle after their employment reached an end (Hopkins, 2017, p.3).

The Arab population in Scotland grew substantially after the dispersal programme policy proposed in 1999. Created in response to the significantly increased numbers of refugees and asylum seekers during the 1990s, the Asylum and Immigration Act was responsible for dispersing and accommodating refugees in certain areas to decrease migrants' congregation in London and the South East (Sim, 2015, p.731). Since then, Glasgow council has received the largest numbers of asylum seekers compared to other UK local authorities, of which Arabs constituted a large percentage (Dorrian, 2004; Sim, 2015). While it was estimated in the 2001 UK Census that the number of Arabs in Glasgow who were born in the Middle East is 3,108, this number is doubled to 6,600 in the 2011 UK Census (Elshayyal, 2016, p.14). Recently, a BBC report indicates that Scotland has received the largest number of Syrian asylum seekers in the UK, which was estimated to be around 2000 refugees in 2017 (Easton and Butcher, 2018).While large number of Arabs in Scotland are recent asylum seekers who were part of the dispersal programme policy, smaller numbers of British Arabs were reported to move recently to Scotland (Bonino, 2016, p.9). With the lack of up-to-date and precise figures, the number of Arabs in Scotland is not definitive. However, recent reports asserted that Arabs in Scotland form the second largest Muslim ethnic community after Pakistani communities, with the majority residing in main Scottish cities such as Edinburgh, Glasgow, Dundee and Aberdeen (Bonino, 2016, p.28).

3.4 Heterogeneity

Unlike general perceptions, the UK Arab community is not a homogeneous group. Arabs are diverse in terms of their religious and dialectal background, settlement patterns and socioeconomic status in the UK. Dialectal, religious and sectarian differences exist across UK Arab communities, but are more obvious within communities in England due to their larger numbers and longer residence. Although all Arabs' heritage language is Arabic, spoken Arabic has numerous regional dialects in which, for example, Moroccan Arabic can be completely unintelligible to Iraqi Arabic speakers. Religious and sectarian affiliation is another divider within Arab communities. The majority of Arabs are Muslims. However, there is a considerable number of Christians, Jewish and secular Arabs within the community. Within the Muslim community, Arabs belong to either Sunni or Shi'i Islam, which may also affect Arabs' political affiliation due to the recent sectarian conflict in the Middle East.

In addition to religious divisions, Arab communities in the UK are one of the ethnic communities that show clear stratification according to socioeconomic status. In her notable study on London Arab communities, El-Solh (1992) investigates how socio-economic, religious and sectarian differences within Arab communities influence their social ties with each other as well as with the larger Muslim and British communities. El-Solh (1992, pp.243-244) found that Arabs' economic status plays a major role in their social networks and the degree of integration into the mainstream British society. Specifically, she found that middle- and upper-middle-class Arabs tend to have stronger social ties with their Arab counterparts from different nationalities rather than working-class speakers from their own national background. This social division, however, does not apply to most Shi'i communities whose religious affiliation is more important than socioeconomic status (El-Solh, 1992). El-Solh (1992, p.240) also notes that religious affiliation was an important reason behind the integration of early Christian Arabs into the mainstream British society.

3.5 The Iraqi Community in the UK

3.5.1 Introduction

The Iraqi community in the UK is long standing and hugely diverse. Constituting a large portion of the UK Arab population (Al-Rasheed 1992,p.537), it is estimated that there are 75,300 Iraqi-born individuals in the UK (Office for National Statistics (ONS), 2011). However, Iraqis' actual number is expected to be much higher given lack of precise and detailed investigations on this community. Moreover, these figures do not include second-generation Iraqis and EU Iraqi nationals who moved to the UK after settling in EU countries (Degli Esposti, 2019, p.264). For example, the UK Iraqi Embassy estimates that UK Iraqis are between 350,000 and 400,000 whereas recent studies on the community reported a number between 282,000 and 350,000 (Saleh, 2011). Despite the conflicting reports, it is confirmed that about half of the Iraqi population is concentrated in London, making London community the largest Iraqi community in the UK (Office for National Statistics (ONS), 2011; The International Organization for Migration, 2007).

This section provides an overview of the UK Iraqi communities, with a focus on Iraqis in London and Glasgow. First, a general background on Iraqis' migration history to the UK, the social and economic differences are provided. Then their linguistic background is explored with a focus on Iraqi Arabic accent features.

3.5.2 Migration History

Looking at the history of Iraqis' migration to the UK and other countries, Iraqis present the clearest example of the relationship between political events in their home country and establishment of communities in diaspora (Al-Rasheed, 1992; Flynn, 2013, p.538). Unlike most migrant communities in the UK, Iraqis did not come to the UK searching for better economic opportunities. In fact, the majority of Iraqi migrants are educated, middle-class individuals who left their country due to successive political unrest in Iraq (Al-Rasheed, 1992; Chatelard and Morris, 2012). To date, Iraq has been through six main political changes, each of which has resulted in different waves of Iraqi migration to the UK. These political developments are: the 1958 revolution, the 1963 coup, the 1968 Ba'athist takeover, the Iran-Iraq war in 1980, the Gulf war in 1991 and the US invasion of Iraq in 2003.

The first wave of Iraqis came to the UK after the fall of the British installed monarchy in 1958. All of the first wave Iraqis were Sunni affluent diplomats and army generals who had strong association with the former monarchy (Al-Rasheed, 1992, p.539). The second wave of

Iraqi migrants took place after the 1963 coup, when the Ba'athist and Nasserite parties excluded members of Iraqi Communist parties from political positions and started pursuing and accusing its members. This led members from the Communist party to escape the country and live in the UK. While first wave migrants were rich gentry, Iraqi Communist members who came to the UK were middle-class professionals, doctors, lawyers and intellectuals (Al-Rasheed, 1992, p.539). Both waves secured upper middle-class or middle-class status and resided mainly in London's affluent areas.

Political intolerance in Iraq got worse after the Ba'athists took over in 1968 in which Iraqis in general did not have freedom of speech and other ethnic and religious minorities were suppressed (e.g., Kurds, Jews). Such situation triggered another wave of migration of Iraqi professionals and merchants to the UK where they could express their religious and political activities without restriction. During that time, many higher-education Iraqi students in the UK found professional jobs after graduation and preferred to stay in the UK (Al-Rasheed, 1992, p.540).

The largest waves of Iraqi migration to the UK was between 1979 to 2003 when Saddam Hussain took over the power (Al-Rasheed, 1992; Degli Esposti, 2019). The outbreak of Iran-Iraq war in the 1980s and the following political developments were a turning point in the history of Iraqi migration to the UK, in which Iraqis from diverse socio-economic backgrounds came to the UK as refugees and asylum seekers. During the Iran-Iraq war, many Iraqi Shiite families were forcibly deported from Iraq, as they were accused of having alliance with Iran. While large number of Iraqis were deported to Iran, other professional and merchant Iraqis as well as working-class Iraqis came to the UK and were granted asylum status. The number of Iraqis in the UK has significantly increased after the Gulf War in 1991, as it was followed by ten years of financial sanction against Iraq, thus motivating further migration of Iraqi minds and competencies who searched for better professional work and experience (Al-Rasheed, 1992; Flynn, 2013).

The US invasion of Iraq in 2003 resulted in the most recent wave of Iraqi refugees and asylum seekers in the UK. The sectarian violence and terror attacks that took place after the invasion led to the migration of many Iraqis to neighbouring countries as well as western countries (Flynn, 2013, p.164). The total number of asylum applications by Iraqis to the UK increased from about 4,489 applications in 1992, to 15,000 asylum applications in 2004 (Office, 2007). Moreover, it is stated that the largest number of asylum seekers in the UK and other western countries during 2006 were Iraqis (Office, 2007).

3.5.3 The Iraqi Community in London

As stated earlier, more than fifty percent of Iraqis in the UK reside in London, making Iraqi London community "the second largest Arab community after the Egyptians" (Al-Rasheed, 1992, p.537). With the most recent waves of Iraqi migration, it is more likely that London Iraqis currently outnumber Egyptians as Al-Rasheed (1992) statement is outdated. In a report published by the International Organization for Migration (The International Organization for Migration, 2007), it was estimated that there are about 125,000 Iraqis in London.

What is well-documented though is that London has been home to middle- and upper-middle class Iraqis. Early Iraqi and Arab migrants live mainly in the central boroughs of Kensington, Chelsea and Westminster as well as the western borough of Ealing (El-Solh, 1992; Nagel, 2001). In a study conducted by Al-Rasheed (1992), only twenty percent of her London Iraqi participants reported to have low-skilled jobs, which, as she put it, reflects the socio-economic make-up of the larger community in London (Al-Rasheed, 1992, p.540). However, recent migration from Iraq has resulted in larger numbers of working-class Iraqis than before mainly due to their migration status and experience. In a recent investigation of Arabs' migration patterns in London, Pharoah and Hale (2007) reported that a considerable number of male Arab, including Iraqi, asylum seekers prefer to live in London despite being dispersed to other UK cities due to the better employment opportunities available to them, especially in the catering and service industry. Unlike professionals, London Iraqi refugees and asylum seekers live in less affluent areas in London and rely on the governmental support.

London Iraqis are diverse in terms of their ethnic and religious background. In addition to Iraqi Arabs, there are significant numbers of Iraqi Kurds, Assyrians and Shabaks in London (Hopkins and Fiaz, 2009). While most of the Kurds and Arabs are Sunni or Shi'i Muslims, a considerable number of secular, Christian and Jewish Iraqis live in London (Hopkins and Fiaz, 2009). Additonally, Esposti's (2019) investigation of London Muslim Iraqis reported a visible spatial segregation between Iraqi Sunni and Shi'i, with the latter being found mostly in northern and western areas of Brent, Westminster and Harrow.

3.5.4 The Iraqi Community in Glasgow

Since the legislation of the Asylum and Immigration Act in 1999, Glasgow has received the largest number of refugees and asylum seekers in the UK, playing a role in the increased visibility of Glasgow Iraqi community. In 2008, it is reported that Iraqi asylum seekers were the second largest national group in Glasgow after the Iranians (Sim and Bowes, 2007). Due to their relience on the National Asylum Support System (NASS), recent Iraqi refugees were accommodated in unpopular deprived areas in Glasgow (Sim and Bowes, 2007). Although data on the Iraqi community in Glasgow is scarce, their presence is evident in the existence of Iraqi owned grocery stores, restaurants, complementary schools, a mosque/Hussainia and the Scottish Iraqi Association established in 2012. While large percentage of Iraqis in Glasgow are recent refugees and asylum seekers, there are considerable numbers of well-established Iraqi professionals as well as British Iraqis who moved to Scotland to seek better opportunities (Marranci, 2007, p.170).

The Iraqi community in Glasgow is significantly different from London community. While British Iraqis have a long history in London, Glasgow community is recent and less socially stratified. Moreover, the Iraqi community in Glasgow is numerically smaller than the Iraqi community in London, with some reports estimating that about 5000 Iraqis reside in Scotland (Briggs, 2008). Compared to other Arab communities, the Iraqi community is the largest, as it constitutes more than half of Arabs in Scotland.

3.5.5 UK Iraqis: Different Despite Commonalities

Similar to Arab communities, the UK Iraqi communities are not homogeneous, but vary ethnically, religiously and politically. In fact, these divisions are more clearly observed within the Iraqi community compared to other Arab communities as ethnic and religious/ sectarian suppressions in Iraq were the main reason behind their migration in the UK. The two main Iraqi ethnic communities are Arabs and Kurds. Iraqi Kurds have been marginalized in Iraq for a long time, and are also reported to have little contact with Iraqi Arabs in the UK regardless of social class (Hopkins and Fiaz, 2009).

Additionally, division based on religious differences is found among Iraqi Arabs and plays a major effect on Iraqis' political affiliation. While most of the Iraqi Arabs adhere to Islam, there is a considerable number of Christian and Jewish Iraqis who fled the country due to political suppression. Nowadays, it is estimated that there are between 4000-8000 Christian Iraqis in London who are completely segregated and have little contact with other Iraqi communities (Hopkins and Fiaz, 2009, p.34). Furthermore, the ongoing sectarian conflict in Iraq and the Middle East created a division between Sunni and Shi'i Iraqi Muslims. According to previous research on Iraqis (e.g., El-Solh, 1992; The International Organization for Migration, 2007, p.36), Iraqi Shiites are observed to have strong social ties with their Iranian counterparts regardless of their social class or migration status and have established different associations based on their sectarian affiliation (e.g., Ahl-AlBayt Shi'i Association, El-Solh, 1992, p.274).

Notably, the Iraqi communities in the UK show a clear socioeconomic stratification as a result of their migration experience and status despite the fact that most of them came from the same social background (Al-Rasheed, 1992, p.206). Specifically, early Iraqis who came to the UK before the 1980s were either well-off gentries or educated middle-class Iraqis who were familiar with English language and British culture. Their migration profile as well as time of migration enabled them to maintain their socio-economic status in the host country. While migration of middle-class professional Iraqis continued in the following years until the present date, a larger number of Iraqi asylum seekers and refugees arrived after the 1980s. Although the majority were educated Iraqis, they could not secure jobs suitable for their qualifications due to English language barrier and/ or their migration status in the UK. While the employment rate of early Iraqis is seventy-eight percent, it drops significantly among recent Iraqi refugees who migrated after the US-invasion to thirty-eight percent (Hopkins and Fiaz, 2009). Although it is stated that British-born Iraqis have better employment opportunities than their refugee parents, they are not as fortunate as British Iraqis whose parents are early middle-class migrants (Hopkins and Fiaz, 2009, p.6).

Differences also exist with respect to locality and migration experience. Specifically, refugees in London and Glasgow differ in terms of time of migration and opportunities available to them. While a large number of London-based Iraqi refugees migrated at the time of the Iraq-Iran war in the 1980s (Esposti 2018, p.274), most Glasgow-based refugees migrated to the UK after the US-led invasion in 2003. While both suffered from downward social mobility and lack of qualified employment, London-based refugees are reported to have better work opportunities compared to their Glasgow counterparts; this is mainly due to the existence of a large and well-established network of Arab/Iraqi owned-businesses in London as well as their time of migration (Pharoah and Hale, 2007). In contrast, Glasgow-based refugees are more dependent on government financial support and face more difficulties in securing employment. Despite these challenges, Glasgow-based Iraqi refugees are reported to be more involved in integration activities like volunteer work promoted by the Scottish government and the local councils as compared to refugees in other UK cities, such as London (Ramachandran and Vathi, 2022).

3.5.6 Gender Differences

Based on existing research on the UK Iraqi community, clear gender differences in terms of migration patterns and roles exist in the community (e.g., Hopkins and Fiaz, 2009; Pharoah and Hale, 2007). As for early Iraqis, when male professionals and activists fled the country, their wives or female relatives had no choice but to leave Iraq. Although most of them were educated women who used to work as doctors, pharmacists or teachers, many ended up being housewives in the UK, either due to their lack of English proficiency or because they preferred raising their children to pursuing careers (Hopkins and Fiaz, 2009, p.43). Thus, most early Iraqi women settled in the UK as dependants to their male partners.

Among the recent influx of Iraqi migrants, it is unlikely for Iraqi females to take a risk leaving Iraq on their own without knowing their future in the UK. Instead, they migrate to the UK either as students or seek refugee legally with their families (Pharoah and Hale, 2007). Many recent Iraqi women are not as educated as their earlier counterparts, which increases the unemployment rates among Iraqi women in the UK (Hopkins and Fiaz, 2009, p.43). However, second-generation Iraqi women are reported to have better employment opportunities than their first-generation counterparts. Overall, Iraqi women are still expected to follow Iraqi cultural values and avoid inappropriate behaviour (Change Institution 2009).

3.5.7 Language Background

Arabic is the official language in Iraq, where the majority speak Arabic as their mother tongue. Other minority languages are also recognised, such as Kurdish and Turkoman in the north. Although English is taught in primary and secondary education as a foreign language, its use is restricted to institutional domains. However, English is extensively used in medical schools in higher education (Abu-Haidar, 2003). Thus, despite being restricted to institutional domains, medical and science graduate students in Iraq have higher-level of English proficiency than their counterparts from other majors.

First-generation Iraqis in the UK speak Arabic or Kurdish as their mother tongue (Hopkins and Fiaz, 2009, p.38). Although second generation Iraqis seem to prefer English to Arabic, efforts are made to teach Arabic within the community and they are exposed to, albeit to varying degrees, spoken Arabic dialects at home or through communication with new arrivals from Iraq (Abu-Haidar, 2003).

The next sections will turn to a broad overview of English language research on Arab communities before describing the phonemic inventory of Iraqi Arabic dialects.

3.6 Research on Arab Speakers of English

3.6.1 Introduction

While only few studies investigated sociological and historical issues related to Arab communities in the UK, linguistic research on Arab diaspora in the UK and other English speaking countries is scarce. Furthermore, despite their long and well-established existence in English speaking countries, there is only a handful of sociolinguistic/ sociophonetic studies on the English spoken by Arab diaspora. Linguistic research on Arab communities has mainly concentrated on language use, language shift and code-switching. Moreover, most existing literature on English spoken by Arabs has mainly focused on second/foreign language acquisition by Arabic-English bilingual speakers, leaving the Arab diaspora on the outskirt of contribution to research on Arab communities. Unlike most previous studies on Arab bilinguals, English production patterns by Iraqi Arabs in the present study are examined in relation to the majority English regional variety (i.e., London/ Glasgow).

In this section, previous studies on Arabs' acquisition of English sounds are outlined. Then, a general overview of the linguistic research on Arab speakers of English is presented, before detailing English sociophonetic research on Arab diaspora.

3.6.2 Acquisition of English Sounds by Arab Bilinguals

Observations of Arabic accented features in the English spoken by Arab bilinguals are well-documented (Al Abdely and Thai, 2016, p.99). Although spoken Arabic varies from one dialect area to another, Arab learners of English tend to 'follow similar routes during their acquisition of English sounds' (Munro, 1993), a suggestion supported by results of the existing research on speakers from different Arab nationalities, such as Saudi, Lybian and Iraqi speakers of English (e.g., Alanazi, 2018; Aziz, 1974; Garib, 2014). Specifically, Arab speakers tend to produce Arabic accented features for sounds that do not exist in Arabic (e.g., replacing /p/ by /b/) (Aziz, 1974), sounds that have different phonetic details in Arabic than English (e.g., producing pre-voiced VOT for English voiced stops) (Alanazi, 2018; Garib, 2014), or English sounds that are articulated differently in Arabic (e.g., producing the English /r/ as a trill) (Aziz, 1974).

Arabic accented features in the production of English vowels by Arab learners were also reported (e.g., Ali, 2003; Evans and Alshangiti, 2018; Hubais and Pillai, 2010; Munro, 1993). For example, in an acoustic study conducted with 23 Arab students, who had acquired English in adulthood and had been living in the US for at least five years, Munro (1993) found that while participants showed a native-like difference in the production of English /i/ and /ɪ/, they produced an exaggerated temporal difference between them, phonologically similar to Arabic long and short vowels /i/ and /ī/. Arabic accented English vowel production patterns were also reported in studies that focused on one national background (e.g., Evans and Alshangiti, 2018; Hubais and Pillai, 2010, on Saudi and Omani bilinguals, respectively).

An important work on second language speech production and perception is Flege (1980, 1984); Flege and Port (1981) studies on Arab, and more specifically Saudi, bilingual speakers, as his findings in these studies, among other studies, paved the way for his Speech Learning Model (Flege, 2003). By examining the Arabs' production and perception of English sounds, which have different phonetic features from speakers' first language-Arabic (i.e., closure duration contrast and VOT in the production of voiced and voiceless stops), Flege (2003, p.345) found informative relationship between speakers' comprehension of speech sounds and their production patterns. For example, while Saudi speakers successfully produced the English phonemic contrast between /p/ and /b/, they showed different acoustic features in the production of /p-b/ contrast from native speakers of English (i.e., short-lag VOT for /p/ and prevoicing for /b/), a pattern which Flege and Port (1981) suggest as being closely related to the perception of these sounds by Saudi learners. Flege (2003) asserts that, at a phonetic level, when second language speakers perceive a sound as similar to the one existing in their first language, as in the case of Arabic and English /b/, they would show strong first-language interference, which consequently results in a foreign accent production of this sound. By contrast, second language sounds which are perceived as new, or do not exist in speakers' first language, such as /p/ for Arabic speakers, would be acquired more accurately than similar sounds, but may also have different phonetic features from native speakers, depending on the level of exposure to second language and experience of speakers. Therefore, Flege (2003) suggests that second language speakers' production is also highly dependent on their input and experience (cf. Best and Tyler, 2007; Flege et al., 2021).

3.6.3 Sociolinguistic Work on the Arab Diaspora

To date, a small amount of sociolinguistic work has been conducted on Arab communities across different English speaking countries (Bichani, 2015; Clothier, 2019; Clothier and Loakes, 2018; Ferguson, 2013; Khattab, 2002a, 2011; Samant, 2010). While Bichani (2015); Ferguson (2013) studies examined Arabic/ English language use within and across UK Arab communities, Clothier (2019); Clothier and Loakes (2018); Khattab (2002a, 2011); Samant (2010) investigated English phonetic production patterns among Arab speakers of English in the UK, US and AU, respectively. The following paragraphs shed light on each of these studies.

Language Use and Identity

Previous research on bilingual ethnic communities has shown a clear link between language use and ethnic identity (e.g., Agnihotri, 1987; Romaine, 1995). Bichani's (2015) study on UK Arabs from different national origins (i.e., Iraq, Palestine, Morocco, Jordan, Lebanon, Syria..etc) showed similar observations, as Arab communities in London and Leeds had different attitudes and identities reflected in their Arabic/English use and proficiency. Choosing Arabic complementary schools as sites for her study, Bichani (2015) found a general preference for English among Arab younger generation, which is an indicator of an ongoing language shift. In addition to the generational difference, Bichani (2015) found differences between London and Leeds communities in terms of language attitude and identity. While the Arab community in Leeds perceived Arabic language as an important element in the construction of their Muslim identity, Arabs in London community learn and speak Arabic to maintain their ethnic identity. According to Bichani (2015), the common belief that Arabic is the language of Quran, through which Islamic culture is transmitted, resulted in the more frequent use of Arabic within Leeds than London Arab communities.

With a narrower focus on Yemeni community in Sheffield, Ferguson (2013) examined patterns of language use and their relation to identity. By interviewing 38 Yemeni speakers from different age groups, Ferguson (2011) found that all speakers are English-Arabic bilinguals, with English dominant bilingualism among younger generations. Interestingly, Ferguson (2012, p.133) notes that Arabic language proficiency is important among Yemenis not only because of its primacy in Islam but also to distinguish themselves from other Muslim communities (e.g., the Pakistani community), contrasting with the representation of Muslims in the UK as a homogeneous entity.

Previous Sociophonetic Research

One of the earliest studies on Arab bilinguals in English speaking countries is Khattab's (2002, 2012, 2013) detailed studies on the production patterns of English sounds by three Lebanese Arabic-English bilingual children and their parents in York and Leeds. Investigating the production of English sounds, known to be phonetically different from Lebanese Arabic (i.e., VOT in stops, /l/ and /r/), (Khattab, 2002b) found that the adult bilingual speakers showed predominantly Arabic accented features in their English (e.g., clear /l/ realisations). Unlike their parents, the children produced native-like patterns in their production of English sounds. However, Khattab (2002b) found that children tended to produce Arabic-accented English features when code-switching or talking to their parents in a bilingual mode (e.g., clear final /l/, trilled /r/). Similar results are shown in her examination of the children's production of BATH, STRUT, PALM, FACE and GOAT vowels (Khattab, 2007), with English-like production patterns in their speech, except when communicating with their parents. According to (Khattab, 2002b, 2009), the shift to Arabic accented English in the children's speech is not resulting from Arabic language interference, as this behaviour was not observed during their English conversations with monolingual speakers. Instead, Khattab (2009) suggests that the Arabic-accented English patterns observed in the children speech is either a way to show convergence with the Arabic spoken by their parents or simply to accommodate with their parents' non-native accent. Despite the focus of her studies on bilingual children speech, Khattab's (2002, 2004) work was remarkable, as it was one of the earliest studies to provide an account of UK Arab bilinguals' speech from a sociolinguistic perspective.

More recently, Samant (2010) investigated sociophonetic variation in the speech of second-generation Arab speakers in Michigan-US. Conducting an ethnographic research on thirteen Arab teenagers at Mercer high school in Dearborn-the US, Samant (2010) examined how Arab adolescents vary in the production of the Northern Cities Shift vowels (i.e., /a/, /æ/,/ /ɛ/, /ʌ/) to index their social behaviour and ethnic identity. Treating students' national background as ethnicity (i.e., Lebanon, Iraq, Syria and Palestine), Samant (2010) found that ethnicity, gender and religious practice were all major social factors influencing the participants' social and linguistic behaviour. As for ethnicity, the affluent Lebanese Arabs, who constitute the largest proportion of Arab speakers at Mercer high school and, more broadly Dearborn City, distinguished themselves from recent Arab migrants from other countries such as Iraq and Syria. Such division is shown in the participants' production of Northern Cities Shift vowels in which Lebanese students are found to lead /ʌ/ backing and /æ/ fronting. Moreover, these variables are more commonly observed in the Arab boys' speech than the girls, an observation which was interpreted as indexing the boys' dominance in the school and the larger Arab community in Dearborn. Specifically, while the girls' social behaviour and practices are always evaluated and criticised by older members of the community (i.e., parents, relatives), the boys' practices are not usually encountered by criticism from the larger community. Moreover, the religious practice is found to be significant when interacting with speakers' ethnicity and gender. While Lebanese female students with sporadic religious practice tend to produce the shifted variable of /æ/, non-Lebanese participants with sporadic religious practice do not follow the same route. According to Samant (2011), such results are relevant to the common belief among Lebanese that sporadic religious practice is part of assimilation process with the mainstream western community, which contrasts with the belief held by the non-Lebanese that sporadic religious practice indicates their unreadiness to follow the Islamic orders. Thus, the different ways of conceptualising social categories among Arab teenagers affected the way they behave socially and linguistically, as described by Samant (2010).

With a particular focus on Lebanese Arabs, Clothier (2019); Clothier and Loakes (2018) investigated English phonetic variation within second-generation Australian Lebanese speakers and in comparison to ethnically White Anglo-Australians. Examining /l/ and VOT production patterns, Clothier (2019); Clothier and Loakes (2018) found significant ethnic differences, with Lebanese Australians generally producing clearer /l/ realisations and shorter VOT values than White Anglo-Australians. Moreover, significant intra-ethnic variation in the speech of Lebanese Australians is observed when considering speakers' gender and ethnic orientation (i.e., ethnic identity, density of Lebanese social network). Specifically, while Lebanese male speakers showed decreased VOT values and clearer /l/ realisations as they have stronger ethnic orientation, Lebanese female speakers showed prestigious English patterns (i.e. stronger positional contrast in the production of /l/, longer voiceless VOT), as they reported stronger ethnic orientation. Clothier (2019); Clothier and Loakes (2018) results point to the signifiant effect of social categories, such as gender, in constructing and negotiating Lebanese speakers' sociolinguistic identity.

3.7 Iraqi Arabic: An Overview

As with other Arab countries, the situation of Arabic in Iraq is diglossic, in which spoken dialects are considerably different from Modern Standard Arabic (Watson, 2002, p.8). While Modern Standard Arabic is the official variety used in formal domains, other social/regional dialects are used in daily interactions (Watson, 2002, p.8). Tables 3.1 and 3.2 illustrate consonant and vowel inventories in Iraqi Arabic dialects, as provided by (Versteegh, 2006). For the purpose of clarity, the semi-IPA notation used by Versteeqh (2006) was replaced by the IPA notation.

	Consonants							
	Bilabial	Labio-dental	Apical	Palatal	Velar	Uvular	Pharyngeal	Glottal
Stop	(p) b		t d tˤ dˤ		k g	q		ʔ
Affricate				tʃ dʒ				
Fricative		f	θ ð ðˤ s z sˤ	ʃ ʒ	x ɣ		ʕ ħ	h
Nasal	m		n					
Lateral			l lˤ					
Vibrant			r rˤ					
Semivowel	w			j				

Table 3.1: Inventory of consonants in Iraqi Arabic dialects provided by Versteegh (2006)

	Vowels	
	qəltu dialect	*gələt dialect*
Short vowels	ə a	i u a
Long vowels	i: e: a: o: u: ay aw	i: e: a: o: u: ay aw

Table 3.2: Inventory of vowels in Iraqi Arabic dialects provided by Versteegh (2006)

Iraqi Arabic has two main dialects: *qəltu* and *gələt* dialects. The terms were first used by Blanc (1964) to describe the social and regional phonological differences in Iraq. While *qəltu* was used to refer to Iraqi Arabic spoken by Christians, Jews and Muslims in northern Iraq, *gələt* refers to Iraqi Arabic spoken by Muslims in central and southern Iraq. Despite sharing similar sound inventory, *qəltu* and *gələt* dialects show the following major differences:

- The phoneme /q/ is preserved in *qəltu* dialects whereas it is frequently shifted to /g/ in *gələt* dialects (e.g., *qa:m* vs *ga:m*) (Versteegh, 2006).
- In *gələt* dialects, /k/ is replaced by /ʧ/ in certain contexts, but is preserved in *qəltu* dialects (e.g., *ʧi:s* vs *ki:s*) (Versteegh, 2006).

- /r/ is shifted to /ɣ/ in *qəltu* dialect, but is preserved in *gələt* dialects.
- With the exception of few *qəltu* dialects, /aw/ and /ay/ are produced as the monophthongs /o:/ and /e:/ across most Iraqi dialects, albeit are preserved in certain contexts (i.e., third person plural masculine perfect) (Versteegh, 2006).
- Unlike *gələt* dialects, the short vowels /i/ and /u/ are merged into /ə/ in all *qəltu* dialects (Versteegh, 2006).

3.8 Summary

To conclude, this chapter has provided an overview to the sociohistorical and linguistic background of the UK Arab community as a whole, and specifically the UK Iraqi community. Although the UK Arabs are long-standing minority ethnic communities, they have received little attention in governmental reports and social research, making them one of the underrepresented UK minorities. As for the UK Iraqi community, their migration history and experience are closely related to political developments in Iraq, which resulted in clear social, demographic and economic stratifications within the community in the UK. London and Glasgow Iraqi communities are prime examples of this difference, thus allowing for the examination of the possible effect of migration experience on their production patterns. The next chapter turns to the present study by explaining the general methodology.

Chapter 4

Methodology

4.1 Overview

This chapter outlines the methodology of the present study by describing the fieldwork and data collection methods, data management, and analysis. Section 4.2 provides information on the general approach of the study, before details are provided in subsequent sections.

The first part focuses on the fieldwork and data collection. Section 4.3 is concerned with sampling and fieldwork process, explaining the ethical procedure, pilot interviews, the selection of the current sample, the process of gaining access to the Iraqi community and recruiting participants and the status of the researcher. Section 4.4 describes the data elicitation method, including the speech styles used to elicit data, recording equipment and data management.

The second part of the chapter presents the process of data analysis. Section 4.5 explains the method used for the phonetic analysis, namely the acoustic analysis. Finally, Section 4.6 describes the statistical tests used throughout the thesis.

4.2 The Methodological Approach

The present study is largely based on first-wave variationist sociolinguistic approach in that it examines patterns of language variation in the Iraqi Arab community in relation to macro-social categories, namely migration experience, dialect and gender. The main assumption is that linguistic variation in a given community is not random but strongly influenced by linguistic and social factors (Llamas et al., 2007, p.75). Acknowledging the significant role of individuals' social practices and attitudes in the construction of their sociolinguistic identity (See Section 2.2), speakers' attitudes, sense of identity and social networks are also considered within and across social groups using a set of micro-level social variables elicited from the Acculturation

Questionnaire, as discussed in detail in Chapter 5. Therefore, the present study adopts a more integrated analysis which incorporates macro- and micro-social factors to account for and explain phonological variation within and across social groups.

The present study focuses on the phonetic variation in the English spoken by first-generation Iraqis. To obtain controlled, albeit natural speech for the phonetic analysis, the traditional sociolinguistic interview was used as the main data collection material in the present study. Specifically, phonetic data was elicited through a wordlist task (Arabic and English), a picture-naming task, and semi-structured interviews. The social data was elicited either through the interviews and/ or through a written social questionnaire (Acculturation Questionnaire). In the present thesis, only data elicited from the English wordlist task and the Acculturation Questionnaire was examined.

Because identifying and selecting the linguistic variables for the analysis are one of the first steps in variationist sociolinguistic studies (Tagliamonte, 2012, p.7), and given the methodological approach of the present study, prior knowledge of the linguistic variables was essential for the material design. Therefore, the first step was to decide which linguistic variables to examine. As detailed in Section 4.4 , it was deemed appropriate to focus on the following three linguistic variables: word-initial stops, word-initial and final /l/, and FACE and GOAT vowels (not analysed). These variables were mainly selected because they are produced differently in London and Glaswegian English as well as in Iraqi Arabic. Previous research on patterns of cross-linguistic and dialectal variation in the production of stops and laterals are detailed in Chapters 6 and 7, respectively.

Fine-grained phonetic analysis for English stop positive VOT and laterals was carried out using acoustic measurement, a method which has been used extensively in sociophonetic research, as it provides detailed measures that cannot always be detected auditorily (Gordon, 2006, p.25). Moreover, acoustic analysis is relatively objective and is suitable for statistical analysis since it provides continuous measures.

The data was then analysed statistically using linear mixed-effects models, one of the most widely used statistical modelling techniques in the language sciences (Winter, 2020, p.238). The linear mixed-effects models were used to investigate the linguistic and social effects on stops' and laterals' production, without neglecting the effects of random factors (e.g., *speaker, word*). The methods of phonetic and statistical analysis for VOT and laterals are given in sections 6.3 and 7.4, respectively, as the introduction for each of those chapters.

4.3 Sampling and Fieldwork

4.3.1 Ethics Approval

Before launching fieldwork, ethical approval had to be obtained from the University of Glasgow following the procedures laid out by the school (**https://www.gla.ac.uk/colleges/arts/research/ethics/ethicsapplicationprocedures/**). An ethical form, explaining the nature and aims of the study, was submitted to the committee along with the research proposal, participants' information sheet and consent forms (See Appendix A). Given that some of the participants in the present study are vulnerable migrants, namely refugees and asylum seekers, an application to join Protecting Vulnerable Group Scheme (PVG) was submitted. In August 2018, the approval from the University of Glasgow ethical committee was received and disclosure membership was granted, allowing for the start of the data collection process.

During the data collection, all participants were informed of the general research aims and design of the interview before recording them. They were informed that participation in the project is voluntary and that they can drop out of the project at any time. Moreover, it was ensured to discuss data confidentiality with each participant before the interview and ask them to sign a consent form acknowledging their awareness of their rights as participants.

4.3.2 The Pilot Interviews

A common practice in sociolinguistic research is to carry out a small-scale pilot study prior to the actual fieldwork either to identify the linguistic variables of interest or to check the suitability of speech materials for the community under investigation (Milroy and Gordon, 2003, p.141). In the present study, pilot interviews were necessary to check the validity of the data collection materials for the Iraqi community. It was also a good opportunity for me to be familiar with the recording materials and interview questions. The pilot study was initially conducted with three Arab female participants, whom I knew already. Although they are not originally from Iraq, they all speak Arabic as a first language and have a migration profile similar to the targeted sample in the present study (i.e, arriving in the UK as professionals or refugees). Still, it was important to interview Iraqis to check the suitability of the speech materials for the Iraqi community. Therefore, two more female Iraqis were further interviewed, one was a postgraduate student at the University of Glasgow whereas the other is a wife of a second- generation British Iraqi who came recently to the UK. Table 4.1 provides details on the participants' profile in the pilot interviews.

Participant	Country of Origin	Migration experience	Length of Residence
W1G	Algeria	Professional	22 years
A2G	Egypt	wife of a professional	18 years
S5G	Sudan	Refugee	10 years
M3G	Iraq	PhD student	5 years
A4G	Iraq	Wife of a professional Iraqi	2 years

Table 4.1: The social profile of participants in the pilot interviews

Conducting the pilot study was useful, as it helped me edit and reconsider some points in the interview materials and design before interviewing Iraqis. First, the initial material design required at least about two- hour-long time slot, which was a considerably long time for all participants, as they expressed. Consequently, I reduced the overall duration of the interview to one hour and a half, by excluding some words from the wordlist (i.e., words containing post-vocalic /r/), and setting a maximum of 30 minutes-long time slot for the semi-structured interview.

Second, in the Arabic and English wordlist tasks, participants had to read more than 12 pages of plain-text words, placed in a carrier sentence. All participants showed boredom and lack of interest while reading the wordlist. To avoid being in such situation during the actual data collection, words were classified into semantic themes to make them look meaningful and relevant to each other (i.e., animals, fashion.. etc.). Moreover, pictures were added to words to help readers connect visually with the word. Also, a clearer and bigger font size was used to make the reading process easier for the participants.

Third, interviewing the two Iraqi participants provided useful insights into the topics to discuss and topics to avoid while interviewing Iraqis. For example, when discussing participants' memories in Iraq, it was clear that Iraqis' memories in Iraq are closely related to the political developments mentioned earlier (e.g., Sanctions against Iraq, Iraq-Iran war), some of which were unpleasant or sad to remember (e.g., death of a relative or suffering from the sanctions). Therefore, care was taken not to ask such questions directly unless the participant started talking about them. Thus, carrying out the pilot interviews at the beginning of this study proved to be useful in editing the data collection materials and identifying appropriate topics for the semi-structured interviews.

4.3.3 Speaker Selection and Stratification

The speaker sample selected for the present analysis consisted of 44 Iraqi Arab speakers, who meet the social and linguistic criteria of the present study. Speaker selection and stratification was based on pre-defined social variables, namely migration experience, dialect and gender, with other variables, such as age of arrival, ethnic and religious background, being controlled for. The following paragraphs discuss the process of selecting and stratifying participants according to these social variables.

Age of Arrival

For the purpose of the present study, only first-generation adult Iraqis, aged between 30- 70 were included in the present analysis. Previous research has widely shown a significant effect of age of arrival and exposure to native accent on speakers' production patterns, with a considerable difference between early and late arrivals (e.g., McCarthy et al., 2013). To minimize the significant effect of age on speakers' production patterns, all participants selected for the present analysis had arrived to the UK after the age of 18.

The initial plan was to include speakers' age of arrival as an independent variable in the analysis. However, most participants in the study were within a similar age range when they arrived in the UK (i.e., 25-35 years old). Thus, participants' age of arrival in the UK was one of the variables determining the participants' selection for the present analysis, but was not included in subsequent analysis due to the small differences among participants in terms of age of arrival. Based on the recent evidence that type and amount of L2 input are better predictors to variation in bilinguals' speech than age (Flege et al., 2021), speakers' age was not considered as a factor in the present analysis. Instead, the possible effect of other factors, such as quantity and quality of speakers' social network, on linguistic variation was examined in the present study (See Chapter 5).

Ethnic, Linguistic and Religious Background

As discussed in Chapter 3, the Iraqi community in the UK is not homogenous, consisting of different ethnic and religious groups. Although the majority of Iraqis speak Arabic as a first language, there are other ethnic communities such as Kurds and Turkomans who speak Kurdish and Turkish as a first language, respectively. Moreover, in addition to the UK Muslim Iraqis, there is a sizeable community of Christian, Jewish, and to a lesser extent, Mandaean Iraqis. Given the significant effects of religious identity and linguistic background on individuals' socioliguistic behaviour, only Muslim Iraqi Arabs were included in the present analysis.

Information on speakers' city in Iraq was elicited during the interviews but was not included in the statistical analysis due to the very low numbers in some of the cities (i.e., only one participant in each city)(See Figure 4.1).

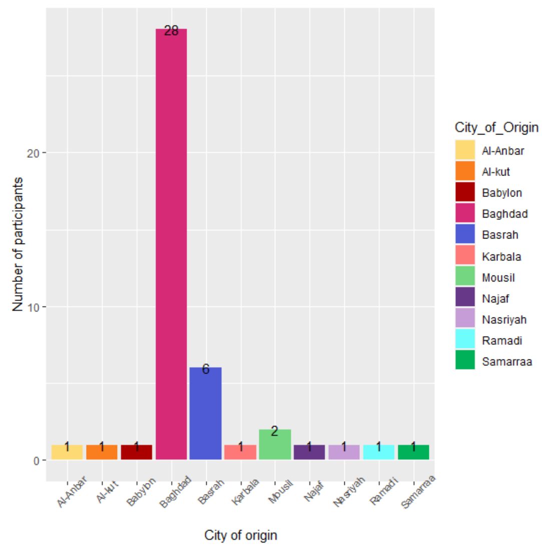

Figure 4.1: Number of speakers according to their city in Iraq

Migration Experience

Despite the growing number of studies on language variation and ethnic identity, none of the existing research, to my knowledge, has investigated the possible impact of migration routes and experience on individuals' sociolinguistic identity. Although migration experience has been reported to significantly impact economic (e.g., Al-Rasheed, 1992), and social (e.g., El-Solh, 1992) aspects in migrants' lives, little is known about the effect of migration experience on the sociolinguistic behaviour of migrants. In the UK, Iraqi Arabs present a clear example of socioeconomic stratification resulting from migration routes and experience despite belonging to the same national, linguistic and ethnic background, making the investigation of migration effect on intra-ethnic linguistic variation feasible.

Prior to the fieldwork, it was impossible to determine Iraqis' migration profile since there is lack of available demographic data on the UK Iraqi Arab communities (cf. Al-Rasheed, 1992). Given the sensitivity of this topic to some Iraqis, especially refugees, information on speakers' migration status and experience was indirectly elicited during the semi-structured interviews. During the data collection process, a clearer picture on Iraqis' migration history and patterns was obtained. For example, existing literature on Iraqis showed that Iraqis' migration patterns are closely related to their time of migration, with early Iraqi migrants entering the UK as professionals or merchants whereas recent Iraqis entering the UK as refugees and/ or asylum seekers (e.g., Al-Rasheed, 1992, p.206). While this information holds true when considering the Iraqi migration at a group level, a number of middle-class Iraqi professionals interviewed in the present study were recent arrivals (i.e., arrived in the UK after the invasion of Iraq). Likewise, a couple of Iraqi refugees interviewed in the present study were early settlers (i.e., arrived to the UK during the 1970s). Thus, although Iraqis migration experience is highly determined by time of migration, it did not apply to all participants in the present study.

Additionally, useful information on Iraqis' migration routes was elicited from speakers during the interviews. Specifically, Iraqi professionals entered the UK mainly through one of the following routes: Iraqis who arrived in the UK as students and then chose to work in the UK after graduation, affluent Iraqis who had family established business in the UK, Iraqis who could secure professional jobs in the UK prior to arrival (e.g., doctors), or wives/ husbands of professional Iraqis who entered the UK as dependents. Most, if not all, first-generation Iraqi professionals in the UK still hold Iraqi nationality. By contrast, Iraqi refugees were forcibly deported from Iraq, entered and settled in the UK as refugees or asylum seekers and relied on the government. A considerable number of early Iraqi refugees were deported to Iran soon after the outbreak of Iran-Iraq war (1980s). Then they migrated from Iran to EU countries, including the UK, and entered as refugees and asylum seekers. Recent Iraqi refugees left Iraq after the US- led invasion in 2003, as they and their families were persecuted and threatened by other political or sectarian groups. Most Iraqi refugees had to illegally enter other neighbouring countries (e.g., Syria) or EU countries before arriving in the UK. Because of their migration routes and experience, most Iraqi refugees arrived in the UK with no identity documents, capital and/ or did not find employment opportunities despite the fact that most of them were middle-class merchants or professionals in Iraq.

In the present analysis, Iraqis' migration experience is considered an independent variable, possibly explaining variation in the English spoken by Iraqis. Iraqis' migration experience was classified into two main types (i.e., Levels):

- Iraqi Arab speakers who entered the UK as refugees or asylum seekers and suffered from downward socioeconomic mobility .
- Iraqi Arab speakers who came to the UK as professionals and maintained their socioeconomic class.

Social Class

In the present study, participants' social class is linked to their migration experience and status in the UK. As mentioned earlier, most Iraqis who could find their way to the UK were educated and/ or middle-class Iraqis in Iraq. However, their migration experience and civil status in the UK have created social stratification within the community. Specifically, Iraqis who came to the UK as refugees and asylum seekers depended on the authorities, thus were mostly dispersed to working-class areas and suffered from downward social mobility. On the other hand, Iraqis who arrived and settled in the UK as professionals retained their social class. Thus, speakers' social class in the present study is reflected in their migration status in the UK.

UK Dialect Area

Apart from Wong and Hall-Lew (2014); Wormald (2016), previous sociolinguistic research has not directly investigated regional variation in the English spoken by a single ethnic community. As mentioned earlier, the geographical distribution of Iraqi community in the UK is closely linked to their migration history, with early waves of Iraqi migrants settling in London, and recent waves of Iraqis living in different UK cities, including Glasgow. Moreover, London is home to a large Arab community, with more than half of the UK Arabs residing in London (UK Government, 2018). This is different from Glasgow, which has a small and recent Arab community.

London and Glasgow are geographically separate, with London being in the south-east of England and Glasgow in the west of Scotland (See Figure 4.2). In addition to the geographical separation, London and Glasgow differ across linguistic (Stuart-Smith, 2004; Wells, 1982b, p.393), and socio-demographic measures. London English typically ranges from RP/ SSBE accents, spoken by middle-class speakers, to Cockney/ popular London English, spoken by working-class Londoners (Wells, 1982b, p.302). Because of its political and economical importance, London has attracted successive waves of migrant communities for centuries, making it one of the most multiethnic cities in Europe. It is stated that London has the highest number of ethnic communities in the UK, with more than 40 % of the population identified as non-Anglos (UK Government, 2018). Such ethnic diversity makes London a major centre for linguistic innovation, resulting from languages and dialects in contact (Britain, 2002).

Figure 4.2: Map of the UK illustrating the location of the two field sites: London and Glasgow

Glaswegian English, on the other hand, is described as ranging on a continuum from Standard Scottish English to Scots, with the former being mostly spoken by middle-class speakers and the latter by working-class speakers (Stuart-Smith, 2004; Wells, 1982b). Glasgow English generally shows different phonological features from London English, illustrated in the general presence of rhoticity, dark initial /l/, prevoiced and less aspirated voiced and voiceless VOT, monophthongisation for the FACE, and GOAT vowels in the Glaswegian speech (Stuart-Smith, 2004; Stuart-Smith et al., 2015a,b). While Glasgow is the largest city in Scotland, it is much less ethnically diverse than London, as minority ethnic communities constitute only about 17 % of the population (UK Government, 2018). Therefore, the comparison between London and Glasgow is informative as they represent distinct dialect regions, with different VOT and /l/ production patterns, and are different in the multi-ethnic, Arab and Iraqi composition, possibly impacting Iraqis' sociolinguistic identity and behaviour.

During the data collection process, initial plans were to control for participants' geographical mobility before and after arrival in the UK in order to limit participants' exposure to other languages or English dialects. However, most refugees interviewed in the present study reported that they had spent some time in another country before arriving in the UK. Moving from one country to another was part of their jouney to the UK. For example, during the Iraq-Iran war, many Iraqis were forcibly deported to Iran, as they were accused of having a political alliance to Iran. Upon arrival to Iran, many of the middle-class Iraqis chose to seek asylum in the UK, as they did not feel welcome in Iran either. Thus, those Iraqis were exposed to Farsi and had varying levels of competence in the language, depending on the time they spent in Iran. Nevertheless, most Iraqi refugees did not report mobility after they had arrived in the UK.

On the other hand, a considerable number of Iraqi professionals did not live in countries other than Iraq or the UK, but worked for some time in other UK cities before settling in London or Glasgow. For example, An Iraqi professional worked first in Ireland before moving to Edinburgh and then to Glasgow.

Thus, most participants in the present study were either exposed to a different language or dialect of English other than Iraqi Arabic and Glasgow / London English. This situation is in line with Wiese (2013) findings on German multiethnic communities, in which she reported that urban communities are linguistically diverse not only at a group-level, but also at the individual levels, a fact that has been neglected in previous sociolinguistic research. Nevertheless, to limit the effect of exposure to other languages or English dialects, all participants included in the present analysis had spent the largest proportion of their life in Iraq, London or Glasgow.

Gender

Previous literature on Arab communities has shown a strong gender effect on speakers' linguistic behaviour both in Arabic (e.g., Al-Wer, 1991, 2007) and English (e.g., Clothier, 2019), mainly as a result of the community cultural norms and gender responsibilities. In the present study, gender is considered as an independent variable, given its salience in the construction of their sociolinguistic identity.

Due to the cultural norms of the community and my profile as an Arab Muslim female, the Iraqi community was initially accessed through Iraqi females in both sites. For the same reason, more female speakers were interviewed than male speakers, resulting in a relatively larger number of female than male speakers in the selected sample (i.e., 18 male speakers and 26 female speakers).

To summarize, the above-mentioned social variables and criteria were considered when recruiting and selecting participants for the present analysis. Specifically, all participants should be originally Arabs, Muslims and first-generation Iraqis who had arrived in the UK after the age of 18, are between 30 and 70 years old and had spent most of their live in the UK either in London or Glasgow. The following sections describe the process of gaining access into the community and recruiting participants.

4.3.4 Accessing the Iraqi Community and Recruiting Participants

Gaining access to the speech community is a necessary step for the researcher to better understand the nature of the community and establish contacts with its members prior to the data collection process (Feagin, 2013). This step, however, may be accompanied by difficulties, especially when the researcher is an outsider to the community under investigation (Feagin, 2013). Since I am not a member of the Iraqi community, entering the Iraqi community prior to the fieldwork process was essential to be able to recruit participants for the present study and to gain a deeper understanding of the community.

Differences between London and Glasgow Iraqi communities in terms of the demographic and social composition triggered different techniques to access participants for the present study. Overall, the main recruitment method was establishing contacts with UK Iraqi members to identify initial participants and then using a snowball technique (i.e., "a friend of a friend technique") to recruit more participants. This sampling method is one of the widely used techniques in sociolinguistic research (Milroy and Gordon, 2003; Nagy et al., 2014, p.31). The initial criterion used to recruit participants was wide (i.e., any UK Iraqi), yielding a number of Iraqi participants from different age groups (i.e., second-generation Iraqis), ethnic (i.e., Kurdish) and religious (i.e., Christian) backgrounds. However, it helped gain quicker access to the community. The participants who did not meet the social criteria were then excluded from the present analysis (See Section 4.3.5). The following paragraphs provide details on how each community was accessed and my position as a fieldworker.

Glasgow Iraqi Community

Because Glasgow was my place of study and residence, the Iraqi community in Glasgow was initially accessed in order to gain adequate knowledge about the community prior to data collection and to establish strong contacts with members of the community, who later played a major role in introducing me to members of London community. The community was mainly approached through active Iraqi members and gatekeepers who are socially engaged with the Iraqi community. I was initially introduced to a female Iraqi member by a friend who lives in Birmingham. This Iraqi female has close social contacts with other Iraqis in Glasgow and is considerably active in the community. After meeting her few times and establishing a good relationship with her, she was comfortable enough to introduce me to other Iraqi females and encouraged them to take part in the study as she did. Establishing a good relationship with this Iraqi female helped me recruit five female participants.

However, more participants were still needed for the study. As a result, I went to the Iraqi-based mosque/ Hussainiyah in Glasgow and introduced the project to the mosque coordinators and an Arabic complementary school teacher. This technique was useful as it helped me obtain further support and participation from Iraqi members. Their status in the community as educated active members and their good relations with other Iraqis encouraged other male and female speakers to take part in the study, who in turn introduced me to their friends and relatives.

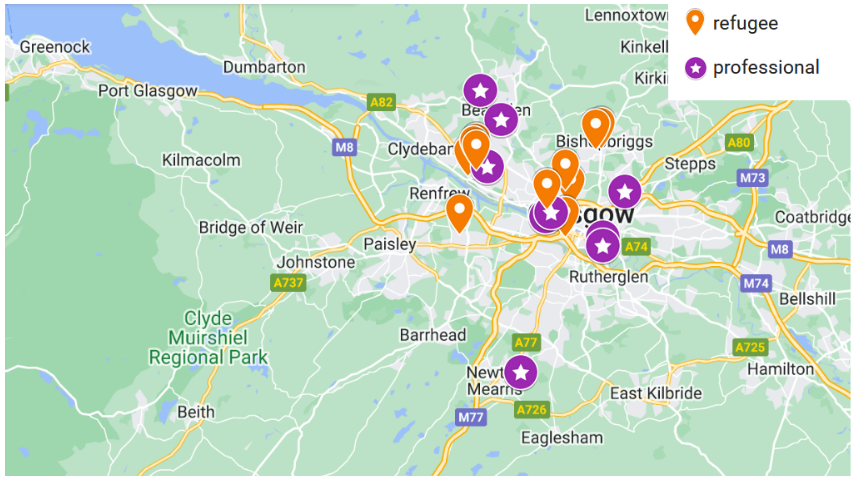

Figure 4.3: Map illustrating the distribution of Iraqi participants in Glasgow by the first part of their postcode. Orange pins represent Iraqi refugee participants, while purple stars represent professional participants.

Therefore, it can be said that, in Glasgow, 'a friend of a friend' approach (Milroy and Gordon, 2003, p.32) was the main method used to recruit participants, a technique which has been effectively used in previous studies on small and/ or minority communities (Alqahtani, 2015, p.80).

Fewer number of participants were recruited through Iraqis' social media groups such as WhatsApps and Facebook groups. However, they were not as effective as the above technique. The data collected in Glasgow revealed that most members of the Iraqi community knew each other regardless of their migration status; this was probably due to the small size of the community. Moreover, there was no clear division in areas of residence in accordance with migration profile for Glasgow-Iraqi participants; the participants interviewed for the present study were scattered all over Glasgow. Figure 4.3. illustrates the spread of Iraqi participants within Glasgow based on the first part of their postcodes. As discussed in the results section (Chapter 8, Section 8.4.2), this observation impacted the socio-linguistic behaviour of Glasgow participants.

London Iraqi Community

Unlike Glasgow Iraqi community, London Iraqi community is large and diverse (See Chapter 3). Therefore, it was important to establish contacts with Iraqi members through social media and/ or mobile apps prior to arrival. The first contact was made through the Iraqi female whom I first knew in Glasgow. She introduced me to one of her female relatives in London who is also an active member in the community and has a fairly good relationship with other Iraqis. She was a group admin in a female Iraqi WhatsApp communication group. She added me to the group and introduced me and my project to the group members. To reassure the group members about the reliability of my research objectives, she invited me to her house via a message on the group and encouraged others, through voice messages, to take part in the study. What she did helped me gain the trust and support from other Iraqi members, who in turn participated in the study and/ or introduced me to other Iraqi participants. As anticipated, this method helped me recruit a considerable number of London female participants.

However, recruiting male participants was one of the main challenges I faced prior to and during the fieldwork in London. Initially, I tried to gain access to and recruit male members of the community by posting in social media and mobile apps. I made contact with two Iraqi males before arriving to London, but this helped me recruit only three male participants. The difficulty in obtaining male Iraqi speakers in London was mainly due to their very busy lifestyle in London, negatively affecting their willingness to participate in the study. For example, one Iraqi male participant confirmed that most of his friends are too busy to participate in the study, as they usually wake up and prepare for work at 5 a.m and do not return home before 8 p.m.

After unsuccessful attempts to recruit male participants through social media, it was essential to find an alternative method to recruit more male participants. As a result, I started to advertise to Arab/ Iraqi based mosques and Iraqi-owned restaurants and shops in London. One area I visited was Edgware Road or the so called *The Arab Street*, where there are many Iraqi-owned shops and restaurants. Once I established some initial contacts, I used the "friend of a friend" method mentioned above to recruit more participants.

Few more Iraqi male and female participants heard about the project through other different ways. I visited two Iraqi-based associations in London, where I had the chance to introduce my project and ask for volunteers. Although little interest to take part in the study was expressed by most attendants, an Iraqi travel agent, who has a WhatsApp group, sent a picture of the information sheet to her clients in the group. As a result, a few more participants took part in the study. Overall, two main effective ways helped in recruiting London participants for the present study: the Iraqis' WhatsApp groups and visiting Iraqi-owned institutions, shops and restaurants.

Unlike Glasgow, fieldwork observations revealed a clear stratification of London-based Iraqi refugees and professionals in terms of social network and area of residence. As illustrated in Figure 4.4, the spread of participants within London based on the first part of participants' postcodes indicates a clear division between areas in which Iraqi professionals and refugees reside, a division which was also observed in Iraqi-based religious and social/cultural institutions. The stratification of London-based Iraqis by area of residence and migration experience was expected, as has been reported in previous research on the Iraqi community in London (e.g. Esposti, 2018, p.274, Al-Rasheed 1992, El-Solh 1992).

Figure 4.4: Map illustrating the distribution of Iraqi participants in London by the first part of their post-code. Red pins represent Iraqi refugee participants, while purple stars represent professional participants.

My Position as a Fieldworker

The status of the researcher during the fieldwork process depends on the commonalities he/ she has with the speech community as well as his/ her degree of engagement with the community prior to and during the data collection process (Schilling, 2013, p.177). While the researcher may be an existing member of the speech community under investigation (e.g., Frazer, 1980), he/ she may be a complete outsider to the community (e.g., Bowern, 2008; Wormald, 2016). The method and duration of the data collection (e.g., ethnography or interviews) also play a role in the researcher's degree of involvement with the speech community (Schilling, 2013, p.177).

During my work with the Iraqi community as the interviewer, it was clear that I was considered both an insider and outsider. Being a Saudi student who recently moved to Glasgow for the purpose of study, I had no previous contact with Iraqis. When I first approached the community, I was clearly seen as an outsider, a fact which I became much more aware of when I was asked pointedly by some Iraqis: 'why did you focus on the Iraqi community rather than the Saudi community in the UK?'

However, during the interviews, I found that I was, to some extent, considered as an insider due to the fact that I belong to the same ethnic group, and share aspects of cultural and religious identity with participants (i.e., being an Arab Muslim speaker). Being a Muslim Arab speaker allowed them to express freely their opinion on topics they would not have discussed with a complete outsider (e.g., their attitudes towards the larger community). This was explicitly stated by one of my participants who confirmed that much of what she said during the interview would not have been discussed if I was from a different ethnicity. Moreover, having knowledge of Arabic and not being a native speaker of English was advantageous, as this encouraged speakers to speak English without worrying too much about their English proficiency and allowed them to use Arabic words when they could not express their thoughts in English. Thus, while not being an existing member of the Iraqi community, my profile as a Muslim Arab bilingual gave me accreditation among the Iraqi community.

Despite efforts to make the participants feel comfortable during the interview, such interactions are only an approximation of their speech patterns for two reasons: First, the fact that both myself and the participants speak Arabic as a first language means that the interview can never be completely natural. Second, as highlighted in previous sociolinguistic research (e.g., Labov, 1972), in addition to my presence during the interview, recorded speech data may have affected the participants' degree of attention to their speech and consequently their production patterns. Nevertheless, as a means of minimising the effects of the latter issue, participants were interviewed either in their homes or in public places (e.g., coffee shops).

4.3.5 Data Collection

The data collection process launched in February 2019. As mentioned earlier, Glasgow was the first site for data collection, where fieldwork was carried out over a two-months period, as I needed to familiarize myself with the community and establish good relationships with active Iraqi members, who introduced me to their friends and relatives in both research sites. Once I gained access to the Iraqi community in London, participant recruitment and data collection were carried out at the same time in April and lasted for three weeks. Because it was difficult to get all the data collected during the first visit, another visit to London, which lasted for one week, was arranged after establishing contact with Iraqis during my first visit.

Place and time of the interviews depended on the participants' preference and availability. While some participants, especially females, preferred to be interviewed at their homes, others were interviewed in public libraries and/ or coffee shops. Length of the semi-structured interviews also depended on the participants' free time available to them. For example, the semi-structured interview portion was shorter for most Iraqi male professionals than for other participants because of the time constraints on them.

By the end of July 2019, the data collection process was complete, interviewing a total of 74 Iraqi speakers. However, 30 participants were excluded from the present analysis, as they did not meet the criteria set for the present study (See Section 4.3.3.). Specifically, seven participants were second-generation Iraqis, five participants were of Kurdish origin and spoke Kurdish as a first language, one participant was Christian, five participants spent most of their lives in European countries before moving to the UK, and two Iraqis were born and raised in London until they were five before going back to Iraq. Finally, ten participants did not speak English fluently and thus were interviewed only in Arabic. The data elicited from those speakers will be available for future research.

The final sample contained 44 Iraqi Arab speakers, stratified by migration experience, dialect and gender. An overview of the speakers and their number according to the macro-social categories are provided in Tables 4.2 and 4.3.

	Professional		**Refugees**	
	Male	**Female**	**Male**	**Female**
London	Hanoosh	Danah	Amjed	Bashair
	Abid	Norah	Ammar	Beian
	Sabri	Sabirah	Bilal	Hajar
	Salim	Safiah	Haleem	Zuhour
		Sama	Hamid	Nawras
		Zuha	Redha	
		Manar		
Glasgow	Habib	Ani	Qusai	Luluah
	Qader	Reem	Ala	Mais
	Abdulsamad	Faten	Basel	Ola
	Wahid	Hebah	Mazen	Rasha
		Huda		Dalia
		Ibtisam		Sanaa
		Israa		Shouq

Table 4.2: Participants (Pseudonyms) by migration experience, dialect and gender

	Professional		Refugees		Totals
	Male	Female	Male	Female	
London	4	7	6	5	22
Glasgow	4	7	4	7	22
Totals	8	14	10	12	44

Table 4.3: Number of participants by migration experience, dialect and gender

4.4 The Linguistic Variables

Central to the study of sociophonetic variation is identification and selection of the phonetic variables. As defined by Labov (1978), a phonetic variable is a sound that can be produced in two or more alternative ways. The selection of phonetic variables to study depends on a number of general criteria, such as frequency of use and/ or robustness (See Tagliamonte, 2006, p.71). Importantly, the phonetic variables chosen for analysis should answer the main research questions of the study (Tagliamonte, 2006, p.85). Given the main research questions of the present study (See Chapter 1), ideal phonetic variables are those that are produced differently in the speakers' first and second languages (Iraqi Arabic and English) as well as English dialects under investigation (London and Glaswegian English), as they are more likely to uncover patterns of variation within ethnicity.

Previous research on Arab speakers of English has identified Arabic accented features in the production of some English sounds, such as voiced and voiceless stops (e.g., Alanazi, 2018; Aziz, 1974; Flege, 1981; Khattab, 2002a), the fricatives /v/ and /ʒ/ (e.g., Aziz, 1974), the approximants /l/ and /r/ (e.g., Aziz, 1974; Khattab, 2002a), and the FACE and GOAT vowels (e.g., Aziz, 1974; Khattab, 2002a). With the exception of /v/ and /ʒ/, English also shows dialect differences in the production of the above sounds (Wells, 1982b).

The present study focuses on stops and laterals, as they are produced differently in London and Glasgow English as well as in Iraqi Arabic. Moreover, compared to other variables, these variables received considerable attention in previous studies on Arab speakers of English as well as Anglo speakers (e.g., Alanazi, 2018; Clothier, 2019; Flege, 1981; Khattab, 2002a; Stuart-Smith et al., 2015b, 2011), thus allowing for comparison with the existing literature. Detailed comparisons of the stops and laterals' production patterns in London and Glasgow English as well as in Iraqi Arabic will be explored in details in Chapter 6 and 7, respectively.

Other interesting variables were initially considered, but were not analysed in the present thesis. For example, tokens of FACE and GOAT vowels were elicited from the wordlist data, but they were not analysed due to time constraints. Moreover, tokens of post-vocalic /r/ (e.g., *car*) were included in the early stages of material design, but they were removed later to reduce the time of the interviews (See Section 4.3.2).

4.5 Data Elicitation

Following first-wave variationist sociolinguistic research, the present study used four different data elicitation methods: a wordlist task (Arabic and English), a picture-naming task, a semi-structured interview and a questionnaire. Such data collection material allows for eliciting different speech styles in one session, thus providing rich data for analysis. However, due to the time constraints, only the English word-list data and the questionnaire data were analysed in the present thesis. The following paragraphs provide details on each of these tasks.

4.5.1 The Wordlist

The word-list task is one of the most widely used data elicitation methods in sociophonetic research, as it enables the researcher to obtain enough tokens of a sound and also controls for the effect of the linguistic and contextual factors on speakers' production patterns (Gordon, 2006, p.25). The word-list task has been also used, along with other tasks, to elicit register variation given that it represents a careful speech style (Labov, 1981). In the present study, the main aim of the word-list task was to investigate speakers' production patterns while controlling for the linguistic environment. It was also used to investigate whether linguistic factors, namely following/ preceding vowel height and duration, would condition VOT and /l/ variation.

The wordlist was designed in consideration of some aspects. For example, in the early stage of the word list design, all monosyllabic and disyllabic English words containing the target linguistic variables (e.i., stops, /l/) were extracted, resulting in a large number of English and Arabic words. However, a decision was made to exclude disyllabic words for three reasons: First, to avoid having participants to read a long word list (See the pilot interviews in Section 4.3.2). Second, to allow for a comparison between participants' Arabic and English production patterns, as they rarely share two-syllable words with similar phonetic environments for the sounds of interest (Alanazi, 2018). Third, to allow for a direct comparison with previous relevant work on

English spoken by Arabs (e.g., Alanazi, 2018; Khattab, 2002a), which mostly investigated the production patterns of these variables in monosyllabic words.

The phonetic environment of the target variables was also a point to consider when designing the word list, as surrounding sounds can affect the production patterns of the target variable due to coarticulation (Ladefoged and Johnson, 2015). The wordlist in the present study included only pre-vocalic word-initial stops, pre-vocalic word-initial /l/ and post-vocalic final /l/. In other words, all word-initial tokens of stops as well as word-initial and final /l/ are preceded and followed by vowels (e.g., *bill, tell, lamp*). Twenty-one words were added to the English word list for future research on FACE and GOAT vowels.

All tokens were classified based on place and manner of articulation of the preceding/ following segment. Vowel quality (High/ Non-high vowels) in London and Glasgow English was considered and classified for all tokens. Care was taken to include comparable number of tokens for each sound to avoid the impact of tokens number on the analysis. Moreover, tokens containing /r/ (e.g., *pearl*) were removed, as they may impact the preceeding vowel quality (Ladefoged and Johnson, 2015). Minimal pairs or near minimal pairs of all variables were included where possible in the wordlist (e.g., *bat, pat*). Table 4.4 and Table 4.5 present the final word list tokens for the linguistic variables under analysis.

Word-initial Stops					
/p/	/t/	/k/	/b/	/d/	/g/
Pea	Tea	Cup	Beef	Date	Ghee
Pan	Till	Cash	Beet	Duck	Gum
Peach	Tax	Coin	Bowl	Dog	Geese
Pig	Teeth	Cook	Bill	Dad	Goat
Pup	Tongue	Kid	Bee	Dust	Goose
Pest	Toe	Cave	Bat	Door	Gush
Pet	Tooth	Coast	Bug	Dill	Got
Palm	Team	Coach	Beak	Deep	Get
Path	Tap	Cab	Bull	Deaf	God
Pool	Tub	Key	Back	Doom	Guess
Patch	Top	Cot	Beach	Day	Give
Pen	Teal	Cap	Bud	Dance	Gab
Pond	Tape	Coat	Bush	Dint	Geek
Pants	Task	Keep	Bank	Dip	Gasp
Page	Test	Cool	Bay	Dot	Goal
Pick	Tell	Call	Bus	Deal	
Post	Tuck	Come	Bike		
Peel	Tall	Kick	Bath		
Pat	Tad	Cut	Bell		
Push	Talk		Bead		
Pit	Tug		Boot		
Pack	Toss		Book		
Pull	Tip		Bad		
Poach	Tan		Boost		
Pay			Big		
Pod			Bet		

Table 4.4: Word list tokens for word-initial stops

Laterals	
Word-initial /l/	Word-final /l/
Leek	Meal
Lamb	Hill
Loan	Hole
Leg	School
Lip	Dill
Lung	Wall
Lake	Bell
Leaf	Pool
Lab	Teal
Lift	Fool
Lamp	Dull
Late	Tell
Lost	Till
Laugh	Tall
Leap	Cool
Long	Call
Let	Deal
Love	Goal
Luck	Bull
Law	Bowl
Lock	Pull
Lose	Peel
Look	Bill
Loop	
Last	

Table 4.5: Word list tokens for laterals

With regard to the Iraqi Arabic wordlist, words with similar phonetic environments to the English words were chosen to allow for cross-linguistic comparison (e.i., CVC, CV:C syllables). Care was taken not to include words that are not used in vernacular Iraqi Arabic, as some Arabic words are used in Standard Arabic and/ or other Arabic varieties but not in spoken Iraqi. To avoid that, the Iraqi Arabic word list was designed with the help of an Iraqi female (A4G)(See Table 4.1) who had lived in Iraq most of her life before moving to Glasgow three years before the time of the interview.

The word-list items were grouped according to different semantic themes (e.g., *kitchen, animals, body*) and presented in the carrier phrase (*I say.....again*) to elicit a more natural production of the word by distracting away from minimal pairs, and focusing on word meaning (Richard et al., 1998, p.100) (See Figure 4.5). The final version of the word list consisted of 252 target words, of which 169 are English and 83 are Arabic (See Appendix B).

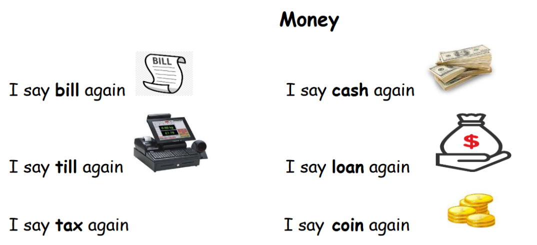

Figure 4.5: The presentation of the wordlist tokens

During the design of the wordlist, other social-related considerations were taken into account. For example, it was expected to interview participants who have reading difficulties either due to their age or due to their poor reading proficiency in English. Therefore, it was ensured that all words included in the wordlist are easy to read and understand by choosing commonly used, frequent words.

4.5.2 The Picture-naming Task

The picture-naming task was used to elicit words containing the target variables in a less careful speech style than the word list. It was also included to elicit comparable data across all speakers, as it was expected that some participants might face difficulty reading the wordlist. Unfortunately, the data elicited from this task was not included in the present analysis due to time constraints.

The picture was designed after choosing a set of lexical items, extracted during the word-list task search. These were 23 monosyllabic words, consisting of word-initial stops, word-initial and final /l/ and FACE and GOAT vowels (See Table 4.6). Clarity and simplicity were considered during the picture design to avoid confusion when naming objects. The picture was designed using Canva, a graphic-design webpage that provides high-quality images (Perkins, 2012) (See Figure 4.6). The picture-naming task was introduced to participants after the semi-structured interview, in which each participant was shown a coloured- A3- size copy of the picture and was asked to describe it.

lamp	ball	leaf	bag	box
boot	pen	tail	desk	cat
bed	plate	ten	doll	cake
cap	cup	desk	sofa	phone
boat	gift	girl		

Table 4.6: Lexical items used for the picture-naming task

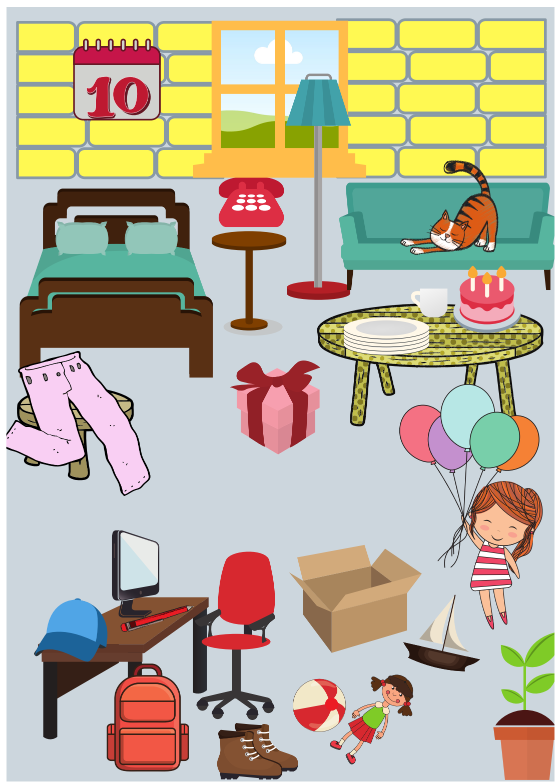

Figure 4.6: The image used for the picture-naming task

While most objects in the picture were identified using the target words, few objects were sometimes described using words other than the target words. For example, the boat and the doll in the picture were sometimes referred to as a girl and a ship. Other target objects in the picture such as leaf and tail were overlooked by some speakers. Nevertheless, the picture-naming task was a useful data elicitation method, as it helped obtain data from speakers with low English language proficiency who did not produce the English wordlist and spoke mainly Arabic during the interview.

4.5.3 The Semi-structured Interview

The semi-structured interview has been widely used in previous sociolinguistic research to elicit dialectal features, as it collects more natural and spontanous data than other elicitation methods (Chambers, 2009, p.24). In the present study, the semi-structured interview was used to elicit less careful speech data. Effort was made to reduce the level of formality during the interviews, using some techniques suggested in Labov (1966); Llamas (1999) and Dick (2006). For example, most questions asked during the semi-structured interviews were open ended, allowing participants to talk freely and elaborate on their answers. As participants were speaking, I showed attention and interest to their topic by maintaining eye contact and using expressions without interrupting them. In some cases, I shared my own stories and memories with the participants to create a less formal atmosphere and encourage participants to speak freely.

Additionally, the semi-structured interview was used to qualitatively explore participants' attitudes towards the larger community and evoke details on their migration experience. As many sociolinguists assert (e.g., Labov, 1981; Llamas et al., 2007), eliciting data on participants' attitudes and their sense of identity during the interview is important, as it provides valuable insight into participants' sociolinguistic behaviour.

The semi-structured interview included questions suitable for participants of different social profiles. These questions varied from general to specific, depending on the participants' preference. It included questions on cultural differences between Iraq and the UK, former and current profession, memories in Iraq, and migration motives and experience (See Appendix C for a full list of questions). Before the interview, participants were informed that they did not have to discuss a topic if they did not feel comfortable talking about it, resulting in the emergence of different topics from one participant to another. For example, some participants enjoyed talking about their memories in Iraq and their migration experience whereas others expressed discomfort discussing such personal topics and preferred to talk about more general topics such as work experience in the UK or English language acquisition. In the latter situation, information on participants' migration experience was obtained indirectly during the interviews.

All participants took part in the semi-structured interview and were recorded with myself as the interviewer. Initial plan was to conduct the semi-structured interview only in English, but participants had varying degrees of English proficiency. As a result, the language spoken during the interview was mainly determined by the participants, with a few preferring to speak Arabic most of the time and others code switching between Arabic and English. Phonetic analysis of the semi-structured interview data was beyond the scope of this thesis, but it served as an important resource for eliciting qualitative data on the participants' social profile.

4.5.4 The Acculturation Questionnaire

Individuals' sense of identity and their social network are found to influence speakers' linguistic behaviour in many sociolinguistic studies (e.g., Labov, 1963; Milroy, 1980). Such social aspects have been investigated either qualitatively through ethnography and/ or interviews (e.g., Milroy and Milroy, 1985) or quantitatively through questionnaires (e.g., Hoffman and Walker, 2010; Llamas et al., 2009; Nagy and Kochetov, 2013). Being exposed to a different culture and speech community, immigrants' sense of identity and their social integration into the larger community have been shown to impact their sociolinguistic behaviour (e.g., Harris, 2006; Nagy and Kochetov, 2013), making these factors important when examining the speech of ethnic and migrant communities.

In the present study, a written questionnaire adopted from Berry et al. (2006) acculturation questionnaire on migrant communities in 13 countries was used to collect information on the participants' attitudes, sense of identity and participation in social networks. The acculturation questionnaire is based on Berry et al. (1989)'s acculturation theory, in which he argues that individuals who belong to ethnic minority groups tend to show different degrees of acculturation, ranging from a complete rejection of either ethnic (assimilation) or national identity (separation) to a complete isolation from both ethnic and host communities (marginalisation). According to Berry et al. (2006), immigrants' degree of acculturation can be measured quantitatively by considering certain social aspects such as attitudes towards the speakers' own community and the larger community, language use and social contact. Berry's acculturation questionnaire has been widely used in research on ethnic communities to investigate the relationship between migrants' degree of acculturation and other social or medical aspects (e.g., Gül and Kolb, 2009; Koch et al., 2004). Only a handful of linguistic studies have recently adopted Berry et al. (2006)'s acculturation questionnaire to investigate the degree of acculturation in relation to ethnic/national language use (e.g., Ahamefule, 2019; Panicacci, 2018).

Participants were asked to complete the acculturation questionnaire after reading the wordlist. The social aspects elicited from the questionnaire were then quantitatively measured in order to compare participants' production patterns ranging from macro- to micro-social factors. Description of the questionnaire and the selection of the micro-social factors for subsequent sociolinguistic analyses are detailed in Chapter 5. The main aspects investigated in the acculturation questionnaire were:

- Demographic information, e.g., age group, age of arrival in the UK, religious affiliation, city of origin in Iraq, length and place of residence in Glasgow/ London.
- Arabic and English language use and proficiency.

- Sense of ethnic and national identity.
- Attitudes towards ethnic and larger community.
- Social contacts and social networks.
- Discrimination experienced and life satisfaction.

4.5.5 Recording Equipment

All interviews were recorded using a Zoom H4n Handy Recorder and a Beyerdynamic microphone with ear hooks. The Beyerdynamic microphone is ideal for the sociolinguistic interview, as it is placed in an appropriate distance from the lips while requiring little attention from the speaker. However, some female participants could not place the microphone hooks over their ears as they were wearing headscarves. In these cases, participants had to place it around their necks. Overall, with few exceptions, the recording equipment used in the present study produced high-quality recordings, allowing for fine-grained phonetic analysis even when the interviews were carried out in public places.

4.5.6 Data Management

Anonymity and storage of the speakers' data are essential aspects to consider in any sociolinguistic study (Milroy and Gordon, 2003, p.79). After data collection was complete, it was ensured that data was stored safely and transcribed anonymously using pseudonyms instead of participants' real names. The recorded data was transferred from the recorder's memory card onto a password-protected laptop. Social data extracted from the questionnaire was saved in a separate csv. file. Both linguistic and social data was then stored and backed up onto my personal University of Glasgow OneDrive for Business, whereas the hard copies of the questionnaire and consent forms, were stored in a locked drawer.

4.6 Data Analysis

The present investigation of English variation among Iraqi Arabs focuses on stop VOT and /l/, with reference to the existing literature on their production patterns in London and Glasgow English as well as Iraqi Arabic (e.g., Al-Ani, 1970; Al-Siraih, 2020; Kirkham and McCarthy, 2021; McCarthy et al., 2013; Stuart-Smith, 2004; Stuart-Smith et al., 2015b, 2011). The data analysed in the present thesis consists of English word-list items produced in a carrier phrase by 44 first-generation Iraqi Arab speakers. Instrumental and statistical methods were used to observe and interpret phonetic variation.

4.6.1 Acoustic Data Processing and Analysis

Instrumental techniques, and more specifically acoustic measurements, have been used extensively in phonetic research to visualize and analyse fine-grained patterns of speech (Gordon, 2006, p.25). In the field of sociolinguistics, the acoustic analysis was first introduced by Labov et al. (1972) in their examination of vowel variation and change across different US dialects (Thomas, 2011, p.369). Despite the growing number of subsequent instrumental studies on language variation and change (e.g., Fridland, 1999; Labov, 1991), sociophonetics has only recently been recognised as a subfield that utilizes phonetic methods and instrumental techniques in the analysis of socially-grounded variation. Sociophonetic studies have mainly used acoustic analysis to examine both segmental (e.g., vowels, consonants) (e.g., Foulkes and Docherty, 2006; Jacewicz et al., 2009; Stuart-Smith et al., 2015b) and suprasegmental (e.g., stress, intonation) features (e.g., Nance et al., 2018). Following previous sociophonetic research on English VOT and laterals, acoustic analysis in the present study was carried out in Praat (Boersma and Weenink, 2022).

Primarily, the recorded word-list data for each speaker was transcribed orthographically and then saved as a simple text file, a necessary step to produce automatically segmented *.TextGrid* files for the acoustic analysis in Praat. The automatic segmentation of the speech data was done in the Munich Automatic Segmentation System MAUS web services (Ludwig Maximillian University of Munich, (LMU), 2019). By uploading the .Wav file and its corresponding .Text file, MAUS produced a *.TextGrid* file containing a word- and phoneme-level segmentations. Although the automated *.TextGrid* file required manual checking and correction due to the lack of absolute accuracy, it saved a lot of time and effort compared to manual segmentation. Given that the MAUS segmentation was carried out at the word and phoneme levels, voice onset time (VOT) and voicing during closure (VDC) were hand segmented using acoustic measurements. Further details on the acoustic analysis of VOT and /l/ are given in Chapters 6 and 7, respectively.

4.6.2 Statistical Analysis

In the present study, both English VOT and laterals were analysed quantitatively using descriptive statistics and statistical tests in R (R Core Team, 2021) (See Winter, 2020, for details on R). Descriptive statistics, such as mean and standard deviation were carried out using ‘tidyverse’ packages (Wickam et al., 2019). ‘Tidyverse’ packages were also used to organize and prepare the data as well as visualise the results. For the statistical analysis, linear mixed-effects models

(LMER) were carried out using ‘lme4’ (Bates et al., 2015) and ‘lmerTest’ (Kuznetsova et al., 2017).

Mixed-effects regression models, also known as multilevel or hierarchical models, have recently become the primary test in sociolinguistic research, as they serve the purpose of sociolinguistic studies aiming to explain variation in grouped and multilevelled data rather than individual observations (Johnson, 2009; Sonderegger et al., 2020, p.294). Moreover, mixed-effects models consider variability caused by both fixed and random factors. Fixed factors are the predictors which are expected to affect the dependent (linguistic) variable in a certain way. Fixed factors can be categorical (and have levels) or continuous; e.g., vowel height is a categorical variable that has two levels, but word duration is continuous. This is different from random factors which consist of levels sampled randomly from the larger population, thus are unrepeatable and their effect is unpredicted (e.g., Speaker variability)(Baayen, 2008).

Compared to other linear models, mixed-effects models have two major advantages that make them particularly convenient for the nature and design of sociolinguistic studies. First, mixed-effects models obtain the significant effects of fixed factors only if their effects is above and beyond variability caused by random factors. This is specifically important when the fixed factors are of direct interest, as it ensures more reliable results than the results of fixed-effects-only models, which may over estimate the statistical significance of fixed factors (Type I error) (Johnson, 2009, p.377; Sonderegger et al., 2020, p.296). Second, mixed-effects models can handle unbalanced or missing data (Sonderegger et al., 2020, p.294; Field et al., 2012, p.883), which is the case for the present analysis (i.e., number of observations within levels of fixed factors is unequal, given differing numbers of participants by social factors).

In the present analysis, all mixed-effects models included *speaker* and *word* as random intercept. F-statistic and p-values for fixed effects were calculated using the Satterthwaite approximation method via anova () function applied to the models. Before fitting the mixed-effects models, fixed factors were selected and included after conducting two separate statistical tests: Pearson’s correlation test, and variance inflation factors (VIF). The main purpose of conducting these tests was to avoid multicollinearity, a situation which takes place when one independent variable is highly correlated with another variable (Winter, 2020, p.112). For example, in the present data, correlation tests showed a significantly high correlation between migration experience and length of residence, with Iraqi professionals reporting longer residence in the UK than Iraqi refugees. Such high correlation between the two variables may lead to Type II errors (i.e., failing to show a significant effect of a factor when there actually is one) (Sonderegger et al., 2020, p.151; Winter, 2020, p.112). Therefore, only one of the two factors was included in the model. Full discussion of the correlation of macro- and micro-social factors, as well as the rationale of social factor selection, are given in Chapter 5 (Section 5.4.2).

Primarly, the correlations among social fixed factors were computed using Pearson's r method. Pearson correlation test was deemed suitable, as it examines the linear relationship between categorical and interval variables (Field et al., 2012, p.219), which is the case for the present study. The test was calculated in R using 'cor' function, 'rcorr' function from the 'Hmisc' package (Harrell, 2021) to obtain the p-values, and 'corrplot' (Wei et al., 2017) to visualise the correlations among factors. Considering factors to be collinear at $p< 0.05$, results of the correlation test showed a number of significant correlations among variables, which resulted in excluding some of the correlated variables. Details on the correlation testing are provided in Chapter 5.

To further ensure that data included in the models are not collinear, VIF were used to assess the degree to which one factor is largely predicted by another (Winter, 2020, p.114). By providing numerical values for each factor, the VIF measures how much the variance is inflated as a result of multicollinearity in the model. There are different recommendations for what VIF values to consider as an indication of collinearity issues, with some researchers suggesting a limit of 10 (Field et al., 2012; Montgomery et al., 2012, p.293), and others setting a more conservative limit (i.e., VIF < 4) (Winter, 2020, p.114). Following Stuart-Smith et al. (2013), a cut-off of 1.5 was used to determine if there exists collinearity issues in the models. The VIF results showed that all variables were less than 1.5, meaning that the remaining variables are not highly correlated.

Two statistical methods were used to find the best fit models for the VOT and laterals data. First, initial models, containing different sets of factors and interactions, were compared using the *anova ()* function. Then, the selected models were subjected to the stepwise model selection process using *step ()* function from the 'lmerTest' package. Specifically, backwards elimination was used to remove factors and interactions that do not contribute to the variation in the data. Despite its drawbacks, stepwise model selection is recommended when the original model consists of a large set of predictors, as the case for the present analysis (See Sonderegger et al., 2020, p. 172 for more details). Overall, both methods were helpful in choosing final models with factors of interest. The strategy used for the VOT and laterals statistical analyses are detailed in sections 6.3.3 and 7.4.4, respectively.

After fitting the final models, Tukey post-hoc tests for pairwise comparisons were performed in order to statistically compare and interpret interactions with multi-levelled factors (i.e., three-way interactions) while controlling for Type I error (i.e., showing a significant effect that does not exist) (Sonderegger et al., 2020, p.263). Tukey post-hoc test was selected as it is specifically designed for pairwise comparisons and is more reliable when testing large number of comparisons (Field et al., 2012, p.431). The R package *emmeans()* (Lenth, 2018) was used to perform the post-hoc test. The Satterthwaite Approximation method was used to calculate degrees of freedom and p-values. Because Tukey post-hoc test is a conservative test (Field et al., 2012, p.431), both corrected and uncorrected p-values are reported when a contradiction between mixed model results and post-hoc test results is observed. The mixed-effects model summary tables were created using the 'stargazer' package (Hlavac, 2022). From the models' summary, fixed effects and interactions were considered significant when $p < 0.05$, but marginal effects ($p < 0.1$) were also reported when not involved in higher level interactions following Sonderegger (2022, p.203).

4.7 Summary

This chapter has provided details on the general methodology of the present study, designed to explore the effects of a number of social and linguistic factors on Iraqis' production patterns. The following three chapters present the analysis and results of the acculturation questionnaire, English stop VOT and laterals.

Chapter 5

The Acculturation Experience: Quantitative Investigation of Cultural Identities and Social Behaviour of Iraqi Arabs

5.1 Introduction

The main aim of the present study is to uncover patterns of intra-ethnic variation within the Iraqi Arab community in the UK. While broad social categories, such as gender and ethnicity, have been shown to play a role in phonetic variation in first-wave studies (e.g., Trudgill, 1974; Wolfram, 1969), focusing only on macro-level social categories as the only factors behind variation has been criticized in subsequent studies (Eckert, 2012). In fact, third-wave studies found that individuals' social and stylistic practices and attitudes largely contribute to speakers' linguistic behaviour, and therefore can explain phonetic variation within social groups (e.g., Alam, 2015; Kirkham, 2013; Sharma and Sankaran, 2011) (See Chapter 2). Therefore, the present chapter quantitatively investigates participants' sociolinguistic practices and attitudes through a self-reported questionnaire. It also seeks to reveal the possible correlations between individuals' social behaviour and the macro-social variables of migration experience, dialect and gender, as previous research has noted a link between speakers' social practice and their predefined social category (e.g., ethnicity and social class as in Kirkham, 2013; Milroy, 1987).

The following section begins with an overview of relevant quantitative research on ethnic orientation and linguistic variation in previous sociolinguistic studies on ethnic communities. Then, a brief background on the acculturation model, proposed by Berry et al. (1989), is introduced before outlining the structure of the acculturation questionnaire in Section 5.3. Section 5.4. describes preparation and analysis of the data elicited from the questionnaire. Then results are presented in Section 5.6 before concluding with a summary in Section 5.7.

5.2 Investigating Orientation in Ethnic Communities

Given the complexity of the social and linguistic interactions of members of ethnic communities, the relationship between individuals' social practices and their linguistic behaviour has received considerable attention in sociolinguistic studies on ethnic communities. Much of the existing research investigates the way members of ethnic groups express and construct their sociolinguistic identity through qualitative or ethnographic methods (e.g., Alam, 2015; Mendoza-Denton, 2008; Ryan, 2018). While adopting such approach is viable when investigating a small group of speakers who share daily social practices, ethnographic fieldwork becomes hard when considering regional variation in the speech of ethnic communities or when investigating the speech of large number of participants. Thus most cross-regional or large-scale sociolinguistic studies tend to categorise speakers according to their ethnic background, overlooking intra-ethnic variation caused by speakers' social practices and attitudes (cf. Nagy et al., 2014).

In an attempt to overcome this issue, a number of sociolinguistic studies on minority ethnic communities devised quantitative measures to examine the impact of individuals' social behaviour on their production patterns. A notable example is Hoffman and Walker (2010) quantitative investigation of the relationship between speakers' degree of ethnic orientation and linguistic variation across and within two ethnic communities in Toronto. Specifically, Hoffman and Walker (2010) examined variation in (t/d) deletion and the Canadian Vowel Shift within and across members of ethnically Italian and Chinese communities. To account for sociolinguistic variability within ethnic groups, Hoffman and Walker (2010) measured participants' degree of ethnic orientation through their responses to a social questionnaire, referred to as *Ethnic Orientation* questionnaire. Focusing on patterns of ethnic orientation, namely involvement with cultural heritage, language choice, ethnic attitudes and experience of discrimination, Hoffman and Walker (2010) found a correlation between intra-ethnic linguistic variation and groups' ethnic orientation score (i.e., first vs second generation speakers), demonstrating the viability of quantitative social measures for ethnicity in sociolinguistic investigation.

Hoffman and Walker (2010) questionnaire was adopted in some sociolinguistic studies to account for variation within ethnic communities (e.g., Clothier and Loakes, 2016; Nagy et al., 2014). While the *Ethnic Orientation* questionnaire is informative in a sense that it obtains information on participants' degree of social and linguistic involvement with their ethnic group, it only focuses on one dimension in their social life (ethnic orientation) and neglects other important social aspects (i.e., attitudes towards larger community, degree of involvement with the larger community, etc.) that play a major role in the individuals' sociolinguistic identity and behaviour.

5.2.1 Acculturation in Migrant Communities

Among several psychological approaches developed to understand the social and linguistic practices and attitudes of migrant and ethnic communities is the acculturation model proposed by Berry et al. (1989). Unlike existing models that capture ethnic experience through either individuals' relationship with their ethnic group, or with the larger community, Berry et al. (1989) adopts a two-dimension approach to better understand migrants' complex social practices. Specifically, individuals' social behaviour is explored in relation to both ethnic and national communities. Berry et al. (1989) has examined his model in subsequent studies across different cultural contexts and among different ethnic groups (e.g., 13 countries including Australia, Canada, France, Germany, UK, and USA in Berry et al. (2006)).

Considering individuals' behaviour and attitudes towards both ethnic and national communities, Berry et al. (2006) asserts that members of ethnic groups generally acculturate in four different ways (See Figure 5.1):

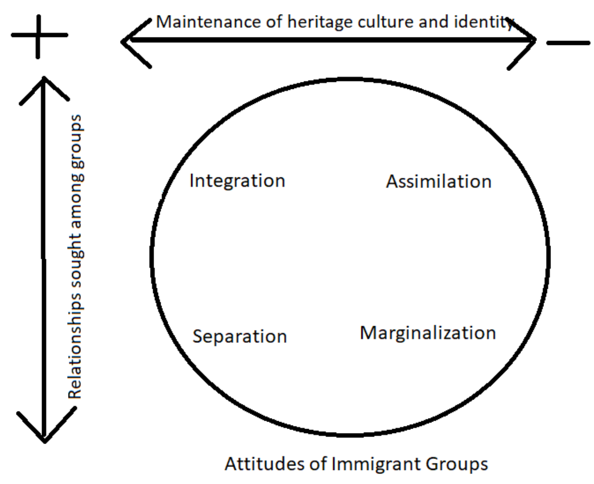

Figure 5.1: Acculturation experience of immigrant groups in Berry's (1974) model

1. **Assimilation**: Describes members of ethnic groups who are socially, culturally and linguistically involved with the host community, but do not express involvement with their ethnic group.

2. **Separation**: Describes members of ethnic groups who maintain their ethnic cultural, linguistic and social behaviour, but are not involved with the larger community.

3. **Integration**: Describes members of ethnic groups who seek to maintain their ethnic cultural, linguistic and social behaviour and are also involved socially and linguistically with the larger community.

4. **Marginalisation**: Describes members of ethnic groups who show little interest in maintaining their own culture and show little involvement with the larger community.

According to Berry et al. (2006), different social aspects affect the way individuals' acculturate. These factors include: attitudes towards both ethnic and larger communities, cultural (i.e., ethnic and national) identities, language proficiency and usage, ethnic and national social contact and network and perceived discrimination, all of which can be measured quantitatively through the acculturation questionnaire.

Berry et al. (1989)'s acculturation model and questionnaire have been widely used and validated in several studies across different disciplines (e.g., Psychology in Berry (2001); Medicine in Fox et al. (2017), Second language acquisition in Culhane (2004)), as it provides a thorough understanding of individuals' and groups' behaviour within and across migrant communities.

5.3 Data Elicitation and Analysis

The present study adopted Berry et al. (2006) acculturation questionnaire to look at the relationship between speakers' sociolinguistic behaviour and attitudes and phonetic variation across and within macro-social categories, namely migration experience, dialect, and gender. The acculturation questionnaire was deemed useful, as it allows investigation of ethnic and national orientations, both essential in the study of language variation. Indeed, Berry et al. (2006) acculturation questionnaire proves important for understanding and interpreting results of the present study (See Chapters 6 and 7). Additionally, Berry et al. (2006) acculturation questionnaire was mainly devised and developed to understand the social attitudes and behaviour of first-generation migrant communities, and thus is suitable for the scope of the present study.

Out of the 44 participants included in the present study, only one participant (*Amjed*) did not complete the questionnaire. Other three participants did not answer a few items in the questionnaire, resulting in the existence of a few empty cells in the data. All participants completed the questionnaire during the interview except two participants who sent it later by email, as they ran out of time during the meeting. The questionnaire was mainly in English, but an Arabic version

of the questionnaire was also available in case participants found a difficulty understanding the English version. Only one participant completed the Arabic version of the questionnaire.
The following paragraphs provide information on the content of the questionnaire before describing the statistical tests used to analyse the questionnaire data.

5.3.1 The Acculturation Questionnaire

Berry et al. (2006) acculturation questionnaire consists of 11 themes, each of which has a number of items/questions with a five-point Likert scale or multiple choice responses. Most items/ themes in Berry et al. (2006) questionnaire were not modified. However, some measures that are irrelevant to the present study were not included in the present questionnaire. These are *family relationship, self-esteem, school adjustment and psychological problems*. English version of the adapted questionnaire is provided in Appendix D.

The acculturation questionnaire elicited information on the following themes:

1. **Demographic/ Background variables**: The first part in the questionnaire aims to elicit information on participants' demographic background. It collects data on participants' age, age of arrival to the UK, length of residence, city of origin, mobility in the UK, religious affiliation, area of residence, neighbourhood composition, citizenship status, participants' and participants' parents level of education. Among these, only length of residence and mobility in the UK were included in the correlation test (See Section 5.3.2), as other variables were either not completed by participants or were hard to quantify for the statistical analysis.

2. **Acculturation attitudes**: The acculturation attitude scale consists of 16 items assessing four acculturation attitudes: assimilation, integration, separation and marginalisation. The items explore four aspects: cultural traditions, language, social activities and social contacts. For example, the items in the cultural traditions consist of four statements: I feel that Iraqis should adapt to Scottish/ British cultural traditions and not maintain those of their own [**Assimilation**]; I feel that Iraqis should maintain their own cultural traditions but also adapt to those of Scottish/ British [**Integration**]; I feel that Iraqis should maintain their own cultural traditions and not adapt to those of Scottish/British [**Separation**]; I feel that it is not important for Iraqis either to maintain their own cultural traditions or to adapt to those of Scottish/ British [**Marginalisation**]. Response options range from 1 *strongly disagree* to 5 *strongly agree*.

3. **Ethnic and national identities**: Participants' sense of ethnic and national identities were explored and measured separately. Ethnic identity contains 11 items assessing Iraqi and Arab affiliation whereas the national identity scale contains 5 items assessing sense of belonging in England/ Scotland. Two items assessing Muslim identity were added in the present questionnaire given its central role in the formation of Iraqis' identity (cf. El-Solh, 1992). All responses range from 1 *strongly disagree* to 5 *strongly agree*. Examples of the items on ethnic and national identity are: "I feel that I am part of Iraqi culture"; "I am happy I am British/ Scottish".

4. **Ethnic and national language proficiency**: Arabic and English language proficiency were explored and measured separately, in which participants were asked about their ability to understand, speak, read and write Arabic and English. Answers are given on a 5-point scale ranging from 1 *not at all* to 5 *very well*. An example is: "How well do you speak Arabic/ English?"
   While the data on English proficiency may not exactly reflect participants' level of proficiency given that it is based on participants' self-assessment, it was deemed more convenient than a language test for two main reasons: First, examining participants' proficiency in English would cause stress during the interview, given that participants are first-generation speakers and some are also refugees, and could potentially be more difficult for them. This contradicts with the aims of sociolinguistic interviews, where participants should not feel that their language is being evaluated or judged. Second, including a language test would require more time, which may have caused further difficulty in participants' recruitment process. Therefore, data on participants' language proficiency was only elicited through the questionnaire.
   Questions about Arabic proficiency did not define a specific variety (i.e., neither Standard nor Iraqi Arabic). Only one participant asked which variety was intended and expressed less proficiency in writing and speaking in Standard Arabic (i.e., *somewhat*). All other participants reported a high-level of proficiency in Arabic (i.e., *very well*).

5. **Ethnic and national language use**: The language use scale measures the extent to which participants use Arabic and English in their daily interactions and when using the media. As with other scales, items on Arabic and English use were measured separately on a 5-point scale ranging from 1 *not at all* to 5 *all the time*. An example is: "I speak Arabic with my children/ grandchildren/ other Iraqis' children"; "I speak English with my children/ grandchildren/ other Iraqis' children".

6. **Ethnic and national social contacts**: This theme consists of two sub-scales: 11 items as-

sess the quantity and frequency of interactions with Iraqi, Arab, Muslim and British/Scottish individuals, separately. An example is " How many close Iraqi, Arab, non-Arab Muslim, Scottish friends do you have?". Answers for this part are given on a 5-point scale ranging from 1 (*none/ or never*) to 5 (*many/ or daily*). The other subscale assesses the density of social connections using the multiple choice question: How many of your friends know each other and meet on a regular basis? Answers to this question range between 1 (*none*) to 4 (*many*). The social contact theme used in the questionnaire, including both frequency, quantity and density of networks, is similar to the social networks analysis, often used in sociolinguistic research (e.g., Milroy, 1987; Sharma, 2017).

7. **Perceived descrimination**:The perceived discrimination scale assesses the frequency of exposure to racist behaviour as Iraqi Arabs. An example is: " I have been teased or insulted because of my ethnic background". Participants responded on a 5 point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

8. **Life satisfaction**: The life satisfaction scale measures the overall degree of participants' satisfaction with their lives using a 5-item scale. One example is:" The conditions of my life are excellent".

5.3.2 Data Preparation and Quantitative Analysis

To recap, most themes in the questionnaire were measured using a five-point Likert scales (e.g., *strongly disagree*= 1, *strongly agree*= 5). Background variables, such as mobility and religious affiliation, had binary responses or answers (e.g., yes or no), but were recoded on a two point scale (either 1 or 0) to quantify them. For example, participants' answers on mobility were awarded 1 if they have lived in other UK cities and 0 if not. The same was applied to religious affiliation and citizenship status. Data elicited from the questionnaire was saved as a .CSV file before calculating the total scores for each theme (e.g., ethnic identity theme).

As mentioned earlier, most themes in the questionnaire consist of two subscales which were measured and calculated separately: one is addressed to ethnic affirmation whereas the other is to national affirmation. This was done to examine participants' degree of identification with each group without categorising speakers into either belonging or not belonging to one group (Berry et al., 2006, p.78). Although most subscales were measured using 5 point Likert scales, it was sometimes difficult to compare them as they had different number of items (e.g., ethnic identity had 11 items whereas national identity had 5 items). Thus, in order to facilitate comparison between subscales (e.g., ethnic identity and national identity) and interpretation of the results, raw data (i.e., the total number of scores calculated from Likert scales) was standardized using **scale()** function in R (R Core Team, 2021). By doing so, all micro-social variables were converted into "a scale of standard units" (Winter, 2020, p.89), ranging between -2z and 2z.

Before including the variables elicited from the questionnaire as independent variables in subsequent analyses, the relationship between variables was examined using Pearson's correlation test for two reasons: Firstly, to observe if there is any correlation between micro- (i.e., variables elicited from the questionnaire) and macro- (i.e. pre-defined social categories) social variables, thus providing information on groups' sociolinguistic behaviour, as reported in a number of previous studies (e.g., Milroy and Milroy, 1992). Secondly, to avoid multicollinearity in the regression models, frequently arising from high correlation between independent variables (Winter, 2020, p.113) (See Chapter 4). Thus a correlation test was an essential step to understand the ways macro- and micro-social variables are related to each other and help ensure the reliability of subsequent statistical analyses by identifying the highly interacting and overlapping variables.

Since the main aim of the present analysis is to test the linear relationship between social variables, Pearson's correlation test was used in the present analysis (Winter, 2020). Pearson's correlation matrix was generated in R using Hmisc (Harrell, 2021) and corrplot (Wei and Simko, 2021) packages. With correlation coefficients ranging between -1 and +1, a coefficient close to +1 indicates a positive correlation between two variables whereas a coefficient close to -1 indicates a negative correlation. The closer the coefficient to zero, the weaker a correlation between variables is. Because Pearson's test measures the relationship between numerical variables, macro-social variables (i.e., migration experience, dialect, gender) were recoded on a two point scale (either 1 or 0) following Field et al. (2012) (i.e., *Male=1, Female=0; London=1, Glasgow=0; Professional= 1, Refugee= 0*). Missing values were handled by excluding empty cells from the analysis using *"pairwise.complete.obs"* (Field et al., 2012, p.216). P-values for the correlation coefficients were calculated using **rcorr()** function.

5.4 Results

In this section, the results of the correlation test are presented, followed by a description of the significant correlations among social variables of interest. The remainder of this section explains the choice of independent social variables for the regression analysis adopted in Chapters 6 and 7.

Figure 5.2, below illustrates the highly significant correlations among the social variables based on Pearson's correlation matrix. Note that significant coefficients (p< 0.05) are displayed in blue circles if the correlation is positive and in red circles if the correlation is negative.

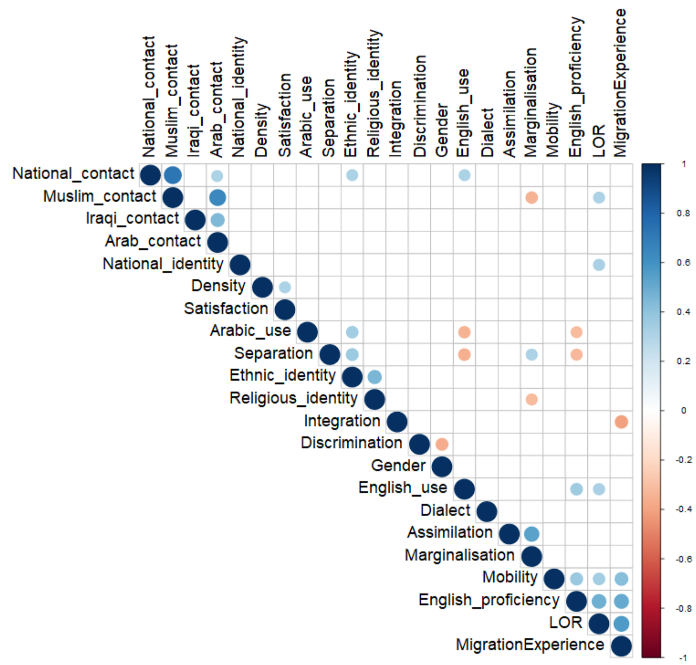

Figure 5.2: Correlation plot of all social variables, micro and macro.

5.4.1 Correlations between Macro- and Micro-social Variables

As shown in Figure 5.2, there is an interplay between MigrationExperience, length of residence (LOR), English language proficiency and mobility, with highly significant positive correlations among them (r=0.5, p<0.005). Unsurprisingly, the significant correlations between MigrationExperience and length of residence (LOR), English language proficiency and mobility indicate that professional Iraqis have longer residence in the UK, are more mobile and report more English proficiency than their refugee counterparts. These correlations are expected given that Iraqi professionals' migration dated back to the 1950's whereas Iraqi refugees' migration sharply increased after the US- led invasion of Iraq. Also, unlike, refugees, most Iraqi professionals gained a high level of English proficiency prior to arrival to the UK. The correlation between MigrationExperience and mobility is also predicted by previous relevant research which reported a higher-level mobility among middle-class speakers (Chambers, 2009; Kerswill and Williams, 1999). Illustration of the correlations between MigrationExperience and the above social variables is provided in Figures 5.3 and 5.4.

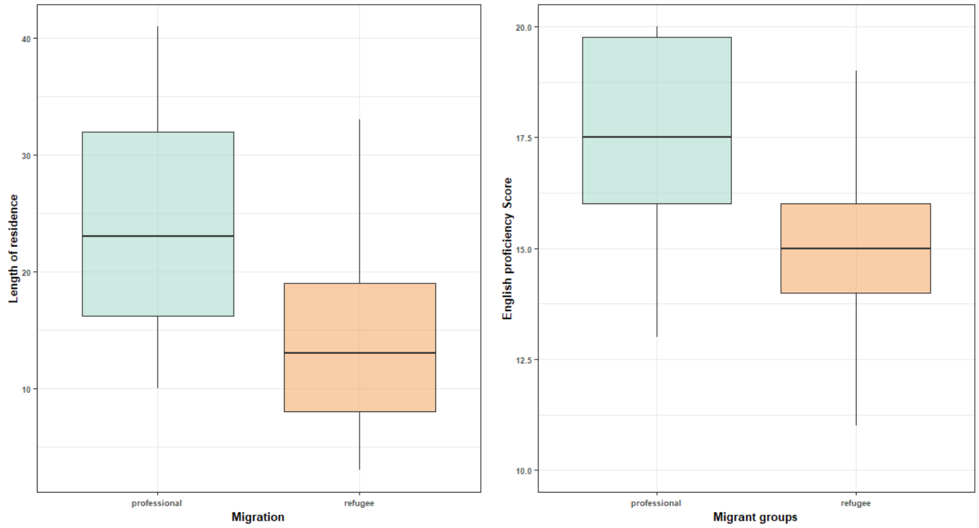

Figure 5.3: Boxplots of length of residence (LOR) by migration experience (*left*), and English proficiency by migration experience (*right*).

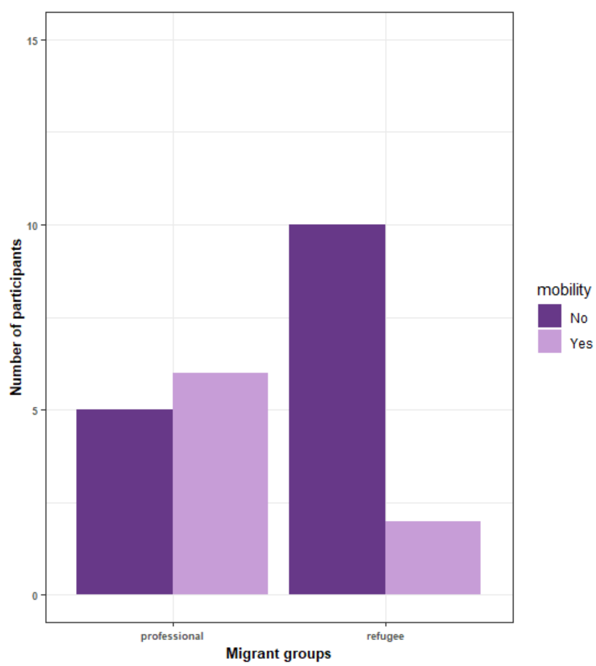

Figure 5.4: Barplots of mobility in the UK by migration experience

MigrationExperience also shows a significant negative correlation with integration attitudes ($r= -0.4$, $p<0.01$), indicating lower integration attitudes among Iraqi professionals than their refugee counterparts. In other words, Iraqi refugees expressed more preference for involvement with both ethnic and national communities than professionals. This correlation is clearly observed in the illustration of integration attitude across migrant groups (See Figure 5.5).

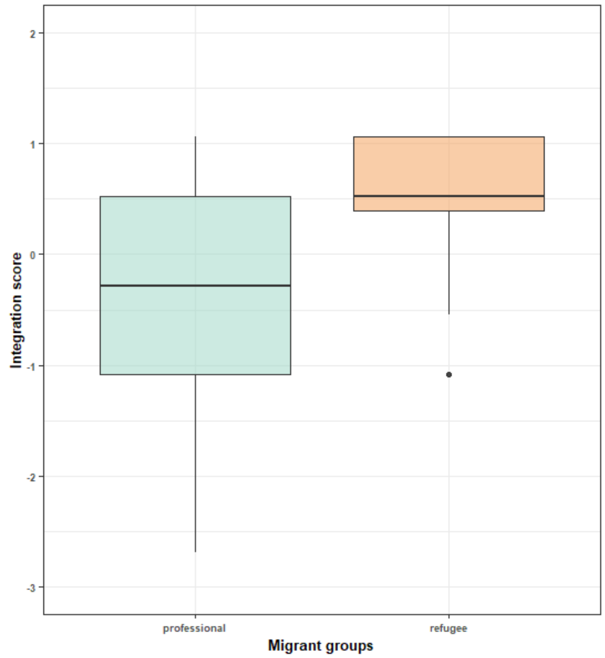

Figure 5.5: Boxplots of integration attitudes across migrant groups

Interestingly, the correlation plot (See Figure 5.2) shows a significant negative correlation between gender and discrimination, suggesting that Iraqi males perceived less discrimination than did Iraqi females ($r= -0.3$, $p= 0.01$). Visualisation of mean discrimination score across male and female participants is provided in Figure 5.6.

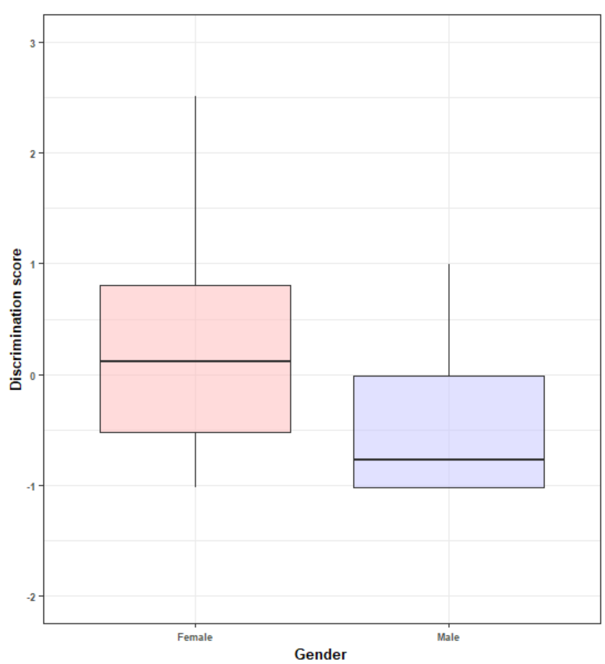

Figure 5.6: Boxplots of mean discrimination score across Iraqi male and female participants

As can be seen in Figure 5.6, Iraqi females reported higher discrimination than Iraqi males. Given the community's religious background as Muslims, most Iraqi female participants are more visible than their male counterparts as they wore headscarves, jilbab or face-covering at the time of the study. Thus, it seems that the higher perceived discrimination score by Iraqi females is related to the fact that they are more visible members of the Muslim community than Iraqi males, highlighting the impact of religious visibility on perceived discrimination from larger community. Such observation aligns with Berry et al. (2006, p.102) results in which they found a strong correlation between perceived discrimination and highly visibile ethnic and religious groups. While Berry et al. (2006) reported a negative relationship between discrimination and national orientation, the correlation plot did not show further significant correlations between discrimination and other variables or differences in males' and females' social behaviour and attitudes (See Figure 5.2).

Surprisingly, Figure 5.2 did not show any correlation between speakers' dialect area and micro-social variables. Despite the clear differences between London and Glasgow in the structure of ethnic and Arab communities, there was not a significant relationship between dialect, or what it stands for (i.e., the size and composition of ethnic/ Arab/ Iraqi populations) and Iraqis' social behaviour and attitudes.

5.4.2 Correlations among Micro-social Variables

As mentioned earlier, illustration of the significant correlations among micro-social variables (See Figure 5.2) was necessary, as it provided an understanding of the ways aspects of social behaviour are related to each other. Importantly, it helped decide which independent variables to include in subsequent statistical analysis. As will be explained in the following paragraphs, from all of the above micro-social variables, only six factors were selected, namely national (British/ Scottish) identity, ethnic (Iraqi/ Arabic) identity, English use, Muslim contact, Iraqi contact and density of networks.

The first part in this section explores the correlations among micro-social variables whereas the second part discusses which micro-social variables were used in subsequent statistical modelling for phonetic variables.

As Figure 5.2 shows, most micro-social variables are significantly correlated with each other. While some associations were in the expected directions, others were related in unexpected ways. The expected correlations are summarised in the following points:

- Separation attitudes were negatively related to English language proficiency and English use ($r= -0.3$, $p< 0.05$) but were positively related to ethnic identity ($r= -0.4$, $p< 0.05$). These correlations suggest that participants who reported strong separation attitudes have less English proficiency, use less English, and show strong ethnic (Iraqi Arabic) identity.

- Ethnic (Iraqi Arabic) identity was positively related to Arabic use, separation and religious identity ($r= 0.4$, $p< 0.05$).

- National (British/ Scottish) identity was positively related to participants' length of residence ($r=0.3$, $p= 0.04$), indicating stronger sense of national identity among participants who reported longer residence in the UK.

- English and Arabic use as well as English proficiency were interrelated, with negative correlations between Arabic use on the one hand and English proficiency and use on the other hand ($r=-0.3$, $p< 0.05$)(See Figure 5.2).

- English use was positively related to national contact ($r=0.3$, $p< 0.05$).

In addition to the above, a number of interesting correlations were observed in Figure 5.2. These can be summarised as follows:

- Acculturation attitudes were interrelated in unexpected ways, with marginalization attitudes showing positive correlations with separation and assimilation attitudes ($r= -0.4$, $p< 0.05$).

- Ethnic (Iraqi Arabic) identity was positively related to national contact ($r= 0.4$, $p< 0.05$).

- Quantity and frequency of social contacts with Iraqis, Arabs, Muslims and nationals were positively interrelated. Specifically, Arab contacts showed a positive correlation with Iraqi ($r=0.4$, $p< 0.01$), Muslim and national contacts ($r=0.3$, $p< 0.05$), suggesting that participants who reported contacts with their ethnic (Iraqi/Arab) group also reported contact with the larger community (Muslims/ nationals).

Notably, the above unexpected correlations have been observed in Berry et al. (2006) results, in which they interpreted these patterns as indications of the following: First, individuals' endorsement of separation, marginalisation and assimilation attitudes together, may indicate uncertainty about their place in the ethnic (Iraqi Arabic) and larger (British/ Scottish/ Muslim) community. Berry et al. (2006) interpretation is supported here by the significant negative associations found between marginalization and Muslim contact, religious identity and integration attitudes in the correlation plot ($r= -0.3$, $p< 0.05$)(See Figure 5.2). Second, the positive correlation between ethnic (Iraqi Arabic) identity and national (British/Scottish) contact suggests that high endorsement to ethnic identity does not always imply less involvement with the larger community, but may reflect integration into both communities. Third, the observed interelated positive correlations among social contacts highlight a fundamental aspect in Berry et al. (2006) acculturation model, which is the necessity of considering both ethnic and national groups when measuring migrants' social interactions in order to gain a clearer picture of their sociolinguistic behaviour.

Micro-social Variable Selection

Given the correlations observed above (See Figure 5.2), some variables had to be dropped from subsequent analyses, as including all variables would violate the assumption of independence in regression models used in the present study. Variable selection was based on the following criteria: excluding one of the highly correlated variables while retaining all social aspects (i.e., themes) of acculturation questionnaire, if possible (i.e., acculturation attitudes, cultural identities, language use and social contacts). It was also ensured that the selected variables have normal distributions, as including predictor variables with non-normal distributions can affect the normality of the model residuals, one of the assumptions of regression modelling (Sonderegger, 2023, p.119). To do so, interrelated variables as well as variables with less normal distribution were excluded. Based on the above criteria, the following micro-social variables were dropped from the subsequent analysis:

- Length of residence, English proficiency, mobility in the UK and integration attitudes were removed as they were significantly correlated with MigrationExperience, a main variable in the present study (See Figure 5.2).
- The acculturation attitudes (i.e. Assimilation, Separation, Marginalization) were excluded as they were interrelated and showed significant correlations with other social variables (See Figure 5.2).
- Religious identity was removed as it was related to ethnic identity and was less normally distributed than the latter.
- Arabic use was not included as it was related to English use. Given that the main focus of the present study is Iraqi English phonetic variation, English use was added as an independent variable (See below).
- National contact was removed as it was correlated with Muslim contacts, with the former showing less normal distribution than the latter. Morover, national contact is a more

general term in that it is not limited to Anglo monolinguals but also includes British/ Scottish speakers from other ethnic origins, thus might result in confusion when answered by participants.

- Arab contact was involved in more correlations with other social contacts than Iraqi contacts, and thus was excluded.
- Discrimination was not included as it was related to gender (See Figure 5.2).
- Life satisfaction was excluded as it was correlated with density score.

Overall, along with the macro-social variables (i.e., migration experience, gender, dialect), the following six micro-social variables were included as independent variables in the statistical models:

1. National (British/ Scottish) identity.
2. Ethnic (Iraqi/ Arabic) identity.
3. English use.
4. Muslim contact.
5. Iraqi contact.
6. Density of social networks.

Although speakers' dialect area in Iraq was elicited from the questionnaire, it was not possible to include participants' Iraqi dialect as a fixed factor in the statistical analysis due to the small sample size in some dialect areas (See Section 4.3.3). A similar issue persists even when Iraqis' dialect areas were broadly divided into northern and central/ southern dialects following Blanc (1964) (See Chapter 3). To account for the possible effect of Iraqis' dialect of origin on their production patterns, illustrations of Iraqi English VOT and lateral results according to their dialect areas are presented and discussed in Appendices H and O, respectively.

5.5 Summary and Conclusion

Moving away from pre-defined macro-social categories, third-wave sociolinguistic studies have found a strong link between speakers' linguistic behaviour and their social practices and attitudes, with both being used to index a social meaning, such as ethnic identity (e.g., Alam, 2015;

Kirkham, 2013). A number of the existing studies on ethnic communities adopted ethnographic methods to understand the relationship between speakers' social and linguistic behaviour. By contrast, other sociolinguistic studies investigated participants' social practices and attitudes quantitatively through questionnaires. Following the latter, the present study adapted Berry et al. (2006) acculturation questionnaire with the aim of providing the opportunity to observe whether the speakers across and within pre-defined social groups (i.e., migration experience, dialect, gender) differ according to the micro-social variables, and/or whether different micro-social factors create distinct group of speakers who have shared social practices and attitudes.

Migration experience showed the strongest relationship with micro-social variables; Professional participants had longer residence in the UK, were more mobile, were more proficient in English, but showed less integration attitudes than refugee participants. Observing these differences is interesting, as it highlights the significant role of individuals' migration history and experience in the existence of social, and as we will see, phonetic variation within a single ethnic community, a factor which has received little attention in previous sociolinguistic research. Other aspects of the acculturation questionnaire did not show significant correlations with MigrationExperience, indicating that refugees and professionals do not divide easily on these social aspects but show within group variation.

Gender was significantly related to discrimination, with Iraqi females reporting higher discrimination than Iraqi males. A possible explanation for this correlation lies in the fact that Iraqi females are more visible in terms of their religious affiliation than their male counterparts, as most female participants wore headscarves and/or jilbab at the time of the interviews. Initial expectations were that the differences between London and Glasgow structures in terms of the ethnic and Arab populations might affect Iraqis' social behaviour and attitudes. However, Iraqis' dialect area did not correlate with any of the micro-social variables, indicating a lack of significant difference between London and Glasgow Iraqis in terms of their social background (i.e., i.e. length of residence, mobility) and practices (i.e., social contacts).

The data also showed significant correlations among almost all micro-social variables, providing a picture of the complexity of the social behaviour of members of the Iraqi community. Considering both ethnic and national orientations of participants, results revealed positive correlations between ethnic identity, Iraqi and Arabic contacts, with national contact, showing integration behaviour as previously noted on other ethnic groups in Berry et al. (2006) (See Section 5.2.1). However, correlations among other variables, such as language use and separation attitudes, were in the expected direction.

Since one of the aims of the correlation test was to eliminate high correlations between independent variables before introducing them into the statistical modelling used in the subsequent analyses, some correlated variables had to be excluded. The selection of independent variables was based on two criteria: Choosing a variable with a normal distribution and including all different aspects of acculturation, if possible. Consequently, six micro-social variables were included in the subsequent analyses as independent variables: national identity, ethnic identity, English use, Muslim contact, Iraqi contact and density of social network. As we will see in Chapters 6 and 7, results showed an important role of both macro-, and micro-social factors in influencing phonetic varaition for Iraqi Arab speakers.

Chapter 6

English Voice Onset Time (VOT)

6.1 Overview

The present chapter explores phonetic variation in the production of English stops by Iraqi Arab speakers. Specifically, it investigates the production patterns of positive VOT in voiced (i.e., /b, d, g/) and voiceless (i.e., /p, t, k/) stops, with a consideration of linguistic and social factors that may play a role in VOT variation.

Previous sociophonetic research has shown that Voice onset time (VOT) is highly sensitive to linguistic and social factors (Ryalls et al., 2004; Stuart-Smith et al., 2015b). In the present study, VOT was considered a salient feature to capture intra-ethnic phonetic variation conditioned by linguistic and social factors. This is mainly because Arabic and English generally have different VOT systems, with Arabic showing prevoicing and English aspiration (Khattab, 2002a). Moreover, English shows dialect differences in VOT, with longer aspiration and less voicing in Anglo than Scottish varieties (Scobbie, 2006). Such cross-linguistic and dialectal differences in VOT are more likely to trigger socially-based variation within the Iraqi community, as shown in previous research on ethnic communities (e.g., Alam, 2015).

This chapter is structured into four parts. In the first part, a general background on Arabic and English stops, and more specifically voice onset time (VOT), is outlined by comparing the phonetic features of Arabic and English stops, including VOT, as well as reviewing relevant research on Arabic and English independently. In the second part, the method used for the English stops' data collection and analysis is described. In the third part, results of the analysed data are described with reference to previous accounts of Arabic and English VOT. The last part discusses the results in the light of existing research.

6.2 Arabic and English Stops

Oral stops, also known as plosives, are a group of sounds produced with different place of articulations (e.g., labial as in *boat*, coronal as in *tall*, dorsal as in *gum*). Despite the great variety of oral stops across languages, they are similar in terms of their articulation, which consists of three main phases: a closing phase, a holding phase and a release phase. The production of the stops starts with the closure phase, whereby two articulators are brought together, obstructing the airflow from escaping through the vocal tract. This is followed by a hold phase, with the airflow being blocked and pressure increases behind the closure as it continues to flow out of the lungs. Finally, the release phase occurs when the two articulators move apart, consequently releasing the obstructed air (Docherty, 1992; Ogden, 2009).

Comparing Iraqi Arabic to English, there are differences in the number and nature of stops across the two languages. Presented in Table 6.1 is the inventory of stops in Iraqi Arabic and English according to their place of articulation as described by Versteegh (2006) and Ogden (2009), respectively.

	Stops				
	Bilabial (*labial*)	Apical (*coronal*)	Velar (*dorsal*)	Uvular	Glottal
Iraqi Arabic	(p) b	t d tˤ	k g	q	ʔ
English	p b	t d	k g		ʔ

Table 6.1: Stops in Iraqi Arabic and English provided by Versteegh (2006) and Ogden (2009), respectively.

As shown in Table 6.1, Iraqi Arabic consists of nine stops whereas English consists of seven stops. Overall, Arabic has all the stops found in English, namely labial, coronal, dorsal and glottal stops. By contrast, English lacks the Arabic coronal /tˤ/ and uvular /q/ stops. Since the scope and focus of the present study is restricted to the production of English stops by Iraqi Arab speakers, stops which are not found in English (i.e. /tˤ/, /q/) or do not occur in word-initial positions (i.e. /ʔ/) are not described here. Thus, the following paragraphs only consider the following stops: /p, b, t, d, k, g/ .

Although /p/ does not originally belong to Arabic phonemic inventory, it has become part of the Iraqi Arabic inventory through the common use of Persian, Turkish and English loanwords (e.g., *parda* Turkish for curtain). While Versteegh (2006) describes /p/ as "a stable phoneme in most Iraqi dialects", Al-Siraih (2020) indicates that neither herself (i.e. a native Iraqi speakers) nor her participants produce /p/ in loanwords when speaking Iraqi Arabic, but instead replace it with /b/.

In Table 6.1, both Iraqi Arabic and English have /t/ and /d/. While English /t/ and /d/ are mostly described as alveolar stops, descriptions of Iraqi Arabic /t/ and /d/ varied, with some referring to them as alveolar stops (e.g., Blanc, 1964), and others as dental stops (e.g., Al-Ani, 1970). Due to such variability, Versteegh (2006) used a more general term to describe them (i.e., apical sounds).

In terms of stop voicing, both Iraqi Arabic and English are described as having the same sets of stops' categories, namely voiced (i.e. /b, d, g/) and voiceless (i.e. /p, t, k/), with the presence of vocal fold vibration in the former and absence of vocal fold vibration in the latter. Such similarity makes both languages belong to the two-category language classification proposed by Lisker and Abramson (1964). However, as highlighted by Abramson and Whalen (2017); Ogden (2009), this classification is very broad, as it overlooks the phonetic details and variation in the closure and release phases across different languages. For example, English voiced stops (i.e. /b, d, g/) are generally produced without voicing during the closure phase, followed by the release phase and then voicing of the following sound. This is different from the production patterns of Iraqi Arabic voiced stops which are mostly produced with full or partial voicing during the closure, lasting until the release phase. Likewise, English voiceless stops (i.e. /p, t, k/) are described as having longer durations of the release phase, accompanied by aspiration, than Iraqi Arabic voiceless stops. Thus, despite similarity in the phonological categorisation of Iraqi Arabic and English stops, the phonetic realisations of stops' voicing contrast are different in both languages.

6.2.1 Voice Onset Time (VOT)

In their groundbreaking acoustic study of word-initial stops in 11 languages, Lisker and Abramson (1964) proposed voice onset time (VOT) as a measure to classify and distinguish between voiced and voiceless stops. As defined by Lisker and Abramson (1964, p.422), voice onset time is "the time interval between the burst that marks release of the stop closure and the onset of quasi-periodicity that reflects laryngeal vibration". Considering the release phase of the stop as a reference point (i.e. the burst is assigned 0 value), VOT is positive when there is a voicing delay of the following sound after the burst, but negative when voicing commences before the release phase (burst). Based on its acoustic features, Lisker and Abramson (1964) classified VOT in stops into three main categories:

- Negative or prevoiced VOT takes place when voicing (phonation) commences before the release phase (burst). Voicing during the closure phase can be either full or partial.

- Zero or short-lag VOT occurs when voicing (phonation) commences at or shortly after the release of the stop. Thus the duration of VOT (ms) ranges between 0 and 30 msec.

- Positive or long-lag (aspirated) VOT takes place when there is a delay in voicing after the release of the stop (burst). In this condition, VOT duration is more than 30 msec.

A representation of the above three main VOT categories is provided in Figure 6.1.

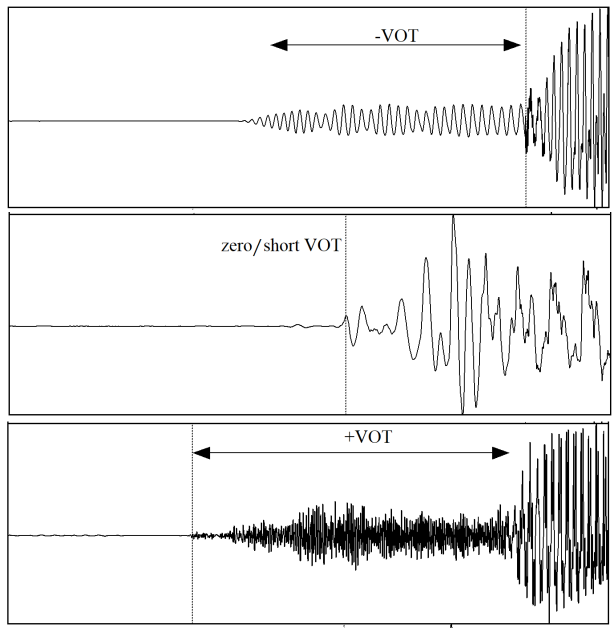

Figure 6.1: Waveform illustrations of the three main categories of VOT: negative VOT (*top*), zero/short-lag (*middle*), and long-lag (*bottom*), as described in Lisker and Abramson (1964) (*the burst is marked with dotted lines*)

Lisker and Abramson (1964) suggest that stops across all 11 languages can also be categorised with reference to the above VOT categories, with voiced stops generally having either prevoiced or zero/ short-lag VOT, and voiceless stops having short-lag or long-lag VOT. Subsequent studies emphasize the importance of examining and defining VOT boundary for each language independently, as VOT shows different features from one language to another (Cho and Ladefoged, 1999). This observation was further noted within a single language, as more variation is observed according to linguistic and social factors as well as individual speakers. For example, Lisker and Abramson (1964) stated that English voiced stops (i.e. /b, d, g/) are mostly produced with a short-lag VOT and no voicing during the closure phase. However, in their own study as well as subsequent studies (Davidson, 2016; Docherty, 1992), a considerable number of voiced VOT values were prevoiced (i.e., contain voicing during closure), especially when produced in connected speech, meaning that there is no clear-cut classification for VOT patterns in each language.

Despite the observed differences in VOT phonetic features within and across languages, phonetic studies provided evidence for VOT to follow a similar pattern when conditioned by linguistic factors in a number of languages (Cho and Ladefoged, 1999; Chodroff and Wilson, 2018; Lisker and Abramson, 1964). Specifically, previous studies have found a universal tendency for VOT to vary according to stops' place of articulation (e.g., Cho and Ladefoged, 1999; Chodroff and Wilson, 2018; Docherty, 1992), following vowel context (e.g., Klatt, 1975; Rochet and Yanmei, 1991), word position or context (e.g., Docherty, 1992; Lisker and Abramson, 1964, in English), (e.g., Gosy, 2001, in Hangarian), (e.g., Gao and Arai, 2019, in Japanese), and speech rate (e.g., Kessinger and Blumstein, 1997; Miller et al., 1986; Stuart-Smith et al., 2015b; Summerfield, 1975, in English),(e.g., Beckman et al., 2011, in Swedish). Details on the effects of linguistic factors on English and Arabic VOT are provided in Sections 6.2.2 and 6.2.3, respectively.

Moreover, recent sociophonetic research shows clear effects of social factors, such as dialect, gender, age and ethnicity on VOT durations, suggesting that VOT is not only sensitive to linguistic, but also to social factors (e.g., dialect in Puggaard, 2021; Stuart-Smith, 2004), (e.g., age in Stuart-Smith et al., 2015b), (e.g., gender in Oh, 2011). Further details on the effects of social factors on English VOT are provided in Section 6.2.2.

Overall, the extensive study of oral stops across different languages shows that languages vary in the phonetic details of VOT and stops' voicing categories, resulting in a degree of variability in VOT patterns across languages. Furthermore, VOT production patterns are shown to be highly conditioned by linguistic and social factors across a number of languages. The following paragraphs provide a review on previous research on English and Arabic VOT, with a focus on the effects of linguistic and social factors of interest on VOT patterns.

6.2.2 English VOT

English VOT has generally received considerable attention in the existing literature compared to other languages, with more studies on American than British English. Considering stops' voicing distinction, English is described as a two-way aspirated language, with short-lag voiced stops and long-lag aspirated voiceless stops. Such distinction was first proposed by Lisker and Abramson (1964) in their pioneering study and was confirmed in subsequent studies. Table 6.2 lists word-initial VOT values in English voiced and voiceless stops reported in Klatt (1975); Lisker and Abramson (1964) on American English and Khattab (2002a); Kuan-yi and Li-mei (2008) on British English. Given the main interest in London and Glaswegian English, VOT reported on these varieties or relevant varieties (i.e. Southern British English, Scottish English) are detailed separately in the following section.

Studies	Voiced VOT			Voiceless VOT		
	/b/	/d/	/g/	/p/	/t/	/k/
(Lisker and Abramson, 1964) *words in isolation*	-101/ 1	-102/5	-88/21	58	70	80
(Kuan-yi and Li-mei, 2008) *words in isolation*				67	76	91
(Lisker and Abramson, 1964) *carrier sentence*	-66/7	-56/9	-47/17	28	39	43
(Klatt, 1975) *carrier sentence*	11	17	27	47	65	70
(Khattab, 2002a) *carrier sentence*	5	10	28	63	70	80

Table 6.2: Voice Onset Time (ms) in English voiced and voiceless stops reported in Klatt (1975); Lisker and Abramson (1964) on American English and Khattab (2002a); Kuan-yi and Li-mei (2008) on British English

As can be seen from Table 6.2, all studies show two separate VOT patterns for voiced and voiceless stops with no overlap between them (i.e., prevoicing/short lag and long lag). Additionally, all studies show a systematic difference in voiced and voiceless VOT values according to place of articulation, with labials having shorter VOT than coronals, and dorsals having the longest VOT values. As described in previous studies, the pattern observed in VOT values according to place of articulation indicates that English VOT duration gets longer as the stops are articulated further back in the oral cavity (cf. Docherty, 1992).

The VOT values for English voiceless stops, listed in Table 6.2, are broadly comparable, showing long-lag voiceless VOT that ranges between 28 and 91 ms depending on the place of articulation of the stop. When considering VOT values in British and American English studies independently, shorter VOT durations in voiceless stops are observed in a carrier sentence than in isolation, a difference which was reported as a context effect in Lisker and Abramson (1964).

As for voiced stops, a short-lag voiced VOT is generally observed in Table 6.2. The only study that reported a range between pre-voiced and short-lag VOT is Lisker and Abramson (1964). As indicated by Lisker and Abramson (1964), the pre-voiced tokens were mainly produced by one participant. This, however, does not mean that prevoicing does not occur in the production of English voiced stops, as a number of subsequent studies reported varying amount of voicing during closure in the production of voiced stops (e.g., Davidson, 2016; Docherty, 1992; Khattab, 2002a).

Among the above studies, only Klatt (1975) reported a significant effect of following vowel context on English VOT durations. Specifically, when investigating word-initial stops before /i, ɜ, a, u/, VOT was found considerably longer before the high vowels /i, u/ than before the non-high vowels /ɜ, a/. Klatt (1975) result was further confirmed in subsequent studies on English VOT (Docherty, 1992; Stuart-Smith et al., 2015b).

The above studies provide a general overview on English stops' VOT patterns according to a number of linguistic factors. A significant effect of place of articulation is reported in all the studies listed in Table 6.2 whereas the significant effects of word context and following vowel on VOT values were only reported in Lisker and Abramson (1964) and Klatt (1975), respectively. In addition to these factors, a significant effect of speech rate has been widely reported in other studies on English VOT, with considerably longer VOT in slower speech rate (e.g., Kessinger and Blumstein, 1997; Miller et al., 1986; Summerfield, 1975). This effect, however, is more widely observed in the production of voiceless than voiced stops.

While variability in English VOT has largely been explored in relation to linguistic factors, rather less studies considered the possible effect of social factors on English VOT variation (e.g., Ryalls et al., 2004, 1997; Swartz, 1992, on American English) and (Docherty et al., 2011; Sonderegger et al., 2020; Stuart-Smith et al., 2015b; Whiteside and Irving, 1997, on English in the UK). One of the earliest studies that examined gender differences in the production of English VOT is Swartz (1992) study on 16 male and female American speakers. By investigating the VOT values and patterns in the production of /t/ and /d/, Swartz (1992) found that male speakers produced significantly shorter English VOT than female speakers and show larger proportion of prevoiced /d/ than their female counterparts. Similar results were observed in Whiteside and Irving (1997) study on Sheffield Anglo speakers, with females producing significantly longer voiceless stops than their male counterparts.

Two explanations were provided in Swartz (1992) and Whiteside and Irving (1997) to account for such gender differences. Swartz (1992) suggested that the longer VOT durations observed in the females data may be due to speech rate, as female speakers had significantly slower speech rate than male speakers. However, this interpretation is unlikely to be the reason behind the observed gender differences, as her results did not show a correlation between speech rate and VOT durations. By contrast, Whiteside and Irving (1997) indicated that a possible reason for gender differences in the production of VOT is that female speakers produced the target words more carefully than their male counterparts, as this has been reported previously in studies with similar elicitation method (i.e. word-list data).

In addition to gender, Ryalls et al. (2004, 1997) investigated the possible effects of age (i.e.

young vs old speakers) and ethnicity (i.e. African vs Caucasian American speakers) on American English VOT. Ryalls et al. (2004, 1997) data generally revealed significant age differences, whereby older speakers produced significantly prevoiced and less aspirated voiced and voiceless VOT, respectively, than younger speakers, irrespective of speech rate. As for other social factors, only younger speakers showed significant gender and ethnic differences in the production of VOT, with longer voiceless stops in the data of African American and female speakers independently. While Ryalls et al. (2004, 1997) did not provide much interpretation on the gender and ethnic variation observed in their results, their study paved the way for further investigation on the role these social factors have on VOT variation.

Moreover, recent investigation of American English VOT shows significant dialectal variation, particularly in the production of voiced stops (e.g. Herd, 2020; Jacewicz et al., 2009). Jacewicz et al. (2009) investigated the production patterns of the voiced labial stop /b/ in two dialectal areas, namely North Carolina in the South and Wisconsin in the North. They found that participants from North Carolina show a significantly larger proportion of voicing during the closure phase than Wisconsin participants. Interestingly, similar observation is found in Herd (2020) investigation of English VOT production patterns in different regional areas in Mississippi-US. Although Herd (2020) found significantly larger proportion of prevoicing in the stops produced by African American speakers than their Caucasian American counterparts, variation according to dialect areas override ethnic differences. Herd (2020) results highlight the importance of considering dialect when examining inter-ethnic phonetic variation.

London VOT

London English is generally described as having short-lag voiced and aspirated voiceless stops, with the latter showing larger degree of aspiration in Cockney than RP accents (Wells, 1982a, p.303). As mentioned in Chapter 4, London English is not limited to Cockney or RP, but these varieties represent opposite ends of a continuum that includes other varieties, such as SSBE and popular London speech (Wells, 1982a, p.303). In the present study, London Iraqis' production patterns are likely to vary according to which variety they are exposed to and communicate with mostly, which is probably conditioned by their migration experience (e.i., professional Iraqis are more likely to interact with SSBE speakers than Iraqi refugees whose English interaction is perhaps mostly with popular London English speakers). To date, variation in word-initial VOT in London English has not been explored sociophonetically despite its status as a multicultural city. For this reason, this section presents previous acoustic descriptions of VOT in Standard Southern British English (SSBE).

Docherty (1992) study is one of the earliest studies that provided a thorough acoustic examinatin of Standard Southern British English (SSBE) stops. In his study, Docherty (1992) examined the acoustic features of English stops produced by five male speakers across different word positions (i.e. word-initial, medial and final stops) and contexts (i.e. words in isolation vs carrier phrase). In general, Docherty (1992) found a significant difference in VOT values between voiced and voiceless stops, with long aspirated voiceless VOT and short-lag voiced VOT. Although Docherty (1992) reported some prevoiced tokens in the voiced stops' data, he did not include them in the final analysis. Moreover, a significant effect of linguistic factors such as place of articulation, following vowel height and context was also reported. Specifically, both voiced and voiceless labial stops showed significantly shorter VOT than coronal and dorsal stops. However, voiceless coronal and dorsal stops did not show a significant difference in VOT, contradicting with the suggestion that VOT tends to be longer as the stop is produced further back in the oral cavity. The widely reported effect of following vowel and context was shown in Docherty (1992), in which all stops showed significantly longer VOT before high vowels and when produced in isolation.

Recently, Alanazi (2018) and Kupske (2017) examined English VOT production patterns by SSBE speakers as part of a larger study on VOT production by Saudi and Brazilian bilingual speakers, respectively. Alanazi (2018) recorded 30 SSBE speakers reading monosyllabic words containing stops in initial positions. Similar to Docherty (1992), Alanazi (2018) found that the voiced stops were produced with a short-lag VOT and the voiceless stops were produced with a long-lag aspirated VOT, with no overlap between them. Furthermore, Alanazi (2018) reported a significant effect of place of articulation (i.e. labial<coronal<dorsal) and word context (i.e. words in isolation vs carrier sentence) on voiced and voiceless VOT. However, following vowel height showed a significant effect only on voiceless labial and coronal VOT (i.e. longer /p/ and /t/ before high vowels), but did not reach significance in the production of voiceless dorsal and voiced stops.

Kupske (2017) analysed word-initial voiceless stops produced in a carrier phrase by 10 SSBE speakers (5 males and 5 females). As expected, mean VOT values for all voiceless stops showed long-lag VOT. Within voiceless stops, a clear difference in VOT according to place of articulation was also reported, with /p/ having the shortest VOT durations and /k/ having the longest VOT durations. Since the main focus of Kupske (2017) study is on bilinguals' VOT production patterns, the possible effects of other linguistic or social (e.g., gender) factors were not considered in his analysis.

Table 6.3 shows the voiced and voiceless mean VOT values for SSBE speakers as reported in Docherty (1992), Alanazi (2018) and Kupske (2017) studies.

Studies	Voiced VOT			Voiceless VOT		
	/b/	/d/	/g/	/p/	/t/	/k/
Docherty (1992)	15	21	27	41	65	62
Al-Anazi (2018)	11	17	24	64	79	80
Kupske (2017)	_	_	_	62	79	83

Table 6.3: Voice Onset Time (ms) in SSBE voiced and voiceless stops (*in a carrier phrase context*), reported in Docherty (1992), Alanazi (2018) and Kupske (2017) studies

Comparison of mean VOT values according to place of articulation in previous studies on SSBE shows considerably shorter voiceless VOT durations in Docherty (1992) than in Alanazi (2018) and Kupske (2017). This difference is not likely to be a contextual effect as all VOT values listed in Table 6.3 were for stops produced in the carrier phrase: *I say* ...., but may result from speech rate differences, age or gender effects, as Docherty (1992) sample was limited to male speakers aged between 18 and 21.

Glasgow VOT

Scottish English has been described as having two main varieties: Standard Scottish English (SSE), spoken by middle-class speakers, and Scots, spoken by working-class speakers. Early accounts of Scottish English suggest that, compared to British English, this variety generally displays shorter VOT in voiceless stops and larger proportion of prevoicing in voiced stops (Johnston, 2007; Wells, 1982a). This claim was confirmed in recent acoustic investigations on Scottish English across different geographical locations (e.g., Docherty et al., 2011, on two Scottish-British border towns), (Scobbie, 2006, on English spoken in Shetland Island), (Sonderegger et al., 2020; Stuart-Smith et al., 2015b, on Glaswegian English) and (Masuya, 1997, on Lowland Scottish English).

The VOT differences between Scottish and British English stops have been directly investigated in Docherty et al.'s (2011) study on four Scottish-British border towns (i.e., 159 speakers). Despite the short distance between the Scottish and British towns under investigation, Docherty et al. (2011) found a significant difference in voiceless VOT according to location, with speakers in Eymouth and Gretna, Scotland, producing shorter voiceless stops than speakers in Berwick and Carlisle, England. Docherty et al. (2011) suggest that speakers' sense of national (Scottish/ British) identity played a major role in the existence of VOT variation across these towns, as confirmed in their social questionnaire data. As for voiced stops, a significant difference according to age was observed within each location, with a considerably larger proportion of prevoicing in the data of old than young speakers, and thus possibly suggesting an apparent-time change. Docherty et al. (2011) results present a clear example of how VOT production patterns can be largely conditioned by social factors, highlighting the importance of considering them to better understand the motives behind variation.

Social and individual differences in the production of VOT were also found in Scobbie (2006) and Sonderegger et al. (2020); Stuart-Smith et al. (2015b) investigations on Shetland and Glasgow English stops, respectively. Scobbie (2006) and Sonderegger et al. (2020); Stuart-Smith et al. (2015b) generally reported a range between prevoiced and short-lag voiced stop VOT, and long-lag voiceless stop VOT (i.e. Scobbie (2006): /b/ = a range between -71 and 15 ms, /p/= 56 ms; Sonderegger et al. (2020); Stuart-Smith et al. (2015b): voiced=18 ms, voiceless= 50 ms). Nevertheless, a large degree of variability in VOT was observed in the above studies and explained by different factors. Scobbie (2006), for example, examined English labial VOT produced by 12 Shetlandic speakers, whose parents are either local speakers of the dialect (Shetlandic English) or originated from other dialect areas (i.e. Other Scottish, British dialects). Although most speakers showed a range between prevoicing and short-lag VOT for /b/ and long-lag VOT for /p/, larger proportion of voicing in /b/ as well as shorter VOT in /p/ is observed among speakers whose parents are local speakers of Shetlandic English. Thus despite the general similarity, constant exposure to different dialects can play a role in VOT variation (Scobbie, 2006).

Furthermore, in a thorough investigation of English stops in Glaswegian vernacular connected speech (i.e. 23 female speakers born in different decades), Sonderegger et al. (2020); Stuart-Smith et al. (2015b) investigated VOT patterns as an important cue to stop voicing contrast. Results showed that the VOT variation was conditioned by linguistic factors such as place of articulation (i.e. voiced =labial < coronal < dorsal, voiceless= labial < non-labial), following vowel height (i.e. longer VOT before high vowels) and speech rate (i.e. voiceless VOT is longer in slower speech rate). However, VOT also varied by speakers' age and decade of birth, indicating a change in Glaswegian accent. Specifically, old speakers recorded in the 2000s showed considerably longer VOT durations and less voicing during closure than their counterparts recorded in the 1970s, a difference which may indicate lengthening of VOT in Glaswegian stops over time. However, the opposite pattern was observed in the production of the young speakers recorded in the 2000s, who had more voicing during closure and shorter VOT values for voiced and voiceless stops, respectively. According to Sonderegger et al. (2020); Stuart-Smith et al. (2015b), the pattern observed in the speech of the young generation reflects a sharper sociolinguistic dichotomy between working-class and middle-class adolescents in Glasgow, evidenced through the shift towards local, non-standard features in the speech of the former group.

Given that Glaswegian English is reported to have shorter VOT durations for voiceless stops than SSBE, Glaswegian Iraqi speakers are generally expected to produce shorter voiceless VOT than their London counterparts. Bearing in mind the variability and change recently reported on Glaswegian English stop patterns, Iraqis in Glasgow are also expected to show high degree of variability in English VOT according to social factors, such as social contact and sense of identity.

Overall, previous studies on English VOT show a tendency for English voiced stops to range between prevoicing and short-lag, and for voiceless stops to have a long-lag aspirated VOT. A significant effect of place of articulation, following vowel context and speech rate is reported in studies on English VOT, with a general tendency for VOT to be longer as the stop is produced further back in the oral cavity, is followed by high vowels, and is produced with a slower speech rate. Moreover, recent studies on American English stops showed that variation in VOT is partially explained by social factors, such as age, gender, ethnicity and dialect. Similarly, British and Scottish English VOT is highly conditioned by linguistic and social factors. Dialect differences are reported in previous studies on British and Scottish English stops, with Scottish accents generally showing shorter VOT and prevoicing in the production of voiceless and voiced stops than British accents.

6.2.3 Arabic VOT

Arabic is generally described as having two voicing categories, with phonologically voiced and voiceless stops (cf. Lisker and Abramson, 1964). In Arabic, the distinction between voiced and voiceless stops is generally implemented through prevoicing and short lag. However, as with English, the growing number of instrumental studies on Arabic stops showed inconsistent patterns, as clear individual and dialectal variation were observed in the implementation of voicing categories (e.g., Kulikov, 2016). This can be clearly observed in Figure 6.2, which compares mean VOT values (ms) collated from: Yeni-Komshian et al.(1974), Khattab (2002), Khattab et al. (2006) on Lebanese Arabic, Tamim and Hamann (2021) on Palestinian Arabic, Mitleb (2006) on Jordanian Arabic , Kulikov (2020) on Qatari Arabic, Alshahwan (2015) on Bahraini Arabic, Flege (1981), Alanazi (2018) and Al-Gamdi et al. (2019) on Saudi Arabic and Al-Dhari and Al-Otabie (2011) on Modern Standard Arabic (MSA).

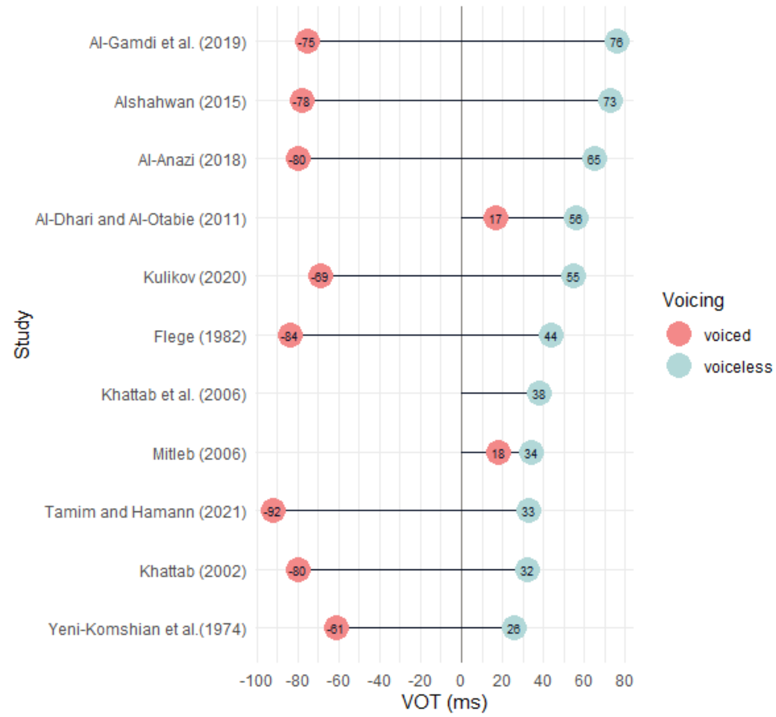

Figure 6.2: Mean VOT durations (ms) for Arabic voiced and voiceless stops in previous studies

As shown in Figure 6.2, differences in voiced and voiceless VOT values are observed across the studies. While such differences may be partially resulting from differences in elicitation methods or individual differences, dialectal differences can be clearly observed. For example, similar patterns in the production of voiceless VOT are observed when considering geographical dialects under analysis, with studies on Levantine Arabic (i.e. Lebanese, Palestinian, Jordanian Arabic) reporting short-lag or slightly aspirated voiceless VOT (i.e. VOT range= 26/ 38 ms), and studies on Gulf Arabic (i.e. Dialects of the Arabian peninsula) and MSA reporting long-lag aspirated voiceless VOT (i.e. range= 44/ 76 ms).

By contrast, with the exception of Mitleb (2006) and Al-Dhari and Al-Otabie (2011) studies, prevoicing is observed in the production of Arabic voiced stops in all studies (i.e. VOT ranging from -61 to -92 ms). Alanazi (2018) explained the unexpected positive voiced VOT in Mitleb (2006) and Al-Dhari and Al-Otabie (2011) as a result of including bilingual speakers in their sample (i.e. Arabic-English bilinguals in Mitleb (2006) and non-Arab Muslim speakers in Al-Dhari and Al-Otabie (2011)). While including bilingual speakers who speak languages known to have different VOT patterns (e.g. English is considered an aspirated language) may have affected their results, few instances of positive VOT in the production of voiced stops, more specifically /g/, have been reported in other recent studies on Arabic monolingual speakers (e.g. Al-Siraih, 2020; Al-Tai and Kasim, 2021). Apart from Mitleb (2006) and Al-Dhari and Al-Otabie (2011), all previous accounts of Arabic stops across different dialects reported negative voiced VOT. Thus, it seems that Arabic VOT generally shows one of the following patterns: Prevoicing in voiced stops and short lag in voiceless stops, as in Levantine Arabic, or prevoicing in voiced stops and aspiration in voiceless stops, as in Gulf Arabic (cf. Kulikov, 2016). This classification, however, is not clear-cut given the scarcity of cross-dialectal investigation of Arabic VOT.

Recent sociophonetic investigation on Arabic voiceless VOT showed variation according to social factors, such as gender, age and tribal affiliation. In their study on Qatari Arabic, Kulikov (2016) found that VOT in voiceless stops (i.e. /t/, /k/) is considerably longer among younger, female and Hadar (Sedentary) speakers than older, male and Bedouin speakers, respectively. According to Kulikov (2016) and Kulikov (2020), the generational difference observed in Qatari VOT is part of an ongoing sociolinguistic change in Qatari dialect, taking place as a result of a language contact situation and use of English as a second language in Qatar, which has recently become a host country to different ethnic communities. Kulikov (2016), Kulikov (2020) findings are one of the first Arabic studies that showed significant effects of social and demographic factors on Arabic VOT variation.

Iraqi Arabic VOT

Looking at the existing literature on Iraqi Arabic, only a handful of phonetic studies have examined VOT acoustic features in the production of stops. One of the earliest acoustic examinations of Iraqi Arabic stops is Al-Ani (1970) study on Modern Standard Arabic spoken by Iraqis. More recent studies focused on Spoken Iraqi Arabic VOT in different dialect areas, such as Dickins et al. (1996) on Muslim Baghdadi Arabic, Al-Tai and Kasim (2021); Rahim and Kasim (2009) on Muslawi Arabic and (Al-Siraih, 2020) on Basrawi Arabic. A summary of VOT values reported in these studies is presented in Table 6.4.

Study	**word- initial VOT (ms)**					
	/b/	**/d/**	**/g/**	**/p/**	**/t/**	**/k/**
Al-Ani (1970)	-60 / -110	-80/ -100	_	_	40 /60	60 /80
Heselwood (1996)	_	_	_	_	31.4	_
Al-Tai & Kasim (2021)	-69 / -74	-59 /- 82	-57 / -70	17 / 20	41/ 44	50/ 53
Rahim & Kassim (2009)	-58	-98	-78	17	41	57
Al-Siraih (2020)	-60/ -76	-60/ -75	-55/ -85	_	31/ 58	48/ 75

Table 6.4: Iraqi Arabic VOT values (mean or range) as reported in previous studies

Despite the variability observed in VOT values in Table 6.4, both voiced and voiceless VOT in Iraqi Arabic generally show a similar pattern across dialects, with prevoicing in the production of voiced stops and long-lag/ aspiration in the production of voiceless stops. Such pattern makes Iraqi Arabic VOT more similar to studies on Gulf Arabic than Levantine Arabic dialects. However, when considering Iraqi dialect areas in the studies listed in Table 6.4, a difference in the phonemic inventory is observed between Muslawi Arabic and other dialects. Specifically, both studies on Muslawi Arabic reported VOT values for /p/ as part of its inventory (Al-Tai and Kasim, 2021; Rahim and Kasim, 2009). In contrast to Al-Tai and Kasim (2021); Rahim and Kasim (2009), Al-Siraih (2020) stated that neither herself nor her participants produce this sound in Arabic, but instead replace it with /b/. Such difference may indicate that, unlike other Iraqi dialects, northern Iraqi dialects have acquired this sound, possibly as a result of their greater degree of exposure to other languages (e.g., Kurdish, Turkmen, Turkish)(Versteegh, 2006). Direct comparative work is needed to confirm dialect differences in Iraqi Arabic stops.

Notably, all studies listed in Table 6.4 show the expected effect of place of articulation on voiceless VOT (i.e. /k/> /t/> /p/). By contrast, voiced VOT does not show a clear difference according to place of articulation, with overlapping values across voiced stops (i.e. /b/ ranges between -58 and -110, /d/ ranges between -59 and -100, /g/ ranges between -57 and -85). Following vowel effect was directly investigated in Rahim and Kasim (2009) sudy, in which they found significantly longer voiceless VOT in the front than non-front vowel contexts. By contrast, voiced VOT did not show a significant difference according to following vowel. Although the above-mentioned studies provided a general description of voiced and voiceless VOT patterns in

Iraqi Arabic, there is still a need for further investigation of the possible effect of other linguistic (e.g., speech rate) and social factors (e.g., gender, education) as well as individual differences on Iraqi Arabic VOT variation.

Comparing previous accounts of Iraqi Arabic stops to the ones reported on SSBE and Glaswegian English, it is clear that, despite the cross-linguistic differences, stop patterns in Iraqi Arabic are generally closer to the stop realisations in Glaswegian than SSB English. Specifically, compared to SSBE, both Iraqi Arabic and Glaswegian English generally have more voicing during closure in the production of voiced stops and shorter VOT durations in voiceless stops, which may have a different impact on how Iraqi Arabs perceive and produce English VOT in each regional dialect.

6.2.4 VOT Studies on Arabic-English Bilinguals

Due to the presence of clear phonetic and phonological differences between Arabic and English stops, the production patterns of English stops by Arab speakers of English has been investigated in a number of previous studies (e.g., Alanazi, 2018; Flege, 1980, 1981; Khattab, 2002a; Port and Mitleb, 1983). Given the relevance of these studies to the present analysis, they are briefly discussed in the following paragraphs.

The most relevant study is Khattab (2002a) study on four Arabic-English Lebanese bilinguals who resided in the UK for more than ten years during the time of data collection. When investigating their VOT production patterns in word-initial English stops, Khattab (2002b) found that all her participants produced voiced stops with prevoicing and voiceless stops with a short-lag VOT, a pattern which was similar to their Lebanese Arabic production patterns. Although Lebanese Arabic phonemic inventory lacks the voiced stop /g/ and voiceless stop /p/, Khattab (2002a) found that, participants successfully produced these sounds, despite the presence of accented features in their production (i.e prevoicing and short-lag VOT in /g/ and /p/, respectively).

In their comparative work on Saudi Arabic, American English and Saudi English stops, Flege (1980, 1981) investigated different acoustic cues to stop voicing, namely voice onset time (VOT), effect of stop voicing on preceding vowel, closure duration and voicing during closure, in the Arabic and English spoken by Saudi students in the US as well as English spoken by monolingual American speakers. Overall, similarity in the acoustic features of Arabic and English stops produced by Saudi bilingual speakers is found, indicating first language interference (Saudi Arabic) in the speakers' English production patterns. Specifically, significant differences in English VOT patterns between English monolinguals and Saudi speakers were observed, with Saudi speakers showing voicing during closure and less aspirated VOT in English voiced and voiceless stops, respectively. Despite the fact that Saudi Arabic lacks the phoneme /p/, Saudi speakers displayed a distinction between /p-b/ in their VOT by producing prevoiced /b/ and a short-lag /p/. Although Flege (1980, 1981) considered length of residence as a possible factor contributing to individual variation in the production of English VOT by Saudi speakers, no significant differences in VOT were observed within groups according to length of residence.

Similar observations were reported in Port and Mitleb (1983) who investigated /p-b/ and /t-d/ production patterns in the English spoken by two groups of bilingual Jordanian speakers, one lived in the US for further education whereas the other was in Jordan during the time of the study. Port and Mitleb (1983) reported that direct exposure to American English did not result in longer VOT by the first group. Instead, both Jordanian groups showed similar VOT values, in which both groups produced English stops with shorter VOT than the control group (i.e. monolingual American speakers). Notably, all Jordanian speakers showed VOT duration difference between /p-b/ as well as the expected place of articulation effect on /p-t/ even though /p/ does not exist in Jordanian Arabic phonemic inventory.

To further understand English stops' production patterns by Arabic-English bilinguals, Alanazi (2018) examined English VOT produced by Saudi students in the UK in relation to different linguistic factors, namely place of articulation (i.e. labial, coronal, dorsal), following vowels (i.e. high, non-high vowels) and word context (i.e. word in isolation, carrier sentence). He also considered the possible effects of Saudis' length of residence in the UK-Sussex, as well as daily use of English on their English VOT production patterns. In line with previous studies, Alanazi (2018) found that participants showed little overlap in the production of voiced and voiceless stops, with the former being mostly produced with negative VOT and the latter being produced with positive VOT. Moreover, the expected effects of place of articulation and following vowel height were observed in the production of voiced and voiceless stops (i.e. labial <coronal< dorsal; VOT before high vowels > VOT before non-high vowels). By contrast, VOT values did not vary according to word context. For length of residence and daily use of English, a positive correlation between the two factors and voiceless VOT was observed, with longer voiceless VOT as speakers reported greater length of residence and more frequent use of English and vice versa.

While voiced stops were overall produced with a negative VOT, Alanazi (2018) found an interesting pattern in the production of the voiced labial stop /b/. Specifically, some /b/ tokens were produced with positive VOT values which were significantly longer than previous accounts of typical English /b/ and monolingual English speakers in his study (i.e. mean positive VOT for /b/ in a carrier sentence: 31 ms). Alanazi (2018) suggested that the long-lag VOT for /b/ observed in his data was probably produced as a result of speakers' awareness of the lack of /b-p/ contrast in Arabic. According to Alanazi (2018, p.81), the speakers' awareness of this phonological difference between Arabic and English may have resulted in the production of exaggerated positive VOT durations for /b/ or even ‘perceptual confusion’ in the production of English voiced and voiceless labial stops. Notably, exaggeration in the production of phonetic correlates of voiced and voiceless stops has been also discussed in Flege (1981) study on Saudi speakers, as one of his participants produced an exaggerated amount of closure duration contrast between English /p-b/, even longer than the one typically found between Arabic /t-d/ and /k-g/ (i.e. Arabic voiceless stops show longer closure duration than voiced stops). Thus, bilinguals’ awareness of the phonetic differences between their first and second languages in the production of a certain sound may result in exaggerated utterances which are neither similar to their first language nor their second language.

6.3 Research Questions for Iraqi English Positive VOT

This main aim of the present chapter is to ascertain whether phonetic variation in the production of English positive VOT by Iraqi Arabs is explained by macro- (i.e., migration experience, dialect, gender) and micro- (i.e., ethnic identity, national identity, English use, Iraqi contact, Muslim contact, density) social factors.

Additionally, despite the large and growing number of Arabic-English Iraqi bilinguals in different English speaking countries, English VOT patterns in the speech of Iraqi Arab speakers have not been explored. Bearing in mind the clear dialectal and social differences between speakers in the above studies and participants in the present study, examining Iraqi-English VOT patterns will contribute to the existing literature on English-Arabic bilingual speakers.

Therefore, in light of the limitations of previous studies, the present analysis examines English positive VOT patterns of Iraqi-Arab speakers thoroughly, by exploring the following questions:

- What are the positive voiced and voiceless VOT patterns of English stops produced by Iraqi-Arab speakers?
- How do linguistic factors affect positive VOT in word- initial English stops produced by Iraqi-Arab speakers?
- Does Iraqi English positive VOT vary according to macro-social factors, namely migration experience, dialect and gender, as well as micro-social factors?

6.4 Method

6.4.1 Sample

The VOT in English stops analysed in the present study is elicited from a word-list data produced by 44 Iraqi-Arab speakers (See Chapter 4). The final data used in the analysis contains a total of 5692 mono-syllabic word-initial stop tokens. Table 6.5 presents a summary of the counts for voiced and voiceless stops by place of articulation.

Stop voicing	No. Tokens & (%)	Place of articulation		
		Labial	Coronal	Dorsal
Voiced	2656 (47%)	1135	842	679
Voiceless	3036 (53%)	1192	1016	828

Table 6.5: Summary of stop counts by stop voicing and place of articulation

Table 6.5 shows a slightly larger number of voiceless than voiced tokens in the sample, with the voiceless tokens comprising about 53% and the voiced tokens comprising approximately 47% of the data. A larger proportion of voiceless than voiced stops is also shown in the data across each social group (See Appendix E). Despite differences in the number of voiced and voiceless stops, mean number of voiced and voiceless stop tokens separately is 2846 .

Within voiced and voiceless stops data, labial stops show larger number of tokens than coronal and dorsal stops (i.e., 43% for voiced and 39% for voiceless labial stops). By contrast, dorsal stops constitute about 27% of the voiced and voiceless data separately and coronal stops comprise about 32 % and 34 % for voiced and voiceless stop tokens, respectively. The reasons behind differences in token counts are detailed in the following paragraphs. Table 6.6 provides a summary of the stop token counts according to social groups (i.e., migration experience, dialect, gender) as well as individual speakers.

Dialect	Gender	No. Tokens & Sample (%)	Speaker	No. Tokens	Migration
London	male	1296 (23%)	Redha	88	
			Amjed	130	
			Ammar	139	Refugees
			Bilal	132	
			Haleem	139	
			Hamid	124	
			Hanoosh	138	
			Abid	138	Professionals
			Sabri	131	
			Salim	137	
	female	1518 (27%)	Bashair	108	
			Beian	133	
			Hajar	126	Refugees
			Zuhour	118	
			Nawras	154	
			Danah	138	
			Nurah	131	
			Sabirah	129	
			Safiah	95	Professionals
			Sama	112	
			Zuha	136	
			Manar	138	

Table 6.6: Speaker and group sample for English stops

Dialect	Gender	No. Tokens & Sample (%)	Speaker	No. Tokens	Migration
Glasgow	male	1048 (18%)	Qusai	125	Refugees
			Ala	119	
			Basel	129	
			Mazen	139	
			Habib	136	Professionals
			Qader	136	
			Abdulsamad	127	
			Wahid	137	
	female	1830 (32%)	Luluah	144	Refugees
			Mais	129	
			Ola	136	
			Rasha	136	
			Dalia	121	
			Sanaa	114	
			Shouq	111	
			Ani	137	Professionals
			Reem	130	
			Faten	138	
			Hebah	139	
			Huda	132	
			Ibtisam	138	
			Israa	125	

Table 6.7: Speaker and group sample for English stops

Presentation of stop tokens in general (See Tables 6.6 and 6.7) shows that London and Glasgow data have similar proportions of the data sample (i.e. 49% in London and 51% in Glasgow). As for gender, female speakers show larger number of VOT tokens than male speakers in both dialect areas (i.e. London: 27% and Glasgow 32%). Such difference is expected given the larger number of female than male participants, especially in Glasgow (See Chapter 4). Migrant groups generally show little difference in the proportion of data in both dialect areas, with both London and Glasgow professionals comprising 51 % and their refugee counterparts comprising 49 % of the data.

Differences in stop counts are also observed across individual speakers. Such differences existed in the data as a result of discarding some tokens due to mispronunciation or background noise. This is clearly observed in the data of *Radha* and *Safiah* who show considerablly smaller number of tokens than other participants as they mispronounced some tokens. Tokens discarded from other participants were mainly unclear due to background noise and therefore can not be analysed acoustically (See Chapter 4).

6.4.2 Acoustic Analysis

Previous phonetic studies have identified numerous different phonetic features as cues to distinguish between voiced and voiceless stops. A good paper that summarizes all possible phonetic cues is Lisker (1986), in which 16 acoustic properties were reported in the analysis of English voiced and voiceless stops. Among these cues, voice onset time (VOT) (e.g., Lisker and Abramson, 1967; Stuart-Smith et al., 2015b), length of preceding vowel (e.g., Flege, 1980; Raphael, 1972) and the amount of voicing (phonation) during the closure period (e.g., Davidson, 2016; Docherty, 1992) have received considerable attention in previous research.

Given previous descriptions of Arabic as well as Arabic accented English voiced stops of being produced with prevoicing (i.e., negative VOT)(e.g., Al-Siraih, 2020; Alanazi, 2018; Flege, 1981), initial intention was to analyse both negative and positive VOT in the production of English stops in the present analysis. During the analysis of voiced stops, several patterns were observed in the location and amount of voicing during the constriction period of voiced stops. These include:

- Full voicing throughout the closure period (See Figure 6.3 *left*).
- Completely devoiced voiced stop, especially when preceded by a pause (See Figure 6.3 *right*).
- Partial voicing during closure that:
  - *either* continues from the preceding voiced vowel in *say* and then disappears before the release (See Figure 6.4 *left*).
  - *or* starts in the middle of the closure and continues until the following sound (See Figure 6.4 *right*).

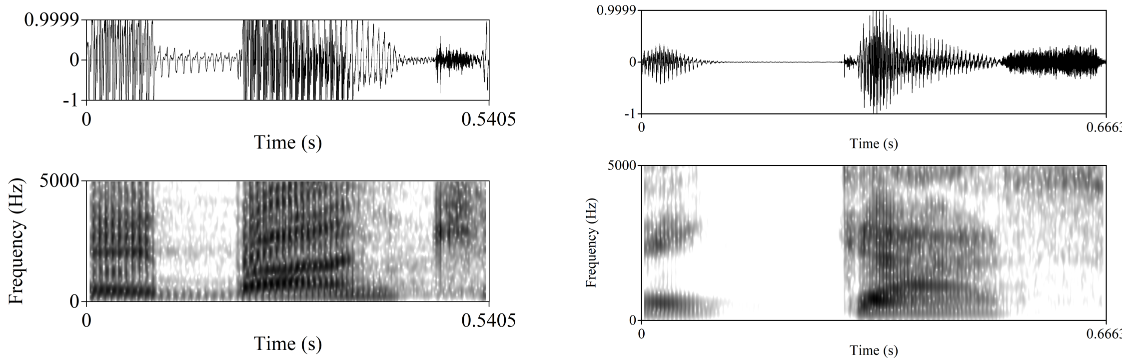

Figure 6.3: Examples of full voicing during closure in *bank* (left); and devoiced stop in *gas* (right)

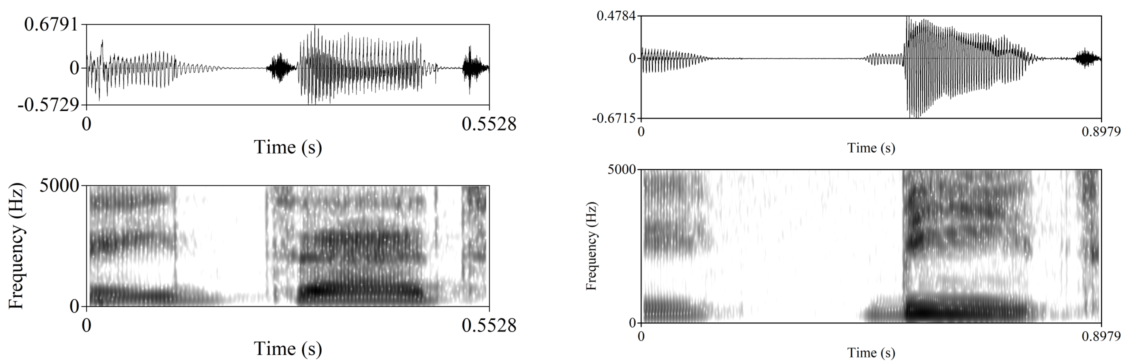

Figure 6.4: Examples of differences in the location of partial voicing during closure: Continuing from the preceding vowel in *dad*(left); and prevoicing in *beet* (right)

Such differences in the location and duration of voicing during closure were not reported in previous studies on English produced by Arab speakers. However, few recent studies on English stops have highlighted this issue (Davidson, 2016; Stuart-Smith et al., 2015b). Therefore, a decision was made to follow method used in Davidson (2016); Stuart-Smith et al. (2015b) by measuring positive voice onset time (VOT) and voicing during closure (VDC) separately. Although both (VOT) and (VDC) were initially considered during the acoustic analysis (i.e. segmentation and labelling), it was difficult to find a way of assessing the proportion of voicing during closure due to the variability observed in the voicing patterns. Therefore, only the results of positive voice onset time (VOT) in voiced and voiceless stops are presented and discussed in this chapter. The (VDC) results will be a subject for future work.

Praat Segmentation and Coding

After preparing the recorded data for acoustic analysis (See Chapter 4), the .Textgrid and .wav files for each speaker were segmented and labelled in Praat. All .Textgrid files were created using MAUS (Ludwig Maximillian University of Munich, (LMU), 2019) and thus already contain automatic segmentation for target words and their phonemes. However, the boundaries and labels for all tokens were checked and, when required, adjusted by hand. Additionally, manual segmentation of voice onset time and closure period for each stop token were added (See Figure 6.5).

Consequently each .Textgrid file consists of the following tiers:

- Tier 1 contains the closure period, voice onset time (VOT) and following segments.
- Tier 2 contains phonemic segmentation for the word.
- Tier 3 contains the word.

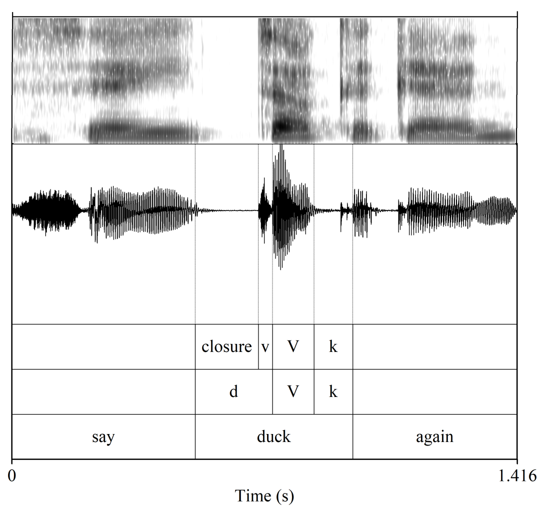

Figure 6.5: An example of Praat segmentation for the stop tokens

Stop and VOT Segmentation

Although the present analysis focuses on positive VOT, closure phase was also marked during the acoustic analysis (See Section 6.4.2). Both waveforms and spectrogram were used to identify and mark closure phase and positive VOT for voiced and voiceless stops. Following previous work on stops (e.g., Cho and Ladefoged, 1999; Turk et al., 2012), stop closure was marked upon visualising the offset of F2 of the preceding vowel accompanied with a drop in its amplitude on the waveform and ends at the stop release point (i.e. VOT burst). Positive voice onset time

(VOT) was marked manually for all tokens from the release burst in the spectrogram and the spike on the waveform to the vowel start, identified through quasi-periodic waveforms. In other words, positive VOT included the short aperiodic friction occuring after the burst (Stuart-Smith et al., 2015b). Voiced stop tokens were sometimes produced without a friction noise following the burst, and thus VOT segmentation in these tokens included only the release phase (VOT< 5 ms). In the cases where stops produced with multiple bursts, the very first burst was marked as the start of the release (VOT) following Turk et al. (2012). Figures 6.6 and 6.7 provide examples of VOT segmentation for voiceless and voiced stops, respectively.

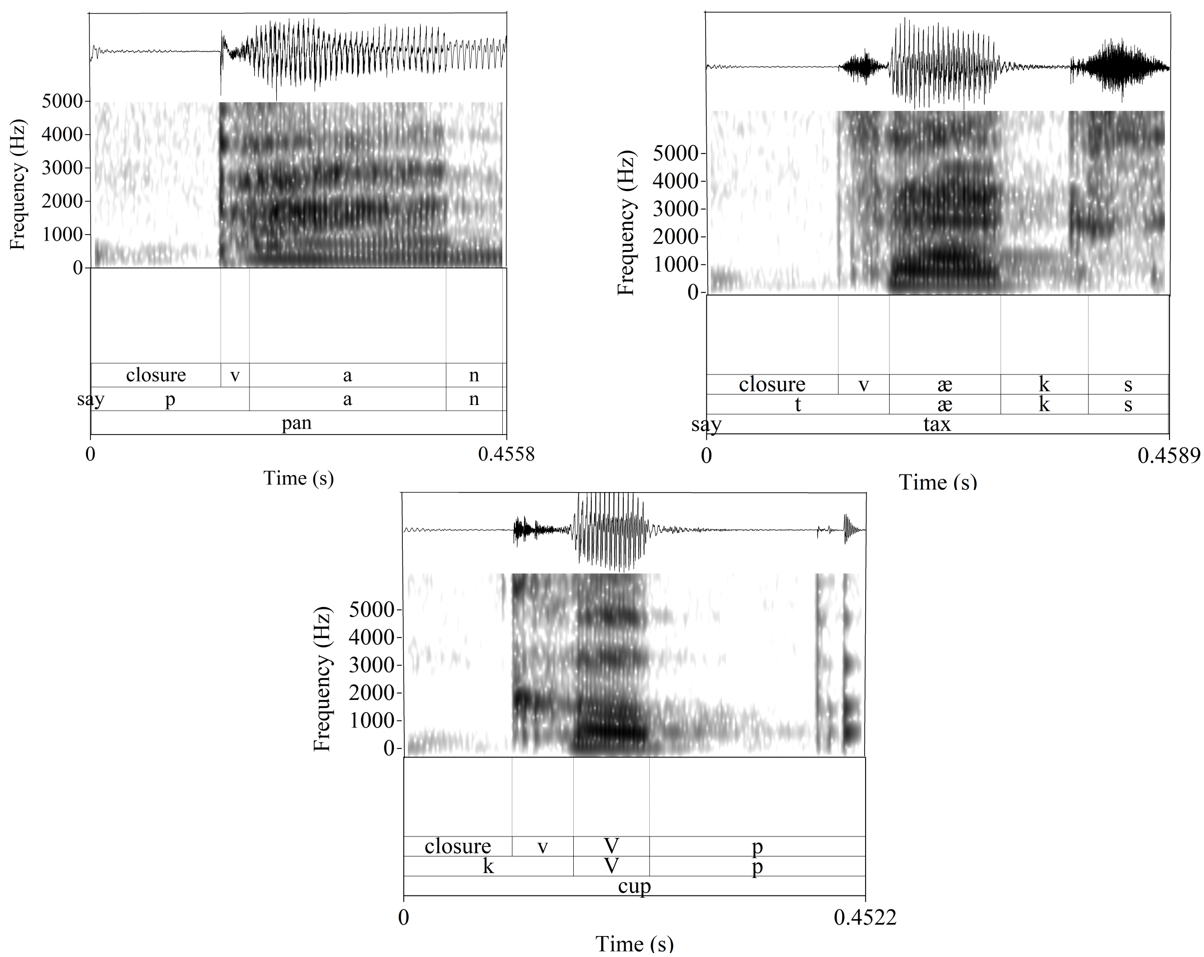

Figure 6.6: Segmentation of positive VOT for voiceless stops

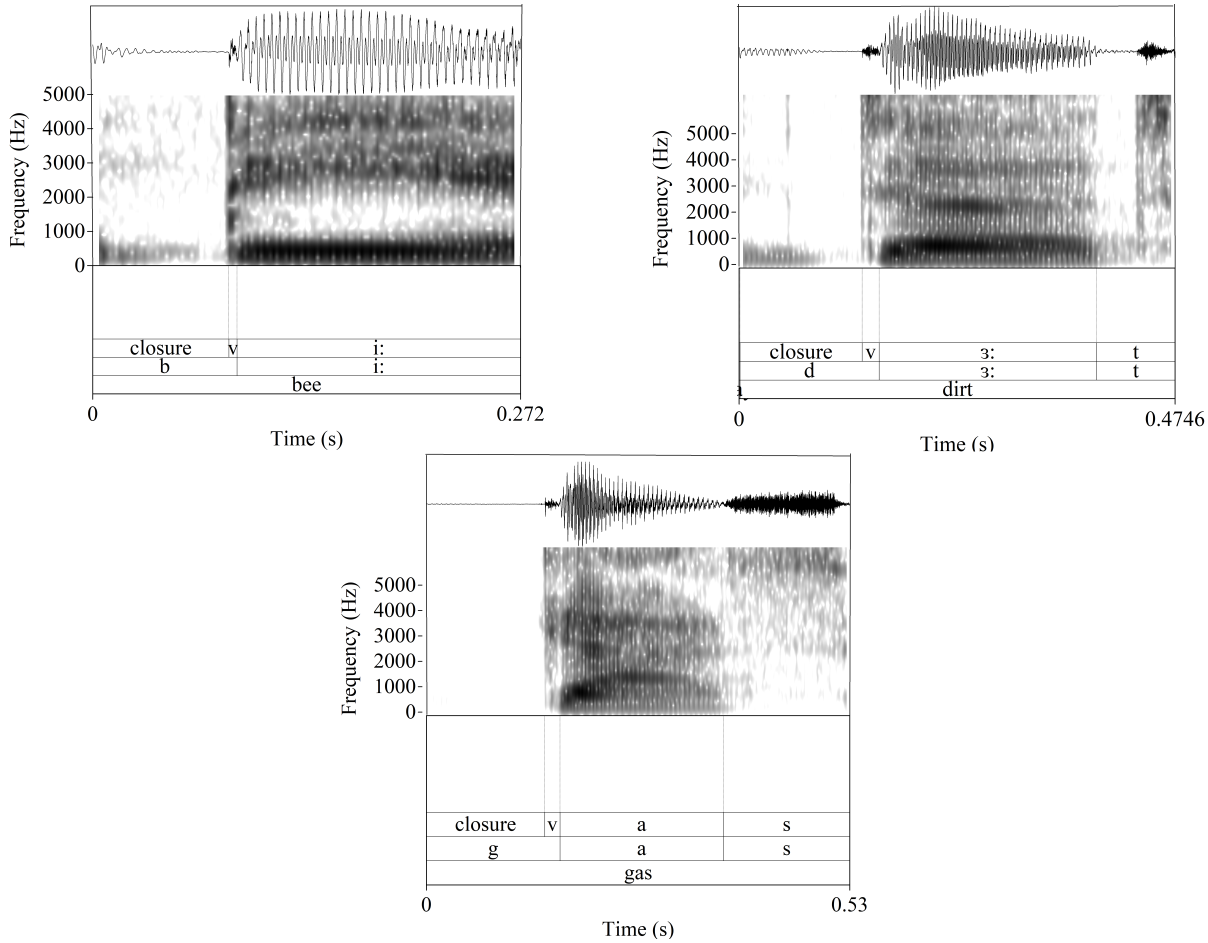

Figure 6.7: Segmentation of positive VOT for voiced stops

After acoustic analysis was complete, a praat script, based on Stuart-Smith et al. (2015b), was edited and used to extract positive VOT durations (ms), word durations (ms) as well as labels for the stops, following vowels and words from the analysed data (See Appendix F). The extracted data was saved as a csv. file. To ensure accuracy of the extracted measures, random tokens from the data were checked manually.

As for coding, target words were labelled as produced by participants (See Figure 6.5). In addition to coding for stop voicing (i.e., voiced/ voiceless) and place of articulation of the stops (i.e., labial/coronal/dorsal), adjacent vowel height (i.e., high/ non-high) and the presence of a pause before saying the target word in the carrier phrase were coded (i.e., some speakers paused before producing the target word). Primarily, the extracted data consisted of different ranges of vowel qualities (See Appendix E). However, following the exisiting literature on VOT (Docherty, 1992; Klatt, 1975), following vowels were categorised as high/non-high vowels to examine the effect of following vowel quality on VOT durations. Table 6.8 provides a summary of following vowels' classification and their counts whereas Table 6.9 provides a summary of token counts for the key linguistic factors, namely stop voicing, place of articulation and following vowel height.

Classification	**Following vowel**	**No. Tokens**	Sample %
High vowel	iː, ɪ, e , eɪ, ʊ, u, uː, o, oː, oʊ, oɪ	1442	25%
Non- high vowel	ɜ, ɜː, ʌ, əʊ, æ, a, aː, aɪ, aʊ, aɪ ɒ, ɔ, ɔː	4250	75%

Table 6.8: Classification and counts of the following vowels

Stop voicing	POA	Following vowel height: High vowel	Following vowel height: Non- high vowel
Voiced stops	Labial	421	714
	Coronal	175	667
	Dorsal	163	516
Voiceless stops	Labial	267	925
	Coronal	244	772
	Dorsal	172	656

Table 6.9: Summary of token counts for stop voicing, place of articulation and following vowel height

Tables 6.8 and 6.9 show an overall higher percentage of non-high vowel context than high vowel context. Such difference exists as a result of the original design of the word list, which was to capture a number of different features.

6.4.3 Data Preparation and Statistical Analysis

Extracted measures were prepared and statistically analysed using R (R Core Team, 2021). Prior to statistical analysis, initial summary data was obtained and visualised, to gain a general understanding of positive VOT production and check data distribution. Based on the initial distributions of the VOTms, a decision was made to remove tokens with VOT durations exceeding 100 ms in voiced stops and 150 ms in voiceless stops. These tokens were considered extreme outliers, as they have very large values in comparison to previous accounts of English VOT and thus may negatively impact the statistical results (Winter, 2020, p.91).

Furthermore, visualisation of raw VOT values after removing outliers showed a positively skewed distribution, specially in the voiced stops' data. Having this shape of distribution in the data may negatively impact the model results, as one of the main assumptions in the regression modelling is normal distribution (Field et al., 2012; Winter, 2020, p.91). Consequently, the VOT data was log transformed using R default log function *log ( )*. Raw VOT values of the model results were obtained, when required, by back-transforming log VOT values using *exp( )* function.

The effect of speech rate on VOT was not measured directly. However, word duration and word were included in the models as fixed and random factors, respectively, to partially account for the differences in speech rate across both speakers and sentences. Similar to VOT, word duration was scaled using log function to facilitate interpretation of the model results and follow previous relevant phonetic research (e.g., Stuart-Smith et al., 2015b; Winter, 2020, p.94).

As for the statistical testing, linear mixed-effects models (LMER) were performed using the 'lme4' (Bates et al., 2015) and 'lmerTest' (Kuznetsova et al., 2017) R packages. An essential first step was to examine voicing contrast in VOT as well as the effects of both linguistic and social factors on VOT across voicing categories. For macro-social factors alone (i.e., migration experience, dialect, gender), it was impossible to look at the relationship between these factors and stopvoicing without adding a 4-way interaction to the model (i.e., stopvoicing: migrationExperience:dialect:gender), which was avoided as recommended in Sonderegger (2023, p.108) and Field et al. (2012, p.640). Thus, mixed-effects models were further performed to voiced and voiceless stop data separately, to look at the relationship between social factors within each category. Consequently, the following three analyses were conducted on log (VOT) as a dependant variable:

- Overall Stop Analysis: Analysis of log (VOT) in voiced and voiceless stops.
- Voiced Stop Analysis: Analysis of log (VOT) in voiced stops.
- Voiceless Stop Analysis: Analysis of log (VOT) in voiceless stops.

Additionally, for each analysis, interactions between the fixed factors (i.e. linguistic and social factors; macro and micro) were assessed and included in the final models based on the following three-stages procedure:

1. Running an initial model (**macro-social model**) which contains linguistic and macro-social factors, as well as all possible interactions between them (e.g., *Stopvoicing+ migrationExperience+ Dialect+Stopvoicing:migrationExperience+ Stopvoicing: Dialect*).

2. Running an initial model (**micro-social model**) which contains linguistic and micro-social factors, as well as all possible interactions between them (e.g., *Stopvoicing+ English_use+ ethnic_identity+ Stopvoicing:English_use +Stopvoicing:ethnic_identity*).

3. Building a final model (**Final model**) which contains linguistic factors, only those social factors (macro and micro), and their interactions, which were significant in the previous two models (i.e., **macro-social model** and **micro-social model**). Higher-level interactions between them were also included, if possible (e.g., *Stop_voicing: Dialect: English_use*).

The main reason behind following the above procedure was to ensure reliability of the results and avoid the negative effect of including large number of fixed factors on the model statistical power. The final model was then compared to initial models (i.e. **macro-social model** and **micro-social model**) using *anova ()* function to ascertain the fit of the final model. Note that initial models are compared to the final model separately as **macro-social model** and **micro-social model** are not nested within each other and therefore can not be compared (Winter, 2020, p.264). Models' comparison output is provided in Tables 6.10 and 6.11.

	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
Macro-social model	6318.39	6460.98	-3137.196	6274.39			
Final model	6017.98	6432.78	-2944.99	5889.98	384.42	42	2.2e-16***

Table 6.10: Comparison of **Macro-social model** and **Final model**

	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
Micro-social model	6661.51	6797.62	-3309.75	6619.51			
Final model	6017.98	6432.78	-2944.99	5889.98	729.533	43	2.2e-16***

Table 6.11: Comparison of **Micro-social model** and **Final model**

As shown in Tables 6.10 and 6.11, the likelihood ratio test of **Final model** against **Macro-social model** revealed a highly significant difference between the models (χ^2= (42)=384.42, p<0.0001), indicating that adding micro-social factors (i.e. variables elicited from the social questionnaire) improved the fit of the model. Similarly, **Final model** was significantly different from **Micro-social model** (χ^2= (43)=729.53, p<0.0001), confirming that including linguistic, macro- and micro-social factors provide a better explanation for variation in VOT in the present analysis. Examples of the macro-, micro- and final models are provided in Appendix G.

For the final model, *step ()* function was used to discover the final best-fit model. As mentioned earlier (See Chapter 4), it was ensured that no collinearity existed between fixed factors by using variance inflation factors (VIF), which was below 1.5 for all variables. The VOT analysis and results reported here only describe the final models determined after conducting the above-described procedure.

Overall Stop Analysis: Analysis of log (VOT) in Voiced and Voiceless Stops

The motive behind analysing log (VOT) across both voiced and voiceless stops is to compare positive VOT durations across the two voicing categories. This was deemed important as English stops are different in number and nature from Arabic stops (See Section 6.2). Thus, statistical comparison of positive VOT in voiced and voiceless stops addresses the first question in the present analysis by providing an overall picture on stop voicing contrast in Iraqi English as well as the significant factors affecting VOT across both voicing categories.

Speaker and word were added as random factors to the model (word: 168 levels; speaker: 44 levels). Following the three-stage process outlined above, all linguistic, macro- and micro-social factors, listed in Table 6.12, were added as fixed factors. Moreover, interactions between these variables, selected by the above-mentioned procedure, were also included in the model. Interactions between stop voicing, place of articulation and micro-social factors were excluded from this analysis to limit overcomplexity of model results.

Fixed factors	**Levels**
Stop voicing	Voiced Voiceless
Log (word_duration)	Log duration of word (Continuous)
Place_of_articulation	Labial Coronal Dorsal
Following_vowel	High Non-high
Gender	Male Female
Dialect	London Glasgow
Migration Experience	Professionals Refugees
Density of social networks	Centered values (-2, -1, 0, 1) of density score: (**-2** = Less dense social network, **1** = more dense social network)
Ethnic_identity	Centered values (-2, -1, 0, 1) of participants ethnic identity score: (**-2** = weak ethnic identity, **1** = strong ethnic identity)
National_identity	Centered values (-2, -1, 0, 1) of participants national identity score: (**-2** = weak national identity, **1** = strong national identity)
English_use	Centered values (-2, -1, 0, 1, 2) of participants frequency of English use score: (**-2** = infrequent English use, **2** = frequent English use)
Iraqi_contact	Centered values (-2, -1, 0, 1, 2) of participants Iraqi contact score: (**-2** = less contact with Iraqis, **2** = more contact with Iraqis)
Muslim_contact	Centered values (-2, -1, 0, 1, 2) of participants Muslim contact score: (**-2** = less contact with Muslim non-Arab speakers, **2** = more contact with Muslim non- Arab speakers)

Table 6.12: Fixed factors and description of their levels in the final model of the overall stop analysis before running ‘step‘ function

Voiced Stop Analysis: Analysis of log (VOT) in Voiced Stops

In line with previous VOT analyses (e.g., Alanazi, 2018; Stuart-Smith et al., 2015b), two separate models were fitted for voiced and voiceless stops. This is also done to include all possible interactions, which were impossible to look at in the overall stop analysis (e.g., migrationExperience:Dialect:Gender). Table 6.13 shows the main fixed factors added to the final model before running 'step' function. Note that log (word duration), density, ethnic identity and muslim contact were not included in the final model as they were not significant in the initial models **Macro-social model** and **Micro-social model** . By-word (76 levels) and by-speaker (44 levels) random effects were included in the models.

Fixed factors	**Levels**
Place_of_articulation	Labial Coronal Dorsal
Following_vowel	High Non-high
Gender	Male Female
Dialect	London Glasgow
Migration Experience	Professionals Refugees
National_identity	Centered values (-2, -1, 0, 1) of participants national identity score: (**-2** = weak national identity, **1** = strong national identity)
English_use	Centered values (-2, -1, 0, 1, 2) of participants frequency of English use score: (**-2** = infrequent English use, **2** = frequent English use)
Iraqi_contact	Centered values (-2, -1, 0, 1, 2) of participants Iraqi contact score: (**-2** = less contact with Iraqis, **2** = more contact with Iraqis)

Table 6.13: Fixed factors and description of their levels in the final model of Voiced Stop Analysis before running 'step' function

Voiceless Stop Analysis: Analysis of log (VOT) in Voiceless Stops

As with previous analyses, voiceless stop final model included only fixed factors which were significant in the initial models **Macro-social model** and **Micro-social model** (See Table 6.14), as well as possible interactions between them. Random effects in the model were word (93 levels) and speaker (44 levels). Because the initial models did not show significant effects of ethnic identity and national identity, these two variables were not included in the final model.

Fixed factors	**Levels**
Log (word_duration)	Log duration of word (Continuous)
Place_of_articulation	Labial Coronal Dorsal
Following_vowel	High Non-high
Gender	Male Female
Dialect	London Glasgow
Migration Experience	Professionals Refugees
Density of social networks	Centered values (-2, -1, 0, 1) of density score: (**-2** = Less dense social network, **1** = more dense social network)
English_use	Centered values (-2, -1, 0, 1, 2) of participants frequency of English use score: (**-2** = infrequent English use, **2** = frequent English use)
Iraqi_contact	Centered values (-2, -1, 0, 1, 2) of participants Iraqi contact score: (**-2** = less contact with Iraqis, **2** = more contact with Iraqis)
Muslim_contact	Centered values (-2, -1, 0, 1, 2) of participants Muslim contact score: (**-2** = less contact with Muslim non-Arab speakers, **2** = more contact with Muslim non- Arab speakers)

Table 6.14: Fixed factors and description of their levels in the final model of Voiceless Stop Analysis before running ‘step‘ function

6.5 Results: English Voice Onset Time (VOT)

The following sections present the results of word-initial English positive VOT as produced by Iraqi-Arab speakers. Section 6.5.1 presents the general descriptive results of English VOT according to the main linguistic and macro-social factors of interest (i.e. stopvoicing, place of articulation, gender, dialect and migration experience), with reference to relevant findings on English and Arabic VOT, where appropriate. Then the statistical results of the linear mixed-effect models fitted to VOT across stop voicing categories, VOT in voiced stops and VOT in voiceless stops are described in Sections 6.5.2, 6.5.3 and 6.5.4, respectively.

6.5.1 Overall Results

Observation of mean VOT across voiced and voiceless stops shows a clear distinction between the two voicing categories. Summary statistics show that VOT in voiced stops is considerably shorter (mean = 18.7, sd = 13.1) than VOT in voiceless stops (mean = 42.8, sd = 27.2), indicating the existence of voicing contrast in the data. Such distinction is confirmed when plotting VOT distribution of raw data and log (VOT) across voiced and voiceless stops (See Figure 6.8).

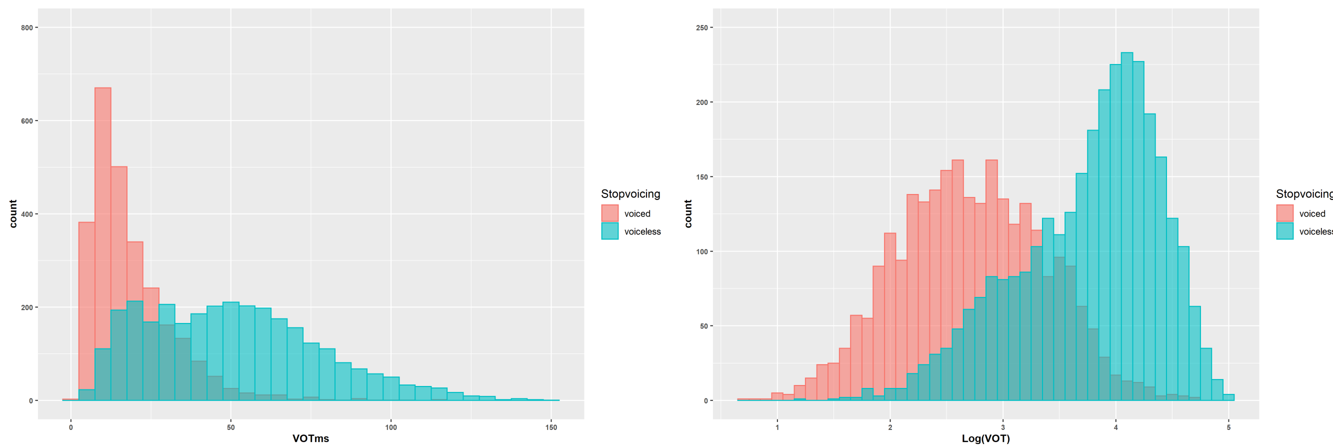

Figure 6.8: Histogram of VOTms (left) and log (VOT) (right) for voiced (n= 2656) and voiceless (n= 3036) stops

Figures 6.9 presents log (VOT) in relation to place of articulation as well as place of articulation and stop voicing.

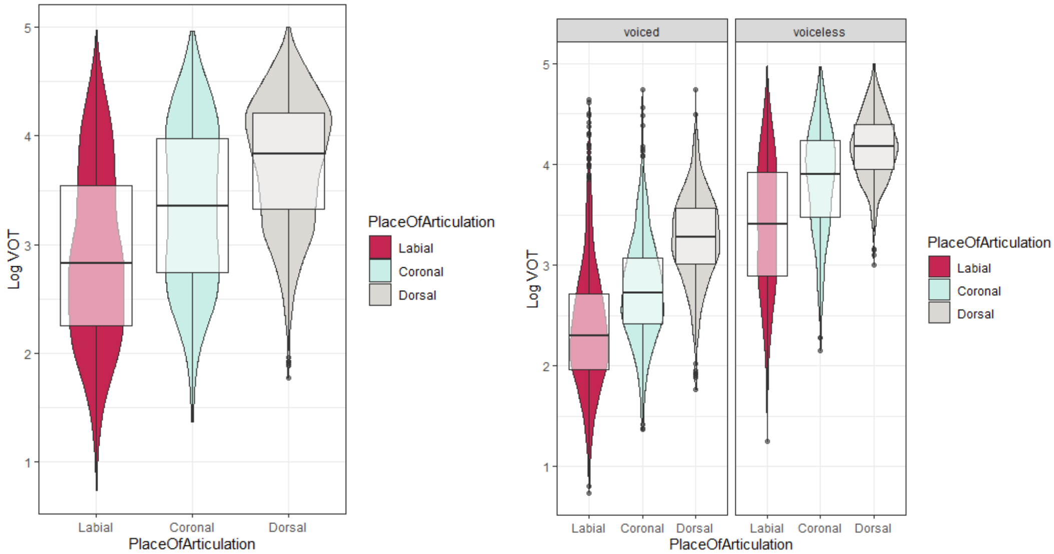

Figure 6.9: Log (VOT) of word-initial stops by place of articulation (left) as well as place of articulation and stop voicing (right)

As shown in Figure 6.9, Iraqis' production of English stops shows a robust difference in mean VOT according to place of articulation, with labial stops having the lowest mean VOT values, followed by coronals, and then dorsals. Such difference in VOT mean values according to place of articulation is predicted by previous work on English stops, suggesting that VOT increases as the stop is articulated further back in the oral cavity (e.g., Cho and Ladefoged, 1999; Lisker and Abramson, 1967). The effect of place of articulation on VOT is also observed when further considering stop voicing, with a gradual increase in mean VOT values from labial to dorsal stops in the production of both voiced and voiceless stops. The pattern observed in the production of coronal and dorsal voiceless stops is in contrast to both Docherty (1992) and Stuart-Smith et al. (2015b) studies on SSBE and Glaswegian stops, in which they reported similar mean VOT values in the production of /t/ and /k/.

Figure 6.10 shows log (VOT) according to the following vowel height while Figure 6.11 illustrates log (VOT) in voiced and voiceless stops according to word duration.

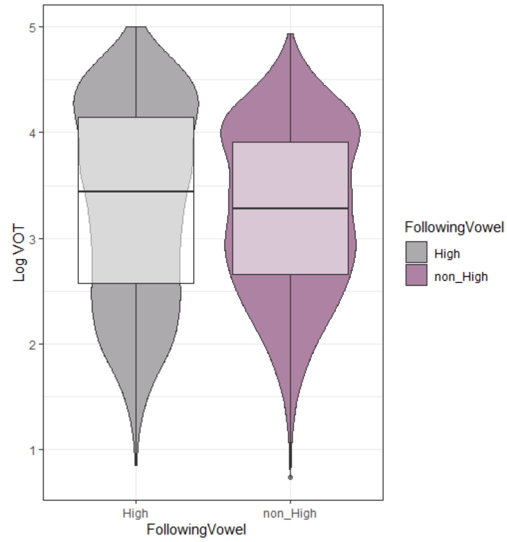

Figure 6.10: Log (VOT) by following vowel height

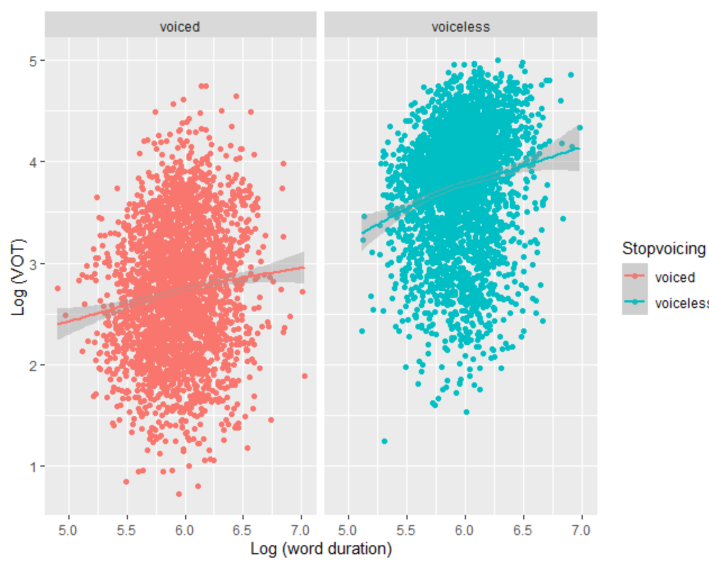

Figure 6.11: Scatterplot of log (VOT) and log (word duration) for voiced and voiceless stops

As expected, a clear, yet small, difference in VOT according to following vowel height is observed (See Figure 6.10), with VOT being longer before high than non-high vowels. This difference is supported by summary statistics in which mean VOT values before high vowels is 41*ms* (n= 1442, sd= 32) and 34*ms* before non-high vowels (n= 4250, sd= 25). Although the observed difference according to vowel context is quite small (i.e. less than 10 ms) , it is in line with a number of previous studies on English VOT (e.g., Docherty, 1992; Klatt, 1975; Stuart-Smith et al., 2015b).

With regard to word duration, a positive correlation between log word duration and log VOT is observed across both voiced and voiceless stops (See Figure 6.11), with longer VOT in longer words. However, the positive correlation is stronger in voiceless than voiced stops, a pattern which aligns with previous studies on English VOT that reported a significant effect of speech rate on voiceless stops (e.g., Kessinger and Blumstein, 1997; Miller et al., 1986; Summerfield, 1975).

To observe VOT patterns across macro-social factors in the present analysis, log (VOT) values are visualised according to gender, dialect and migration experience in Figures 6.12 and 6.13.

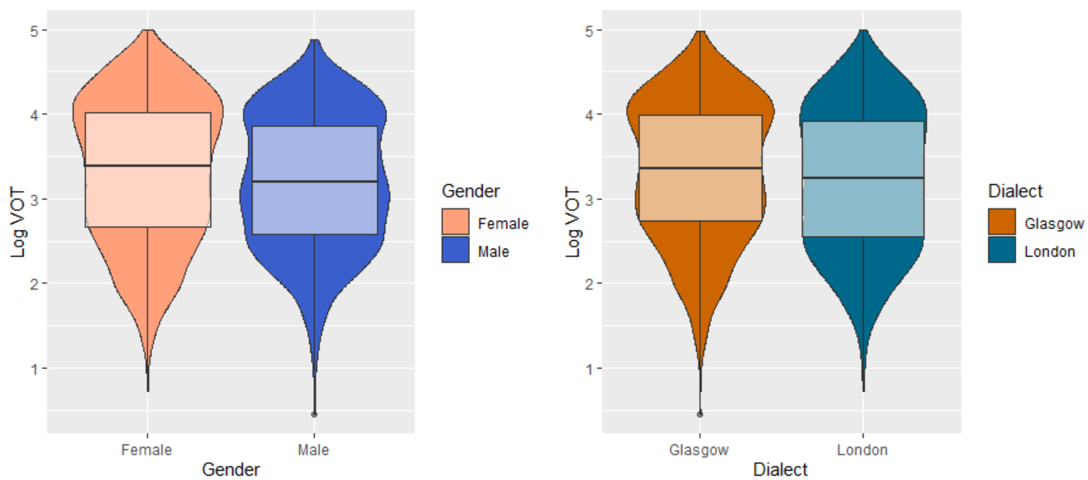

Figure 6.12: Log (VOT) by gender (Left) and by dialect (Right)

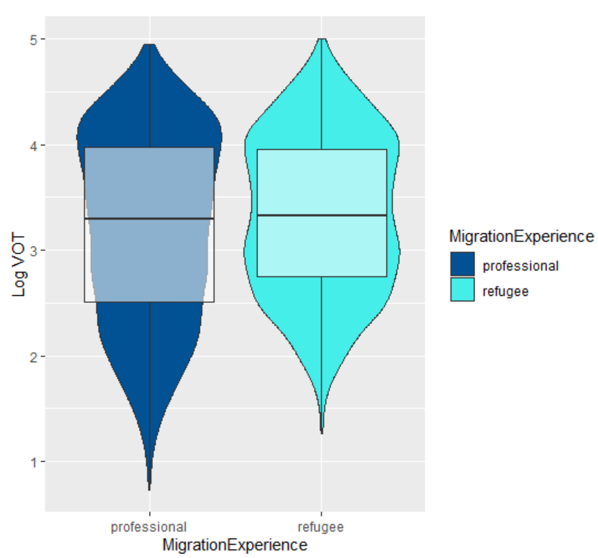

Figure 6.13: Log (VOT) by migration experience

Compared to linguistic factors, social factors seem to show smaller overall effect on VOT

(See Figures 6.12 and 6.13). As for gender, female speakers produced a slightly longer VOT than male speakers (mean VOT for male = 32ms, sd= 24; female = 38ms, SD= 29). Such gender difference has been reported in a number of previous studies on English VOT (e.g., Ryalls et al., 1997; Swartz, 1992; Whiteside, 1996; Whiteside and Irving, 1997, 1998).

As shown in Figure 6.12, visualisation of VOT according to speakers' dialect area also shows small differences, with Glasgow speakers generally producing longer VOT than London speakers (mean VOT for London speaker =34ms, sd= 27.04; Glasgow speakers = 37ms, sd= 27.1). The observed difference is very small, and may hide dialect differences in interaction with other factors, but initial expectation was to see longer VOT by London than Glasgow Iraqi speakers, as previous descriptions of Scottish and British English VOT generally suggested shorter VOT durations in Scottish than British English stops (See Section 6.2.2).

As for migration experience, visualisation of VOT produced by refugee and professional Iraqis shows almost no difference according to speakers' migration profile (See Figure 6.13), with professional Iraqis showing mean VOT value of 35.2ms (n= 2898; sd= 27.58) and refugee Iraqi speakers having mean VOT value of 36.4ms (n= 2794; sd= 26.43).

Overall, the general presentation of VOT values according to linguistic and macro-social factors shows a clearer effect of the former than the latter on VOT. Iraqi-English VOT is clearly different according to stop voicing and place of articulation. Small, but expected, differences in VOT according to the following vowel height and word duration are also observed in the data. While VOT also seems to vary according to gender and dialect, these differences are quite small. By contrast, no clear difference according to migration experience is observed. These observations are preliminary as they are based only on visual illustrations and descriptive statistics. Nevertheless, they are necessary as they provide a general outlook on the results and contribute to our understanding of VOT production patterns by Iraqi speakers in relation to linguistic and macro-social factors of interest. The following sections build on these preliminary observations by providing detailed statistical evidence, wherever possible.

6.5.2 Overall Stop Analysis: Results of VOT across Voiced and Voiceless Stops

As stated in Section 6.4.3, mixed-effects modelling was fitted to log (VOT) of voiced and voiceless stops to ascertain the stop voicing contrast and investigate the statistical effects of linguistic and social factors of interest as well as interactions between them on English VOT across both voicing categories. To recap, the selection of the fixed factors and interactions was based on a three-stage procedure (See Section 6.4.3). Then, the best-fit model was identified using 'step' function. The results of the final model, containing linguistic factors, and significant macro- and micro-social factors, is presented in Table 6.15.

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	1.149*** (0.235)
log (Word_duration)	0.278*** (0.034)
FollowingVowelnon_High	−0.266*** (0.051)
Stopvoicingvoiceless	1.482*** (0.068)
PlaceOfArticulationDorsal	0.463*** (0.082)
PlaceOfArticulationLabial	−0.587*** (0.070)
FollowingVowelnon_High: PlaceOfArticulationDorsal	0.139* (0.069)
FollowingVowelnon_High: PlaceOfArticulationLabial	0.161** (0.060)
Stopvoicingvoiceless: PlaceOfArticulationDorsal	−0.229** (0.085)
Stopvoicingvoiceless: PlaceOfArticulationLabial	0.045 (0.076)
Stopvoicingvoiceless: GenderMale	−0.267*** (0.040)
Stopvoicingvoiceless: DialectLondon	−0.172*** (0.034)
Stopvoicingvoiceless: MigrationExperiencerefugee	−0.266*** (0.048)
Stopvoicingvoiceless: density	−0.205*** (0.036)
Stopvoicingvoiceless: ethnic_identity	−0.110*** (0.026)
Stopvoicingvoiceless: English_use	0.089*** (0.024)
Stopvoicingvoiceless: Iraqi_contact	0.119*** (0.030)
Stopvoicingvoiceless: Muslim_contact	−0.219*** (0.024)
PlaceOfArticulationDorsal: DialectLondon	0.011 (0.032)
PlaceOfArticulationLabial: DialectLondon	−0.114*** (0.029)
PlaceOfArticulationDorsal: MigrationExperiencerefugee	−0.143** (0.049)
PlaceOfArticulationLabial: MigrationExperiencerefugee	0.225*** (0.043)
Stopvoicingvoiceless: PlaceOfArticulationDorsal: MigrationExperiencerefugee	0.145* (0.065)
Stopvoicingvoiceless: PlaceOfArticulationLabial: MigrationExperiencerefugee	−0.131* (0.058)
Stopvoicingvoiceless: MigrationExperiencerefugee: density	0.233*** (0.039)
Stopvoicingvoiceless: MigrationExperiencerefugee: ethnic_identity	0.068* (0.030)
Stopvoicingvoiceless: MigrationExperiencerefugee: Muslim_contact	0.262*** (0.036)
Observations	4,943
Log Likelihood	−3,147.545
Akaike Inf. Crit.	6,423.091
Bayesian Inf. Crit.	6,839.457
Note:	*p<0.05; **p<0.01; ***p<0.001

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	1.149^{***} (0.235)
Stopvoicingvoiceless: DialectLondon: density	-0.138^{***} (0.035)
Stopvoicingvoiceless: DialectLondon: Iraqi_contact	-0.072^{*} (0.035)
Stopvoicingvoiceless: GenderMale: density	0.109^{*} (0.042)
Stopvoicingvoiceless: GenderMale: Iraqi_contact	0.153^{***} (0.038)
Observations	4,943
Log Likelihood	−3,147.545
Akaike Inf. Crit.	6,423.091
Bayesian Inf. Crit.	6,839.457
Note:	*p<0.05; **p<0.01; ***p<0.001

Table 6.15: Significant effects and interactions on log (VOT) from Overall Stop Analysis

As shown in Table 6.15, English VOT produced by Iraqi-Arab speakers in the present study is affected by all linguistic factors, and both macro- and micro-social factors, but only in interaction with the linguistic factors. The main significant results found in the model output on VOT across voiced and voiceless stops, namely main effects and interactions of **linguistic factors**, **stopvoicing: place of articulation: migration experience** interaction, **stopvoicing: migration experience: ethnic identity** interaction, and **stopvoicing: migration experience: Muslim contact interaction**, are detailed here. Because there is evidence that the other social factors shown in the model are significant in interaction with voicing, these are considered in the voiced and voiceless separate models. Full write up of the model output is provided in Appendix I.

Effects of Linguistic Factors

Highly significant main effects of stop voicing, F (1,136.5) = 1089.3; p < 0.001, place of articulation, F (2,134) = 225.5; p < 0.001, word duration, F (1,4489.2) = 66.9; p < 0.001, and following vowel, F (1,629.8) = 28.03; p < 0.001 are shown. The effects of stop voicing and place of articulation are in the expected direction, with VOT in voiceless stops being significantly longer than voiced stops (i.e., reference level), and VOT in coronal stops (i.e. reference level) being longer than labials and shorter than dorsals.

As for word duration, VOT is significantly positively correlated with word duration, so that words of longer duration (likely reflecting slower speech rate) show longer VOT. This effect of word duration is in line with previous work on English VOT (Kessinger and Blumstein, 1998; Miller et al., 1986), which found a negative correlation between VOT duration and speech rate. While some of these studies reported significant speech rate effect only on voiceless stops (e.g., Miller et al., 1986), the overall model results did not show a significant interaction between stop voicing and word duration. Nevertheless, the separate voiced and voiceless models show that word duration is significant for voiceless but not for voiced stops (See Sections 6.5.3 and 6.5.4).

As shown in Table 6.15, place of articulation is also involved in a significant two-way interaction with following vowel height, F (2,585.1) = 3.91; p= 0.02. This interaction is illustrated in Figure 6.14.

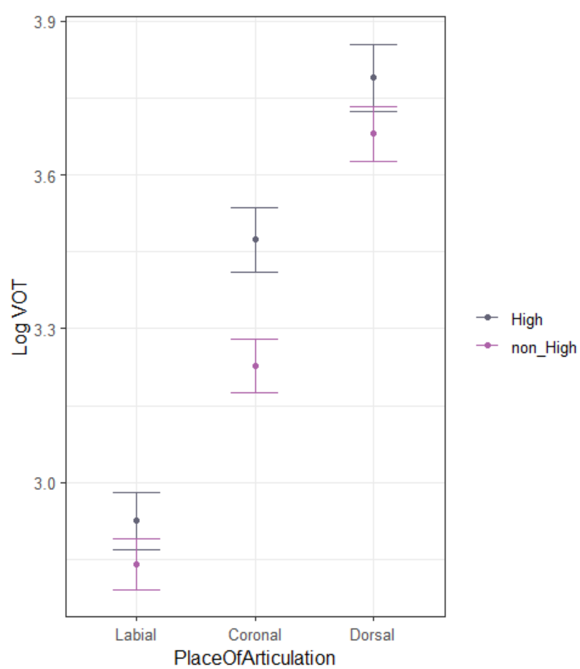

Figure 6.14: Following vowel height and place of articulation interaction from the Overall Stop Analysis. Points and error bars represent the model-estimated mean values of log (VOT) and 95% confidence intervals, respectively

Overall, Figure 6.14 shows a clear effect of place of articulation on log (VOT), with labials being significantly shorter than coronals (i.e. reference level) and coronals being significantly shorter than dorsals. The commonly reported effect of following vowel height on VOT (Chao et al., 2006; Klatt, 1975; Port and Mitleb, 1983) is also observed in the graph, with VOT being generally longer before high (i.e. reference level) than before non-high vowels. However, following vowel effect varied according to place of articulation, with stronger effect of following vowel height on coronals than on labial and dorsal stops. Tukey post-hoc test confirmed visual illustration of the interaction in which a significant difference in VOT according to vowel contexts is shown in the production of coronal stops ($p < 0.001$), but not in the production of labial ($p = 0.244$) and dorsal stops ($p = 0.32$) (See Appendix I for mean VOT values).

The following section now explores the significant interactions of the social factors with the linguistic factors.

Interactions between Linguistic and Social Factors

The model output shows a highly significant interaction of place of articulation and stop voicing (See Table 6.15). The significant interaction is, however, part of highest-order interaction (i.e., *Stopvoicing: PlaceOfArticulation: MigrationExperience*). Figure 6.15 illustrates the significant interaction for stopvoicing, place of articulation and Migration experience F (2,4725.5) =10.04, $p < 0.001$.

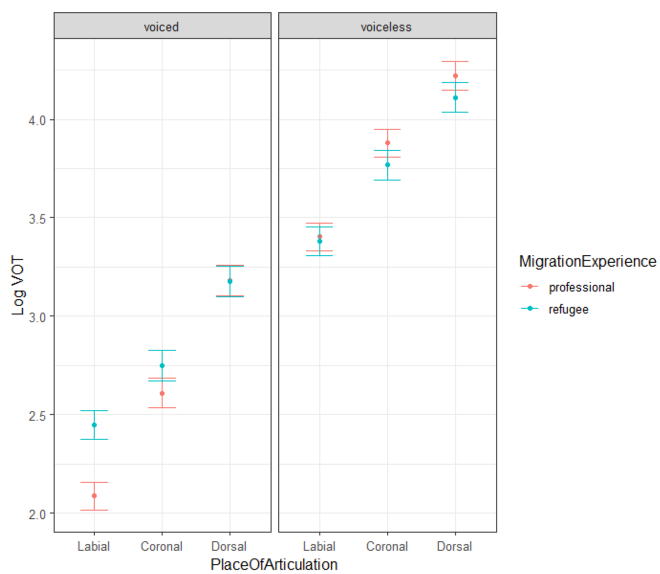

Figure 6.15: Significant interaction of stopvoicing, place of articulation and Migration experience on log VOT from the overall stop analysis. Points and error bars represent the model-estimated mean values of log (VOT) and 95% confidence intervals, respectively

Figure 6.15 shows that both migrant groups produce different VOT according to stop voicing and place of articulation (i.e., shorter voiced than voiceless VOT; labial < coronal < dorsal VOT). However, refugee speakers have a considerably longer voiced labial, and to a lesser extent, coronal VOT than professional speakers. Tukey post-hoc test shows a significant difference between professional and refugee speakers in the production of voiced labial VOT, but no significant difference in the production of coronal and dorsal VOT is shown in the test ($p > 0.5$)

(See Appendix I for mean VOT values).

In addition to the above interaction, migration experience is further involved in significant three-way interactions with stop voicing and two micro factors, namely ethnic_identity and Muslim_contact (See Table 6.15). Observing such significant interactions between macro and micro factors is interesting, as it suggests variation in the production of voiced and voiceless VOT within each migrant group, depending on the reported social behaviour. The significant interactions are presented in Figure 6.16.

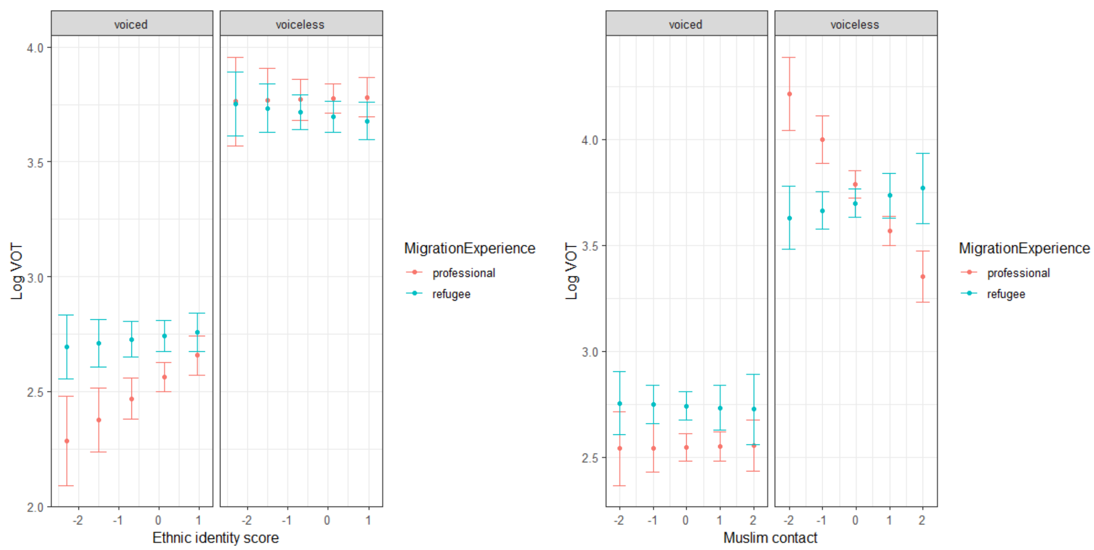

Figure 6.16: The significant interactions of Stopvoicing* MigrationExperience* ethnic_identity (i.e. Score -2 _ weak sense of ethnic identity, Score 2_ strong sense of ethnic identity)(*left*) and Stopvoicing* MigrationExperience*Muslim_contact (i.e. Score -2 _ limited muslim contact, Score 2_ high-level muslim contact) (*right*) from Overall Stop Analysis

It can be seen from Figure 6.16 that, for the significant Stopvoicing: MigrationExperience: ethnic_identity interaction F (1,4705.2) = 4.89; p= 0.02, professional speakers show significantly longer voiced VOT as they report stronger ethnic (Iraqi Arab) identity and vice versa (i.e., **Score -2**: 9.83ms _ **Score 1**:14.26ms). Refugee speakers, on the other hand, do not show a significant correlation between ethnic identity score and their VOT values.

The significant three-way stopvoicing: MigrationExperience: Muslim_contact interaction (F (1,4705.2) = 54.31 ; p < 0.001) shows a significant difference in the professionals' production of voiceless VOT with reference to the degree of Muslim contact, with a considerably shorter voiceless VOT amongst professional speakers who reported more Muslim contact than professionals who reported less Muslim contact (i.e., **Score -2**: 67.68ms_ **Score 2**: 28.58ms). By contrast, no change in voiced VOT values according to Muslim contact score is observed within both migrant groups.

To summarize, the mixed effects model fitted to log (VOT) across voiced and voiceless stops shows the following findings:

- Iraqi English positive VOT is affected by word duration, stop voicing, place of articulation and vowel height, as expected.
- VOT is influenced by frequent use of English, differently according to stop voicing (See Appendix I, Figure I.2).
- VOT is affected by stop voicing in conjunction with macro-social factors, namely migration experience, dialect, and gender, but always in connection with the micro-social factors: density, ethnic identity, muslim contact, Iraqi contact (See Appendix I).

From the large number of interactions with stop voicing, it is clear that voiced and voiceless VOT are affected differently. For this reason, and with the aim of consistency with previous research on VOT (Alanazi, 2018; Chodroff and Wilson, 2017; Stuart-Smith et al., 2015b), separate statistical analyses were further performed for voiced and voiceless stops' VOT (See Section 6.4.3). This is also done to include all possible interactions which were not included in the first analysis (i.e., Overall stop analysis) and facilitate a better understanding of VOT variation produced by Iraqi Arab speakers. What follows is a presentation of the VOT results of the models fitted to each voicing category.

6.5.3 Voiced Stop Analysis: Results of the Voiced VOT

The significant fixed factors and interactions on voiced VOT are shown in Table 6.16. As with the previous analysis, results of the voiced VOT model show a significant effects of the random factors of speaker and word.

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	2.782*** (0.048)
PlaceOfArticulationDorsal	0.049* (0.023)
PlaceOfArticulationLabial	−0.67*** (0.024)
FollowingVowelnon_High	−0.13*** (0.014)
GenderMale	0.056 (0.046)
DialectLondon	0.043 (0.047)
MigrationExperiencerefugee	0.122* (0.045)
English_use	−0.001 (0.060)
Iraqi_contact	−0.011 (0.046)
PlaceOfArticulationDorsal: GenderMale	0.014 (0.016)
PlaceOfArticulationLabial: GenderMale	0.031* (0.017)
PlaceOfArticulationDorsal: DialectLondon	0.058*** (0.016)
PlaceOfArticulationLabial: DialectLondon	−0.081*** (0.017)
PlaceOfArticulationDorsal: MigrationExperiencerefugee	−0.030* (0.015)
PlaceOfArticulationLabial: MigrationExperiencerefugee	0.104*** (0.016)
PlaceOfArticulationDorsal: English_use	0.112*** (0.021)
PlaceOfArticulationLabial: English_use	−0.050** (0.022)
PlaceOfArticulationDorsal: Iraqi_contact	0.028* (0.016)
PlaceOfArticulationLabial: Iraqi_contact	0.008 (0.016)
GenderMale: MigrationExperiencerefugee	−0.047 (0.046)
GenderMale: English_use	0.037 (0.051)
GenderMale: Iraqi_contact	−0.052 (0.052)
DialectLondon: MigrationExperiencerefugee	0.068 (0.044)
DialectLondon: English_use	−0.038 (0.045)
MigrationExperiencerefugee: English_use	0.097* (0.051)
MigrationExperiencerefugee: Iraqi_contact	−0.009 (0.047)
Observations	2,370
Log Likelihood	−1,546.783
Akaike Inf. Crit.	3,185.567
Bayesian Inf. Crit.	3,451.016
Note:	*p<0.05; **p<0.01; ***p<0.001

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	2.782^{***} (0.048)
PlaceOfArticulationDorsal: GenderMale: MigrationExperiencerefugee	0.044^{**} (0.016)
PlaceOfArticulationLabial: GenderMale: MigrationExperiencerefugee	-0.041^{*} (0.017)
PlaceOfArticulationDorsal: DialectLondon: MigrationExperiencerefugee	0.015 (0.015)
PlaceOfArticulationLabial: DialectLondon: MigrationExperiencerefugee	-0.35^{***} (0.016)
PlaceOfArticulationDorsal: MigrationExperiencerefugee: English_use	0.034^{*} (0.018)
PlaceOfArticulationLabial: MigrationExperiencerefugee: English_use	0.060^{***} (0.019)
PlaceOfArticulationDorsal: MigrationExperiencerefugee: Iraqi_contact	0.067^{***} (0.016)
PlaceOfArticulationLabial: MigrationExperiencerefugee: Iraqi_contact	-0.031^{**} (0.017)
PlaceOfArticulationDorsal: GenderMale: English_use	0.038^{*} (0.017)
PlaceOfArticulationLabial: GenderMale: English_use	-0.005 (0.018)
PlaceOfArticulationDorsal: GenderMale: Iraqi_contact	0.097^{***} (0.018)
PlaceOfArticulationLabial: GenderMale: Iraqi_contact	-0.027^{*} (0.019)
Observations	2,370
Log Likelihood	−1,546.783
Akaike Inf. Crit.	3,185.567
Bayesian Inf. Crit.	3,451.016
Note:	*p<0.05; **p<0.01; ***p<0.001

Table 6.16: Mixed-effects model output showing significant effects and interactions on log (VOT) from Voiced Stop Analysis

As Table 6.16 shows, the model output reveals significant main effects of the linguistic factors, namely place of articulation and following vowel height. Place of articulation shows a highly significant effect on voiced VOT, with labial and dorsal VOT being significantly different from that of the reference level (i.e. coronal stop), F (2,76.37) = 276.03; p < 0.001. Since place of articulation is involved in highest-order interactions, its effect will be explored when occurring in interactions with other factors.

Following vowel height shows a main effect on voiced VOT, F (1,131.34) = 22.24; p < 0.001. Figure 6.17 shows the expected effect of following vowel height on voiced VOT, whereby VOT is considerably longer when followed by high (reference level) than non-high vowels.

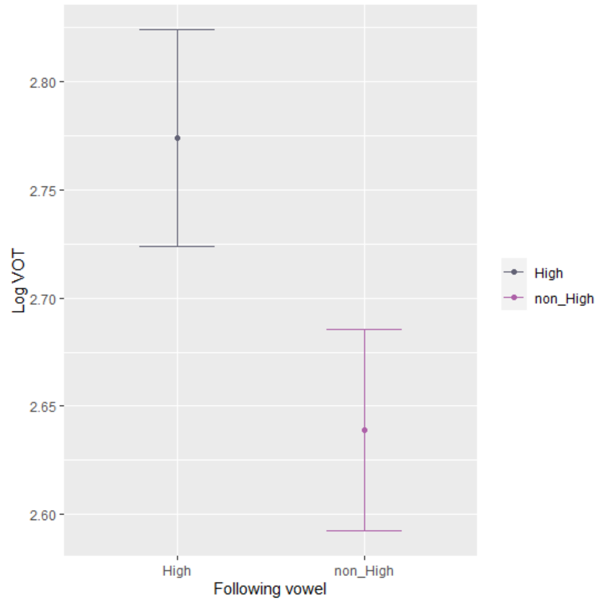

Figure 6.17: The significant effect of following vowel on log (VOT) from the Voiced Stop Analysis. Points and error bars represent the model-estimated mean values of log (VOT) and 95% confidence intervals, respectively

Although word duration was significant for all stops, it was not significant for voiced stops produced by Iraqi Arab speakers. Such observation is not surprising as some previous studies reported lack of speech rate effect on English voiced VOT (e.g., Miller et al., 1986).

Among social factors included in the model, only migration experience shows a significant main effect on voiced VOT (F (1,24.97) = 6.02 ; p = 0.02), which is also included in higher-order interactions. Therefore, migration experience is detailed only when occuring in the highest-level interactions.

Interactions between Place of Articulation and Social Factors

The model results (See Table 6.16) show that place of articulation is involved in six three-way significant interactions with social factors. Specifically, there are four significant interactions of place of articulation by migration experience, of which two involve the macro-social factors: gender and dialect, and two involve the micro-social factors: English_use and Iraqi_contact. The final set of three-way interactions involve place of articulation, gender and the micro-social factors: English_use and Iraqi_contact.

Figure 6.18 shows results for the two significant interactions involving place of articulation and migration experience, with gender (*left*) and dialect (*right*).

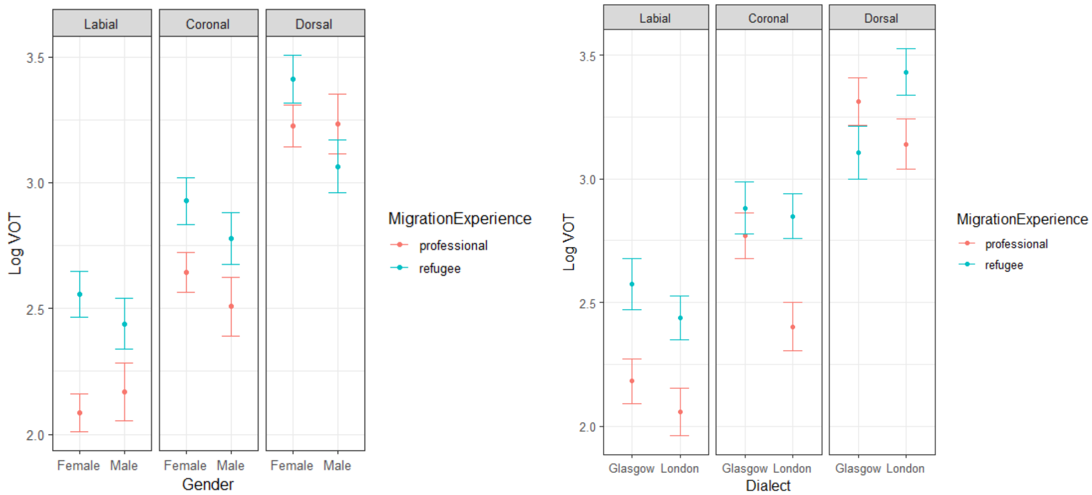

Figure 6.18: Significant interactions of place of articulation*gender*migration experience (*left*) and place of articulation*dialect*migration experience (*right*) on log (VOT) from the Voiced Stop Analysis

For the significant PlaceOfArticulation*Gender*MigrationExperience interaction ($F(2,2238.9)= 4.41$, $p = 0.01$), variation in the production of voiced VOT within and across groups is observed. Specifically, male and female professionals overall show small gender differences in the production of voiced VOT, with both groups producing considerably shorter labial and coronal VOT than their refugee counterparts. By contrast, larger gender differences are observed in the refugees data, with female refugees producing longer voiced VOT durations, especially in /g/, than thier male counterparts (See Figure 6.18 *left*). Tukey post-hoc test shows significant differences within and across groups only when comparing labial VOT produced by female professionals to female refugees ($p < 0.0001$). Although the graph shows additional differences in voiced VOT across other groups, none of these differences were returned as signficant in the corrected Tukey post-hoc tests ($p > 0.1$), showing that graphed differences are trends, and possibly affected by other factors (e.g., individual variation) (See Appendix J for mean VOT values).

Illustration of the significant place of articulation: dialect: migration experience interaction ($F(2,2239.1)= 12.97$, $p < 0.001$) also shows clear differences in VOT values of labial, coronal and dorsal voiced stops across and within London and Glasgow migrant groups. As Figure 6.18 (*right*) shows, refugee speakers overall produce considerably longer VOT durations than professional speakers in both dialect areas. Differences in voiced VOT across Glasgow migrant groups are less apparent in the production of coronal and dorsal stops, but are clearly observed across London professional and refugee speakers (i.e., London professionals produce considerably shorter coronal and dorsal VOT than London refugees). Tukey post-hoc test revealed significant differences in the production of coronal VOT by London and Glasgow refugees on the one hand and London professionals on the other hand ($p < 0.05$). Significant differences in the production of VOT for /b/ between Glasgow refugees and Glasgow/ London professionals were also observed in Tukey post-hoc test (See Appendix J for mean VOT values).

The model output also shows significant three-way interactions of PlaceOfArticulation: MigrationExperience: English_use, ($F(2,2240.12)= 16.32$, $p < 0.001$) and PlaceOfArticulation: MigrationExperience: Iraqi_contact ($F(2,2241.38)= 9.21$, $p < 0.001$), revealing intra-group variation in the production of voiced VOT with reference to English language use as well as contact with Iraqis (See Figure 6.19).

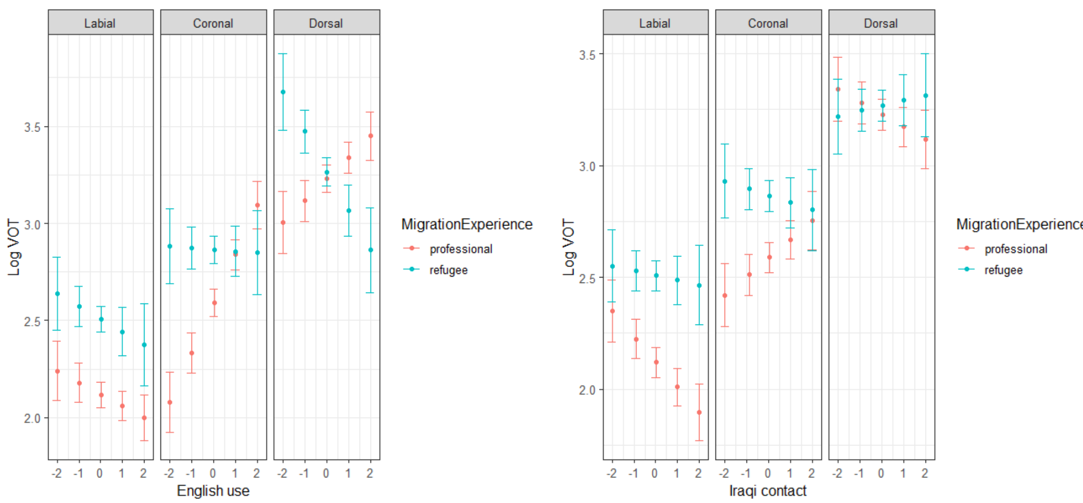

Figure 6.19: Significant interactions of PlaceOfArticulation*MigrationExperience* English_use (*left*) and PlaceOfArticulation*MigrationExperience* Iraqi_contact (*right*) on log (VOT) from Voiced Stop Analysis

Visualisation of the PlaceOfArticulation: MigrationExperience: English_use interaction in Figure 6.19 (*left*) shows that professional speakers produce shorter labial but considerably longer coronal and dorsal VOT as they reported more frequent English use. On the other hand, refugee speakers who reported more frequent English use produce shorter labial and dorsal VOT than their counterparts who reported the opposite.

As for PlaceOfArticulation*MigrationExperience* Iraqi_contact interaction, Figure 6.19 (*right*) shows that professional speakers who reported more Iraqi contact produce shorter labial but longer coronal VOT than the professionals who reported less contact with Iraqis. Smaller differences are observed in the production of dorsal VOT which might be due to large variability in each score. By contrast, refugee speakers do not show variation in VOT with reference to their Iraqi contact score.

Variation in the production of voiced labial, coronal and dorsal VOT within gender groups is further observed when considering speakers' English language use as well as Iraqi contact in the significant interactions of place of articulation*Gender*English_use ($F(2,2238.64)= 3.15$, $p = 0.04$), and place of articulation*Gender*Iraqi_contact ($F(2,2238.47)= 17.74$, $p < 0.001$) (See

Figure 6.20).

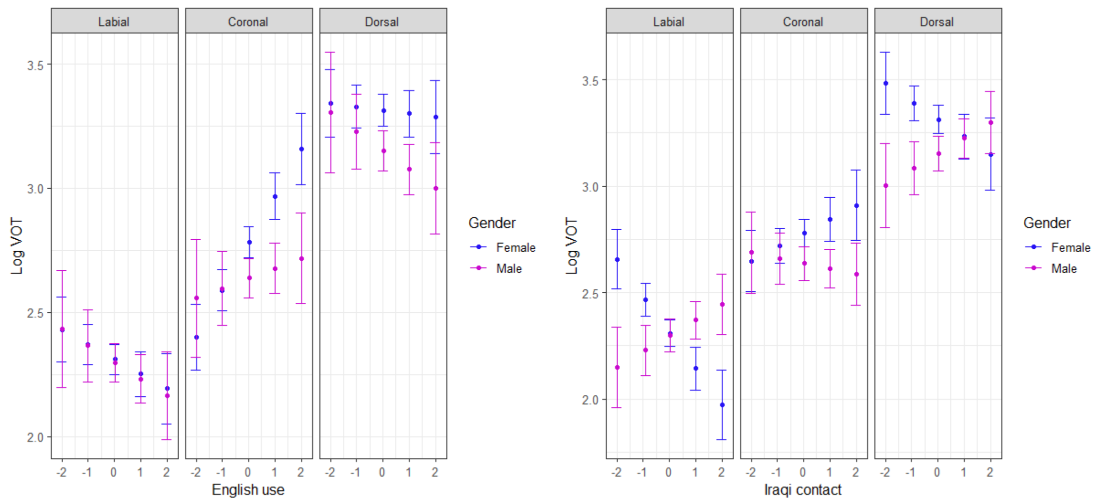

Figure 6.20: Significant interactions of place of articulation*Gender*English_use (*left*) and place of articulation*Gender*Iraqi_contact (*right*) on log (VOT) from the Voiced Stop Analysis

As shown in Figure 6.20 (*left*), variation in voiced VOT within gender groups were observed when considering speakers' frequency of their English language use. Specifically, both male and female speakers show an unexpected effect of English use on their production of voiced labial VOT, with shorter VOT amongst speakers who reported more frequent English use than speakers who reported less frequent English use (**Score -2**: Male = 11.39ms, Female = 11.36ms; **Score 2**: Male = 8.71ms, Female = 8.95ms). However, the opposite pattern is observed in the production of coronal stops, with a considerably longer coronal VOT amongst female, and to a lesser extent, male speakers as they reported more frequent English use and vice versa (**Score -2**: Male = 12.89ms, Female = 11.02ms; **Score 2**: Male = 15.14ms , Female = 23.52ms). The differences in labial and coronal VOT values according to English language use are larger in the females' than males' data, with the latter group showing error-bars' overlap across English use score, probably reflecting individual speaker variation.

Illustration of the significant place of articulation: Gender: Iraqi_contact in Figure 6.20 (*right*) shows that female speakers produce shorter labial and dorsal voiced VOT, but longer coronal voiced VOT as they reported more contact with Iraqis whereas male speakers show the opposite pattern. Specifically, male speakers' labial and dorsal voiced VOT is considerably longer when reporting more Iraqi contact.

To summarize, the following VOT variation in voiced stops in Iraqi English can be determined:

- Voiced VOT is affected by place of articulation and vowel height.

- Voiced VOT is affected by macro-social factors (migration experience, dialect, gender), as well as micro-social factors (English_use, Iraqi_contact), but always in interaction with place of articulation.
- Variation in voiced VOT is observed across groups. Results of macro-social factors are summarised in the following points:

  1. Refugees produce longer labial and coronal voiced VOT than professionals.
  2. Female refugees produce significantly longer /b/ than female professionals.
  3. London professionals produce significantly shorter VOT for /d/ than the other groups.

- Intra-group variation in the production of particular stops according to migration experience and gender is observed when involved in interaction with English use and Iraqi contact. Results for micro-social factors are summarised in the following points:

  1. Both male and female speakers who reported frequent English use show shorter VOT for /b/ than their counterparts who reported less English use.
  2. Refugee speakers who reported frequent English use produce shorter VOT for /g/ than their counterparts who reported less English use. By contrast, professional speakers who reported more English use produce considerably longer VOT for /g/ than professionals who use English less frequently.
  3. Female and professional speakers who reported more frequent English use produce longer VOT for /d/ than their counterparts who reported less frequent English use.
  4. When reporting more contact with Iraqis, female speakers produce shorter labial and dorsal, but longer coronal voiced VOT. This correlation is also observed amongst professional speakers who reported high-level Iraqi contact. Refugee speakers, on the other hand, show insignificant differences in VOT values according to Iraqi contact.
  5. In contrast to female speakers, male speakers who reported high Iraqi contact show longer labial and dorsal voiced VOT than those who reported limited contact with Iraqis.

6.5.4 Voiceless Stop Analysis: Results of the Voiceless VOT

Analysis of the mixed- effects model of voiceless stops showed a set of significant effects and interactions on voiceless VOT. Additionally, significant effects of the random factors: speaker and word were observed. Table 6.17 presents the model output.

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	1.140*** (0.286)
log (Word_duration)	0.498*** (0.044)
PlaceOfArticulationDorsal	0.135 (0.106)
PlaceOfArticulationLabial	−0.666*** (0.095)
FollowingVowelnon_High	−0.176** (0.066)
DialectLondon	−0.208* (0.100)
MigrationExperiencerefugee	0.039 (0.098)
GenderMale	−0.193 · (0.108)
density	−0.253* (0.119)
English_use	0.034 (0.064)
Iraqi_contact	0.128* (0.077)
PlaceOfArticulationDorsal:FollowingVowelnon_High	0.123 (0.094)
PlaceOfArticulationLabial:FollowingVowelnon_High	0.184* (0.085)
PlaceOfArticulationDorsal:GenderMale	0.175*** (0.045)
PlaceOfArticulationLabial:GenderMale	0.088* (0.041)
PlaceOfArticulationDorsal:DialectLondon	0.101* (0.042)
PlaceOfArticulationLabial:DialectLondon	−0.023 (0.038)
PlaceOfArticulationDorsal:MigrationExperiencerefugee	0.004 (0.042)
PlaceOfArticulationLabial:MigrationExperiencerefugee	0.080* (0.038)
PlaceOfArticulationDorsal:density	0.168*** (0.050)
PlaceOfArticulationLabial:density	0.247*** (0.045)
PlaceOfArticulationDorsal:English_use	−0.007 (0.026)
PlaceOfArticulationLabial:English_use	−0.026 (0.024)
PlaceOfArticulationDorsal:Iraqi_contact	−0.113*** (0.032)
PlaceOfArticulationLabial:Iraqi_contact	−0.102*** (0.029)
Observations	2,775
Log Likelihood	−1,487.409
Akaike Inf. Crit.	3,060.818
Bayesian Inf. Crit.	3,315.740
Note:	· $p<0.1$; * $p<0.05$; ** $p<0.01$; *** $p<0.001$

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	1.140^{***} (0.286)
density:GenderMale	$0.234^{\cdot}$ (0.129)
density:DialectLondon	$-0.192^{\cdot}$ (0.108)
density:MigrationExperiencerefugee	0.378^{**} (0.124)
English_use:DialectLondon	$0.213^{\cdot}$ (0.110)
Iraqi_contact:DialectLondon	-0.125 (0.111)
PlaceOfArticulationDorsal:density:MigrationExperiencerefugee	-0.249^{***} (0.052)
PlaceOfArticulationLabial:density:MigrationExperiencerefugee	-0.233^{***} (0.048)
PlaceOfArticulationDorsal:density:DialectLondon	0.101^{*} (0.044)
PlaceOfArticulationLabial:density:DialectLondon	-0.054 (0.041)
PlaceOfArticulationDorsal:density:GenderMale	-0.225^{***} (0.054)
PlaceOfArticulationLabial:density:GenderMale	-0.167^{***} (0.050)
PlaceOfArticulationDorsal:English_use:DialectLondon	-0.203^{***} (0.045)
PlaceOfArticulationLabial:English_use:DialectLondon	-0.013 (0.042)
PlaceOfArticulationDorsal:Iraqi_contact:DialectLondon	0.110^{*} (0.045)
PlaceOfArticulationLabial:Iraqi_contact:DialectLondon	0.042 (0.041)
Observations	2,775
Log Likelihood	−1,487.409
Akaike Inf. Crit.	3,060.818
Bayesian Inf. Crit.	3,315.740
Note:	$^{\cdot}$ p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table 6.17: Mixed-effects model output showing significant effects and interactions on voiceless log (VOT) from Voiceless Stop Analysis

Results of VOT for voiceless stops show a highly significant main effect of word duration F (1,2702.5) = 129.61; p< 0.0001, with longer voiceless VOT in words of longer duration. In other words, as speech rate becomes slower, voiceless stops are produced with longer VOT. Such finding aligns with previous studies on VOT (Kessinger and Blumstein, 1998; Miller et al., 1986), which reported a similar effect of speech rate on voiceless VOT.

Moreover, the model results show highly significant main effects of place of articulation F

(2,76.24) = 68.4; p < 0.0001, and following vowel *F* (1,918.8) = 4.10; p < 0.05, on voiceless VOT. However, both effects are involved in higher-level significant interactions and therefore will be detailed when included in highest-level interactions.

As shown in Table 6.17, place of articulation is involved in a significant two-way interaction with following vowel, as well as five significant three-way interactions with macro- and micro-social factors. These interactions are explored in the following paragraphs.

In the significant interaction of place of articulation and following vowel height *F* (2,912.87) = 2.34, p = 0.09, following vowel effect is modulated by place of articulation. Figure 6.21 shows the expected pattern of VOT by place of articulation, but the following vowel effect is only significant in the production of the voiceless coronal stop, with significantly longer VOT before high than non-high vowels (See Appendix K for mean VOT values).

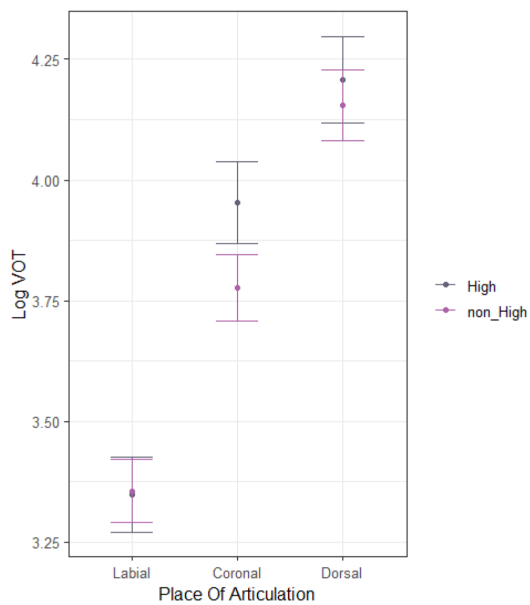

Figure 6.21: The significant interaction of place of articulation and following vowel height on voiceless log (VOT) from the Voiceless Stop Analysis. Points and error bars represent the model-estimated mean values of log (VOT) and 95% confidence intervals, respectively

Interactions between Place of Articulation and Social Factors

As Table 6.17 shows, place of articulation and density are involved in significant three-way interactions with migration experience $F(2,2610.05) = 15.68$, p < 0.0001, dialect $F(2,2608.41) = 6.42$, p = 0.001, and gender $F(2,2610.26) = 9.77$, p < 0.0001. Figure 6.22 illustrates the nature of the three interactions.

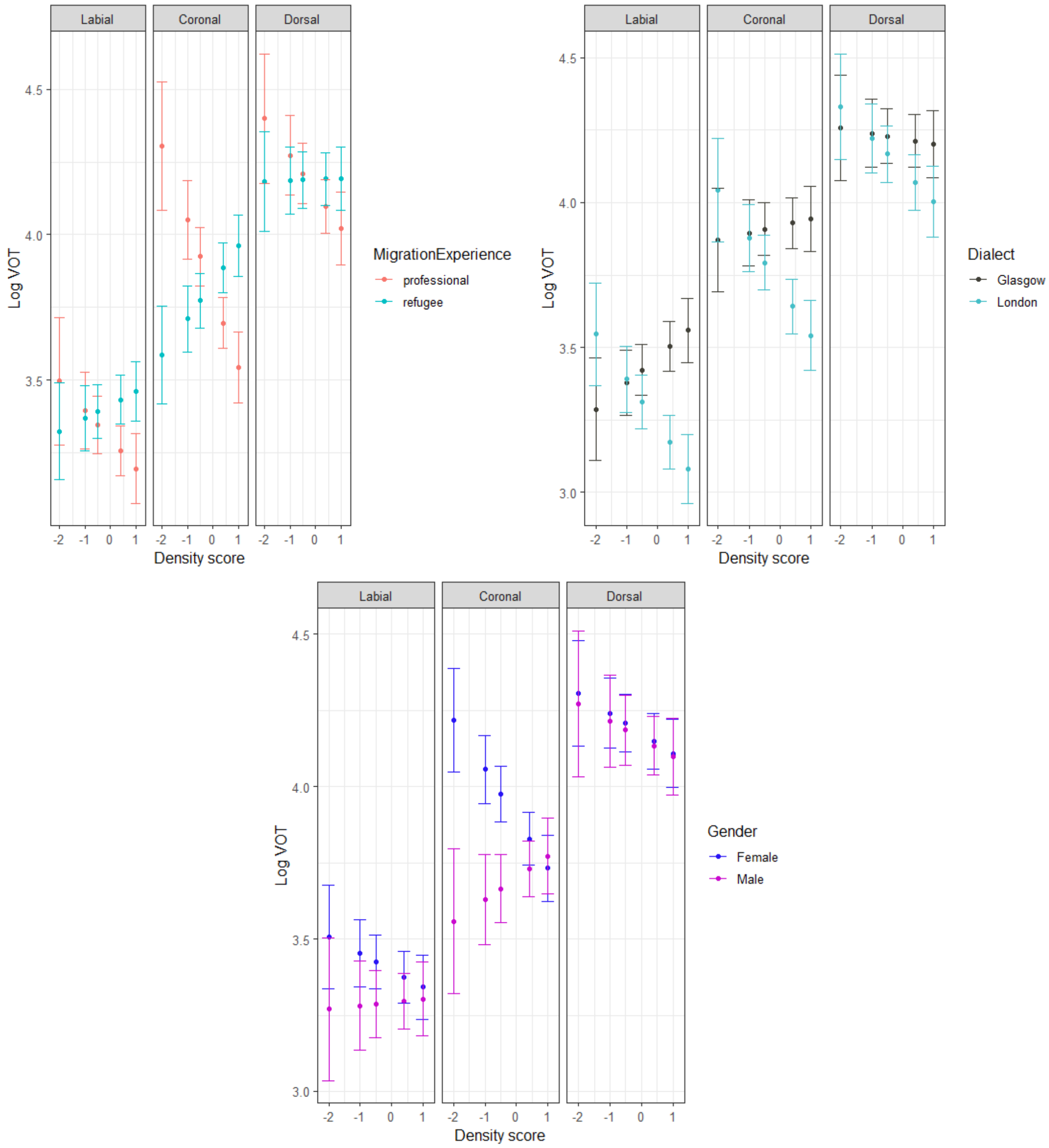

Figure 6.22: The significant effects of PlaceOfArticulation* density* MigrationExperience (*top left*), PlaceOfArticulation* density* Dialect (*top right*), and PlaceOfArticulation* density* Gender (*bottom*) on voiceless log (VOT) from Voiceless Stop Analysis

In Figure 6.22 (*top left*), more variation is observed within than across migrant groups in the production of voiceless VOT according to density score. Density shows a contrasting effect on voiceless VOT produced by professional and refugee speakers. While refugee speakers produce longer labial and coronal voiceless VOT as they reported engagement in dense social network, professional speakers produce significantly shorter voiceless VOT as they reported engagement in dense social network.

Dialect differences in voiceless VOT are also observed in relation to density score. As shown in Figure 6.22 (*top right*), London speakers produce considerably shorter labial and coronal VOT as they reported engagement in dense social network whereas Glasgow speakers show the opposite pattern only in the production of labial VOT (i.e., longer VOT for /p/ when reporting engagement in dense social network and vice versa).

Intra-group differences in the production of voiceless VOT according to density score are further observed in the significant place of articulation: density: Gender interaction (See Figure 6.22 *bottom*). Specifically, a negative correlation between density score and females' production of voiceless VOT is observed, with female speakers producing overall shorter voiceless VOT as they reported engagement in dense social network. The effect of density on females' production is, however, strongly observed in the production of /t/ compared to other voiceless stops. By contrast, male speakers show a smaller effect of density and larger degree of variation in each score, illustrated in the overlapping errorbars. Comparing male and female voiceless VOT production patterns, significant gender difference in the production of /t/ is observed, with female speakers producing longer VOT than their male counterparts. This difference is, however, modulated by density score, as gender differences in coronal VOT become smaller as male and female speakers report engagement in dense social network (See Appendix K for mean VOT).

The last set of the significant three-way interactions in the model output show that VOT values in voiceless stops are affected by place of articulation and dialect, but also use of English and reported Iraqi contact (PlaceOfArticulation* English_use* Dialect $F(2,2613.17) = 12.31$, $p < 0.0001$, and PlaceOfArticulation* Iraqi_contact* Dialect $F(2,2615.10) = 2.99$, $p < 0.05$) (See Figure 6.23).

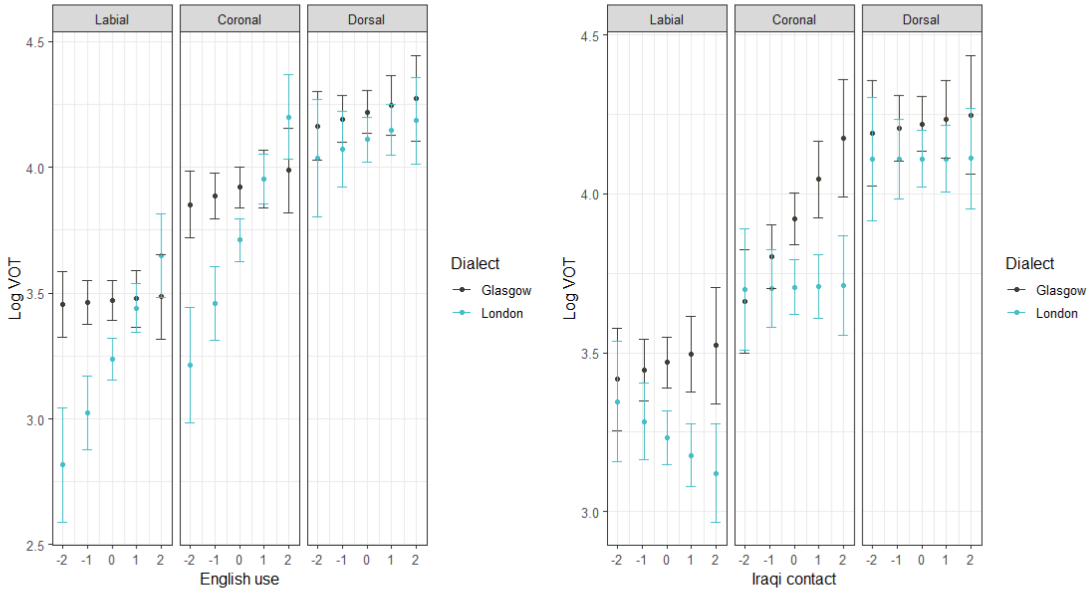

Figure 6.23: The significant interactions of PlaceOfArticulation*English_use*Dialect (*left*) and PlaceOfArticulation*Iraqi_contact*Dialect (*right*) on voiceless log (VOT) from Voiceless Stop Analysis

As illustrated in Figure 6.23 (*left*), London speakers show the expected effect of English language use on their labial and coronal voiceless VOT values, with significantly longer VOT among Iraqi London speakers who reported frequent English use and vice versa (**Score -2**: /p/ = 17ms, /t/ = 25ms; **Score 2**: /p/ = 38ms , /t/ = 67ms). By contrast, Glasgow speakers do not show a strong effect of English language on their VOT values.

Figure 6.23 (*right*) shows a strong positive correlation between Glasgow speakers' production of coronal VOT and Iraqi_contact (**Score -2**: /t/ = 39 ms; **Score 2**: /t/ = 65 ms). London speakers, on the other hand, show a small effect of Iraqi_contact on their production patterns, with slightly shorter labial VOT by speakers who reported more contact with Iraqis (**Score -2**: /p/ = 28 ms; **Score 2**: /p/ = 23 ms).

To summarise, the production of voiceless VOT by Iraqi Arab speakers is affected by the following factors:

- The expected effects of linguistic factors, namely word duration, place of articulation and following vowel height are found in the voiceless VOT model.
- Following vowel effect is modulated by place of articulation, with voiceless coronal VOT showing significantly longer values before high than non-high vowels.
- Voiceless VOT is significantly affected by macro- and micro-social factors, but always in interaction with place of articulation.

- Voiceless VOT is sensitive to speakers' reported participation in social networks, and this varies by migration experience, dialect and gender in the following ways:

  1. Significantly shorter voiceless VOT is shown among professionals who reported engagement in dense social network than their counterparts who reported less engagement in dense social network. The opposite pattern is observed in the refugees' data, with longer labial and coronal voiceless VOT among speakers who reported engagement in dense social network and vice versa.
  2. Significantly shorter voiceless VOT is observed among London speakers who reported engagement in dense social network than their counterparts who reported the opposite. Glasgow speakers, on the other hand, show longer VOT for /p/ when they reported more engagement in dense network.
  3. Significantly shorter coronal voiceless VOT and, to a lesser extent, labial and dorsal VOT as female speakers reported engagement in dense social network.

- Intra-group variation in the production of voiceless VOT is observed according to dialect when involved in interaction with English use and Iraqi contact. Results for the micro-social effects on London and Glasgow speakers are summarised in the following points:

  1. The expected effect of frequency of English use is shown among London speakers, with longer voiceless VOT as speakers reported more frequent English use and vice versa.
  2. Glasgow speakers show intra-group variation according to their Iraqi contact score, with longer coronal voiceless VOT among speakers who reported more contact with Iraqis and vice versa.

6.6 Discussion

The following paragraphs summarise and discuss English VOT results with reference to the research questions outlined in Section 6.3. The discussion is then followed by a conclusion presenting the limitations of the present analysis and some suggestions for future research.

6.6.1 Iraqi English Positive VOT Patterns

The first question in the present analysis sought to generally determine the production patterns of word-initial positive VOT in the English spoken by first-generation Iraqi Arabs living in the

UK. Acoustic and statistical results showed the following:

- Iraqi Arab speakers showed a clear distinction between voiced and voiceless positive VOT, with voiced stops being generally produced with a short-lag VOT and voiceless stops with long-lag VOT (i.e., exponentiated model estimates: voiced= 14ms, voiceless= 42ms)

Iraqi Arab speakers clearly produce short-lag voiced and aspirated voiceless stops, a pattern which is broadly similar to previous descriptions on English voiced and voiceless VOT (Docherty, 1992; Flege, 1981; Klatt, 1975; Lisker and Abramson, 1964). In their studies on American English VOT, Lisker and Abramson (1967) report an overall VOT mean of 41ms and 70ms for voiceless stops in sentences and isolated words, respectively, and VOT mean of 12ms and 17ms for voiced stops in sentences and isolated words, repectively. Stuart-Smith et al. (2015b) give 46.5ms for voiceless VOT and 15.5ms for voiced VOT for Glaswegian speakers. Comparison of mean VOT values for voiced and voiceless stops in the present results to values in Lisker and Abramson (1967); Stuart-Smith et al. (2015b) shows that Iraqis voiced VOT values are comparable to or longer than monolingual speakers' VOT in Lisker and Abramson (1967); Stuart-Smith et al. (2015b) studies. Voiceless mean VOT value was comparable to or shorter than monolinguals' mean VOT in Lisker and Abramson (1967); Stuart-Smith et al. (2015b) studies. While absolute comparison between the present study and Stuart-Smith et al. (2015b) study may be problematic given that their VOT tokens are elicited from spontaneous speech data (i.e. VOT in spontaneous speech tends to be shorter), Iraqi speakers in the present study produced comparable mean voiceless VOT but longer voiced VOT than speakers in Lisker and Abramson (1967) in the carrier phrase context. Bearing in mind Iraqi Arabic voiced VOT patterns (i.e., negative VOT in the production of voiced stops) as well as results of previous research on English VOT by Arab speakers (e.g., Flege, 1981; Khattab, 2002a; Port and Mitleb, 1983), it is striking to see voiced VOT values similar to English monolingual speakers in the present analysis. This finding is further discussed in consideration of place of articulation.

6.6.2 The Effect of Linguistic Factors on Iraqi English Positive VOT

The second question in this chapter aimed to identify the effect of linguistic factors, namely place of articulation, following vowel height and word duration on Iraqi English VOT. Based on the acoustic and statistical analyses, Iraqi English VOT showed the following:

- Both voiced and voiceless VOT produced by Iraqi speakers showed a significant difference according to stops' place of articulation, with longer VOT durations from front to back (labial< coronal< dorsal).

- A significant negative correlation between speech rate and VOT durations was observed in the production of voiceless but not voiced stops.

- Voiced stops showed significantly longer VOT before high than non-high vowels. By contrast, only voiceless coronal stop (/t/) had longer VOT duration before high than non-high vowels.

The production of English voiced and voiceless VOT by Iraqi speakers followed the universal VOT pattern reported by Cho and Ladefoged (1999) (See Section 6.2), with statistically longer VOT durations for stops articulated further back in the oral cavity (labial< coronal< dorsal). Tables 6.18 and 6.19 compare mean English positive VOT according to place of articulation in the present analysis to mean (*or* range of) positive VOT for English and Iraqi Arabic stops reported in Docherty (1992); Khattab (2002b); Klatt (1975); Lisker and Abramson (1967), and in Al-Ani (1970); Al-Siraih (2020); Al-Tai and Kasim (2021); Rahim and Kasim (2009), respectively.

List of studies	Variety of English	/b/	/d/	/g/	/p/	/t/	/k/
Lisker and Abramson (1967)	American English	7	9	17	28	39	43
Klatt (1975)	American English	11	17	27	47	65	70
Docherty (1992)	SSBE	15	21	27	42	64	62
Khattab (2002)	British English	5	10	28	63	70	80
PRESENT-STUDY	Iraqi English	13	18	29	37	53	68

Table 6.18: Mean English VOT*ms* by place of articulation produced in words in carrier sentences in monolingual English speakers in previous work, and Iraqi Arab speakers in the present study

List of studies	Variety of Arabic	/p/	/t/	/k/
Al-Siraih (2020)	Southern Iraqi Arabic	_	31/58	48/75
Al-Ani (1970)	Modern Standard Iraqi Arabic	_	40 /60	60 /80
Al-Tai & Kasim (2021)	Muslawi Arabic	17 / 20	41/ 44	50/ 53
Rahim & Kassim (2009)	Muslawi Arabic	17	41	57
PRESENT-STUDY	Iraqi English	37	53	68

Table 6.19: Range or mean Iraqi Arabic voiceless VOT*ms* by place of articulation in previous work, and mean Iraqi English voiceless VOT in the present study

Additionally, a comparison of mean VOT values according to place of articulation by London and Glasgow Iraqi speakers to previous studies on Standard Southern British English (SSBE) VOT (Alanazi, 2018; Docherty, 1992; McCarthy et al., 2013) and Scottish English VOT (Stuart-Smith et al., 2015; Scobbie, 2006) is given in Figure 6.24.

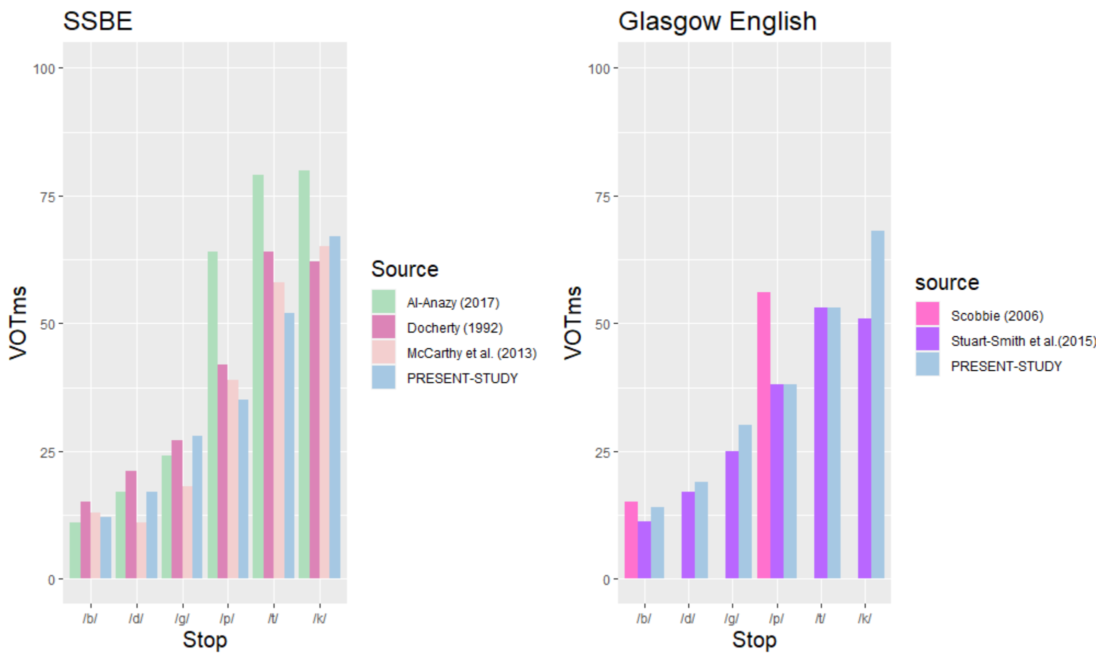

Figure 6.24: Comparison of mean VOT*ms* from London and Glasgow Iraqi speakers to previous work on SSBE (*left*) and Scottish (*right*) English

As shown in Tables 6.18 and 6.19, the effect of place of articulation on VOT values for voiceless stops in the present data is generally in line with previous accounts of English and Iraqi Arabic VOT. Iraqi Arabs show significant difference in voiceless VOT values according to place of articulation (/p/ < /t/ < /k/). Observation of voiceless labial, coronal and dorsal VOT values in comparison to previous English and Iraqi Arabic studies reveals interesting patterns. First, Iraqi Arabs in the present analysis successfully produce aspirated /p/ (mean VOT= 37ms) despite being absent from their first language and previous accounts of this sound to be produced with a short-lag VOT by Arab speakers (e.g., Flege, 1981; Khattab, 2002a). Mean English VOT value for /p/ produced by Iraqi speakers is, however, shorter than monolinguals' VOT values in previous studies (See Table 6.18 and Figure 6.24). Second, comparison of voiceless coronal VOT in the present analysis to Iraqi Arabic and English VOT shows that Iraqi speakers' English coronal VOT appears in the lower end of voiceless VOT values reported for English monolinguals in previous studies (See Table 6.18 and Figure 6.24). By contrast, Iraqi English VOT for /t/ is generally in the range of reported values on Iraqi Arabic voiceless coronal VOT (See Table 6.19). Although voiceless dorsal VOT for Iraqi speakers is comparable to findings on both Iraqi

Arabic and English VOT, it appears in the lower end of the long-lag region in comparison to English studies in Table 6.18. Thus, it seems that, apart from /p/, Iraqi English voiceless VOT patterns are more similar to Iraqi Arabic than English VOT.

The effect of place of articulation on voiced VOT values accords with the previous English research on VOT (e.g., Cho and Ladefoged, 1999; Docherty, 1992; Flege, 1981; Stuart-Smith et al., 2015b). Iraqi speakers' positive VOT increases significantly as stops are articulated back in the oral cavity (/b/ < /d/ < /g/). Observing significant increase in positive VOT values from front to back for voiced stops in the present analysis (i.e. /b/< /d/< /g/) suggests divergence from Iraqi Arabic voiced VOT patterns.

Surprisingly, Iraqi English VOT values for /b/, /d/, /g/ show comparable mean values to monolingual speakers in previous English VOT studies (See Table 6.18 and Figure 6.24). Voiced labial, coronal and dorsal VOT values for London and Glasgow Iraqi speakers are similar to or longer than values reported in previous studies on SSBE (Alanazi, 2018; Docherty, 1992; McCarthy et al., 2013)(Figure 6.24, *left*) and Scottish English (Scobbie, 2006; Stuart-Smith et al., 2015b) (Figure 6.24, *right*). Previous SSBE studies reported voiced VOT values that range roughly between 11- 15 ms for /b/, 11- 21 ms for /d/, and 18- 27 ms for /g/, which are comparable to VOT values produced by London Iraqi Arab speakers (i.e., /b/= 12 ms, /d/= 17 ms, /g/= 28 ms). Similarly, Glasgow Iraqis' voiced VOT is slightly longer than Stuart-Smith et al. (2015b) results and comparable to Scobbie (2006). While a close comparison between the present data and Scobbie (2006) and Stuart-Smith et al. (2015b) data is tricky given differences in the data and speaker sample (i.e., spontanous speech in Stuart-Smith et al. (2015b) and different parental background in Scobbie (2006)), Glasgow Iraqis' production patterns for voiced VOT are generally similar to English monolinguals.

Results of voiced VOT according to place of articulation also contradicts with previous studies on English VOT produced by Arab bilinguals, which did not show a significant effect of place of articulation on prevoiced VOT (e.g., Alanazi, 2018; Flege, 1981; Khattab, 2002a; Port and Mitleb, 1983). Direct comparison between the present study and previous English studies on Arab bilingual speakers is impossible given differences in the acoustic measures adopted for voiced VOT. Nevertheless, the contrasting voiced VOT results between Iraqis in the present analysis and previous studies on Arab speakers may exist due to differences in the speakers' social profile and status in the host country. With the exception of Khattab (2002a), all previous investigations on English VOT produced by Arab speakers were mainly conducted on EFL/ ESL students, meaning that their sociolinguistic experience and status is different from Iraqis in the present study. The impact of speakers' status and experience in the host country on second language acquisition and sociolinguistic competence has been reported in Flege and Liu (2001) study on Chinese bilinguals in the US, in which they observed a significant difference in the perception of English stops between Chinese students and non-students, a difference interpreted as resulting from varying degrees of exposure to monolingual speakers. While differences in the degree of exposure to monolinguals' production patterns between Iraqis and Arab EFL/ ESL students may be an important factor, this factor is likely to be intertwined with other contributing factors, such as sense of identity, attitudes towards the host community, and future plans. It is difficult to draw a conclusion on Iraqis' English voiced stop patterns based on the VOT analysis alone, as analysis of VDC is certainly needed to gain a complete picture of their English production patterns. However, the increased positive voiced VOT values observed with respect to place of articulation is similar to English monolinguals' production patterns in previous studies.

Furthermore, Iraqi speakers in the present study showed the expected effect of speech rate, as reflected in word duration, and following vowel height on their English VOT. The results show an overall effect of speech rate, but separate models show that this is really carried by voiceless stops. This result is in line with previous studies on English VOT, which found a significant effect of speech rate only on voiceless stops (e.g., Miller et al., 1986; Stuart-Smith et al., 2015b). Following vowel height also showed a significant effect on Iraqi English stops, with longer VOT before high than non-high vowels. While this result disagrees with Lisker and Abramson (1967) findings, in which they did not find a major effect of the following vowel on VOT, it aligns with many other studies such as Chao et al. (2006); Klatt (1975); Port and Rotunno (1979); Stuart-Smith et al. (2015b). However, the observed differences in VOT values according to following vowel were further modulated by stop voicing and place of articulation. Specifically, the voiceless VOT model shows a significant difference according to vowel context only in the production of the coronal stop /t/, but not in the production of /p/ and /k/. This finding is unexpected, as it contradicts with the general effect of following vowel on Iraqi Arabic and English voiceless VOT (Chao et al., 2006; Rahim and Kasim, 2009). In contrast to previous studies, results of the present analysis show that following vowel effect varies depending on voice and place of articulation of the stop, which is possibly a result of different high-vowel qualities, and/ or related to the nature of Iraqi English /t/.

6.6.3 Iraqi English Variation in VOT by Social Factors

A main objective of the present analysis is to investigate intra-ethnic variation in the production of English VOT by Iraqi speakers resulting from social differences among them. Consideration of a number of macro- and micro-social factors revealed significant differences. Since social factors included macro and micro variables, discussion of the findings is presented in two separate sub-sections as follows.

English VOT Variation According to Macro-social Factors

Analysis of English VOT in relation to Iraqis' migration experience (Professionals *vs* Refugees), dialect area (London *vs* Glasgow), and gender (Males *vs* Females) revealed the following:

- Iraqi refugees overall produce longer VOT for /b/ than their professional counterparts (See Figure 6.15).
- VOT is significantly longer for /b/ in:
    1. Female Iraqi refugees than female professionals (See Figure 6.18).
    2. Glasgow Iraqi refugees than Glasgow and London professionals (See Figure 6.18).
- London professionals produce significantly shorter voiced coronal VOT (i.e. /d/ as in *dull*) than London and Glasgow refugees (See Figure 6.18).

The above results show that refugee speakers produced longer VOT for /b/ than professionals, with a further significant difference in the production of /b/ by Glasgow and female refugee speakers than their professional counterparts. Previous studies on English VOT reported a range between 1- 15ms for /b/ (Flege, 1981; Klatt, 1975; Lisker and Abramson, 1964, on American English) and (Scobbie, 2006; Stuart-Smith et al., 2015b, on Scottish English). In the present analysis, empirical mean VOT for /b/ was 17ms and 18ms among female and Glasgow refugee speakers, respectively. By contrast, London, Glasgow and female professionals showed a mean VOT of 10- 11ms for /b/. Compared to monolinguals' production patterns, Glasgow and female refugees showed higher mean VOT durations than mean VOT reported in most studies on monolingual speakers whereas mean VOT values for /b/ produced by professionals fall in the VOT range for English /b/, as reported in the previous studies (See Figure 6.25).

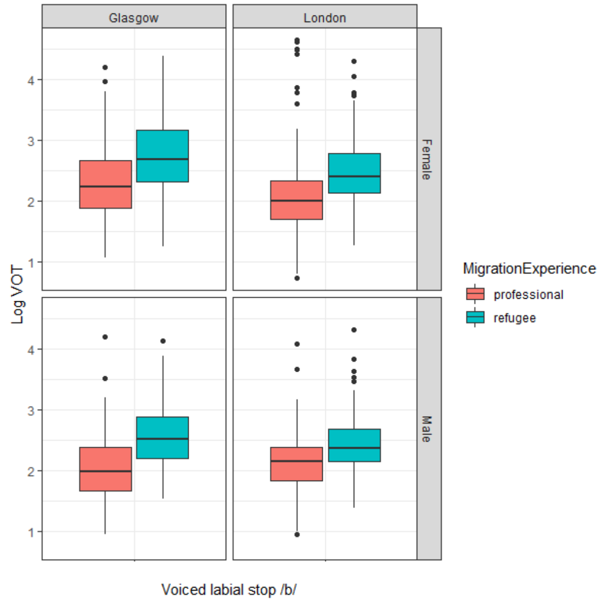

Figure 6.25: Mean log (VOT) for /b/ according to migration experience, dialect and gender

A possible explanation for this result might be that refugee speakers paid more attention to their production of labial stops than professional speakers during the interviews. This is supported by the fact that data was elicited from a careful speech style (i.e., words in a carrier phrase) as sociolinguistic research has widely reported more attention to speech in more careful speech styles (e.g., Labov, 1972). This has been also demonstrated in previous sociolinguistic research on bilingual and ethnic groups, especially when being aware of the phonetic difference between first and second language (e.g., Alanazi, 2018; Flege, 1981; Sharma and Sankaran, 2011). Lack of the /p-b/ contrast in Iraqi Arabic may result in more attention to /b/ production patterns by refugee speakers. This is not the case for coronal and dorsal stops which show voiced and voiceless contrast in both languages (i.e. /d-t/ and /g-k/), consequently resulting in less group variation in their VOT compared to the labial stops. As Flege (1980) states, when bilingual speakers are aware of the phonetic differences between their first and second language ‘they may attempt to modify their pronunciation either by exaggerating a phonetic dimension they already control or by exaggerating one which they have discovered to be part of the target language phonetic system’ (Flege, 1980, p.132).

Assuming that the difference observed in the data is caused by speakers’ awareness of phonetic differences between Arabic and English labial stops, why did only Iraqi refugees pay more attention to the production of the labial stops by producing considerably long voiced labial VOT? There are several possible explanations for this difference, all of which are related to participants’ sociolinguistic background. Firstly, all professional speakers interviewed in the present study had acquired English in Iraq and had high level of English proficiency prior to arrival to the UK. While professional Iraqis were mostly exposed to Arabic accented English production patterns during the time of English acquisition (i.e., prevoicing and short-lag VOT; See Section 6.2.4), most refugee speakers had to obtain English qualifications in the UK through registering in English language courses to be able to find jobs even when they had prior knowledge of English. Refugee speakers may become more aware of Arabic/ English phonetic differences during the time of English acquisition in the UK in an attempt to achieve intelligibility when speaking to monolingual English speakers/ instructors. In fact, the extra attention to the difference between /p/ and /b/ was clearly stated by some refugee speakers when they read the wordlist.

Secondly, Glasgow and female refugees' considerable atttention to their production of labial stops may be broadly related to their need to swiftly fit into the host communities and be part of the larger community or may be a result of considerable emphasize on refugees, specifically female and Glasgow Iraqi refugees, to show sociolinguistic involvment with the larger community. This is in contrast to professional speakers, who are socially more settled than refugee speakers, thus have more confidence in their English and receive less attention than refugees in terms of governmental integration policies. This possibility is supported by the higher integration score observed in the refugees' than professionals' data, illustrated in the social correlation plot (See Chapter 5, Figure 5.2) and also expressed by some Glasgow refugee speakers during the interviews. For example, when I asked a female refugee speaker in Glasgow (*Ola*) whether she speaks Arabic with her kids at home she replied:

> " You know... they were speaking Arabic... but after that I have a very bad experience..I always blame myself and blame their school teachers because they forced me to speak to them in English.......when I came here, I stayed with my four kids, so I have the responsibility for four and I was struggling with the life here.... I couldn't send them to any Arabic school" (*Ola*)

The second extract is from another refugee speaker (*Qusai*) who explained how he needed to overcome the language barrier when he first arrived in Glasgow.

The researcher: When you came here.. was it hard to understand people because the accent is a bit different, you know?

Qusai: I know...ohh, it was terrible...
you know, because I got here as a refugee.. the government provided me a translator and gave me a flat and when I have appointment at that time, they used to send an interpreter to assist me...
but after one or two years I had to rely on myself. I can see that I quickly got English skills.

Moreover, being in London or Glasgow may also contribute to the refugees' degree of attention to speech given that minority ethnic communities, including Arabs, are much smaller in Glasgow than in London (See Section 4.3.3). As shown in Figure 6.25, Glasgow refugees produced longer VOT for /b/ than the other groups, a difference which may indicate the significant role of size of migrant communities, and more specifically Arab communities, on the sociolinguistic behaviour of migrant communities. This factor may also explain the significantly short coronal voiced VOT by London professionals compared to the other groups, as living in a multicultural environment raises the possiblity of directing less effort to achieve native-like production patterns. The effect of the size and composition of ethnic communities on individuals' degree of attention to phonetic details and its role in creating intra-ethnic variation has been reported in Sharma and Sankaran (2011) study, who investigated stylistic variation in the production of retroflexed /t/ by London Punjabi speakers (See Chapter 2).

The last possible explanation may be caused by differences in the social behaviour of refugees and professionals, partially explained by interactions with micro-social factors. For example, although refugee speakers generally showed longer VOT in the production of the voiced labial stop, they produced shorter VOT for /b/ as they reported more frequent use of English. Further discussion on the significant effects of micro-factors is provided in the following paragraphs.

English VOT Variation within Social Groups

In the present analysis, each social group shows significant differences in the production of voiced and voiceless VOT values in relation to micro-social factors. The main findings are summarised in the following points:

- Professional speakers produce longer VOT for voiced, than voiceless, stops when they report strong ethnic identity and vice versa (See Figure 6.16).
- Professional speakers who reported more Muslim contact produced shorter VOT for voiceless than voiced stops and vice versa (See Figure 6.16).
- Iraqi contact is found significant in interaction with dialect for voiceless coronal VOT and with migration experience and gender for voiced VOT (See Figures 6.19, 6.20, 6.23).
- English use is found significant in interaction with dialect for voiceless labial and coronal VOT and with migration experience and gender for voiced VOT (See Figures 6.19, 6.20, 6.23).
- Density showed a significant effect on voiceless VOT when interacting with migration experience, dialect and gender (See Figures 6.22).

The results show subtle differences in VOT, for voiced and voiceless stops, always at the level of particular place of articulation, reflecting different aspects of Iraqi Arabs' lives, including social categories, such as where they live, their migration experience, and gender, but also their sociolinguistic behaviour and attitudes, such as their sense of identity, degree of contact with other Muslims and Iraqis, their use of English, and the kinds of social networks they engage in. Some of these relationships are easier to explain than others.

Ethnic identity showed a significant effect on voiced than voiceless VOT produced by Iraqi professionals, with longer voiced VOT durations among professionals who expressed stronger ethnic identity than their counterparts who reported the opposite (i.e., Score -2= 9.83ms; Score 1= 14.26ms). This result is hard to interpret given further variation observed in voiced VOT in relation to place of articulation and other social factors. However, such correlation may indicate that expressing a strong sense of ethnic identity does not always imply separated ethnic attitudes and behaviour. In fact, recent research on migrant communities showed that members of minority ethnic communities who expressed strong identification with the larger community may also express a strong ethnic identity, an attitude which Berry et al. (2006) refer to as the integration attitude. Thus, it is possible that professionals who produced longer voiced VOT are involved with both ethnic and national groups.

Moreover, Muslim contact shows a significant effect on voiceless than voiced VOT produced by professionals, with a significantly shorter voiceless VOT among speakers who reported more Muslim contacts than professionals who reported less Muslim contact. Specifically, professionals who reported less Muslim contact have a mean VOT value of 68ms whereas professionals who reported more Muslim contact have a mean value of 29ms. Lisker and Abramson (1967) reported a mean value of 70ms for voiceless stops in sentences, meaning that voiceless VOT produced by professionals who reported more contact with Muslims is considerably short compared to English monolingual speakers. Interestingly, a similar effect of density is observed in the professionals' data, with considerably shorter voiceless VOT among professionals who reported engagement in more dense social network. Thus, it is clear that Iraqi professionals' voiceless VOT is affected by both the type and quality of social network. Interpretations of the effects of Muslim contact and density on professionals' VOT are provided in the following paragraphs.

Density of social networks showed a significant effect on voiceless VOT among other social groups, namely Glasgow, refugees, London and female speakers. Specifically, Glasgow and refugee speakers produced longer VOT for /p/ and /t/, respectively, when they reported enagement in more dense networks. By contrast, London and female speakers produced considerably shorter VOT for /p/ and /t/ when they reported engagement in more dense networks. Given that the data elicited on density does not directly investigate type of dense social network (i.e., Muslims, Iraqi, Arabs, monolinguals), interpretations of density effect within and across groups is sought in relation to other social factors rather than in isolation.

There are two possible interpretations of the variation observed in the production of voiceless VOT in relation to density. First, the contrasting effect of density across social groups may indicate differences in the type of interlinked network each group has. It could be that Glasgow and refugee speakers are engaged in interlinked network with Anglo monolingual speakers whereas professionals, London and female speakers are engaged in interlinked networks with Iraqi, Arab or other Muslim minority ethnic speakers. Considering the social status of gender and dialect groups, it is more likely for London and female speakers to be engaged in dense links with their ethnic or religious groups than Glasgow and male speakers. Clearly, first-generation Iraqi female speakers are expected to be engaged in dense social network mainly with female speakers who belong to their ethnic and/ or religious background given the social, cultural and religious norms of the community (See Chapter 3). Moreover, engagement in dense links with other Iraqi, Arab and/ or migrant groups is likely to be affected by the size of these communities (See Chapters 3 and 4). Thus, it is possible that London speakers who reported high density scores are engaged in interlinked social network with Iraqi, Arabs, or other ethnic minority groups. Confirming the above suggestion, the correlation plot of refugee speakers' acculturation questionnaire data shows a significant negative correlation between density score and Arabic use, indicating that as refugees reported more engagement in dense social network, they reported less Arabic use (See Figure 6.26).

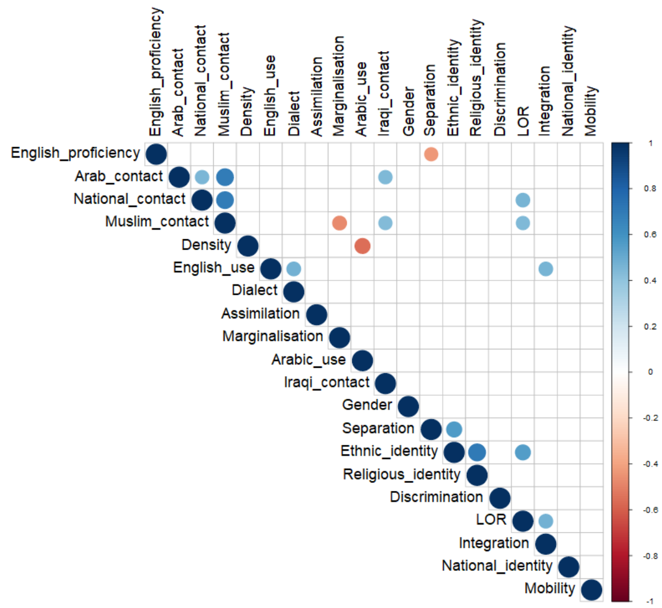

Figure 6.26: Correlation plot of Iraqi refugees' social data

Second, the observed variation in the production of voiceless VOT in relation to density may indicate a more complex social meaning. Recent variationist research has found that while speakers' social characteristics and networks can impact their linguistic behaviour, they do not necessarily entail the use of the incoming linguistic feature (e.g., Eckert, 2000; Zhang, 2005). In some cases, speakers use a certain feature over another to index a social meaning, such as identity (See Chapter 2). In the present analysis, Iraqi professionals showed significant differences in the production of voiceless VOT according to density score and Muslim contact, producing a considerably shorter voiceless VOT as they reported more frequent contact with Muslims and more dense networks and monolingual-like voiceless VOT values as they reported less dense and less frequent social networks with Muslims.

Considering the professionals' social behaviour and attitudes as a whole (See Figure 6.27), it is clear that the effects of social contact and network can not be interpreted in isolation, as they are significantly correlated with other factors. As illustrated in Figure 6.27, the professionals' correlation plot shows that Muslim contact is positively correlated with national and Arab contact, meaning that professionals who reported more contact with Muslims also reported more contact with Arab and nationals, and therefore does not indicate less exposure to monolingual speakers. Notably, density shows significant correlations with mobility and religious identity. Specifically, professionals who reported previous geographic mobility in the UK reported less dense social networks whereas professionals who reported more dense networks also reported stronger religious identity. It seems that as Iraqi professionals become more settled, they show a more Arab Muslim identity, reflected in their social, and linguistic behaviour, namely the use of short-lag voiceless VOT. In other words, less mobile Iraqi professionals, who have established strong contact with their community, may not feel the need to accommodate to Anglo-English norms and therefore produce short-lag English VOT for voiceless stops as part of their Arab Muslim identity in the UK. By contrast, weakly-tied mobile professionals are more open to mainstream Anglo-English norms (cf. Villena-Ponsoda, 2005, p.311), and thus produced native-like voiceless VOT.

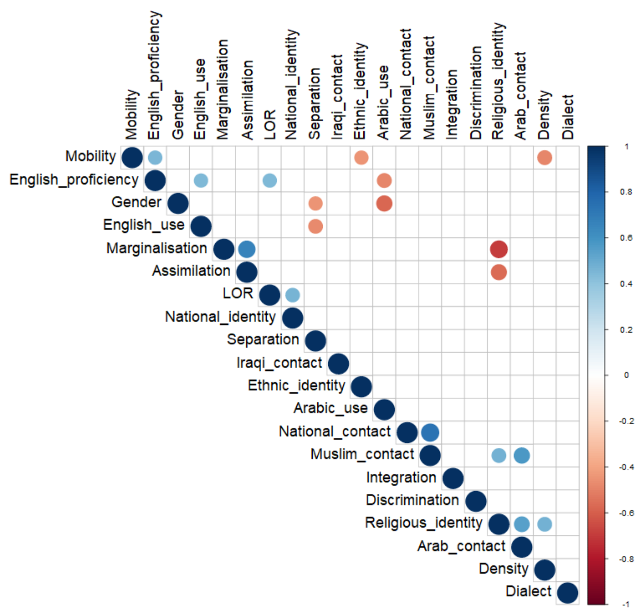

Figure 6.27: Correlation plot of Iraqi professionals' social data

Further differences in voiced and voiceless VOT are observed in consideration of English language use. London speakers showed the expected effect of frequency of English use on their voiceless VOT, as they produced longer VOT for /p/ and /t/ when they reported more frequent English use. This result is in line with Alanazi (2018) results, in which he found that Saudi bilinguals who use English more frequently produce longer voiceless VOT than their counterparts who use English less frequently. However, the present data shows an inconsistent pattern in the production of voiced VOT in relation to English use by female, professional and refugee speakers. Specifically, all groups showed shorter VOT for /b/ when they reported more frequent English use. By contrast, the opposite pattern is observed in the production of /d/ by female and professional speakers. The increased VOT values for /d/ when speakers reported more English use is expected. The unexpected pattern in the production of /b/ raises again the possibility that Iraqi speakers who do not use English frequently pay more attention to their /p-b/ contrast, which does not exist in their Arabic, by producing considerably longer /b/. Thus, it seems that when Iraqi speakers reported less English use, they pay more attention to their production of

/b-p/ phonemic contrast by producing longer VOT for /b/.

The frequency and quantity of contact with Iraqis also showed a significant effect on voiced and voiceless VOT according to place of articulation and macro-social categories. For voiceless VOT, Glasgow speakers show longer VOT for /t/ when they reported more Iraqi contact. For voiced stops, a contrasting effect of frequency of Iraqi contact is shown on voiced VOT across and within gender and migrant groups. Specifically, female and professional speakers produce shorter VOT for /b/ and /g/ and longer VOT for /d/ when they reported more Iraqi contact and vice versa. Male speakers, on the other hand, produced longer /b/ when they reported more Iraqi contact. Interpretation of the contrasting patterns in voiced VOT results is tricky given that voicing during closure is not included in the present analysis. However, the longer VOT for /b/ by professionals and females who reported less contact with Iraqis is not an indication of native-like production patterns, as they produce even longer mean VOT values than monolingual speakers in a number of previous studies (e.g., Khattab, 2002a; Lisker and Abramson, 1964) and do not show a difference in the VOT values for /b/ and /d/ (i.e., mean VOT: professionals /b/ = 10.5, /d/=11; females /b/, /d/= 14). By contrast, professionals and females who reported more Iraqi contact produced VOT values which are comparable to previous accounts of monolingual English /b/ and /d/ (i.e., mean VOT for professionals: 7ms for /b/ and 16ms for /d/; female: 7ms for /b/ and 18ms for /d/) (e.g., Alanazi, 2018; Klatt, 1975).

The unexpected and inconsistent effect of Iraqi contact suggests two important points: First, as indicated earlier, reporting frequent contact with Iraqis does not necessarily imply social and linguistic separation from the larger community but may indicate involvement with both communities, a pattern which has been observed in social research on ethnic communities in general (e.g., Berry et al., 2006) and in sociolinguistic research more specifically (e.g., Sharma and Sankaran, 2011). Second, the contrasting effect of Iraqi contact on particular stops within and across groups highlights again the fact that speakers' social contact and network do not always explain variation, as participation in social networks and identity construction are not necessarily the same (Eckert, 2000; Mendoza-Denton, 2008). While some speakers tend to use a certain linguistic feature associated with their social category or group, others may avoid using that feature to convey a different social meaning. Moreover, recent research has found that the relationship between variation and social meaning is flexible, and may vary depending on the individuals' personal journey or even the situation (e.g., Podesva, 2007; Sharma, 2018).

In the present analysis, the interactions between macro- and micro-social factors illustrate, to some extent, variation in individuals' production patterns in relation to their social practices. However, a detailed examination of individual variation in the production of VOT in relation to social factors remains the subject of future work.

6.6.4 Limitations and Future Directions

The present analysis examined sociophonetic variation in English positive VOT produced by first-generation UK Iraqi Arabs. Voicing during closure (VDC) was not analysed in the present thesis due to the difficulty encountered in assessing different patterns of voicing (See Section 6.4.2). Because VDC is generally considered an important phonetic cue to stop voicing, and more specifically to speakers in the present study (See Section 6.2.3), results of positive voiced VOT in the present analysis were interpreted with caution. Examination of VDC will certainly add more information, and therefore its production patterns will be further examined to better understand variation in English voiced stops produced by Iraqi-Arab speakers.

Moreover, the present analysis revealed a number of significant interactions between macro- and micro-social factors, showing unexpected and sometimes inconsistent correlations between speakers' linguistic and social behaviour. For the present data, further examination of individual variation in VOT in relation to social factors will be useful. Additionally, it is possible that other factors which were excluded from the present analysis play a role in explaining VOT variation. For example, the significant effect of density score on professionals' voiceless VOT patterns may be also attributed to mobility, as professionals who reported more geographical mobility had weakly-tied social network (See Figure 6.27). Consequently, they are more open to Anglo-English norms and produce more native-like voiceless VOT patterns. Likewise, the observed VOT differences according to speakers' social network may be also affected by speakers' age, as previous sociolinguistic studies on bilingual communities reported a strong correlation between speakers' age and the type of their social network (e.g., Divyani and Sankaran 2017; McCarthy 2013). Therefore, exploring the interplay between these factors and speakers' social network may help understand the motives behind VOT variation in the present study.

The complex relationship observed between VOT and speakers' social behaviour raises the possibility that variation in VOT carry social meanings among Iraqi speakers, that may or may not correspond to Iraqis' social categories and networks. Future research can use other methodological approaches (e.g., ethnographic or perceptual methods) to examine thoroughly how Iraqi Arabs use certain features to index their social identity.

The next chapter will move onto English /l/, another variable which shows phonetic variation conditioned by linguistic and social factors.

Chapter 7

Laterals

7.1 Overview

With only a handful of sociophonetic studies on the production patterns of English laterals by Arab speakers (cf. Clothier, 2019; Clothier and Loakes, 2016; Khattab, 2002a, 2011), the present chapter aims to provide an acoustic description of English /l/ produced by Iraqi Arabs in two different dialect areas, namely London and Glasgow. Moreover, by considering different social aspects, the present analysis shows how macro- and micro-social factors (See Chapter 5) play a main role in the intra-ethnic variation observed in the production of English /l/.

This chapter begins with a general background on the articulatory and acoustic features of English /l/, with a focus on London and Glasgow English as well as main studies on English /l/ produced by other minority ethnic communities in the UK. Then a description of Arabic /l/ in general and, more specifically, Iraqi Arabic /l/ is provided. The specific research questions for laterals are then outlined before describing the methodology used in the analysis of English /l/. Finally, the statistical results and a concluding discussion are presented.

7.2 Background on /l/

7.2.1 English /l/: Articulatory and Acoustic Descriptions

English /l/ is generally described as a voiced alveolar lateral approximant (Ogden, 2009). English laterals are primarily produced through a contact between the tongue tip/ blade and alveolar ridge. However, other secondary articulations are reported to be involved in the production of English /l/ (Ladefoged and Maddieson, 1996; Ogden, 2009; Wrench and Scobbie, 2003, p.83). In addition to the tongue tip/ blade closure against the alveolar ridge, /l/ production involves tongue body fronting and raising or/ and tongue dorsum backing. /l/ produced with the apical gesture is generally described as a palatalised or clear lateral whereas /l/ articulated with a dorsal gesture is referred to as a velarised or dark lateral (Browman and Goldstein, 1995; Carr, 2013; Gick et al., 2013, p.34).

Articulatory examination of English /l/ showed that both clear and dark /l/ tend to involve both apical and dorsal gestures, but the main difference between the two allophones is timing, with the tongue dorsum retraction (backing) occurring before tongue tip gesture in the latter case (Sproat and Fujimura, 1993; Turton, 2014, p.189). The involvement of primary and secondary articulations in /l/ resulted in a degree of variability in the description of its articulatiory features (Ogden, 2009; Wrench and Scobbie, 2003).

The degree of English /l/ clearness/ darkness is largely affected by syllable position and dialect. English /l/ clearness/ darkness is conditioned by syllable position, with clearer /l/ realisations in syllable onset (e.g., *leaf*) and darker /l/ realisations in coda or rhyme positions (e.g., *feel*) (Gick et al., 2013; Recasens, 2012; Sproat and Fujimura, 1993; Turton, 2015). /l/ also varies by dialect, with some dialects, such as Newcastle English, generally showing clear /l/ realisations and others, such as Manchester English, showing dark /l/ realisations (Carter and Local, 2007; Kirkham, 2017; Kirkham and McCarthy, 2021; Recasens, 2012). While the effect of syllable position on /l/ seems to be universal (Recasens, 2012), some English dialects show a stronger positional contrast than others (e.g., Southern English dialects), meaning that the effects of syllable position and dialect are often interrelated (See Kirkham and McCarthy, 2021; Turton, 2017).

Previous studies on English laterals showed a degree of variability even within clear and dark /l/ categories, with a debate on whether the allophonic distinction is categorical or continous (Lee-Kim et al., 2013; Sproat and Fujimura, 1993; Turton, 2014, 2015, 2017; Yuan and Liberman, 2009). While some studies argued that /l/ degree of darkness is gradient and varies depending on duration (e.g., Sproat and Fujimura, 1993) and morphological context (Lee-Kim et al., 2013), other studies found that there is a sharp distinction between syllable initial and syllable final /l/, and thus supported /l/ categoricity (Yuan and Liberman, 2009).
Along with articulatory examination (X-ray microbeam data), Sproat and Fujimora (1993) used the difference between first and second formants (F2-F1) to measure the degree of /l/ clearness and darkness acoustically in the speech of five speakers (4 American and 1 British speakers). Their acoustic and articulatory results showed that /l/'s degree of darkness varies depending on its position in the word and lateral duration. Sproat and Fujimura (1993) concluded that English /l/'s degree of darkness is gradual depending on utterance duration and morphological context (Sproat and Fujimora 1993, p.294). While their study was thorough in terms of phonetic measurement (articulatory and acoustic), their argument was based on data elicited from only

five speakers, four of whom are from the same dialect area (i.e., Midwestern American English).

Carter and Local (2007) examined the production of laterals in different phonological contexts across two UK dialects, namely Newcastle and Leeds. Previous descriptions of Newcastle and Leeds /l/ indicated a lack of initial/ final contrast in both dialects, with the former showing clear /l/ in all word positions and the latter showing dark /l/ in all word positions (Wells, 1982a, p.370-374). Using F2 Hz values as the main acoustic measure of /l/ clearness and darkness, comparison between dialects confirmed previous descriptions, with F2 being overall considerably lower (darker /l/) in Leeds than in Newcastle regardless of word position. However, Carter and Local's (2007) acoustic analysis also showed that Newcastle English exhibits stronger positional effect in the production of /l/ (clear final /l/ but clearer initial /l/), than Leeds English, raising again the question of whether English has one or two distinct allophones (Carter and Local 2007, p.196- 197).

In an attempt to contribute to this debate, Turton (2014, 2015, 2016, 2017) examined articulatory features of /l/ produced in different morphosyntactic/ phonological environments across different English dialects. She found that dialects behave in three different ways in relation to /l/ articulation. Specifically, the first group of dialects, such as RP and London English, has significantly different /l/ realisations (categorical) between onset and coda positions regardless of phonological/ morphological environments. The second group of dialects, such as Belfast English, produces /l/ with the same articulatory gestures in all syllable positions. The third group of dialects (e.g., Manchester English) shows a gradual effect of linguistic factors (e.g., morphological environment) on /l/ darkness. Although Turton's studies are limited in terms of the sample size (i.e., only one speaker in each dialect area), they contributed to the existing literature by highlighting the significant role of dialect in determining /l/'s categoricity/ gradience.

Additionally, recent studies on English /l/ directly addressed variation in /l/'s degree of darkness with respect to dialect and positional effects (Kirkham and McCarthy, 2021; Kirkham et al., 2019). Kirkham and McCarthy (2021) examined acoustically /l/ production patterns in twelve dialect areas (i.e. Leeds, Liverpool, Manchester, Newcastle, Sheffield, York, London, Bristol, Norwich, Peterborough, Birmingham and Nottingham), and provided a general classification of English laterals with reference to the positional effect. Their analysis included two acoustic measures: The difference between second and first formant values of laterals' steady state in Hz (F2-F1) to observe the degree of /l/ clearness and darkness in each dialect area, and Euclidean distance of median z-scored F1 and F2 values to measure onset/ coda contrast across dialects. Supporting Turton's (2015, 2016, 2017) results, Kirkham and McCarthy (2021) found that the classification of /l/ allophony as either categorical or gradient is highly dependent on the dialect under analysis and generally fall under one of the following categories:

1. Dialects that have clear syllable initial /l/ and dark syllable final /l/ (e.g., London and Birmingham).

2. Dialects, such as York and Liverpool, that show intermediate dark initial but darker /l/ in final positions.

3. Dialects that show no initial/ final contrast in the production of /l/ such as Leeds and Sheffield English, with similar formant values across all syllable positions.

In another study, Kirkham et al. (2019) investigated the nature of /l/ positional contrast in Manchester and Liverpool English, both known to have different /l/ production patterns according to syllable positions (See Kirkham et al. 2019 description of /l/ in each dialect). They used F2-F1 as well as F3-F2 to observe variation in /l/ and its adjacent vowel across both dialects (i.e., low F2-F1 and high F3-F2 indicate darker /l/ realisation). Their acoustic analysis showed significant differences across dialects in laterals' formant values, with Liverpool speakers producing clearer /l/ than Manchester speakers. With regard to positional contrast in the production of /l/, Liverpool speakers showed a stronger initial/ final distinction than Manchester speakers in general, and females more specifically. Kirkham et al. (2019) concluded that Liverpool English is best described as "an intermediate /l/ variety" whereas Manchester English is a dark /l/ variety (Kirkham et al., 2019). Although speakers' social profile was not thoroughly investigated in their analysis, the gender differences in /l/'s positional contrast observed in Manchester data indicate a possibility for /l/ to carry a social meaning (Kirkham et al., 2019).

Notably, the significant effects of social factors on the production of English /l/ was also reported in Turton (2014) acoustic and articulatory investigation of Manchester /l/, in which she found a significant initial/ final contrast in the production of /l/ only by middle-class speakers. Ethnicity was also reported to contribute to /l/ variation in other dialect areas, such as Glasgow (Stuart-Smith et al., 2011), Sheffield (Kirkham, 2017), and London (Kirkham et al., 2020) (discussed below).

In addition to variability in the degree of English /l/ clearness/ darkness, coda /l/ is sometimes produced with a vowel-like articulation (i.e., lack of tongue tip contact with the alveolar accompanied with a dorsal gesture; e.g., *hill* as [hɪw]), a realisation referred to as l-vocalisation (Ogden 2009, p.84; Carr 2013, p.167). Vocalised /l/ was first reported as a feature of Cockney English (Wells 1982, p.313- 315), but recent research suggested the spread of this feature to other English varieties (e.g., Britain, 2009; Stuart-Smith et al., 2006; Wrench and Scobbie, 2003).

The following paragraphs provide information on /l/ production patterns in London and Glasgow, the dialect areas under investigation in the present study.

London English /l/

London /l/ is typically described as an alveolar approximant. It has a clear realisation in word-initial syllable while it is dark in coda or word-final positions (e.g., *light* vs *hill*) (Wells, 1982a, p.11). London dark [ɫ] is usually replaced by [ʊ] in certain phonetic environments (e.g. syllabic /l/ as in people [pipʊ]; word-internal pre-consonantal as in milk [miʊk]) (Wells, 1982a, p.259), (Cruttenden, 2014, p.89). This phonetic feature, which is referred to as l-vocalisation, is suggested to be a characteristic of London speech, though is recently observed in other UK cities (Britain, 2009; Stuart-Smith et al., 2006; Wright, 1988).

The most recent acoustic and articulatory investigations of London English /l/ indicate the significant effect of syllable position in this dialect, with /l/ being clear in initial positions but sharply dark or vocalised in final positions (Kirkham and McCarthy, 2021; Turton, 2017). Turton (2017) found that while London /l/ is considered categorical in terms of allophonic distinction between initial and final syllables, duration shows a strong effect on dark /l/ (i.e. darker /l/ in longer utterances), resulting in a gradient nature of dark /l/ (Yuan and Liberman, 2009). Likewise, Kirkham and McCarthy (2021) study on /l/ across twelve English dialects showed acoustically distinct syllable-initial and final /l/ in London English, with the former being considerably clear (i.e., Mean F2- F1= 1000 Hz) and the latter being considerably dark.

/l/ Production Patterns in SSBE

In the present study, London professional Iraqis, who are socioeconomically middle-class speakers, are more likely to be exposed to SSBE, making it a relevant variety to the present analysis. Given the scarcity of research on SSBE /l/ production patterns, previous accounts of /l/ in RP, a variety which shows similar /l/ patterns to SSBE, is provided here. As described by Cruttenden (2014) and Carr (2013, p.166), RP is one of the English accents that show a strong allophonic distinction between onset and coda positions, with the former being light and the latter being dark. This description is recently confirmed by Turton (2014) in her articulatory examination of /l/ produced by an RP speaker, whereby a strong allophonic distinction between syllable initial and syllable final /l/ is observed (Turton, 2014, 2017, p.193). Notably, Turton (2017) found that, compared to London /l/, RP accent has a stronger positional contrast in the production of /l/. Similarly, RP speakers in Recasens' (2012) cross-linguistic acoustic analysis of /l/ showed a considerably clear initial but dark final /l/ in different vowel contexts (F2 in *li* context= 1600 Hz, *la* context= 1120 Hz; *il* context= 1000 Hz, *al* context= 860 Hz).

Glasgow English /l/

In Glasgow, /l/ is described as being dark in all contexts in both Scottish Standard English and Scots (Wells, 1982a, p.411); (Carr, 2013); (Stuart-Smith, 2004, p.63). In Stuart-Smith et al. (2011), acoustic analysis of syllable initial /l/ produced by four Glaswegian white speakers showed strongly dark /l/ realisations (mean F2 for male speakers= 943Hz, female speakers= around 1270 Hz). Such results were confirmed in recent acoustic investigation of word-initial (Stuart-Smith et al., 2017) and word-final /l/ (Stuart-Smith et al., 2015b) in Glaswegian speech over time (from 1970s to 2000s). Stuart-Smith et al. (2017, 2015b) also noted a significant real-time change in Glaswegian word-initial and word-final dark /l/s, with even darker initial /l/ realisations and final /l/ vocalisation among younger speakers (i.e. lower F2 and higher F3 values). While initial /l/ darkening in Glasgow is in contrast to the observed change in other Anglo-English varieties, vocalisation of word-final /l/ in the speech of both Standard Scottish English speakers as well as Glasgow working-class speakers follows the general trend observed in other UK cities (i.e. preconsonantally as in *milk*) (Stuart-Smith et al., 2006; Wrench and Scobbie, 2003).

In their pilot study on variation and identity in Glasgow accent, Braber and Butterfint (2008) noted interesting variations in the production of initial /l/ considering speakers' gender, socioeconomic class and sense of local identity. While Glasgow initial /l/ was predominantly dark across all groups, Braber and Butterfint (2008) observed occurrences of clear /l/ realisations among middle-class females, who also reported low local identity compared to others. Although Braber and Butterfint (2008) findings are based on a small-scale investigation, they highlight the important link between speakers' sense of identity and their linguistic behaviour, and indicate a possible sociolinguistic change in progress.

Ethnicity and Variation in English /l/

Recent sociophonetic studies have examined the production of English /l/ across ethnic communities in dialect areas known to have dark /l/ in all word positions (e.g., *Bradford English* in Kirkham and Wormald (2015), *Sheffield English* in Kirkham (2017), *Glaswegian English* in Stuart-Smith et al. (2011)). In their investigation of ethnic variation in the production of /l/ in Bradford English, Kirkham and Wormald (2015) found significant acoustic and articulatory differences between Anglo and Asian speakers in the production of word-initial and word-medial /l/ (e.g., *lead, belly*). While Anglo speakers produced the typical pattern for Bradford /l/ in both positions (i.e. dark word- initial and word-medial /l/), Asian speakers produced considerably clearer /l/ realisations in these positions (Kirkham and Wormald, 2015). Kirkham and Wormald (2015) interpreted the clear English /l/ observed in Asian speakers' data as a result of a phonetic influence from Punjabi, which they speak as a heritage language. However, Kirkham's (2017) further investigation of ethnic variation in the production of Sheffield /l/ revealed that even when British Asian speakers reported limited use of/ exposure to their heritage language (i.e. Punjabi), they tend to produce significantly clearer /l/ than their Anglo counterparts, suggesting a significant role of ethnic identity and social network on their production of /l/ (Kirkham 2017).

Similar findings were observed in a study on syllable initial /l/ produced by second-generation (Punjabi) Asians in Glasgow (*Glaswasians*) (Stuart-Smith et al., 2011), in which Asian speakers generally produced clearer syllable-initial /l/ realisations than their Scottish (Anglo) counterparts. However, unlike Asians in Sheffield and Bradford (Kirkham 2017, Kirkham and Wormald 2015), Glasgow Asians' initial /l/ is still classified as dark when compared to other English varieties (e.g., RP) (Stuart-Smith et al., 2011), suggesting a greater influence of regional dialect on Glasgow Asian speech than their counterparts in Sheffield and Bradford (i.e., Glasgow Asians: Initial F2= 1092 Hz for male and around 1350 Hz for female speakers; Sheffield: Initial F2= 1960 for male and 1895 for female speakers; Bradford female speakers: Initial F2= around 2100 Hz). Such regional differences in the production of /l/ despite similarity in /l/ production patterns in the three dialect areas (i.e., dark /l/ in all word positions) highlight the significant impact of the larger majority English dialect community on the formation of ethnic communities' sociolinguistic identity (Kirkham, 2017). This factor, however, has not been directly investigated in previous work on laterals (cf. Wong and Hall-Lew, 2014; Wormald, 2016, on other variables).

7.2.2 Arabic /l/: Articulatory and Acoustic Descriptions

Although the production of Arabic /l/ by Iraqi speakers is not analysed in the present study, considering previous descriptions of its articulatory and acoustic features is important, as speakers in the present analysis speak Iraqi Arabic as a first language. In general, Arabic /l/ is described as a voiced dento-alveolar or apico-alveolar approximant, involving the tongue tip with the alveolar ridge or upper teeth as the primary articulators (Newman, 2002, p.65); (Al-Ani, 1970, p.129); (Shaheen, 1979, p.176). Arabic /l/ tends to be clear in all word positions whereas dark /l/ is limited to certain environments (discussed below). The articulatory description of Arabic clear /l/ is different from that of English, with the former involving only the apical gesture and lacking the dorsal secondary articulation (Khattab, 2002a, 2011). The lack of dorsal gesture in the production of Arabic clear /l/ has been also shown in previous articulatory studies on other languages known to have clear /l/, such as German (Ladefoged and Maddieson, 1996, p.184).

Despite the cross-linguistic similarity between Arabic and other languages in the articulatory gestures, Arabic clear /l/ is acoustically different in terms of positional and contextual effect on its degree of clearness (Khattab, 2002a, 2011; Shaheen, 1979). While acoustic examination of /l/ in languages known to have clear /l/ realisations, such as German and French, shows that F2 is significantly different in word-initial and final /l/ positions (e.g. Recasens, 2012), Arabic /l/ is reported to show similar formant values in different word positions as well as vowel contexts, indicating a lack of allophonic difference of Arabic /l/'s degree of clearness with consideration of linguistic factors (Shaheen, 1979, p.167-179); (Khattab, 2002a, 2011). Moreover, when compared to English clear /l/, Arabic clear /l/ is reported to have higher F2, indicating clearer /l/ realisations in Arabic than in English (Khattab, 2002a, 2011). Note, however, that Khattab (2002a, 2011) suggestion was based on a comparison between Arabic /l/ and Yorkshire English, a variety known to have dark /l/ in all positions compared to other English dialects (Kirkham, 2017; Kirkham and McCarthy, 2021).

As for dark /l/, previous accounts of the articulatory features of Arabic dark /l/ are inconsistent (cf. Khattab, 2002a, 2011). In general, Arabic dark /l/ is described as an emphatic sound produced with a secondary articulation. While some studies suggest that emphatic /l/ involves pharyngeal constriction in its articulation (e.g., pharyngealised /l/ in Laufer and Baer, 1988; Shaheen, 1979), other studies claim that emphatic /l/ involves a velar or uvular gesture and therefore described it as a velarised or uvular sound, respectively (e.g., Ferguson, 1956).

The disagreement in the description of emphatic /l/ in the literature exists for two main reasons. First, there is scarcity of empirical investigation and analysis of emphatic /l/ (cf. Abu Ain, 2016; Al-Wer et al., 2015; Khattab, 2002a, 2011; Shaheen, 1979) as its occurrence is limited to certain phonological environments. These environments are: **(a)** The name of God (*Allah*) except when preceded by the front vowel /i/. **(b)** Word-medial and word-final /l/ in velar, uvular and emphatic contexts (e.g., [ʃeɣɫ] 'work', [xaːɫ] 'maternal uncle', [ʕəṭɫ] 'damage'). **(c)** In some loanwords (e.g., lamba for lamp). Second, within the above-mentioned limited phonological environments, dark /l/ is reported to be highly variable across dialect and social groups (cf. Khattab 2002, Khattab 2011). For example, in their investigation of variation and change in Ḥōrani dialect-Jordan, Al-Wer et al. (2015) noted a clear pattern of variation in the production of clear and dark /l/ according to speakers' religious affiliation, with more frequent use of dark /l/ variant (e.g., /gaḷub/ 'heart') among Christian than Muslim speakers. Moreover, Abu Ain (2016) investigation of dark /l/ in the same dialect area showed less use of dark /l/ among young speakers, indicating a change in progress. In addition to social differences, Khattab (2002, 2011) noted that individual speakers show variability in the production of emphatic /l/ despite controlling for dialect.

Acoustically, emphatic /l/ is shown to be gradient according to syllable position, with final emphatic /l/ showing lower F2 and in many cases invisible F3 compared to other positions (Shaheen 1979, Khattab 2002). Moreover, along with low F2, emphatic /l/ is reported to have considerably higher F1 values than clear /l/ (Shaheen 1979, Khattab 2002, 2011), suggesting pharyngeal constriction in the production of emphatics in general, as described in previous articulatory studies (See Al-Tamimi and Heselwood (2011); Hassan and Esling (2011) for more details on articulatory and acoustic features of other emphatic sounds in Iraqi and Jordanian Arabic).

As for Iraqi Arabic, Al- Ani (1970) provided detailed acoustic and articulatory descriptions on Standard Iraqi Arabic /l/. Al- Ani (1970, p.48) described clear /l/ as a voiced dental lateral that has considerably high F2 values (1500- 1600 Hz) whereas emphatic /l/ as a pharyngealized post-dental lateral with a considerably low F2 (about 900 Hz). The production patterns of Standard Iraqi Arabic /l/ are, however, different from Spoken Iraqi dialects, which received little attention in previous research. The only general descriptions of Spoken Iraqi Arabic /l/ are provided in Blanc (1964) and Versteegh (2006). Blanc (1964) indicates that dark /l/ is produced in Baghdadi Arabic and other gelet dialects when preceded by /x/, /q/ or /ɣ/ whereas Versteegh (2006) states that Iraqi Arabic has clear and emphatic /l/, with the latter showing a "marginal status" in many Iraqi dialects. Versteegh (2006) did not provide further details on the status of emphatic /l/ in each dialect area.

7.2.3 Previous Research on English /l/ Produced by Arab Speakers

One of the few studies that investigated English /l/ production patterns by Arab speakers is Khattab's (2002, 2011) notable study on four adult bilingual Lebanese speakers in Yorkshire (UK). Her acoustic and auditory results, elicited through a word-list task and interviews, showed a clear effect of Arabic on the bilinguals' production of English /l/, with overall clearer /l/ realisations in onset and coda positions than monolingual English speakers. While two of her participants showed a small initial-final contrast in the production of English /l/, the other two participants did not show a positional effect on their production of English /l/ (i.e. same degree of /l/ clearness in both positions). Additionally, Khattab (2002, 2011) reports significant gender differences in the bilinguals' data, with male speakers producing darker /l/ (lower F2) than female speakers. None of the participants in her study produced vocalised /l/ in final positions. Given the main focus of Khattab's (2002, 2011) study on Lebanese children acquistion of English, she did not consider the social aspects that may have affected the production patterns of bilingual adults (e.g. social network, attitudes, sense of identity ... etc), and therefore variation observed in her data was mainly interpreted as an interference from Lebanese Arabic.

Of considerable relevance to the scope of the present study is Clothier's (2019) examination of intra-ethnic variation in the production of Australian English /l/ by Lebanese Australians. Clothier's (2019) sociolinguistic interview with 30 Lebanese Australians included a wordlist task and a social questionnaire on participants' social network as well as sense of ethnic identity. His acoustic and statistical results showed that the sociolinguistic behaviour of female Lebanese speakers is significantly different from their male counterparts as well as Anglo speakers, with female Lebanese speakers generally producing clearer English /l/ (higher F2- F1) than male speakers. While both male and female Lebanese speakers' initial /l/ becomes clearer as the density of their ethnic social network increases, the opposite pattern is observed in the females' production of final /l/ in relation to social network. In other words, female speakers who reported participation in denser Lebanese social networks showed a larger initial-final contrast than the other groups .

Likewise, Clothier and Loakes (2016)'s investigation of /l/ vocalisation in the speech of two Lebanese speakers revealed a significant correlation between frequency of vocalised /l/ and ethnic orientation score, with more vocalised /l/ realisations in the speech of the speaker with higher ethnic orientation score. Clothier (2019); Clothier and Loakes (2016) did not provide a detailed interpretation on the observed patterns, but highlighted two important points: First, the unpredictable correlation between /l/ darkening and density of social network, along with other sociolinguistic features (e.g., longer voiceless VOT among speakers who reported strong ethnic identity), may indicate " the emergence of a larger pattern of sociophonetic behaviour" (Clothier 2019). Second, when examining the speech of minority ethnic communities, and more specifically Arab communities, it is important to consider gender variation, as male and female speakers tend to show different social behaviour (cf. Al-Wer, 2014).

To summarize, existing literature on English laterals shows a degree of complexity across social and linguistic correlates. English laterals are highly sensitive to syllable position and dialect, showing varying degrees of /l/ clearness/ darkness according to word position and dialect area (Recasens, 2012). The effects of syllable position and dialect on /l/ degree of clearness/ darkness can be interrelated, with some English dialects showing a strong positional contrast and others showing smaller differences. Additionally, recent sociophonetic research on English /l/ showed that /l/ degree of clearness/ darkness varies according to ethnicity, and thus may carry a social meaning among individuals (Kirkham, 2017; Stuart-Smith et al., 2011). Compared to English /l/, Arabic /l/ is generally clear regardless of word position, but is sometimes produced as dark /l/ in limited contexts depending on social factors and/ or dialect areas (Al-Wer et al., 2015; Khattab, 2002a).

Given the existing cross-linguistic and dialectal differences in the producion of /l/, as well as previous accounts of English /l/ to vary according to ethnicity, variation in the production of English /l/ by London and Glasgow Iraqi Arabs is investigated in this chapter with consideration of linguistic and social factors. The following section presents the specific research questions for /l/ analysis.

7.3 Research Questions for English Laterals

The main research questions investigate the phonetic features of English /l/ produced by first-generation Iraqi Arabs in London and Glasgow, and whether differences in Iraqis' migration history and experience, as well as other social factors, play a significant role in their English /l/ production patterns. In order to examine this, the following research questions will be addressed:

- What are the phonetic characteristics of English /l/ as produced by Iraqi Arab speakers in London and Glasgow?
- Does Iraqi English /l/ vary according to macro-social factors, namely migration experience and gender, as well as micro-social factors?

7.4 Methodology

7.4.1 Data Sample

A total of 2184 monosyllabic word-initial and final-/l/ tokens (i.e., 1080 /l/ tokens in initial position and 1104 /l/ in final position) were elicited through the word-list task produced by 44 first-generation Iraqi Arab speakers (See Chapter 4). All speakers were aged 30-70 and were stratified according to gender (male/ female), dialect (London/ Glasgow) and migration experience (professional/ refugee). Table 7.1 shows a summary of the speakers (pseudonyms) and their social profile (i.e., gender, dialect and migration experience) including information about the number of tokens and proportion of data sample in dialect and gender groups.

Dialect	Gender	No. Tokens	Sample %	Speaker	No. Tokens	Migration
London	male	498	23%	Redha	33	Refugees
				Amjed	52	
				Ammar	55	
				Bilal	55	
				Haleem	52	
				Hamid	51	
				Hanoosh	52	Professionals
				Abid	49	
				Sabri	51	
				Salim	51	
	female	595	27%	Bashair	43	Refugees
				Beian	52	
				Hajar	46	
				Zuhour	43	
				Nawras	62	
				Danah	51	Professionals
				Nurah	52	
				Sabirah	51	
				Safiah	52	
				Sama	41	
				Zuha	52	
				Manar	52	

Dialect	Gender	No. Tokens	Sample %	Speaker	No. Tokens	Migration
Glasgow	male	399	18%	Qusai	48	Refugees
				Ala	43	
				Basel	49	
				Mazen	54	
				Habib	53	Professionals
				Qader	52	
				Abdulsamad	49	
				Wahid	51	
	female	686	32%	Luluah	53	Refugees
				Mais	50	
				Ola	49	
				Rasha	53	
				Dalia	48	
				Sanaa	46	
				Shouq	42	
				Ani	52	Professionals
				Reem	49	
				Faten	53	
				Hebah	48	
				Huda	50	
				Ibtisam	51	
				Israa	42	

Table 7.1: Data Sample for /l/

As shown in Table 7.1, larger number of tokens is observed in the females' than males' data. While London and Glasgow female speakers comprised 59% of the data, male speakers in both dialect areas comprised the remaining 41%. This is mainly because more female Iraqi Arabs took part in the present study than male speakers. Despite gender differences in the number of /l/ tokens, London and Glasgow speakers show equal proportions of the data sample (50% in each dialect). Likewise, migrant groups show approximately equal proportions of /l/ tokens (professionals = 51% , refugees = 49%) simply because the number of participants according to migration experience and dialect was equal or similar (See Chapter 4).

With regard to individual speakers, subtle differences in the number of tokens existed even though data was elicited from the same task (See Table 7.1). Such differences existed as a result of discarding some participants' tokens due to either background noise or mispronunciation of the target word.

The surrounding context was considered during the word-list design (See Chapter 4), and therefore was investigated as an independent variable in the present analysis. All /l/ tokens were preceded and/ or followed by a vowel (i.e., C-V as in *lid*, V-C as in *bill*), and were produced in the carrier sentence *"I say...... again"*. However, some participants paused before or/ and after some target words, resulting in a number of pre/ post pausal tokens in the data. As a result, /l/ tokens were produced in two main linguistic environments:

- Word initial and final /l/ preceded and followed by /e/ and /ə/, respectively (e.g., *I say love again*; *I say dill again*).
- Post-pausal initial /l/ and pre-pausal final /l/ (e.g. *I say PAUSE lake again*, *I say till PAUSE again*).

7.4.2 Praat Segmentation and Coding

The .Textgrid and .wav files for each speaker, generated using MAUS (See Chapter 4), were segmented and labelled in Praat (Boersma and Weenink, 2022). Three tiers were added to the .Textgrid files. The first tier contains a phonemic transcription of the lateral, preceding segment and following segment. The second tier contains the target word (e.g., *pool*). The third tier was added to note tokens with wrong formant tracks, so they could be corrected manually at a later stage.

With regard to phoneme coding, laterals were coded as one of the following three variants:

- lati= Word-initial laterals (e.g., *let*).
- latf = Word-final laterals (e.g., *till*).
- latv = Vocalised laterals in word-final /l/ (e.g., */fiʊ/*).

Preceding and following segments were coded using broad phonetic transcription to reflect participants' productions of the sounds (e.g., preceding segment in *hill* was coded as /ɪ/) (For the full list of preceding/ following vowels, See Appendix L). Pause before initial /l/ or after final /l/ was coded as <p> following MAUS coding. Figure 7.1 illustrates praat segmentation and coding of the target words.

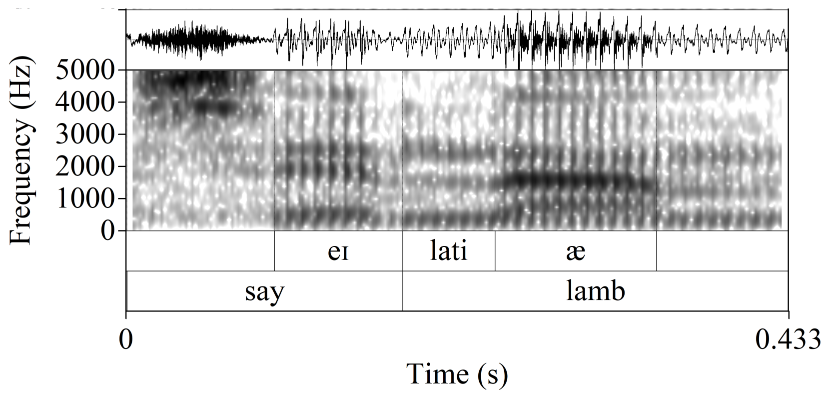

Figure 7.1: Praat segmentation and coding in the word *lamb*

Although following and preceding vowels were finely coded in Praat, they were re-coded later and reduced to two phonetic contexts. This is done to allow for statistical analysis and, importantly, comparison with the existing literature on English /l/, which found a significant effect of vowel height on /l/ degree of clearness/ darkness (i.e., clearer /l/ realisations in the high vowel context) (e.g., Recasens, 2012). The final codes were: *High* for high vowels, and *Non-high* for mid and low vowels (See Table 7.2). For example, in the utterance *I say hill again*, preceding vowel was coded in praat as /ɪ/ but re-coded during statistical analysis as *High*. Likewise, the vowel that follows *hill* was coded in praat as /ə/ but re-coded as *Non-high* during statistical analysis. Summary of preceding and following segments for initial and final /l/ is provided in Tables 7.3 and 7.4, respectively.

Classification	Preceding/ Following Vowels
High vowel	ɪ, ʉ, uː, ʊ, eɪ, aɪ,
Non- high vowel	e, ɛ, æ, ə, ʌ, ɒ, ɔː, ɑː

Table 7.2: Classification of Preceding and Following Vowels

	Preceding Segment		Following Segment	
	No. Tokens	Sample %	No. Tokens	Sample %
High vowel	811	75%	544	50%
Non- high vowel	6	1%	536	50%
Pause	263	24%	NA	NA

Table 7.3: Summary of Preceding and Following Segments for initial /l/

	Preceding Segment		Following Segment	
	No. Tokens	Sample %	No. Tokens	Sample %
High vowel	556	50%	5	1%
Non-high vowel	542	50%	864	78%
Pause	NA	NA	229	21%

Table 7.4: Summary of Preceding and Following Segments for final /l/

Tables 7.3 and 7.4 show similar proportions of high and non-high vowels after initial /l/ (i.e. following segment) as well as before final /l/ (i.e. preceding segment). Given that the target words were produced in the carrier phrase *"I say .... again"*, most initial /l/ tokens (75 %) were preceded by high vowels whereas the majority of final /l/ tokens (78%) were followed by non-high vowels. By contrast, non-high vowels before initial /l/ (i.e. preceding segment) and high vowels after final /l/ (i.e. following segment) comprise a very small proportion of the data- approximately 1% each - and therefore were not included in subsequent analysis (i.e., these were mostly filler sounds produced before or after target words). As shown in Tables 7.3, and 7.4, post-pausal initial /l/ and pre-pausal final /l/ tokens comprise about 24% and 21% of the sample, respectively.

Along with careful examination of the spectrogram and waveform, an auditory check of every /l/ token was carried out for three reasons: First, to ensure that target words are pronounced correctly. Second, to recognize and label vocalised /l/ tokens, as formant values are not reliable clues in distinguishing between dark and vocalized final laterals (Hall-Lew and Fix, 2012). Third, Praat formant tracking is not always accurate, hence requiring an auditory check for every single token to ensure accuracy of formant values. As expected, conducting the manual check on the data revealed about 200 tokens with wrong formant tracks in praat. These tokens were marked as (x) in a separate tier to be checked and corrected at a later stage (See section 7.4.3).

Final /l/ tokens which were heard as /o/ or /ɔ/ and had the acoustic characteristics of vowels were coded as vocalized /l/ (latv). Of 1104 final /l/ tokens, only five tokens, produced by two London speakers (i.e., Ammar and Zuha), were heard as vocalized variant of /l/, all of which were preceded by back vowels (e.g., *ball /bɔː/*). Given their small number, vocalized /l/ tokens were not included in the statistical analysis.

7.4.3 Acoustic Analysis

Following Carter (2003); Kirkham and McCarthy (2021); Nance (2014); Simonet (2010); Sproat and Fujimura (1993), acoustic analysis of laterals' steady-state was measured by taking the first three formants. Given the similarity in the phonetic environment of /l/ tokens (i.e., /l/ was mostly preceded and followed by either vowels or pause), the same criteria was used to determine the onset and offset of lateral tokens. When /l/ tokens were preceded (initial /l/) or followed (final /l/) by a pause, the start/ end of the lateral segment was determined by the onset/ offset of periodic voicing on the waveform as well as visible and steady F2 on the spectrogram (See Figure 7.2). When preceded and/ or followed by a vowel, the lateral portion was generally determined by a decreased complexity in the waveform, combined with lower amplitude on the spectrogram (lighter color), and accompanied by progressive listening. Within the lateral portion only laterals' steady-state, where F2 was stable on the spectrogram, were labeled and segmented (Carter and Local, 2007). In other words, the start/ end of lateral boundary did not include formant transition periods from the vowel portion to the lateral portion or vice versa. Examples of word-initial and word-final /l/ segmentation in vowel contexts are shown in Figures 7.3 and 7.4.

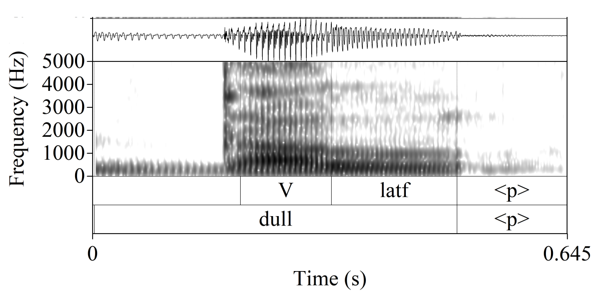

Figure 7.2: Pre-pausal final /l/

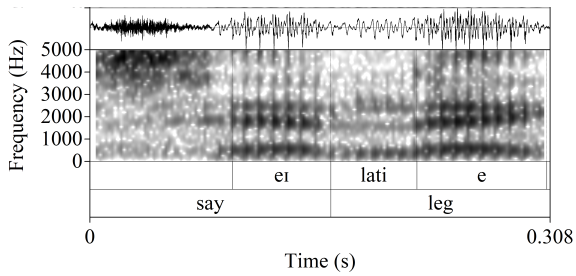

Figure 7.3: Initial /l/ in the word *leg*

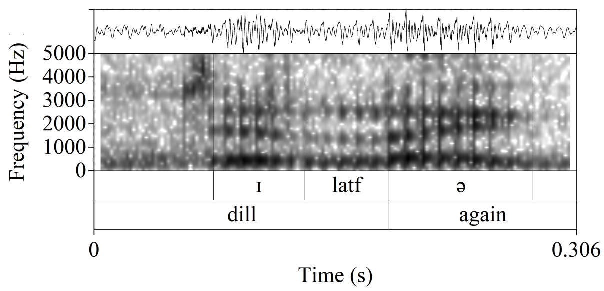

Figure 7.4: Final /l/ in the word *dill*

After segmentation was complete, midpoint formant values (F1, F2 and F3) of laterals' steady state, preceding segment and following segment were extracted along with lateral duration, word and laterals' preceding/ following segment using a custom-made Praat script (See Appendix M). Default Praat settings for formant measurement were used for both male and female speakers. Then extracted data was saved as a csv. file. To ensure the accuracy of extracted data (e.g., word, formant values, preceding segment) three random /l/ tokens were checked manually for each speaker. Mid-point formant values of tokens, previously noted with incorrect formant tracking, were corrected manually in the csv. file.

From the extracted data, two main acoustic measures were adopted in lateral analysis: F1 and F2 mid-point values as well as the difference between F2 and F1 (F2-F1). These two measures have been widely used in lateral analysis as they characterise the degree of /l/ clearness/darkness (Al-Ani, 1970; Kirkham and McCarthy, 2021; Recasens, 2012; Shaheen, 1979; Sproat and Fujimura, 1993). Consequently, using raw mid-point values of F1 and F2 (Hz) in the present study as an indication of /l/ variation allows for comparison with previous research on English and Arabic /l/. This measure, however, does not control for speakers' physiological differences (e.g., differences in males' and females' vocal tract) (Kirkham et al., 2020). By contrast, measuring the difference between F2 and F1 provides a relative value, and hence effectively shows /l/'s degree of clearness or darkness while reducing differences in speakers' physiology. Therefore, for the purpose of comparison with relevant literature, raw formant values (Hz) are used in the summary statistics whereas F2-F1 values (Hz) are used in the final statistical modeling (See

Sections 7.4.4 and 7.4.5 for more details).

7.4.4 Statistical Analysis

Prior to statistical testing, the empirical data (Hz) was plotted to consider trends in the data and allow for comparison with previous studies on English and Arabic laterals. Statistical testing was conducted in R (R Core Team, 2021) using linear mixed-effects regression (LMER) which requires the R packages ‘lme4’ (Bates et al., 2015) and ‘lmerTest’ (Kuznetsova et al., 2017). Then results were plotted using ‘ggplot2’ package (Hadley Wickham2016).

Initially, mixed-effects models were fitted to F1, F2 and F2-F1 (Hz) separately. However, due to the similarity observed in the significant factors and interactions across models, only results of F2-F1 (Hz) models are reported in the present analysis. Additionally, F2- F1 has been widely implemented in previous research to show the degree of /l/ clearness or darkness, as it has the advantage of inter-speaker normalization (Carter, 2003; Kirkham and McCarthy, 2021; Nance, 2014; Simonet, 2010; Sproat and Fujimura, 1993). The best-fit models were generated using the automatic "step" function. Tukey post-hoc tests for pair-wise comparisons were used, where appropriate using *emmeans()* package (Lenth, 2018), to compare levels of significant interactions of categorical factors (e.g., *word position:Gender*) while controlling for Type I error (Field et al., 2012, p.428-432).

7.4.5 Methods of Laterals Statistical Analysis

The analysis of lateral data was carried out using the same process as for VOT. First, the following three analyses were conducted on F2- F1 as a dependent variable:

- **Analysis of laterals in all positions**: To identify key linguistic effects, and social and linguistic interactions across position in the word.
- **Analysis of laterals in word-initial position**: To examine the effects of all possible interactions on initial /l/.
- **Analysis of laterals in word-final position**: To examine the effects of all possible interactions on final /l/.

Then, similar to the VOT analysis, the choice of the macro- and micro-social factors in each analysis was based on the following three-stages procedure:

1. Running an initial model (**Macro model**) which includes linguistic (i.e., word position) and macro-social factors (i.e., Gender, Dialect, MigrationExperience) as well as possible two way and three way interactions between them (See Appendix N).

2. Running an initial model (**Micro model**) which includes linguistic (i.e., word position) and micro-social factors (i.e., ethnic_identity, national_identity, English_use, Iraqi_contact, Muslim_contact, density) as well as possible two and three way interactions between them (See Appendix N).

3. Building a final model (**Final model**) which includes significant terms and interactions from **Macro** and **Micro** models as well as additional possible two and three way interactions between them (e.g., *word position:Gender: Iraqi_contact*) (See Appendix N).

The three models (i.e., **Macro model**, **Micro model** and **Final model**) were then compared using 'anova ()' function to ascertain the fit of the final model. Tables 7.5 and 7.6 show the output of model comparisons. Note that no comparison is made between the first initial models (**Macro model**) and (**Micro model**), as they are not nested within each other.

	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
Macro model	25740.62	25845.54	-12851.31	25702.62			
Final model	25582.07	25808.49	-12750.04	25500.07	202.5482	22	< 2.2e-16 ***

Table 7.5: Output of **Macro model** and **Final model** *anova ()* comparison

	AIC	BIC	logLik	deviance	Chisq	Df	Pr(>Chisq)
Micro model	26437.44	26520.62	-13203.72	26407.44			
Final model	26171.05	26398.41	-13044.53	26089.05	318.3914	26	< 2.2e-16 ***

Table 7.6: Output of **Micro model** and **Final model** *anova ()* comparison

As expected, *anova()* comparison shows a high significance of the **Final model** when compared to **Macro model** (χ^2= (22)=202.5, p<0.0001) and **Micro model** (χ^2= (26)=318.4, p<0.0001) separately, suggesting that including linguistic, macro- and micro-social factors as well as interactions between them in one model significantly improved the fit of the model. Therefore, it is the final model (**Final model**) whose results will be reported and interpreted in the following sections.

Analysis of Laterals in all Positions

This analysis was conducted on F2-F1 (Hz) as a dependent variable in all word positions (i.e., initial and final). Speaker and word were added as random factors (word: 55 levels; speaker: 44 levels). A decision was made to exclude following and preceding segments as fixed factors from this analysis (**Analysis of laterals in all positions**) given the distribution of pauses across word position (See Tables 7.3 and 7.4). Nevertheless, preceding and following segments were included in the subsequent analyses (**Analysis of laterals in word-initial position** and **Analysis of laterals in word-final position**), as each examines initial and final F2-F1 separately. Table 7.7 lists the linguistic and social variables included as fixed factors in the final model (**Final model**) before running 'step' function.

Fixed factors	**Levels**
Word position	Word-initial lateral Word-final lateral
Log duration	Log duration of lateral steady state (Continuous)
Gender	Male Female
Dialect	London Glasgow
Migration Experience	Professional Refugees
Ethnic_identity	Centered values (-2, -1, 0, 1) of participants ethnic identity score: (**-2** = weak ethnic identity, **1** = strong ethnic identity)
English_use	Centered values (-2, -1, 0, 1, 2) of participants frequency of English use score: (**-2** = infrequent English use, **2** = frequent English use)
Iraqi_contact	Centered values (-2, -1, 0, 1, 2) of participants Iraqi contact score: (**-2** = less contact with Iraqis, **2** = more contact with Iraqis)

Table 7.7: Fixed factors included in the **Final Model** of **Analysis of laterals in all positions** before running 'step' function

Analysis of Laterals in Word-initial Position

After creating a separate data set for word-initial /l/ tokens, mixed-effects models were fitted to initial F2-F1 as a dependent variable, following the above procedure. Speaker and word were included as random factors (word: 25 levels; speaker: 44 levels). Both preceding and following segments were added as fixed factors in the models. As mentioned earlier, non-front vowels were excluded from the preceding segment cell as they constitute a very small proportion and therefore can not be analyzed statistically (See Table 7.3). Table 7.8 shows the main fixed factors added to the final model (**Final Model**) before running 'step' function. Note that log (lateral duration) was dropped out of the final model, as it was not significant in the initial models (**Macro model** and **Micro Model**).

Fixed factors	**Levels**
Following segment	High vowels Non- high vowel
Gender	Male Female
Dialect	London Glasgow
Migration Experience	Professional Refugees
Ethnic_identity	Centered values (-2, -1, 0, 1) of participants ethnic identity score: (**-2** = weak ethnic identity, **1** = strong ethnic identity)
National_identity	Centered values (-2, -1, 0, 1, 2) of participants national identity score: (**-2** = weak national identity, **2** = strong national identity)
English_use	Centered values (-2, -1, 0, 1, 2) of participants frequency of English use score: (**-2** = infrequent English use, **2** = frequent English use)
Iraqi_contact	Centered values (-2, -1, 0, 1, 2) of participants Iraqi contact score: (**-2** = less contact with Iraqis, **2** = more contact with Iraqis)
Density of social networks	Centered values (-2, -1, 0, 1) of participants density score: (**-2** = less dense social network , **2** = more dense social network)

Table 7.8: Fixed factors included in the **Final Model** of **Analysis of laterals in word-initial position** before running ‘step’ function

Analysis of Laterals in Word-final Position

The third analysis was conducted on final /l/, with F2- F1 included as a dependent variable, and *speaker* and *word* included as random factors in the models (word: 30 levels; speaker: 44 levels). Again, to be able to include following segment in this analysis, front vowel tokens were excluded due to their low proportion in the data (See Table 7.4). As with previous analyses, fixed factors were included in the final model (**Final Model**) based on the above procedure, along with possible interactions between them. The fixed factors included in this analysis before running 'step' function are shown in Table 7.9.

Fixed factors	**Levels**
Preceding segment	High vowels Non-high vowels
Log duration	Log duration of lateral steady state (Continuous)
Gender	Male Female
Dialect	London Glasgow
Migration Experience	Professional Refugees
Ethnic_identity	Centered values (-2, -1, 0, 1, 2) of participants national identity score: (**-2** = weak national identity, **2** = strong national identity)
English_use	Centered values (-2, -1, 0, 1, 2) of participants frequency of English use score: (**-2** = infrequent English use, **2** = frequent English use)
Iraqi_contact	Centered values (-2, -1, 0, 1, 2) of participants Iraqi contact score: (**-2** = less contact with Iraqis, **2** = more contact with Iraqis)

Table 7.9: Fixed factors included in the **Final Model** of **Analysis of laterals in word-final position** before running 'step' function

The following paragraphs present the results of English /l/ analysis conducted on the data. Section 7.5.1 provides a general descriptive overview on the data in relation to linguistic and social variables of interest. Then, results of the final best-fitted models derived after running 'step' function in **Analysis of laterals in all positions**, **Analysis of laterals in word-initial position**, **Analysis of laterals in word-final position** are described in Sections 7.5.2, 7.5.3 and 7.5.4, respectively.

7.5 Results: Iraqi English Laterals

This section reports results of English laterals produced by Iraqi Arabs in the present analysis. Section 7.5.1 presents general descriptive results of laterals by showing mean formant values (i.e., F1, F2 and F3) according to the main linguistic and social factors (i.e., word_position, vowel context, lateral duration, Migration experience, Dialect and Gender). Then the results of the linear mixed-effects regression models fitted to the laterals' F2-F1 midpoint values in all word positions, word-initial and word-final positions are reported in Sections 7.5.2, 7.5.3 and 7.5.4 respectively.

7.5.1 Descriptive Results

General observation of raw mean formant values (i.e., F1, F2 and F3) shows apparent differences for laterals in different word-positions. As shown in Table 7.10, mean values of F1, F2 and F3 vary across initial and final /l/, with F2 showing bigger mean difference across word positions than F1 and F3 (i.e., higher mean F2 in word-initial than in word-final /l/). This is expected given previous accounts of F2 association with /l/ degree of clearness/ darkness, as F2 is "sensitive to variation in tongue dorsum height and fronting" (Recasens, 2012). Moreover, comparison of F2 across word-positions shows a larger frequency range for initial /l/ than final /l/ (See Figure 7.5 and Table 7.10), indicating more variability in the production of initial /l/ than final /l/. This observation is in line with Recasens (2012) cross-linguistic study on laterals, in which he reported more variation across initial than final /l/, with the former being generally clearer than the latter.

Formant	Word-initial	Word-final
	Mean(Sd)	**Mean(Sd)**
F1	359 (59)	421 (64)
F2	1630 (379)	1136 (211)
F3	2723 (313)	2646 (390)

Table 7.10: Mean and standard deviation of F1, F2 and F3 (Hz) for /l/ across word positions (n = 2178 tokens)

The low F1 and high F2 mean values observed in word-initial laterals indicate clear /l/ realizations whereas high F1 and low F2 mean values in word-final /l/ indicate darker /l/ realisations (See Figure 7.5)(Carter and Local, 2007; Gick et al., 2006; Ladefoged and Maddieson, 1996;

Sproat and Fujimura, 1993). The clearer /l/ realisations in initial than final positions is predicted by previous work, as such systematic distinction between word initial and final /l/ was reported in English as well as other languages (e.g., Recasens, 2012).

With regard to F3, previous acoustic studies on laterals reported contradicting F3 values according to word position. Recasens (2004, 2012) reported higher F3 formant values in final than initial /l/ in the non-high vowel context (i.e., /a/), with the former being darker than the latter. By contrast, Ball et al. (2001)'s preliminary investigation of a Northern Welsh variety showed lower F3 values in final than in initial /l/. In the present analysis, general comparison of F3 mean values across word positions (See Table 7.10 and Figure 7.5) shows slightly higher mean values in word-initial than in word-final positions, which aligns with Ball et al. (2001) finding. Similar difference is observed when considering vowel context, as illustrated in Figure 7.6, with F3 showing slightly lower mean values in final than initial positions, especially in the non-high vowel context.

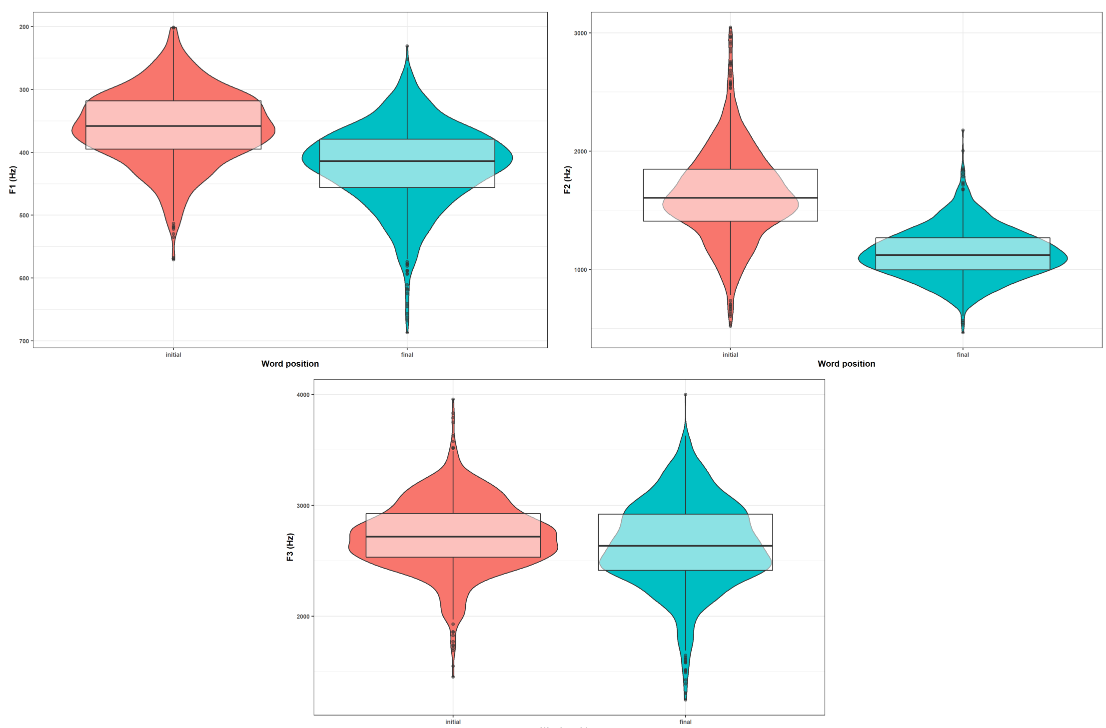

Figure 7.5: Laterals' F1 (top left), F2 (top right) and F3 (bottom) mean values (Hz) by word position for all speakers (n= 44 speakers)

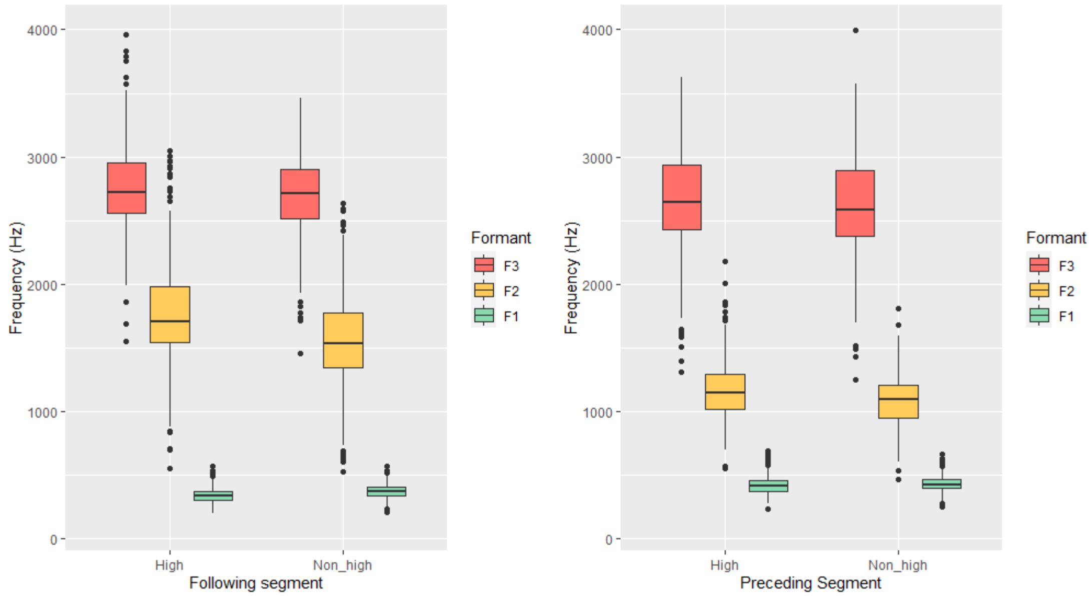

Figure 7.6: Comparison of F1, F2 and F3 mean values for initial /l/ (left) and final /l/ (right) in different vowel context.

As expected, Figure 7.6 shows a clear effect of vowel context on F2 for initial /l/, with clearer /l/ (i.e., Higher F2) before high than non-high vowel contexts. The duration of laterals' steady-state according to word position is illustrated in Figure 7.7.

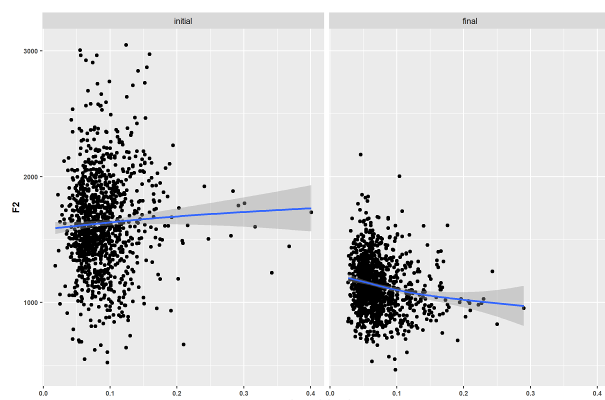

Figure 7.7: F2 mean values for initial /l/ (left) and final /l/ (right) by lateral duration

Figure 7.7 shows a clear effect of duration on final /l/, with darker realisations (lower F2 values) in longer durations. By contrast, F2 values for initial /l/ do not vary according to lateral duration, indicating lack of duration effect on initial /l/. This observation is in line with previous research on English /l/, which reported a significant effect of duration only on dark /l/ (e.g., Sproat and Fujimura, 1993; Yuan and Liberman, 2009).

To further understand patterns of variation in initial and final /l/, mean formant values across word positions are explored in relation to macro-social factors of gender, dialect and migration experience (See Figures 7.8, 7.9 and 7.10).

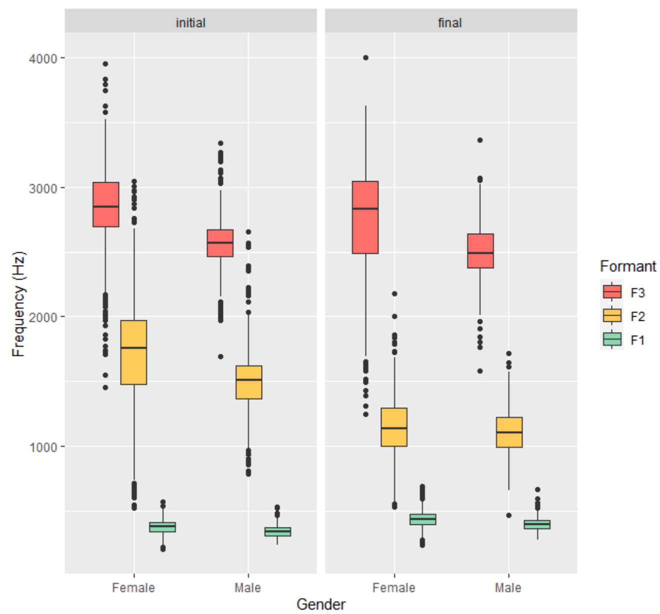

Figure 7.8: Mean formant values for initial and final /l/ across gender groups

As illustrated in Figure 7.8, mean F2 and F3 values of word initial and final /l/ for male and female speakers are slightly different, with female speakers showing higher F2 and F3 in initial /l/ and higher F3 in final /l/ than male speakers. While the higher initial F2 mean value by female speakers may indicate clearer initial /l/ realisations, such gender differences in raw formant values should be interpreted with caution, as they are affected by physiological differences.

As for dialect, illustration of formant values across dialect areas shows subtle differences, with slightly higher initial and final F2 and lower final F3 in London than in Glasgow data (See Figure 7.9). Such observation indicates clearer realisations of laterals by London participants, and thus suggesting a possible effect of regional variety on Iraqis' production of English /l/.

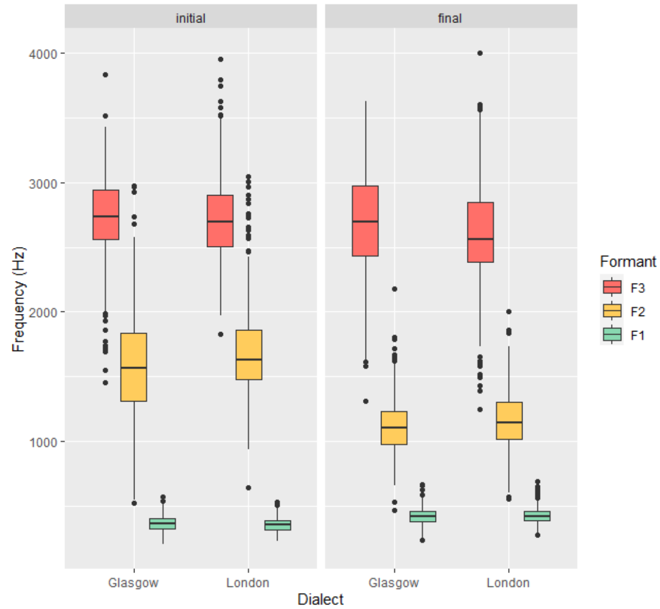

Figure 7.9: Mean formant values for /l/ across word positions in London and Glasgow data

With regard to migration experience, illustration of formant values for initial and final /l/ according to migration experience (See Figure 7.10) shows a clear distinction between word-initial and final /l/ across both groups. However, there are small differences in final /l/ mean formant values between the groups, with slightly higher F2 and lower F3 mean values in the refugees data, suggesting clearer final /l/ by refugees than professional speakers.

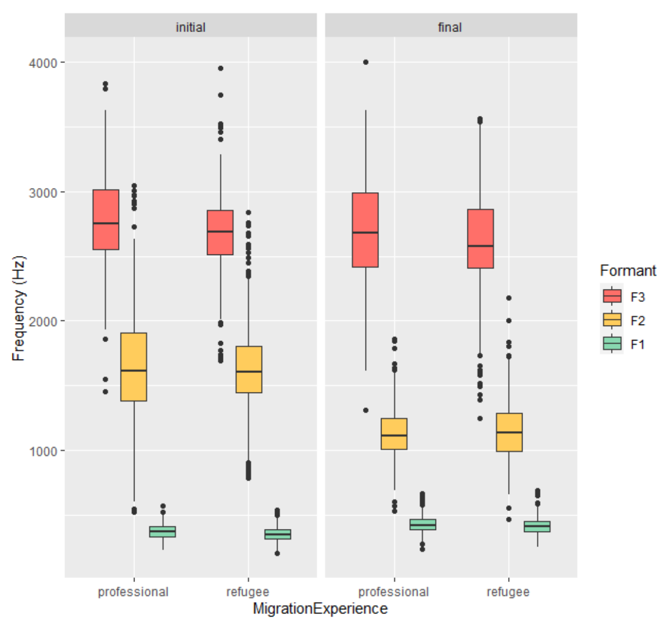

Figure 7.10: Mean formant values for /l/ across word positions for professional and refugee speakers

Overall, the general descriptive results in the present study show a clear effect of word position on the production of English laterals, with considerably clearer realisations in initial than final /l/. Illustration of formant values according to macro-social factors shows subtle differences. Importantly, Iraqis in Glasgow show a strong positional effect in their English /l/ although previous accounts of Glasgow English reported lack of positional contrast in the production of /l/. Nevertheless, Glasgow Iraqi speakers show slightly darker initial and final /l/ than their London counterparts. These descriptive results are now subjected to the statistical analyses (See Sections 7.4.4 and 7.4.5), and the results are presented in the sections below.

7.5.2 Results of Laterals in all Positions

This section presents the results of the mixed-effects model fitted to F2-F1 for all laterals. Following the strategy discussed above (See Section 7.4.5), F2-F1 difference was analysed first for linguistic/macro-, then for linguistic/micro-social factors, to discover the terms/interactions to put into the final model. Then, 'step' function was used to find the best fit model.

Table 7.11 shows the model output for the final model. Results show a significant effect of random factors of *speaker* and *word*. All significant main effects were included in interactions, so only higher-order interactions are discussed following Field et al. (2012).

	Dependent variable:
	F2-F1 (Hz)
	Estimate (Std. Error)
Constant	717.494*** (88.696)
lateral duration	−1,014.442*** (276.449)
lateralinitial	712.654*** (56.069)
GenderMale	31.206 (99.649)
DialectLondon	79.644 (113.808)
MigrationExperiencerefugee	−81.298 (85.825)
ethnic_identity	9.778 (58.118)
English_use	−30.581 (46.014)
Iraqi_contact	−37.147 (52.487)
lateral duration:lateralinitial	1,008.225*** (337.237)
lateralinitial:GenderMale	−287.876*** (44.554)
lateralinitial:DialectLondon	−35.928 (50.775)
lateralinitial:MigrationExperiencerefugee	21.720 (38.681)
lateralinitial:ethnic_identity	−229.459*** (26.075)
lateralinitial:English_use	111.754*** (20.456)
lateralinitial:Iraqi_contact	80.113*** (23.395)
GenderMale:ethnic_identity	−2.112 (57.396)
GenderMale:English_use	28.597 (68.719)
GenderMale:Iraqi_contact	66.742 (69.473)
DialectLondon:ethnic_identity	−20.641 (67.986)
DialectLondon:MigrationExperiencerefugee	166.328 (116.052)
MigrationExperiencerefugee:Iraqi_contact	−91.148 (62.864)
MigrationExperiencerefugee:English_use	−55.045 (62.339)
lateralinitial:DialectLondon:MigrationExperiencerefugee	−148.415*** (51.724)
lateralinitial:MigrationExperiencerefugee:Iraqi_contact	76.096*** (28.037)
lateralinitial:MigrationExperiencerefugee:English_use	−65.369** (28.281)
Observations	1,892
Log Likelihood	−12,541.220
Akaike Inf. Crit.	25,164.430
Bayesian Inf. Crit.	25,390.690
Note:	*p<0.05; **p<0.01; ***p<0.001

	Dependent variable:
	F2-F1 (Hz)
	Estimate (Std. Error)
Constant	717.494*** (88.696)
lateralinitial:GenderMale:ethnic_identity	128.943*** (25.891)
lateralinitial:GenderMale:English_use	−177.345*** (30.810)
lateralinitial:GenderMale:Iraqi_contact	−89.855*** (30.967)
lateralinitial:DialectLondon:ethnic_identity	164.524*** (30.656)
Observations	1,892
Log Likelihood	−12,541.220
Akaike Inf. Crit.	25,164.430
Bayesian Inf. Crit.	25,390.690
Note:	*p<0.05; **p<0.01; ***p<0.001

Table 7.11: Mixed-effects model output showing the effect of fixed factors and interactions on F2- F1 (Hz) from Analysis of laterals in all positions

As expected, the model results show a highly significant main effects of word position (*lateral*) and log lateral duration on F2-F1 values. These linguistic factors are also significant when interacting with each other $F(1{,}1819.74) = 8.94$, $p < 0.005$, indicating a different effect of lateral duration on initial and final /l/. Confirming initial observations (See Figure 7.7), while F2- F1 for final /l/ is considerably lower in longer durations, lateral duration does not show a significant effect on initial /l/. Such result is expected, as it has been reported in a number of previous studies on English laterals (Carter, 2002; Huffman, 1997; Sproat and Fujimura, 1993; van Hofwegen, 2010).

Unlike linguistic factors, none of the social factors show a significant main effect on F2-F1 values, but were all involved in significant interactions with word position (See Table 7.11). Specifically, there are seven three-way interactions of word position by macro-social factors, of which one involves both migration experience and dialect, two involve migration and micro-social factors, three involve gender and micro-social factors, and finally one involves dialect and and a micro-social factor.

Migration experience shows a significant effect on F2-F1 when involved in interaction with word position and dialect $F(1{,}1784.20) = 8.23$, $p < 0.005$. Illustration of the interaction (See

Figure 7.11) shows clearer initial /l/ realizations (i.e., higher F2-F1) by London professionals than other speakers in both dialect areas. When considering migrant groups in both dialect areas, small differences are observed in the production of initial and final /l/ by professional and refugee speakers in Glasgow. By contrast, London professionals produce clearer initial, but darker final /l/ than their refugee counterparts. Glasgow speakers generally produce darker (lower F2-F1) final /l/ than London speakers, with Glasgow refugees producing significantly darker final /l/ (lower F2-F1) than their London counterparts (i.e., mean F2-F1 in final /l/: Glasgow refugees = 569 Hz; London refugees= 801 Hz and p= 0.01 in Tukey post-hoc test).

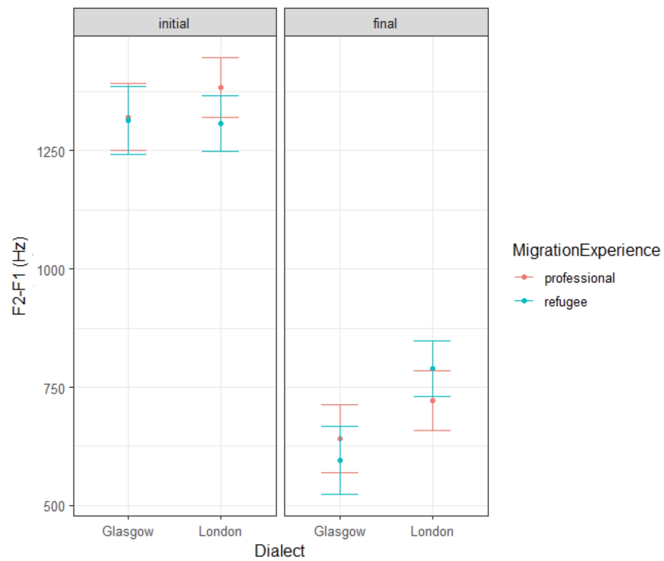

Figure 7.11: F2-F1 (Hz) for the significant interaction of Word position, Dialect and Migration experience from Analysis of laterals in all positions. Points and error bars represent the model-estimated mean values and 95% confidence intervals, respectively

The model results also show variation within migrant groups in the significant word_position: Migration experience: Iraqi_contact interaction, $F(1,36.99) = 7.4$, $p < 0.01$. As illustrated in Figure 7.12, professional speakers who reported more contact with Iraqis show higher initial F2-F1 values, and thus clearer initial /l/, than speakers who reported less contact with Iraqis (i.e., Mean initial F2-F1: Score 2= 1416 Hz; Score -2= 1284 Hz). By contrast, refugee speakers show clear differences in the production of final /l/, with significantly darker final /l/ realizations (lower F2-F1) among refugee speakers who reported more contact with Iraqis than those who reported less Iraqi contact (i.e., Mean final F2-F1: Score 2= 483 Hz; Score -2= 884 Hz).

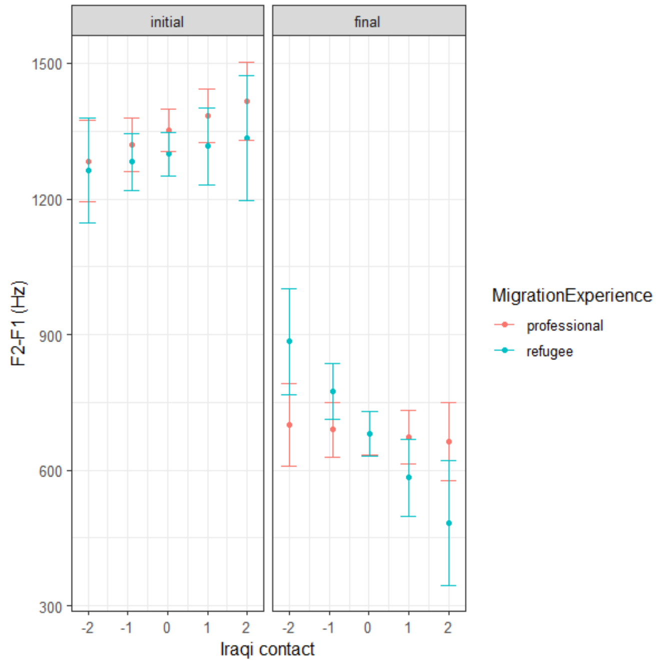

Figure 7.12: F2-F1 (Hz) for the significant interaction of Word position, Migration experience and Iraqi_contact from Analysis of laterals in all positions. Points and error bars represent the model-estimated mean values and 95% confidence intervals, respectively

Furthermore, refugee speakers show variation in the production of initial and final /l/ when considering frequency of English use (See Figure 7.13). In the significant word_position: Migration experience: English_use interaction ($F(1{,}1785.9) = 5.34$, $p < 0.05$), refugee speakers who reported frequent use of English produced significantly darker initial and final /l/ (lower F2-F1) than their counterparts who reported the opposite (i.e., Mean initial F2-F1: Score 2= 1095 Hz, Score -2= 1502 Hz; Mean final F2-F1: Score 2= 540 Hz; Score -2= 835 Hz). Professional speakers, on the other hand, did not show a significant effect of English use on their initial and final /l/.

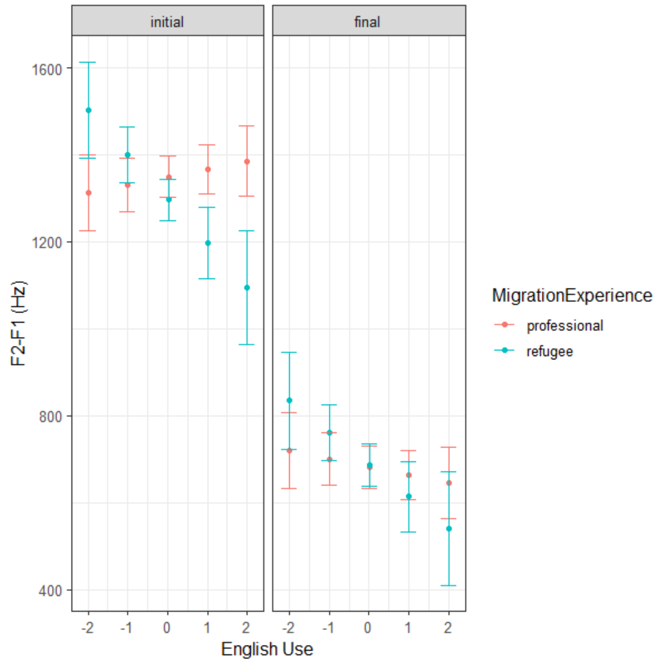

Figure 7.13: F2-F1 (Hz) for the significant interaction of Word position, Migration experience and English_use from Analysis of laterals in all positions

Gender was involved in highly significant three-way interactions with word position and a number of micro-social factors. Gender interacts with word position and ethnic identity F (1,1784.83) = 24.8, p< 0.0001, as shown in Figure 7.14. While there is no difference by gender or ethnic identity in word-final position, female speakers overall produce considerably clearer initial /l/ (i.e. higher F2-F1) than male speakers (i.e., mean F2-F1: male speakers = 1162 - 1228 Hz; female speakers = 1287- 1766 Hz) and show darker initial /l/ when reporting stronger ethnic identity (Score 1= 1287 Hz; Score -2=1766 Hz). The darker initial /l/ realisations among females who expressed strong ethnic identity was unexpected given previous accounts of strong ethnic identity to correlate positively with non-native accented features (e.g., Hoffman and Walker, 2010).

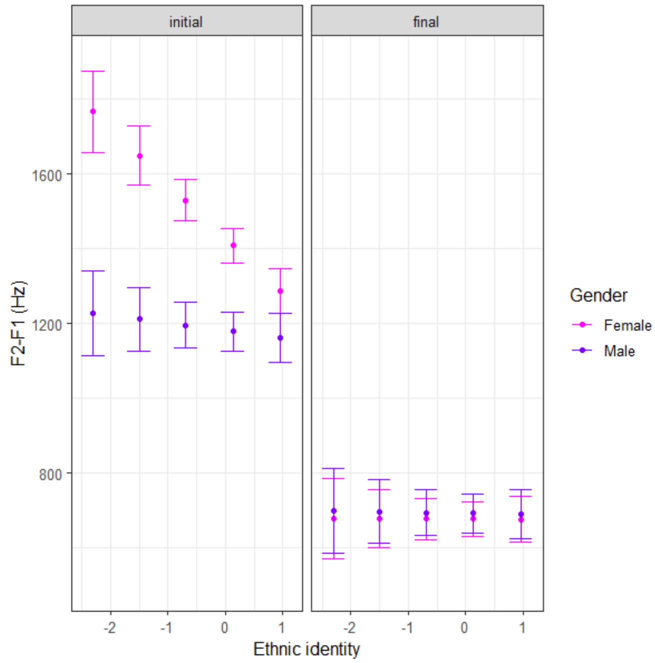

Figure 7.14: F2-F1 (Hz) for the significant interaction of Word position, Gender and Ethnic identity from Analysis of laterals in all positions

Moreover, the model results show a highly significant effect of word position:gender:English use interaction on F2-F1; F (1,1788.3) = 33.13, p< 0.0001. As shown in Figure 7.15, significant differences according to gender and English use are observed in the production of initial /l/, with males producing considerably darker initial /l/ (lower F2-F1) when they reported more English use than their counterparts who reported less English use and female speakers overall (Male initial /l/: Score 2= 936 Hz, Score -2= 1430 Hz). In final position, female speakers show darker /l/ as they reported more English use (Female final /l/: Score 2= 566 Hz, Score -2= 790 Hz).

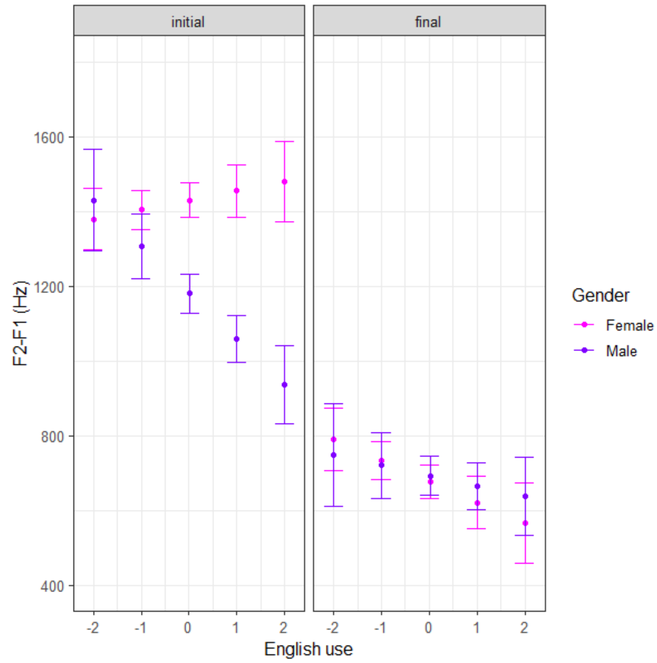

Figure 7.15: F2-F1 (Hz) for the significant interaction of Word position, Gender and English use from Analysis of laterals in all positions

In the significant word position:gender:Iraqi_contact interaction *F* (1,1784.3) = 8.42, p< 0.005, gender differences are observed in word-initial position (See Figure 7.16), with male speakers generally producing darker initial /l/ than female speakers. While male speakers do not show a visible effect of Iraqi contact on their production of initial and final /l/, female speakers show contrasting effect of Iraqi contact on initial and final /l/. As illustrated in Figure 7.16, female speakers who reported more Iraqi contact produced clearer initial /l/ (higher F2-F1) than female speakers who reported less Iraqi contact (Score 2= 1503 Hz, Score -2= 1359 Hz). The opposite pattern is observed in the production of final /l/, with female speakers who reported more Iraqi contact producing darker final /l/ (lower F2-F1) and vice versa (Score 2= 516 Hz, Score -2= 834 Hz).

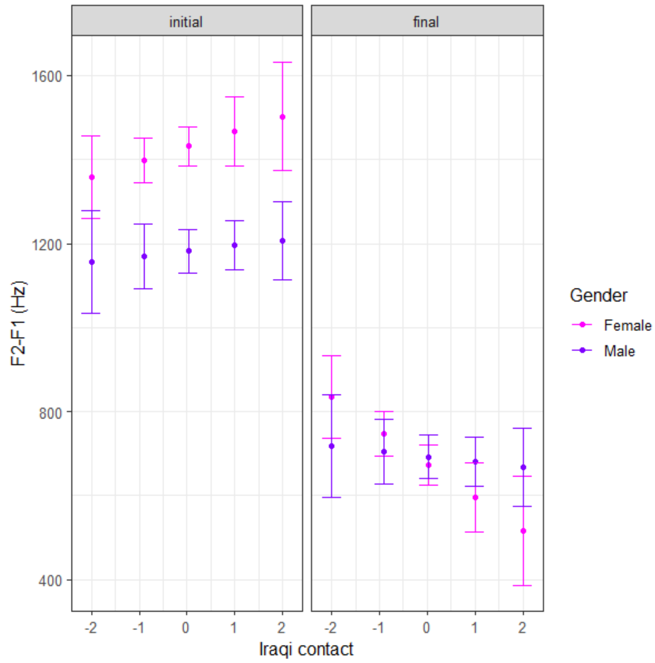

Figure 7.16: F2-F1 (Hz) for the significant interaction of Word position, Gender and Iraqi_contact from Analysis of laterals in all positions

Finally, dialect was involved in a significant three-way interaction with word position and ethnic identity, $F(1,1785.7) = 28.8$, $p < 0.0001$. Visualization of the significant word_position: dialect: ethnic_ identity interaction (See Figure 7.17) shows that Glasgow speakers show an unexpected effect of ethnic identity on their production of initial /l/, with significantly darker initial /l/ (lower F2-F1) among speakers who reported strong ethnic (Iraqi Arabic) identity and vice versa (i.e., Mean initial F2-F1: Score 1= 1135 Hz, Score -2= 1677 Hz). By contrast, London speakers do not display differences in F2-F1 values in relation to their ethnic identity score.

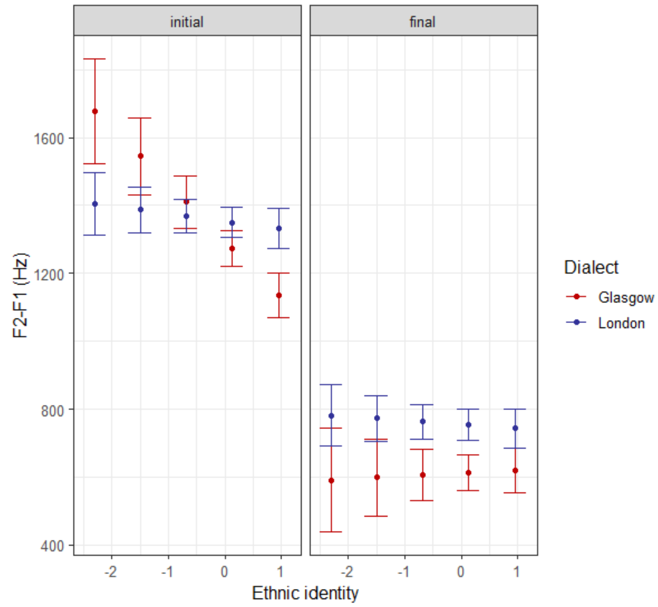

Figure 7.17: F2-F1 (Hz) for the significant interactions of Word position, Dialect and ethnic identity from Analysis of laterals in all positions

Variation in the production of English laterals as produced by Iraqi Arab speakers can therefore be summarized as follows:

- Laterals are affected by word position and lateral duration, in which initial /l/ is always clearer than final /l/ and final /l/ is darker in longer durations.
- Laterals are affected by macro-social factors (i.e., migration experience, dialect, gender) and a number of micro-social factors (i.e., ethnic_identity, English_use, Iraqi_contact), but always in interaction with word position.
- Dialect differences are observed in the production of English /l/ according to migration experience, with clearer initial /l/ by London professionals than other groups and darker final /l/ by Glasgow than London refugees.
- Intra-group variation in F2-F1 values are not only observed across but also within migrant and dialect groups as follows:

  1. Professional speakers who reported more contact with Iraqis produced clearer initial /l/ whereas refugee speakers who reported more Iraqi contact produced darker final /l/.
  2. Refugee speakers who reported frequent English use produced darker initial and final /l/ than those who reported infrequent English use.

3. Glaswegian Iraqi speakers who expressed strong ethnic identity produced considerably darker initial /l/ than their counterparts who reported the opposite.

- Variation in the production of initial and final /l/ are observed within gender groups when involved in interaction with micro-social factors in the following ways:

  1. Females who expressed strong ethnic identity produced darker initial /l/ than their counterparts who reported the opposite.
  2. Male speakers who use English more frequently produced darker initial and final /l/. A similar effect of English use is observed among female speakers, but only for final /l/.
  3. Contact with Iraqis correlates with female speakers' production of initial and final /l/, with clearer initial but darker final /l/ realisations amongst those who reported more contact with Iraqis.

The statistical analysis of F2-F1 in both word positions shows that /l/ is produced differently in initial and final positions, and these differences are also affected by social factors. The following sections now present results of F2-F1 analysis for each word position separately.

7.5.3 Results of Laterals in Word-initial Position

As before, initial /l/ model shows a significant effect of random factors of *speaker* and *word*. The significant fixed factors and interactions are shown Table 7.12.

	Dependent variable:
	F2-F1 (Hz)
	Estimate (Std. Error)
Constant	1,552.461*** (67.921)
following_Segment Non_high	−230.973*** (47.248)
GenderMale	−391.056*** (100.992)
MigrationExperiencerefugee	−147.205 (93.309)
Ethnic_identity	−91.512* (34.339)
following_Segment Non_high:MigrationExperiencerefugee	158.317** (48.530)
following_Segment Non_high:GenderMale	63.965 (50.641)
GenderMale:MigrationExperiencerefugee	348.520* (144.356)
following_Segment Non_high:GenderMale:MigrationExperiencerefugee	−222.773** (73.511)
Observations	983
Log Likelihood	−6,947.096
Akaike Inf. Crit.	13,918.190
Bayesian Inf. Crit.	13,976.880
Note:	*p<0.05; **p<0.01; ***p<0.001

Table 7.12: Mixed-effects model output showing the effect of fixed factors and interactions on F2- F1 (Hz) from Analysis of laterals in word-initial position

As shown in Table 7.12, following segment (i.e., High *vs* non-high vowel contexts) and gender show significant main effects on initial /l/ F2-F1, but both are included in a significant three way interaction with migration experience $F(1{,}910.9) = 9.18$, $p < 0.005$. Illustration of the interaction (See Figure 7.18) shows that initial /l/ is generally clearer before high than non-high vowels, but with additional differences by gender and migration experience. Professional male speakers produce significantly darker initial /l/ than female professionals in both vowel contexts, but show a smaller effect of following segment than their female counterparts, who produce very clear initial /l/ in the high vowel context (p< 0.01 in Tukey post-hoc test). By contrast, refugee speakers do not show gender differences in the production of initial /l/ in the high vowel context, but are relatively different in the non-high vowel context. Specifically, refugee male speakers produce considerably darker /l/ than their female counterparts before non-high vowels (p = 0.04 in Tukey post-hoc test).

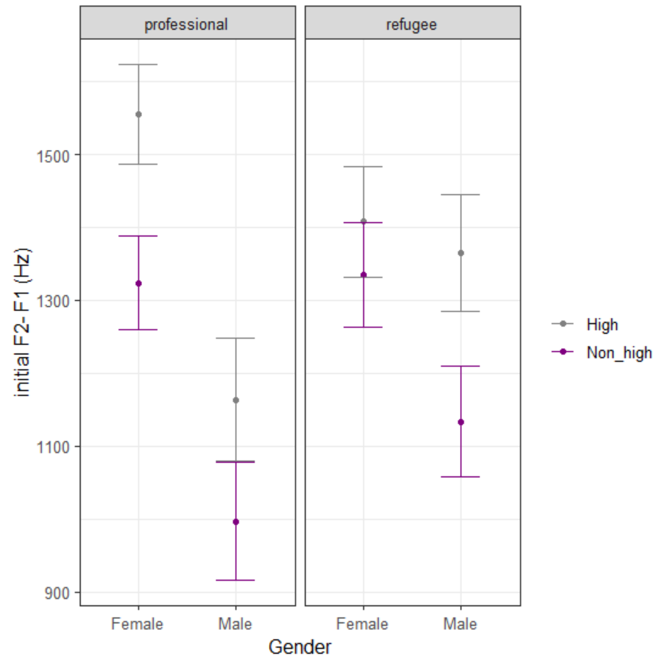

Figure 7.18: Initial F2-F1 (Hz) for the significant following_Segment:Gender:MigrationExperience interaction from Analysis of laterals in word-initial position. Points and error bars represent the model-estimated mean values and 95% confidence intervals, respectively

Interestingly, the initial /l/ model output shows a significant main effect of ethnic identity score on F2-F1 values $F(1,34.8) = 7.10$, p = 0.01. The negative estimate (See Table 7.12) indicates lower initial F2-F1 values for higher ethnic identity scores, a pattern visually confirmed in Figure 7.19. Initial /l/ is significantly darker (lower F2-F1 values) among speakers who reported stronger ethnic identity (higher scores) than speakers who reported weak ethnic identity score.

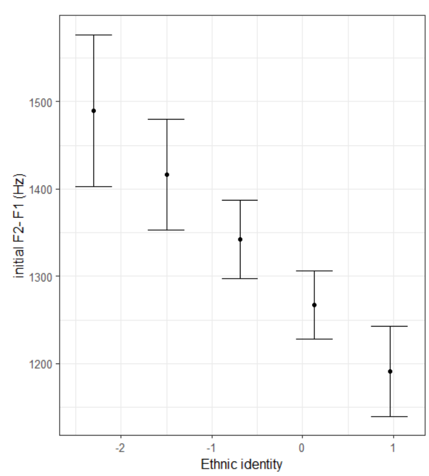

Figure 7.19: Initial F2-F1 (Hz) for the significant effect of ethnic identity from Analysis of laterals in word-initial position. Points and error bars represent the model-estimated mean values and 95% confidence intervals, respectively

The following factors and interactions play a role in the variation observed in the production of initial /l/ by Iraqi Arab speakers:

- Initial /l/ is clearer before high than non-high vowels.
- Males generally show darker initial /l/ than females, but this difference is modulated by following segment and migration experience. While professional speakers show gender differences in both vowel contexts, refugee speakers show gender differences only in the non-high vowel context.
- Speakers produce darker initial /l/ as they reported stronger Iraqi Arab identity.

7.5.4 Results of Laterals in Word-final Positions

Mixed effects model analysis of word-final laterals shows significant effects of speaker and word as random factors. Table 7.13 shows the significant fixed effects in the final model.

	Dependent variable:
	F2-F1 (Hz)
	Estimate (Std. Error)
Constant	764.354*** (33.577)
lateralduration	$-1{,}023.575^{***}$ (202.567)
DialectLondon	66.771 $^{\cdot}$ (36.723)
Observations	1,098
Log Likelihood	$-7{,}198.068$
Akaike Inf. Crit.	14,410.140
Bayesian Inf. Crit.	14,445.140
Note:	$^{\cdot}$ p<0.1; *p<0.05; **p<0.01; ***p<0.001

Table 7.13: Mixed-effects model output showing the significant fixed factors on final F2- F1 (Hz) from Analysis of laterals in word-final positions

Unlike word-initial /l/, model results of final laterals (See Table 7.13) show a highly significant effect of laterals' steady-state duration on F2-F1 values $F(1{,}1077.5) = 25.69$, $p < 0.0001$, with F2-F1 being considerably lower when laterals' duration is longer. In other words, final /l/

is considerably darker in longer /l/ utterances, an observation that has been reported in previous work on laterals (Sproat and Fujimura, 1993; van Hofwegen, 2010; Yuan and Liberman, 2011).

Preceding_segment did not show a significant effect on final /l/ F2-F1 values in the final model output. This result is in line with Recasens (2012) findings, in which he reported insignificant difference in final F2 values according to the vowel context (e.g. /i/, /a/). Likewise, following_segment did not show any effect on final F2-F1.

The only social factor that has a significant, though marginal, main effect on final F2-F1 values is dialect, $F(1,42.09) = 3.30$, $p = 0.07$. Visualisation of the significant effect, as provided in Figure 7.20, shows darker final /l/ realisations (lower F2-F1) by Glasgow than London speakers (i.e., mean final F2-F1 in Glasgow data is 679 Hz whereas in London data is 747 Hz).

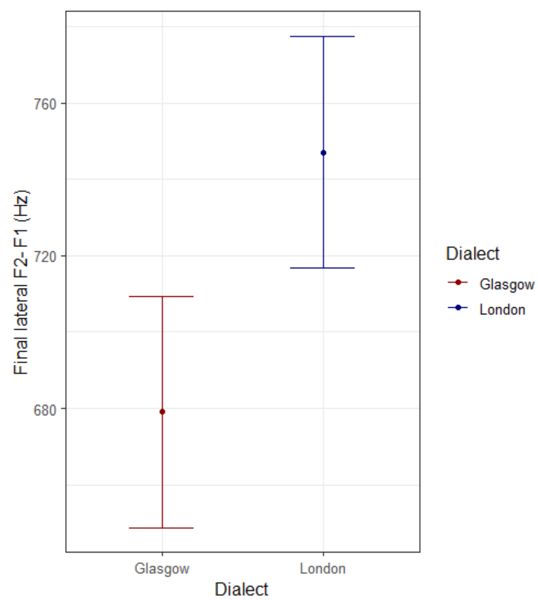

Figure 7.20: The significant effect of dialect on final F2-F1 (Hz) from Analysis of laterals in word-final positions. Points and error bars represent the model-estimated mean values and 95% confidence intervals, respectively

The following factors contribute to final /l/ variation observed in the English spoken by Iraqi Arab speakers:

- Final /l/ is significantly darker in longer utterances.
- London speakers produce clearer final /l/ than Glasgow speakers.

7.5.5 Intra-group Sociolinguistic Variation as Part of the Larger Acculturation Behaviour

Including micro-social factors in the present analysis uncovered significant variation in the production of /l/ within groups of particular interest, highlighting the importance of considering speakers' social behavior along with larger social categories (e.g., the effect of ethnic social contact on females' production of /l/). While the results show the expected effect of certain sociolinguistic variables on the degree of /l/ clearness/darkness within each group, other variables show unexpected significant variation. For example, refugee, male and female speakers show darker /l/ realisations when they reported more frequent use of English. This result is expected given that frequent English use could entail accommodating to monolingual-like /l/ realisations (i.e., darker /l/). On the other hand, the effect of Iraqi contact score on refugee and female speakers is unexpected, as more contact with Iraqis might be assumed to link to Arabic, and so Arabic accented /l/ realisations (i.e., very clear /l/). However, both refugee and female speakers in the present analysis showed darker /l/ realisations as they reported more Iraqi contact (See Figures 7.12, 7.16). Likewise, assuming that stronger Iraqi Arab identity might be linked to Arabic and Arabic accented features, the effect of ethnic identity score on the production of initial /l/ was unexpected, as participants overall produced darker initial /l/ as they reported stronger ethnic identity (See Figure 7.19). This section, therefore, aims to understand the unexpected results observed in the data by considering the larger picture of the speakers' social behavior.

Given the large number of social factors included in the social questionnaire (See Chapter 5), it is possible that the unexpected variation observed among speakers with reference to Iraqi contact and ethnic identity is explained by other social factors, with which Iraqi contact, or ethnic identity, were correlated. To recap, Pearson's correlation test, which captures the interrelation between variables, was used on the questionnaire social variables prior to the statistical analysis (See Chapter 5). Based on the correlation results, only one of the correlated variables was included in the regression models to avoid multicollinearity (See Chapter 5). While certain variables, including Iraqi contact and ethnic identity, were deemed appropriate predictors for the present analysis, and thus included in the statistical analysis, excluded variables may also explain variation (Baayen, 2008, p.183). For this reason, in addition to the matrix plot provided in Chapter 5 on the whole data (See Figure 7.21), Pearson's correlation matrices on Glasgow, refugee and female speakers' data were generated and plotted separately in Figures 7.22 and 7.23.

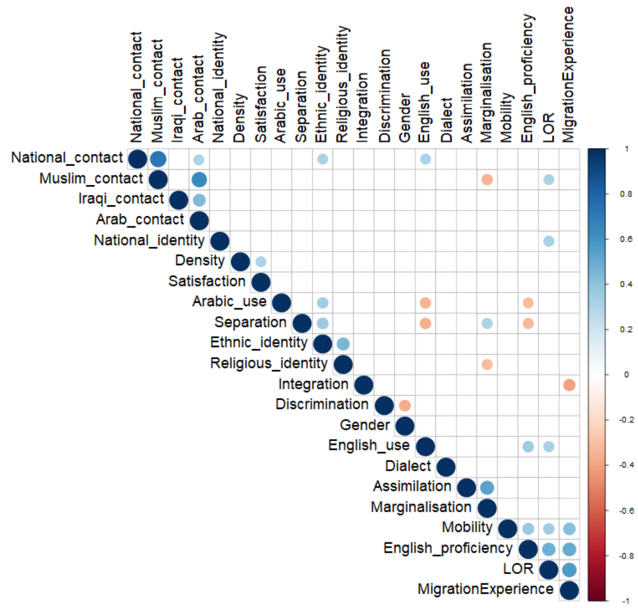

Figure 7.21: Correlation plot for Pearson's correlation matrix on the social questionnaire data for all participants (n= 43)

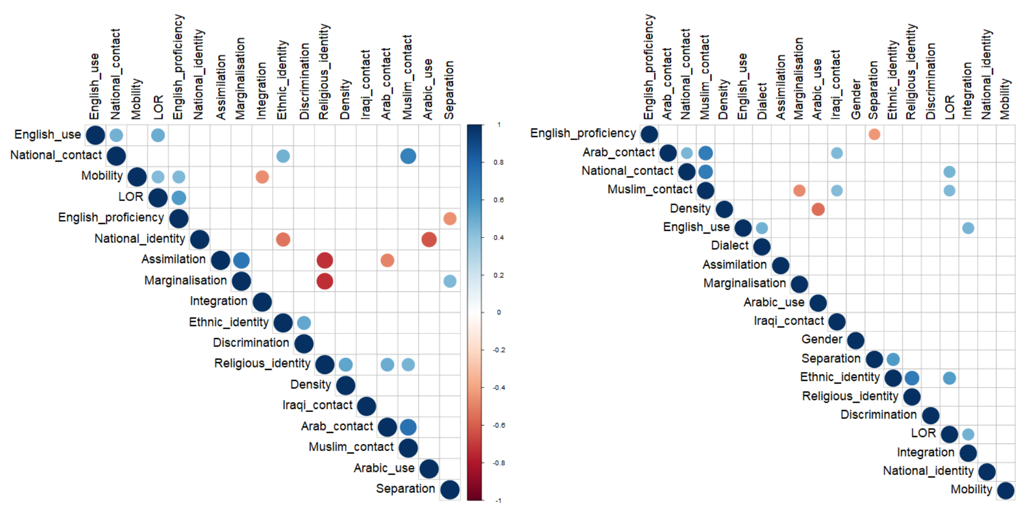

Figure 7.22: Correlation plots of of Glasgow (left) and refugee (right) social questionnaire data

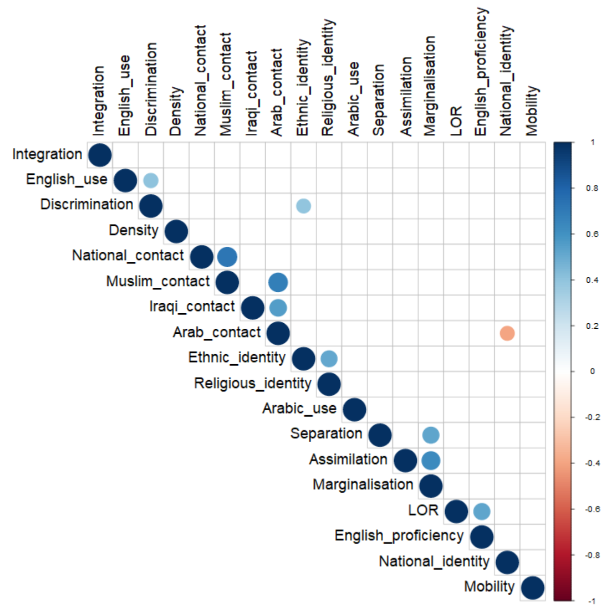

Figure 7.23: A correlation plot of female social questionnaire data

In the results of laterals in word-initial position (Section 7.5.3), ethnic identity score shows an overall significant effect on initial /l/'s degree of darkness on all speakers, and similar effect is observed in the results of laterals in all positions (Section 7.5.2) among female and Glasgow speakers separately. Interestingly, Figure 7.21 shows that ethnic identity score is highly positively correlated with national contact ($p < 0.05$), indicating higher-level contact with Anglo/ Scottish speakers among speakers who also reported high ethnic identity score. Similar significant correlation is observed in the data of Glasgow speakers, with significantly positive correlation between ethnic identity and national contact (See Figure 7.22 ,*left*). While female speakers' correlation matrix does not show a correlation between ethnic identity and national contact, ethnic identity correlated with discrimination, which shows a positive correlation with English use ($p = 0.05$).

As for contact with Iraqis, visualisation of the refugees' correlation matrix (See Figure 7.22 ,*right*) shows a correlation between Iraqi contact and Muslim contact as well as Iraqi contact and Arab contact, both of which show a correlation with national contact ($p <0.05$). Likewise, the females' correlation matrix (See Figure 7.23), shows a correlation between Iraqi contact and Arab contact, with the latter interrelating with Muslim and National contact ($p< 0.05$).

The observed correlations between variables of interest (i.e. ethnic identity and Iraqi contact) and other social factors are complex but interesting as they indicate differences in participants' social behavior within the given groups. In fact, such significant interrelated correlations between these variables (e.g., Iraqi contact , Muslim contact and National contact) have been shown in Berry et al. (2006) examination of the relationship among acculturation variables (See Chapter 5).

Berry et al. (2006) adopted the factorial analysis approach to group and classify variables based on the correlations between them, and then to determine participants' acculturation behaviour (i.e., integration, assimilation..etc). This approach is not used in the present analysis due to time constraint. However, hierarchical cluster analysis (HCA) is performed on the above-presented correlation matrices to reveal the specific linkage between variables of interest and other variables. Hierarchical cluster analysis (HCA) is one of the statistical tools used to explore the correlational structure of variables using a tree-like format (Baayen, 2008, p.139). By turning the correlation into a distance measure (i.e., Euclidean), positively correlated variables will have small distance and therefore appear in one cluster. Bearing in mind the aim and scope of the present study, hierarchical cluster analysis is used here, along with the correlation matrices, only to statistically measure the link between ethnic identity and Iraqi contact on one hand and other social variables on the other hand. Dendrograms for Glasgow, refugee and female correlation matrices are presented in Figures 7.24 and 7.25, respectively.

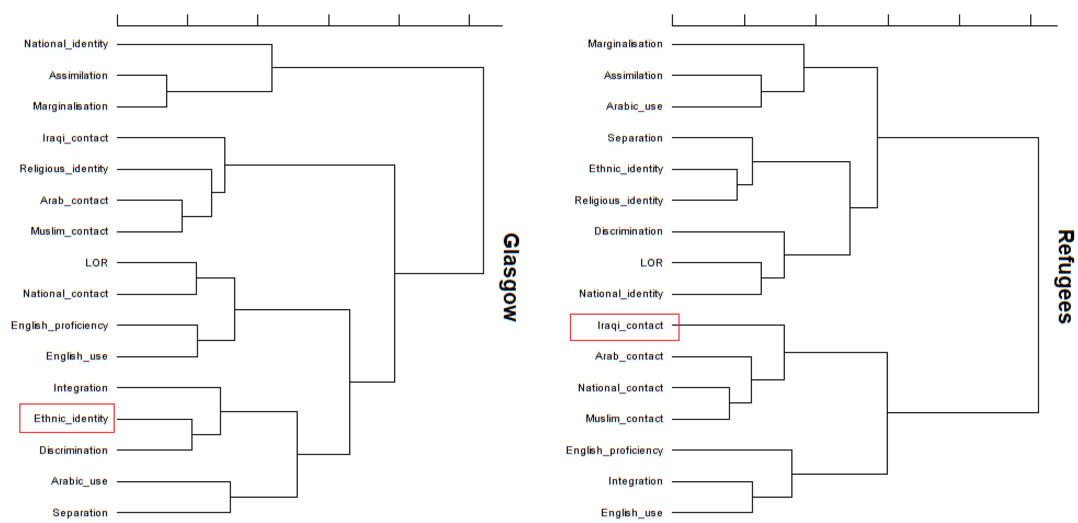

Figure 7.24: Dendrograms showing hierarchical cluster analyses (*Ward method*) of variables based on Glasgow (left) and refugees (right) correlation matrices

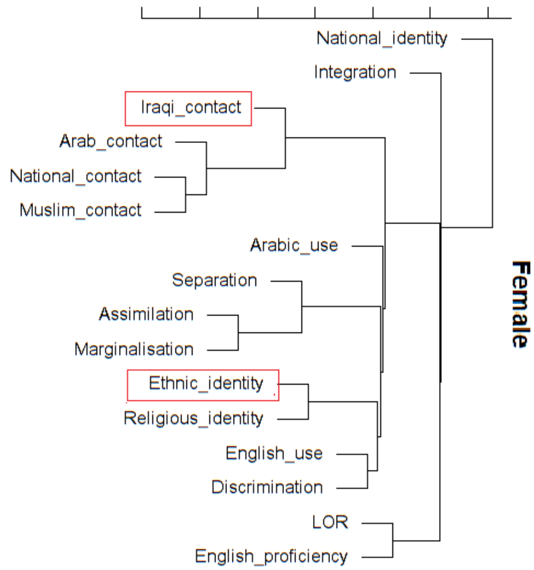

Figure 7.25: Dendrogram showing hierarchical cluster analysis (*Ward method*) of variables based on the females' correlation matrix

As shown above, splits and branches of the dendrogram group positively correlated variables together, with smaller splits/ branches indicating stronger positive correlations between variables. For example, the females' correlation matrix (See Figure 7.23) shows a positive correlation between ethnic identity and religious identity. Thus the two variables appear in one split next to each other in the dendrogram (See Figure 7.25). Because dendograms are based on the correlation matrices, data for each group is ordered and clustered differently.

Notably, there are some interesting commonalities among the Glasgow, refugee and female data. As Figures 7.24 and 7.25 show, Iraqi contact in the female, and in the refugee, data is grouped with Muslim (non-Arab) and National contact in one branch. With regard to ethnic identity, Glasgow data shows ethnic identity, national_contact and English use in the same cluster/ branch. Likewise, English use appears with ethnic identity in one cluster/ branch in the females' data. This pattern was not expected given the general assumption that reporting stronger identification and more contact with an ethnic group (i.e. being Iraqi Arab) might mean at the same time, not being so connected with the host community. However, these correlations suggest this not to be the case, as those who reported high ethnic identity and Iraqi contact, also reported links with the non-Arab Muslim and Anglo/ Scottish speakers, a result which explains why they showed darker lateral realisations. This result is further discussed with reference to the existing literature in the following section.

7.6 Discussion

This section discusses findings of English /l/ analysis presented in this chapter. It also identifies key points and areas for future investigation. The discussion is framed in terms of the two research questions outlined in Section 7.3. These questions are:

- What are the phonetic characteristics of English /l/ as produced by Iraqi Arab speakers in London and Glasgow?
- Does Iraqi English /l/ vary according to macro-social factors, namely migration experience and gender, as well as micro-social factors?

7.6.1 Characteristics of Iraqi English /l/

Analysis of English /l/ shows that Iraqi Arabs display a clear distinction between word-initial and word-final /l/. English /l/ produced by Iraqi Arabs is significantly clearer in initial than in final positions. Such distinction aligns with previous research that shows a tendency for English /l/ to be generally clearer in initial than in final positions (e.g., Recasens, 2012). Considering participants' first language, the observed pattern is in contrast with descriptions of Arabic /l/, which does not show such positional effect in the production of /l/ (e.g., Khattab, 2002a; Shaheen, 1979). This result also contradicts with Khattab (2002a, 2011) findings in her study on bilingual Lebanese adults, who did not show a strong distinction between initial and final positions in their production of English /l/ and produced clear /l/ in all contexts. It is clear then that Iraqi Arab speakers in the present analysis display a significant allophonic distinction similar to the pattern typically observed in English /l/, thus suggesting acquisition of English allophonic contrast.

To better understand Iraqis' English /l/'s degree of clearness/ darkness in each dialect area, their mean F2 values (Hz) are compared to Anglo/Scottish speakers' mean F2 values (Hz) collated from Carter and Local (2007), Kirkham (2017), Recasens (2012), Shaktawat (forthcoming), Stuart-Smith et al. (2011) and Stuart- Smith et al. (2017) (See Table 7.14).

Data	Initial F2 (Hz)	Final F2 (Hz)
Glasgow Iraqi speakers (Female)	1632	1131
Glasgow Iraqi speakers (Male)	1488	1069
London Iraqi speakers (Female)	1823	1177
London Iraqi speakers (Male)	1513	1149
Carter & Local (2007): Newcastle speakers (Female)	1675	1258
Carter & Local (2007): Newcastle speakers (Male)	1351	1024
Carter & Local (2007): Leeds speakers (Female)	1194	1132
Carter & Local (2007): Leeds speakers (Male)	1028	950
Kirkham (2017): Sheffield Anglo speakers (Female)	1139	1135
Kirkham (2017): Sheffield Anglo speakers (Male)	954	890
Recasens (2012): RP speakers (High vowel)	1600	1000
Recasens (2012): RP speakers (Non-high vowel)	1120	860
Shaktawat (forthcoming): Glaswegian speakers (Female)	1029	NA
Shaktawat (forthcoming): Glaswegian speakers (Male)	1251	NA
Stuart- Smith et al. (2011): Glaswegian speakers (Female)	1280	NA
Stuart- Smith et al. (2011): Glaswegian speakers (Male)	943	NA
Stuart-Smith et al. (2017): Glaswegian speakers (High vowel)	1250	NA
Stuart-Smith et al. (2017): Glaswegian speakers (Non-high vowel)	1197	NA

Table 7.14: Mean F2 (Hz) for English /l/ in previous studies and English /l/ by Iraqi speakers in the present study

As presented in Table 7.14, comparison of the raw F2 formant values (Hz) in the present analysis to previous studies on Anglo speakers in different dialect areas shows that Iraqi English initial /l/ in London and Glasgow is somewhat comparable to English dialects characterised with clear /l/, such as Newcastle (Carter and Local 2007) and RP English in the high vowel context (Recasens 2012). Because the production of Iraqis' Arabic /l/ was not examined in the present analysis, it is hard to tell whether the degree of initial /l/ clearness is similar to their Iraqi Arabic /l/, or whether they show darker realisations in their production of English /l/. Nonetheless, mean formant values of Iraqis English /l/ are compared to mean formant values reported in previous acoustic work on Arabic /l/, namely Al-Ani (1970) and Shaheen (1979) in Table 7.15.

Studies	Clear /l/			Dark or emphatic /l/		
	F1	F2	F3	F1	F2	F3
Al-Ani (1970)	250	1600	2500	250	900	2400
Shaheen (1979)	330	1520	2300	425	1045	NA
PRESENT STUDY	359	1630	2723	421	1136	2646

Table 7.15: Mean F1, F2 and F3 (Hz) for Arabic /l/ in previous studies and English /l/ by Iraqi speakers in the present study

Interestingly, comparison with existing acoustic research on Arabic /l/ shows that Iraqi English initial /l/ is comparable to Arabic clear /l/ (See Table 7.15). Mean formant values in the Iraqis' production of English initial /l/ are similar to the values reported in Al-Ani (1970) and Shaheen (1979). Note, however, that Iraqi speakers in the present analysis show slightly higher F2, and considerably higher F3 values, which could be due to linguistic factors (e.g., data elicitation method, vowel context) or physiological differences (i.e., all participants in Al- Ani (1970), except one, were male speakers). Overall, in terms of /l/'s degree of clearness, it seems that initial English /l/ produced by Iraqi speakers is acoustically similar to Arabic clear /l/.

As for their production of final /l/, Iraqi English final /l/ is dark and is comparable to final /l/ produced in English dialects known to have dark final /l/. Iraqi English final /l/ is also acoustically as dark as Arabic emphatic /l/. Again, this is in contrast to what Khattab (2002a, 2011) found in her study, in which her bilingual speakers showed audibly clear /l/ in final positions. In fact, the results of the present analysis are in line with Kirkham (2017) findings on second-generation Asian speakers in Sheffield who showed considerably clearer initial /l/ than Anglo speakers but produced the same degree of /l/ darkness in final positions.

Considering regional dialects, London Iraqi speakers show a strong allophonic contrast in the production of /l/, similar to London English, but produced clearer initial and final realisations than Anglo speakers in previous studies (See Section 7.2.1). By contrast, larger difference is observed between Glaswegian Iraqi English /l/ and Glaswegian /l/ in previous studies (See Table 7.14). While Glasgow /l/ is typically dark and lacks positional contrast, Glasgow Iraqis show a strong initial-final contrast in their production of /l/. This pattern was also observed in previous studies on the English produced by Asian speakers living in dialect areas known to lack /l/ positional contrast (i.e., dark /l/ in Bradford, Sheffield) (e.g., Kirkham, 2017; Kirkham et al., 2020). A possible explanation for the strong positional contrast observed in the data overall, and specifically in the Glaswegian Iraqi data, is the role of participants' exposure to SSBE or RP English in Iraq as part of their education prior to arrival to the UK. Most Iraqis interviewed in the present study had high level of education (University education), meaning that they had been exposed, to varying degrees, to SSBE or RP English, the target English variety in the Iraqi curriculum (Altae, 2020). It is also possible that the clear initial /l/ realisations observed among Iraqi speakers is a cross-language phonetic influence, as Arabic initial /l/ is always clear and can not be substituted for emphatic (dark) /l/, as in Glaswegian English (See Ferguson, 1956).

Comparing Iraqis' production patterns in London and Glasgow, London Iraqi speakers show relatively clearer realisations than Iraqi speakers in Glasgow, especially in final position. Such difference is confirmed statistically only in the production of final /l/. It is not possible to identify a broad dialect difference for initial lateral in the present results, because of the variability from other factors (See Section 7.5.2). Such results indicate that while broad dialect differences between London and Glasgow explained variation in final /l/, variation in initial /l/ was better explained by micro-social factors, due to the greater variability observed within groups (See below).

The significant dialect effect on Iraqis' final /l/ is in contrast with previous studies on English /l/ produced by ethnic speakers, which reported clearer dialectal differences in the production of initial rather than final /l/ (e.g., Kirkham, 2017; Stuart-Smith et al., 2011). However, previous studies on English /l/ confirmed that dark final /l/ tends to be gradient (e.g., Kirkham et al., 2019; Turton, 2014, 2017; Yuan and Liberman, 2009, 2011). Moreover, dialectal differences in the production of final /l/ have been reported in Kirkham et al. (2019) study on Liverpool and Manchester /l/, in which they found significantly darker final /l/ by Manchester male speakers than Liverpool speakers. While the majority English dialect community may play a role in the observed final /l/ variation between Iraqis in London and Glasgow (i.e., Glaswegian final /l/ is typically darker than London Anglo /l/), differences in the size of minority ethnic communities and Arab communities in London and Glasgow may be also a reason behind the observed variation. Unlike Glasgow, London is home to diverse ethnic communities, including large non-Arab Muslim communities. Additionally, London Arab communities are visible and well-established. Such diversity in ethnic communities and languages in contact has been suggested to be a main factor in the linguistic variation in London English (e.g., Cheshire et al., 2011; Gates, 2019). Based on this claim, it is possible that London Iraqis show clearer final /l/ realisations than Glaswegian Iraqis because of the higher-level contact with different ethnic and Arab communities, or maybe because London Iraqis face less social pressure to accommodate to Anglos' production patterns than Iraqis in Glasgow (cf. Sharma, 2017).

7.6.2 Sociophonetic Variation in Iraqi English /l/

/l/ Variation and Migration Experience

In the present analysis, migration experience shows significant effect on /l/ only in interaction with dialect area, with London speakers showing migration differences in the production of /l/ compared to Glasgow speakers. This result is not surprising as existing literature and fieldwork observations revealed a main role of Iraqis' migration profile and status in the existence of social and economic differences between professionals and refugees in London, which is not the case in Glasgow (See Section 3.5.3). The social division resulting from migration experience is clearly reflected in London Iraqis' /l/ production patterns, with London professionals showing clearer initial and darker final /l/ than London refugees. Such strong allophonic distinction in the production of English /l/ by London professional speakers aligns with descriptions of /l/ in RP and SSBE English, typically spoken by middle-class speakers. By contrast, London refugee speakers show considerably clearer realisations of final /l/ in comparison to London professionals as well as Glasgow speakers, possibly suggesting a stronger sociolinguistic stratification between Iraqi professinals and refugees in London than in Glasgow. This result highlights the importance of considering the historical and social structure of ethnic communities in different dialect areas and the role these factors play in intra-ethnic sociophonetic variation.

Other Significant Factors Characterizing English /l/ Variation within the Iraqi Arab Community

Results of the present analysis follow the expected pattern of linguistic effects found in the literature. Lateral duration did not show any effect on the production of initial /l/, but significantly affected final /l/'s degree of darkness, with darker /l/ realisations in longer utterances. This finding is in line with Yuan and Liberman (2009) study on English /l/ which suggested that lateral duration shows a gradual effect on /l/ darkness only in final syllables.

The vowel context showed a significant effect only on initial /l/, with generally clearer /l/ realisations before high than non-high vowels. However, the following vowel effect was further modulated by gender and migration experience, with female professional speakers showing the strongest effect of vowel context and female refugees showing the smallest effect of vowel context on initial /l/ F2-F1. Gender differences were observed according to vowel context in the professionals' data, with females producing significantly clearer initial /l/ than their male counterparts, especially in the high vowel context. While sex-based variation are expected to exist in the data due to differences in men's and women's physiology, as F2-F1 measures do not fully control for them, female professionals also showed considerably higher initial F2-F1 values then female refugees, indicating a socially-based motivation behind variation. Gender differences in

/l/ are further interpreted in relation to other social factors in the following paragraphs and in Chapter 8, Section 8.4.3.

Unlike initial /l/, final /l/ model results did not show a significant effect of vowel context on F2-F1. Such result is not surprising as Recasens (2012) reported a small difference in final /l/ formant values before /a/ and /i/ contexts, especially in the dark /l/ varieties. Recasens (2012, p.381) interpreted the small effect of vowel context on dark final /l/ as resulting from differences in articulatory constraint.

As for social variables, gender was a salient factor in the variation observed in initial /l/, with female speakers generally producing clearer initial /l/ than male speakers. However, female speakers showed more variability in the production of initial /l/ than male speakers, with some producing initial /l/ values similar to male speakers whereas others producing very clear initial /l/. Interestingly, variability in the females' production of initial /l/ was explained when involved in interaction with ethnic identity although in an unexpected direction. Specifically, females' initial /l/ becomes darker as their ethnic identity score increases and vice versa. Similar unexpected correlation between gender and Iraqi contact is found in the females' production of final /l/, with darker /l/ realisations as their Iraqi contact score increases. Glasgow and refugee speakers' showed similar correlations, with darker /l/ realisations among Glasgow and refugee speakers who reported higher ethnic identity and more Iraqi contact, respectively. Further investigation of Glasgow, refugee and female speakers' social behaviour in general revealed significant positive correlations/ clustering between ethnic identity/ Iraqi contact on the one hand and integration attitudes/ behaviour and involvement with both ethnic and larger communities (i.e., non-Arab Muslims, Anglo/ Scottish speakers) on the other hand.

The unexpected correlations between Iraqi females' identification and contact with their ethnic community and their production patterns aligns with Clothier (2019) results on Lebanese Australian speakers, in which he found darker final /l/ realisations among females who participated in denser Lebanese network. Clothier (2019) suggests that the patterns observed indicate the emergence of a sociophonetic ethnic behaviour among this group. In the present analysis, observing speakers' involvement with ethnic as well as larger communities goes in line with Berry et al. (2006) description of integration behavior, in which members of ethnic groups are involved with both ethnic and national communities. Unlike other members of the community, this group of speakers is neither separated from larger community nor isolated (marginalised) from both ethnic and larger communities. Therefore, as indicated by Berry et al. (2006), a strong ethnic orientation (ethnic identity, contact with ethnic group) in migrant communities does not always indicate separated sociolinguistic behaviour.

Moreover, the pattern observed among female, refugee and Glasgow speakers resembles Sharma (2017) notable findings for the old second-generation Asian speakers in London, who reported involvement with their own community as well as the larger community (See Chapter 2). Interestingly, Sharma (2017) found that this group of speakers showed successful use of native-like British variants as well as Asian English phonetic features (e.g. Use of glottal stop /ʔ/ *vs* retroflex /ʈ/), depending on the social context and speech style. Sharma (2017) links their linguistic behaviour to the fact that these speakers needed to maintain and develop membership in both Indian and British groups due to the social and demographic situation of the community at the time they were raised. The sociolinguistic behaviour of the speakers in Sharma (2017) study is similar to the pattern observed here, in that members of the Iraqi community (i.e., female, refugees and Glasgow groups) who reported integration behaviour and involvement with both communities produced native-like dark /l/ realisations.

7.6.3 Future Directions

For the present data, dynamic analysis (e.g., using GAMMs) might add information, especially on laterals coarticulation with the surrounding vowel context. Moreover, the present analysis showed a degree of variability in the production of /l/, but individual variation was not examined given the scope of the present study. Thus, considering individual differences in the production of Iraqi English /l/ and understanding individual variability in relation to their larger sociolinguistic behaviour would provide greater knowledge on their production patterns. Future research on Iraqi English /l/ might further investigate articulatory features to understand variation in the degree of /l/ darkness (cf. Turton, 2014, 2017), as observed in the production of final /l/ in the present analysis.

The analysis of Iraqi English /l/ revealed interesting sociolinguistic patterns. However, examining their Arabic /l/ production patterns would be enlightening, as little is known about Spoken Iraqi Arabic /l/. Despite previous accounts of emphatic /l/ to vary across regional and social groups, the acoustic and articulatory features of emphatic /l/ across Arabic dialects in general, and more specifically, Iraqi dialects have been largely neglected in previous sociophonetic studies. Future investigation of Arabic emphatic /l/ might provide a better understanding of the sociophonetic characteristics of this sound across Arabic dialects. Understanding regional and social variation in the production of emphatic /l/ might also explain variation in the acquisition of English dark /l/ by Arab speakers.

7.6.4 Conclusion

To conclude, the present chapter provided a detailed acoustic description of English /l/ as produced by Iraqi Arab speakers. Variation in Iraqi English /l/ has been observed in consideration to their migration profile, gender and UK regional dialect. Additionally, variation was observed within social groups with reference to speakers' social behaviour, highlighting the complexity of the sociolinguistic behaviour of members of minority ethnic communities.

Chapter 8

General Discussion

8.1 Overview

This study has examined the impact of a number of social factors, namely migration routes and experience, dialect and gender, on Iraqi-Arabs' sociolinguistic identity and behaviour, to better understand the motives behind intra-ethnic variation in their English speech. The following specific research questions were posed and answered to contribute to the main theoretical question:

1. What are the phonetic characteristics of Iraqi English positive VOT and /l/ as spoken by first-generation Iraqi Arabs in London and Glasgow? Do Iraqis share patterns of Arabic accented English in the production of these sounds?

2. How are Iraqis' phonetic realisations conditioned by linguistic factors?

3. Does Iraqis' production patterns vary according to macro-social factors, namely migration experience, dialect and gender as well as micro-social factors?

To answer these questions, 44 first-generation Iraqi-Arab men and women in London and Glasgow, with differing migration experience (professionals/ forcibly displaced refugees), were recorded reading words in a carrier phrase and completed a social acculturation questionnaire. Two phonological variables were analysed in the present thesis: English positive VOT for stops and acoustic quality in laterals.

The present chapter summarises the findings of the present study and discusses main themes with reference to the above research questions. Section 8.2 begins with a general discussion of the acoustic features of Iraqi English positive VOT and laterals in terms of voicing and positional contrast, respectively, and compares the findings with relevant work on Iraqi Arabic, English monolingual and bilinguals speakers. Then, the effects of linguistic factors on Iraqis' production patterns are discussed with reference to the existing literature in Section 8.3.

Section 8.4 presents the phonetic variation in the production of positive VOT and /l/ according to macro-social factors before suggesting possible interpretations for the motives behind these variations.

Section 8.5 summarises the main effects of micro-social factors on Iraqis' production patterns within each social group. The intra-group differences are addressed with reference to the wider literature as well as speakers' general social behaviour.

The potential differences in the sociophonetic status of variables under analysis will be briefly assessed in Section 8.6.

Finally, Section 8.7 suggests directions for future research both for the collected data and Arab communities as well as sociolinguistic research on migrant communities in general.

8.2 General Characteristics of Iraqi-English Stop Voicing Contrast and Laterals

Overall, Iraqi Arab speakers in the present study demonstrated a clear distinction between voiced and voiceless stops through positive VOT and showed a strong allophonic distinction in the production of word-initial and final laterals. The results of English positive VOT produced by Iraqi-Arabic speakers generally showed short-lag and aspirated VOT in voiced and voiceless stops, respectively. English laterals were mainly clear (i.e., high F2-F1 values) in word-initial positions but darker (i.e., low F2-F1 values) in word-final positions. Bearing in mind the production patterns of these sounds in the participants' first language (Iraqi Arabic)(See Chapters 6 and 7), their production of English positive VOT and laterals was unexpected, as they did not show a particularly strong influence of Iraqi Arabic on their English voicing or positional contrast (e.g., producing always clear laterals, and/or showing no contrast for the labial stops). Instead, their production patterns showed a greater similarity to English general patterns described in the existing literature.

However, a closer comparison between Iraqi speakers' production patterns in the present study and previous phonetic investigations on Iraqi Arabic and English monolingual speakers reveals differences in the phonetic details of VOT in voiceless stops and initial /l/. Specifically, comparing positive VOT produced by Iraqi speakers to the results of previous studies on English monolinguals (e.g., Alanazi, 2018; Khattab, 2002a; Klatt, 1975), Iraqis' voiceless VOT values were generally in the low end of long-lag region compared to English monolingual speakers, but were comparable to voiceless production patterns in Iraqi-Arabic (see Al-Ani, 1970; Al-Siraih, 2020). Similarly, the acoustic features (i.e., formant values) of initial /l/ produced by Iraqis were more similar to Arabic than English clear /l/, as the Iraqi English lateral F2 in the present study was clearer than English clear /l/ (see Al-Ani, 1970; Kirkham and McCarthy, 2021). Such observation is similar to Khattab (2002a) results on English initial /l/, in which she noted clearer initial /l/ realisations by the bilingual than the Anglo monolingual speakers.

Existing models explaining acquisition of speech sounds, e.g., Speech Learning Model, PAM, suggest that, the less noticeable the differences are between sounds in speakers' first and second languages, the more likely the first language features for that sound to persist due to the perceived similarity (Best and Tyler, 2007; Escudero, 2009; Flege, 1995; Major and Kim, 1999). This hypothesis provides an explanation for the general patterns observed in the production of clear initial /l/ and voiceless VOT in the present study. Both Iraqi-Arabic and English have clear /l/ allophone despite the subtle differences between them (i.e., the English clear /l/ allophone is positionally constrained (only in syllable-initial position) and the difference in clearness is subtle (for London English)). It seems that Iraqis produced Arabic-like initial /l/ because it is perceived similar to Arabic clear /l/. Likewise, despite the fact that English voiceless stops typically have longer VOT than Iraqi Arabic stops, both languages have relatively long-lag voiceless VOT. Such subtle phonetic differences between Iraqi Arabic and English voiceless stops may have resulted in the production of voiceless VOT values similar to Iraqi Arabic.

Whilst Iraqi Arabic and English vary in the presence/absence of voicing in voiced stops (i.e., Arabic has prevoiced VOT whereas English has short-lag VOT), Iraqi speakers in the present study produced short-lag VOT similar to English monolinguals in previous studies (e.g., Lisker and Abramson, 1967; Stuart-Smith et al., 2015b). However, Iraqis' native-like production of voiced VOT should be interpreted with caution since voicing during closure (VDC) was not included in the present analysis (see Chapter 6). The analysis of VDC will be addressed in future research to fully understand Iraqis production patterns for voiced stops. Because the analysis of positive VOT for voiced stops showed interesting sociophonetic findings, possible interpretations for the positive VOT results are provided with consideration of the linguistic and social factors in the following paragraphs (See 8.3 and 8.4), and in light of previous studies on English VOT produced by other migrant communities.

As for /l/, Iraqis' English final /l/ data was generally comparable to final /l/ produced by English monolingual speakers in previous studies (e.g., Kirkham and McCarthy, 2021; Recasens, 2012). In other words, final /l/ produced by Iraqis was overall as dark as final /l/ typically produced by English monolinguals. Second language research theories suggest that if the allophonic position of a sound is restricted to limited environments in the speakers' first language, it is more likely for speakers to successfully perceive and produce monolingual-like patterns for that sound in their second language (Flege, 1995). In Iraqi Arabic, occurrences of dark /l/ are limited to emphatic and sometimes velar environments (e.g., (χa:ɫi) 'my maternal uncle')(Blanc 1964). This is different from English dark /l/, which is typically produced in final positions in both London and Glasgow speech. Thus, it could be that Iraqis' general tendency to produce a native-like dark /l/ in final position is a result of the speakers' awareness of the contextual differences between Iraqi Arabic emphatic /l/ and English dark /l/.

Overall, the existence of native-like patterns in the English of Iraqi Arabs in the present study did not align with previous findings on other first-generation migrant speakers, as Iraqis' first language (Iraqi Arabic) showed less influence on their production of stop voicing contrast and lateral allophonic distinction. For example, previous sociophonetic studies on first-generation South Asian migrant speakers in the UK showed that speakers' first language had a strong effect on their English phonetic categories (e.g., McCarthy et al., 2013; Sharma, 2011). McCarthy et al. (2013) found that first-generation Sylheti speakers who arrived after the age of 18 mainly produced prevoiced and short-lag VOT for voiced and voiceless stops, respectively. Sharma (2011) reported similar results in a study on Punjabi-English bilinguals, who showed frequent use of retroflexed /t/ and monophthongisation in their English.

First-generation South-Asian speakers may be expected to show stronger effect of first language on their English than Iraqi Arabs due to the greater differences in the phonetic details of stops and laterals between South-Asian languages and English (e.g., South Asian languages have clear /l/ in general, and don't have emphatic laterals; South Asian languages have two series of voiceless stops, short-lag VOT stops, and long-lag VOT stops (/p/ and /ph/) but often use their voiceless unaspirated /p/ for English /p/). However, differences between South Asian and Arab communities in terms of the history of settlement and size of the communities may also play a role in the use or less use of ethnic accent features. The Arab communities in the UK are much smaller in size than the South Asian communities. Moreover, although Arab and South Asian immigration started at about the same time-point (i.e., 1950s), South Asians immigrated at a much higher rate during the earlier periods of settlement between 1948 and 1971 (Edward, 1993; Sharma, 2011), resulting in the establishment of salient and concentrated South-Asian communities in certain areas (e.g., Southall in London). This is different from Arab communities in the UK, which became visible as a result of small successive waves of migration since 1950. Unlike South Asian communities, early waves of Arab migrants were scattered in different areas. Such differences in the migration history and establishment between South Asian and Arab communities may have resulted in stronger social ties and/or more separated behaviour among first-generation South Asian immigrants than Iraqi-Arab immigrants. This is supported by McCarthy et al. (2013) results on London Sylheti-speaking late arrivals (i.e., arrived in the UK after the age of 18), in which they interpreted the Sylheti accented features in their speech as a result of their little contact with non-Asians and strong ties with London-Bengali community. Thus, differences related to the migration history and settlement of both communities may also explain the stronger influence of first-language linguistic features on South-Asians' English patterns than Iraqi Arabs in the present study.

The migration profile and status in the host country may be also another reason behind differences in the overall linguistic behaviour between Iraqi Arabs in the present study and Arab bilinguals in previous studies (e.g., Alanazi, 2018; Flege, 1987; Port and Mitleb, 1983). Apart from Khattab (2002a), previous investigations on adult Arabic-English bilinguals have primarily been conducted on Arab learners of English in EFL/ ESL contexts. As stated by Moyer (2009); Moyer and (Firm), the linguistic behaviour of second language speakers is highly dependent on their residency status in the host country, motivation and degree of involvement with the larger community. Iraqi Arabs in the present study are different from Arab speakers in previous studies in terms of their motives for migration, residency status in the UK and relationship with the larger community. Such differences may result in different identification with the host community, and different sources of social and linguistic input between groups (e.g., more exposure to/ need to accommodate to Anglo/ Scottish speakers by Iraqis than Arab learners of English), evident in the less use of Arabic features in the English produced by Iraqi Arabs in the present than Arab bilinguals in previous studies.

Although Khattab (2002a) sample included bilingual Lebanese speakers whose migration status is similar to the Iraqis in the present study (i.e., UK residents), she interviewed only four participants as part of a larger study on children's acquisition of English. Therefore, her sample may not have been representative of the community's linguistic behaviour or her results might be affected by other factors (e.g., social). Nonetheless, Khattab (2002a) noted some occurrences of monolingual-like English production patterns (e.g., dark final /l/ tokens) in her data .

Another factor that might play a role in Iraqis' general tendency for showing native-like voicing and positional contrast in the production of stop VOT and laterals is the target English model they had acquired as part of their education in Iraq. Altae (2020) reported that, from the 1940s to 2000s, the English taught in primary, secondary and University education was based on Standard British English. As mentioned earlier (See Section 4.3.3), most Iraqi speakers interviewed in the present study are educated Iraqis (i.e., they all had a university education except two), meaning that they had been previously exposed to a Standard British English model through the curriculum before leaving Iraq. The interplay between this factor and the above factors may have resulted in Iraqis' alignment with the general patterns of clear/ dark allophony for /l/ and voicing contrast for stop VOT.

To sum up, first-generation Iraqi Arabs in the present analysis generally showed different linguistic behaviour from bilingual Arabic-English speakers in previous studies. The results of positive VOT showed a clear distinction between voiced and voiceless stops, with the former being produced with a short-lag VOT and the latter with longer-lag aspirated VOT. While their voiced VOT fell in the range of monolinguals' production patterns reported in previous studies, their voiceless VOT values were relatively shorter, suggesting Arabic-like production patterns of English voiceless stops (See Chapter 6). As for laterals, Iraqis showed a strong allophonic distinction in the production of initial and final /l/. Iraqis' initial /l/ was generally clearer than previous accounts of English clear /l/, indicating Iraqi-Arabic influence. By contrast, their final dark /l/ was comparable to English monolinguals' realisations in previous studies. While these findings could be partially explained by the cross-linguistic similarities and differences between Iraqi Arabic and English when compared to other ethnic and bilingual speakers, another explanation could be related to differences in the migration history and profile between Iraqis and other UK communities.

8.3 Effects of Linguistic Factors on Iraqis' Production Patterns

A number of linguistic factors were considered in the present analysis to explore how Iraqis' production patterns are conditioned by internal factors that have been previously reported to affect the production of English VOT and laterals (see Chapters 6 and 7). The results of the present study showed that key linguistic factors had highly significant effects on phonetic variation in the data, showing significant main effects for both phonological variables under analysis, as well as being involved in significant interactions with a range of social factors, where relevant. For example, in the analysis of positive VOT in all stops, significant main effects of place of articulation, following vowel height and word duration were found. Furthermore, place of articulation was involved in most significant interactions with social variables in the separate voiced and voiceless VOT analyses. Likewise, lateral analyses showed significant main effects of word position and adjacent vowel height on lateral formant values (i.e., F2-F1). Additionally, all significant interactions in lateral models involved word position and/ or following vowel height.

Alam (2015) observed a prevalent effect of phonetic context on vowel production by second-generation Glaswegian Pakistanis (*Glaswasians*), but its effect varied across speakers depending on their social practices (i.e., community of practice). Unlike Alam (2015), the results of the present study showed a striking similarity in how linguistic factors affected phonetic variation across all social groups, highlighting the strong influence of internal constraints on phonetic variation among bilingual speakers. This observation aligns with variationist findings more generally, which reported a prevailing effect of linguistic factors (e.g., Bayley et al., 1996; Labov, 1994). The main effects of linguistic factors on the production of positive VOT and /l/ by Iraqis are discussed separately in the following paragraphs.

8.3.1 Positive VOT

In the present study, voiced and voiceless stops were, in general, produced differently according to place of articulation, with increased VOT values as stops were produced further back in the oral cavity (i.e., labial < coronal < dorsal). These results are in line with a number of previous studies on English VOT (e.g., Klatt, 1975; Lisker and Abramson, 1967) as well as previous cross-linguistic studies on VOT which suggest a universal effect of place of articulation on VOT (e.g., Cho and Ladefoged, 1999).

While systematic differences in voiceless VOT values according to place of articulation have also been reported in previous studies on Iraqi Arabic stops (i.e., /t/< /k/) (e.g. Al-Siraih, 2020), Iraqi Arabic voiced stops did not show a clear effect of place of articulation on VOT values, with varying and inconsistent negative VOT values. The significant difference in voiced VOT values according to place of articulation (i.e., /b/< /d/< /g/) in the present study is also contrary to previous studies on Arabic-English bilingual speakers that did not show any effect of place of articulation on, the predominantly negative, voiced VOT values (e.g. Alanazi, 2018; Khattab, 2002a). Exact comparison of the results of voiced VOT in the present analysis to the above studies is impossible because voicing during closure was not measured for this study. Impressionistically, varying degrees of voicing during closure, from full voicing (as for Arabic) to no voicing at all (as for English) in Iraqis' production of English voiced stops was observed during the analysis, making voicing during closure difficult to measure and extract. However, the significant increase in voiced positive VOT according to place of articulation indicates that Iraqis in the present study have acquired monolingual-like production patterns, and that they behaved differently from Arab speakers of English in previous studies.

Notably, the VOT analysis revealed three important findings. Firstly, Iraqi Arab speakers generally produced an English voiceless labial stop with aspiration, despite a voiceless labial stop phoneme (i.e., /p/) being absent from Arabic inventory. Flege (1980) noted that second language speakers are more likely to acquire a sound that does not exist in the speakers' first language due to their awareness of the differences between the languages. The result for /p/ in the present analysis confirms Flege (1981) suggestion, as Iraqis generally produced long-lag

VOT for English /p/ (See Chapter 6). It is also in line with previous studies on Arab bilinguals, which found that speakers produced /p-b/ VOT contrast (e.g., Alanazi, 2018; Flege, 1981; Khattab, 2002a). However, compared to previous studies on monolingual English speakers (e.g., Docherty, 1992; Khattab, 2002a; Klatt, 1975), Iraqis in the present analysis showed slightly shorter VOT values for /p/.

Secondly, Iraqis' VOT values for English /t/, and to a lesser extent /k/, were overall more similar to Iraqi Arabic than English, with considerably shorter VOT values than English monolingual speakers in previous studies (e.g., Docherty, 1992; Khattab, 2002a; Klatt, 1975). In fact, their VOT values fell in the range of those reported for spoken Iraqi Arabic /t/ and /k/ (Al-Siraih, 2020). Thus, it seems that Iraqis generally produced Arabic-like VOT patterns for /t/ and /k/, possibly due to the perceived similarity between Arabic and English /t/ and /k/, as suggested by Flege (1981, 2008).

Thirdly, as mentioned earlier, a striking similarity was found between Iraqis' voiced labial, coronal and dorsal VOT values and those reported in previous studies on monolingual English speakers (e.g., Docherty, 1992; Klatt, 1975), a result that contradicted initial expectations. It is possible that Iraqis are aware of the differences between Arabic and English in the production of voiced VOT, and that their voicing during closure (VDC) patterns are less phonetically voiced than their Iraqi Arabic patterns. Nathan (1987) observed decreased VDC as positive VOT increased for voiced stops in his study on English-Spanish bilinguals. However, it is difficult to make an inference without the VDC analysis. Moreover, most Iraqis in the present study showed some degree of VDC in the production of voiced stops along with positive VOT. Further investigation of both VDC and VOT and the relationship between them is needed to fully understand and interpret the production patterns of voiced stops in these data.

As for other linguistic factors, the expected effect of word duration was found in the present study, with significantly longer voiceless VOT in longer words. By contrast, word duration did not show a significant effect on voiced stops. This observation aligns with previous studies on English stops which reported a negative correlation between voiceless VOT and speech rate and lack of significant effect of speech rate on voiced VOT (e.g., Miller et al., 1986). Kulikov (2020) observed a similar effect of speech rate on voiceless VOT in a study of Qatari Arabic stops, but little is known about the effect of speech rate on Iraqi Arabic stops.

Following vowel height (i.e., high vs non-high vowels) showed a significant effect on VOT, but this was modulated by voicing and place of articulation. Specifically, voiced VOT was longer overall before high than non-high vowels (e.g., *bill* vs *ball*). By contrast, only the coronal voiceless stop /t/ showed a significant effect for vowel height on VOT values. Although voiceless labial and dorsal VOT values were also longer before high than non-high vowels, the differences did not reach significance in the statistical results. Klatt (1975) study on English stops showed longer VOT values before high than non-high vowels (cf. Lisker and Abramson, 1967). The reported effect of following vowel context on voiced and voiceless VOT is inconsistent in both English and Arabic studies, requiring further investigation in future research on both languages.

8.3.2 Laterals

For Iraqi speakers in the present study, the expected effects of lateral duration and adjacent vowel height on lateral formant values (i.e., F2-F1) were shown. Aligning with previous studies on English /l/, the significant effects of lateral duration and adjacent vowel height were further modulated by lateral word position (initial vs final /l/). Specifically, following vowel height showed a significant effect on initial /l/, with clearer /l/ realisations before high than non-high vowels. By contrast, adjacent vowel height did not have an effect on final /l/, as /l/ degree of darkness was similar regardless of preceding/following vowel context. This finding is in line with Recasens' (2012) results on clear and dark /l/ in different languages and dialects, which reported clearer /l/ realisations before high vowels only in the production of clear /l/ especially when produced in initial position. According to Recasens (2012, p.380), unlike clear /l/, dark /l/ shows a small coarticulatory difference before high and non-high vowels, resulting in the lack of a significant effect of vowel context on its degree of darkness.

As for lateral duration, the results of the present study showed a significant effect of lateral steady-state duration only on the production of final /l/, with darker realisations for longer durations, a pattern which is in line with previous studies on English /l/ (e.g., Yuan and Liberman, 2009, 2011). A possible explanation for the significant effect of lateral duration on final dark /l/ is related to tongue articulatory gesture, as longer durations may allow enough time for the tongue dorsum to fully reach the velum, and consequently for /l/ to be darker (Sproat and Fujimora 1993; Turton 2017).

Given the scarcity of acoustic research on Iraqi Arabic laterals, it is unknown how speech rate and vowel height affect Iraqi Arabic /l/ realisations. What is clear, however, is that the effects of these factors on Iraqi English /l/ are in accordance with previous studies on English and other laterals (e.g., Recasens, 2012; Yuan and Liberman, 2009, 2011).

8.4 Phonetic Variation according to Macro-social Factors

The present thesis aimed to investigate whether differences in migration experience and UK dialect area would affect Iraqi-Arabs' English speech patterns. Despite playing a significant role in the formation of ethnic communities and individuals' sociolinguistic behaviour, these two factors have received little attention in previous sociolinguistic studies on ethnic communities. Gender was also considered given its central role in determining speakers' sociolinguistic behaviour and identity.

In the present study, the effect of these macro-social factors on Iraqis' speech patterns was confirmed, showing significant interrelated effects of migration experience, dialect and gender on phonetic variation. Notably, these effects mainly occurred in interactions with linguistic factors, highlighting the intertwined effects of linguistic and social factors on phonetic variation. For example, significant differences in positive VOT across social groups were only shown in interaction with stop voicing and/ or place of articulation. Likewise, significant effects of macro-social categories on lateral production patterns were always modulated by word position (i.e., initial vs final /l/). Figure 8.1 provides an overview of the main significant phonetic differences across and within social groups.

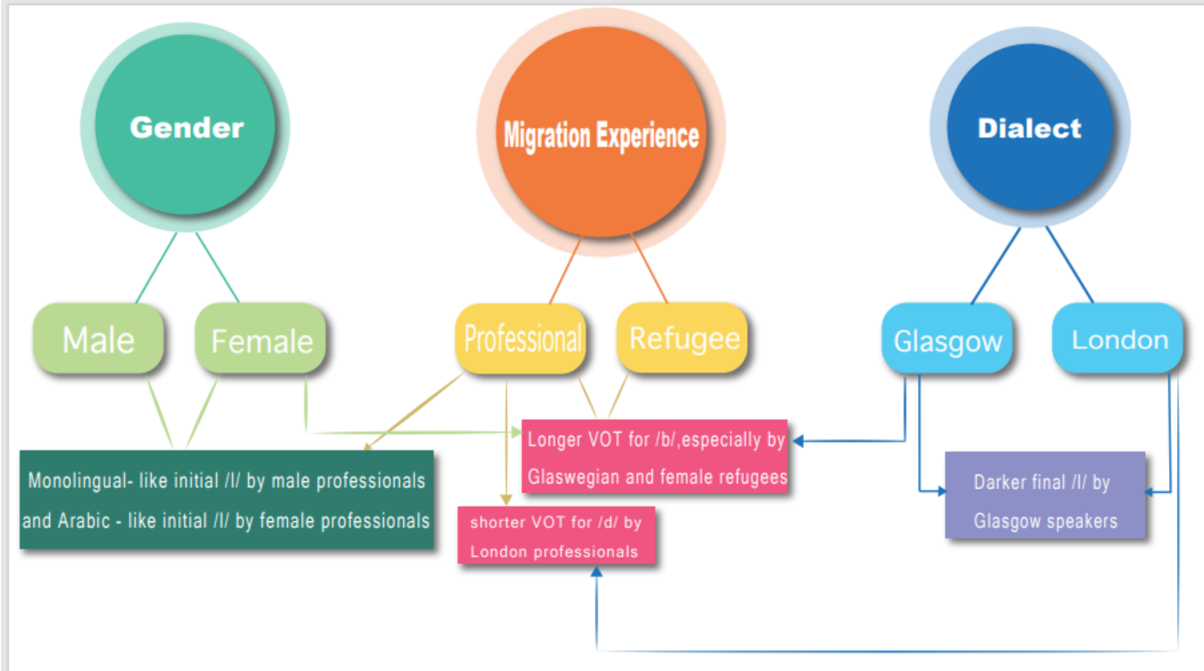

Figure 8.1: Summary graphic of main differences for stop positive VOT and /l/ by dialect, migration experience and gender for the English of Iraqi Arabic speakers

As illustrated in Figure 8.1, the stop data showed a strong overall effect of migration experience on the production patterns of voiced labial VOT, as refugee speakers produced longer VOT for /b/ than professional speakers regardless of gender and dialect. The analysis of voiced VOT revealed that migration effect is further modulated by dialect and gender separately, with Glasgow refugees producing significantly longer VOT values for /b/ than London professionals, and female refugees producing significantly longer VOT values for /b/ than female professionals. In contrast, London professionals produced the shortest voiced coronal VOT values.

As for laterals, significant gender differences in the production of initial /l/ were observed in the professionals' data, with female speakers producing clearer initial /l/ than male speakers in both vowel contexts (e.g. *leed* vs *lab*). However, dialect differences were observed in the production of final /l/, with Glasgow participants producing darker final /l/ than London speakers irrespective of gender.

It is clear that the effects of migration experience, dialect and gender in the present study varied from one linguistic variable to another, indicating the complexity of sociolinguistic variation within a single ethnic community. The following sections discuss the possible reasons behind the observed differences in the production of laterals and positive VOT across social groups.

8.4.1 Migration Experience and Variation in Stop Positive VOT

The present data showed significant differences in the production of voiced labial positive VOT between professional and refugee speakers regardless of gender and dialect area, with the latter group producing considerably longer VOT for /b/ than the former. Comparison of the VOT values for /b/ in the present study with previous studies on English monolingual speakers (See Chapter 6) revealed that professionals produced voiced stop VOT values comparable to English monolinguals, whereas refugee speakers, especially Glasgow and female refugees, showed longer VOT values for /b/ than monolingual speakers in previous studies (e.g., Scobbie, 2006; Stuart-Smith et al., 2015b). A possible interpretation for the relatively long VOT durations in the refugees' production of /b/ is that they produced exaggerated VOT patterns as a result of paying considerable attention to their stops' production, which is a frequently observed practice in a careful speech style (i.e., words in a carrier phrase)(e.g., Labov 1972).

Iraqi refugees may have paid particular attention to the voiced labial stop production because of their higher level of awareness of the lack of voicing contrast in Iraqi Arabic. Existing research on second language speakers has widely suggested that bilingual speakers tend to modify their production patterns of a sound in their second language if they are aware of the phonetic differences between their first and second languages (Alanazi, 2018; Flege, 1981; Sharma, 2011). In fact, Flege (1980) reported that when second language speakers are aware of the phonetic differences between their first and second languages in the production of a certain sound, they may exaggerate their production patterns of a sound that they have discovered to be part of the phonetic system in the second language (e.g., /b-p/ voicing contrast does not exist in Arabic), a pattern which was clearly observed here.

While Flege (1980) suggestion is evident in the present study, it is still interesting to see the exaggerated /b/ utterances only in the refugees' data. Previous research on bilingual speakers has suggested a strong link between input and place of language acquisition on speakers' production and perception of the phonetic details of second language sounds (e.g., Best and Tyler, 2007; Flege, 1987; Flege et al., 2021; Flege and Liu, 2001; Fullana and Mora, 2009; Piske et al., 2001). For example, Fullana and Mora (2009) found that English-Spanish bilinguals showed higher sensitivity to voicing contrast of English stops after receiving formal instructions on English sounds' production patterns. Similarly, Flege and Liu (2001) found that when Chinese bilingual speakers received greater English input from native-speakers, their identification of word-final stops improved. In the present study, all professional speakers acquired a high-level of English proficiency in Iraq and before they moved to the UK. While most refugee speakers were also exposed, to varying degrees, to English as part of their education in Iraq, they also were required to obtain recognized English qualifications in the UK to improve their work prospects. In other words, professional Iraqis were mainly exposed to Arabic-accented English production patterns during the time of English acquisition in Iraq whereas refugee speakers received formal instruction and input mainly from native English speakers during the time of acquisition in the UK. Thus, Iraqi refugees may be more aware of the phonetic differences between Arabic and English labial stops (/b-p/ contrast) through formal instruction and may have felt the need to modify their labial production patterns more often when speaking with monolinguals (e.g., their instructors) to achieve intelligibility; and then also in the read wordlist for the data collection for this study. This could be also related to the fact that a few Glasgow and female refugee speakers were still taking English courses during the time of the interviews, resulting in considerable attention to their production of labial voicing contrast and consequently production of exaggerated /b/ utterances.

8.4.2 Phonetic Variation across and within Dialect Areas

The results of the present study showed significant phonetic variation across and within London and Glasgow data. These differences can be summarised in two main points: First, main dialect effect is found in the production of final /l/, with Glasgow speakers showing relatively darker final /l/ realisations than London speakers. Second, London Iraqis exhibited more variation according to migration experience than Glaswegian Iraqis, with stronger /l/ positional contrast and shorter voiced VOT, especially for /d/, among London professionals than refugees (See Sections 6.5.3 and 7.5.2). London professionals' VOT for /d/ is also considerably shorter than the VOT for /d/ produced by Glasgow speakers overall.

Considering the majority English spoken in London and Glasgow, London English typically has a strong positional contrast in the production of /l/ (i.e., clear initial and dark final /l/) whereas Glasgow English has dark /l/ in all positions, and darker final /l/ realisations than final /l/ in London English. Iraqi Arab speakers in the present study showed a majority (Southern) English allophonic pattern for /l/, with clear initial laterals and dark final laterals, but even darker final /l/ for Glasgow speakers, thus providing evidence for a dialect effect. Another contributing factor could be the differences between London and Glasgow in terms of the size and composition of ethnic populations, and their relationship with the majority ethnic English community. As stated earlier (See Section 4.3.3), London is home to large and diverse ethnic communities, constituting about 40 % of the population. By contrast, only 17 % of the population in Glasgow identified as belonging to ethnic minority groups. Kerswill et al. (2008) suggested that large urban cities such as London act as centres of linguistic variation due to the diverse multi-ethnic and multi-linguistic make-up of these cities. Indeed, sociolinguistic research has reported a strong link between the the size of the multi-ethnic populations and the degree of acquisition of local features by members of ethnic communities (e.g., Cheshire, 2008; Nagy and Kochetov, 2013; Wong and Hall-Lew, 2014). Thus it is possible that the existence of the large minority ethnic

London community resulted in Iraqis' limited contacts with London Anglo speakers or perhaps Iraqis' less need to accommodate to Anglo speakers, thus producing clearer final /l/ than London Anglo speakers. This is different from Glasgow, which has a predominantly white Scottish population, a much smaller minority ethnic population, and a very small Iraqi Arab community, perhaps leading to Iraqis' production of darker final /l/ than their London counterparts. As Fought (2013) puts it, 'The uneven power relationship and pressure to assimilate would lead to more, if not all, of the convergence coming from the minority ethnic group' (p.450).

Results of the current study showed that London professionals produce considerably shorter VOT for /d/, and have a stronger allophonic distinction in the production of /l/ (i.e., clearer initial but darker final /l/) than their refugee counterparts. Both groups do not show a transfer from Arabic for both variables, as they produce short-lag VOT for /d/ that falls within the range of English /d/ (i.e., professionals= 11 ms, refugees= 17ms) and have a strong positional contrast in the production of /l/ (London professionals: initial F2= 1719, final F2= 1130; London refugees: initial F2= 1642, final F2= 1200)(See Sections 6.6.2 and 7.6.1 for comparison with previous studies).

It is possible that the observed phonetic differences between London professionals and refugees are affected by the clear socioeconomic and demographic stratification between the groups, as observed during the fieldwork and reported in previous research (e.g., El-Solh, 1992). As stated earlier, London Iraqi community is long standing and considerably large, as more than half of UK Iraqis reside in London. Moreover, London has been home to successive waves of Iraqi professionals and refugees, resulting is a clear social stratification between the two groups. This was evident in the existence of socially-biased Iraqi associations, social media groups and religious gatherings observed during the data collection and fieldwork in London. For example, when I asked a female Iraqi refugee to introduce me to members of an Iraqi-based Hussainya in London, she stated that she never visits that Hussainya because it is mainly visited by early middle-class Iraqis and that she goes to another Hussainya, which turned out to be formed and visited by Iraqi refugees. Interestingly, such social divide was not observed in Glasgow, where the Iraqi community is small, recent, and tends to attend events and religious gatherings, based on ethnic and religious affiliation rather than migration and settlement patterns. Thus, the observed phonetic variation between London professionals and refugees may be related to the clear differences in their wider sociolinguistic practices and behaviour, or reflect an emergence of different sociolinguistic identity between London professionals and refugees, a result that highlights the important role of migration history and size of the community on their social and linguistic behaviour.

The stronger positional contrast observed in the production of /l/ by London professionals may indicate a preference for SSBE or RP realisations, as RP /l/ is reported to have a greater initial (light)- final (dark) distinction than London /l/ (See Turton, 2017, p.13-16). By contrast, observing shorter-lag VOT for /d/ in the professionals' data is not clear and may be better understood in consideration of other factors/or acoustic cues.

8.4.3 Gender Differences in the Production of Initial /l/

Previous sociophonetic research on Arab diaspora has reported a central role of gender in determining speakers' sociolinguistic behaviour and identity (Clothier, 2019; Clothier and Loakes, 2018; Samant, 2010), with females producing prestigious or more standard variants than their male counterparts (See Section 3.6.3). In the present study, gender was included as an independent variable that might affect the phonetic patterning for the two phonological variables, as previous accounts of the UK Iraqi community have generally reported clear gender differences in terms of social roles and responsibilities (See Section 3.5.6).

Results showed a main effect of gender only for laterals, with clearer initial /l/ (higher F2-F1) by female than male speakers. This effect was further modulated by migration experience and vowel context (see Section 7.5.3). Specifically, female professionals produced considerably clearer initial /l/ than their male counterparts. In fact, female professionals produced higher formant values than all groups, meaning that they produced very clear initial /l/ realisations compared to the other groups (Figure 7.18 in Chapter 7).

Comparing the initial /l/ F2 values of male and female professionals in the present study to RP English in Recasens (2012), female professionals produced considerably clearer initial /l/ than English clear /l/ (See Table 8.1). By contrast, male professionals' initial /l/ was comparable to English monolinguals' initial /l/ reported for RP accent (Recasens, 2012). While the observed difference in F2 values between Recasens' (2012) and Iraqi female professionals may be affected by physiological differences, as Recasens (2012) data was elicited from male speakers, female professionals produced considerably clearer /l/ (in high vowel context) than female refugees (Female refugees F2= 1738 Hz in high vowel context; 1643 Hz in non-high vowel context), indicating a difference motivated by another reason. Although Iraqis' Arabic production patterns were not investigated in the present study, Khattab (2002a) suggested that Arabic clear /l/ is clearer than English clear /l/. Thus, it seems that female professionals produced Arabic-like initial /l/.

Data	**Initial F2 (Hz)**
Female Iraqi professionals (High vowels)	1935
Female Iraqi professionals (Non-high vowels)	1642
Male Iraqi professionals (High vowels)	1562
Male Iraqi professionals (Non-high vowels)	1373
Recasens (2012): RP speakers (High vowels)	1600
Recasens (2012): RP speakers (Non-high vowels)	1120

Table 8.1: Mean F2 (Hz) for RP English initial /l/ in Recasens (2012) and English /l/ produced by male and female Iraqi professionals in high and non-high vowel contexts

Based on the fieldwork observations and the interview data, gender differences between males' and females' roles were clearly observed among professionals, with male professionals having more commitment to the workplace than family, and females showing the opposite. Most first-generation female professionals interviewed in the present study initially came to the UK as dependents of their professional partners. Although all of them had a high level of education and professional jobs in Iraq, some of them chose not to work upon arrival in the UK, as their partners had secured full-time professions. Even those who were working during the time of the interviews reported having part-time jobs or less time-consuming jobs compared to their partners. When being asked about her qualifications, a professional female Iraqi responded:

> " I was a pharmacist in my country; when I came to this country, I didn't work because I was busy bringing up my children, but I did [a] few courses here and there.. I learned English in my country when I was studying in Iraq... so when I had the first interview in the airport, the interviewer was surprised [by] how good I used to speak." (*Sabirah*)

Interestingly, such differences in gender roles were not observed among refugees who sought to improve their economic situation, regardless of gender. Thus, it is possible that gender differences among professionals in terms of work and family roles resulted in female professionals' restricted exposure to Anglo/ Scottish production patterns, and consequently Arabic-like initial /l/ realisations.

Considering the production patterns of both initial and final /l/, the production of Arabic-like clear initial /l/ realisations (especially in high vowel context) and native-like dark final /l/ in both vowel contexts by Iraqi female professionals in London and Glasgow (See Table 8.2), may also suggest a more complex sociolinguistic behaviour. In his study on English /l/ produced by Lebanese Australians, Clothier (2019) found that female speakers produced clearer initial /l/ but darker final /l/ when they reported more engagement in Lebanese social network, a pattern which he interpreted as indexing their sociolinguistic identity and behaviour. It could be that Iraqi female professionals produced very clear initial but dark final /l/ to convey a social meaning (e.g., a female Arab/ Muslim professional). This interpretation is supported by recent findings that certain phonetic features can be used by speakers to index a social meaning, such as ethnic or religious identity (e.g., Alam, 2015; Kirkham, 2013). Thus, the maintenance of Arabic-like clear /l/ realisations by female professionals may index a female, Arab/Muslim professional identity within the Arabic communities in Glasgow and London. While female refugees showed a similar pattern in the production of /l/ (See Table 8.2), they produced a smaller initial-final contrast than their professional counterparts. Further investigation of the social perception of English /l/ by gender among Iraqi Arab speakers would be useful and informative.

Speakers	**Initial F2 (Hz)**	**Final F2 (Hz)**
Female professionals	1756	1125
Female refugees	1678	1185

Table 8.2: Mean F2 (Hz) for initial and final /l/ produced by Iraqi female professionals and refugees

8.5 Effects of Sociolinguistic Behaviour and Attitudes on Phonetic Variation

In the present study, the effects of speakers' social behaviour and attitudes on phonetic variation were investigated given their important role in speakers' linguistic behaviour, as reported in previous sociolinguistic studies. The acculturation questionnaire was used to elicit different aspects of Iraqis' social practices and attitudes, six of which were included in the statistical analysis to avoid multicollinearity resulting from high correlations between variables (See Section 5.4.2). These variables are frequency of English use, degree of contact with Iraqis, degree of contact with non-Arab Muslims, density of social network, sense of ethnic (Iraqi Arab) identity and sense of national (British/Scottish) identity. With the exception of national identity, all micro-social factors showed significant interactions with linguistic factors and macro-social factors, thus contributing to phonetic variation within gender, dialect and migrant groups in different ways. Figures 8.2 and 8.3 illustrate the interactions between linguistic, micro- and macro social factors for the phonological variables within which they were studied. For an interaction between macro- and micro-social factors for stops, green circles indicate a positive correlation and orange circles a negative correlation between the micro-social factor and positive VOT within a given group. For example, the green circles for /d/, /g/, /p/ and /t/, indicate longer VOT for these stops, for those who reported greater use of English, and who are female professionals (/d/), all professionals (/g/), all London speakers (/p/, /t/). For an interaction between macro- and micro-social factors for laterals, blue circles indicate a positive correlation and red circles a negative correlation between the micro-social factor and F2-F1 (Hz) within a given group. Note that blank cells indicate lack of significant interactions between macro- and micro-social factors for the phonological variables.

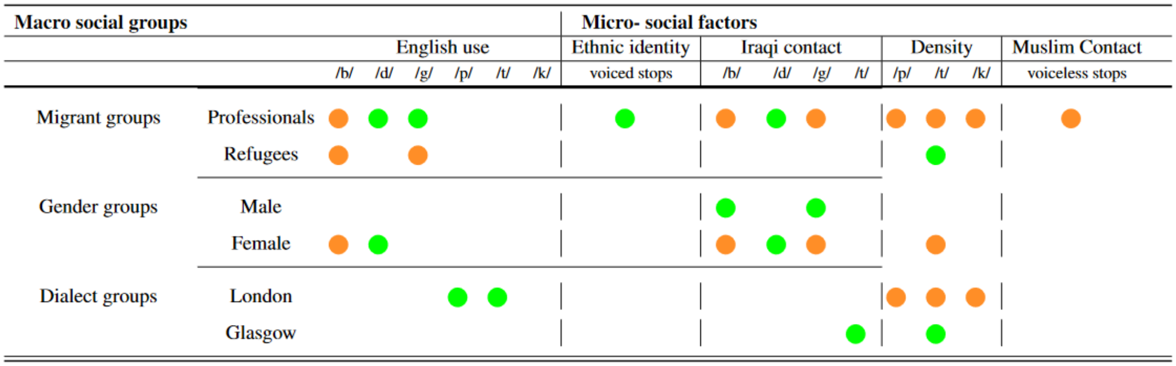

Figure 8.2: Summary of the significant interactions between macro- and micro-social factors for English VOT

Note: positive correlation (longer lag VOT with greater score for micro-social factor); negative correlation (shorter lag VOT with greater score for micro-social factor).

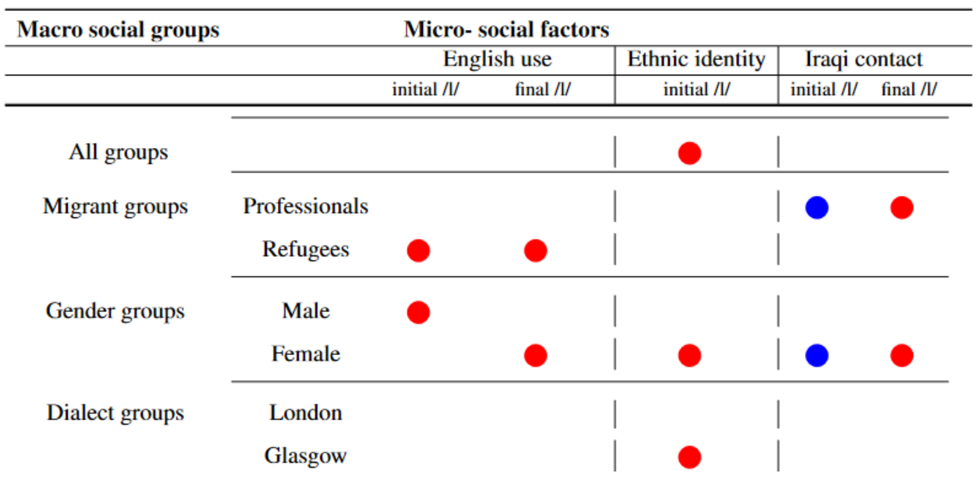

Figure 8.3: Summary of the significant interactions between macro- and micro- social factors for English laterals

Note: positive correlation (clearer lateral (higher f2-f1) with greater score for micro-social factor); negative correlation (darker lateral (lower f2-f1) with greater score for micro-social factor).

As shown in Figures 8.2 and 8.3, the micro-social factors included in the present analysis showed different effects on linguistic variables and social groups. For instance, the factors found to be significant for initial /l/ were not the same as the factors affecting the production of voiceless VOT. Likewise, factors affecting London speakers' production patterns were different from those affecting Glasgow speakers' production patterns. Additionally, the effects of the micro-social factors did not always follow the expected direction and were sometimes inconsistent across groups, indicating complex effects of speakers' sociolinguistic behaviour on phonetic variation.

One major finding here was the effect of the frequency of English use on both VOT and laterals production across most groups. Particularly, more English-like production patterns were observed among members who reported more frequent English use. This was illustrated in the longer VOT for voiced and voiceless stops, except for /b/, the more Iraqi Arabs reported English use. Similarly, darker /l/ overall was observed, the more English use was reported (See Figure 8.3).

There are orange dots for professionals, refugees, and also women for /b/, meaning that when those speakers, regardless of dialect, reported more English use, they produced shorter VOT values for /b/. Observing this correlation in the production of /b/ is interesting, as it provides further support for the suggestion that longer VOT values observed for /b/ are exaggerated productions (see Section 8.4.1). It seems that as Iraqi speakers use English more frequently, they pay less attention to their labial stops and vice versa, a factor that may intersect with the careful speech style from which the data was elicited (i.e. word-list data). Further research is needed to confirm the interrelated effects of bilinguals' level of awareness of first and second language phonological differences, speech style and frequency of second language use on exaggerated utterances.

Notably, micro-social factors relating to speakers' ethnic orientation (i.e., contact with Iraqis, sense of Iraqi Arab identity) showed trends that did not follow initial expectations. While it was expected to see short-lag VOT for voiced stops (i.e., Orange dots) and clearer /l/ realisations (i.e., blue dots) as speakers report stronger ethnic orientation, the opposite pattern was sometimes observed (See Figures 8.2 and 8.3). For example, longer VOT in voiced stops for Iraqi professionals (in general) with higher 'ethnic identity', and darker initial lateral for all speakers, and for Iraqi Glaswegian and Iraqi women more specifically, with higher 'ethnic identity' were observed. Moreover, the present study showed a contrasting effect of Iraqi contact in the production of particular variables within a single group. For example, clearer initial /l/ but darker final /l/ realisations were observed among female and professional speakers with higher-levels of Iraqi contact. Similarly, shorter VOT for /b/ and /g/ but longer VOT for /d/ among professionals and females who reported more Iraqi contact (See Figure 8.2). Thus, it is clear in the present results that the effects of ethnic contact and identity are not parallel or uniform across social groups and linguistic variables, indicating that the relationship between bilinguals' ethnic orientation and their linguistic behaviour is not always simple or straightforward.

Interestingly, unexpected correlations between speakers' ethnic behaviour and their production patterns have been previously reported in a number of English studies on ethnic communities. For example, Sharma and Sankaran (2011) study on members of the London Punjabi community showed that some speakers in their sample who maintained contact with their ethnic community successfully produced monolingual-like production patterns. Nagy and Kochetov

(2013) studies on Toronto Italian speakers showed a lack of correlation between ethnic orientation score and VOT values among speakers who produced Italian-accented VOT patterns (i.e., short-lag voiceless VOT). In their study on the effect of speakers' ethnic orientation on the use of null-subject among ethnically Russian, Ukranian and Italian speakers, Nagy et al. (2014) found a negative correlation between null-subject usage rate and extensive ethnic contact among some speakers. Thus, the effects of ethnic identity and contact on speakers' linguistic behaviour do not always entail ethnic accent features (i.e., influence of first-language on English).

The unexpected effects of Iraqi contact and identity on Iraqis' production patterns highlight two important points. First, looking at previous social studies on ethnic communities (e.g., Berry et al., 2006; Deutsch et al., 1988), it is evident that individuals' strong sense of ethnic identity and frequent contact with ethnic group do not always imply social and linguistic separation from the larger community. In fact, some members of ethnic groups show a greater sense of ethnic identity and frequent ethnic contact while being well-integrated into the larger community, a pattern which may even persist among second-generation members of ethnic communities (Berry et al., 2006; Deutsch et al., 1988). While it is still true that some members of ethnic groups are linguistically and socially separated from or assimilated into the larger community, not all members of ethnic communities fit into this dichotomous description (Berry et al., 2006, p.116).

Confirming the above suggestion, the correlation plot in the present analysis (see Section 5.4) indicates a significant positive correlation between Iraqis' sense of ethnic identity and national contact. Additionally, Iraqi, Arab, Muslim and national contacts were positively interrelated, meaning that speakers with more reported Iraqi contact did not indicate fewer Arab, Muslim or national contacts. Similarly, Glasgow and female Iraqis showed significant positive correlations between ethnic identity and national contact, integration attitudes or English use (See Figures 7.22, 7.24, and 7.25), meaning that speakers who expressed a strong ethnic orientation in the present data were also more involved with the larger community and therefore produced more monolingual-like patterns than other Iraqi participants. Of course, the direct relationship between speakers' production patterns and their acculturation behaviour would be clearly observed and better understood if individuals' sociolinguistic behaviour was investigated, but individual variation was beyond the scope of the present study. Further investigation of individuals' sociolinguistic behaviour will be conducted in future work.

Second, the inconsistent patterns observed in relation to the quantity and frequency of contact with Iraqis confirm that participation in a social network does not always explain variation. In fact, speakers' linguistic behaviour index their characteristics as individuals, which may or may not coincide with broader categories and affiliations (Eckert, 2012). The contrasting patterns observed across groups may be better understood when considering how Iraqi speakers use linguistic features to construct and index their sociolinguistic identity and practices. The inconsistent effect of Iraqi contact on social groups (i.e., male vs female) may be a result of differences in how speakers construct and index their identities. It is also possible that the contrasting patterns within groups carry a social meaning, such as Iraqi or Arab Muslim identity. For example, professionals' use of clear initial but dark final /l/ as they reported more Iraqi contact may be used as part of their identity as middle-class professional Iraqis. Future work on the social meanings of phonetic variation among Iraqi Arabs may help understand the observed patterns.

Similarly, the density score showed contrasting effects on voiceless VOT across gender, dialect and migrant groups. Negative correlations between density score and voiceless VOT (shorter VOT for higher scores) were found for female, London and professional speakers. By contrast, a positive correlation between density score and VOT for /t/ was found for refugee and Glasgow speakers. Since the current study did not thoroughly investigate the type and nature of speakers' dense networks (e.g., Anglo, Iraqi or non-Arab Muslim speakers) (Milroy, 1987; Sharma, 2017), it is difficult to provide a definite interpretation for these findings. However, the contrasting effect of density on voiceless VOT patterns across groups may suggest one of the following: Either that the former groups of Iraqis (female, London, professionals) are more engaged in dense networks with non-Anglo/non-Scot speakers whereas the latter groups (refugees, Glasgow) are more engaged in dense networks with Anglo/Scot speakers; Or that the observed variation in relation to density indicates different social meanings for speakers. For example, it could be that as Iraqi professionals become more settled, they become engaged in strongly-tied social networks and also establish a more Arabic Muslim identity, which they convey through the use of Arabic accented English VOT. By contrast, weakly-tied professionals are more open to Anglo-English norms and therefore display native-like voiceless VOT. This suggestion is supported by the significant negative correlation found between professionals' density score and mobility (i.e., professionals who reported previous mobility in the UK also reported less engagement in dense social networks) as well as the positive correlation observed between density and religious identity in the professionals' social data (See Chapter 6, Figure 6.28).

Overall, investigating the role of Iraqis' sociolinguistic practices on phonetic variation across social groups in the present data was informative, as it demonstrated the following points. First, the relationship between aspects of bilinguals' social behaviour and phonetic variation is not always straightforward, uniform or following the expected direction. As highlighted in previous English studies on ethnic communities in different contexts (e.g., Sharma and Sankaran, 2011, in the UK) (Nagy et al., 2014, in Canada) (Fix, 2014, in the US), social practices may show different effects on linguistic behaviour for members of a single ethnic group. Individuals' social practices combine and intersect with their linguistic behaviour in different ways for different social groups, even across communities with a shared ethnicity, language or religion, thus countering the 'simplistic correlations between ethnicity and language variation', as noted by Kirkham (2013).

The complex significant interactions between linguistic factors and macro- and micro-social factors in the present data are striking given the participants' profiles as first-generation late-bilingual migrants. This observation confirms previous suggestions that adult bilinguals' social behaviour and attitudes play significant roles in second language variation (see Hoffman and Walker, 2010; Nagy et al., 2014; Nagy and Kochetov, 2013). As Nagy et al. (2014) indicated, 'second language variation should not be attributed solely to subtractive processes such as acquisition'.

Second, investigating the effects of speakers' social practices on phonetic variation *within* macro-social categories revealed interesting variation at the level of individuals. The observed within-group variation, captured here through micro-social factors, highlights the need for a further examination of individuals' production patterns in relation to their social practices and attitudes. Thus, examining within speaker correlations for the specific variables could be very informative.

In conclusion, investigation of different aspects of social behaviour and attitudes across and within macro-social categories and linguistic variables revealed varying effects of speakers' social practices and attitudes on the groups and variables of interest. While the effects of some of these factors were in the expected direction, others showed a more complex sociolinguistic behaviour, implying possible social meanings of phonetic variation among Iraqi Arab speakers.

8.6 A Note on the Sociophonetic Status of the Linguistic Variables Under Analysis

The results of the present study suggest the existence of a potential difference in the social salience of VOT and /l/ variation among first-generation Iraqi bilinguals. While variation in the production of VOT across and within social groups was mostly explained by speakers' attention to speech as well as input and degree of exposure to majority English, it was evident that /l/ variation is socially based and carries strong social implications among speakers (See Sections 8.3 and 8.4). Thus, variation in VOT in the present analysis may not have the same extent of meaningful social salience compared to /l/ variation, but it is more affected by other factors, such as type and quantity of input. Recent investigations of the social meanings of linguistic variation revealed that the social salience of a linguistic variable may vary depending on its position in the word (e.g., word-medial vs word-final released /t/ Podesva et al., 2015) or the type of produced variant (e.g., -in *vs* -ing Campbell-Kibler, 2010). However, to date, the different status of linguistic variables in relation to social meanings has not been directly investigated despite being fundamental to the understanding and interpretation of sociolinguistic variation (cf. Cambell-Kibler 2010). Thus, the results of the present study also highlight the importance of considering the unequal social salience of linguistic variables in indexing social meanings and their sociolinguistic status in a speech community.

8.7 Future Directions

The present thesis has provided a fine-grained phonetic investigation of the English spoken by an under-researched minority ethnic community in the UK- Iraqi Arabs. It has also confirmed the expectation that at the broader level, the sociolinguistic context (here London or Glasgow) as well as lived experience of migration (here professional or refugee) influences phonetic variation, in conjunction with a range of attitudinal and identity factors. Nevertheless, there are still numerous issues and topics that should be investigated in future work which were beyond the scope of the present study.

As for the linguistic variables analysed in the present study, further examination of other phonetic cues in the production of English stops and laterals are needed. Notably, analysis of voicing during the closure phase would provide a better understanding of the nature of voicing contrast in the production of Iraqis' stops. For English /l/, a further extension could be a dynamic analysis using e.g. GAMMs to understand /l/ coarticulation with the surrounding vowels.

Moreover, further investigation of individual speaker variation in the production of VOT and /l/ is needed, as a great degree of variability was observed within macro-social categories with consideration of speakers' social behaviour and attitudes. It would also be very interesting to look at case studies of individual speakers, as the interview data provided rich qualitative information that could be investigated alongside the phonetic data.

The Iraqi data collected for the present study is rich and will open up a range of possibilities for future research. The data included participants' Arabic production of the variables investigated in the present study. Thus, a direct comparison between participants' Arabic production patterns and the results of the present analysis would be extremely useful. For instance, analysing Iraqis' production of Arabic /l/ would be informative, as little is known about spoken Iraqi Arabic /l/. Despite previous suggestions that Arabic emphatic /l/ varies across regional and social groups (see Jasim, 2020; Khattab, 2011), it has been overlooked in previous sociophonetic work. Such a topic would not only be useful for providing an account of the sociophonetic characteristics of emphatic /l/ but might also explain variation in the acquisition of English dark /l/ by Arab speakers.

Additionally, other linguistic variables could be explored in future research using the collected data. For example, regional variation in the production of FACE and GOAT vowels could be investigated, as they were included in the word-list data. In addition to the word-list data, the collected data included less-careful speech styles, namely a picture-description task and interview data. Comparing speakers' production patterns across different speech styles would be informative. This would be particularly interesting for VOT producation patterns, which were clearly affected by the careful speech style in the present data.

As for the acculturation questionnaire data, different methods of analysis could be used to provide different insights into speakers' social behaviour (Nagy et al., 2014). For example, grouping speakers' social behaviour into different acculturation profiles (see Chapter 5) through methods like factor or cluster analysis would provide a broad picture of speakers' social behaviour and attitudes and the impact these may have on their production patterns.

It is also possible that other social factors, such as mobility and length of residence, play a role in the sociophonetic variation within groups. Given the main aims of the present study, these factors were not analysed quantitatively, as they were highly correlated with migration experience (See Chapter 5). Nevertheless, they could be considered in a more qualitative way in future research. The possible effect of mobility on phonetic variation is particularly interesting, given the high correlations observed between mobility and other factors (e.g., density in the professionals' data). The effect of mobility on monolinguals' linguistic behaviour has been widely explored (see Auer, 2020; Siegel, 2010). However, little is known about the role of regional mobility on the English produced by migrant and bilingual communities despite regional mobility being a central practice among members of migrant groups.

In terms of future work on UK Arab communities, there is still much to explore given the scarcity of research on the community. For example, given the significant migration effect observed in the present data, it would be interesting to explore whether the patterns found for the first generations will filter down to the second generations. The production patterns of other large Arab communities, such as Egyptian Arabs, could also be explored in future studies. Additionally, a comparative approach examining different Arab varieties of English and the effects of Arabic dialect variation on their English production patterns would be interesting.

Chapter 9

Conclusion

In conclusion, the present study aimed to provide a better understanding of the motives behind phonetic variation in the English spoken by Iraqi Arabs in London and Glasgow who, despite commonalities, have differing experiences of migration. Investigation of the effect of migration experience on Iraqis' sociolinguistic behaviour filled a substantial gap in the literature, which has overlooked this important source of sociolinguistic diversity within and across migrant communities. Other macro factors, namely dialect and gender, as well as aspects relating to speakers' social practice and attitudes were included in an attempt to account for phonetic variation in Iraqi English. Moreover, this thesis has provided an acoustic description of positive VOT of English stops and laterals as produced by first-generation Iraqi Arabs, a community that has received little attention in previous English research on ethnic communities.

The study showed that Iraqi Arabs generally demonstrated a distinction between positive VOT of voiced and voiceless stops, with the former being produced in the short-lag region and the latter being aspirated. As for laterals, Iraqis showed a strong allophonic distinction between word-initial and final /l/, illustrated in the clear initial and dark final realisations. Thus, Arabic had less effect on Iraqis' English production patterns in the present study compared to previous reports on Arab bilingual speakers (e.g., Alanazi, 2018; Flege, 1981; Khattab, 2002a). However, the participants of the current study did exhibit Arabic-like phonetic details in the production of voiceless VOT and initial /l/. By contrast, both voiced positive VOT and final dark /l/ were overall comparable to English monolinguals' patterns, which may be explained by speakers' awareness of the perceived difference in the production of dark /l/ and voiced VOT between Arabic and English. However, further investigation of voicing during closure in voiced stops is needed to fully understand and interpret voiced VOT patterns.

The production of positive VOT and laterals was also found to be significantly affected by linguistic factors in the expected direction. Both voiced and voiceless stops showed longer VOT as they are articulated further back in the oral cavity (labial < coronal < dorsal), and they had longer VOT before high than non-high vowels. Speech rate showed a significant negative correlation with voiceless VOT, an observation that aligns with previous studies on English VOT (e.g., Stuart-Smith et al., 2015b). As for laterals, the effects of surrounding vowel height and speech rate were separately modulated by word-position, with clearer initial /l/ before high than non-high vowels and darker final /l/ in slower than faster speech.

Highlighting the intertwined effects of linguistic and social factors on phonetic variation, significant effects of migration experience, dialect and gender were always observed in interaction with the linguistic factors. The results of the analysis showed considerably longer VOT durations in the production of /b/ by Iraqi refugees than professionals. Comparison of VOT values with previous research showed that while professionals' VOT values for /b/ were comparable to monolingual speakers, refugees' VOT values for /b/ were slightly longer. This exaggeration in the latter group may have been the result of paying more attention to labial voicing contrast, which does not exist in Arabic. Different types of English input during time of acquisition and level of English proficiency and use are possible motives behind refugees paying more attention to their /b/ production patterns.

As for dialect variation, differences between Glasgow and London Iraqis were observed in the production of final /l/, with Glasgow speakers producing patterns closer to those of monolingual speakers than their London counterparts did. This difference was linked to the fact that Glaswegian majority English final /l/ is darker than London final /l/, and that London has a larger multi-ethnic population than Glasgow, possibly resulting in London Iraqis' limited contact with Anglo speakers or London Iraqis' experiencing less pressure to accommodate to Anglos' linguistic behaviour than Glaswegian Iraqi speakers.

Significant gender differences were observed in the production of initial /l/ in the professionals' data, with Arabic-like clear initial /l/ realisations by female speakers and monolingual-like initial /l/ by their male counterparts. This difference could be explained by the clear gender roles observed in the professionals sample, as most female professionals interviewed in the present study were houswives or part-time employees, despite their high-level of education and English proficiency. This may have limited professional females' contact with Anglo/ Scottish speakers. Considering female professionals production of both initial and final /l/, another interpretation could be that the clear initial but dark final /l/ by female professionals was used, along with other variables, to index a social meaning, such as female professional Iraqi identity.

Incorporating micro-level investigation within macro analysis, a number of social factors relating to speakers' practices and attitudes showed significant effects on phonetic variation. These were frequency of English use, sense of ethnic identity, Iraqi contact, density and Muslim contact. The results revealed a degree of complexity across linguistic variables and social groups, with some effects going in unexpected directions. Nonetheless, two important points emerged from these results. First, expressing strong identification with ethnic culture and group did not necessarily imply separated sociolinguistic behaviour, as Iraqis who produced monolingual-like patterns for some variables also reported a strong sense of ethnic identity and/ or frequent contact with Iraqis. Second, broad social categories and affiliation, including social contact and network, do not always explain phonetic variation when investigating the speech of late bilinguals, possibly suggesting the existence of social meanings for the observed variation. Confirming findings in previous work on ethnic communities (e.g., Hoffman and Walker, 2010; Nagy and Kochetov, 2013), the linguistic behaviour of first-generation bilingual speakers was affected by social practices and attitudes in complex ways, bringing these factors to the forefront when interpreting and understanding phonetic variation in bilinguals' speech.

This thesis has contributed to the ongoing English research on ethnic communities by investigating the production patterns of an understudied migrant community, Iraqi Arabs, in two distinct regional dialects, London and Glasgow. It has also provided the first examination of the role of different migration routes and experiences on intra-ethnic sociolinguistic behaviour and identity in an attempt to enhance our understanding of the motives behind sociolinguistic variation within a single ethnic community.

As shown, this thesis in its current position foregrounds the possibility for future quantitative and qualitative work on the UK Iraqi community; their English and Arabic accent features overall, and in relation to different social aspects. Further sociolinguistic work on minority ethnic communities in general, and Arab diaspora more specifically, is needed to enhance our understanding of the formation of ethnic communities and the influence this may have on individuals' sociolinguistic behaviour and identity.

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Appendix A

Participant Information Sheet

Introduction

My name is Ebtehal Asiry and I am a PhD student at The University of Glasgow in the English Language and Linguistics department. This project will be carried out as part of my PhD thesis.

What is the purpose of this study?

This study aims to explore English language use within and across Iraqi Arabs, aged 40- 70 years old, in London and Glasgow. In order to research that, I will make audio recordings of the participant and myself during the interview.

How will the study be conducted?

Each participant will be interviewed by myself for about one hour. The interview, which will be led by the participant, consists of three tasks: a word list task, a conversation and a questionnaire. During the conversation, participants will discuss different topics (e.g. language- culture) with the interviewer.

Do I have to take part?

Participation is entirely voluntary and participants may drop out of the project at any time. If participants decide to drop out, all data collected from them will be destroyed.

What will I get in return?

Your participation means a lot to me. Therefore, in addition to my gratitude, each participant will receive a £ 10 thank you voucher.

What if I have a problem?

Any complaint or concern about any aspect of this study; please contact my supervisor, Prof. Jane Stuart-Smith (Jane.Stuart-Smith@glasgow.ac.uk)

Will my taking part in the study be kept confidential?

Each participant will be informed that all data will be presented anonymously, so that anyone reading the thesis will not know who has contributed to it. Nobody other than my PhD supervisors and me will have access to the data and all data will be stored securely on password-protected hard drives and computers. After my research study stops, data will be saved on a password-protected hard drive for future academic use.

What happens when the research study stops?

The conversations will be transcribed and the results will be written up as part of my PhD thesis. These results may also be used in conference presentations and published in academic papers in the future. I will use short, anonymized extracts from the recordings to illustrate particular points of how English language is used in the community, only if the participant allows me to do so.

Who has reviewed this project?

The study has been reviewed and approved by the University of Glasgow College of Arts Ethics Committee.

Any questions? Please contact:

Principal Investigator:
Ebtehal Asiry
Department of English Language and Linguistics
University of Glasgow

(email)

Supervisor:
Professor Jane Stuart-Smith
Department of English Language and Linguistics
University of Glasgow
(email)

CONSENT TO THE USE OF DATA
University of Glasgow, College of Arts Research Ethics Committee

I understand that Ebtehal Asiry is collecting data in the form of taped interviews and a short questionnaire for use in an academic research project at the University of Glasgow.

☐ I give my consent to the use of data for this purpose on the understanding that:

- My participation in this study is voluntary, so I may opt out at any stage.
- The information will be processed by the University in accordance with the provisions of the General Data Protection Regulation 2018.
- All names and other material likely to identify individuals will be anonymised
- My data will be treated as confidential and kept in secure storage at all times.
- My data will only be listened to, and/or analysed using phonetic and conversational analysis, by Ebtehal Asiry and her supervisors.
- Short anonymised extracts and/or words may be used in the thesis, and in any presentations and/or publications arising from this project

In addition:

☐ I give my consent for the use of my recording for future linguistic research and teaching by students and researchers from the English Language and Linguistics at the University of Glasgow.

- Your data will be fully anonymised in this project and any presentations and/ or publications which may arise from it unless you choose to be identified.

Signed by the contributor:

____ Date: _______________

Signed on behalf of the contributor (i.e. parent/guardian in case of a person under 18)
____ Date:

Appendix B

Wordlists

B.1 English Wordlist

Kitchen

I say **pea** again 

I say **leek** again 

I say **meal** again 

I say **gum** again 

I say **Pork** again 

I say **peach** again 

I say **tart** again 

I say **tea** again 

I say **dill** again 

I say **beef** again 

I say **ghee** again 

I say **beet** again 

I say **date** again 

I say **lamb** again 

I say **oat** again 

I say **grape** again 

I say **pan** again 

I say **bowl** again 

I say **cup** again 

I say **tray** again 

Money

I say **bill** again 

I say **cash** again 

I say **till** again 

I say **loan** again 

I say **tax** again

I say **coin** again 

Animals

I say **bee** again 

I say **snake** again 

I say **bird** again 

I say **beak** again 

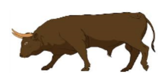
I say **bat** again 

I say **pet** again 

I say **geese** again 

I say **duck** again 

I say **pig** again 

I say **bull** again 

I say **pup** again 

I say **snail** again 

I say **bug** again 

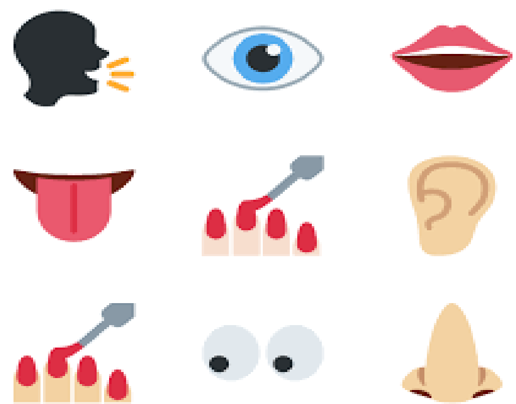
I say **goose** again 

I say **pest** again 

I say **dog** again 

I say **goat** again 

Body



I say **teeth** again

I say **tongue** again

I say **nose** again

I say **leg** again

I say **face** again

I say **lip** again

I say **nail** again

I say **toe** again

I say **back** again

I say **throat** again

I say **palm** again

I say **tooth** again

I say **lung** again

People

I say **team** again 

I say **kid** again 

I say **dad** again 

I say **guard** again 

I say **cook** again 

Nature

I say **beach** again

I say **hill** again

I say **lake** again

I say **cave** again

I say **bud** again

I say **coast** again

I say **dust** again

I say **hole** again

I say **dirt** again

I say **leaf** again

I say **snow** again

I say **rose** again

I say **pond** again

I say **bush** again

Places

I say **road** again

I say **school** again

I say **park** again

I say **bank** again

I say **lab** again

I say **path** again

I say **bay** again

I say **dell** again

Transportation

I say **bus** again

I say **car** again

I say **coach** again

I say **cab** again

I say **train** again

I say **bike** again

Home

I say **pool** again

I say **door** again

I say **bath** again

I say **tap** again

I say **tub** again

I say **wall** again

I say **key** again

I say **cot** again

I say **bell** again

I say **lift** again

I say **lamp** again

Fashion

I say **cap** again

I say **pants** again

I say **coat** again

I say **bead** again

I say **top** again

I say **teal** again

I say **boot** again

I say **patch** again

Learning

I say **book** again

I say **pen** again

I say **tape** again

I say **task** again

I say **test** again

I say **page** again

I say **late** again	I say **deep** again	I say **safe** again
I say **fool** again	I say **deaf** again	I say **day** again
I say **dull** again	I say **big** again	I say **cool** again
I say **bad** again	I say **long** again	I say **tad** again
I say **lost** again	I say **tall** again	I say **dance** again
I say **tell** again	I say **doom** again	I say **luck** again
I say **laugh** again	I say **let** again	I say **pray** again
I say **leap** again	I say **bet** again	I say **law** again
I say **gush** again	I say **pick** again	I say **pit** again
I say **own** again	I say **love** again	I say **pack** again
I say **keep** again	I say **post** again	I say **toss** again
I say **boost** again	I say **peel** again	I say **tug** again
I say **tuck** again	I say **pat** again	I say **call** again
I say **got** again	I say **push** again	I say **pull** again

I say **talk** again	I say **joke** again	I say **deal** again
I say **poach** again	I say **dip** again	I say **give** again
I say **get** again	I say **guess** again	I say **gab** again
I say **lock** again	I say **look** again	I say **geek** again
I say **lose** again	I say **kick** again	I say **gasp** again
I say **come** again	I say **cut** again	I say **date** again
I say **pay** again	I say **tip** again	I say **age** again
I say **God** again	I say **pod** again	I say **loop** again
I say **name** again	I say **tan** again	I say **goal** again
I say **dint** again	I say **dot** again	I say **last** again

B.2 Arabic Wordlist

آني أتهجّى **هيل** وأعيدها

آني أتهجّى **كاش** وأعيدها

آني أتهجّى **لام** وأعيدها

آني أتهجّى **كوب** وأعيدها

آني أتهجّى **لوز** وأعيدها

آني أتهجّى **فال** وأعيدها

آني أتهجّى **دار** وأعيدها

آني أتهجّى **لان** وأعيدها

آني أتهجّى **حال** وأعيدها

آني أتهجّى **خلّ** وأعيدها

آني أتهجّى **فول** وأعيدها

آني أتهجّى **دُبّ** وأعيدها

آني أتهجّى **داخ** وأعيدها

آني أتهجّى **خال** وأعيدها

آني أتهجّى **لوح** وأعيدها

آني أتهجّى **جِلْ** وأعيدها

آني أتهجّى **داس** وأعيدها

آني أتهجّى **لوم** وأعيدها

آني أ تهجّى **كاف** وأعيدها

آني أتهجّى **مَلْ**وأعيدها

آني أتهجّى **شال** وأعيدها

آني أتهجّى **لوط** وأعيدها

آني أتهجّى **دُوش** وأعيدها

آني أتهجّى **بير** وأعيدها

آني أتهجّى **گام (قام)** وأعيدها

آني أتهجّى **بِرّ** وأعيدها

آني أتهجّى **قوس** وأعيدها

آني أتهجّى **بيت** وأعيدها

آني أتهجّى **تاب** وأعيدها

آني أتهجّى **ليث** وأعيدها

آني أتهجّى **كُلّ** وأعيدها

آني أتهجّى **گول** (**قُول)**وأعيدها

آني أتهجّى **ليش** وأعيدها

آني أتهجّى **ديچ (ديك)** وأعيدها

آني أتهجّى **تاج** وأعيدها

آني أتهجّى **بطّ** وأعيدها

آني أتهجّى **بيض** وأعيدها

آني أتهجّى **توم (توأم)** وأعيدها

آني أتهجّى **گاع (قاع)** وأعيدها

آني أتهجّى **بُنّ** وأعيدها

آني أتهجّى **ليل** وأعيدها

آني أتهجّى **ذيل** وأعيدها

آني أتهجّى **قاس** وأعيدها

آني أتهجّى **گال (قال)** وأعيدها

آني أتهجّى **بس** وأعيدها

آني أتهجّى **(گوم)قُم** وأعيدها

آني أتهجّى **گصّ (قصّ)** وأعيدها

آني أتهجّى **دُود** وأعيدها

آني أتهجّى **كيك** وأعيدها

آني أتهجّى **سِلّ** وأعيدها

آني أتهجّى **مال** وأعيدها

آني أتهجّى **دُور** وأعيدها

آني أتهجّى **دَمّ** وأعيدها

آني أتهجّى **حلّ** وأعيدها

آني أتهجّى **گحّ (كحّ)** وأعيدها

آني أتهجّى **دَلّ** وأعيدها

آني أتهجّى **ذُلّ** وأعيدها

آني أتهجّى **دَفّ** وأعيدها

آني أتهجّى **دال** وأعيدها

آني أتهجّى **زَلّ** وأعيدها

آني أتهجّى **كَدّ** وأعيدها

آني أتهجّى **كَفّ** وأعيدها

آني أتهجّى **كُلْ** وأعيدها

آني أتهجّى **دِين** وأعيدها

آني أتهجى **سيل** وأعيدها

آني أتهجّى **تلّ** وأعيدها

آني أتهجّى **(گُصّ)قُصّ** وأعيدها

آني أتهجّى **بيع** وأعيدها

آني أتهجّى **تَمْ** وأعيدها

آني أتهجّى **توت** وأعيدها

آني أتهجّى **بارّ** وأعيدها

آني أتهجّى (**گاد)قاد** وأعيدها

آني أتهجّى **بات** وأعيدها

آني أتهجّى **لَفّ** وأعيدها

آني أتهجّى **تاج** وأعيدها

آني أتهجّى **لِبّ** وأعيدها

آني أتهجّى **تاه** وأعيدها

آني أتهجّى **فيل** وأعيدها

آني أتهجّى **باب** وأعيدها

آني أتهجّى **تين** وأعيدها

آني أتهجّى **جيل** وأعيدها

آني أتهجّى **بوح** وأعيدها

آني أتهجّى **بوت** وأعيدها

Appendix C

Semi-structured Interview Questions

<u>Suggested interview topics</u>

- Participants will be encouraged to talk about the following topics. If they do not want to talk about a certain topic, they can move to the next one.

1. **Personal information**
    - Age
    - Time of arrival to London/ Glasgow
    - Current activity (work/ education)
    - Educational qualification/ Parents' educational qualification
2. **Life history**
    - Childhood and family background
    - Working history/ Parents working history
    - School life
    - Memories from Iraq
    - Life experience and feelings in the host country
3. **Language**
    - Iraqi Arabic/ standard Arabic use
    - English language use
    - Motivation for speaking Arabic/ English
4. **Culture and faith**
    - Iraqi culture (in the past- present)
    - Religious/ national celebrations in Iraq
    - Iraqi community values in the UK
    - Iraqi traditional clothes/ food
    - Religious practice
    - Islamic beliefs
    -
5. **Social relations**
    - Relationships with others (e.g. Anglos, Arabs, Muslims)
    - Iraqi community in London/ Glasgow
    - Time spent with family
    - Friendship
6. **Identity**
    - Attitudes towards the western community and its traditions
    - Attitudes towards Iraqi community/ Arab community/ Muslim community
    - Attitudes towards London/ Glasgow
    - National affiliation
7. **Future plans**

Appendix D

Acculturation Questionnaire

Participants Questionnaire

You can answer almost all the questions by making a check in the bracket [X] beside the answer that applies best. In some cases, you are asked to write your answer. If you wish, you may also write your own comments in the questionnaire.

A. First, here are some questions about yourself and your background. Fill in the blank or check the answer that applies best.

1. Name ---------------------------
2. What is your age group?
   14- 17
   18- 25
   26- 39
   40- 55
   56- 70
3. In what country were you born?
   [ ] UK
   [ ] Another country. What country -------------------------

4. If born in another country, how old were you when you came to the UK?

   ----------------years.

5. Are you a UK citizen?
   [ ] Yes
   [ ] No
   [ ] Don’t know

6. Which city/ region in Iraq you are originally from?

   ----

7. How do you describe your religious affiliation?
   [ ] No religion

1. What is your highest qualification?

   ----

2. What is your father's highest qualification?

   ----

3. What is your mother's highest qualification?

   ----

4. How long have you lived in Glasgow?
   [ ] Less than 8 years.
   [ ] About 8 years.
   [ ] More than 8 years.

5. Can you write the first half of your postcode?

   ----

6. Which statement is most true about the neighbourhood where you live?
   [ ] Almost all people are from a different ethnic group than mine.
   [ ] A majority of the people is from a different ethnic group (e.g. White) than mine.
   [ ] There is about an equal mix of people from my ethnic group and other groups
   [ ] A majority of the people is from my ethnic group.
   [ ] Almost all people are from my ethnic group.

7. Have you ever lived in a UK city other than Glasgow?
   [ ] No.
   [ ] Yes. How long? --------------------

A. Here are some questions about languages. Please answer by checking the answer that applies best.

1. Where did you learn English?

   ----

1. What language do you speak

With adult family members	Not at all	A little	Half the time	A lot	All the time
a. I speak Arabic with my adult family members.					
b. I speak English with my adult family members.					

With your children/ grandchildren/ other Iraqis' children	Not at all	A little	Half the time	A lot	All the time
c. I speak Arabic with my children/ grandchildren/ other Iraqis' children					
d. I speak English with my children/ grandchildren/ other Iraqis' children					

With close friends	Not at all	A little	Half the time	A lot	All the time
a. I speak Arabic with my Arab close friends.					
b. I speak English with my non- Arab close friends.					
c. I speak English with my Arab and non- Arab close friends.					

In everyday communication	Not at all	A little	Half the time	A lot	All the time
a. I speak Arabic in my every day communication					
b. I speak English in my every day communications.					

1. How often do you

Watch T.V. programmes, movies, shows in ….	Never	Rarely	Sometimes	Often	Always
a. I watch Arabic T.V. programmes, movies and shows.					
b. I watch English T.V. programmes, movies and shows.					

Listen to the radio in ...	Never	Rarely	Sometimes	Often	Always
a. I listen to Arabic broadcast					
b. I listen to English broadcast					

Use Arabic/ English in social media applications (Twitter, Instagram..etc)	Never	Rarely	Sometimes	Often	Always
a. I use Arabic in social media					
b. I use English in social media					

1. The following questions concern your knowledge of Arabic and English

How well do you	Not at all	A little	Somewhat	Fairly well	Very well
a. Understand Arabic					
b. Speak Arabic					
c. Read in Arabic					
d. Write in Arabic					

How well do you	Not at all	A little	Somewhat	Fairly well	Very well
e. Understand English					
f. Speak English					
g. Read in English					
h. Write in English					

A. People can think of themselves in various ways. For example, they may feel that they are members of various ethnic groups, such as Indians (etc.), and that they are part of the larger society, Scottish. These questions are about how you think yourself in this respect.

1. How do you think of yourself?	Not at all	A little	Somewhat	Fairly well	Very well
a. I think of myself as Iraqi					
b. I think of myself as an Arab					
c. I think of myself as Muslim					
d. I think of myself as British/Scottish					
e. I think of myself as part of another ethnic group. What group? ----------------					

	Strongly disagree	Somewhat disagree	Not sure/ neutral	Somewhat agree	Strongly agree
2. I feel that I am part of Iraqi culture.					
3. I am proud of being Iraqi.					
4. I am happy to be Iraqi.					
5. I feel that I am part of British/ Scottish culture.					
6. I am proud of being British/ Scottish.					
7. I am happy to be British/ Scottish.					
8. Being part of Iraqi culture is embarrassing to me.					
9. Being Iraqi is uncomfortable for me.					
10. Being part of Iraqi culture makes me feel happy.					
11. Being Iraqi makes me feel good.					

People differ in how important they consider aspects of themselves to be. How important are the following aspects of yourself to you?

	Not at all	A little	Somewhat	Important	Very important
12. That I am Iraqi.					
13. That I am British/ Scottish.					
14. That I am an Arab					
15. That I am a Muslim					

D. Here are some statements about language, cultural traditions, friends etc. Please indicate how much you agree or disagree with each statement by checking the answer that applies best to you.

	Strongly disagree	Somewhat disagree	Not sure/ neutral	Somewhat agree	Strongly agree
1. I feel that Iraqis should adapt to British/Scottish cultural traditions and not maintain those of their own.					
2. I feel that Iraqis should maintain their own cultural traditions but also adapt to those of British/Scottish.					
3. I feel that it is not important for Iraqis either to maintain their own cultural traditions or to adapt to those of British/Scottish.					
4. I feel that Iraqis should maintain their own cultural traditions and not adapt to those of British/Scottish.					
5. It is more important to me to be fluent in Arabic than in English					
6. It is more important to me to be fluent in English than in Arabic.					
7. It is more important to me to be fluent in both Arabic and in English.					
8. It is not important to me to be fluent either in Arabic or in English.					
9. I prefer social activities that involve both Iraqis and British/ Scottish.					
10. I prefer to have only British/ Scottish friends.					
11. I prefer to have only Iraqi friends.					
12. I prefer social activities that involve British/ Scottish only.					
13. I prefer to have both Iraqi and British/ Scottish friends.					
14. I do not want to attend either British/ Scottish or Iraqis social activities.					
15. I prefer social activities that involve Iraqis only.					
16. I do not want to have either British/ Scottish or Iraqi friends.					

E. Here are some questions about your friends and people you know. Indicate the answer that applies best.

1. How many of your family members (e.g. spouses, parents, brothers, sisters, sons, daughters) and relatives (aunts, uncles, cousins…etc) live in Glasgow/ London?

	None	Only one	Some	Many	All of them
a. Family members					
b. Relatives					

2. How many of your family members and relatives live in other cities in the UK?

	None	Only one	Some	Many	All of them
a. Family members					
b. Relatives					

3. How often do you meet your family members/ relatives who live in Glasgow/ London?

	Never	Every 6 months	Every 3 months	Once a month	Several times a month	Daily
a. Family members						
b. Relatives						

c. I have no family members in Glasgow/ London. [ ]

d. I have no relatives in Glasgow/ London. [ ]

4. How often do you meet your family members/ relatives who live in other cities in the UK?

	Never	Every 6 months	Every 3 months	Once a month	Several times a month	Daily
a. Family members						
b. Relatives						

c. I have no family members in the UK. [ ]

d. I have no relatives in the UK. [ ]

5. How many close Iraqi, Arab, non- Arab Muslim, British/ Scottish friends do you have?

	None	Only one	A few	Some	Many
a. Close Iraqi friends					
b. Close Arab friends					
c. Close non- Arab Muslim friends					
d. Close British/ Scottish friends					

6. How often do you spend free time with..

	Almost never	Seldom	Sometimes	Often	Almost always
a. Iraqis					
b. Arabs					
c. Non- Arab Muslims					
d. British/ Scottish					

7. How many of your Iraqi, Arab, non- Arab Muslims or British/ Scottish friends have the same place of work as you?

	None	Only one	A few	Some	Many
a. Iraqi friends					
b. Arab friends					
c. Non- Arab Muslim friends					
d. British/ Scottish friends					

e. I do not have a job [ ]

8. How many of your friends live in the same neighbourhood you live in?

	None	Only one	A few	Some	Many
a. Iraqi friends					
b. Arab friends					
c. Non- Arab Muslim friends					
d. British/ Scottish friends					

e. I do not have friends [ ]

9. How many of your friends attend or participate in the same cultural/ religious activities or customs?

	None	Only one	A few	Some	Many
a. Iraqi friends					
b. Arab friends					
c. Non- Arab Muslim friends					
d. British/ Scottish friends					

10. How many of your friends know each other and meet on a regular basis?

a. None of my friends knows each other and meets on a regular basis. [ ]

b. Few of my friends know each other and meet on a regular basis. [ ]

c. Some of my friends know each other and meet on a regular basis. [ ]

d. All of my friends know each other and meet on a regular basis. [ ]

11. How often do you have contact with people in Iraq?

Almost never	Seldom	Sometimes	Often	Almost always

12. How often do you visit Iraq?

Never	Once every 8- 10 years	Once every 6- 8 years	Once every 2- 4 years	Every year

13. How many close male, female friends do you have?

	None	Only one	A few	Some	Many
a. Male					
b. Female					

F. When people with different background live in multicultural cities like Glasgow, one may sometimes feel unfairly treated. The following questions are about these kinds of experiences.

	Strongly disagree	Somewhat disagree	Not sure/ neutral	Somewhat agree	Strongly agree
1. I think that others behaved in an unfair or negative way towards my ethnic group.					
2. I do not feel accepted by British/ Scottish.					
3. I feel Scottish have something against me.					
4. I have been teased or insulted because of my ethnic background.					
5. I have been threatened or attacked because of my ethnic background.					

G. How do the following statements apply to how you think about your life?

	Strongly disagree	Somewhat disagree	Not sure/ Neutral	Somewhat agree	Strongly agree
1. In most ways my life is close to my ideal.					
2. The conditions of my life are excellent.					
3. I am satisfied with my life.					
4. So far I have got the important things I want in life.					
5. If I could live my life over, I would change almost nothing.					

Appendix E

Stop and Following Vowel Counts in the VOT Data

Dialect	Gender	Migration	Stop voicing	No. Tokens	Sample %
London	male	refugees	voiced	366	49%
			voiceless	386	51%
		professionals	voiced	255	47%
			voiceless	289	53%
	female	refugees	voiced	303	47%
			voiceless	336	53%
		professionals	voiced	414	47%
			voiceless	465	53%
Glasgow	male	refugees	voiced	235	46%
			voiceless	277	54%
		professionals	voiced	248	46%
			voiceless	288	54%
	female	refugees	voiced	404	45%
			voiceless	487	55%
		professionals	voiced	431	46%
			voiceless	508	54%

Table E.1: Summary of stop counts by stop voicing and participants' social profile

Following vowel	**Total number**
ɒ	319
æ	776
ɔ	15
ɔː	163
ɜ	5
ɜː	77
ɪ	572
əʊ	122
a	152
aː	290
aɪ	21
aʊ	6
aɪ	20
e	527
eɪ	232
ʊ	256
iː	811
o	126
oː	155
oʊ	62
oɪ	45
u	3
uː	262
v	674

Table E.2: Summary of following vowel counts in the stop tokens

Appendix F

VOT Praat Script

```
form extract_vot
word sound_extension .wav
word textGrid_extension .TextGrid
comment output file will be created in same directory as sound files
comment type in name of output file (must end in .csv)
text filename [add here].csv
comment enter number of tier which contains label
natural label_tier 1
comment enter number of tier which contains stops
natural stop_tier 2
comment enter number of tier which contains word (= 'Word')
natural word_tier 3
comment enter number of tier which contains pause (= 'ORT-MAU')
natural ort_tier 6
endform


    clearinfo
#this bit sets up the column names in the csv file
fileappend "'filename$'" Soundfile, Word, Preword, FollowingVowel, Stop, Clstart, Tburst, Vs-
tart, VOTms, CDms, Stopms, Tendword, Worddurms, VDC, F0 'newline$'


    #this bit makes a list of all the file names that have .wav extensions, and counts them
mySounds = Create Strings as file list... sounds *'sound_extension$'
nSounds = Get number of strings
printline 'nSounds'
```

#this bit sets the first loop, to take each sound file, pick up its textgrid file, and then start analysing it
for iSound to nSounds
select mySounds
sound$ = Get string... iSound
printline 'sound$'

name$ = sound$ - sound_extension$
printline 'name$'

textGrid$ = name$ + textGrid_extension$

mySound = Read from file... 'sound$'
mySound = Open long sound file... 'sound$'
myTextGrid = Read from file... 'textGrid$'

select myTextGrid

endfile = Get end time
printline 'endfile'

#this bit now focuses on the word tier ninterval = Get number of intervals... word_tier
printline 'ninterval'

for iinterval to ninterval
#now the script takes each word, and extracts the labels and time/durations from them
word$ = Get label of interval... word_tier iinterval
printline 'word$'
if word$ <> ""

 # set a variable which tells us what the previous word is
preword$ = Get label of interval... ort_tier iinterval-1

printline 'preword$'

#this gets us the time of the closure, and the end of the word

clstart = Get starting point... word_tier iinterval

tendword = Get end point... word_tier iinterval

#calculate the duration of the word

worddurraw = tendword - clstart

worddurms = (tendword - clstart)*1000

printline 'worddurms'

#this now goes to tier2, and gets the stop label, plus the start of the vowel (end of vot)

stopinterval = Get interval at time... stop_tier clstart

printline 'stopinterval'

stop$ = Get label of interval... stop_tier stopinterval

vstart = Get end point... stop_tier stopinterval

#this calculates the duration of the stop, i.e. closure - vowel start

stopdurraw = vstart - clstart

stopms = (vstart - clstart)*1000

printline 'stopms'

#this takes the vowel following the stop

follvowel$ = Get label of interval... stop_tier stopinterval+1

#this now goes to tier1, to find the 'vot' interval, which ends at vstart, the beginning of this interval is the burst

votintervala = Get interval at time... label_tier vstart

votinterval = votintervala -1

printline 'votinterval'

tburst = Get starting point... label_tier votinterval

#this calculates the duration of the vot and closure duration (cd)

votraw = vstart - tburst

votms = (vstart - tburst) *1000

printline 'votms'

cdraw = tburst - clstart

cdms = (tburst - clstart) *1000

printline 'cdms'

select mySound

Extract part: clstart, tburst, 'yes'

```
    # Create pitch object for Voice Report


    # Gender-specific pitch track ;need to tell praat if the speaker is male or female
gender = index
regex: name$, ’F’
printline ’gender’
# Following Eager (2015) recommendations for pitch settings
if gender == 0
To Pitch (cc): 0.001, 75, 15, "no", 0.03, 0.45, 0.01, 0.35, 0.14, 250
else
To Pitch (cc): 0.001, 100, 15, "no", 0.03, 0.45, 0.01, 0.35, 0.14, 300
endif


    selectObject: ’Sound name$’
plusObject: ’Pitch ’name$’
To PointProcess (cc)

selectObject: "Sound ’name$’"
plusObject: "Pitch ’name$’"
plusObject: "PointProcess ’name$’_’name$’"
voiceReport$ = Voice report... clstart tburst 75 500 1.3 1.6 0.03 0.45


    # calculate the voicing during closure
percentvoiceless = extractNumber (voiceReport$, " Fraction of locally unvoiced frames: ")
percentvoiceless = 100 * percentvoiceless
percentvoiced = 100 - percentvoiceless

# calculate the frequency F0
freq = extractNumber (voiceReport$, "Mean pitch: ")


    if stop$ <> ""
fileappend "’filename$’" ’sound$’, ’word$’, ’preword$’, ’follvowel$’, ’stop$’, ’clstart:3’, ’tburst:3’,
```

’vstart:3’, ’votms’, ’cdms’, ’stopms’, ’tendword:3’, ’worddurms’, ’percentvoiced’, ’freq’ ’newline$’
endif

endif
select myTextGrid

endfor

endfor

Appendix G

Examples of the Macro, Micro and Final Models for VOT Analysis

macro_model <lmer(log(VOT) ~ Worddurms+ Stopvoicing+ PlaceOfArticulation+ FollowingVowel+
Gender+ Dialect+ MigrationExperience+
Stopvoicing:PlaceOfArticulation+ Stopvoicing:FollowingVowel+
Stopvoicing:Gender+ Stopvoicing:Dialect+ Stopvoicing:MigrationExperience+
PlaceOfArticulation:FollowingVowel+ PlaceOfArticulation:Gender+
PlaceOfArticulation:Dialect+ PlaceOfArticulation: MigrationExperience+
FollowingVowel:Gender+ FollowingVowel:Dialect+ FollowingVowel:MigrationExperience+
Gender:Dialect+ Gender:MigrationExperience+ Dialect:MigrationExperience+
Stopvoicing:PlaceOfArticulation:FollowingVowel+ Gender:Dialect:MigrationExperience+
Stopvoicing:PlaceOfArticulation:Gender+ Stopvoicing:PlaceOfArticulation:Dialect+
Stopvoicing:PlaceOfArticulation:MigrationExperience+ PlaceOfArticulation:Gender:Dialect+
PlaceOfArticulation:Gender:MigrationExperience+
(1 | Pseudonym) + (1|Word), data = VOT_data)

micro_model<lmer(log(VOT) ~ Stopvoicing + FollowingVowel +
density + ethnic_identity + national_identity + English_language_use +
Iraqi_contact+ Muslim_contact +
Stopvoicing:density + Stopvoicing:ethnic_identity + Stopvoicing:national_identity +
Stopvoicing:English_language_use + Stopvoicing:Iraqi_contact + Stopvoicing:Muslim_contact +
(1 | Pseudonym)+ (1 | Word), data = VOT_data, na.action = na.exclude)

Final_model <lmer(log(VOT) ~ Worddurms + FollowingVowel +Stopvoicing + PlaceOfArticulation +
MigrationExperience + Dialect + Gender + density +
ethnic_identity +national_identity + English_language_use + Iraqi_contact + Muslim_contact +
Stopvoicing:PlaceOfArticulation + Stopvoicing:Gender +

Stopvoicing:Dialect + Stopvoicing:MigrationExperience +
Stopvoicing:density + Stopvoicing:ethnic_identity + Stopvoicing:national$_i$dentity +
Stopvoicing:English_language_use + Stopvoicing:Iraqi_contact + Stopvoicing:Muslim_contact +
FollowingVowel:PlaceOfArticulation + PlaceOfArticulation:Dialect +
PlaceOfArticulation:MigrationExperience + FollowingVowel:Gender + FollowingVowel:Dialect +
FollowingVowel:ethnic_identity + FollowingVowel:English_language_use +
MigrationExperience:density + MigrationExperience:ethnic_identity +
MigrationExperience:English_language_use + MigrationExperience:Muslim_contact +
Dialect:density + Dialect:English_language_use + Dialect:Iraqi_contact +
Gender:density + Gender:ethnic_identity +
Gender:national_identity + Gender:Iraqi_contact +
Stopvoicing:PlaceOfArticulation:MigrationExperience +
Stopvoicing:MigrationExperience:density +
Stopvoicing:MigrationExperience:ethnic_identity +
Stopvoicing:MigrationExperience:English_language_use +
Stopvoicing:MigrationExperience:Muslim_contact +
Stopvoicing:Dialect:density +
Stopvoicing:Dialect:English_language_use + Stopvoicing:Dialect:Iraqi_contact+
Stopvoicing:Gender:density + Stopvoicing:Gender:national_identity +
Stopvoicing:Gender:Iraqi_contact+
FollowingVowel:Gender:ethnic_identity + FollowingVowel:Dialect:English_language_use+
(1 | Pseudonym)+ (1 | Word), data =VOT_data, na.action = na.exclude)

Appendix H

Iraqi English VOT according to Speakers' Dialects in Iraq

While voiceless coronal and dorsal stops in the English and Arabic produced by Iraqis in the present analysis and Iraqi Arabic studies in Table 5.13 are generally aspirated, a clear difference in Iraqi Arabic VOT values is observed when considering dialect under investigation. As shown in Table 5.13, studies on Muslawi Arabic, namely (Al-Tai and Kasim, 2021; Rahim and Kasim, 2009), showed considerably short VOT values not only when compared to data in the present analysis but also when compared to other Iraqi Arabic studies. As indicated earlier, this may suggest Iraqi Arabic dialectal differences in the production of VOT (See section 5.2). Based on this suggestion, it is worth investigating participants' production of English VOT according to their Iraqi dialect areas. Due to the small number of participants in some dialect areas (e.g. only one participant from each of the following areas: Babylon, Al-Anbar, Al-kut, Karbala, Najaf, Nasryah, Ramadi, Samarra), it was not possible to include participants' Iraqi dialect as a factor in the statistical analysis. A similar issue persists even when Iraqis' dialect areas are broadly divided into northern and central/ southern dialects following (Blanc, 1964). Therefore, graphical illustrations of Iraqi English VOT values according to their dialect areas are provided in Figures 5.15 and 5.16.

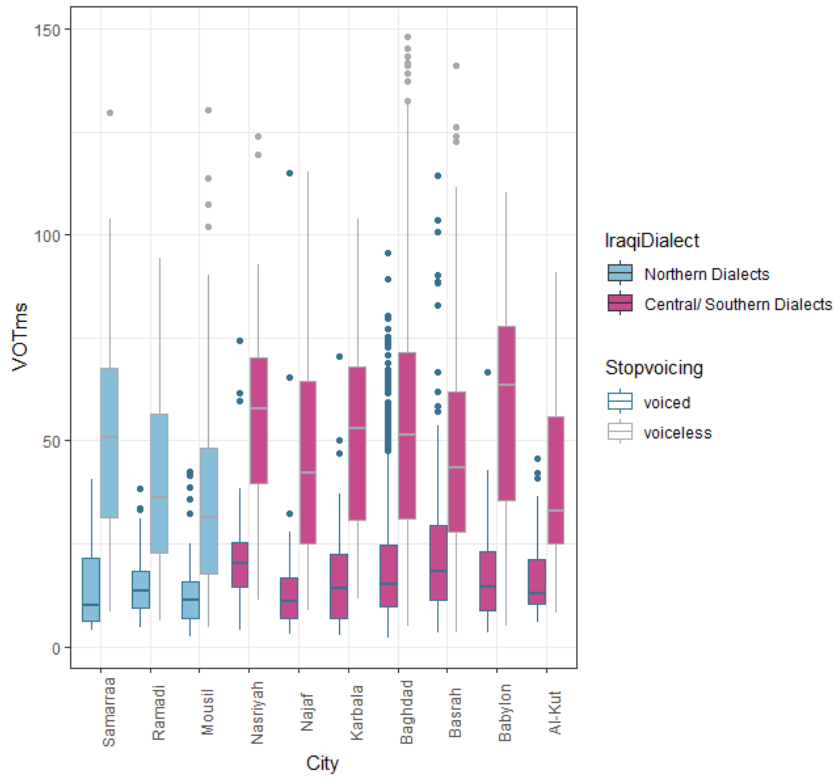


Figure H.1: Iraqi English mean VOT values of voiced and voiceless stops according to participants' Iraqi dialect areas

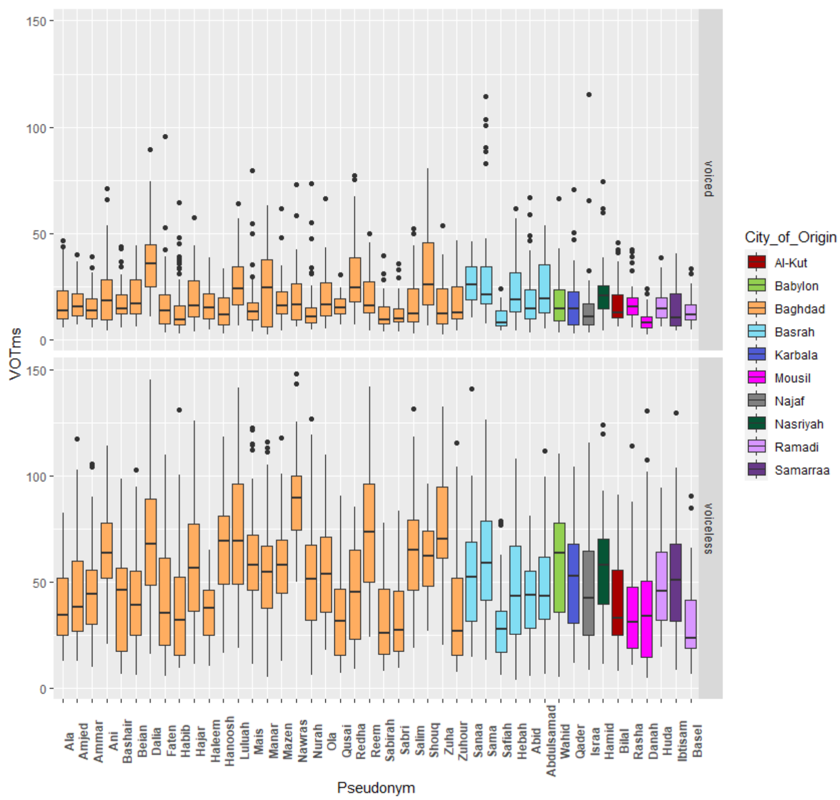


Figure H.2: Iraqi English mean VOTof voiced and voiceless stops produced by individual speakers with reference to their city of origin

As seen in Figure 5.15, illustration of mean VOT of voiced and voiceless stops according to participants' Iraqi dialect areas described by (Blanc, 1964) does not show any clear pattern of of similarity and/or difference in the production of VOT based on participants' Iraqi dialect areas. Mousil particpants show considerably short English voiceless VOT, but similar mean value is also observed in the production of voiceless stops by the participant originating from Al-Kut, a Southern Iraqi dialect. In fact, illustration of mean VOT of individual speakers with reference to their city of origin does not show similar production patterns within each dialect area, suggesting lack of evidence for Iraqi dialect effect on English VOT variation observed in the data (See Figure 5.16). Therefore, it seems that neither *Northern - Central/Southern* dialect classification nor *City* yields an observable effect of Iraqis' dialect area on participants' production of English stops' VOT.

Appendix I

Overall Stop Analysis

The overall stop analysis model output is shown in Table I.1.

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	1.149*** (0.235)
log (Word_duration)	0.278*** (0.034)
FollowingVowelnon_High	−0.266*** (0.051)
Stopvoicingvoiceless	1.482*** (0.068)
PlaceOfArticulationDorsal	0.463*** (0.082)
PlaceOfArticulationLabial	−0.587*** (0.070)
MigrationExperiencerefugee	0.138 (0.093)
DialectLondon	−0.003 (0.099)
GenderMale	−0.029 (0.113)
density	−0.043 (0.101)
ethnic_identity	0.063 (0.090)
English_use	−0.010 (0.067)
Iraqi_contact	−0.146 (0.085)
Muslim_contact	0.004 (0.068)
Stopvoicingvoiceless: PlaceOfArticulationDorsal	−0.229** (0.085)
Stopvoicingvoiceless: PlaceOfArticulationLabial	0.045 (0.076)
FollowingVowelnon_High: PlaceOfArticulationDorsal	0.139* (0.069)
FollowingVowelnon_High: PlaceOfArticulationLabial	0.161** (0.060)
Stopvoicingvoiceless: GenderMale	−0.267*** (0.040)
Stopvoicingvoiceless: DialectLondon	−0.172*** (0.034)
Stopvoicingvoiceless: MigrationExperiencerefugee	−0.266*** (0.048)
Observations	4,943
Log Likelihood	−3,147.545
Akaike Inf. Crit.	6,423.091
Bayesian Inf. Crit.	6,839.457
Note:	*p<0.05; **p<0.01; ***p<0.001

	Dependent variable:
	log (VOT)
	Estimate (Std. Error)
Constant	1.149*** (0.235)
Stopvoicingvoiceless: density	−0.205*** (0.036)
Stopvoicingvoiceless: ethnic_identity	−0.110*** (0.026)
Stopvoicingvoiceless: English_use	0.089*** (0.024)
Stopvoicingvoiceless: Iraqi_contact	0.119*** (0.030)
Stopvoicingvoiceless: Muslim_contact	−0.219*** (0.024)
PlaceOfArticulationDorsal: DialectLondon	0.011 (0.032)
PlaceOfArticulationLabial: DialectLondon	−0.114*** (0.029)
PlaceOfArticulationDorsal: MigrationExperiencerefugee	−0.143** (0.049)
PlaceOfArticulationLabial: MigrationExperiencerefugee	0.225*** (0.043)
MigrationExperiencerefugee: density	0.141 (0.108)
MigrationExperiencerefugee: ethnic_identity	−0.095 (0.083)
MigrationExperiencerefugee: Muslim_contact	−0.011 (0.098)
DialectLondon: density	−0.103 (0.097)
DialectLondon: Iraqi_contact	0.016 (0.097)
GenderMale: density	0.156 (0.117)
GenderMale: Iraqi_contact	0.145 (0.106)
Stopvoicingvoiceless: PlaceOfArticulationDorsal: MigrationExperiencerefugee	0.145* (0.065)
Stopvoicingvoiceless: PlaceOfArticulationLabial: MigrationExperiencerefugee	−0.131* (0.058)
Stopvoicingvoiceless: MigrationExperiencerefugee: density	0.233*** (0.039)
Stopvoicingvoiceless: MigrationExperiencerefugee: ethnic_identity	0.068* (0.030)
Stopvoicingvoiceless: MigrationExperiencerefugee: Muslim_contact	0.262*** (0.036)
Stopvoicingvoiceless: DialectLondon: density	−0.138*** (0.035)
Stopvoicingvoiceless: DialectLondon: Iraqi_contact	−0.072* (0.035)
Stopvoicingvoiceless: GenderMale: density	0.109* (0.042)
Stopvoicingvoiceless: GenderMale: Iraqi_contact	0.153*** (0.038)
Observations	4,943
Log Likelihood	−3,147.545
Akaike Inf. Crit.	6,423.091
Bayesian Inf. Crit.	6,839.457
Note:	*p<0.05; **p<0.01; ***p<0.001

Table I.1: Mixed- effects model output showing significant effects and interactions on log (VOT) from overall stop analysis

As expected, Table I.1 shows that English VOT produced by Iraqi Arab speakers in the present study is affected by all linguistic factors, and both macro- and micro-social factors, but only in interaction with linguistic factors. Following Field et al. (2012, p.640) and due to the involvement of most fixed factors in higher- order interactions, only significant highest- order effects are presented and visualised in the following paragraphs. To aid in the interpretation of the interactions, adjusted post- hoc tests for pair-wise comparison (i.e. Tukey post- hoc test) were performed, when applicable.

Effects of Linguistic Factors

Highly significant main effects of stop voicing, F (1,136.5) = 1089.3; p < 0.001, place of articulation, F (2,134) = 225.5; p < 0.001, word duration, F (1,4489.2) = 66.9; p < 0.001, and following vowel, F (1,629.8) = 28.03; p < 0.001 are shown. The effects of stop voicing and place of articulation are in the expected direction, with VOT in voiceless stops being significantly longer than voiced stops (i.e., reference level), and VOT in coronal stops (i.e. reference level) being longer than labials and shorter than dorsals.

As for word duration, VOT is significantly positively correlated with word duration, so that words of longer duration (likely reflecting slower speech rate) show longer VOT. This effect of word duration is in line with previous work on English VOT (Kessinger and Blumstein, 1998; Miller et al., 1986), which found a negative correlation between VOT duration and speech rate. While some of these studies reported significant speech rate effect only on voiceless stops (e.g., Miller et al., 1986), the overall model results did not show a significant interaction between stop voicing and word duration. Nevertheless, the separate models show that word duration is significant for voiceless but not for voiced stops (See Sections 6.5.3 and 6.5.4).

Moreover, the model output shows a highly significant interaction of place of articulation and stop voicing (See Table I.1). The significant interaction is, however, part of highest- order interaction (i.e. *Stopvoicing: PlaceOfArticulation: MigrationExperience*). Therefore, the significant *Stopvoicing: PlaceOfArticulation* interaction is discussed in the following section as part of the three- way interactions.

As shown in Table I.1, place of articulation is also involved in a significant two- way interaction with following vowel, F (2,585.1) = 3.91; p= 0.02. This interaction is illustrated in Figure I.1.

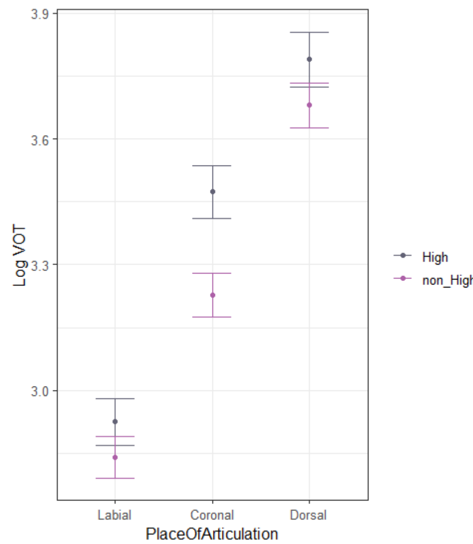


Figure I.1: Following vowel height and place of articulation interaction from the overall stop analysis

Overall, Figure I.1 shows a clear effect of place of articulation on log (VOT), with labials being significantly shorter than coronals (i.e. reference level) and coronals being significantly shorter than dorsals. The commonly reported effect of following vowel height on VOT (Chao et al., 2006; Klatt, 1975; Port and Mitleb, 1983) is also observed in the graph, with VOT being generally longer before high (i.e. reference level) than before non-high vowels. However, following vowel height effect varied according to place of articulation, with stronger effect of following vowel height on coronals than on labial and dorsal stops. Tukey post- hoc test confirmed visual illustration of the interaction in which a significant difference in VOT according to vowel contexts is shown in the production of coronal stops ($p < 0.001$), but not in the production of labial ($p= 0.244$) and dorsal stops ($p= 0.32$). Exponentiated mean VOT values by following vowel height and place of articulation are tabulated in Table I.2.

Place of articulation	**mean VOT (ms) in different vowel contexts**	
	High	Non- high
Labial	18.7	17.11
Coronal	32.3	25.2
Dorsal	44.2	39.7

Table I.2: Exponentiated mean VOT values of voiced and voiceless stops by place of articulation by following vowel height

The following section now explores the significant interactions of social factors with linguistic factors.

Interactions between Linguistic and Social Factors

Stop voicing is involved in a highly significant two- way interaction with English language use, F (1,4709) = 46.4; p< 0.0001 (See Figure I.2).

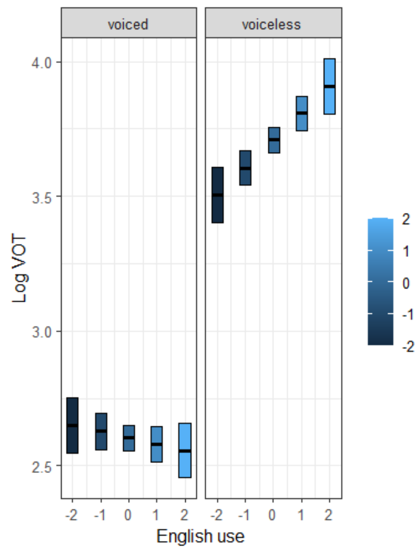


Figure I.2: Significant interaction of stopvoicing and English_use on log VOT from the overall stop analysis

As illustrated in Figure I.2, a significant positive correlation between voiceless VOT values and frequency of English language use is observed. Specifically, Iraqi Arab speakers who reported more frequent English use produce longer voiceless VOT than their counterparts who use English less frequently. This is different from voiced VOT values, which become shorter as English language use scores increase, indicating a negative correlation. Observing positive correlation between voiceless VOT values and English use is expected given previous accounts on English voiceless VOT to be longer than Arabic aspirated voiceless VOT (Flege, 1981).

Additionally, the model output shows a highly significant two- way interaction between place of articulation and dialect, F (2,4712.7) = 11.52; p< 0.0001 (See Figure I.3).

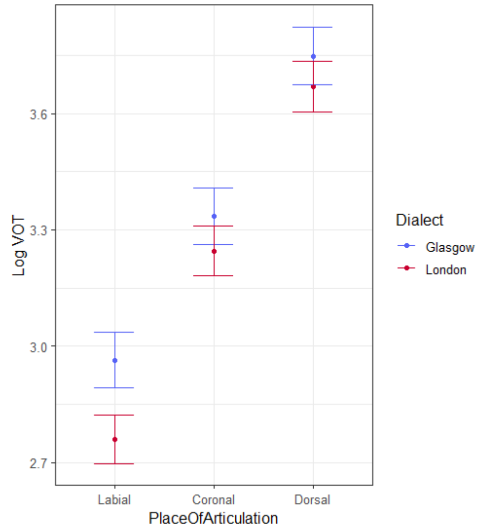


Figure I.3: Significant interaction of place of articulation and dialect on log VOT from the overall stop analysis

Figure I.3 shows a robust difference in VOT estimates according to place of articulation in both dialect areas. However, Glasgow speakers overall show longer VOT than London speakers, especially in the production of labial stops (i.e.exponentiated mean labial VOT by London speakers= 15.8ms; Glasgow speakers= 19.4ms). Although the difference between London and Glasgow speakers in the production of labial VOT is significant in the model (i.e. *PlaceOfArticulationLabial: DialectLondon* -0.114***) and unadjusted post- hoc test, it fails to reach significance in Tukey post- hoc test. Provided in Table I.3 is the p- values in post- hoc paired comparisons before and after Tukey adjustment.

Contrast	**P. value in post hoc paired comparisons**	
	(none)	(Tukey adjusted)
Labial Glasgow - Labial London	0.032	0.26
Coronal Glasgow - Coronal London	0.36	0.94
Dorsal Glasgow - Dorsal London	0.42	0.97

Table I.3: Post- hoc contrasts in the *Place of articulation:Dialect* interaction

The following paragraphs now explore the significant three- way interactions shown in the overall stop model (See Table I.1). The first four interactions involve migration experience. Figure I.4 illustrates the significant interaction for stopvoicing, place of articulation and Migration experience F (2,4725.5) =10.04, p <0.001.

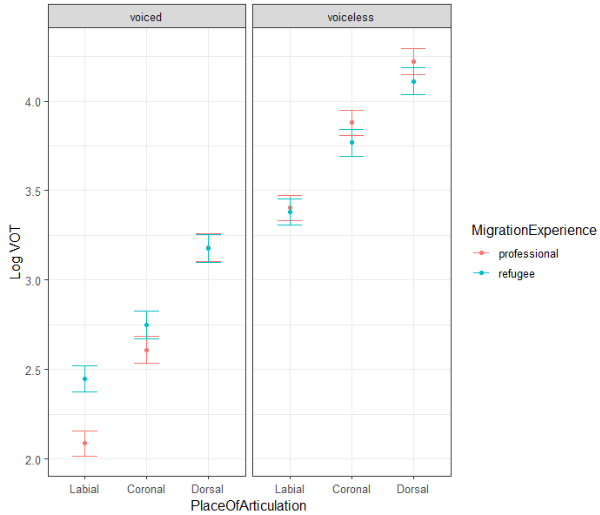


Figure I.4: Significant interaction of stopvoicing, place of articulation and Migration experience on log VOT from the overall stop analysis

Figure I.4 shows that both migrant groups produce different VOT according to stop voicing and place of articulation (i.e. shorter voiced than voiceless VOT; labial < coronal < dorsal VOT). However, refugee speakers have a considerably longer voiced labial, and to a lesser extent, coronal VOT than professional speakers. Tukey post- hoc test shows a significant difference between professional and refugee speakers in the production of voiced labial VOT, but no significant difference in the production of voiceless coronal and dorsal VOT is shown in the test ($p > 0.5$). Exponentiated VOT values of the interaction are shown in Table I.4.

Stop	**Place of articulation**	**Mean VOT (ms) by Migration experience**	
		Professionals	Refugees
	Labial	30.07	29.45
Voiceless stops	Coronal	48.46	43.30
	Dorsal	68.20	61.03
	Labial	8.06	11.59
Voiced stops	Coronal	13.60	15.62
	Dorsal	24.08	23.98

Table I.4: Exponentiated mean VOT (ms) in the *stop voicing: place of articulation: migration experience* interaction

In addition to the above interaction, migration experience is further involved in significant three- way interactions with stop voicing and three micro factors, namely density, ethnic_identity and Muslim_contact (See Table I.1). Observing such significant interactions between macro and micro factors is interesting, as it suggests variation in the production of voiced and voiceless VOT within each migrant group, depending on the reported social behaviour. The significant interactions are presented in Figures I.5.

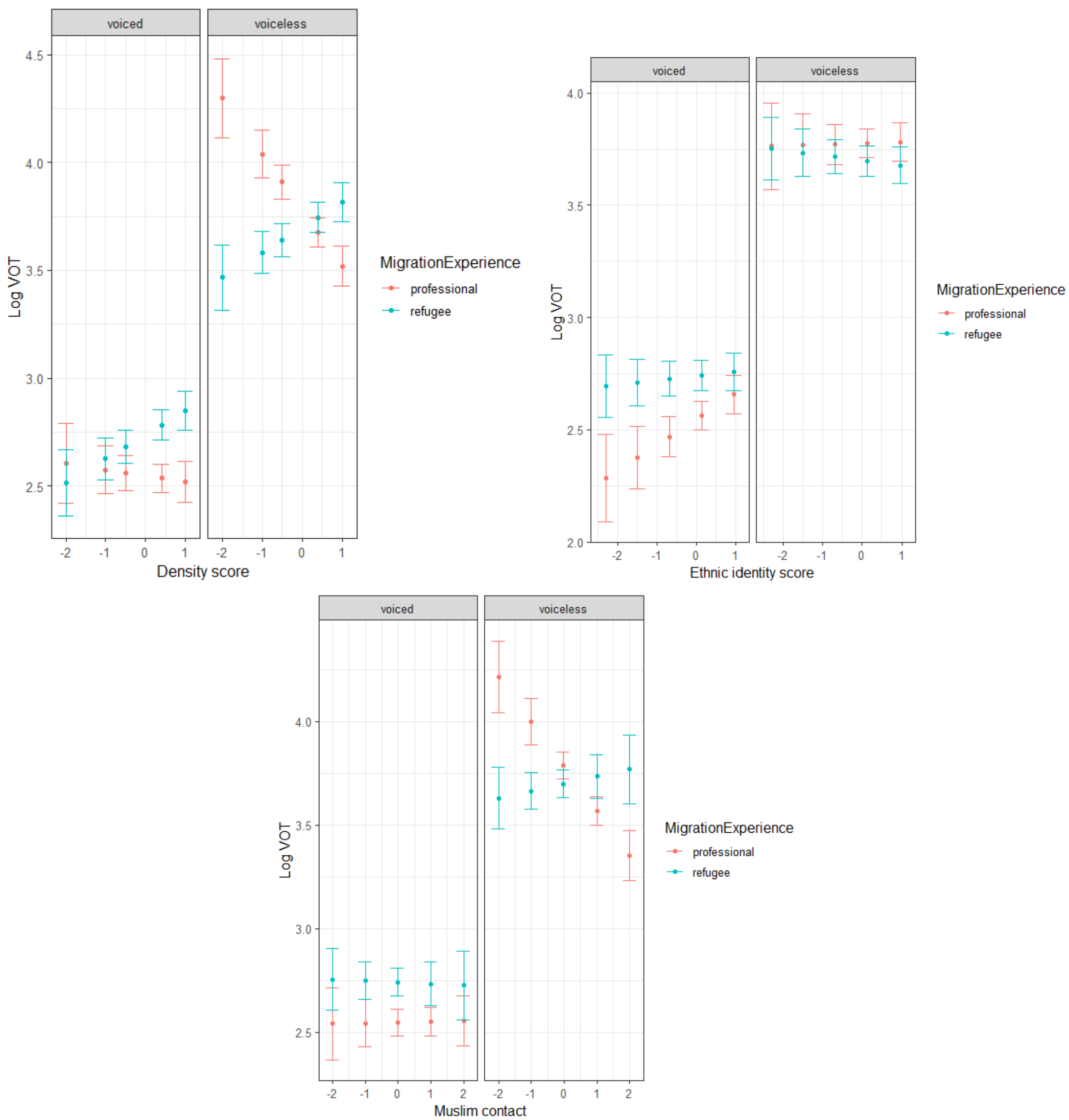


Figure I.5: The significant interactions of Stopvoicing* MigrationExperience* density (i.e. Score -2 _ less dense social network, Score 2_ more dense social network) (*top left*) Stopvoicing* MigrationExperience* ethnic_identity (i.e. Score -2 _ weak sense of ethnic identity, Score 2_ strong sense of ethnic identity)(*top right*) and Stopvoicing* MigrationExperience* Muslim_contact (i.e. Score -2 _ limited muslim contact, Score 2_ high- level muslim contact) (*bottom*)

It can be seen from Figure I.5 that, for the significant Stopvoicing:MigrationExperience:

density interaction F (1,4709.0) = 36.49, $p < 0.001$, refugee speakers produce significantly longer voiced and voiceless VOT as they report engagement in dense social network (i.e., **Score -2**: Voiced= 12.35ms, Voiceless= 32.01ms_ **Score 1**: Voiced = 17.29ms, Voiceless= 45.40ms). By contrast, professional speakers produce considerably shorter voiceless VOT as they report engagement in dense social network (i.e., **Score -2**: Voiced= 13.52ms, Voiceless= 73.52ms_ **Score 1**:Voiced = 12.40ms, Voiceless= 33.78ms).

In the significant Stopvoicing:MigrationExperience:ethnic_identity interaction F (1,4705.2) = 4.89; p= 0.02, professional speakers show significantly longer voiced VOT as they report stronger ethnic (Iraqi Arab) identity and vice versa (i.e., **Score -2**: 9.83ms _ **Score 1**:14.26ms). Refugee speakers, on the other hand, do not show a significant correlation between ethnic identity score and their VOT values.

As shown in Figure I.5, the significant three- way stopvoicing: MigrationExperience: Muslim_contact interaction (F (1,4705.2) = 54.31 ; $p < 0.001$) shows a significant difference in professionals' production of voiceless VOT with reference to the degree of Muslim contact, with a considerably shorter voiceless VOT amongst professional speakers who reported more Muslim contact than professionals who reported less Muslim contact (i.e., **Score -2**: 67.68ms_ **Score 2**: 28.58ms). By contrast, no change in voiced VOT values according to Muslim contact score is observed within both migrant groups.

Similar to migration experience, dialect was involved in a set of significant three- way interactions with stop voicing and micro- social factors, namely density, F (1,4701.2) = 15.76 ; $p < 0.001$, and Iraqi_ contact, F (1,4708.2) = 4.39; p= 0.03 (See Figure I.6).

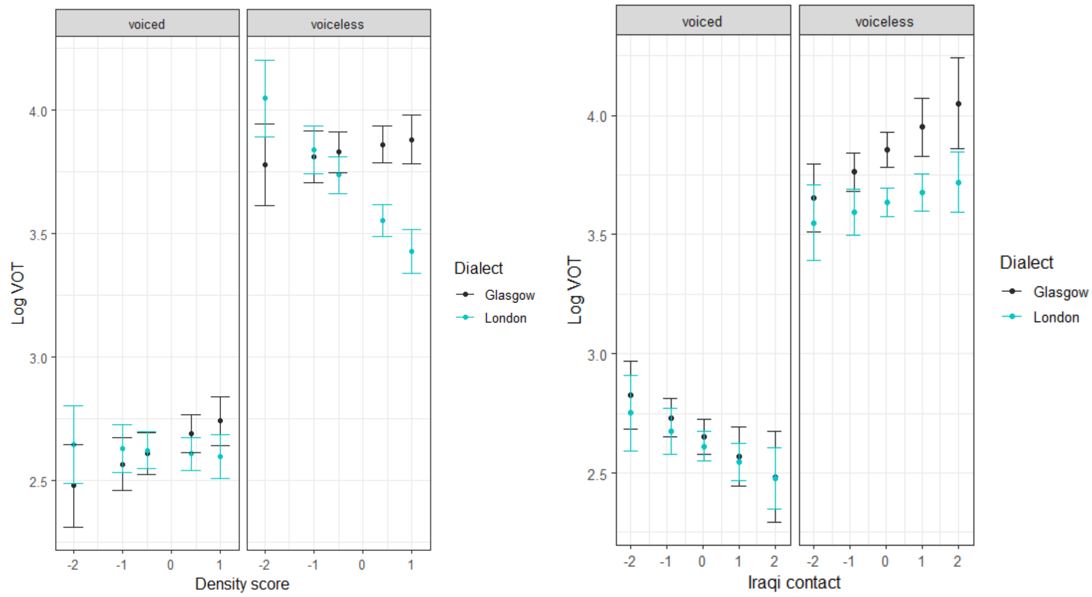


Figure I.6: The significant interactions of Stopvoicing* Dialect* density (i.e. Score -2 _ less dense social network, Score 2_ more dense social network)(*left*) and Stopvoicing* Dialect* Iraqi_contact (i.e. Score -2 _ less Iraqi contact, Score 2_ more frequent Iraqi contact)(*right*)

As illustrated in Figure I.6 (*left*), the Stopvoicing: Dialect: density interaction shows a strong negative correlation between density score and voiceless VOT values in London data, with a considerably shorter VOT among London Iraqi Arab speakers who reported engagement in more dense social network and vice versa (i.e., **Score -2**= 57.28 ms_ **Score 1**= 30.86 ms). Mean VOT values of all stops are slightly higher in Glasgow Iraqi Arab speakers who reported engagement in more mutiplex social networks.

Figure I.6 (*right*) shows a contrasting effect of Iraqi contact on voiced and voiceless VOT values in both London and Glasgow data. While shorter voiced VOT durations are observed as more Iraqi contact is reported amongst London and Glasgow speakers (i.e., **Score -2**: London= 15.65 ms, Glasgow= 16.86ms_ **Score 2**:London= 11.90ms, Glasgow= 11.99ms), longer voiceless VOT durations are produced by London and Glasgow speakers who reported more Iraqi contact. However, the difference in voiceless VOT according to Iraqi contact is stronger in Glasgow than London data (i.e., **Score -2**: London = 34.74 ms, _ **Score 2** = 41.24 ms; Glasgow= 38.56 ms_ **Score 2**= 57.34 ms).

The final set of the significant three- way interactions involved gender (See Table I.1). Specifically, the model showed a significant interactions of stop voicing: gender: density, (F (1,4706.1) = 6.46; p= 0.01), and stop voicing: gender: Iraqi_ contact, F (1,4708.6) = 16.61; $p < 0.001$ (See Figure I.7).

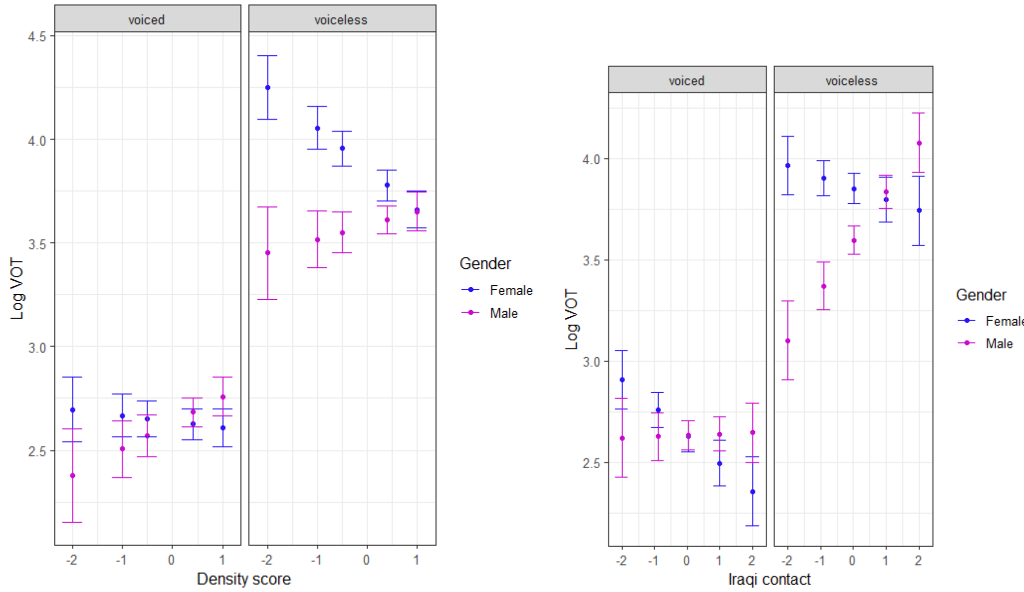


Figure I.7: The significant interactions of Stopvoicing* Gender* density (*left*) (i.e. Score -2 _ less dense social network, Score 2_ more dense social network) and Stopvoicing* Gender* Iraqi_contact (textitright) (i.e. Score -2 _ less Iraqi contact, Score 2_ more frequent Iraqi contact)

As shown in Figure I.7 (*left*), male speakers who reported more engegement in dense social network produce longer voiced and voiceless VOT durations than male speakers who reported less engagement in dense social network (i.e.,**Score -2**: Voiced = 10.79ms, Voiceless= 31.52ms_ **Score 1**:Voiced= 15.78ms, Voiceless= 38.51ms). By contrast, female speakers showed shorter voiceless VOT when reporting more engagement in dense social network, but did not show a significant difference in voiced VOT durations according to their density score (i.e., **Score -2**: Voiced = 14.83ms, Voiceless= 70.19ms_ **Score 1**:Voiced= 13.57ms, Voiceless= 38.89ms)

For the significant three- way interactions of Stopvoicing: Gender: Iraqi_ contact, illustrated in Figure I.7 (*right*), female speakers who reported more Iraqi contact produced shorter voiced and, to a lesser extent, voiceless VOT than female speakers who reported less contact with Iraqis (i.e., **Score -2**: Voiced = 18.36 ms, Voiceless= 52.67 ms_ **Score 2**:Voiced= 10.56 ms, Voiceless= 42.22 ms). Male data, on the other hand, shows a strong positive effect of Iraqi contact on voiceless VOT, with a considerably longer voiceless VOT duration amongst male speakers who reported more Iraqi contact than their counterparts who reported the opposite (i.e., **Score -2**= 22.26 ms_ **Score 2**= 59.05 ms).

To summarize, the mixed effects model fitted to log (VOT) across voiced and voiceless stops shows the following findings:

- Iraqi English positive VOT is affected by word duration, stop voicing, place of articulation and vowel height, as expected.

- VOT is influenced by frequent use of English, differently according to stop voicing.
- VOT is affected by stop voicing in conjunction with macro-social factors, namely migration experience, dialect, and gender, but always in connection with the micro-social factors: density, ethnic identity, muslim contact, Iraqi contact.

Appendix J

Exponentiated Mean VOT of Voiced Stop Interactions from the Voiced Stop Analysis

Exponentiated mean VOT values of voiced labial, coronal and dorsal stops, as produced by gender and migrant groups are provided in Table J.1.

Place of articulation	**VOT(ms) by migration and gender**			
	Professionals		Refugees	
	Male	Female	Male	Female
Labial	8.75	8.05	11.47	12.88
Coronal	12.29	14.07	16.07	18.69
Dorsal	25.33	25.14	21.42	30.31

Table J.1: Exponentiated mean VOT (ms) by place of articulation by migration experience by gender

Displayed in Table J.2 are the exponentiated mean voiced VOT values by place of articulation across migrant and dialect groups.

Place of articulation	**VOT by migration and dialect**			
	Professionals		Refugees	
	Glasgow	London	Glasgow	London
Labial	8.86	7.82	13.13	11.45
Coronal	15.96	11.04	17.84	17.26
Dorsal	27.45	23.12	22.35	30.96

Table J.2: Exponentiated mean voiced VOT (ms) by place of articulation by migration experience by dialect

Appendix K

Exponentiated Mean VOT of Voiceless Stop Interactions from the Voiceless Stop Analysis

Place of articulation	VOT by vowel context	
	High	Non- high
Labial	29.11	30.01
Coronal	51.65	43.75
Dorsal	66.14	64.56

Table K.1: Exponentiated mean voiceless VOT by place of articulation by following vowel height

VOT(ms) by migration experience and density scores

	Professionals		Refugees	
	Score -2	Score 1	Score -2	Score 1
Labial	33	24.5	27.8	31.9
Coronal	74	34.6	36	52.6
Dorsal	81	55.8	65.5	66

Table K.2: Exponentiated mean voiceless VOT (ms) in the significant Place of articulation: density: migration experience interaction

VOT(ms) by gender and density scores

	Male speakers		Female speakers	
	Score -2	Score 1	Score -2	Score 1
Labial	26	27	33	28
Coronal	35	43.5	68	42
Dorsal	72	60	74	61

Table K.3: Exponentiated mean voiceless VOT (ms) in the significant Place of articulation: density: gender interaction

VOT(ms) by dialect and density scores				
	London speakers		Glasgow speakers	
	Score -2	Score 1	Score -2	Score 1
Labial	35	22	27	35
Coronal	57	34.5	48	52
Dorsal	76	55	71	67

Table K.4: Exponentiated mean voiceless VOT (ms) in the significant Place of articulation: density: dialect interaction

Appendix L

Preceding and Following Vowels in /l/ Data

preceding vowel	word- position	No. Tokens
ɒ	final	1
ɔ	final	123
ʊ	final	82
ə	initial	3
əʊ	final	15
a	initial	3
a:	final	1
aʊ	final	9
ae	initial	2
e	final	135
e	initial	2
e:	final	17
e:	initial	5
eɪ	final	69
eɪ	initial	791
i:	final	157
i:	initial	8
ɪ	final	180
o	final	1
o:	final	94
oʊ	final	7
u:	final	172
v	final	40

Table L.1: Preceding/ Following vowels in /l/ data

Appendix M

Praat Script for Lateral Analysis

#script should be in same directory as sound/textgrid files
#sound/textgrid files must have exactly the same names
#script must be run from the Object menu

```
form take phoneme formant measures
word sound_extension .wav
word textGrid_extension .textGrid
comment output file will be created in same directory as sound files
comment type in name of output file (must end in .csv)
text filename myformants.csv
comment enter number of tier which contains phoneme segmenting
natural phoneme_tier 1
comment enter number of tier which contains word
natural word_tier 2
comment enter number of tier which contains F2
natural f2_tier 3
endform
clearinfo

fileappend "'filename$'" name, word, wrongF2, lat, latmidpoint, latf1, latf2, latf3, latduration, pre, premidpoint, pref1, pref2, pref3, preduration, fol, folmidpoint, folf1, folf2, folf3, folduration,'newline$'

mySounds = Create Strings as file list... sounds *'sound_extension$'
nSounds = Get number of strings
```

```
for iSound to nSounds
select mySounds
sound$ = Get string... iSound

name$ = sound$ - sound_extension$
printline 'name$'

textGrid$ = name$ + textGrid_extension$

mySound = Read from file... 'sound$'
myFormant = To Formant (burg)... 0 5 5000 0.025 50
myTextGrid = Read from file... 'textGrid$'
```

 # Extract the number of intervals in the phoneme tier and then loop through each interval on the phoneme tier.

```
numberOfPhonemes = Get number of intervals: 1
appendInfoLine: "There are ", numberOfPhonemes, " intervals."

for thisInterval from 2 to numberOfPhonemes
select myTextGrid

phoneme$ = Get label of interval: 1, thisInterval
previous$ = Get label of interval: 1, thisInterval-1
if phoneme$ <> "" and previous$ == ""

pre$ = phoneme$
printline 'pre$'
pre = thisInterval
printline 'pre'
lat$ = Get label of interval: 1, thisInterval + 1
lat = thisInterval+1
fol$ = Get label of interval: 1, thisInterval + 2
fol = thisInterval+2
```

 # Find the pre midpoint.

```
preStartTime = Get start point: 1, pre
preEndTime = Get end point: 1, pre
```

```
preduration = preEndTime - preStartTime
premidpoint = preStartTime + preduration/2
printline 'premidpoint:3'

# Find the lat midpoint.
latStartTime = Get start point: 1, lat
latEndTime = Get end point: 1, lat
latduration = latEndTime - latStartTime
latmidpoint = latStartTime + latduration/2
printline 'latmidpoint:3'

# Find the fol midpoint.
folStartTime = Get start point: 1, fol
folEndTime = Get end point: 1, fol
folduration = folEndTime - folStartTime
folmidpoint = folStartTime + folduration/2
printline 'folmidpoint:3'

# Get label of word
wordinterval = Get interval at time: word_tier, latmidpoint
word$ = Get label of interval: word_tier, wordinterval

# Get X which refers to wrong F2
xinterval = Get interval at time: f2_tier, latmidpoint
wrongF2$ = Get label of interval: f2_tier, xinterval

select myFormant

pref1= Get value at time... 1 premidpoint Hertz Linear
pref2= Get value at time... 2 premidpoint Hertz Linear
pref3= Get value at time... 3 premidpoint Hertz Linear

latf1= Get value at time... 1 latmidpoint Hertz Linear
latf2= Get value at time... 2 latmidpoint Hertz Linear
latf3= Get value at time... 3 latmidpoint Hertz Linear

folf1= Get value at time... 1 folmidpoint Hertz Linear
folf2= Get value at time... 2 folmidpoint Hertz Linear
```

folf3= Get value at time... 3 folmidpoint Hertz Linear

#printline f1: 'f1:0'; f2: 'f2:0', f3: 'f3:0'
#printline f1: 'f1:0'; f2: 'f2:0', f3: 'f3:0'
#printline f1: 'f1:0'; f2: 'f2:0', f3: 'f3:0'

select myTextGrid

#filewrite "'filename$'" Word, lat, latmidpoint, latf1, latf2, latf3, latduration, pre, premidpoint, pref1, pref2, pref3, preduration, fol, folmidpoint, folf1, folf2, folf3, folduration,'newline$'

fileappend "'filename$'" 'name$', 'word$', 'wrongF2$','lat$', 'latmidpoint:3', 'latf1:0', 'latf2:0', 'latf3:0', 'latduration:3', 'pre$', 'premidpoint:3', 'pref1:0', 'pref2:0', 'pref3:0', 'preduration:3', 'fol$','folmidpoint:3', 'folf1:0', 'folf2:0', 'folf3:0', 'folduration:3' 'newline$'

    endif
endfor
endfor
appendInfoLine: newline$, newline$, "it worked!"

Appendix N

Examples of Full Mixed-effects Models for Lateral Analysis

Model 1: Linguistic and Macro-social Factors

m1 <- lmer (F2-F1 ∼ latduration + lat + Gender + Dialect + MigrationExperience +
latduration: lat + lat: Gender + lat: Dialect + lat: MigrationExperience +
Gender: Dialect + Gender: MigrationExperience +Dialect: MigrationExperience +
lat: Gender: Dialect + lat: Gender: MigrationExperience + lat: Dialect: MigrationExperience +
(1 | Pseudonym) + (1 | word) , data = lat_data).

Model 2: Linguistic and Micro-social Factors

m2 <- lmer (F2-F1 ∼ lat+ density+ ethnic_identity+ national_identity+ English_use+ Iraqi_ contact +
lat: density+ lat: ethnic_identity+ lat: national_identity+
lat: English_use+ lat: Iraqi_ contact +
(1 | Pseudonym)+ (1 | word), data = lat_data).

Model 3: Linguistic Macro- and Micro-social Factors

m3 <- lmer (F2-F1 ∼ latduration+ lat+ Gender+ Dialect+ MigrationExperience+
ethnic_identity+ national_identity+ English_use+ Iraqi_ contact+
latduration: lat+ lat: Gender+
lat: Dialect+ lat: MigrationExperience + Gender: Dialect+
Gender: MigrationExperience+ Dialect: MigrationExperience+
lat: ethnic_identity+ lat: national_identity+ lat: English_use+
lat: Iraqi_ contact+ Gender:ethnic_identity+ Gender:national_identity+

Gender: English_use+ Gender: Iraqi_ contact+
Dialect:ethnic_identity+ Dialect:national_identity+
Dialect:English_use+ Dialect: Iraqi_ contact+
MigrationExperience:ethnic_identity+ MigrationExperience: national_identity+
MigrationExperience:English_use+ MigrationExperience: Iraqi_ contact+
lat: Gender: Dialect+ lat: Gender: MigrationExperience+ lat: Dialect: MigrationExperience+
lat: Gender:ethnic_identity+
lat: Gender:national_identity+ lat: Gender:English_use+
lat: Gender: Iraqi_ contact+ lat: Dialect: ethnic_identity+
lat: Dialect: national_identity+ lat: Dialect: English_use+
lat: Dialect: Iraqi_ contact+ lat: MigrationExperience: ethnic_identity+
lat: MigrationExperience:national_identity+ lat: MigrationExperience: English_use+
lat: MigrationExperience: Iraqi_ contact+
(1 | Pseudonym)+ (1 | word), data = lat_data).

Appendix O

Iraqi English /l/ according to Participants' Dialect of Origin

To account for the possible effect of Iraqi dialect areas on speakers' production of English laterals, the participants' English /l/ formant values according to their city and dialect of origin (i.e. Iraqi dialect areas) are presented in the following paragraphs.

In addition to first- language influence, it is possible for /l/ to vary according to Iraqis' dialect of origin. Unfortunately, cross- dialectal variation in the production of Iraqi Arabic /l/ has not been investigated in previous work, so comparison with other studies can not be provided. Consequently, to observe the possible effect of participants' Iraqi dialect on their English /l/ production patterns, the difference between F2-F1 according to individuals' city of origin as well as Iraqi dialect areas proposed by Blanc (1964) (See Section 7.3.2) are visualized and provided in Figures 7.26 and 7.27, respectively.

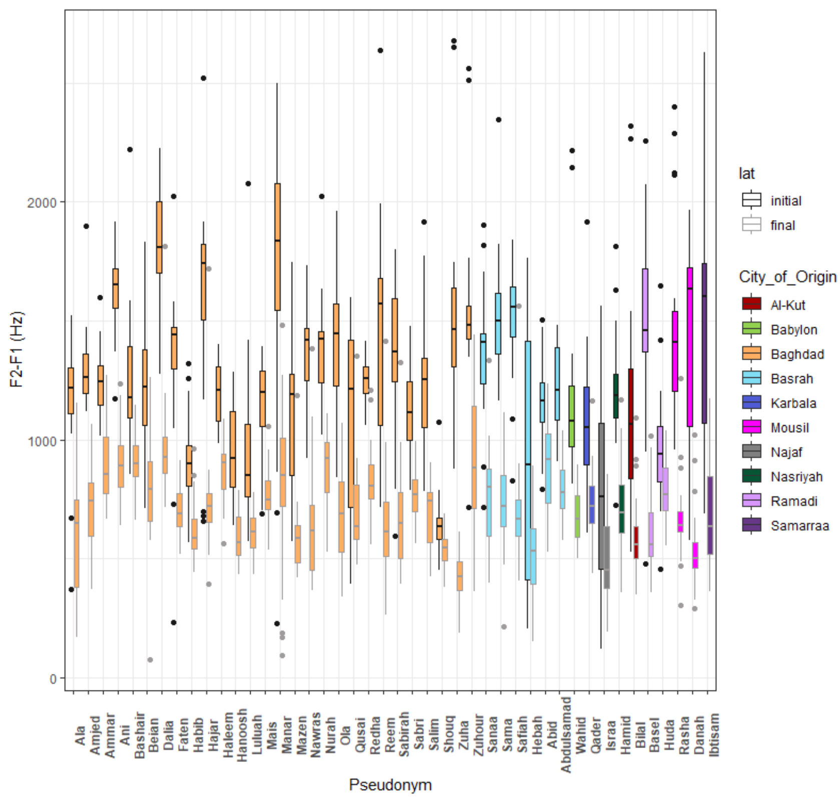


Figure O.1: F2-F1 for initial and final /l/ for individual speakers and Iraqi city

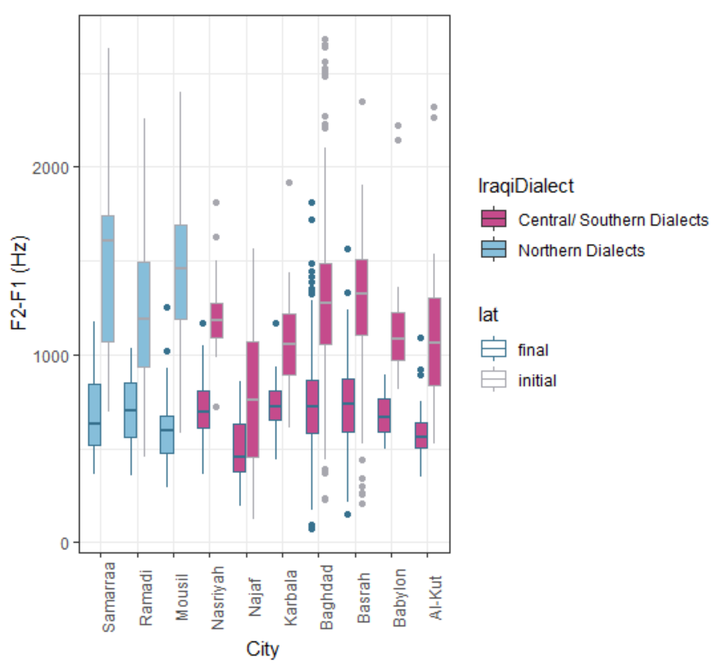


Figure O.2: F2-F1 for initial and final /l/ by Iraqi dialect areas indicated by Blanc (1964)

As shown in Figure 7.26, illustration of individuals' F2-F1 does not show a clear pattern in the production of initial and final /l/ across participants with reference to city of origin. For example, participants who are from Baghdad show large degree of variability in the production of initial and final /l/. The same pattern is observed in other cities with smaller number of participants. Likewise, classification of Iraqi dialect areas into central/ southern and northern dialects following Blanc (1964) did not show similar production patterns according to dialect areas either in word- initial or word- final positions (See Figure 7.27).