

**English in the Connemara Gaeltacht:
A Sociophonetic Study of Bilingual
and Monolingual Speakers**

Kate Tallon

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Phonetics & Speech Laboratory

School of Linguistic, Speech & Communication Sciences

Trinity College Dublin

Declaration

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Summary

This thesis presents a sociophonetic investigation of Connemara English, comparing the English of 12 native Irish speakers with that of 12 monolingual English speakers. It addresses a research gap in the study of Irish English (IrE) in using quantitative methods to examine cross-linguistic (Irish and English) and cross-varietal (English dialects) variation among the bilinguals and monolinguals. The English spoken by native Irish speakers has been commonly characterised as a variety heavily influenced by Irish (Ó hÚrdail, 1997), with some scholars proposing that such influences are direct transfers from speakers' L1 Irish. This creates a distinction between L1 Irish influences and historical substratal Irish influences reported for monolingual IrE varieties (Kallen, 1985). The Connemara Gaeltacht was chosen for two reasons. Firstly, the English varieties therein have not yet been quantitatively documented. Secondly, the opportunity to study present-day language contact between Irish and English in this area is diminishing due to the rapid decline of Irish.

The primary aim of this study is to provide an empirical description of the following features: PEN-PIN merger, FACE and GOAT variation, liquid+sonorant epenthesis (e.g. in 'film'), /t/-variation, and /l/-variation. It examines, in the first place, whether the English of native Irish speakers exhibits L1 influence from Irish and whether their English differs (in line with the above features) from that of monolinguals from the same region. The secondary aim is to question the extent to which a synchronic study of Gaeltacht English and reported ongoing language contact processes can shed light on historical language contact between Irish and English.

Speech data in Irish and English (read sentences and interviews) and social data (age, gender, attachment to community, language dominance and use) were collected from the 24 speakers. This data was acoustically and statistically analysed to explore the relationship between phonetic variation and linguistic and social factors. The results indicate that bilingual and monolingual speakers of Connemara English significantly differ in their realisation of these IrE features. However, these differences vary with age; while older monolingual and bilingual speakers exhibit considerable divergence from one another, their younger counterparts display similar speech patterns. The results indicate an ongoing change in progress in Connemara English. For bilingual speakers, the lack of parallels in Irish for certain features call for a recharacterisation of Gaeltacht English as a variety that is not one-dimensionally synchronically influenced by L1 Irish but is perhaps conservative toward older IrE speech patterns, which may show either Irish substratal traces or retentions from older British English input varieties.

It is concluded that a consideration of synchronic variation in these speakers is limited in elucidating past language contact processes between Irish and English. There are many social and sociohistorical factors that complexify this task. Overall, this study makes important contributions to the fields of Irish English linguistics by advancing the understanding of present-day language contact and variation in the Connemara Gaeltacht and questioning past descriptions of Gaeltacht English.

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PART I - INTRODUCTION AND BACKGROUND

1 Introduction

This thesis presents a quantitative sociophonetic investigation of the segmental system of Connemara Gaeltacht English, a variety in contact with Irish. It compares several phonological aspects of the English of bilingual native Irish speakers to (i) their Irish and (ii) the English of monolingual speakers from a neighbouring area of Connemara. In doing so, it explores existing anecdotal descriptions regarding the English of native Irish speakers, focusing in particular on the reportedly heavy influence from Irish.

The first aim of this investigation is to provide a description of a selection of segmental aspects of Connemara Gaeltacht English, investigating how social and linguistic factors may impact their variation. The second aim is to explore the possible Irish origins of a specific set of segmental features of Irish English (IrE), questioning the extent to which present-day Gaeltacht English can provide a snapshot of historical stages of IrE, and thus provide insights into diachronic language change and language contact between Irish and English.

The aims of this thesis are achieved by conducting auditory, acoustic and statistical analyses on selected phonetic phenomena previously reported for Gaeltacht English or for IrE more generally. These include the PEN-PIN merger, schwa epenthesis in liquid+sonorant clusters, /t/-variation, /l/-variation, and the realisation of FACE and GOAT vowels. Each of these features, along with the investigated sociolinguistic factors, will be detailed in Chapter 2. The upcoming sections will underscore the timeliness and significance of a study of this nature, especially considering the rapid decline of Irish and the Gaeltacht regions. Moreover, existing descriptions of Gaeltacht English largely rely on anecdotal evidence, which further emphasizes the need for systematic investigation.

The remainder of this chapter will situate the present study within its wider research context, highlighting relevant research trends and perspectives concerning Irish influence on the IrE segmental system. It will provide a rationale for examining the English of native Irish speakers, which encompasses both descriptive and theoretical motivations, and will outline the research questions and structure of the thesis.

1.1 Research Context

Irish English, i.e. the set of varieties of English spoken in Ireland, has emerged and developed within a complex setting of long-term language contact between two phonologically divergent languages: Irish and English. Across its many forms and sub-varieties, IrE displays a unique combination of vocalic and consonantal variation that sets it apart from other macro-varieties of English (e.g. British English, American English, Australian English).

At the core of most existing accounts of IrE phonology lies the question of whether certain features have their historical roots in Irish, in earlier language varieties brought to Ireland (e.g. 17th-century English or 12th-century Anglo-Norman) or are the result of ‘linguistic universals’ triggered by the contact process. Each of these sources is discussed in Chapter 2. Early studies of IrE considered Irish to be the main contributor of unique IrE phonological features. Indeed, Henry (1957), an early proponent of this ‘substratist’ view, concluded that the segmental system of North Roscommon English was essentially that of the previously-existing local Irish variety. Lunny (1981) too concluded that the segmental system of Ballyvourney English (Co. Cork Gaeltacht) corresponded “almost exactly” to that of Ballyvourney Irish. In this substratist approach, any IrE features with parallels in Irish were considered Irish transfer features.

In subsequent years, scholars began to consider past input varieties of British English as a plausible source for features that had previously been viewed as Irish transfers (e.g. Harris 1984). This approach viewed IrE as a variety that had retained linguistic structures that had since evolved in British English. Lass’ (1990) research occupies a relatively extreme end of this “retentionist” perspective; he considered IrE phonology as conservative in favour of 17th-century southern British English with little trace of Irish influence. While certain linguistic features of IrE are generally recognised as being either

from a British English or an Irish source, there are others whose origins remain debated. These features will be discussed in Chapter 2, prefaced by an exploration of the genesis and development of IrE and related theories regarding its linguistic formation.

Present-day segmental features of IrE are often explored with reference to historical transfer from Irish during the sustained period of bilingualism and language shift of previous centuries. It is through this historical lens that the notion of Irish-to-English phonological transfer has generally been addressed. However, there remains a significant lack of research into language contact effects between Irish and English in the present day, i.e. in the speech of bilingual Irish-English speakers. Such research has been recognised by some to be a promising endeavour; Hickey (2004a, p. 70) considers the Gaeltacht as a region where Irish-to-English language shift of past centuries is replicated, providing linguists with somewhat of a ‘living laboratory’ to investigate language contact and transfer. Likewise, Harris (1991, p. 45) views the Gaeltacht as an “obvious research site for testing assumptions about the influence of Irish on the development of Irish English.” The general idea of using present-day linguistic patterns to shed light on the past is echoed by Bullock and Toribio (2004, p. 91) in their study on bilingual speech processes: “what happens in the grammars of contemporary bilinguals may provide insight on changes that affect languages in contact situations over time.” The integrity of this idea and its possible application to the Irish-English contact setting will be explored in this thesis.

Examining Connemara Gaeltacht English in the present day also provides an opportunity to quantify what have thus far been limited and anecdotal descriptions of this dialect within broader accounts of Irish English. Hickey (1986, 2007), *inter alios*, sees the principal defining feature of Gaeltacht English to be its particularly heavy Irish influence in the form of strong contact effects. Ó hÚrdail (1997, p.182) agrees that Gaeltacht English exhibits strong influence from Irish, reporting that varieties of IrE “reveal an Irish language substratum which is variable and which reduces progressively from Gaeltacht area speech to regional (rural and urban) varieties, to unofficial-standard [IrE]”. Likewise, Ó Baoill (1997), sees Gaeltacht English as unique among IrE dialects in that it displays Irish transfer features not found elsewhere (e.g., the use of the Irish voiceless bilabial fricative /ɸ/ in <wh>-initial words, e.g. ‘when’ as [ɸɛn]). Additional features considered characteristic of Gaeltacht English, will be explored in Chapter 2. For now, it is sufficient

to note that this dialect has been characterised as phonologically distinct from monolingual IrE varieties, in terms of its Irish influence, but that this characterisation is based on largely anecdotal evidence.

Despite the obvious appeal of studying language contact in the Gaeltacht, it remains an under-explored avenue of research. The Gaeltacht areas of County Donegal and County Cork received a degree of attention in the late 1970s and early 1980s but interest in this area has since waned. Existing fieldwork-based descriptions of Gaeltacht English and its relation to Irish include Ní Chasaide's (1979) and Ní Ghallchóir's (1981) studies on parallels between Irish and English in the Donegal Gaeltacht, Lunny's (1981) description of Ballyvourney English (Múscraí, Co. Cork Gaeltacht) and a more recent sociophonetic analysis of this dialect by O'Cuinneagain (2019). These works and their relevance to the present study will be further explored in Chapter 2. To date there have been no (socio)phonetic studies of both the English and Irish of bilingual speakers in the Connemara Gaeltacht.

For many years, descriptions on IrE have been based on auditory analyses and anecdotal evidence. However, there has been a recent move toward quantitative acoustic analyses and statistical methods, led by a number of researchers (e.g. Lonergan, 2015; Peters, 2016; Skarnitzl & Rálišová, 2022). This study follows a similar path, applying quantitative, data-driven analysis to the study of IrE. Exploring IrE speech data in this way facilitates a fine-grained and holistic understanding of language variation and contact within the Gaeltacht setting. The phonetic features and social factors (linguistic background, age, gender, dominance in Irish, attachment to local community, phonetic context, word position) are introduced in Chapter 3. The incorporation of sociophonetic methods will add to the growing body of empirically-based findings, enabling us to draw more meaningful conclusions about IrE.

Given the decline of Irish and growing presence of English in Gaeltacht communities, the study of Irish-English language contact is more urgent than ever. We are presented with, at once, a pressing situation of language and dialect endangerment; both Irish and the varieties of English spoken by native Irish speakers are receding, and with them the opportunity to study their phonological interaction. This study therefore fills a crucial

research gap, which is of utmost importance to linguistic research on IrE.

1.1.1 A note on terminology: Gaeltacht English

Brief references to the phonology of Gaeltacht English are available in the works of Hickey (e.g. 1984, 2007), who labels the variety ‘Contact Irish English’. He defines Contact Irish English as incorporating those varieties of English spoken in Gaeltacht areas (Hickey 1984), delineating it in a geographical sense. He does not specify whether Contact Irish English is necessarily spoken by native Irish speakers, and as such, his definition could also include those monolingual varieties of IrE spoken in officially designated Gaeltacht areas where Irish has lost significant ground to English.

There is a further ambiguity to the label of Contact Irish English. Filppula (1993, p. 204), *inter alios*, considers IrE (i.e. the variety of English spoken in Ireland and one that technically incorporates Contact Irish English) a “contact language”, relating it to other contact varieties, such as pidgins and creoles. He defines a contact language as one which “has arisen through a (normally) long-standing contact between two languages, and which, being relatively well-established, is no longer dependent on bilingualism.” The terminology employed by Filppula leads to crossover and potential confusion with Hickey’s label of Contact Irish English, the latter referring only to English spoken in Gaeltacht areas, which, importantly, includes bilingual speakers (unlike Filppula’s definition of ‘contact language’).

In the present study, it was decided to use the term Gaeltacht English to refer to English spoken in Gaeltacht areas by native Irish speakers. This label incorporates both geographical and social elements and is intended to be more transparent than Contact Irish English. Notably, however, the present study also includes English spoken by monolingual speakers living in Gaeltacht areas where Irish has receded and is no longer the day-to-day language of the community. In this study, this variety of IrE spoken by monolingual speakers will be referred to as monolingual IrE/English but will fall under the umbrella term of Connemara English, alongside Gaeltacht English.

1.2 Research aims and questions

There are two avenues of research in this study. The first and primary aim is descriptive in nature and involves the quantitative investigation of sociophonetic variation within Connemara Gaeltacht English. This aim is motivated by the current lack of knowledge on varieties of English in this area and their contact with Irish. In fulfilling this aim, reports of unique phonological phenomena attributed to heavy Irish transfer will receive special attention.

A secondary aim of this study is to consider whether and how an exploration of the present-day variation in Gaeltacht English may shed light on historical phonological developments within IrE. In particular, this relates to advancing our knowledge on the mechanisms of diachronic Irish-English language contact and exploring hypotheses about the origins of characteristic features of IrE. Specifically, it considers the possibility that the current language contact situation in Connemara can inform us about historical language contact mechanisms and segmental origins of IrE.

Following this dual approach, the study's aims can be distinguished based on their relevance to either synchronic or diachronic aspects. The research aims along with their corresponding questions are as follows:

Aim 1: Investigate sociophonetic variation for a selection of segmental features in Connemara Gaeltacht English.

Research questions relating to Aim 1:

RQ1a Relative to monolingual Irish English, to what extent does the English of native Irish speakers display features (i) with a proposed Irish influence (ii) anecdotally reported for Gaeltacht English varieties?

RQ1b To what extent do sociolinguistic factors influence the realisation of features that (i) have a proposed Irish origin, and (ii) have been anecdotally reported for the English of native Irish speakers?

Aim 2: In light of the descriptive findings for Connemara English (Aim 1), explore the possibility that the English of L1 Irish speakers in Connemara can shed light on historical language contact processes and segmental origins of Irish English.

Research question relating to Aim 2:

RQ2 To what extent can the synchronic variation patterns in Connemara English shed light on the possible Irish origins of specific IrE phonological features?

1.3 Structure of thesis

The remainder of this thesis is organised as follows:

Chapter 2 explores the historical and current perspectives of language contact between Irish and English in Ireland. It outlines the diachronic development of Irish English and the origins of selected characteristic segmental features, before discussing present-day Irish-English language contact in the Gaeltacht, along with segmental features of Gaeltacht English that reportedly stem from Irish transfer.

Chapter 3 details the study design choices, theoretical framework and rationale behind the employed research methods of the study. The phonetic features investigated in the study are outlined, alongside the diverse linguistic and social factors that may influence their variation. It reports the methods and procedures of data collection, involving both speech data and social data. It details the recruitment and recording of the study participants and the resulting data, additionally addressing the methods used for data visualisation and statistical analysis.

The analysis and findings for each of the segmental features are presented individually in Chapters 4-9. These chapters are ‘self-contained’ in that they each include subsections on the descriptive and statistical analyses of each feature, as well as an examination and interpretation of the results.

Chapter 10 synthesizes the study findings to provide answers to the research questions. It situates the findings of the study within the broader research context and details the implications of the findings therein. The chapter critically assesses the analytic methods used in the study and acknowledges its limitations. Finally, it explores the study’s contributions and suggests possible future research directions.

Concluding remarks are provided in Chapter 11, which provides a brief summary of the study and highlights its significance and contributions within the broader academic context.

2 Background

Since the arrival of the Anglo-Normans in the 12th century, the English and Irish languages have been in continuous contact in Ireland. While research into this language contact has primarily taken a historical approach, focusing on its role in the formation and development of IrE, the contemporary contact between Irish and English within bilingual speakers has been largely overlooked. This chapter explores these two perspectives of language contact in Ireland. By doing so, it highlights questions that remain about the influence of Irish on IrE phonology.

The first section of this chapter (2.1) will discuss the historical perspectives of Irish-English language contact. It will provide an account of the Irish-to-English language shift of past centuries and will discuss theories concerning the origins of various segmental features of IrE. Subsequently, it will introduce the first set of phonetic variables to be examined within this study.

The ‘present-day’ perspective will be explored in Section 2.2, describing Irish-English language contact in the Gaeltachtaí and exploring existing phonological descriptions of the English of native Irish speakers. While many studies have speculated about phonological transfer from Irish to English – said to be particularly evident for native Irish speakers of English (Ó Baoill, 1997) – rarely have the exact mechanisms of such transfer been explored. In light of this, Section 2.2 will also provide an overview of existing theories of L1-to-L2 transfer and their application to the context of IrE. Many of these findings stem from the field of Second Language Acquisition (SLA). The application of findings from SLA research to the context of language contact between Irish and English provides a novel perspective within IrE linguistics. Finally, the second set of this study’s phonetic variables – relating specifically to the English of native Irish speakers – will be introduced.

2.1 Irish English: development and historical perspectives

Any description of Irish English (IrE) phonology in a sociohistorical context necessitates a discussion of language contact between Irish and English. In its most basic sense language contact refers to the concurrent use of two or more languages within the same geographical area (Thomason, 2001). Thomason (2001) further distinguishes between ‘trivial’ and ‘non-trivial’ contact; the former denoting situations where two or more languages are merely spoken by various groups in the same area at the same time (i.e. side-by-side monolingualism), and the latter, non-trivial contact, referring to the use of two or more languages by one or more speakers. The very initial interactions between the native Irish and the Anglo-Normans, following the latter’s invasion of Co Wexford in 1169, would have been a ‘trivial’ kind of contact; the Irish population were not proficient in the languages of the Anglo-Normans and vice versa. Non-trivial contact would soon follow, however, as the Anglo-Normans assimilated into Irish society (see §2.1.1).

The nature and intensity of Irish-English contact has changed over the centuries, due to and in tandem with societal changes in Ireland. Although not all instances of language contact lead to language shift, the interaction between Irish and English ultimately led to a shift from Irish to English throughout the vast majority of the country. The remainder of this chapter section will explore the historical trajectory of Irish-English contact, detailing the arrival of English and subsequent language shift from Irish, and outlining theories of IrE phonological development and the role of language contact therein.

2.1.1 The arrival and spread of English in Ireland

In its simplest characterisation, the language contact period between Irish and English in Ireland can be divided into two time periods: pre-16th century and post-16th century. These periods are demarcated by a hiatus in the spread of English (Hickey, 2007), along with changes in the political landscape of Ireland.

The initial 1169 arrival of Anglo-Normans (comprising Norman French, English, Welsh and Flemish speakers (Ronan, 2023)) from Britain is widely considered the first

significant arrival of any English-speaking populations in Ireland. This arrival was requested by the deposed king of Leinster, Diarmait Mac Murchada (Diarmuid MacMorrow), who, with the help of King Henry II of England, enlisted Norman soldiers from England and Wales to help him reclaim his throne in Ireland. Kallen (1997) highlights issues with the notion of an Anglo-Norman ‘invasion’ of Ireland, noting that there had been long running contact between Ireland and England in the preceding years. Echoing Ó Cróinín (1995), Kallen (1997, p.8) remarks that the coming of the Anglo-Normans was not a dramatic introduction of a foreign force but that their arrival was probably “far more ordinary and in keeping with past relationships that the invasion concept suggests.” Indeed, the Anglo-Norman group was not sufficiently large or socially powerful enough to bring about a country-wide language shift from Irish to English or Norman French. Many of the Anglo-Normans assimilated into Irish communities and adopted linguistic and cultural practices of the native Irish (Ó hÚrdail, 1997, p. 180). One cannot doubt, however, that the arrival of the Anglo-Normans was a significant step toward increased influence of Britain and of the English language in Ireland, leading to eventual colonisation of the country and language shift in later centuries.

Before the wide-scale colonisation of the 17th century, however, came the decline of the English language in Ireland, as the Anglo-Normans (or ‘Old English’ / ‘*Sean-Ghaill*’) gradually became gaelicised. Evidence for this decline is seen in the 1366 Statutes of Kilkenny, an attempt by King Edward III to prevent the assimilation of the Anglo-Normans into Irish society. The Statutes lamented the loss of English culture among the Anglo-Normans in Ireland and forbade them from marrying the Irish, speaking Irish, and adopting the cultural practices and customs of the Irish (Hickey 2007). The Statutes – considered by some as a failed attempt at apartheid in Ireland (e.g. Kearney, 1999) – did not prove effective. Fry (1991) attributes their failure to a lack of enforcement from the English. The decline of the English language in Ireland was likely further accelerated by the adoption of Protestantism by the English government in the 1500s, which isolated the Catholic Anglo-Normans/Anglo-Irish further from English culture and practices (Hickey, 2007). In the centuries immediately preceding the 17th century, records suggest that the English language was not in general use in Ireland and did not hold a significant place of prestige over Irish for the majority of the population. However, English did hold a relatively strong position in certain pockets of the country, such as in the areas of Fingal

(north Dublin) and Forth and Bargo (County Wexford) where linguistic features of the first ‘layers’ of English survived until the start of the 19th century (Kallen, 1997).

The nature of Irish-English language contact intensified considerably in early 17th century, which saw large-scale British invasion and colonisation of Ireland in the form of ‘plantations’, i.e. the seizure and reallocation of Irish-owned land to English and Scottish landlords. These plantations were a pivotal factor in the spread of English throughout Ireland. The largest plantations were in Munster (late 1500s – early 1600s) and Ulster (early 1600s), with the latter often considered as the most ‘successful’ in terms of its scale and endurance (e.g. Hill, 1993). This significant societal change also saw the introduction of various languages and dialects into Ireland. In Ulster, Scottish and English landlords brought varieties of Scots and north-west midlands English, traces of which are seen in present-day Mid Ulster English (Maguire, 2020). Outside of Ulster much of the land was allocated to landlords of mixed origin but many were from the West and North Midlands of England. As English control expanded throughout Ireland, so came the spread of the English language amongst the native Irish-speaking population. According to Hickey (2007) the Irish-to-English language shift was further accelerated not only by the Penal Laws of 1695, which forbade the use of Irish by the Catholic majority of the population, but also by the changing views of many native Irish who were beginning to consider English a socially advantageous language.

In the early 19th century additional momentum for the language shift to English was provided by the establishment of the National Schools system in 1831 (Hickey, 2007). The subsequent exclusion of Irish from the curriculum had an irreversible impact on the language and English was increasingly prioritised. The decline of Irish was not lamented by all, however. Among others, the Irish nationalist leader Daniel O’Connell (known as ‘The Liberator’ due to his achievement of Catholic emancipation in Ireland) saw English as a necessary tool for social and political advancement of the country. In 1833 he claimed “the superior utility of the English tongue, as the medium of all modern communication, is so great that I can witness without a sigh the gradual disuse of Irish” (Ó Tuathaigh, 1974). His opinion on the decline of Irish, is thought to be relatively common amongst the native population at the time (Hickey 2007).

Another significant catalyst in the spread of English was imminent. The Great Famine of 1845-1849, which claimed the lives of an estimated million people due to starvation and disease, further propelled the decline of the Irish language. The rural population in particular, many of whom still spoke Irish, endured profound losses through emigration or death. Both during and after the famine, the mass exodus of Irish people to English-speaking countries, such as the United States, further compelled many Irish speakers to learn English (Kelleher, 2009).

The Irish language was increasingly marginalised within Irish society under British rule until political independence was achieved in Ireland in 1922. The establishment of the Irish Free State was closely tied to the revival of the Irish language and culture, with the education system as a central focus (Walsh, 2023). Following independence, the Irish school curriculum was revised to include the teaching of Irish to all students and Irish was given a new status as the national and “first official language” of Ireland within the constitution (Walsh, 2022). While the Irish language and Gaeltacht areas receive special status and funding from the Irish government, Irish remains an endangered language and the Gaeltacht areas are diminishing year on year (CSO, 2023). The current sociolinguistic situation in these areas is explored in §2.2.

Though specific events in Irish history can be viewed as catalysts in the decline of Irish and shift to English, Ireland maintained centuries of bilingualism before English emerged as the primary language for the majority of the population. It is this extended period of language contact that is deemed crucial in shaping the linguistic development of IrE.

2.1.2 Theories on the phonological development of Irish English

Over the last century there have been several theoretical trends regarding the phonological development of IrE. The majority of early IrE linguistic studies proposed an Irish source for most, if not all, of the characteristic ‘non-standard’ segmental features of IrE. This stance became known as the ‘substratist’ view, featuring seminal works by Joyce (1910) and Hogan (1927), and later Henry (1957) and Bliss (1984). The 1980s subsequently saw greater weight being attributed to the regional varieties of British English (specifically Early Modern English (EModE)) that were brought to Ireland (e.g.

Harris 1984) – this became known as the ‘retentionist’ view, as it proposed that certain features, originating from these British varieties, were retained in Ireland. Finally, a third perspective, known as the ‘universalist’ view, has received more attention in recent years. This approach suggests that some features of Irish English may arise from linguistic processes influenced by language contact, which are not unique to the Irish English context but are cross-linguistically (‘universally’) valid. With the exploration of various viewpoints on the linguistic development of IrE, a complex scenario has unfolded. There is a growing acknowledgment of the challenges in definitively attributing a particular source to a specific feature. Indeed, multiple sources for linguistic features are sometimes feasible. These various approaches to the origins of IrE will be discussed in detail below, with a particular focus on the segmental system.

The Substratist perspective. During the initial decades of research on IrE linguistics the main focus was on the Irish language as a substratum, i.e. the pre-existing language which left linguistic traces in the target/superstrate language (English). Much of the early research on IrE assumed that most, if not all, of the characteristic ‘non-standard’ features of IrE phonology had been transferred from Irish. Specifically, this view assumed that when native Irish speakers began acquiring English as a second language (L2) they introduced phonological elements from their L1 Irish. These elements were then passed on to new generations of native IrE speakers, surviving within subsequent (monolingual) IrE varieties.

Patrick Henry was one proponent of this view. In his seminal 1957 study of Roscommon English, Henry (1957, p. 20), noting parallels between Roscommon IrE and Irish, concluded that its phonological system was “in all essentials that of the Irish dialect which it displaced.” This concept was later echoed by Lunney (1981, p. 126) who reported that the segmental system of Ballyvourney English (Cork Gaeltacht) corresponded “almost exactly” to that of Ballyvourney Irish. Bliss (1984, p.135) also believed that a large degree of substratum influence is evident in IrE, due to native Irish speakers historically interpreting and reproducing the sounds of English in terms of their Irish segmental system. He adds that this Irish influenced dialect of English “has been handed down, more or less intact, to the present day.” While the substratist view contributed many valuable insights into the evolution of IrE, it was challenged by those who considered it too narrow and neglectful of the complexity of the language contact scenario in Ireland.

The fact that a certain IrE linguistic structure had parallels with Irish was not deemed sufficient evidence to posit an Irish source.

The Retentionist perspective. The ‘substratist’ approach was challenged in the 1980s, in particular by Harris (1984), Kallen (1986) and Lass (1990) who claimed that the role of English input varieties in the formation of IrE had theretofore been underestimated. These scholars suggested that, for a selection of IrE features, the role of contact between Irish and English, and a resulting Irish substratal influence, was not as formative as previously thought. Instead, many features of IrE phonology were characterised as ‘retentions’ or residual items from English input varieties brought to Ireland but subsequently changed in Britain. In support of this perspective, Harris (1984) drew parallels between IrE syntactic forms and those found in other English varieties, such as south-western British English. One such example is the IrE habitual aspect with ‘do be’, e.g. in ‘*They do be working every day*’, a structure that was historically found in regional (western) British English varieties brought to Ireland in the 17th century (Hickey, 1997). Although Harris (1986) argued that certain linguistic structures of IrE could be attributed to an English input, he also noted that some syntactical features could be attributed to Irish, e.g., “subordinating *and* with subject pronoun and *ing*-participle”, as in ‘He fell and him crossing the bridge’.

While Harris did accommodate for an Irish substratum, Lass (1990) took a more extreme retentionist view. He dismissed the role of contact with Irish in the development of IrE phonology, viewing IrE instead as an internally-developed variety, conservative in favour of Early Modern English. In more recent years, Maguire (e.g. 2018) has provided convincing evidence for a retentionist view of Mid Ulster English (MUE), particularly for liquid+sonorant epenthesis (e.g. *film* as [‘fɪləm]). This feature of IrE is almost always attributed to Irish in previous research. However, Maguire shows that a parallel pattern existed in the input varieties of English and Scots into Ulster, and that the MUE pattern of epenthesis mirrors these varieties much more closely than it does Irish. Yet, Maguire (2018, p.484) does not completely dismiss an Irish source for epenthesis, regardless of the lack of parallels between Irish and IrE epenthesis patterns. Rather, he allows for a “reinforcing role” of Irish in the retention of epenthesis. This idea is explored further in the following paragraphs.

Within the retentionist view, the heterogeneity of the English input varieties must be acknowledged to avoid assuming that a standard EModE variety of the time was the sole English input. Such an assumption results in the drawing of empty comparisons between IrE and present-day southern British standard varieties, which significantly differ from the western and south-western British Englishes that were brought to Ireland in the 17th century. Taking the above example of IrE habitual aspect with ‘do be’, for example, if looking for parallels in ‘standard’ British English dialects from the 17th century, one would have no luck in finding a plausible source. However, a parallel structure existed in western and south-western EModE British varieties which were brought over to the south of Ireland (Hickey, 2000).¹ This variation must be borne in mind when exploring the origins of IrE linguistic features.

Irish as a ‘reinforcer’. For a selection of features with plausible origins in either Irish or English, some researchers have posited a combined input, noting that the presence of a certain feature in Irish may have exerted a strengthening force on a parallel feature in the incoming English variety. For instance, Harris (1984) refers to a “reinforcing or preservative” role for Irish in the presence of the perfect aspect marking (e.g. ‘she has her dinner eaten’) which has parallels in both earlier British English and in Irish.

Additionally, Hickey (1986) suggests that a “preservative interference” from Irish can explain the continued presence of long monophthong FACE /e:/ and GOAT /o:/ vowels in IrE. He draws attention to the coexistence of these diphthongs in both Irish and earlier English varieties (traces of which are still apparent in regions like the north of England). In a later work Hickey (2020) revisits this phenomenon, but labels it “supportive transfer”, when discussing the origins of the IrE distinction between second person singular and plural for pronouns (e.g., ‘you’ versus ‘youse’ or ‘ye’), which had equivalent structures in Irish and EModE. In such cases, Irish cannot have ‘caused’ the existence of these features in IrE (as they already existed in the input varieties of English) but might explain their persistence (Maguire, 2020). Maguire (2018, p. 503) uses the term ‘reinforcement’ to refer to the same concept, defining it as the “strengthening or

¹ Additionally, Filppula (2002) draws on both south-western British input Englishes and universal grammatical features in accounting for the presence of periphrastic *do* in IrE.

preservation of a feature in the target language which might otherwise be expected to disappear due to it being a variable or recessive feature.”

The concept of reinforcement is not without issues. Maguire (2020) highlights the difficulties in quantifying reinforcement, as it necessitates the quantification of cases where reinforcement was possible but did not occur. There is the added difficulty of proving that reinforcement occurred if it did not cause any change in the feature in question, “distinguishing it from what might well have been inherited in any case” (Maguire 2020, p.155). Maguire also notes that, for the few IrE features which have been thought to be reinforced by parallels in Irish, it is plausible that they would have existed in the target language anyway, regardless of Irish input. He highlights cases where a feature has survived in English varieties that have not been in contact with Irish (or Gaelic), for example in /lm/ epenthesis (e.g. film → [filəm]) which was common until recently in many British English dialects. It must be noted then that in the investigation of reinforcement, either historically or in the present day, that there is no proof, only speculation.

Those who mention a reinforcing role of Irish in the origins of certain features do not delve into the exact mechanisms of how this might operate on an individual speaker level. This is not surprising given that much of socio-historical linguistic IrE research has been conducted from a community-level perspective. As will be discussed in §2.2, a consideration of these mechanisms might further enrich our understanding of Irish-English language contact by encouraging a more fine-grained perspective, applicable to a wider field of language research.

Within IrE linguistic research, reinforcement has mainly been discussed from a historical perspective, with reference to past centuries of widespread bilingualism in Ireland. It has not yet been referred to in a modern-day sense, i.e. to explain apparent heavy influence of Irish on bilingual speakers’ English. Might it be the case that Gaeltacht English speakers display reinforcement of certain IrE phonological features due to parallels existing in their Irish? This study will investigate the concept of reinforcement within the current setting of Gaeltacht bilingualism. This idea will be revisited in §2.2.

Universalist view. A final perspective on IrE development is the “universalist” view, which assumes that certain linguistic structures in IrE are a product of universal linguistic processes, rather than unique factors specific to Ireland. Proponents of the universalist approach (e.g. Filppula, 1990; Kallen, 1981) suggest that certain linguistic features of IrE can be understood as manifestations of universal principles of language change and variation observed cross-linguistically around the world. This approach incorporates methods of comparative linguistics and draws on the concept of Chomsky’s Universal Grammar, which proposes that certain linguistic structures and rules are innate to all humans and apply cross-linguistically. In the universalist view, a particular importance is attributed to the language contact process itself as the source of characteristic IrE phonological features. This refers not to the substrate or superstrate in particular but to the cognitive processes occurring when a speaker learns an additional language in specific setting. By examining similarities and differences across languages and dialects, researchers in this area aim to identify general principles underlying language variation and change.

Some proponents of the universalist approach (e.g. Filppula, 1993; Hickey, 2007a) argue that Irish English may have undergone processes similar to those observed in creole languages, where linguistic features from multiple contributing languages are simplified and restructured in the context of language contact and second language acquisition. While few consider IrE to be a creole, Hickey (2007) draws parallels between IrE and Caribbean creoles in terms of aspectual distinctions, e.g. the use of *do/does* + *be* in habitual expressions. Thus far, the universalist perspective in the field of Irish English linguistics has predominantly been applied to studies of syntax. Conversations about the universalist method in relation to the phonology of IrE are relatively scarce. Although this approach holds value for the analysis of IrE, it will not be a central element of the present study. Instead, a predominant focus will remain on exploring the possible role of Irish in the formation of English (necessarily relating to the substratist view) in more depth.

The following table, adapted from Hickey (2007, p.114), summarises the possible sources of characteristic linguistic features in IrE, along with the corresponding research approaches or frameworks, where applicable. A fourth possible source for IrE features is included, that of ‘independent developments’. This term has been used by Hickey (2007)

and Kallen (1994) in referring to features that cannot be attributed to either contact or conservatism.

Table 1. Possible sources of linguistic features in Irish English (adapted from Hickey 2007).

Source	Research perspective
Transfer from Irish	Substratist
Archaic forms of English	Retentionist
Acquisition context of English	Universalist
Independent development (no recognisable source)	---

2.1.3 Segmental features of IrE with multiple plausible origins

Multiple origins have been proposed for several segmental features of IrE. For example, the use of long monophthongs /e:/ and /o:/ for FACE and GOAT lexical sets¹ has been attributed to both a British English source and to reinforcement from Irish (Barry, 1982; Lass, 1990). Investigating these features in the speech of modern L1-Irish bilingual speakers can offer new insights into the extent of the current influence of Irish on their existence. Understanding the possible contemporary reinforcement provided by Irish could enhance our knowledge of the historical development of these features during Ireland's past extended period of bilingualism. The remaining part of this section will introduce three phonological features which are purported to be influenced by both Irish and English. These features will form the first set of dependent phonetic variables to be examined in this study.

¹ J.C. Wells' lexical sets are a way to categorise English words based on their vowel sounds. They help compare how vowels are pronounced across varieties of English. Each set is named after a key word that represents the vowel sound. For more see Wells (1982).

To contextualise the description of these features, the vowels of various dialects of IrE are presented in Table 2, followed by key consonant phonemes of IrE, compared cross-dialectally in Table 3.

Table 2. Lexical sets and representative values of Irish English vowels (Hickey, 2008)

Lexical set	Rural Northern	Popular Dublin	Fashionable Dublin	Rural South-West/West	Supraregional Southern
LOT	ɒ	ɑ	ɔ	ɑ	ɑ
STRUT	ʌ	ʊ	ʌ	ʌ̃	ʌ̃
FOOT	ʊ	ʊ	ʊ	ʊ	ʊ
FLEECE	i:	i̯ə	i:	i:	i:
FACE	e:ə	e:	e:	e:	e:
BATH	ɑ(:)	æ:	ɑ:	ɑ:	ɑ:
THOUGHT	ɔ(:)	ɑ:	ɔ:, ɒ:	ɑ:	ɒ:
SOFT	ɔ(:)	ɑ:	ɔ:	ɑ	ɒ
GOOSE	ʊ(:)	u̯ə	u:	u:	u:
PRICE	ɛɪ	əɪ	ɑɪ	æɪ	ɑɪ
PRIDE	ɛɪ, ɑɪ	əɪ	ɑɪ	æɪ	ɑɪ
MOUTH	ɛʊ	ɛʊ	ɛʊ	ɑʊ	ɑʊ
CHOICE	ɔɪ	ɑɪ	ɔɪ, ɒɪ	ɑɪ	ɒɪ
GOAT	ɔʊ, ɒ:	ʌɔ	əʊ	ɒ:	əʊ, ɒʊ
NEAR	i(:)ɹ̩	i:(ɹ̩)	i:ɹ̩	i:ɹ̩	i:ɹ̩
SQUARE	ə(:)ɹ̩	ɛ:(ɹ̩)	e:ɹ̩, ø:ɹ̩	e:ɹ̩	e:ɹ̩
START	ɑ(:)ɹ̩	æ:(ɹ̩)	ɑ:ɹ̩	ɑ:ɹ̩	ɑ:ɹ̩
NORTH	ɔ(:)ɹ̩	ɑ:(ɹ̩)	ɒ:ɹ̩, ɔ:ɹ̩	ɑ:ɹ̩	ɒ:ɹ̩
FORCE	o(:)ɹ̩	ɒ:(ɹ̩)	ɔ:ɹ̩, ɒ:ɹ̩	ɔ:ɹ̩	ɒ:ɹ̩
CURE	u(:)ɹ̩	u̯ə(ɹ̩)	u:ɹ̩	u:ɹ̩	u:ɹ̩
NURSE	ə(:)ɹ̩	ʊ:(ɹ̩)	ɜ:ɹ̩, ø:ɹ̩	ɜ:ɹ̩	ɜ:ɹ̩
COMMA	ə	ə, ɐ	ə	ə	ə
LETTER	əɹ̩	ə(ɹ̩)	əɹ̩	əɹ̩	əɹ̩
HAPPY	ɪ, e	ɪ	ɪ	ɪ	ɪ
DANCE	æ, ɑ	æ:	ɑ:, (ɑ:)	æ:, ɑ:	ɑ:
PATH	ɑ	æ:	ɑ:, (ɑ:)	æ:, ɑ:	ɑ:

Table 3. Lexical sets and representative values for consonants in Irish English (Hickey, 2008).

Lexical set	Rural Northern	Popular Dublin	Fashionable Dublin	Rural South-West/West	Supraregional Southern
<u>THIN</u>	θ	t	t̪	t	t̪
<u>BREATHE</u>	ð	d	d̪	d	d̪
<u>TWO</u>	t	t	t, t ^s	t	t
<u>WATER</u>	r, ʔ, Ø	ʔ h	r̪t̪	t̪	r, t̪
<u>GET</u>	t̪, ʔ	h, Ø	t̪	t̪	t̪
<u>FEEL</u>	Ø	l, ɫ	ɫ	l	l, ɫ
<u>SORE</u>	ɹ	ɹ, Ø	ɹ	ɹ	ɹ, ɹ̪
<u>WET</u>	w	w	w	w	w
<u>WHICH</u>	w	ʍ	w	ʍ	ʍ, w

DRESS-raising / the PEN-PIN merger. Raising of the DRESS vowel, from /ɛ/ to /ɪ/, is mentioned in several descriptions of Irish English. It is particularly reported for pre-nasal environments, where it is termed the PEN-PIN merger. Hickey (2007) considers this phenomenon as unique to southern and south-western IrE varieties. Accounts of a raised DRESS vowel in the west of Ireland date as far back as the 15th century. Peters (2016) provides an example from a 1430 manuscript from the Galwegian Blake family, where a comment is made regarding the tendency for Galwegians to use a raised DRESS vowel in words such as ‘kettle’: “*kettle voactur cittel*” (‘kettle is called ‘cittel’). Hickey (2007) and Peters (2016) state that the orthographic evidence regarding the DRESS vowel in IrE suggests a transition from being an unconditioned process to one that is pre-nasally conditioned. Hickey (2007, p.279) reports that a raised variant is found “in many environments in historical documents but later texts show restriction to pre-nasal environments” and he suggests that restriction to pre-nasal contexts began around the 20th century.

Accounts of IrE in the mid to late 20th century, however, suggest evidence of a raised DRESS vowel in a wide range of phonetic environments. For example, in his study of Roscommon English, Henry (1957) describes a raised vowel (i) before and after nasals

(ii) after /r/ and before /tʃ/ (iii) After /j/ and before /s/ and /t/. He gives the examples of *net*, *pen*, *nest*, *stretch*, *yesterday*, and *yet*. More recently, Kallen (2013) has suggested that DRESS-raising is still found in environments other than pre-nasally in some IrE dialects. In particular, he reports a raised vowel in *next* and *best* for east Galway English. Finally, regarding social conditioning of DRESS-raising, Peters (2012) and Lunny (1981) suggest that age plays an influential role. Both studies found a higher frequency of DRESS-raising (or in the case of Peters, the PEN-PIN merger) in older speakers.

Peters (2016) notes that the origins of the PEN-PIN merger remain elusive. Kallen (2013) and Henry (1957) highlight the possibility that it is a retention from Early Modern English, which demonstrated raising of /ɛ/ before /s, l, n/ + consonant. He gives the examples of EModE spellings such as <Gintlemen> and <till> ('tell') (Wyld, 1921). Other linguists (Ó Baoill, 1997; O'Sullivan, 1942) have attributed the merger to an Irish transfer source; Connacht (western) and Munster (southern) dialects of Irish reportedly have raising of mid vowels in nasal environments (Ó Baoill, 1997) e.g. *seinm* → [ʃin^əm] ('playing') (Ó Curnáin, 2007). Note that the PEN-PIN merger is considered by Hickey to be exclusive to the west and south west of the country (i.e. including Connacht and Munster). This parallel geographical patterning between Irish and IrE pre-nasal raising could be considered as further support for an Irish influence.

The possibility that the merger is an independent development (external to a specific Irish or British English source) must also be considered. Hickey (2007) highlights the possibility of a more general phonetic process, whereby the nasal consonant triggers vowel raising due to its formant structure, i.e. the vowel undergoes anticipatory coarticulation with its following nasal consonant. For more on this, see Beddor et al. (1986). It is worth noting here that other varieties of English, such as those of Southern US and Californian English, also display the PEN-PIN merger. While the merger in California is attributed to the Dust Bowl immigration from the South in the 1930s (Xu, 2019), the question remains as to whether Southern US has the merger due to a universal phonetic influence or due to a retention from Early Modern English input therein.

In summary, while DRESS-raising – and more specifically the PEN-PIN merger – has been widely reported in descriptions of IrE, uncertainties remain about its origins and potential sociolinguistic influences. By examining this feature from a sociophonetic perspective in

Connemara Gaeltacht English, we can not only enhance our knowledge of its current distribution patterns but can further investigate a possible Irish transfer source.

FACE and GOAT. The majority of descriptions for IrE report that, for Irish English outside of Dublin and the northern IrE dialects, the vowels in the FACE and GOAT lexical sets are generally realised as long monophthongs [e:] and [o:] (Wells, 1982, Hickey 2007). These variants stand in contrast to the rising diphthongal realisations of FACE as [əɪ] / [eɪ] and GOAT as [əʊ] of other English varieties, such as Standard British English.

The monophthongal realisation of the FACE vowel is considered by Hickey (2007, p.328) to be “the normal realisation in Irish English in the south” with no evidence of a diphthongal variant. However, a recent study by Bessell (2023) on Cork City English reported diphthong [eɪ] variants, which were more common among speakers from affluent areas. Additionally, she found age-based conditioning within working-class speakers, whereby older speakers favoured [e:]. These results echo the observations made by Frost (2000), who reported a similar influence of social class on the diphthongisation of FACE in Cork city. Frost highlighted an interplay of age and gender within middle-class speakers, demonstrating that younger female speakers showed a higher tendency to use the [eɪ] diphthong.

Regarding the GOAT vowel, Hickey (2007) suggests that the monophthongal realisation is declining in IrE generally but remains prevalent in rural varieties. Sociophonetic studies of Galway City and Cork City have indicated a transition towards diphthongisation, influenced by various social factors. Specifically, Collins (1997) identified an emergent diphthongal pronunciation [oʊ] of GOAT in the English spoken in Galway City’s Claddagh district, noting its higher frequency among speakers with more diffuse social networks outside the local community. Moreover, Peters (2012) observed diphthongal occurrences of the GOAT vowel among speakers in Galway City, although he reports an overall prevalence of monophthongal variants [o:] and [ɔ]. Finally, Frost (2000) found GOAT diphthongisation to be more likely among younger speakers and women in Cork City, while Bessell (2023) found that middle-class Cork City speakers predominantly had a diphthong [oʊ], whereas working-class speakers had [o:] or [oə].

Regarding the origins of monophthongal FACE and GOAT, the importation of these variants to Ireland via earlier varieties of British English is generally uncontested. This

idea finds additional support in the fact that monophthongal variants are also found for several other varieties of English, including western Canadian English (Boberg, 2019), Northern British English (Kerswill, 1984; Watt, 2000) and Indian English (Maxwell & Fletcher, 2010). However, some consider Irish to have played a role in the retention of these features. For example, Barry (1982) attributes the prevalence and continued use of monophthongal variants in IrE to a reinforcing influence from Irish. To support this, he draws parallels with the Irish monophthong vowels /e:/ and /o:/. Similarly, Hickey (1986, p.4) invokes the “preservative influence” of Irish to explain the use of these monophthongs in IrE, also drawing parallels with the Irish monophthongs which “show no tendency to diphthongize.”

This latter statement, however, is not entirely true; Ó Siadhail (1989, pp. 56-57) reports a number of contexts – within Munster Irish – in which long vowels are diphthongized: /e:/ changes to [əi] after broad consonants in pre-stressed position, e.g. in *taoscán* ‘draught’ ([ti:s'ka:n] → [təis'ka:n]) and to [ai] in several words, such as *féire* ‘pair’ ([fe:rjə] → [fjairjə]). While these instances of diphthongization may somewhat challenge Hickey's assertion, his observation may retain significance for western dialects, given that Ó Siadhail only cites the mentioned examples for Munster Irish.

The current possible role of Irish as a ‘reinforcer’ of monophthongal variants for FACE and GOAT has not yet been subject to investigation in the west, nor has it been examined within the English of native Irish speakers. A comparison of these vowels in bilingual speakers’ Irish and bilingual IrE, and between bilingual IrE and monolingual IrE is expected to provide further insights into a possible reinforcement from Irish. Doing so provides a novel approach to testing the idea of ‘reinforcement’. If Irish reinforcement is taking place in the present day for this feature (assuming its presence) then we might expect bilingual L1 Irish speakers to display a higher degree of monophthongal variants than monolingual English speakers.

Epenthesis in liquid+sonorant clusters. Epenthesis (insertion) of a schwa vowel within liquid+sonorant coda clusters (e.g. ‘film’ → [ˈfɪləm]) is a well-discussed and documented feature of IrE. It has been widely reported among IrE varieties within /lm/ clusters (e.g. Hickey, 2007; Maguire, 2018; Wells, 1982). Hickey (2007, p.27) considers epenthesis within ‘film’ a cross-dialectal shibboleth of IrE, stating that “if an individual

has no epenthesis in film [...] then there is a very real sense in which that individual is not a speaker of (southern) Irish English”.

Less commonly, epenthesis has also been reported for /ln/ clusters (e.g. ‘kiln’)¹, and in /r/+C clusters, including /rm/, /rl/ and /rn/ (e.g. *farm*, *girl*, *barn*) (Henry, 1957; Sell, 2012). Hickey (2007) notes that epenthesis of this latter kind is only likely to occur in rural varieties. He additionally remarks that epenthesis in /r/+C clusters is found in the English of native Irish speakers; “as expected” (Hickey 2007, p.275). This may refer to his earlier assertion that liquid+sonorant epenthesis in IrE is a “definite contact phenomenon” (Hickey, 1986, p.10), i.e. a transfer from Irish to IrE and therefore is to be reliably found in the English of native Irish speakers whose Irish is reinforcing or influencing epenthesis in their English.

Hickey is not the only scholar to propose an Irish source for epenthesis. This feature has been widely attributed to Irish (Barry, 1982; Hickey, 2007a; Ó Baoill, 1997; Ó hÚrdail, 1997). This is due to the fact that Irish exhibits extensive sonorant+consonant epenthesis (Ní Chiosáin, 1999; Ó Siadhail, 1989) e.g. *borb* ‘abrupt’ [borəb], *dorcha* ‘dark’ [dorəxə] (Ní Chiosáin, 1999). In recent years, the Irish-origin hypothesis has been questioned by Maguire (2018), who demonstrated that epenthesis in Mid-Ulster English (MUE) resembles epenthesis patterns historically present in Scots and English varieties brought to Ulster, more closely than those of Irish. Consequently, Maguire suggests that Scots and English are the main sources for epenthesis in MUE, noting also the wider presence of epenthesis in other Germanic languages. Furthermore, he highlights the discrepancies between the patterns of epenthesis in Irish and in IrE:

“There is no evidence of general extension of epenthesis to those clusters where it is only found in Irish, nor to non-coda position. All we have is the presence of epenthesis, exactly where we would expect it to be given the English and Scots antecedents, in a dialect which is known to have been in contact with Irish, which is not enough to allow us to definitely assign a reinforcing role to Irish.” (Maguire, 2018, p.504)

¹ Note that words with /ln/ coda clusters are extremely infrequent in English.

These alternate sources for epenthesis needn't be mutually exclusive, however. While Maguire's theory may hold true for northern dialects of IrE, an Irish source may better explain the presence of epenthesis in more southerly areas where Irish has retained a stronger presence over the centuries. Additionally, while some areas of the north had Scots input, the more southerly areas of Ireland did not.

Regarding the sociolinguistic patterning of epenthesis in IrE, much remains to be known. A study by Sell (2012) investigated the effects of sociolinguistic factors on epenthesis in Galway City English and found that the word 'film' showed distinctly higher rates of epenthesis than any other word. Sell also reported epenthesis to be more common in casual speech and for older speakers, suggestive of a possible change in progress. To date, no studies have investigated epenthesis in Gaeltacht English nor compared epenthesis rates in bilingual versus monolingual varieties of IrE. In fulfilling these two research gaps, the present study aims to shed light on the possible present-day reinforcing effect of Irish on this feature. Findings from this investigation may, in turn, shed light on the historical origins of epenthesis in IrE.

In summary, the origins of IrE epenthesis have been widely attributed to an Irish influence, yet they remain debated. Maguire (2018) makes a convincing argument that IrE epenthesis is more likely a retention feature from past input varieties of English and Scots in Ireland. He does entertain the possibility, however, that Irish has played a minor reinforcing role in the presence of this feature in IrE. This possibility will be explored further in this study by analysing sociolinguistic variation within and between bilingual and monolingual IrE speakers.

2.1.4 Summary of Section 2.1

The arrival and subsequent spread of English in Ireland led to large-scale language shift from Irish to English and the marginalisation, retreat and eventual (present) endangerment of Irish. The centuries-long contact between Irish and English is viewed by many as a condition that was ideal for substratal Irish transfer to occur and, as such, many of the characteristic segmental features of IrE have been attributed to an Irish source, where a parallel feature is attested in Irish. Yet, others have considered IrE to be a

conservative variety in favour of historical British English features that were brought to Ireland, particularly during the 17th century. Universal linguistic processes linked with the language contact scenario, and independent changes within IrE have also been proposed as origins of characteristic phonological features of IrE. There are several segmental features of IrE whose origins remain somewhat debated. Three of these were introduced in this section: the PEN-PIN merger, liquid+sonorant epenthesis, and FACE and GOAT monophthongs. These are the first set of features to be analysed in this study. Section 2.1 has approached Irish-English language contact from a historical perspective. The following section (2.2.) will consider this contact from a modern-day perspective, exploring the current linguistic setting of the Gaeltacht.

2.2 Irish and English in contact: current perspectives

Present-day contact between Irish and English has been the subject of very few linguistic studies. The nature of this contact takes two forms. On a nationwide scale, both Irish and English are present in the educational, cultural and political spheres, as well as throughout the linguistic landscape of Ireland (i.e. on public transport, road signs etc.). In this way, the presence of Irish is evident in daily life even for those who cannot speak Irish (some 60% of the population (CSO, 2022)). This type of contact falls under Thomason's 'trivial' contact, i.e. the side-by-side existence and use of multiple languages (see §2.1).

Irish and English are also in contact "non-trivially" within bilingual speakers, who embody a wide spectrum of speaker types. A bilingual Irish-English speaker may have been raised at home through Irish, only acquiring English at school or elsewhere outside the home. Alternatively, they may have acquired both Irish and English inside the home. Conversely, a speaker may have been raised through English but have acquired Irish outside the home to a level of considerable fluency. This latter type of bilingual is generally termed a 'new speaker' (O'Rourke & Walsh, 2015). Irish-English bilinguals who acquired Irish as their first language are of particular interest to this study, as they present the opportunity to investigate L1-to-L2 Irish-to-English transfer effects, approximating as closely as possible, the past scenario of language shift in Ireland. An analysis of present-day phonetic transfer effects from Irish to English may, in turn, further

our understanding of the historical role of Irish in the origins of the segmental features discussed in Section 2.1.

This idea is not novel; over recent decades researchers have seen this kind of investigation as a valuable one. The opportunity to test the Irish influence in Gaeltacht areas has been noted by Hickey (2004a, p. 70), who considers the Gaeltacht as an area “in which the language shift scenario of previous centuries is replicated, thus enabling linguists to view the process of language contact and transfer *in vivo*.” Likewise, Harris (1991, p. 45) views Gaeltacht regions as an “obvious research site for testing assumptions about the influence of Irish on the development of Irish English.” Despite these valid calls-to-action, this kind of research remains underexplored.

Phonetic analyses of English spoken by native Irish speakers are rare. However, there are several anecdotal reports that consider it a unique variety of IrE and one that is heavily influenced by Irish (e.g. Hickey 2007). The remainder of this section will provide an overview of Irish-English language contact within the Gaeltacht, evaluating the current sociolinguistic setting and exploring existing segmental descriptions of Gaeltacht English.

2.2.1 Irish-English bilingualism in the Gaeltacht

The Údarás na Gaeltachta (the state agency responsible for the preservation of Irish) defines the Gaeltacht as an area where Irish is “the primary spoken language for the majority of the community” (Údarás na Gaeltachta, 2023). While this is a generally accepted definition of the Gaeltacht, it does not accurately represent the current situation for all Gaeltacht areas. In many towns and villages within Gaeltacht boundaries Irish is no longer spoken as the daily language of the community. For example, in the County Galway Gaeltacht region, which has the highest proportion of daily Irish speakers in Ireland (40% of inhabitants), 28% of inhabitants do not speak Irish (CSO, 2016; 2023). This figure has been increasing year on year (CSO, 2023) and highlights the rapidly declining use of Irish. The geographical boundaries of the Gaeltachtaí (plural of Gaeltacht) are shown in Figure 1, shaded in dark green. The corresponding three main dialects of Irish are indicated in red.

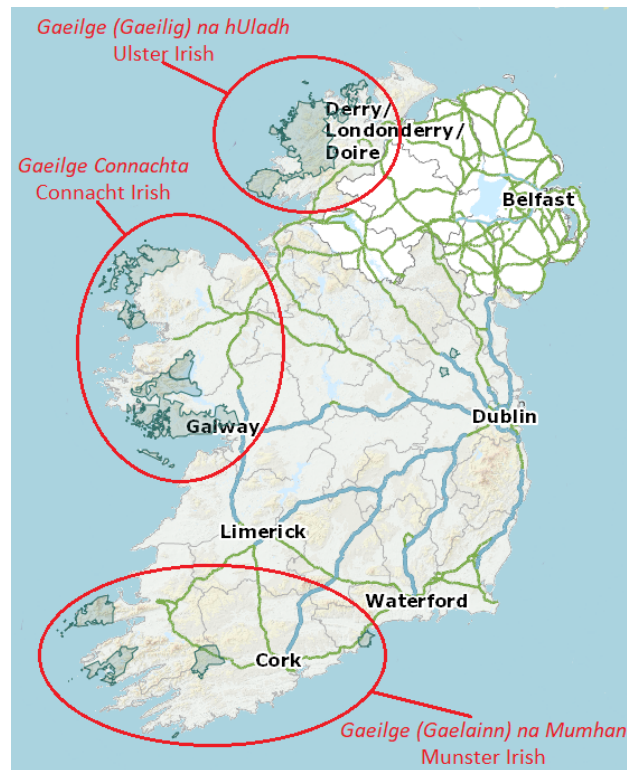


Figure 1. Map of Irish Gaeltacht regions (indicated with dark green shading) and macro dialects of Irish (indicated with red circles).(CSO, 2016).

It is important to note that while Irish is an official language of Ireland, it is a minority language and is categorised by UNESCO as ‘definitely endangered’ in its Atlas of World Languages (UNESCO, 2023). Accelerating the decline of Irish is the increasing presence of English in Gaeltacht areas, mainly through digital media. It is generally acknowledged that there are no monolingual Irish speakers left in Ireland; all native speakers of Irish are nowadays considered to be Irish-English bilinguals. Like many bilingual communities, the Gaeltachtaí exhibit a diverse range of language proficiency and usage among its speakers, existing along a spectrum. On one end there are Gaeltacht inhabitants with limited to no proficiency in Irish, often individuals who have married into local Irish-speaking families. At the other end of the spectrum are inhabitants who have relatively low proficiency in English. These are typically elderly people or pre-school children who primarily use Irish at home. In general, for younger generations of native Irish speakers, it may be assumed that English is present in their day-to-day lives, especially via digital media.

2.2.2 *Gaeltacht English: linguistic descriptions*

Accounts of English spoken in Gaeltacht areas are scarce. Apart from a small selection of studies carried out in the Gaeltacht regions of Gaoth Dobhair, Co. Donegal (Ní Chasaide, 1979; Ní Ghallchóir, 1981) and Múscraí, Co. Cork (Lunny, 1981; O'Cuinneagain, 2019), descriptions of Gaeltacht English are cursory and usually form part of wider descriptions of IrE (e.g. Hickey 2007; Ó Baoill 1997). Uniting these descriptions is the commonly held view that the English of native Irish speakers shows a particularly heavy influence from Irish (Filppula, 1995; Harris, 1984; Hickey, 2007a; Ó hÚrdail, 1997). Harris (1984, p. 305), for example, remarks: “the effects of Irish interference are, not surprisingly, most discernible in parts of Ireland with a high incidence of bilingualism.” Hickey (1986, p.1) likewise claims that the influence of the Irish language on English is most evident in Gaeltacht areas. Echoing this, Ó hÚrdail (1997, p. 182) reports that Irish influences on IrE “reduce progressively from Gaeltacht area speech to regional (rural and urban) varieties, to unofficial-standard [IrE].” While these reports of heavy Irish influence are widespread and widely accepted, there are few studies that investigate this influence empirically.

It has been noted that English spoken in the Gaeltacht regions exhibits distinct phonetic traits. Ó Baoill (1997) reports that the segmental system of Gaeltacht English shows heavy Irish influence. In particular, he refers to a velarised /ɫ/ pre- and post-vocally (where other IrE speakers display clear /l/), the use of the bilabial fricative [ɸ] for [ɱ]/[w] in <wh> words, and monophthongal FACE [e:] and GOAT [o:] vowels. Ní Ghallchóir (1981) in her study of bilingual Irish-English speakers in Donegal also found that Irish bilabial fricatives were used in place of English labiodental fricatives; [β] was substituted for [v], and [ɸ] was substituted for [f] or [ɱ]. She found this to be the case only for older speakers however.

While Gaeltacht English is said to be heavily influenced by Irish, not all of its characteristic features have been directly attributed to an Irish source. One such feature is the use of a plosive /t/ variant, where other IrE varieties generally have a fricated or ‘slit-t’ [t̪]. Hickey (1984) reports that native Irish speakers of English show “no lenition of /t/”. In his definition of lenited /t/ forms, Hickey includes slit-t, among various other weakened /t/ forms, such as taps or glottal stops. The lack of /t/-lenition in Gaeltacht

English has not been explicitly attributed to an Irish transfer source, however. This feature will be further discussed in §2.2.4.

To summarise, there is a widely attested view that the English of native Irish speakers displays particularly heavy Irish influence. While both /l/-velarisation (pre- and post-vocally) and the absence of /t/-lenition are exclusively reported for Gaeltacht English, other features are present in both Gaeltacht and non-Gaeltacht English varieties but are assumed to occur to a higher extent in Gaeltacht English due to an ongoing influence of Irish. The exact mechanisms of this L1-to-L2 transfer have not yet been explored in depth within IrE linguistic research. The following section seeks to remedy this.

2.2.3 *Gaeltacht English: L1-to-L2 influence*

Generally, within language contact research, the interaction between languages is approached from a socio-historical perspective, considering the processes and outcomes of contact on a community-wide scale. This approach, as was detailed in Section 2.1, has long been a central focus of linguistic research on IrE. An alternative approach, more typical of studies within Second Language Acquisition (SLA) and bilingualism, considers contact on an individual speaker level. We might, however, consider these two approaches as inherently linked. Sankoff (2004, p.19) encapsulates this idea: “language change presupposes diffusion from individuals or smaller groups to the speech community as a whole.” While numerous references are made to Irish-to-English phonetic transfer in previous IrE research, the mechanisms of this process are often unexplored. Supplementing the study of Irish-English language contact and transfer with research findings from the individual-speaker perspective can advance this Irish-English contact studies in novel directions and facilitate a deeper understanding of both the synchronic and historical mechanisms of phonetic transfer from Irish to English.

Previous research has established that the phonetic and phonological characteristics of a speaker’s L1 can, to various degrees, be transferred to their subsequent language(s). This is supported by research findings for Arabic to English influences (Flege & Port, 1981) and French-English bilinguals (Fowler et al., 2006). Age of acquisition of a speaker’s L2 is thought to influence the degree of phonetic transfer from an L1; the effects of transfer are attested to a higher degree in late bilinguals (i.e. acquiring a second language after

pre-school age) than in early bilinguals. However L1 effects and bi-directional L1-L2 influences have also been reported for early bilinguals (e.g. Baker & Trofimovich, 2006). Furthermore, these effects can vary as a function of linguistic dominance. For instance, a study by Flege, Schirru & McKay (2003) demonstrated that the pronunciation of English consonants by Italian immigrants who came to Canada as young children (early bilinguals), can be distinguished from that of native English speakers even after several decades. Those who regularly spoke Italian showed a higher degree of Italian-to-English transfer than those who did not.

Returning to the Irish-English context, Ní Ghallchóir's (1981) study of Irish-English bilinguals in Donegal found that younger bilingual speakers showed less L1 Irish influence on their English compared to the older generation. She notes that the older speakers had acquired English during their young adult lives, which classifies these speakers as late bilinguals. According to the abovementioned findings for late bilinguals, influences from their L1 Irish would be expected. The younger bilinguals, however, who had been exposed to English from early childhood acquired English to a more monolingual-like level. Although not included by Ní Ghallchóir, it would be interesting to see if younger bilinguals who were relatively more dominant in Irish reliably varied from those who spoke English more frequently, investigating similar effects to those attested in Flege et al.'s (2003) bilingual Italian immigrant study. This aspect is further explored in Chapter 3 and will be addressed in the present study.

One widely discussed theoretical framework which attempts to account for L1-to-L2 transfer is Flege's Speech Learning Model (SLM), since revised to SLM-r (Flege & Bohn, 2021). The SLM aims to explain how language learners perceive and produce sounds that are not present in their first language (L1). The model states that when learners encounter sounds from a second language they initially classify the sounds based on their first language's sound system. If an L2 sound is very different from any L1 sound, it is more likely to be learned as a new sound rather than being assimilated into an existing L1 category. However, if an L2 sound is perceived as being similar to an L1 sound, the L1 sound may act as a kind of magnet and prevent the formation of the new L2 sound. Flege (1997) termed this process 'equivalence classification'; new L2 sounds are 'equated' with existing L1 sounds. The SLM has mostly been applied to the study of late bilinguals, who often face challenges in achieving native-like production of their L2 (e.g.

Guion, 2003). However, Flege's (1997) notion of 'equivalence classification' might be employed to characterise speech patterns of Irish-English bilinguals, such as those found by Ní Ghallchóir (1981) and may also be useful in explaining possible historical transfer from Irish to English in adult learners during the language shift, the first of whom would have been mostly late bilinguals.

While IrE is said to show substratal traces of Irish transfer (i.e. remnants of past L1 Irish influence), the kind of transfer effects reported for bilingual varieties of IrE are generally characterised as resulting directly from speakers' Irish L1. Regarding Irish-English language contact, Kallen (1985, p. 11) highlights the importance of differentiating between the contemporary transfer effects of bilingualism (from Irish to IrE) and the historical influences stemming from earlier contact settings in Ireland. He highlights the need for criteria to distinguish "true contact effects" in bilingual speakers from historical restructurings. Welsh English has been characterised in a similar manner. Thomas (1997, p. 67) claims that while non-Welsh-speaking areas in Wales retain Welsh substratal influences in English, the Welsh-speaking areas show "continuing influence" of the Welsh language on the English of bilingual speakers. He does not illustrate further what the term "continuing influence" entails but it can be assumed that he is referring to contemporary L1-to-L2 transfer effects, akin to Kallen's "true contact effects". Note, however, that others have considered features of Gaeltacht English with Irish parallels to be substratal effects (Ó hÚrdail, 1997, see §1.1).

Although not yet applied to the context of Gaeltacht English, a more global consideration of general L1-to-L2 transfer principles within bilingual speakers can help to advance our understanding of language contact in the Gaeltacht. As mentioned previously, the English of these bilinguals is reported to show a substantial degree of Irish influence. An exploration of theories that account for the mechanisms of this L1-to-L2 transfer can therefore provide an additional dimension to the study of Irish-English language contact in both historical and present-day language contact settings.

2.2.4 *Reported segmental features of Gaeltacht English*

The exploration of English in Gaeltacht areas not only provides an opportunity to assess the influence of Irish on phonetic characteristics commonly reported for IrE (such as those outlined in Section 2.1) but also facilitates an investigation of other features reported exclusively for Gaeltacht English. One such feature is velarisation of /l/ in pre- and post-vocalic positions, as noted by Ó Baoill (1997), a feature attributed to Irish transfer. Another case in point is the absence of /t/-lenition in post-stressed syllable coda position, which Hickey (1984) reports for native Irish speakers of English. This stands in contrast to fricated variant [t̪] which is widely reported for other varieties of IrE (Hickey, 1984). These two features, which will be discussed here, have yet to be systematically investigated in Gaeltacht English.

/l/-velarisation. Most phonological descriptions of IrE highlight the presence of a clear /l/ in all syllable positions. This is notably different from Standard British English which has clear-dark /l/ allophony, with clear [l] in onsets and dark [ɫ] in codas, e.g. ‘loop’ [lu:p] vs. ‘pool’ [pu:l]. The articulation of a clear /l/ involves contact between the front of the tongue and the alveolar ridge, whereas a dark or /ɫ/ is produced by an additional raising of the tongue dorsum toward the velum or retracting it towards the pharynx wall (Recasens et al., 1995).

The prevalence of the clear /l/ is a frequently discussed aspect of IrE. However, instances of dark /ɫ/ have also been documented. Ó Baoill (1997) and Hickey (1986) report the possibility of a dark /ɫ/ in pre- and post-vocalic positions in the English of Irish speakers. Hickey (1986) suggests that this is a “transfer phenomenon” from Irish, which generally has a three-way phonemic distinction between a velarised (dark) /ɫ/, a palatalised /l̪/ and a ‘neutral’ /l/ (Ní Chasaide, 1999). Additionally, Hickey (2004b) and Bessell & Mulhall (2014) have observed syllable-final /ɫ/ among younger urban speakers throughout Ireland. Hickey (2023) suggests that this variant has spread from Dublin to other regions and considers it “one of the chief distinguishing features between younger and older speakers” of IrE (Hickey, 2009, p. 5).

This hypothesis that the dark /ɫ/ of Gaeltacht English results from an Irish source deserves further attention. Aligning this idea with a widely stated proposition that the clear /l/ of

IrE also derives from Irish is challenging. The non-velar, non-palatal /l/ of Irish has been suggested by multiple scholars such as Bliss (1984), Hickey (2007b), and Kingsmore (1995) (as noted by Maguire (2020)) to have contributed to the presence of clear /l/ in all positions in IrE. Additionally, Hickey (2007b) suggests a combined source of Irish and English to explain the presence of clear /l/ in IrE. However, he does not elaborate on the precise role of English therein.

Conversely, Maguire (2020) builds a convincing case against an Irish transfer source for the clear /l/ of IrE, hinging on two main arguments. First, the varieties of Irish spoken during the historical language shift are thought to have possessed four distinct /l/ phonemes, /ɫʲ/, /lʲ/, /l̪/ and /l̪ʲ/ (commonly transcribed as /L /, /l /, /L' / and /l' /, respectively). It seems unlikely, given the capacity for a velar /lʲ/ in Irish, that the non-velar /l̪ʲ/ would have been used for a possible incoming English velar /l/. Secondly, recognising that the English initially introduced to Ireland was neither regionally homogenous nor akin to today's Standard British English invites an examination of the contemporaneous dialects of British English. Maguire (2020), referring to Kolb et. al (1979), notes that a clear /l/ was, in fact, historically found in many Midlands varieties of British English likely brought to Ireland. He subsequently warns against blindly assuming that the present-day clear-dark /l/ allophony of British English was present in the 17th-century varieties that were transported to Ireland, as it is "likely that clear [l] in all positions was common in the input" (Maguire, 2020, p. 77).

Along with the syllable-final dark /l/ of younger IrE speakers and the dark /l/ reported for Gaeltacht English, there is another case in which clear /l/ is not always used in IrE. Ní Chasaide (1979) and Ó Baoill (1997) have reported that an alveolo-palatal [ɹ] is used by many IrE speakers, where e.g. British English speakers might have word-medial /l+/j/ (e.g. in words like 'million' [mɪɹən]). This variant is attributed to a historical transfer via equivalence with the Irish alveolo-palatal /ɹ/ (or /l̪ʲ/).

To date, there have not been any quantitative analyses that explore age-based /l/-darkening (syllable-finally) in western IrE or the reported dark /l/ of Gaeltacht English. The alveolo-palatal also remains to be quantitatively investigated in these varieties. The origins of these features, although interesting, are of less import to the present study for several reasons, (i) the syllable-final /l/ for younger IrE speakers is more likely to be an

influence from American digital media than an influence from Irish (as it is found for younger monolingual IrE speakers), (ii) the [t̪] in Gaeltacht English and the alveolo-palatal [ʎ] of IrE do not have debated origins – i.e. it is not contested that these are Irish transfers. The main aim will therefore be to describe the occurrence of these features which (apart from the syllable-final dark /l/ in younger speakers) have not yet been quantitatively investigated.

Absence of /t/-lenition. A wide range of variants have been reported for post-tonic syllable coda /t/ in IrE. Perhaps the most salient of these IrE variants – and considered somewhat of a shibboleth for southern IrE – is the apico-alveolar fricative [t̪], or ‘slit-t’ (Hickey, 2007; Kallen, 2013; Wells, 1982). In producing a slit-t the tongue does not make full contact with the alveolar ridge, causing frication. Along with the slit-t, further variants have been reported for IrE, including taps [ɾ] and glottal stops [ʔ] (Schulte, 2020), which, unlike slit-t are frequently reported for other macro-varieties of English (e.g. Australian English (Tollfree, 2001), British English (Badia Barrera, 2015) respectively). The commonly reported /t/ variants for IrE are presented in Table 4. All can be considered cases of weakening. In addition to the variants listed in Table 4, Skarnitzl & Rálišová (2022) reported a voiced slit-t, and a one-off instance of a fricative flap within the young IrE speakers they recorded. Note that [ɹ], [h] and Ø (deleted segment/elision) are only reported for Dublin English.

Table 4. Weakened /t/ variants in Irish English (adapted from Hickey, 2007 and Skarnitzl & Rálišová, 2022).

Type of weakening	Variant	Example
Elimination of closure	[ɾ]	<i>sitting</i> [ˈsɪɾɪŋ]
Stop to fricative	[t̪]	<i>sit</i> [ˈsɪt̪]
Stop to approximant	[ɹ]	<i>sit up</i> [sɪˈɹɒp]
Elimination of lingual gesture	[h], [ʔ]	<i>sit</i> [sɪh], [sɪʔ]
Elision	[ø]	<i>sit</i> [sɪ]

While the slit-t is widely reported for IrE varieties, across styles and regions (Hickey, 2007) a noted exception to this is Gaeltacht English, which, according to Hickey (1984) has “no lenition of /t/”. Hickey labels all /t/ variants (apart from plosive [t]) as ‘lenited’,

and so he is implying here that Gaeltacht English displays the stop variant [t], where other IrE dialects may show various weakened realisations. Hickey's description of /t/ in Gaeltacht English is only a brief statement, forming part of a larger work on coronal segments in IrE (1984). The reported absence of /t/-lenition in Gaeltacht English therefore remains to be systematically investigated and will be the main aim of the analysis of /t/ in the present study.

Both linguistic and extralinguistic factors have been shown to condition /t/ realisation in IrE and, as such, will also be considered in this study. Along with Hickey's numerous sociolinguistic observations on /t/-variation, Schulte (2020) and Skarnitzl & Rálišová's (2022) recent quantitative investigations have yielded valuable insights into further linguistic and social predictors of /t/-variation. These findings are presented in Table 5, as they pertain to each variant of /t/ analysed in this study.

Table 5. Commonly reported /t/ variants of Irish English and associated sociolinguistic findings

Variant	Sociolinguistic observations
Fricated [t̪] / ‘Slit-t’	- Reported throughout southern IrE varieties (Hickey, 2007) – considered a shibboleth. - Occurrence positively correlated with speaker’s positive stance on discourse topic (Schulte, 2020) and with lexical (vs. grammatical) words (Skarnitzl & Rálišová, 2022) (S&R).
Tap [ɾ]	- Restricted to intervocalic position. Positive correlation with grammatical words when occurring in word-final position (S&R). - More common among younger than older speakers (Wells, 1982). - Reported for young educated middle-class female speakers of Dublin English (Schulte, 2020).
Plosive [t]	- Largely restricted to post-consonantal position (especially following an obstruent). - Extremely rare in the speech of young middle-class Dublin females (Schulte, 2020). - Reported to be the main /t/ variant for Gaeltacht English (Hickey 1984).
Glottalised [t̚] / [ʔ]	- Often realised not as complete closure but with a degree of creaky voice (S&R, Schulte) - Present in vernacular Dublin English, but not in supraregional IrE or in rural varieties of southern IrE (Hickey, 2009). However, recently attested for Dublin-external varieties (S&R). - More common in spontaneous speech (S&R, Schulte, 2020)

Wells (1982) suggests that the IrE slit-t is a case of Irish influence. Hickey (2007b) similarly says that a “phonological directive from Irish” is a possible source of slit-t, as

lenition of consonants is widespread in Irish. However, in an earlier work Hickey (1984) highlights two facts that bring an Irish source into doubt: (i) the patterns of lenition in Irish and IrE are very divergent: lenition of this kind is not found elsewhere in IrE but affects numerous phonemes in Irish, (ii) slit-t is not reported for native Irish speakers of English. If slit-t was an Irish transfer, we might expect it to be present in Gaeltacht English, seeing as it is considered to be a variety heavily influenced by Irish. Hickey does not elaborate on the possible reasons as to why Gaeltacht English might not have lenition of /t/ but, as with other characteristic features of Gaeltacht English, the obvious question arises as to whether this may be an influence from Irish.

The aims of investigating /t/-variation in the present study are to (i) document the realisation of /t/ in Gaeltacht English, investigating Hickey's reports of no lenition, and (ii) investigate possible sociolinguistic predictors of /t/-variation (in both bilingual and monolingual Connemara English) in order to compare with the previous sociolinguistic findings outlined in Table 5.

2.2.5 Connemara Irish

Any study on the phonological interaction between Irish and English must take into account the particular dialects that are being studied. In studies of IrE, it has been common to draw parallels between features in a specific IrE dialect and features of Irish, without specifying the particular Irish dialect involved. Due to the divergent nature of Irish dialects, this oversight can lead to false conclusions. For example, analysing potential Irish influences on Donegal English while referring to parallel features in a Munster dialect of Irish serves little purpose. In light of this, this section will provide a brief description of the consonantal and vocalic systems of Connemara Irish, a variety within the macro-dialectal area of Connacht. As brief descriptions of Irish parallels with specific IrE features investigated in this study have already been outlined (§2.1 and §2.2), the present section simply serves to further contextualise these features within the Irish segmental system.

The dialects of Irish can be categorised, in a macro-level approach, as belonging to Ulster, Connacht or Munster (see Figure 2). Within Connacht Irish further distinctions

can be made, including dialects of North Mayo, the Aran Islands and Connemara, among others. As will be outlined in Chapter 2, the bilingual participants of the present study are all native Irish speakers from Ceantar na nOileán, part of the Conamara Theas (South Connemara) Gaeltacht, which is indicated in Figure 3, below. A detailed description of and rationale for selecting this area will also be provided in Chapter 3. We will now turn to the segmental system of Connemara Irish.



Figure 2. Map of Gaeltacht boundaries (dark green) and the macro-dialects (Ulster, Connacht and Munster) of Irish (CSO, 2016).

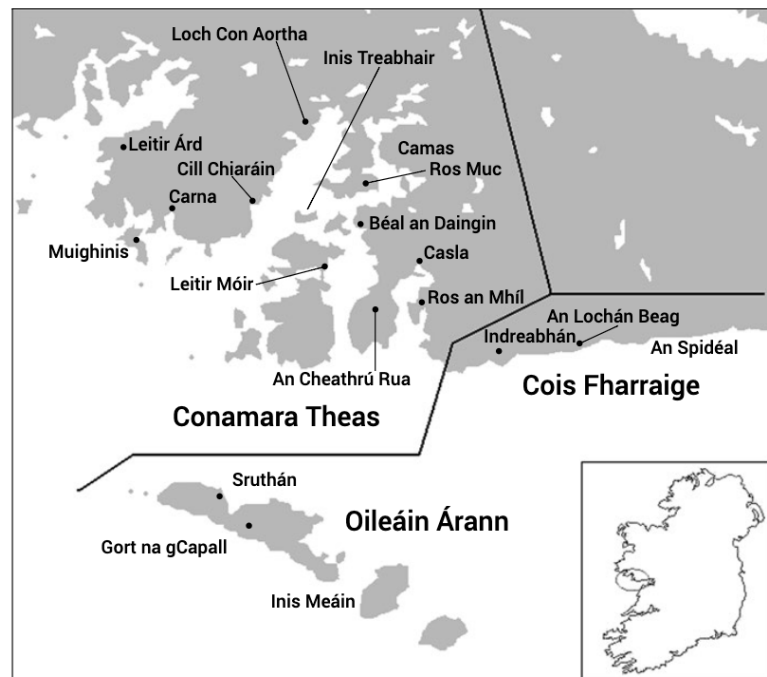


Figure 3. Map depicting dialectal boundaries of Irish within Connemara (Hickey, 2014).

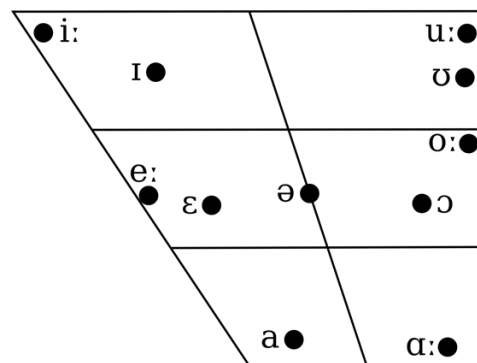
A notable property of the Irish segmental system (particularly in contrast to Irish English) is its set of consonants, which includes pairs of velarised and palatalised segments. The former are often marked with a superscript gamma [γ] and the latter with a superscript yod [j]. This opposition is evident in both lexical and grammatical differentiation, observed in minimal pairs such as / $b^{\gamma}o:$ / *bó* ‘cow’ vs. / $b^j o:$ / *beo* ‘alive’, or in / $b^{\gamma}a: \dot{d}^{\gamma}$ / *bád* ‘boat’ vs. / $b^{\gamma}a: d^j$ / *báid* ‘boats’. The consonantal system of Connemara Irish is displayed in Table 6.

Table 6. Phonemic consonant inventory of Connemara Irish, from Ní Chiosáin and Padgett (2012)

CONSONANT INVENTORY OF CONNEMARA IRISH								
	Labial		Coronal		Dorsal		Glottal	
Stop	p	p ^j	t	t ^j	k	k ^j		
	b	b ^j	d	d ^j	g	g ^j		
Fricative	f	f ^j	s	s ^j	x	x ^j	h	(h ^j)
	v	v ^j			(ɣ)	(ɣ ^j)		
Nasal	m	m ^j	n	n ^j	ŋ	ŋ ^j		
Liquid			l	l ^j				
			r	r ^j				

Irish has five contrastive short vowels /i e a o u/, each which have corresponding long vowels, displayed in Figure 4. Additionally, the diphthongs /iə ei ai au uə/ occur. It must be noted, however, that the vowels of Irish can be strongly influenced by the quality of a neighbouring consonant. When a vowel's frontness/backness conflicts with the secondary articulation of their neighbouring consonant, clearly audible on/off glides occur. A front vowel preceded by a velarised consonant, for example, will result in a diphthongal glide of velar origin and a back vowel preceded by a palatalised consonant will result in a palatal glide (Ní Chasaide, 1999).

Vowel inventory of Connemara Irish



Diphthongs

iə	ei	ai	au	uə
----	----	----	----	----

Figure 4. Vowel inventory of Connemara Irish (de Bhaldraithe, 1966; de Burca, 1958; Ó Curnáin, 2007).

For a comprehensive description of the Irish segmental system, see Ó Siadhail (1989) or Ní Chasaide (1999), who offers a detailed account of Ulster Irish. De Bhaldraithe (1966) and Ó Curnáin (2007) provide descriptions of the Connemara dialects of Cois Fhairrge and Iorras Aithneach, respectively.

2.2.5 *Summary of Section 2.2.*

Irish and English are currently in contact within bilingual Irish-English speakers. This presents the researcher with an opportunity to investigate possible present-day transfer effects from L1 Irish to L2 English and, as claimed by Hickey (1986), the Gaeltacht areas may be viewed as a microcosm of the past language shift scenario in Ireland, thereby revealing possible effects that were present historically. This section has presented an overview of the current setting of the Gaeltacht, a brief description of the Connemara Irish segmental system and two features reported as unique to Gaeltacht English.

2.3 Chapter summary

This chapter presented two perspectives on Irish-English language contact. The historical perspective (§2.1), a well-researched area of IrE linguistics, relates to language shift of past centuries and theories on the development of IrE. Through this perspective emerged the first set of phonological features to be investigated in this thesis. For these features (PEN-PIN merger/DRESS-raising, FACE and GOAT monophthongs, and liquid+sonorant epenthesis) both English and Irish have been suggested as possible sources. It was proposed that studying these features in the English of present-day native Irish speakers may not only add to our understanding of this understudied variety but could shed light on a possible ‘reinforcing’ role of Irish on their occurrence. These present-day findings may, in turn, shed light on the historical development of these features in IrE.

The second perspective (§2.2) addressed present-day Irish-English language contact. This relates to the current linguistic situation in the Gaeltacht areas, the characterisation of Gaeltacht English, and its presumed transfer effects from Irish to English. The second set of segmental features to be investigated were introduced, absence of /t/-lenition and presence of /l/-velarisation. These features have been anecdotally reported for Gaeltacht English but have not yet been quantitatively investigated.

It must be acknowledged that in any endeavour relating to historical language contact, ‘proving’ the source of a particular feature is near impossible (Hickey, 2020). However, findings on present-day variation, along with knowledge of language contact mechanisms and processes, linguistic parallels with Irish, British English and Scots, can all contribute further richness to our understanding of contact processes between Irish and English. In essence, this study serves as an investigation of present-day phonetic variation, the

findings of which can provide a basis for the formation of hypotheses regarding historical patterns.

PART II - METHODOLOGY

3 Methodology

This chapter explores the data collection and data analysis methods used in the study. It describes the geographical location and participants of the study, the phonetic features and sociolinguistic factors investigated and the data collection procedures. It details the recording, management and initial processing of the speech data and social data. A brief description of the data visualisation and statistical analysis methods used in the study will also be provided.

All fieldwork took place between 5th October 2021 and 12th July 2022 in the County Galway Gaeltacht areas of Ceantar na nOileán and Na Forbacha (Furbo).

3.1 Location

In choosing the primary location and dialects for this study, several criteria were prioritised. Foremost was the requirement of a Gaeltacht location where Irish was the language of daily communication for the majority of the community. It is important to note that this is not the case with all Gaeltacht areas. In many Gaeltacht regions the majority of speakers do not speak Irish daily. To select an appropriate location, the Central Statistics Office results of the 2016 national census (current at the time) were consulted to locate a Gaeltacht area with a high proportion of daily Irish speakers (outside of education). Tory Island, Co. Donegal was noted as having the highest proportion of such speakers (74.6%), followed by Ceantar na nOileán, Co. Galway (71.7%) (CSO, 2016). While there have been studies of bilingual Irish-English speakers in Donegal (e.g. Ní Ghallchóir, 1981) there has not yet been research of this kind in the west. This reason, coupled with logistic practicality, as well as the researcher's familiarity with Galway, led to the selection of Ceantar na nOileán as the research site for this study.

Ceantar na nOileán is an archipelagic region within Conamara Theas, the South Connemara Gaeltacht, in County Galway. It is located on the west coast of Connemara,

56 kilometres from Galway city and has a population of around 2,000 (Údarás na Gaeltachta, 2023). The region boasts a rich background in traditional music and is also well-known for its boating activities with currach and hooker racing competitions every year. There are four main islands within Ceantar na nOileán: Eanach Mheáin (Annaghvane), Leitir Móir (Lettermore), Garmna (Gorumna) and Leitir Mealláin (Lettermullen). Figure 5 displays a map of Ceantar na nOileán, including the surrounding areas of An Ceathrú Rua (Carraroe) to the east and Cill Chiaráin (Kilkieran) to the north-west.

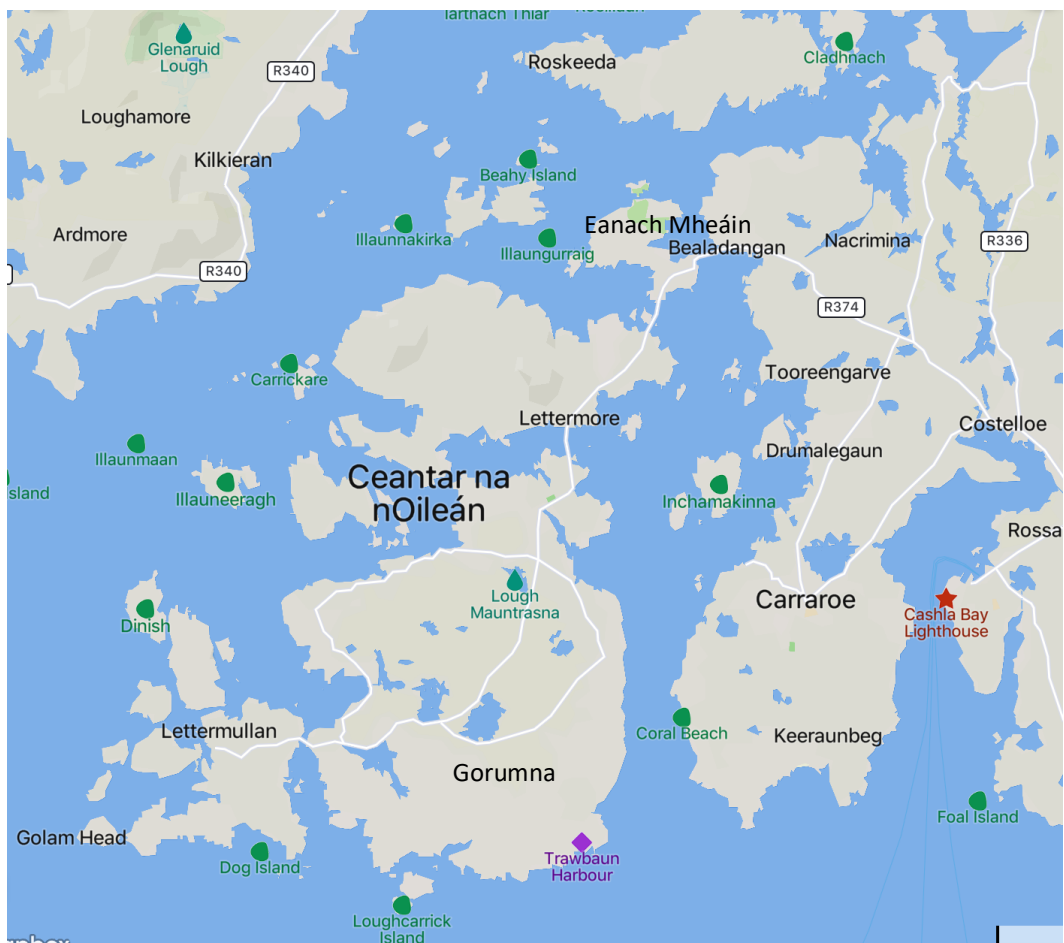


Figure 5. Map of Ceantar na nOileán including its four islands: Eanach Mheáin, Leitir Móir, Garmna and Leitir Mealláin. The external areas of An Ceathrú Rua (Carraroe) and Cill Chiaráin (Kilkieran) are also included. Picture adapted from Mapcarta.com (2024).

The high proportion of daily Irish speakers (all of whom are nowadays considered bilingual Irish-English speakers) makes Ceantar na nOileán an ideal testing ground for investigating Irish-English language contact and the Irish influence on the IrE segmental system. While Ceantar na nOileán is by no means exempt from contact with the English

language, the relatively low permeation of English in the community enables closer parallels to be drawn with the historical situation of language shift from Irish to English.

For the second location, it was necessary to select an area that was close to Ceantar na nOileán (in the effort of keeping the region as a relatively constant factor) but had availability of monolingual English speakers. The neighbouring area of Na Forbacha/Furbo (alternatively Furbogh), highlighted in Figure 6 was chosen as the location for monolingual speaker recruitment.



Figure 6. Map showing Na Forbacha/Furbo(gh) in relation to Ceantar na nOileán and Galway city. Note that the orange ring around 'Furbogh' is merely to highlight the name and does not delineate the geographical boundaries of Na Forbacha.

Na Forbacha is a Gaeltacht region comprising multiple townlands situated between the villages of Bearna and An Spidéal (Spiddal), with a population of 868 people (CSO, 2022). While Irish is the main language of the community, i.e. used in schools, churches and community council settings and it is home to the *Údarás na Gaeltachta* headquarters, the proportion of daily Irish speakers (outside of education) is lower than Ceantar na nOileán, at approximately 48% (CSO, 2016). This made Na Forbacha an ideal area to locate speakers who were from the Connemara Gaeltacht but who were monolingual English speakers.

Within the areas of Ceantar na nOileán and Na Forbacha, two groups of participants were recruited. The first group of speakers, from Ceantar na nOileán, were the bilingual Irish-

English speakers, who constituted the primary focus group. These are the speakers about whom the study seeks to draw conclusions regarding Irish-to-English language transfer. The second group of speakers were monolingual English speakers from Na Forbacha, who, although having learned Irish at school, considered themselves monolingual in English. These speakers were the control group, who were selected to provide a baseline against which to compare the phonetic variation and potential contact effects within the bilingual speakers' speech patterns.

3.2 Participants

For the bilingual group, the main selection criterion was that each speaker had acquired Irish as a first language (either simultaneously (with English) or sequentially (before English)), although all were sequential L1-Irish bilinguals who, at the latest, had learned English at primary school). It is important to note that due to the increased spread of English in Connemara over the past century, many inhabitants –particularly the younger cohort – have been exposed to English since early childhood, despite speaking only Irish at home with their families. All of the bilingual participants however, identified themselves as native speakers of Irish. To enable the analysis of effects of age and gender on phonetic variation, efforts were made to recruit an equal distribution of male and female speakers from older and younger generations.

The monolingual speakers, analysed as a control group, were recruited from the Na Forbacha area. All had grown up speaking only English at home and had learned Irish as a compulsory subject at school (primary and secondary). Although they had varying levels of proficiency in Irish, each of these speakers identified themselves as a monolingual English speaker. As with the bilinguals, in order to analyse the effects of age and gender on phonetic variation, efforts were made to recruit an equal distribution of male and female speakers from older and younger generations.

3.2.1 Participant recruitment

In total 24 participants were recruited for this study, including 12 bilingual Irish-English speakers (L1 Irish, L2 English) and 12 monolingual English speakers. The bilingual participants were recruited from the Ceantar na nOileán area of Connemara (described in Section 3.2). Six of these participants were recruited via the friend-of-a-friend method,

whereby a friend known to the researcher referred an individual who met the criteria for the study (friend-of-a-friend) and so on. This allowed a degree of trust to be built with the potential participants and facilitated recruitment in an area little known to the researcher. Another 6 bilingual participants were recruited through a combination of in-person approaching and recruitment via a letterbox flyer and a poster.

The 12 monolingual English speakers were recruited via the friend-of-a-friend method. All were from the Na Forbacha area of Co. Galway. Both speaker groups were well balanced in terms of gender (Monolingual: 6M 6F; Bilingual 5M 7F). This enabled investigation of possible gender-based variation and better representation of the broader population (and subsequent generalizability of results). Efforts were made to recruit participants from a wide range of ages to facilitate an investigation of age-based variation and apparent-time language change (see Chapter 3). All participants were over 18 years of age, (age range 20-79, mean = 44, SD= 18) which ensured their ability to independently consent to participation in the study.

To ensure that participants understood the nature of the research before agreeing to take part, they were each given a Participant Information Sheet (Appendix A) which described the study's purpose, the tasks involved, and the researcher and affiliations. The sheet also detailed how the collected data would be used and informed participants of their right to request removal of their data if so desired. If the participant agreed to take part they were subsequently given a Participant Consent Form (Appendix B) to sign. This served as a formal agreement between the researcher and the participant that the participant was providing informed consent to take part in the study. The consent form highlighted that the participant's participation was voluntary and that they were free to withdraw from the study at any time without facing negative consequences. The data collected in this study was done so following the Speech and Phonetics Laboratory Research Ethics Application in 2016, which was approved by the Ethics Research Committee of the School of Linguistic, Speech, and Communication Science.

3.3 Materials

Decades of research into language variation and change have shown that phonetic variation can be influenced by social and linguistic factors. This study attempts to account for variation within the speech of bilingual and monolingual speakers in Connemara

through a consideration of several social and linguistic factors, alongside the phonetic features of interest. The following subsections explore (i) the phonetic features and (ii) the social factors investigated in this study.

3.3.1 *Phonetic features of interest*

The phonetic features investigated in this study – along with the rationale for doing so – were outlined in Sections 2.1 and 2.2, and are relisted in Table 7. These features either (i) have debated origins/reported reinforcement from Irish (PEN-PIN merger, FACE GOAT diphthongisation, epenthesis) or (ii) have been anecdotally reported within the English of L1 Irish speakers (/t/-stopping and /l/-velarisation). Vowels in ‘h_d’ contexts were also required to provide a general overview of the vocalic system and further contextualise the investigated vocalic phenomena.

Table 7. Phonetic features investigated in this study.

Features with debated origins	Reported features of Gaeltacht English
Monophthongal FACE and GOAT	/l/-velarisation
DRESS-raising/ PEN-PIN merger	Absence of /t/-lenition
Schwa epenthesis in liquid+sonorant clusters	

At the beginning of this study, it was decided to collect speech data on a wide range of phonetic features to facilitate discovery of processes or phenomena that may not have been previously addressed and to subsequently base investigations on observed patterns. The intention of this bottom-up approach was to subsequently refine the study focus to the most interesting variables. Impressionistic analysis of the data coupled with further research into pertinent issues regarding phonological variation of IrE revealed certain features to be of more interest than others, and so these were prioritised in the study. These are the features outlined in Table 7 above.

The speech data for this study were collected via read sentences and short semi-structured interviews, enabling an investigation of the effects of speech style (a concept further explored in the following section). A typical Labovian sociolinguistic data collection

framework would involve further speech tasks, such as a read passage and minimal pair tests. However, the wide range of variants analysed in this study placed restrictions on the amount of data that could be realistically collected and analysed. These additional datasets would provide a more complete picture of style-based variation however. Table 8 outlines the phonetic features being investigated, with vowels denoted by their lexical set. Tokens of dress were elicited in pre-nasal and pre-oral consonant environments to investigate pre-nasal raising. The pre-oral consonant environments were informed by Lunny (1981) and Henry's (1954) reports of a raised dress vowel therein. Pre-nasal contexts were also included for FACE and GOAT to investigate parallels with Ó Siadhail's (1989) reports of nasal raising of mid vowels in Irish – these were contrasted with oral consonant environments. For the investigation of liquid+sonorant epenthesis, the clusters /lm/, /rm/, /ln/ and /rn/ were included, with two words for each cluster. Tokens of /t/ were elicited in post-vocalic word-final position (_V#), post-consonant word-final position (C_#) and intervocalic position (V_V), environments where weakening of /t/ occurs.

Table 8. List of investigated features and corresponding words for read sentence corpus.

Investigated feature/ lexical set	Context	Word
DRESS	pre-nasal	den, pen, stem, ten, sent
	pre-oral C	bed, beg, best, bet, met, net, head
FACE	pre-oral C	hayed, stayed
	pre-nasal	name, made, came,
GOAT	pre-oral C	hode, oaf,
	pre-nasal	won't, no, own, don't
Liquid+sonorant epenthesis	/lm/	film, elm
	/rm/	arm, farm
	/rn/	barn, corn
	/rl/	girl, pearl
/t/	V_#	cut, met, net, bet
	C_#	best, rest, sent
	V_V	water, cutting
/l/	#_V	left, leaf, loaf
	V_V	milling
	V_#	feel, foal
	V_/j/	million, value, William

Table 9. Monophthongs and diphthongs in /h_d/ contexts with corresponding lexical sets.

Vowel	Word	Lexical set
Monophthongs		
i	heed	FLEECE
ɪ	hid	KIT
ɛ	head	DRESS
ʌ	had	TRAP
a:	half	BATH
ɑ / ɒ	hod	LOT
ɑ:/ ɒ:	hawed	THOUGHT
ʌ / ʊ	hud	STRUT
ʊ	hood	FOOT
u:	who'd	GOOSE
Diphthongs		
eɪ / e:	hayed	FACE
aʊ	how'd	MOUTH
oʊ / o:	hode	GOAT
ɔɪ	hoyed	CHOICE
aɪ	hide	PRICE

The full list of elicited sentences is provided below and again in Appendix D. Note that not all collected data was subsequently investigated in the present study.

Table 10. Elicited sentences in English

Investigated feature/ lexical set	Carrier sentence	Word
DRESS	Say_____again.	bed, beg, best, bet, den, head, met, net, pen, stem, ten
	—	They sent him a new car.
FACE	Say_____again.	came, hayed, made
	—	Leaf' was the name of the film.
	—	Through thick and thin we've stayed together.
GOAT	Say_____again.	hode, no, own
	—	Run past the canyon and don't stop.
	—	Loaf rhymes with oaf .
Epenthesis	—	"Leaf" was the name of the film .
	—	On his left arm he had a cut.
	—	That barn is worth a million euro.
	—	The button looked like a pearl .
	—	The girl was cutting down the elm trees.
	—	They were milling corn on the farm .
/t/	Say_____again.	cut, met, net, bet, best
	—	He's cunning but he won't win the bet .
	—	They put mint in the water .
	—	Rest is good for the soul.
/l/	—	Which bottle of milk is the best value ?
	—	Leaf was the name of the film.
	—	Did you see the new foal ?
	—	That barn is worth a million euro.
	—	William can't whistle.
	—	What did you feel ?
	—	They were milling corn on the farm.
h_d (vowel space)	Say_____again.	Monophthongs: heed, hid, head, had, half, hod, hawed, hud, hood, who'd
		Diphthongs: hayed, how'd, hode, hoyed, hide /r/: heard, here'd, hoard, cured

This study also examined various segmental features of Irish to identify potential transfer/parallels with English. The data collection process for Irish mirrored that of English, i.e in addition to tokens gathered during the Irish interview (spontaneous speech), phonemes were elicited in sentence form (read speech). These can be found below and again in Appendix E.

Table 11. Elicited sentences in Irish.

Investigated feature	Carrier sentence	Word
/o:/	Abair ____ arís. (Say ____ again)	fón, nócha, bó, cóta,
	–	Thóg sí mo bhrú fola.
/e:/	Abair ____ arís.	cén, sé, tae
/e/	Abair ____ arís.	ceimic, meicneoir
/i/	–	D’ith sé arán agus mil .
	–	Bhris sé an fhuinneog.
Epenthesis	Abair ____ arís.	leanbh
	–	Bhí pian i mo bholg .
	–	Colm is ainm dó.
	–	Bhí fearg uirthi.
	–	Tá dath gorm ar an gcaile.
/j/	–	Bhí mé ag léamh Cré na Cille .
	–	Ná habair mil, abair mill .
	Abair ____ arís.	leanbh
	–	Tháinig na gaill .
/l/	–	Ná habair mil , abair mill .
	–	Tá dath gorm ar an gcaile .
	–	Cheannaigh sé coileach .
/ɣ/	–	–
	–	Tá na coinnle ag soilsiú go geal . Briotanach, sasanach nó gall .

3.3.2 Sociolinguistic factors of interest

The following subsections detail the various social factors included in this study. This data was obtained for each participant via a questionnaire (Appendix C) given at the start of the recording sessions.

Linguistic background. As this study primarily investigates Irish-English language contact, the main group of interest is the bilingual Irish-English speakers. To attempt to differentiate L1 transfer effects from regional dialect features, a group of monolingual English speakers from the Connemara region are also included. This latter group acts as a control group, although sociolinguistic variation within their speech is also of interest in itself. The study therefore involves the comparison of speech patterns between these two groups, using the binary measure of ‘linguistic background’ (i.e. monolingual or bilingual) as a potential predictor of variation. It must be noted, however, that ‘monolingual’ speakers of IrE is taken to mean those who are not fluent (self-reported) in Irish. They may have proficiency in other languages external to Irish. Additionally, the monolinguals will likely have varying levels of proficiency in Irish due to its being compulsory as a primary and secondary school subject. This latter point makes the binary distinction between monolingual and bilingual a little more blurred and is discussed below, in relation to the addition of a Linguistic Profile Score (LPS) as a measurement of language dominance, proficiency and use.

Age. Several sociophonetic studies have demonstrated the effect of age on phonetic variation. Linguistic innovations have been frequently shown to emerge among younger speakers and subsequently spread throughout the speech community. While real-time or longitudinal data is optimal for studying the effects of age on speech patterns, such studies are extremely time- and resource-intensive. This study employs the apparent time construct, which infers language change over time by comparing the language use of different age groups at a single point in time. It involves the assumption that older speakers reflect the linguistic state of the language at their formative years and that differences between age groups represent change across the years, thus providing a snapshot of language change in “apparent” time. This method presents a simple alternative to real time studies. However the apparent time construct faces challenges;

age-based variation in the data may instead be indicative of age-grading phenomena, where individuals change their linguistic behaviour as they age. This can complicate interpretations of apparent time data. It must also be noted that the factor of age is often intertwined with other factors, and can be of little use when studied in isolation. In the present study, age was analysed statistically as a continuous variable and was also coded as a categorical variable, facilitating data visualisation. For the categorical organisation of age, participants were categorised as ‘younger’ or ‘older’ with an age boundary of 38. This was based on the post-hoc inspection of age distribution.

Gender. The social factor of gender has formed a crucial part of many sociolinguistic studies. A large number of these studies have found patterns in line with Labov’s principles of linguistic change. These principles highlight the Gender Paradox: Women conform more closely than men to sociolinguistic norms that are overtly prescribed, but conform less than men when they are not (Labov, 2001). Labov’s principles offer a framework for understanding the gender dynamics that might influence language variation and change in the Gaeltacht. The principles are as follows:

Principle I: For stable sociolinguistic variables, women use the standard or prestige variable more than men.

Principle IIa: For changes in progress above the level of awareness, women use the standard more than men.

Principle IIb: For changes in progress below the level of awareness, women will use the incoming variant more than men.

However, the approach to the study of gender and language variation has changed substantially in recent decades. Whereas earlier studies focused primarily on the binary differences between men’s and women’s language use (e.g., Labov, 1966), more recent research has highlighted the importance of considering other social factors in explaining variation. Gender can be intertwined with other aspects of an individual’s identity. For example, Eckert (2000), in her study of a Detroit high school, found that teenagers’ ‘community of practice’ – ‘jocks’ vs. ‘burnouts’ – had higher explanatory value for their speech patterns than gender alone.

Of the few quantitative sociophonetic studies on IrE, findings suggest that gender is an important predictor of segmental variation (e.g. Lonergan, 2013) and furthermore, that it is intertwined with various other aspects of a speaker's identity, including community of practice, social network and socio-economic status (Peters, 2016, 2023). While the present study does not present a full-scale ethnographic analysis of Connemara English, the relationship between speaker gender and other social factors will be analysed to shed light on gender-based language variation within Connemara English.

Speaking style. Speakers have been shown to vary their speech depending on the social context or formality of the situation. This phenomenon has been widely researched within sociolinguistics, through various methods and frameworks. Much of this research has followed Labov's approach to style. His seminal research on linguistic variation in New York City English (1966) revealed style-related consistency across speakers, showing that for several variables, speakers displayed similar trends in both formal and informal speech contexts. On the basis of his findings, Labov proposed that speakers pay more attention to their speech in formal styles e.g. reading, and less attention in more casual styles, e.g. conversations with friends. Labov's sociolinguistic interview – a commonly employed method of data collection – was subsequently designed to elicit various styles through various speaking tasks. The interview includes various tasks for the interviewee; a read list of minimal pairs, a read list of isolated words, and a short read passage, along with a more casual conversation with the interviewer. Labov saw these tasks as varying in formality along a continuum, with the minimal pairs at the formal end and the casual conversation at the informal/casual end.

Although Labov's methods have been widely employed in sociolinguistics, some researchers have challenged his approach to style. For example, Milroy (1980) argued that read and spoken styles do not fit neatly onto a continuum. She instead proposed that stylistic variation could be better analysed with reference to a speaker's social network, a theory she employed in her well-known Belfast study. Additionally, Bell (1984) proposed that rather than speaking styles being solely dictated by the speaker's attention to speech or level of formality, they are significantly influenced by the audience. Bell suggests that speakers adjust their language style based on who they are talking to.

While various other sociolinguistic methods offer richer insights into the complexities of style and audience interaction, they typically require extensive data collection processes, often as part of larger ethnographic studies. The present study broadly follows Labov's approach to sociolinguistic data collection methods, eliciting speech data from two tasks; read sentences and semi-structured interviews. It was initially intended that the read sentences would be the only task given to participants; however, style has been shown to be an important factor in recent studies of IrE features such as /t/-lenition (Schulte, 2020; Skarnitzl & Rálišová, 2022) and GOAT diphthongisation (Collins, 1997). It was therefore decided to include a more casual speaking task, in the form of semi-structured interviews. This allowed for the inclusion of style as a social factor with the levels of (i) read speech (sentences) and (ii) spontaneous speech (interview). An extension of the scope of this study would have facilitated the inclusion of further elicitation tasks, such as a read passage or minimal pair tests. Given the range of phonetic features analysed in this study, only two elicitation tasks (interview and sentence-reading task) were conducted to ensure a manageable amount of data for collection and analysis, while still enabling a meaningful comparison of speech styles.

Linguistic Profile Score (LPS). While the participants in this study were recruited based on their being either bilingual (native Irish speakers) or monolingual English speakers, it can be argued that a binary monolingual-bilingual distinction fails to capture nuances that are relevant to the speakers and can influence language production. Bilingual speakers can vary widely in their proficiency, dominance and usage of their languages. Studies have shown that these factors can influence the degree of cross-linguistic phonetic transfer (e.g. Flege et al., 2003; Tsui et al., 2019). It can also be argued that a 'true' monolingual speaker of IrE is difficult to find. Many self-identified monolingual speakers of IrE will likely have some degree of proficiency in Irish, given that Irish is a compulsory school subject. Indeed the latest National Census figures indicate that 1.9 million of the population "can speak Irish" to some degree (CSO, 2023).

To account for these intra-group nuances a continuous measure – the Linguistic Profile Score (LPS) – was devised. Using a continuous measure allows for finer-grained analysis of linguistic variation and a more natural representation of the data. The LPS was loosely based on the Bilingual Language Profile (BLP), created by Gertken et al. (2014), which has been widely used as a measure of bilingual language dominance. As Gertken et al.'s

BLP was created for fluent bilinguals as a measure of dominance, it was not suitable for the present study which included monolinguals with relatively low proficiency in Irish. The LPS used in this study allows this factor to be taken into account. Table 12 details the questions given to the participants used to calculate the LPS. They were presented to the participants in a format that did not show the weighting. The full participant questionnaire is available in Appendix C.

Table 12. Questions used to calculate Linguistic Profile Score.

Linguistic Profile Score			
ASPECT	QUESTION	ANSWER	WEIGHTING
LINGUISTIC HISTORY			
Childhood home language	What language did you speak growing up at home?	Irish	2
		Mix	1
		English	0
Language of education	Were you educated through Irish?	No	0
		Primary	1
		Secondary	1
		University	1
Acquisition of English	What language did you learn first?	Irish	2
		English	0
		Both	
		(simultaneously)	1
CURRENT USAGE (DOMINANCE)			
Frequency	How often do you speak Irish?	Daily	3
		Weekly	2
		Monthly	1
		Less often	0
	How often do you speak English?	Daily	0
		Weekly	1
		Less often	2
Use cases	Which language(s) do you use most in the following situations?		
	At work	Irish	2
		English	0
		Even mix	1
	With family	Irish	2
		English	0

	With friends/ socialising	Even mix	1
		Irish	2
		English	0
	Talking to yourself	Even mix	1
		Irish	2
		English	0
		Even mix	1
PROFICIENCY			
Speaking	How well can you speak Irish?	Fluent	4
		Advanced	3
		Conversational	2
		A few phrases	1
LINGUISTIC ATTITUDE			
Comfort	I feel like myself when I speak Irish	Scale 1-5	
		0	0
		1	1
		2	2
		3	3
		4	4
		5	5
	I feel like myself when I speak English	Scale 1-5	
		0	5
		1	4
		2	3
		3	2
		4	1
		5	0
			Max = 34

Although Linguistic Profile Score was mostly of interest for the bilingual group as a quantifier of dominance in L1 Irish, it was also recorded for the monolingual group in acknowledgment of the fact that although the speakers identified as monolingual, they were all able to speak Irish to varying degrees (due, at minimum, to Irish being a compulsory school subject). It was not expected that the monolingual speakers would show any large effects of LPS and so their scores mainly act as a benchmark against

which to compare the scores of the bilingual speakers. However, it could be argued that a higher LPS value for a monolingual English could be reflective of a more positive attitude toward Irish language and identity. This could mean that those monolinguals who have higher proficiency in Irish could be more likely to display conservative or traditional features than those who have lower levels of Irish. A more detailed sociolinguistic study that accounts for speakers' attitudes toward Irish identity, culture and language would shed light on this concept but it is beyond the scope of the present study.

Local Attachment Score (LAS). In a short pilot study conducted in Connemara at the start of the PhD (not detailed here), it was found that young male bilingual speakers of a similar age and proficiency in Irish from the same family varied to a substantial degree in their realisation of a number of phonetic features. One possible explanation for this variation was that one of the speakers – who demonstrated pronunciations akin to Galway City speakers – was less attached to his local community, with his social network being mainly outside of the Gaeltacht. The two other brothers, who had speech patterns resembling more traditional rural IrE realisations – including a higher degree of features with possible Irish sources – were more attached to their local community and spent most of their time within the Gaeltacht.

Past studies of linguistic variation have shown that an individual's relationship and attitude toward their social environment and local community can explain a great deal of phonetic variation. Milroy & Milroy's (1985) seminal study on Belfast English demonstrated that the relative tightness of a speaker's social network can influence their speech patterns. Closer to home, for Galway English, Collins (1997) and Peters (2016) have both explored speakers' social networks in relation to their segmental variation. Related to this is the notion of social mobility, which has also been shown to influence speech patterns (Jeszenszky et al., 2024). These previous studies informed the decision to include a measure for a speaker's attachment to their local community within the present study. The idea is that such a measure may be able to predict certain variation better than simply one's hometown region, proficiency in Irish, age or gender. A Local Attachment Score (LAS) was devised for the present study. This was based loosely on Milroy & Margrain's (1980) Network Strength Scale, which placed individuals on a scale of 0-5, with higher scores indicating "extremely close integration into the community" (Milroy & Margrain, 1980, p. 52). The LAS builds on the NSS by additionally taking into account

the amount of time a participant had spent living outside of the Gaeltacht area. The LAS was created as a ten-point scale of 0-9, based on questions posed in the participant questionnaire. Table 13 presents the questions used to calculate LAS along with their respective weighting.

Table 13. Questions used to calculate Local Attachment Score (LAS) with related responses and weighting.

Question	Response	Weighting
How long have you lived in Ceantar na nOileán / Furbo? (Open ended)	<40% of life	0
	40-69% of life	1
	> 70% of life	2
Do you work locally?	No	0
	Yes	1
Do you have other family members in the local area?	No	0
	Yes	1
Do you mainly socialize in the local area?	No	0
	Yes	1
How attached do you feel to your local community?	Not at all	0
	A little	1
	Quite	2
	Very	3
	Extremely	4
		Max = 9

3.3.3 Questionnaire

The social factors detailed above were obtained via a participant questionnaire, given after the consent form had been signed and the participant information sheet presented. The questionnaire was designed using Qualtrics (www.qualtrics.com) and consisted of 20 questions designed to collect data on each participant's (i) basic demographic information (ii) language dominance and use (measured using Linguistic Profile Score) and (iii) attachment to local community (Local Attachment Score). Participants were reminded that the data they provided in the questionnaire would be anonymised and would not be used outside the present study. In the interest of efficiency, the questionnaire was designed to be quick and easy for the participants to fill out, with most questions being a tick-box format. None of the questions required lengthy answers. The questionnaire was given to participants before the recordings to aid in the settling of nerves; questions often

prompted small talk between the research and participant, which enabled the latter to feel more comfortable.

3.4 Data collection

3.4.1 Recording procedure

The 12 monolingual participants were recorded at various locations between Bearna (on the Gaeltacht border with Galway) and Spiddal either in their own homes or in the home of one of the researcher's friends. The 12 bilingual participants were recorded at 3 locations in Ceantar na nOileán: (i) the Muintearas office (educational organisation) in Leitir Móir, (ii) the Comhar Chuigeal office in Leitir Mealláin, (iii) a house in Eanach Mheáin (rented by the researcher). All audio recordings were made using an Audio Technica AT2020 USB microphone and an Apple MacBook Pro laptop running Audacity (Audacity Team, 2022). Recordings were made at a 44.1 kHz sampling rate. The microphone and laptop were placed on a table in front of the participant, who was sitting on a chair. To ensure optimal sound quality, and reduce distortion or unwanted background noise, each speaker was advised to sit about an arm's length away from the microphone.

The read speech data (sentences) were presented individually on PowerPoint slides on the laptop. The spontaneous speech data was subsequently collected in the form of a short semi-structured interview (~15 minutes per participant). The speaker was given the option of answering from a series of open-ended questions/discussion points on various general topics (e.g. the changes in their hometown over recent decades) or talking about any topic of their choosing. The bilingual speakers completed parallel tasks in Irish and in English (with different topics discussed in the interview task, e.g. the vitality of Irish) and the monolingual speakers completed the tasks in English only.

3.4.2 Collected speech and social datasets

The audio speech data was recorded as one file per recording session (i.e. per participant) in Audacity. The audio file was then divided into two sections (read and spontaneous

speech) and exported as WAV files. This process resulted in two WAV files per participant. These files were then imported into Praat (Boersma & Weenink, 2021) for acoustic analysis, the process of which is outlined in the following section. The analyses for each feature are further detailed in Chapters 5-10.

The obtained social data via the questionnaire was either saved onto the Qualtrics platform (if the participant filled out the form online) and then transferred to a digital spreadsheet to calculate the weightings for each answer, or the data was manually marked on a paper version of the questionnaire and subsequently transferred to the spreadsheet.

Table 14 displays the gender, age, LPS and LAS data results for each participant.

Table 14. Participant demographic information for bilingual and monolingual speakers, showing Participant ID, gender, age, Linguistic Profile Score (LPS) and Local Attachment Score (LAS)

Monolingual speakers

Participant ID	Gender	Age	LPS	LAS
P1	F	57	5.5	4
P10	F	55	6.5	5
P14	M	60	7	2
P16	M	30	6.5	4
P17	M	30	7	4
P18	M	66	7.5	3
P20	F	63	5	3
P21	M	64	7.5	5
P22	M	27	8	2
P23	F	30	3	4
P24	F	29	10	5
P25	F	30	12	3

Social data – bilingual speakers

Participant ID	Gender	Age	LPS	LAS
P2	M	29	26	9
P3	M	68	34	9
P4	M	32	28	7
P5	F	79	30	9
P6	M	67	34	9
P7	F	25	22	7
P8	F	39	25	5
P9	M	38	29	9
P11	F	60	30	9
P12	F	27	28	9
P13	F	26	32	9
P15	F	20	29	7

Regarding the resulting Local Attachment Scores (LAS), distinctly lower values were recorded for the monolingual speakers from the Na Forbacha/ Furbo area. This suggests that they did not feel attached to the local Gaeltacht community and indeed many of them spoke of their attachments to urban life in Galway city. While the collected values for LAS showed a large degree of variation between bilinguals and monolinguals when compared on a macro level, the scores varied minimally between speakers with the same linguistic background (monolingual vs. bilingual), see Section 4.2. Therefore, it must be noted that in the analysis of intra-group variation, LAS is of limited explanatory value.

3.5 Data analysis

3.5.1 Acoustic feature extraction and normalisation

The speech data of the participants was recorded using Audacity (Audacity Team, 2022) which created WAV audio files. These files were then imported into Praat (Boersma & Weenink, 2021) for segmentation and annotation. The details of analysis for each feature are outlined in their respective chapters (5-10) but a brief description will be given here. For the analysis of epenthesis, spectrograms were visually and acoustically analysed for presence of a short epenthetic vowel within the liquid and sonorant clusters. For the analysis of /t/, the spectrograms were analysed for evidence of closure in the vocal tract (a pause in spectrogram) or for aperiodic high-frequency energy suggesting frication. For the acoustic and statistical investigation of the vowel features and of /l/, formant frequencies (F1 and F2) were measured and extracted using Praat. These formant measurements were obtained by firstly manually annotating the recorded sound files in Praat, i.e. assigning phones to time boundaries. The first and second formants of the relevant tokens were then automatically extracted using a Praat script and imported into a CSV file for further analysis. The number of formant measurements taken from each vowel varied; single measurements for F1 and F2 (at midpoint in vowel) were extracted for monophthongs (e.g. DRESS, KIT) and multiple measurements (across the vowel) for diphthongs to measure dynamic change over time (e.g. FACE and GOAT). The acoustic parameters outlined here serve as the dependent variables for the statistical analysis of the features, the process of which is detailed below.

As human vocal tract sizes vary, the formants of the same (phonological) vowel produced by different speakers will have varying values. The larger the vocal tract size, the lower the formant values (Fant, 1960). In general men have larger vocal tract sizes and therefore produce lower formant values than women, who produce lower formant values than children. The listener is able to normalise this variation and hear a vowel as the same vowel across multiple speakers. However, for acoustic analysis, this vocal tract variation makes inter-speaker comparison unreliable (Adank et al. 2004). One way to account for this is by transforming the raw Hz formant values into normalised values, which enables retention of focus on meaningful sociolinguistic variation while minimizing the influence of individual anatomical differences. As the participants of this study include both male

and female speakers, it was decided to normalise the values in order to compare reliably between speaker groups.

Multiple methods are available for normalisation of data, which will not be discussed in detail here. For a comparison of various normalisation methods see Adank et al (2004) or Fabricius et al. (2009). Adank et al. (2004) in their comparative study of vowel normalisation techniques found that, across multiple studies, the Lobanov (or Z-score) method was the most effective in reducing physiological variation effects while retaining sociolinguistic differences. Lobanov normalisation is a formant-extrinsic technique, which works best when investigating multiple vowels in the acoustic vowel space, as is the case in the present study. The Lobanov method has been used by many researchers within sociophonetics (Fridland & Kendall, 2019; Fridland et al., 2014; Lawson et al., 2019) and, more specifically, was used by Lonergan (2013) in his comprehensive study of Dublin English vowels. Using the Lobanov method therefore had an added benefit in optimising cross-dialectal comparison with Lonergan's findings. In the present study Lobanov/Z-score normalisation was carried out on the vowel formant values using the `scale()` function in R (R Core Team, 2023).

3.5.2 Data visualisation and statistical analysis

Data visualisation was carried out in this study using the `ggplot2` package (Wickham, 2016) in R. A range of plots were used, depending on the research questions and data structure. Each of these plots is introduced and briefly described in the following paragraphs.

Density plots. Many studies have used scatter plots to visualise the distribution of vowel tokens in an F1-F2 space. However, scatter plots can easily lose their effectiveness when subject to overplotting, making them difficult to interpret. For this study, it was decided to use density plots instead of scatter plots to visualise F1-F2 values for vowels. Density plots provide a more comprehensive representation of the data's density and shape and create a smoother and more interpretable depiction of the data distribution. This is particularly useful for dealing with large datasets or when there is a high degree of overlap among points. By summarising the distribution of data along the variable's range, density plots facilitate quick identification of peaks (indicated by darker areas) and

asymmetries in the data. Additionally, density plots are particularly useful for detecting multimodal distributions. This can offer valuable insights into the data's underlying structure, which can be used to inform hypotheses for further analysis. Density plots were created in this study using the `stat_density2d()` function in R. An example of a density plot from this study is provided in Figure 7. This plot depicts the distribution of normalised F1 and F2 values for pre-nasal consonant DRESS (purple), pre-oral consonant DRESS (orange) and KIT vowels (navy) for bilingual women (left) and bilingual men (right).

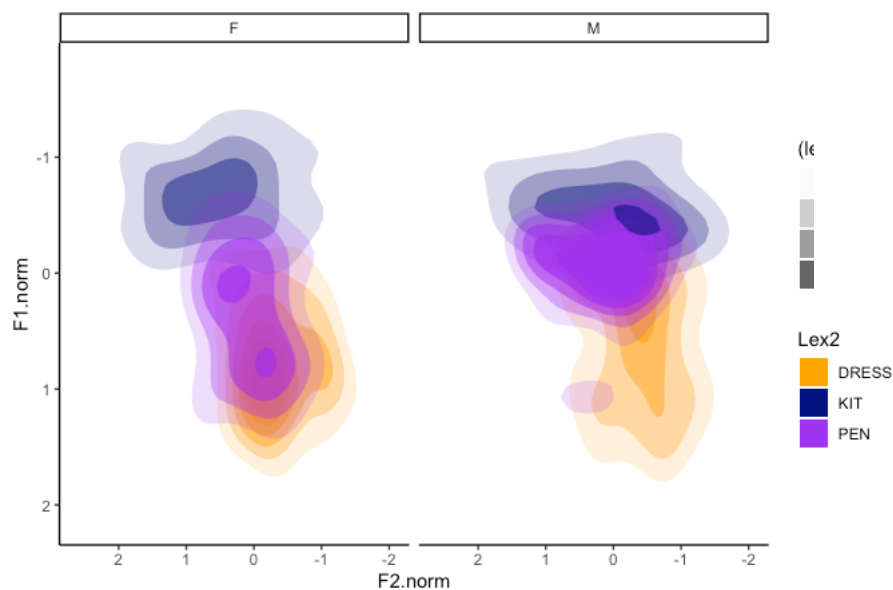


Figure 7. Example of a density plot, showing normalised F1 and F2 values for DRESS, PEN, and KIT vowels in bilinguals.

Bar charts. For the investigation of /t/-variation and epenthesis in this study, stacked bar charts were used. Bar charts facilitate comparison of proportions between the multiple variants of a variable. For example, the variable of /t/ is a multinomial categorical variable with multiple possible realisations, e.g. tap, glottal stop, plosive. For a multinomial variable stacked bar charts are particularly suitable, as they allow for concise visualisation of complex data with multiple levels of variation and an understanding of the distribution patterns and trends across various sociolinguistic factors. Bar charts were created using the `geom_bar()` function in R. An example of a bar chart from this study

is provided in Figure 8 below. It depicts the distribution of intervocalic /t/ variants across younger and older bilingual speakers.

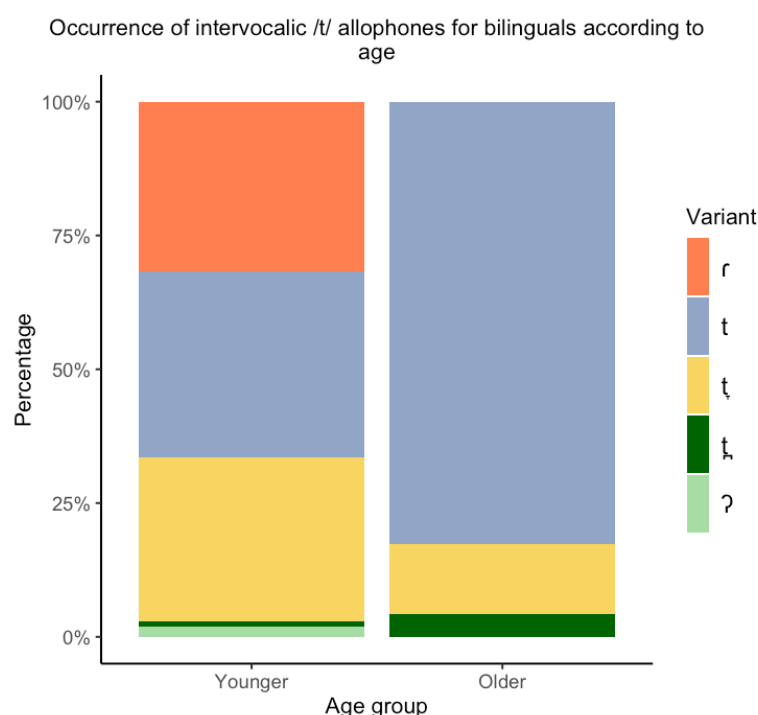


Figure 8. Example of a stacked bar chart, illustrating the occurrence (%) of intervocalic /t/ variants across younger and older bilingual speakers.

Violin plots. In examining /l/-velarisation (Chapter 9), the analysis focuses on assessing F2 values at the midpoint. F2 (and its correlated normalised values) is a continuous measure; while between-category comparison of continuous variables has traditionally been visualised via boxplots within linguistic studies, it was decided in this study to use violin plots overlaid with boxplots. The advantages of using a violin plot include the provision of more detail regarding the data distribution. Unlike box plots which show summary statistics such as median, quartiles, and outliers, violin plots incorporate kernel density estimation to depict the entire probability density function of the data. This enables viewers to observe nuances in the distribution shape, enhancing insights into the underlying data characteristics. To interpret a violin plot, one can examine the width of the plot at various points along the x-axis, where wider sections indicate higher data density. Figure 9 below provides an example of the same dataset visualised with (i) a violin plot overlaid with a boxplot, as used in this study and (ii) a boxplot alone. These

examples use data from the analysis of /l/-velarisation (Chapter 9) and displays normalised F2 values on the Y-axes and word position of /l/ on the X-axes.

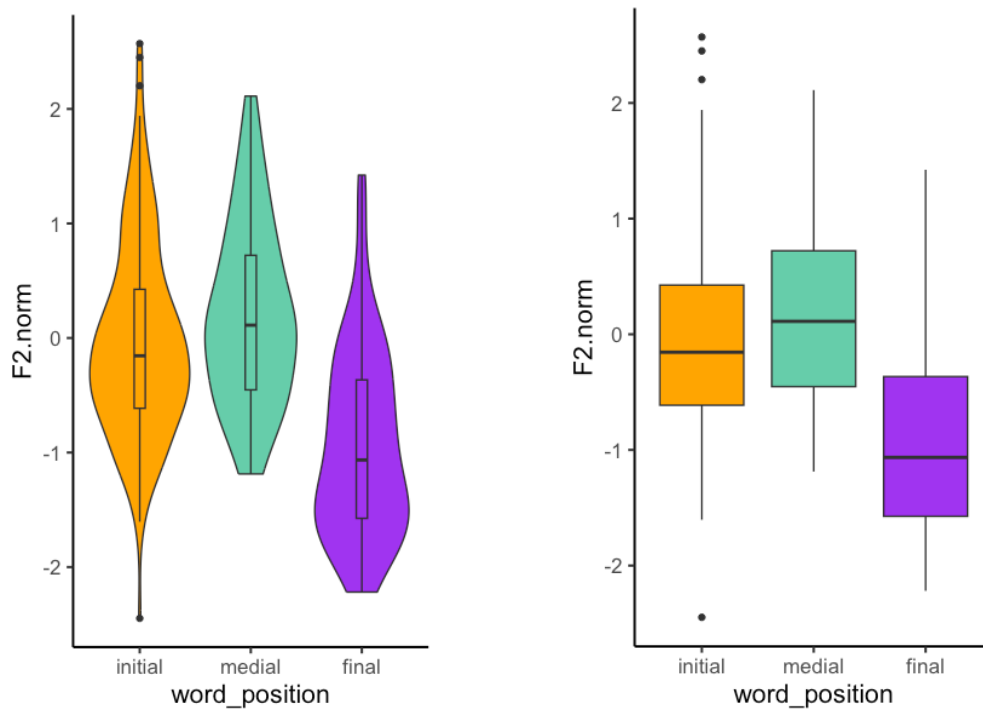


Figure 9. Example of violin plot (left) and boxplot (right). The box plot (both inside the violin plot on the left and as a standalone plot on the right) shows in the coloured box the middle 50% of the data, from the 1st to the 3rd quartile. The line in the middle of the box is the median.

Line plots. Line plots were used in the exploration of data on the FACE and GOAT vowels. As their investigation pivots on the extent of diphthongisation, a method of visualisation was needed that showed their dynamic nature. These can be interpreted in the same way that a formant might be interpreted on a spectrogram, with Hz values on the Y-axis and time on the X-axis. Figure 10 provides an example of a line plot, showing average formant values of the FACE vowel for younger and older monolingual women.

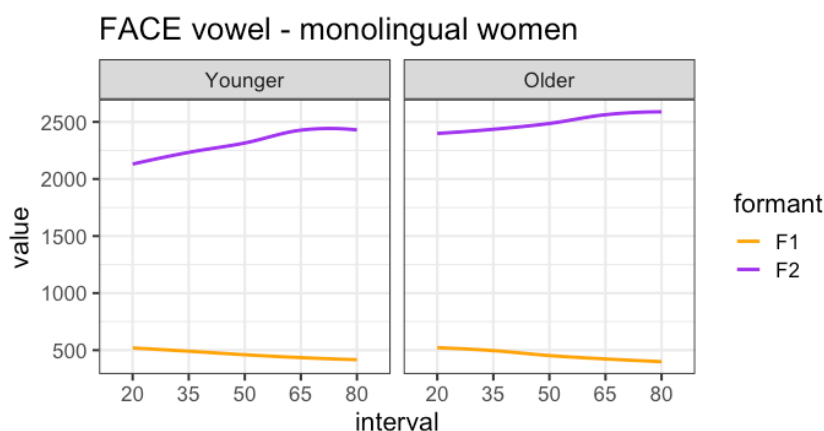


Figure 10. Example of a line plot, showing trajectories of F1 and F2 in the FACE vowel.

Quantifying vowel merger. To quantify the distributional patterns of the DRESS vowels and investigate the extent of merger between speakers, Pillai scores (calculated per speaker) were used. This was chosen as the most suitable measure for merger, following the recommendation of Nycz and Hall-Lew (2013). The use of Pillai scores, or the Pillai-Barlett trace, in measuring merger was introduced to the field of phonetics by Hay et al. (2006) in their New Zealand English study on near and square vowels. Prior to that, vowel mergers had traditionally been measured using averaging in methods such as Euclidean distance (e.g. Baranowski, 2006; Dinkin, 2009), which can obscure variability present in the data. Pillai scores have since been commonly used in sociolinguistic, phonological and phonetic studies of merger (Freeman, 2023; Nycz & Hall-Lew, 2013; Stanley & Sneller, 2023). They provide a measure for the extent of overlap between two distributions, and range from 0 to 1, where 0 indicates no difference between categories and 1 indicates complete separation. The Pillai score is an output of a MANOVA (multiple analysis of variance) model, which evaluates two or more dependent variables simultaneously, along with any relevant independent variables. The advantage of using Pillai scores to measure vowel merger is that they allow for modelling of data points using multiple variables simultaneously – thus, in the case of vowel analysis, both F1 and F2 can be used.

Statistical methods. As mentioned in Chapter 2, much of the current understanding of IrE phonological variation has been based on impressionistic or anecdotal descriptions.

While these methods serve as valuable starting points for the analysis of phonetic variation in IrE, supplementary empirically-based findings can provide a more fine-grained understanding of these patterns.

The use of statistical analyses are crucial within sociophonetic studies, as they enable quantification of variation patterns, validation of hypotheses, reproducibility of research and – through the use of inferential statistics – generalisation of findings to the wider population. By employing inferential techniques, meaningful conclusions can be drawn about the relationships between linguistic features and social or linguistic variables. Statistical analyses within this thesis were carried out using R (R Core Team, 2023). The following subsections will introduce two types of inferential statistical models that are used in this study; linear mixed effects models (LMMs) and generalised mixed effects models (GLMMs).

Linear Mixed Effects Models. For the statistical analysis of phonological features, this study involves the estimation of effects of a number of social and/or linguistic factors (e.g. age, gender, phonetic context) on multiple data points from the same word or from the same participant, for example each speaker will have produced multiple tokens of /t/. In general, these data points will be more similar within than across participants. This connection between data points is known as a dependency and makes this study a repeated-measures design. For some features included in this study, there is a single measurement per participant (e.g. Pillai scores as a method of measuring PEN-PIN merger (Chapter 5)). In this case, as there are no dependencies, a simple linear regression model can be used. However, when there are dependencies in the data, mixed effects models should be used (Winter, 2019).

Mixed effects models allow for the inclusion of both fixed and random effects. Fixed effects are variables that are assumed to have a constant effect on the outcome, e.g. age or phonetic context may have an effect on /t/-variation. Random effects are grouping factors, and while they may not be of specific interest to the research question, they might be influencing the variation observed. For example, in this study ‘speaker’ and ‘word’ are modelled as random effects in all mixed models (apart from cases where the inclusion of ‘speaker’ caused issues). This is because multiple tokens of a phoneme are repeated across words and across speakers. When analysing the effects of fixed and random

effects on a continuous outcome, such as F1 or F2 (formant measurements) – which can take on any value in a range – a Linear Mixed Effects Model (LMM) is required. In this study the R packages `lme4` (Bates et al., 2015) and `lmerTest` (Kuznetsova et al., 2017) were used to create LMMs.

Generalised Linear Mixed Models. When an outcome variable is categorical (e.g. presence vs. absence of a particular variant) – and is to be modelled against both fixed and random effects – Generalised Linear Mixed Models (GLMMs) can be used, in particular mixed logistic regression. GLMMs use a logistic regression framework. Unlike linear regression, which predicts a continuous outcome (e.g. formant values), logistic regression predicts the probability of a categorical outcome. It provides a formula that calculates the likelihood of the outcome (e.g. presence of an epenthetic vowel in ‘film’) as a function of predictor variables (e.g. age, gender). The `glmer()` function from the `lme4` (Bates et al., 2015) package was used to conduct GLMMs in the analysis of binary-outcome variables in this study.

Statistical models were compared in each instance to determine which was the best fit for the observed data. The value used to compare them was the Akaike Information Criterion (AIC). AIC measures how well a model aligns with the data it was derived from. The preferred model is one that balances explaining the most variation with the fewest independent variables employed, avoiding overfitting. A relatively lower AIC suggests a better model. AIC is automatically calculated for LMMs in `lmerTest` and for GLMMs in `lme4` and is provided within the model output table in R.

3.6 Chapter summary

This chapter has described the study’s location, participant criteria, speech data and social data included in the study. It has provided a rationale for the selection of data and for the analytical methods used. It has outlined the methods of data collection, including the recruitment and recording of participants, and detailed the subsequent methods of data normalisation, visualisation and statistical analysis. The following chapters will present the auditory, acoustic and statistical analyses of the various phonetic features.

PART III – ANALYSIS & RESULTS

4 The vowel space: an overview

4.1 Vowel data

This short chapter presents an acoustic visualisation of the vocalic systems (monophthongs) of bilingual and monolingual speakers. While an analysis of the acoustic vowel space for these speakers is not a main focus of the study, it was deemed useful to provide a context within which to situate the findings for the vowel variables of the main study. The collected vowels (2 tokens per vowel per speaker), along with their associated words and lexical sets, are presented in Table 15. These words were embedded in the carrier sentence ‘Say _____ again.’

Table 15. Monophthongs and diphthongs in /h_d/ contexts with corresponding lexical sets.

Vowel	Word	Lexical set
Monophthongs		
i	heed	FLEECE
ɪ	hid	KIT
ɛ	head	DRESS
a	had	TRAP
a:	half	BATH
ɑ / ɒ	hod	LOT
ɑ:/ ɒ:	hawed	THOUGHT
ʌ / ʊ	hud	STRUT
ʊ	hood	FOOT
u:	who'd	GOOSE
Diphthongs		
eɪ / e:ʔ	hayed	FACE
aʊ	how'd	MOUTH
oʊ / o:ʔ	hode	GOAT
ɔɪ	hoyed	CHOICE
aɪ	hide	PRICE

Density plots were generated using the extracted vowel tokens for each speaker group (bilingual and monolingual). The creation of vowel space plots offer a visual representation of the distribution of vowels across speaker groups, facilitating the identification of patterns of variation, such as mergers, splits, or shifts in vowel categories. These patterns may be indicative of ongoing or completed linguistic changes. As such, before examining a specific vowel or subsystem of vowels in depth, it is useful to gain a general understanding of the overall vowel space of a dialect. For an explanation of the interpretation of density plots, see Chapter 3.

The monophthongs are examined below to facilitate comparison with other dialects of IrE, which have been investigated in a similar way (e.g. Dublin English by Lonergan (2013), Drogheda English by Kalaldehy (2011)). Note that, while the FACE and GOAT vowels are often reported to be monophthongal (/e:/ and /o:/) in IrE, based on recent sociophonetic analyses (e.g. Bessell, 2023) they are treated as possible diphthongs in this study and are not included in this plot. However, their distribution within the vowel space will be explored in Chapter 6.

4.2 Results

Figure 11 displays the vowel space (monophthongs) for bilingual speakers.

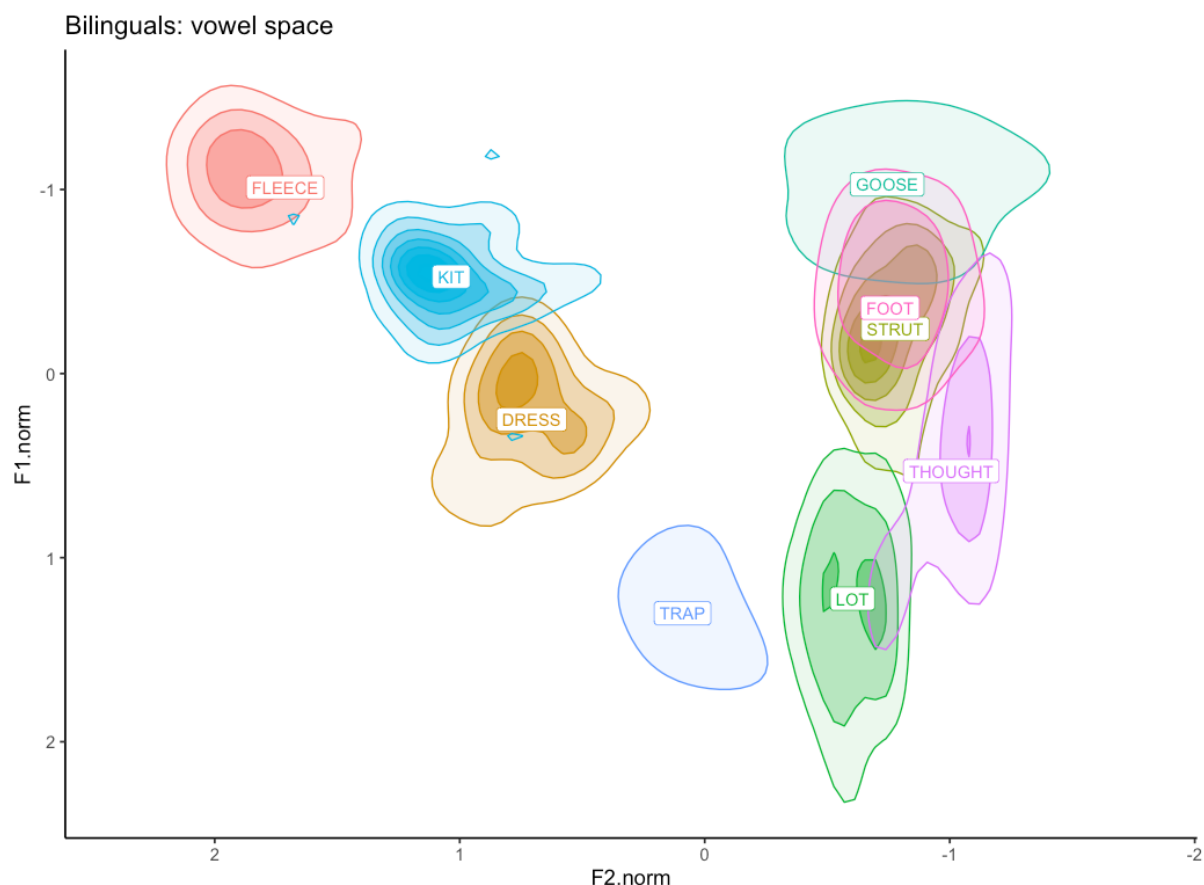


Figure 11. Density plot of normalised F1 and F2 values for a selection of monophthongs of bilingual Irish-English speakers.

It is evident that, for the bilingual speakers, there is a considerable degree of overlap between the FOOT and STRUT vowels. The absence of a FOOT-STRUT split (which is present for Southern British English, for example) has been previously reported for IrE (e.g. Ferragne & Pellegrino, 2010; Lonergan, 2013) and so the overlap observed here is not a surprising find. In addition, these two categories appear to overlap to some degree with GOOSE. For the front vowels there appears to be overlap between DRESS and KIT, though this is minimal.

Figure 12 displays the parallel data for the monolingual speakers.

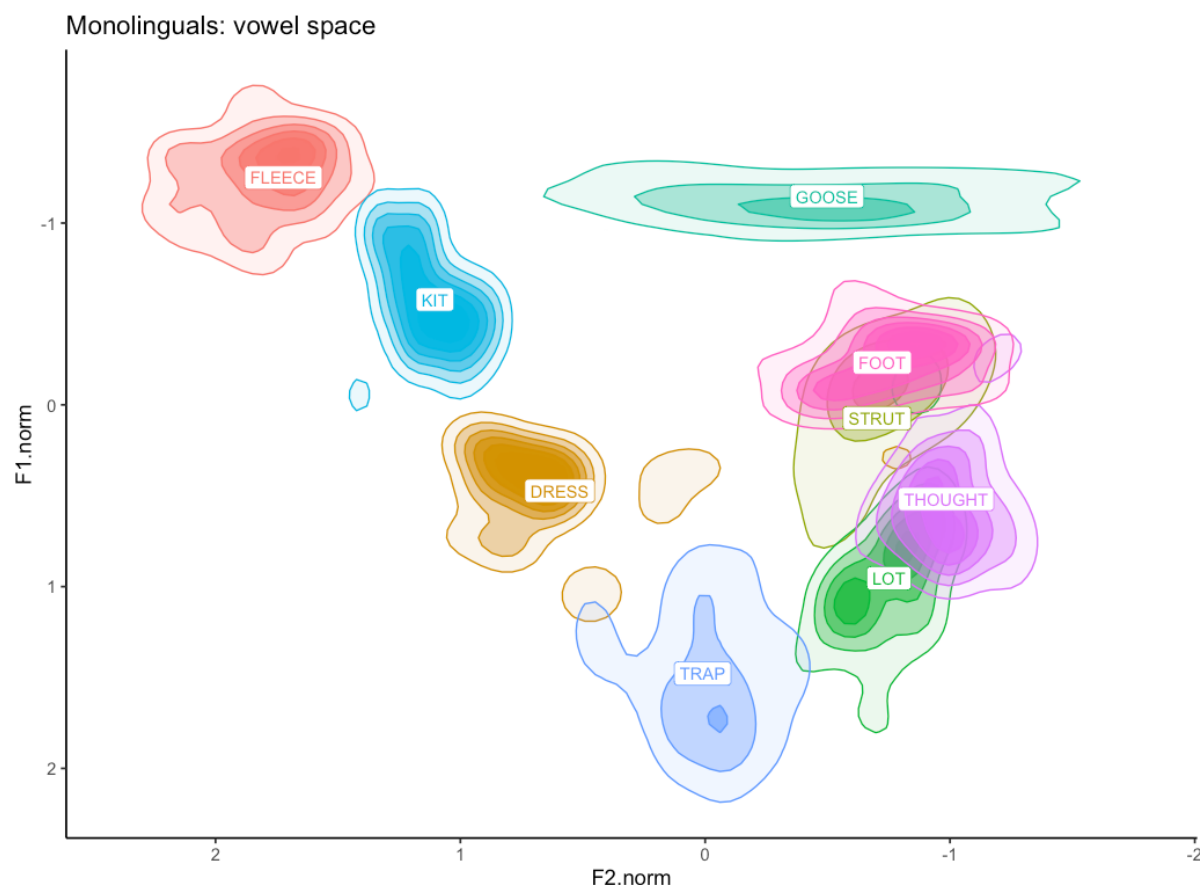


Figure 12. Density plot of normalised F1 and F2 values for a selection of monophthongs of monolingual speakers.

The monolinguals also show a large degree of overlap between FOOT and STRUT, though there appears to be some variation within the latter, whereby some tokens are notably lower. The LOT vowel of monolinguals looks to be higher than that of the bilinguals, overlapping to greater extent with THOUGHT. The most striking difference between the bilingual and monolingual vowel spaces is that in the latter there is a large degree of variation in the GOOSE vowel, which occupies a more expansive area of the upper vowel space.

Fronting of the GOOSE vowel has been observed for other dialects of IrE, including Dublin English (Hickey, 2016; Lonergan, 2013), Drogheda English (Kalaldehy, 2011) and Cork English (Bessell & Mulhall, 2014). It is notably reported for younger IrE speakers (Hickey, 2016). GOOSE-fronting is also present in other macro-varieties of English (Lawson et al., 2019). Ferragne and Pellegrino (2010), in their survey of several dialects in the UK and Ireland found that fronted GOOSE variants were common across dialects.

As the factor of age has been previously identified as a predictor of GOOSE-fronting for IrE (Hickey, 2016; Lawson et al., 2019), it was hypothesised that age-based conditioning would explain the large variability seen in the GOOSE vowel.

Figure 13 displays the normalised GOOSE vowel formants for monolingual speakers, categorised by age group (younger vs. older). The X and Y axes are expanded to allow a direct comparison with the previous vowel space plots. This figure indicates that the age effect found for GOOSE-fronting in other IrE dialects is also present for these speakers, with the younger group showing a more fronted vowel.

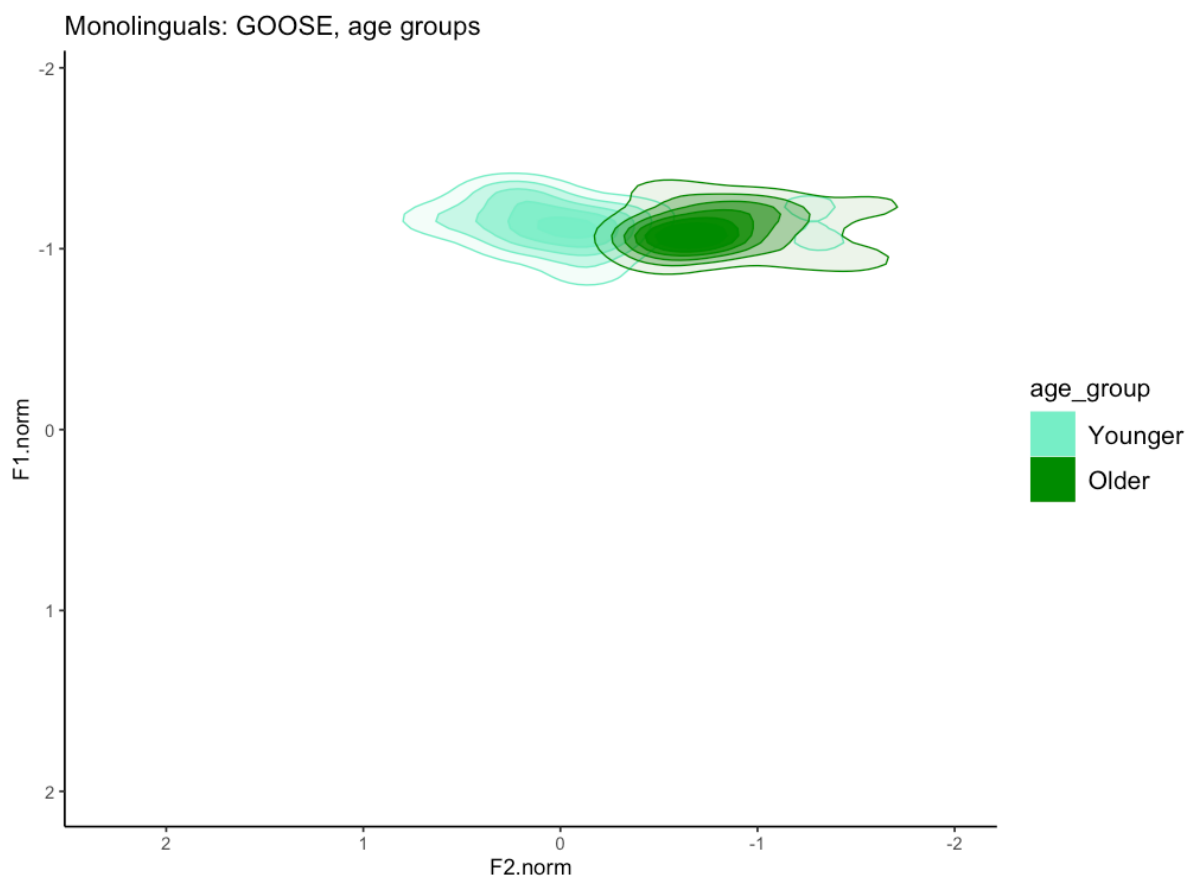


Figure 13. Density plot of F1 and F2 values for the GOOSE vowel of monolingual speakers, according to age.

While not within the scope of this study, exploring the potential correlation between GOOSE fronting and front vowel lowering, as observed by Lonergan (2013) in Dublin English women, would be a valuable avenue for further research among these speakers, along

with further age-based analysis.

4.3 Summary

This short chapter presented an overview of the vowel spaces for bilingual and monolingual Connemara English speakers. A notable difference between the English of these two groups was in the fronting of the GOOSE vowel, seen predominantly for younger monolinguals. Having provided context for further analysis of these speakers' vowels, we will now turn to an analysis of the PEN-PIN merger/ DRESS-raising.

5 PEN-PIN merger (DRESS-raising)

5.1 Background and research questions

As detailed in Chapter 2, there are a number of linguistic reports of a raised /ɛ/ (DRESS) vowel in western and southwestern Irish English dialects. Older reports (e.g. Lunny, 1981) suggest phonologically unconditioned raising of DRESS, whereas more recent reports (e.g. Peters 2016 on Galway English) have found it to be conditioned by a following nasal. It is the general consensus that DRESS-raising is now pre-nasally conditioned in IrE (Hickey, 2007). As such, it has been termed the PEN-PIN merger. Regarding the origins of this feature, suggestions have been made for both an Early Modern English source (Kallen, 2013) and an Irish source (Ó Baoill, 1997; O'Sullivan, 1942). The PEN-PIN merger has not yet been analysed in the English of L1 Irish speakers, nor have claims been made about its occurrence therein. For Connemara Irish, however, Ó Siadhail (1989) reports raising of /e/ to /i/ pre- and post-nasally (e.g. *seinm* → [ʃinʲəm] ‘I play’), along with /o/ to /u/ and /o:/ to /u:/, suggesting a process that applies to mid vowels. There are no reported parallels of this latter kind of vowel raising for IrE, however.

Comparing DRESS-raising patterns in the English of native (bilingual) Irish speakers with potential parallels in (i) their Irish speech and (ii) the English of monolingual speakers can shed further light on the possible Irish influence on this feature. Gaeltacht English has been noted for its heavy Irish influence, and so, if one presumes that this is an Irish transfer feature we may expect it to a higher degree in the English of native Irish speakers (as opposed to monolingual IrE).

Taking these points into account, the following questions were explored regarding the realisation of the DRESS vowel for Connemara English. These relate to the overarching Aim 1 of the study, to quantitatively investigate sociophonetic variation within Connemara English.

- RQ1a** Relative to monolingual Irish English to what extent does the English of native Irish speakers show a PEN-PIN merger?
- RQ1b** To what extent do sociolinguistic factors influence the realisation of the PEN-PIN merger?

In line with the second overarching aim of the study, to explore the possible Irish origins for specific features of IrE, a further descriptive question was posed:

- RQ2** To what extent do the bilingual speakers' realisations of Irish /ε/ and /ɪ/ show parallels with their English /ε/ and /ɪ/?

5.2 Methods

The following subsections outline the procedure of vowel formant measurement and extraction and the methods used for quantifying vowel merger.

5.2.1 *Vowel formant measurement and extraction*

The participant interview and sentence recordings (detailed in Chapter 3) were imported into Praat as .wav files. All pre-consonantal tokens of primarily-stressed /ε/ and /ɪ/ vowels in the English and Irish datasets were manually annotated in Praat (Boersma & Weenink, 2021). The onset of the vowel was marked where there was an obvious increase in intensity and increase in strength of formants. The offset was marked where there was an obvious decrease in intensity and decrease of formant strength/change in formant trajectory. A Praat script was written (adapted from Stanley and Lipani (2019)) to automatically extract the midpoint measurements of F1 and F2 for each vowel token. In previous studies of the PEN-PIN merger, F1 has been the only formant analysed (e.g. Bigham, 2005). In the present study, however, F2 measurements were also included to enable a broader understanding of the vowels' distributions within the wider acoustic vowel space.

All automatically extracted measurements of F1 and F2 were exported into Excel, and were supplemented with social and linguistic variable labels, including phonological context (pre-nasal-consonant vs. pre-oral-consonant), style (spontaneous vs read speech),

word (in which the vowel appeared), and the social data for each speaker (age, gender, Linguistic Profile Score (LPS), and Local Attachment Score (LAS)). Outlying tokens were manually checked and corrected where necessary. Formant measurements were Lobanov/ Z-score normalised (See Chapter 3 for explanation) using the `scale()` function in R. In total, 1033 tokens of DRESS were extracted for analysis, comprising 530 tokens from bilingual speakers and 503 from monolingual English speakers. 805 KIT tokens were also extracted; 453 from bilingual speakers and 352 from monolingual English speakers. For the bilingual speakers, 142 Irish / ϵ / tokens were extracted, along with 139 / ɪ / tokens.¹ This data is displayed in Table 16.

Table 16. Resulting tokens of / ϵ / and / ɪ / in (i) Monolingual speakers’ English, (ii) Bilingual speakers’ English, (iii) Bilingual speakers’ Irish. Tokens are uneven due to the use of interview data yielding variable amounts of tokens per participant.

Extracted tokens of / ϵ / and / ɪ /

	Monolingual English	Bilingual English	Bilingual Irish
/ ϵ /	503 (incl. 328 DRESS, 175 PEN)	530 (incl. 348 DRESS, 182 PEN)	142
/ ɪ /	352	453	139

5.2.2 Quantifying vowel merger

To quantify the distributional patterns of the vowels and investigate the extent of merger between speakers, it was decided to use Pillai scores. Pillai scores (calculated per speaker) were chosen as the most suitable measure, following the recommendation of Nycz and Hall-Lew (2013). The use of Pillai scores, or the Pillai-Barlett trace, to measure merger was introduced to the field of phonetics by Hay et al. (2006) in their New Zealand English study on NEAR and SQUARE vowels. Prior to that, vowel mergers had traditionally been measured using averaging in methods such as Euclidean distance (e.g. Baranowski,

¹ The discrepancy in the Irish data vs. English is due to the Irish tokens being taken from read speech only. Style was not considered when investigating the differences between English and Irish data for the bilingual speakers. Due to time constraints on the project, I was unable to analyse all the data collected for this feature but intend to do so in future research.

2006; Dinkin, 2009), which can obscure variability present in the data. Pillai scores have since been commonly used in sociolinguistic, phonological and phonetic studies of merger (Freeman, 2023; Nycz & Hall-Lew, 2013; Stanley & Sneller, 2023). They provide a measure for the extent of overlap between two distributions, and range from 0 to 1, where 0 indicates no difference between categories and 1 indicates complete separation. The Pillai score is an output of a MANOVA (multiple analysis of variance) model, which evaluates two or more dependent variables simultaneously, along with any relevant independent variables. The advantage of using Pillai scores to measure vowel merger is that they allow for modelling of data points using multiple variables simultaneously – thus, in the case of vowel analysis, both F1 and F2 can be used. The resulting Pillai scores from individual speakers MANOVAs and their subsequent analysis within regression models will be outlined in the following section.

The following subsections present the results for the acoustic analysis of the vowel formants (§6.3). Subsequently, the statistical analysis of potential sociolinguistic predictors on the Pillai scores and on F1 values is presented (§6.4).

5.3 Results – acoustic analysis

Linguistic background (monolingual vs. bilingual). To investigate inter-group variation between the monolingual English speakers and the bilingual speakers, the DRESS (pre-oral-consonant), PEN (pre-nasal-consonant) and KIT tokens for the two speaker groups were plotted on two-dimensional density plots (Figure 14). See Chapter 3 for a discussion of the benefits of density plots over traditionally used scatter plots for vowel analysis. The plots were created using `ggplot2` (Wickham, 2016) in R.

As seen in Figure 14, the bilingual speakers (left) show a relatively higher PEN vowel (purple), and a slightly lower KIT vowel than the monolinguals, resulting in visible overlap between the two categories. The monolingual speakers, however, appear to show no overall raising of pre-nasal DRESS (PEN) vowels and the plotted vowels appear to fall into two main categories (KIT vs. DRESS & PEN).

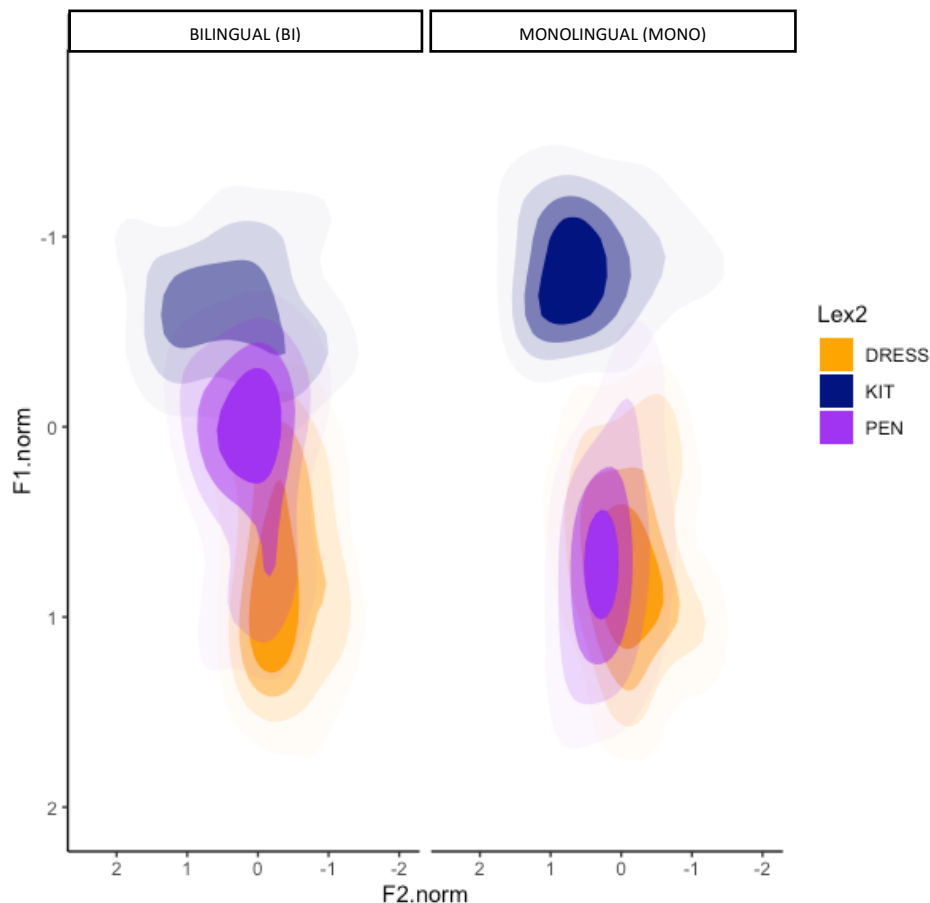


Figure 14. Density plot of KIT, PEN and DRESS vowels for bilingual and monolingual speakers. Lobanov-normalised formant values are plotted. For the bilinguals, 348 DRESS, 182 PEN and 453 KIT tokens are plotted. For the monolinguals 328 DRESS, 175 PEN and 352 KIT tokens are plotted.

The evident discrepancy between the vowel distributions for monolinguals and bilinguals might prompt immediate conclusions that an Irish influence must be the underlying cause of this variation. However, such an assumption would be premature, as (i) although there are reports of similar pre-nasal raising for Connemara Irish (Ó Siadhail, 1989), these have not been quantified in recent years (and more importantly are not verified for these speakers); (ii) to do so would be to disregard the advances made in IrE linguistics that warned against blindly assuming an Irish source for features that may have Irish parallels. The Irish data will be explored in §6.5, following a further investigation into the variation displayed in Figure 14.

Linguistic background and age. Peters' (2012) study indicated that age was a possible predictor of the PEN-PIN merger in Galway City English, which motivated its inclusion in

the present analysis. Figure 15 explores the variation of the vowel tokens for bilinguals and monolinguals, according to age group.

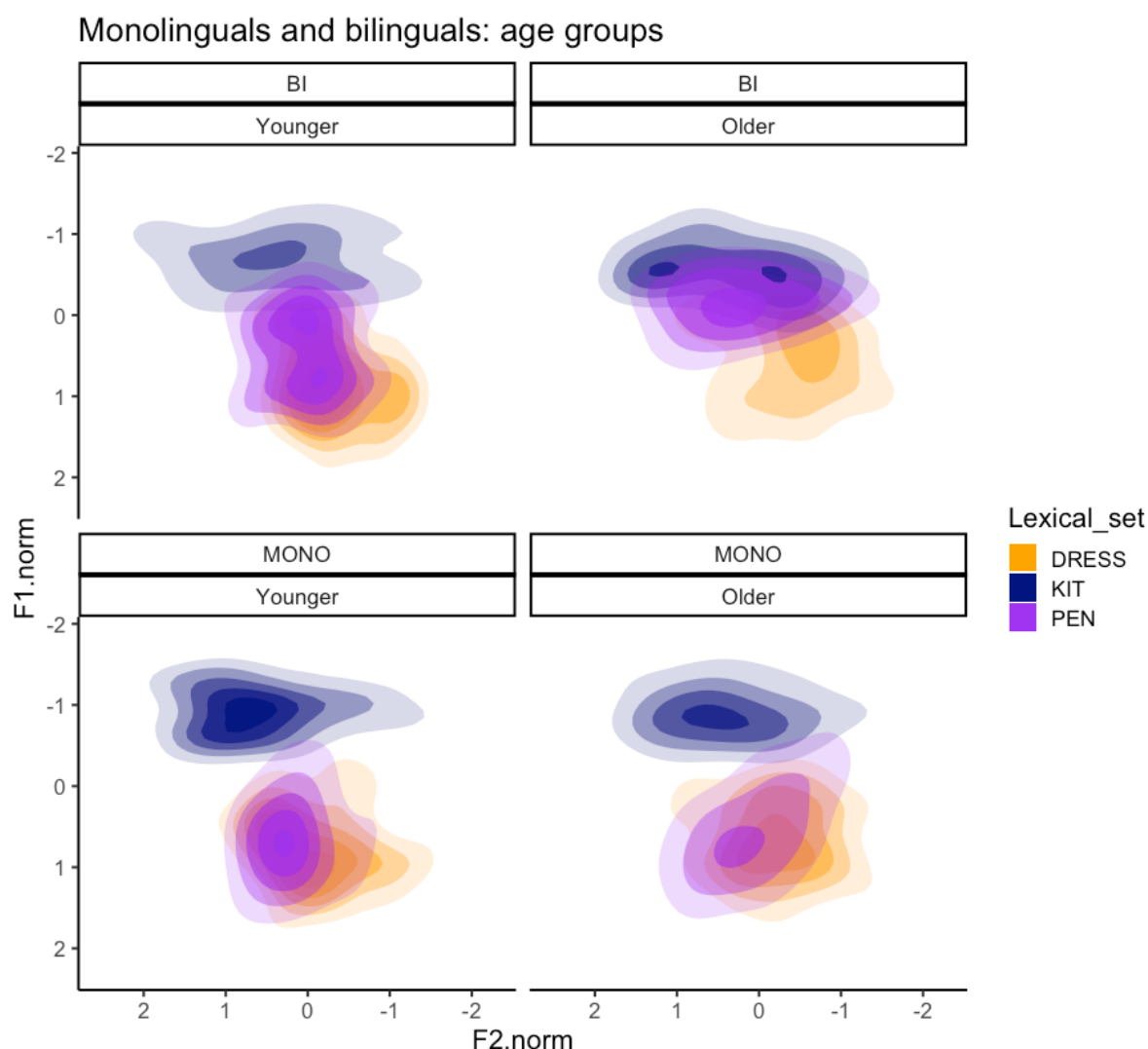


Figure 15. Density plot of KIT (navy), DRESS (orange) and PEN (purple) for bilinguals and monolinguals by age.

The monolingual speakers (bottom row of Figure 15) show minimal age-based variation. There does not appear to be any substantial overlap between the vowel categories; the PEN and DRESS vowels align closely and show a clear degree of separation from KIT. In contrast to this, the bilingual speakers (top row) show a distinctly higher degree of age-based variation, indicating a higher degree of DRESS raising in the older speakers. Overall, the age-based patterning seen here aligns with Peters' (2012) finding that the PEN-PIN merger seems to be on the retreat in Galway.

Linguistic background and gender. Figure 16 presents the distribution of vowel tokens for both bilingual and monolingual speakers by gender. The monolingual group (bottom row) continues to demonstrate little variation, similar to the patterns observed in the age-based analysis. In contrast, the bilingual group exhibits apparent gender-based variation. The higher PEN vowel, and overlap between PEN and KIT, suggests a moderate degree of merger for the bilingual men.

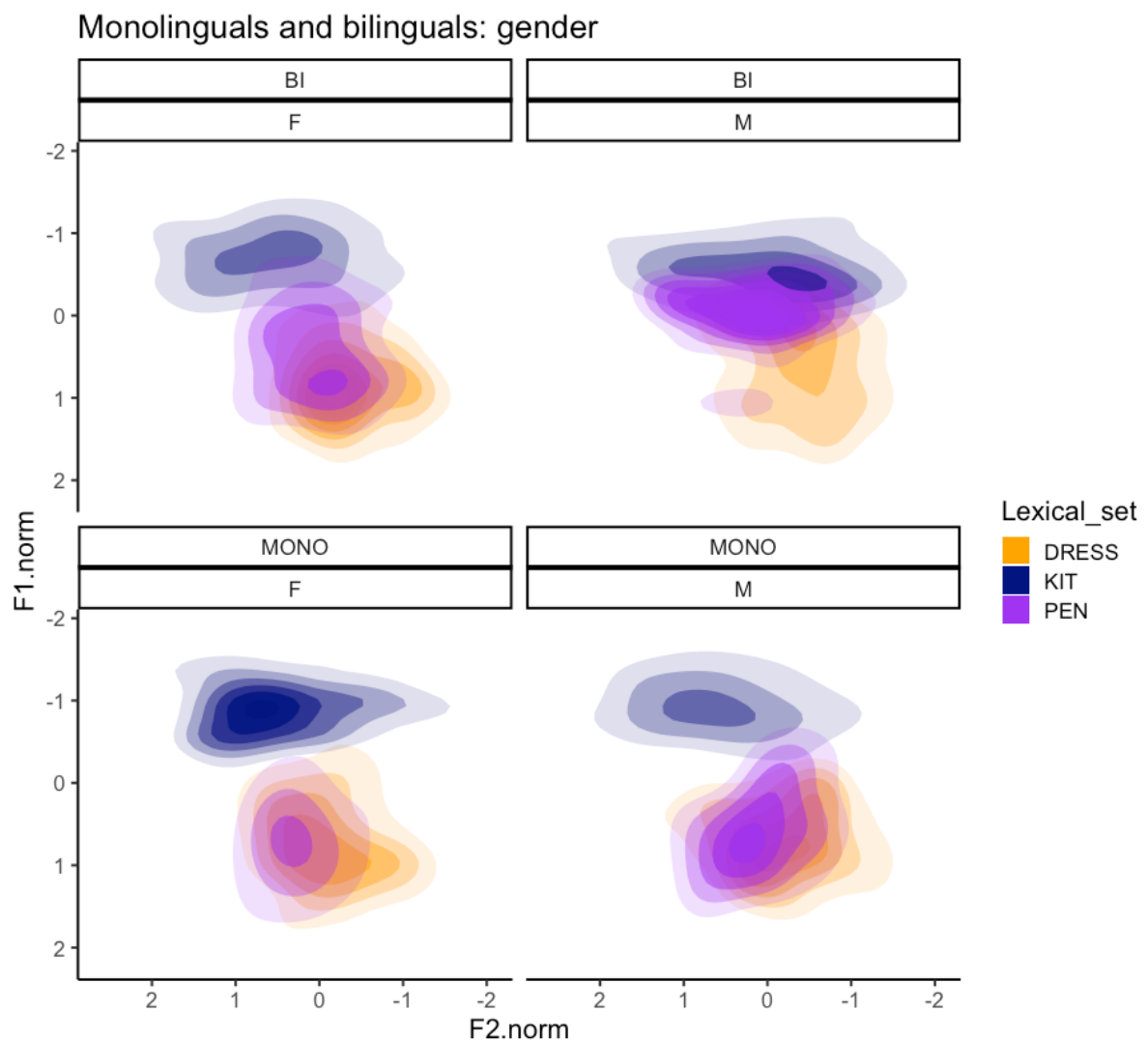


Figure 16. Density plot of KIT (navy), DRESS (orange) and PEN (purple) for bilinguals and monolinguals by gender.

The following sections analyse the vowels for bilinguals and monolinguals separately to further explore the relationship between gender and age.

Bilinguals only – age and gender. Figure 17 displays the normalised F1 and F2 values for DRESS, PEN and KIT for bilingual speakers only. The data is categorised according to age group and gender.

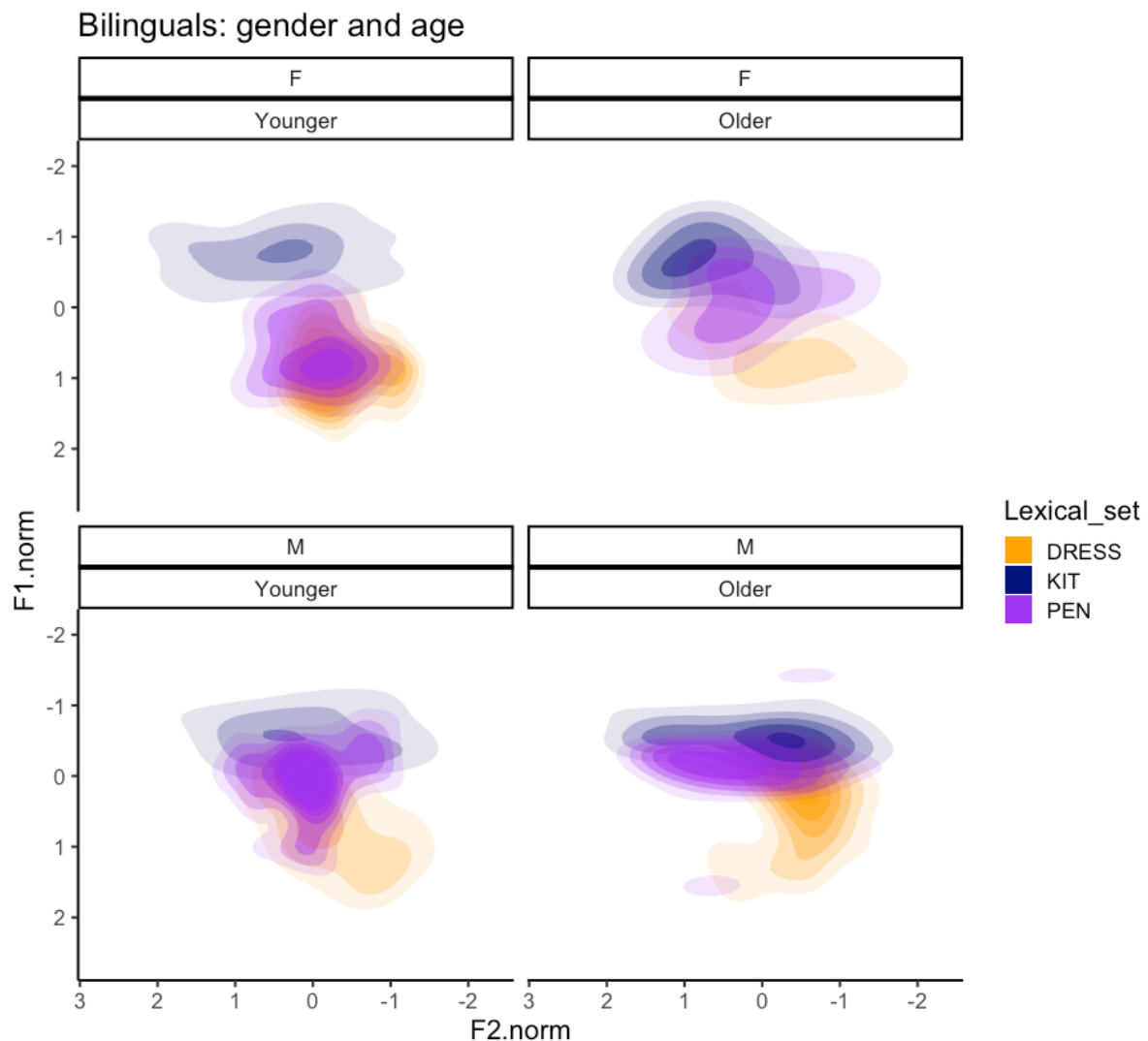


Figure 17. Density plot of KIT (navy), DRESS (orange) and PEN (purple) for bilinguals by age and gender.

The older male bilinguals (bottom right panel) appear to show the most advanced degree of PEN-PIN merger. In addition their DRESS vowel also appears to be relatively high, suggesting an overall tighter vocalic subsystem for these vowels. The younger males (bottom left) show raising of both DRESS and PEN vowels, the latter to a larger extent, causing a moderate degree of overlap between PEN and KIT. Both groups of males show a degree of PEN-PIN merger but differ in their vowel distributions.

Regarding the females, there is evidence of age-based variation. The younger females do not appear to have a raised PEN or DRESS vowel, and show the largest degree of separation between KIT on the one hand and DRESS and PEN (which overlap substantially) on the other. The older women, however, have a similar degree of separation for DRESS and KIT but they show a raised PEN vowel, suggesting a higher degree of PEN-PIN merger than their younger counterparts. Unlike the older males, the older females show clear separation between DRESS and KIT vowels. Finally, the bimodal distributions that were observed in Figure 15 (bilinguals and monolinguals: age) have a possible explanation here; the younger bilingual females have a relatively lower PEN vowel than their male counterparts.

Monolinguals only – age and gender. Figure 18 displays the normalised F1 and F2 values for DRESS, PEN and KIT vowels for monolingual speakers by age and gender. There is minimal variation between the groups. Each group largely has two categories: (i) combined DRESS and PEN, and (ii) KIT. This suggests that the lack of PEN-PIN merger for monolinguals – seen initially in the macro-level bilingual vs. monolingual plot in Figure 14 – remains constant across subgroups of monolinguals.

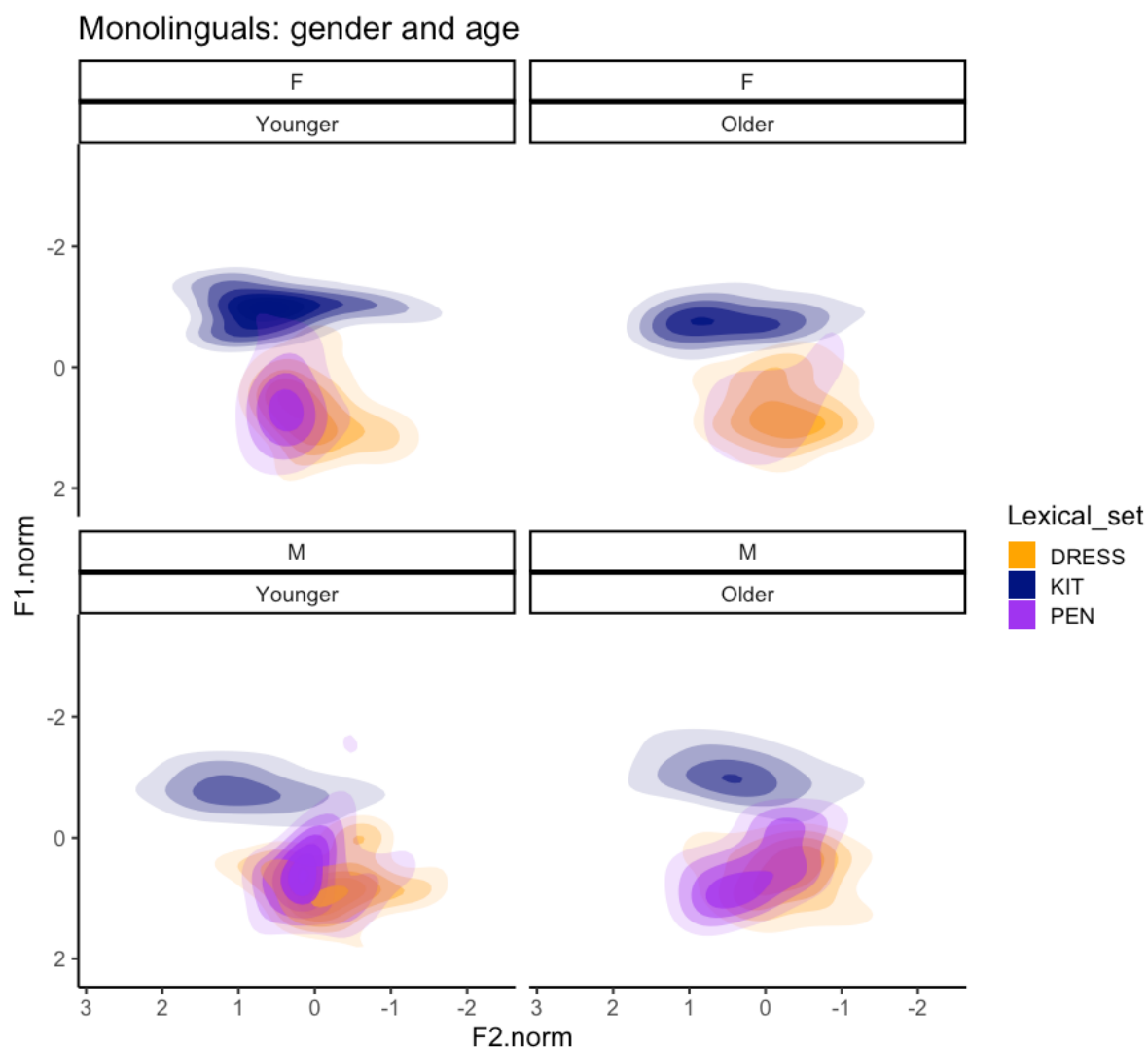


Figure 18. Density plot of KIT (navy), DRESS (orange) and PEN (purple) for monolinguals, by age and gender.

Bilinguals style and gender. Figure 19 shows the vowel distribution patterns for bilinguals, according to gender and speaking style, i.e. read speech ('sentences') vs spontaneous speech ('interview'). For the women (top row), it appears that style may have an effect on the height of PEN; with a PEN-PIN merger more common in spontaneous speech than in the more formal style of read sentences. Style-based variation is also apparent for the bilingual men (bottom row) who show a higher PEN vowel in spontaneous speech than in read speech. Note, however, that there is a similar degree of merger in both styles for the men but that the distribution incorporates lower values in the read sentences.

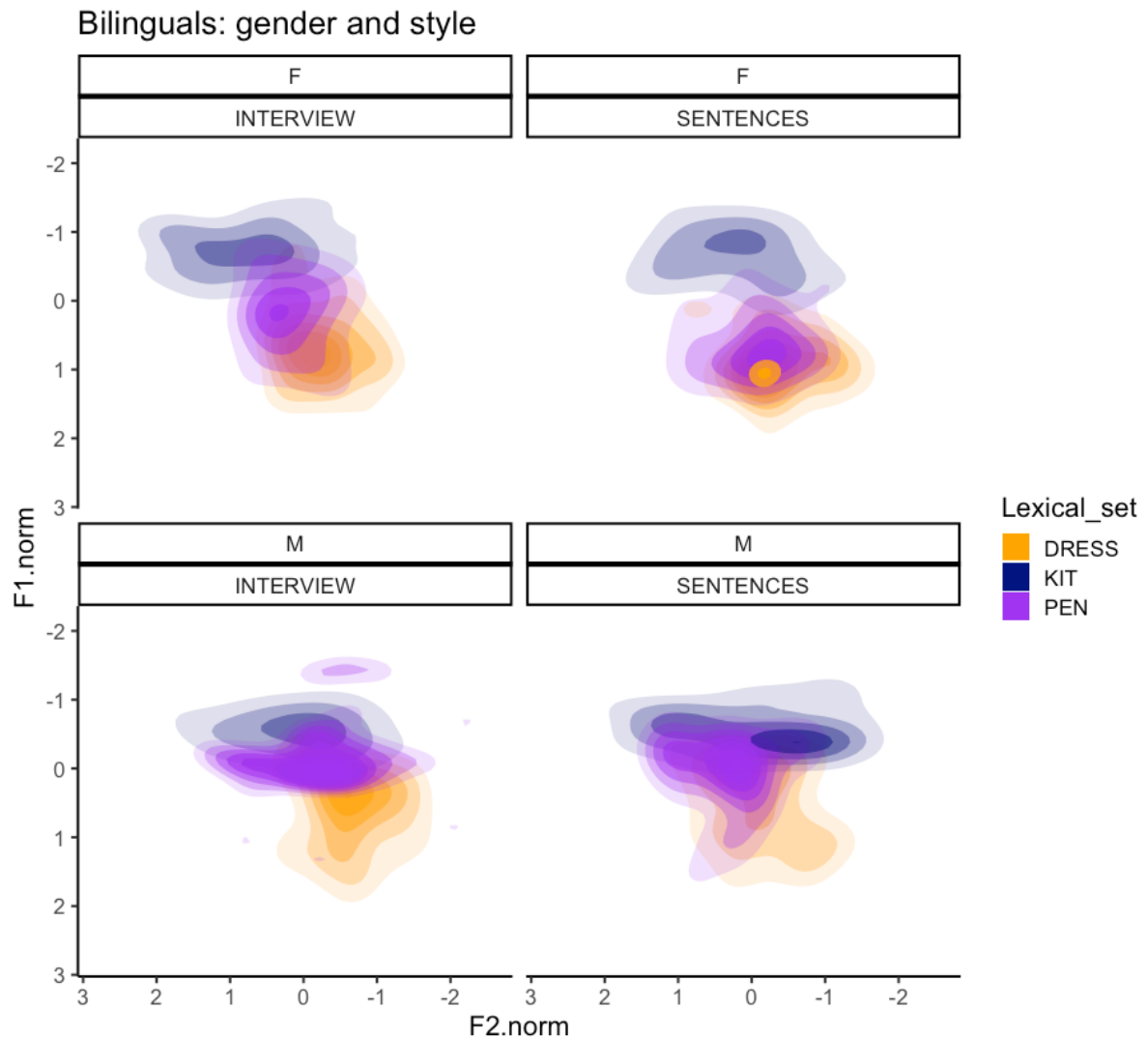


Figure 19. Density plot of KIT (navy), DRESS (orange) and PEN (purple) for bilinguals by gender and style.

Monolinguals – style and gender. Figure 20 displays the vowel distributions for monolingual speakers, according to gender and speaking style. There does not appear to be an effect of gender for the monolinguals when grouped with style. However, there does appear to be a slight effect of style on the vowel distributions, whereby both genders show higher values of the combined DRESS and PEN category in spontaneous (‘interview’)

speech. This is seen in the small degree of overlap between this combined category and KIT in the left column for both genders. Notably, in the more formal read sentence style, neither gender shows any degree of overlap between these two categories.

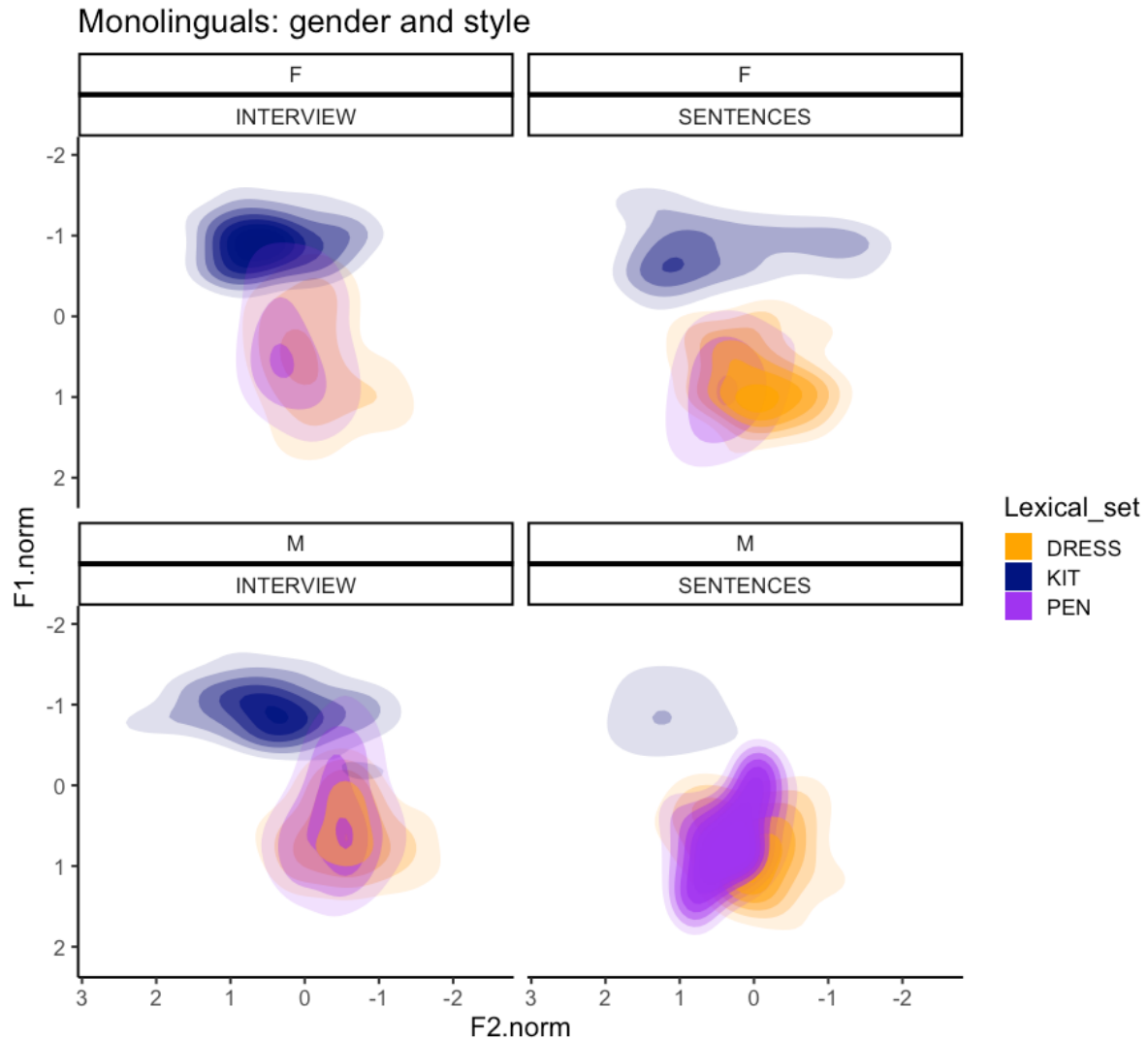


Figure 20. Density plot of KIT (navy), DRESS (orange) and PEN (purple) for monolinguals by gender and style.

5.4 Results - statistical analysis

This section firstly presents the Pillai scores obtained for each speaker (via MANOVA tests) and subsequently describes the further statistical analysis of these scores using linear regression models.

5.4.1 Pillai scores

Pillai scores were used in this study to quantify the degree of overlap between vowel categories, enabling a better understanding of the extent of the PEN-PIN merger.

MANOVA tests were conducted in R to obtain a unique Pillai score for the distribution of PEN and KIT vowels for each speaker. F1 and F2 were modelled as the dependent variables and the vowel category (PEN vs KIT) as the independent variable. Table 17 provides a breakdown of the Pillai scores, with accompanying p-values and basic speaker demographics. The table is arranged with Pillai scores in decreasing sequence; those speakers exhibiting the greatest extent of overlap are positioned at the table's lower end. Stanley and Sneller (2023) advised including p-values along with Pillai scores, noting that there is an inverse correlation between Pillai scores and the size of the data sample – that is, a larger sample size typically yields a lower p-value in the MANOVA test.

Table 17. Pillai scores and corresponding p-values for individual monolingual and bilingual speakers, including speaker ID, gender and age, number of PEN and KIT tokens. Pillai score range is 0-1 where values increase with degree of PEN-KIT category separation.

Pillai scores by speaker

<i>Monolingual</i>					<i>Bilingual</i>				
ID	Age/Gen.	Pillai	p-value	#tokens	ID	Age/Gen.	Pillai	p-value	#tokens
P25	F, 30	0.72	< .001	42	P15	F, 20	0.64	< .001	45
P18	M, 66	0.72	< .001	45	P7	F, 25	0.60	< .001	51
P24	F, 29	0.67	< .001	47	P13	F, 26	0.48	< .001	38
P21	F, 64	0.62	< .001	36	P12	F, 27	0.48	< .001	40
P22	M, 27	0.54	< .001	41	P11	F, 60	0.30	0.006	31
P17	M, 30	0.51	< .001	42	P4	M, 32	0.29	< .001	48
P1	F, 57	0.46	< .001	32	P6	M, 67	0.19	< .001	49
P14	M, 60	0.38	< .001	43	P9	M, 38	0.19	0.025	37
P20	F, 63	0.38	< .001	47	P5	F, 79	0.15	0.004	47
P10	F, 55	0.28	< .001	34	P2	M, 29	0.13	0.13	35
P16	M, 30	0.27	0.008	33	P8	F, 39	0.08	0.13	50
P23	F, 30	0.27	< .001	45	P3	M, 68	0.02	0.64	49

The Pillai scores are also visualised in the boxplot in Figure 21, according to linguistic background (bilingual vs. monolingual). On average, the bilinguals demonstrate lower Pillai scores than the monolinguals.

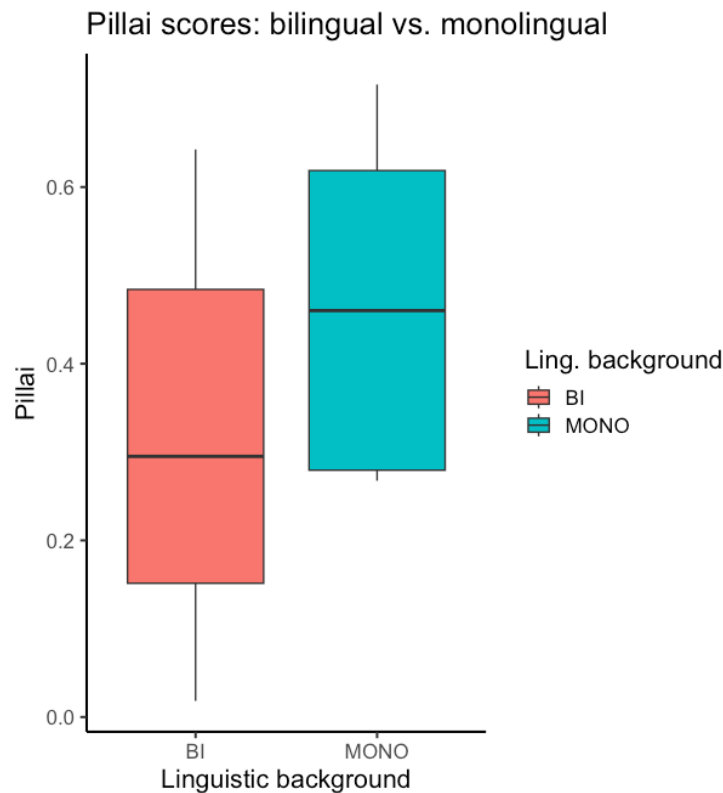


Figure 21. Box plot of Pillai scores by linguistic background.

This pattern is further explored by age in Figure 22. There is notable age-based variation for the bilinguals, whereby older speakers have notably lower Pillai scores, i.e. greater overlap between PEN and KIT vowels. This pattern echoes that seen in the density plot in Figure 17.

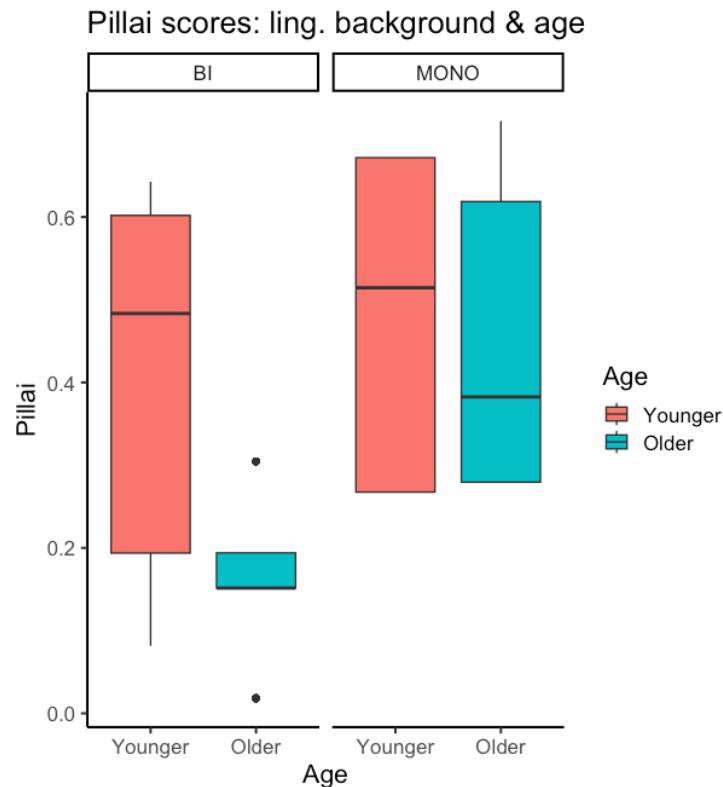


Figure 22. Box plot of Pillai scores by linguistic background and age group.

Monolingual vs. bilingual. The first aim of the statistical analysis was to investigate the effect of linguistic background (monolingual vs. bilingual) on the extent of the PEN-PIN merger. This was done via a linear regression model in R. The model was formulated as follows: `lm(Pillai ~ LING, data = PIL)`. The results showed a significant positive effect between monolinguals and Pillai scores ($\beta = 0.16628$, $SE = 0.07836$, $t = 2.122$, $p < 0.05$), indicating that monolinguals have a significantly lesser degree of merger than bilinguals.

Bilinguals – social factors. The second aim of the statistical analysis was to investigate possible sociolinguistic predictors for the merger. This applies only to the bilinguals, as the monolinguals do not show evidence of merger. The modelling of Pillai scores as a function of the various sociolinguistic predictors would result in a very small sample size for the bilinguals. Consequently, it was decided to measure normalised F1 for PEN instead. The initial rationale for using Pillai scores stemmed from the necessity to include measurements of the KIT vowel. Analysing F1 only was not considered sufficient, as high F1 for PEN does not necessarily imply a merger, particularly if it is accompanied by a

higher F1 for KIT. However, observing the stability of the KIT vowel from the acoustic analysis results, it was decided that modelling the F1 of PEN alone would be sufficient. This, in turn, resulted in a higher number of observations, resulting in increased validity of statistical tests. Using F1 only also allows for an investigation of style alongside other social variables in the same model.

Initially, a comprehensive model including the fixed effects of age, gender, LPS, LAS and style was specified to investigate the normalised F1 values of PEN vowels in bilinguals. To optimise the balance between model fit and complexity, the Akaike Information Criterion (AIC) was employed as a guiding metric for model selection. Comparisons of AIC across a series of nested models led to the selection of a model that included age, gender (and their interaction) and speaking style as fixed effects. This model was selected as it had a lower AIC value, indicating a preferable fit to the data without unnecessary complexity. All models were run using `lme4` (Bates et al., 2015) in R and incorporated speaker and word as random intercepts to adjust for data dependencies. The results of the bilingual model are presented in Table 18. The conditional R^2 estimates the proportion of variance explained by both the fixed and random effects, while marginal R^2 estimates the variance explained by the fixed effects only. For example, a conditional R^2 of .10 means that 10% of the variance is explained by the whole model, and a marginal R^2 of .50 indicates that 50% of the variance is explained by fixed effects.

Table 18. Results of linear mixed effects model for bilinguals. Normalised F1 was modelled as a function of age, gender (and their interaction) and style.

Bilingual LMM : `lmer(F1.norm ~ age_group*gender + style + (1|speaker) + (1|word)`

Conditional R2: .22; Marginal R2: .18

	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	0.37	0.11	14.45	3.21	0.006**
age_groupOlder	-0.48	0.18	8.95	-2.68	0.025*
GenderM	-0.45	0.16	10.73	-2.77	0.018*
StyleSentences	0.30	0.12	15.74	2.61	0.019*
age_groupOlder:GenderM	0.37	0.27	9.27	1.39	0.197

Table 18 shows a significant negative estimate for the older speakers. This suggests that – controlling for the other variables in the model – as the age of the speaker increases, there is a tendency for the F1 of PEN vowels to decrease. In other words, older speakers have a higher PEN vowel than younger speakers. Gender also had a significant effect, indicating that male speakers show a higher PEN vowel (indicated by the negative correlation between males and normalised F1). The interaction between age and gender however, was not significant. Finally, there was a significant positive effect for style, suggesting that in the more formal read style of speaking, the F1 of PEN vowels is higher, indicating a lower vowel.

Monolinguals – social factors. The density plots for monolingual speakers, seen above, indicated that speaking style may be an important predictor of PEN-raising among monolingual speakers. To facilitate a direct comparison with the findings from the bilingual speakers, a corresponding model was constructed exclusively for the monolingual data. The inclusion of speaker as a random intercept caused singularity issues and so was omitted. While the results confirmed a positive association between speaking style and F1, as initially presumed, none of the included predictors achieved statistical significance.

Table 19. Results of linear mixed effects model for monolinguals. Normalised F1 was modelled as a function of age, gender (and their interaction) and style.

Monolingual LMM : `lmer(F1.norm ~ age_group*gender + style + (1|word))`
Conditional R2: .12; Marginal R2: .09

	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	0.223	0.13	130.00	1.75	0.083
age_groupOlder	0.004	0.17	200.00	0.02	0.981
SexM	0.063	0.18	196.00	0.36	0.722
StyleSentences	0.143	0.16	23.00	0.92	0.369
age_groupOlder:SexM	0.102	0.25	201.00	0.40	0.688

6.4.1 Summary of acoustic and statistical results

The descriptive (acoustic) and statistical findings have indicated that the bilingual speakers show a greater degree of PEN-PIN merger than the monolingual English speakers.

Additionally, within the bilingual speaker group age, gender and style were shown to be significant predictors for F1 values of PEN, whereby PEN tokens are significantly higher for older speakers, men and in spontaneous speech style (interview). No predictors were significant for monolingual speakers, who maintain relatively low PEN vowels across the various social factors.

5.5 Results - Irish vs. English data

The fact that the bilingual speakers show a higher degree of merger than monolingual English speakers from the same region might lead one to question whether there is Irish-to-English transfer occurring for the bilingual speakers. However, without knowing more about the Irish speech data of the bilinguals, this would be a premature conclusion. Just as features of Irish English phonology should not be blindly attributed to an Irish source, so too features of the English of Irish speakers should not be blindly attributed to their L1 Irish.

Age and gender were both revealed as significant predictors of PEN height in the bilinguals' English data. This raises the question of whether the bilinguals show a degree of Irish-to-English transfer regarding the occurrence of the English pre-nasal raising. Figure 23 displays the vowel distributions for the Irish vowel tokens, showing /ε/ in pre-nasal (purple) and pre-oral consonant (orange) positions (n= 142 total) , alongside the /ɪ/ vowel (n=139 total). The data is categorised according to gender, with women on the left.

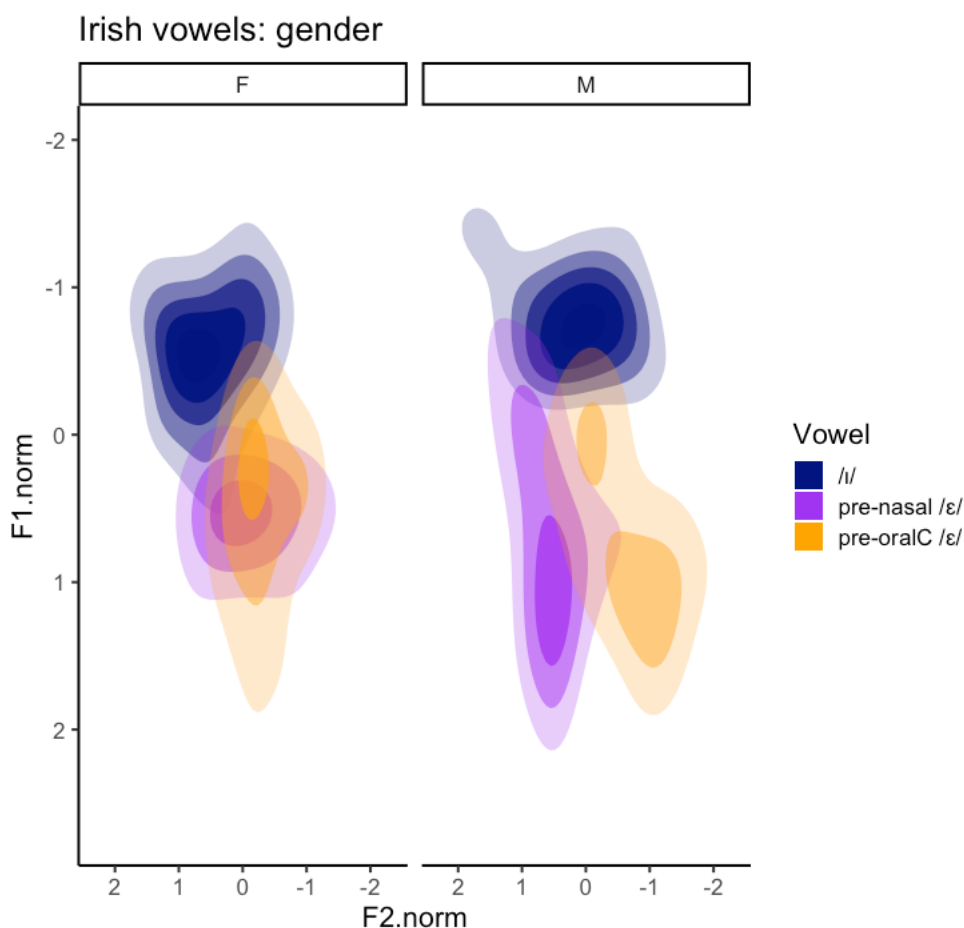


Figure 23. Distribution of bilingual speakers' Irish /ɛ/ and /ɪ/ vowels, according to gender.

Figure 23 suggests that there is no evidence of Irish pre-nasal /ɛ/ raising for the women. In fact the distribution peak for pre-nasal vowel tokens is lower in the vowel space than those in pre-oral consonant contexts. The women show a considerable degree of overlap between the two types of /ɛ/ vowel, which in turn shows a small degree of overlap with /ɪ/. Compared to the English data, there are some similarities in that there does not appear to be any distinct pre-nasal raising. The bilingual males show a distinctly fronted pre-nasal /ɛ/ vowel. This pattern is surprising given the lack of its description in accounts of Connemara Irish. The pre-nasal vowel does show a small degree of overlap with /ɪ/ but it is better characterised by its fronted nature in relation to pre-oral consonant /ɛ/.

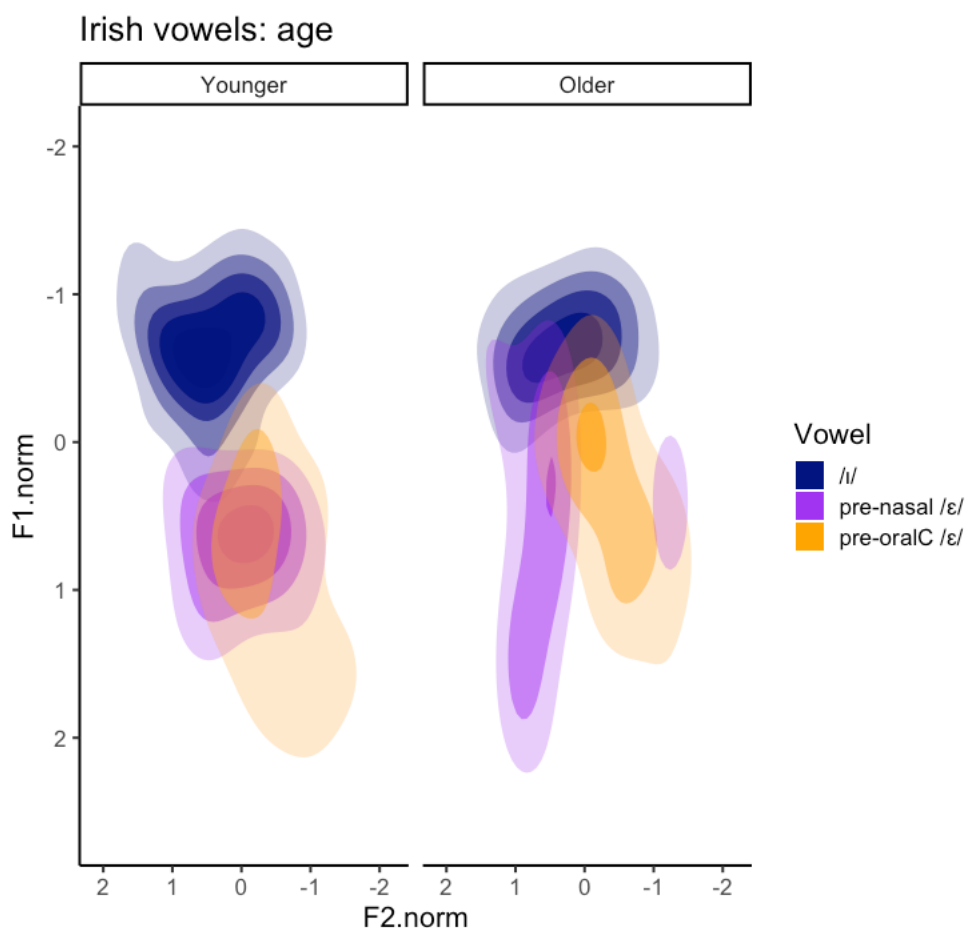


Figure 24. Distribution of bilingual speakers' Irish /ɛ/ and /ɪ/ vowels, according to age.

Figure 24 displays the Irish vowel tokens according to age. Younger speakers show considerable overlap between the two /ɛ/ vowel categories and moderate separation from /ɪ/. The older speakers show less overlap between the /ɛ/ vowel categories and – similar to male speakers alone – there is fronting of the pre-nasal vowel. Both /ɛ/ vowels slightly overlap with the /ɪ/ vowel and pre-nasal /ɛ/ has a wide range of variation in its height. Finally, the pre-oral consonant /ɛ/ vowel appears to be higher for the older speakers than for the younger speakers.

The following group of density plots (Figure 25) considers both age and gender together.

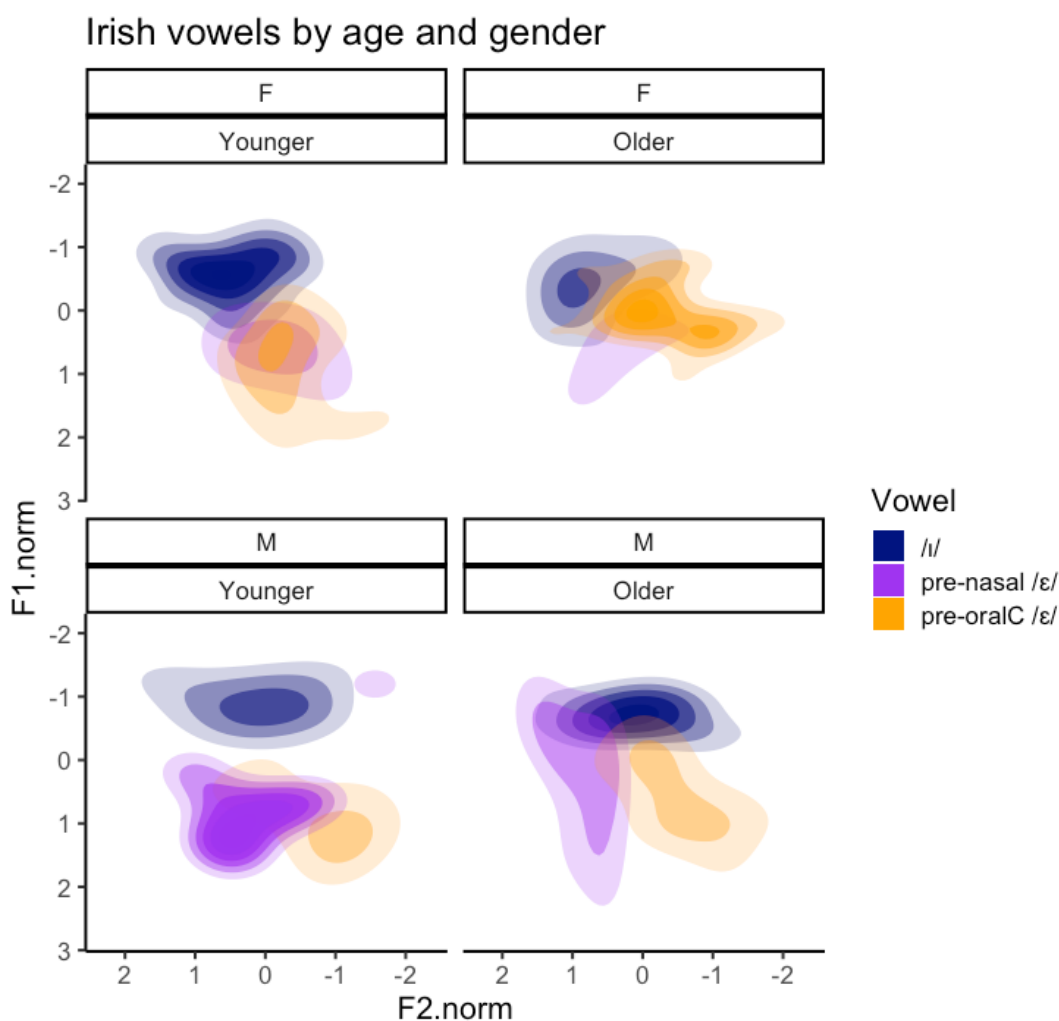


Figure 25. Distribution of bilingual speakers' Irish /ɛ/ and /ɪ/ vowels, according to age and gender.

When compared to the women (top row), the men (bottom row) have a more fronted pre-nasal /ɛ/ vowel. However, for the younger males there does not appear to be overlap between /ɛ/ and /ɪ/ vowels, as is seen for their older counterparts. For both groups of men the pre-nasal /ɛ/ is visibly more fronted than /ɛ/ before an oral consonant. Therefore, it was determined that Pillai scores would not adequately capture the subtleties present in this data as they solely gauge overlap. Furthermore, given the disparity in the amount of Irish data compared to English data, the precision of these findings would be weak. Instead, the Irish and English data were simply plotted beside each other. The following graphs explore this comparison for (i) the older bilingual men (Figure 26), who show particularly divergent cross-linguistic patterns and (ii) the younger bilingual women (Figure 27) who show relatively similar patterns between their English and Irish.

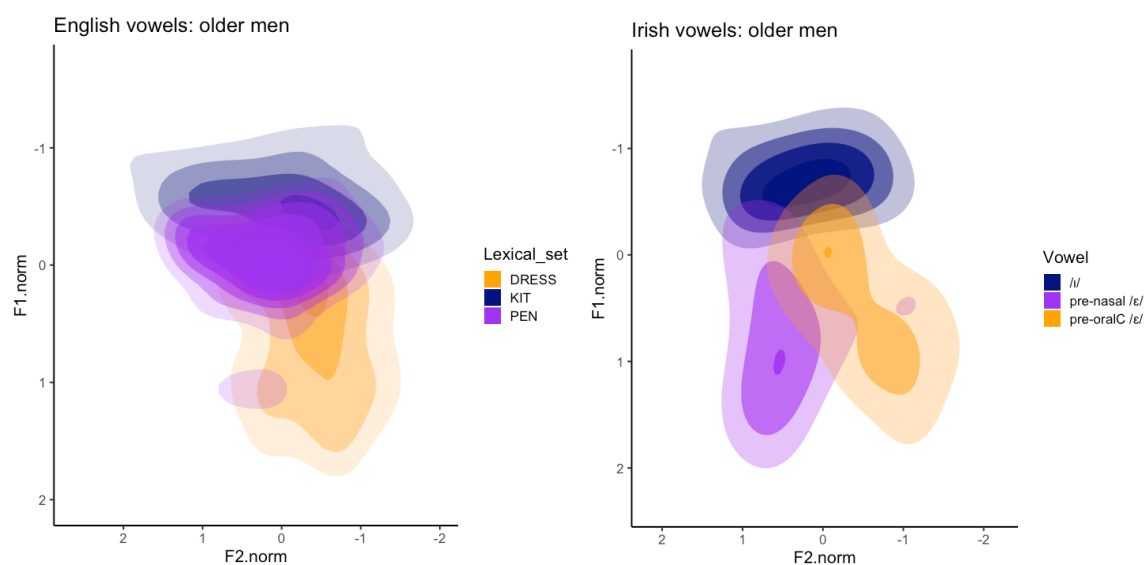


Figure 26. English and Irish vowel distributions for older bilingual men.

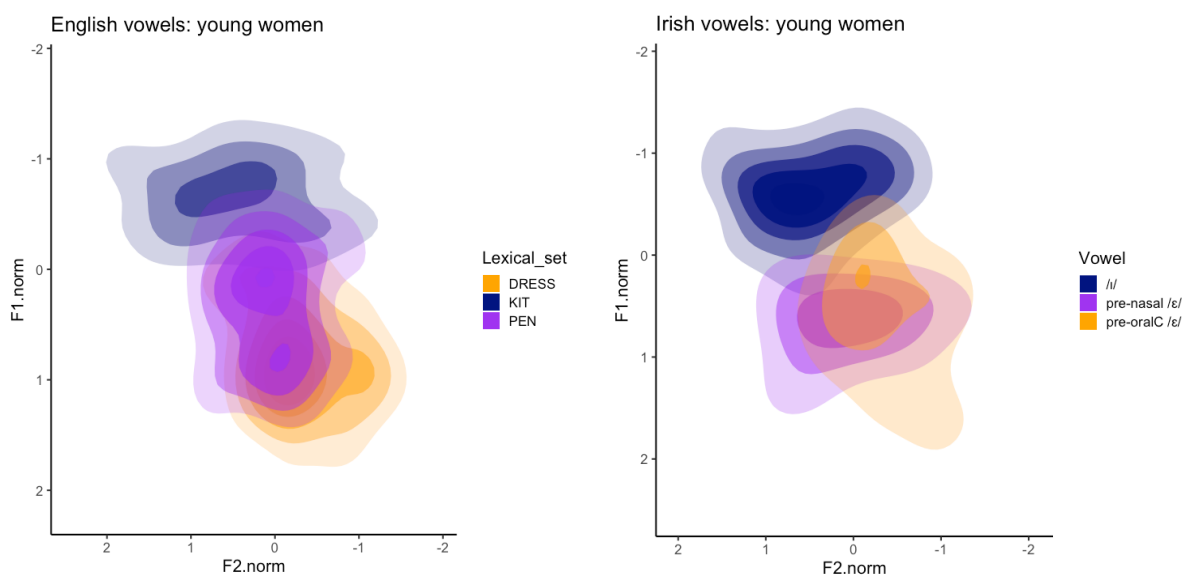


Figure 27. English and Irish vowel distributions for younger bilingual women.

When the Irish and English data is compared, there does not appear to be any indication of phonetic transfer happening for these bilinguals, whereby a merger in their English is a result of or is influenced by a parallel process in their Irish. While there was gender and age-based patterning evident in both the bilinguals' Irish and English vowels, the distributions are quite divergent.

5.6 Results – analysis of DRESS coarticulation

The vowel distributions (of English vowels) in the previous figures prompted further investigation into DRESS-raising in other phonetic contexts (i.e. not just pre-nasal vs. pre-oral consonant). There was evidence suggesting that vowel raising is not exclusive to pre-nasal contexts in men (across both age groups) and older women, but that DRESS in other phonetic environments may be raised as well. This finding, coupled with previous reports of unconditioned DRESS-raising in Ireland (e.g. Lunny, 1981) prompted an exploration of DRESS in all recorded phonetic contexts. The average normalised F1 of dress in each phonetic context is plotted by linguistic background and gender in the following figures (Figure 28 and Figure 29). Note that the amount of tokens for each context varies widely, due to inconsistencies with spontaneous speech data. For example, there are only 6 pre-rhotic tokens for bilinguals, but 174 pre-nasal tokens. Therefore these graphs can only provide a very preliminary exploration of the data.

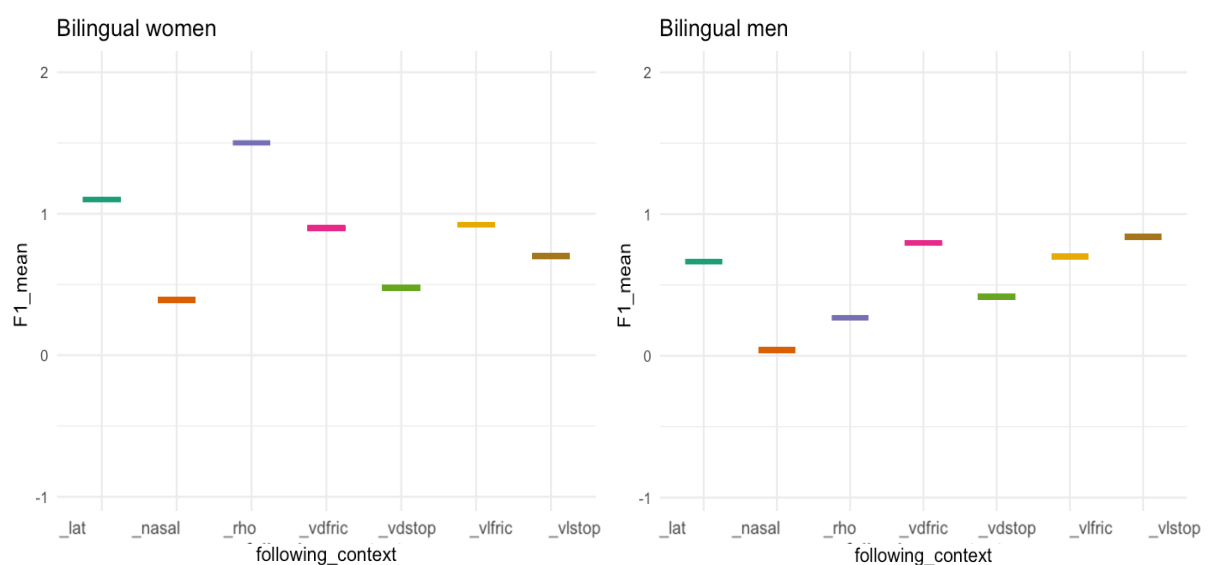


Figure 28. Average normalised F1 for bilingual speakers preceding various phonetic contexts: laterals (lat), nasals (nasal), rhotics (rho), voiced fricatives (vdfic), voiced stops (vdstop), voiceless fricatives (vlfic) and voiceless stops (vlstop).

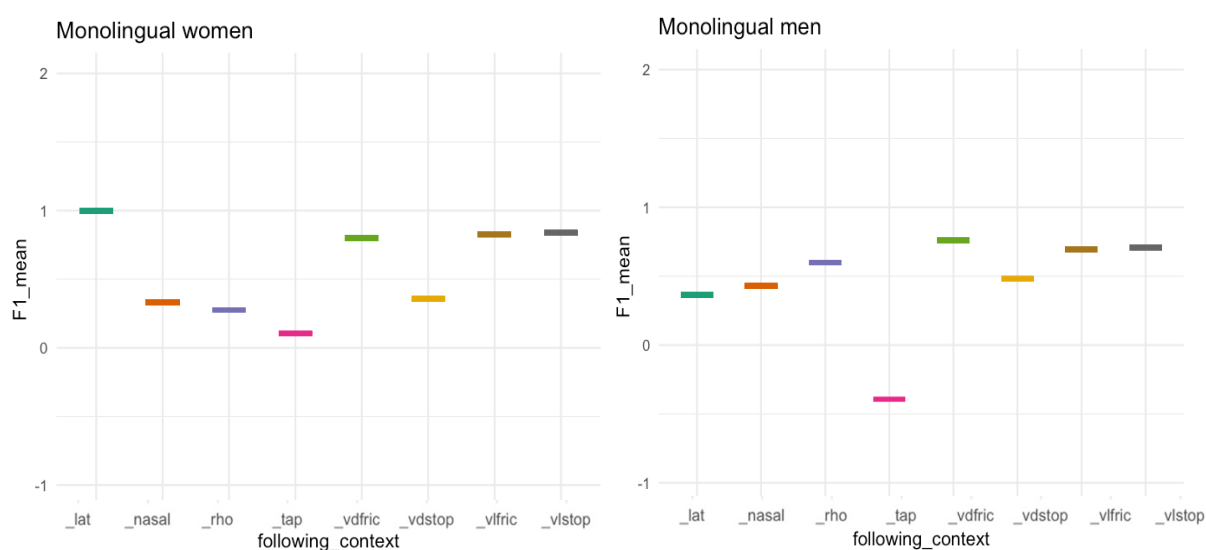


Figure 29. Average normalised F1 for monolingual speakers preceding various phonetic contexts: laterals (lat), nasals (nasal), rhotics (rho), taps (tap), voiced fricatives (vdfic), voiced stops (vdstop), voiceless fricatives (vlfic) and voiceless stops (vlstop).

The patterns observed here suggest that a binary division of tokens into pre-nasal DRESS vs pre-oral DRESS may not be the most informative method of analysis. While the bilingual data does indicate that DRESS is the highest pre-nasally, it is closely followed by other contexts, such as the voiced stop. More data would be needed to investigate this further but it points toward a more general pattern of DRESS-raising rather than a distinct PEN-PIN merger.

5.7 Summary of results

Compared to the monolinguals, bilingual speakers showed a significantly higher degree of PEN-PIN merger, confirmed by a linear regression analysis of Pillai scores. The effect size was rather small however, indicating a modest relationship between the variables. A subsequent investigation of sociolinguistic predictors for PEN-raising found that the absence of a PEN-PIN merger remained constant across the monolingual-internal groups of age and gender.

PEN-raising for the bilinguals, however, was significantly predicted by a number of sociolinguistic factors: age, gender and style. Older speakers, male speakers and spontaneous speech correlated with a higher PEN vowel.

A comparison of bilinguals' English and Irish vowel distributions revealed divergent patterns. Bilingual speakers who exhibited a considerable degree of overlap between their PEN and KIT vowels in English did not demonstrate a parallel trend in their Irish. Specifically, older male bilingual speakers displayed fronting of the /ε/ vowel preceding nasals in their Irish, yet this did not accompany any distinct raising. In contrast, their English speech clearly showed a raised pre-nasal /ε/ vowel.

The following section will contextualise these findings, directly addressing the research questions regarding the PEN-PIN merger. The discussion will initially focus on sociolinguistic variation and will then explore the debated origins of the merger, a motivating factor that underpinned the examination of this particular linguistic feature.

5.8 Discussion, limitations and conclusion

This section will directly address the research questions posed at the beginning of this chapter, incorporating the analysis results outlined in the previous section. The study findings will be synthesized and contextualised in relation to existing knowledge of the PEN-PIN merger in IrE. Several limitations concerning the methodology used for this analysis will be outlined, before providing concluding remarks.

Sociolinguistic variation. The first research question prompted a comparison of the PEN-PIN merger between monolingual and bilingual speakers.

RQ1a	Relative to monolingual Irish English to what extent does the English of native Irish speakers show a PEN-PIN merger?
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This question was motivated by the debated origins of pre-nasal DRESS-raising in IrE. It is reported that a raised DRESS vowel was likely brought to Ireland during the 17th century.

While acknowledging this possibility, some researchers have highlighted that pre-nasal DRESS-raising in IrE may instead (or additionally) be attributed to an Irish transfer source (Ó Baoill, 1997). It was hypothesized that a reinforcing role of Irish in this feature may exhibit itself in bilingual speakers. That is to say that if the PEN-PIN merger is an Irish transfer feature, we might expect its presence to a higher extent in the English of native Irish speakers than in monolingual English speakers.

Through descriptive and statistical analysis, it was shown that linguistic background (i.e. monolingual vs. bilingual) is a significant predictor of merger for this group of speakers. On the whole, bilingual speakers show a greater extent of merger than monolinguals. However, it was acknowledged that this finding alone does not ‘prove’ an Irish influence. The subsequent investigation of the Irish data will be explored after a further discussion of the sociolinguistic predictors of the merger.

RQ1b To what extent do sociolinguistic factors influence the realisation of the PEN-PIN merger?

RQ1b required an investigation of the effects of various social (age, gender, LPS, LAS) and linguistic factors (style, phonetic context) on the PEN-PIN merger. The descriptive and statistical analyses indicated that a raised PEN vowel was significantly more predominant in older bilinguals, male bilinguals and in spontaneous speech.

The age-related patterns observed in this study align with the findings from Peters’ (2012) research on Galway City English. Peters noted a higher incidence of PEN-PIN merger among older speakers compared to their younger counterparts. Such age-based variation points toward an ongoing linguistic shift, implying a gradual decline in the prevalence of the merger. It appears that for the monolingual speakers in this study the PEN-PIN merger has already receded substantially. This is said with caution, however, as to ‘prove’ a change has happened, one needs to prove its existence in the previous forms for the same group of speakers. However, one might assume that monolingual varieties of Galway English did previously have widespread/ phonetically unconditioned DRESS-raising, given the evidence of a raised vowel in various contexts (Kallen, 2013; Peters, 2015).

The gender-based variation for the PEN-PIN merger within bilinguals constitutes a new finding for this IrE feature. While studies of the merger in American dialects have shown

various patterns of gender-based variation (Hazen, 2005; Labov et al., 2006). This pattern could suggest that the merger carries social significance as an indicator of style, even if speakers are not aware that they are altering their production between styles.

Finally, the coarticulation graphs suggested that – for the bilinguals – there were other environments in which DRESS was raised, indicating that they may not show a clearcut case of PEN-PIN merger but rather a more general pattern of DRESS-raising. This would echo reports from earlier studies of rural IrE, e.g. Lunny (1981), which found DRESS-raising in a wide range of environments, and would tally with other claims that DRESS-raising was once unconditioned in IrE. Although more data is needed, this is an important finding as it suggests that the imposition of pre-nasal vs. pre-oral consonant categories on the data is perhaps not the best approach, and that a consideration of a generally lower DRESS vowel might be more appropriate and informative.

Irish influence. RQ2 concerned the comparison of Irish and English data within bilinguals, aiming to shed light on a possible Irish influence on the occurrence of the PEN-PIN merger in bilingual English.

RQ2 To what extent does L1 Irish appear to influence PEN-PIN merger in bilingual speakers?

The debated origins of the IrE PEN-PIN merger were a primary motivating factor of this analysis. Some have suggested an Early Modern English origin, while others have drawn parallels with mid-vowel raising in Irish. This latter origin was explored through analysing possible present-day contact effects (Irish-to-English) in bilingual speakers, and comparing their English with monolingual English of speakers from the same region.

The fact that bilingual speakers have the merger to a significantly greater extent than monolinguals might, *prima facie*, prompt an assumption that this difference is due to an Irish transfer in the bilinguals, as pre-nasal raising has also been reported for Irish (Ó Siadhail, 1989). However, an investigation of Irish /ε/-raising for these speakers suggested that their Irish vocalic subsystem does not parallel that of their English. It might then be considered unlikely that the bilingual speakers, who have evidence of PEN-

PIN merger, do so because of a direct L1-Irish transfer or reinforcing process. In their Irish, the /ε/ vowel showed pre-nasal fronting in those speakers for whom it was raised in English. If a strong case cannot be made for an Irish transfer effect within these bilinguals, how might their relatively higher degree of PEN-PIN merger, compared to monolinguals, be explained? It must firstly be recognised that the absence of pre-nasal raising in these speakers' Irish does not mean that it was not historically present. The merger may be present in the bilingual speakers' English due to historical influences from Irish. That is, Irish may have historically reinforced the presence of a raised PEN vowel in IrE but has since changed itself.

The idea that the historical presence of vowel raising in Irish merely reinforces this feature may be the extent of its influence. This is supported by the preliminary observations showing that raised vowels are not confined solely to pre-nasal contexts. Consequently, the patterns of vowel raising in English as spoken by Irish bilinguals may more closely align with accounts of DRESS-raising observed Early Modern English (i.e. in a wider range of contexts). We cannot ignore the fact, however, that DRESS-raising was present in Galway English in the 15th century (see §2.1.3) in non-nasal environments. Whether it was also present in Middle English at this time is not clear and so the question still stands as to whether Irish had an influence there (prompting raising in English beyond its Irish nasal environments) or whether it was a more widespread feature in English English brought to Ireland.

All of this brings into question the characterisation of Gaeltacht English thus far. It could be that the variety of English spoken in the Connemara Gaeltacht is reflective of an older variety of IrE; one that patterns more closely to Early Modern English (than other IrE varieties) and contains more conservative/archaic features than previously thought. This idea does not seem so unlikely when we consider studies that show that heritage languages, which are often spoken infrequently (as English is for many Gaeltacht inhabitants), change at a slower pace than mainstream or less isolated varieties (Polinsky, 2018). Although English in the Gaeltacht is not considered a heritage language by any means, it may share characteristics with heritage languages, especially for older Irish-English bilinguals. Additionally, there are studies showing that conservative varieties tend to be those which are more geographically isolated than “rapid-change” varieties (Trudgill, 2020).

Limitations. There are several limitations to this analysis. One limitation concerns the use of Pillai scores, which although useful for quantifying the overlap between vowel categories, do not account for directionality or the shape of the vowel distributions (Hall-Lew, 2010). This shortcoming is evident if we consider a comparison between the Irish data and English data of bilinguals discussed above. There was a degree of overlap between the pre-nasal /ɛ/ vowel and /ɪ/ vowel in both Irish and English. However, their distribution is distinctly different, with the Irish pre-nasal /ɛ/ showing much wider height variation, as well as fronting. Although not conducted here, a simple comparison of Pillai scores for the Irish and English data of bilinguals would have overestimated the degree of similarity between the distributions, ignoring their shapes within the vowel space. Pillai scores therefore can only form part of the analysis of vowel mergers and should be supplemented with additional data visualisation.

This analysis followed a top-down classification approach, whereby DRESS vowels were categorised as pre-nasal or pre-oral consonant. This method of classification was based on previous accounts of the PEN-PIN merger in IrE, suggesting that DRESS vowels in pre-nasal contexts patterned differently to those in other contexts. However, an examination of the normalised F1 of DRESS vowels across various following phonetic contexts revealed that, while the pre-nasal DRESS vowel indeed possesses the lowest F1 for bilingual speakers — suggestive of vowel raising—this phenomenon is not restricted to pre-nasal contexts; a low F1 was also observed for other contexts, such as preceding a voiced stop. Further investigation and data collection would be necessary to investigate this pattern further but it indicates that a bottom-up approach may be more useful in the examination of DRESS-raising. Additional research could delve into the contexts further with more data to investigate the extent of DRESS-raising in speakers of IrE.

A further limitation of this analysis was the small sample size of Irish data (142 tokens of /ɛ/, 139 of /ɪ/) along with the scarcity of phonetic contexts investigated; for example, only 4 words (with multiple repetitions) for pre-nasal tokens: *lena*, *ceimic*, *deanaim*, *dheanamh*, (the latter two realised with a short vowel) were present. The patterns found for the vowel distribution in Irish would therefore benefit from supplemental investigation and verification.

Concluding remarks. There are significant differences between monolinguals and bilinguals in the occurrence of the PEN-PIN merger. Within the bilinguals, there is further sociolinguistic conditioning present. The patterning of the vowels, along with the sociolinguistic predictors found for bilingual speakers' English does not have evident parallels with their Irish. Therefore, the presence of a merger for bilinguals does not seem to be a direct (contemporary) transfer from their L1 Irish. Although Irish may have historically influenced the presence of this merger in IrE, one also needs to consider the possibility that English spoken in the Connemara Gaeltacht may pattern more closely to older IrE varieties (which may also show closer retention patterns to EModE) than to Irish. This brings into question the overall characterisation of the English of native Irish speakers as being heavily influenced by Irish. This matter will be further explored in Chapter 10.

6 FACE and GOAT

6.1 Background and research questions

Outside of Dublin English, the vowels in southern IrE FACE and GOAT lexical sets (Wells, 1982) are generally described as monophthongs [e:] and [o:]. In recent years, however, quantitative studies in Galway (Collins, 1997; Peters, 2012) and Cork (Bessell 2023) have found evidence of diphthongal FACE and GOAT variants, conditioned by various social factors, such as age, gender and social class. Specific sociolinguistic findings were detailed in §2.1.4.

It is generally acknowledged that the monophthongal variants of FACE and GOAT were imported to Ireland via Middle and Early Modern British English and have been retained in IrE (Lass, 1990). The retention of the monophthongs is also attested for other varieties of English, such as various northern British dialects, contrasting the diphthongs of /eɪ/ (FACE) and /əʊ/ (GOAT) in Southern Standard British English (SSBE). A fully British origin of the monophthongs in IrE is not accepted by all. Hickey (1986) and Barry (1982) state that Irish may have also played a role in reinforcing the retention of the monophthong FACE and GOAT variants in IrE, given that Irish has the long monophthongs /e:/ and /o:/.

A primary motivation behind the analysis of FACE and GOAT in this study was to investigate the role of Irish as a present-day reinforcer of monophthongal variants. This could, in turn, shed light on the possibility that Irish historically acted as a reinforcer of this variant during the long period of bilingualism and language shift in Ireland. Guided by this motivation, along with the more descriptive aims of documenting potential sociolinguistic predictors of FACE and GOAT variation, the following questions were investigated:

- RQ1a** Relative to monolingual Irish English to what extent does the English of native Irish speakers show monophthongal realisations of FACE and GOAT?

RQ1b To what extent do sociolinguistic factors influence the realisation of FACE and GOAT?

The following section will detail the analytical methods used in the analysis of FACE and GOAT, providing information on the formant measurement and extraction methods, the calculations used to quantify the degree of diphthongisation and the statistical methods used to investigate sociolinguistic effects.

6.2 Methods

The following subsections outline the methods used for formant measurement and extraction for FACE and GOAT vowels, along with the descriptive and statistical methods used.

6.2.1 Formant measurement and extraction

While the measurement of monophthongs traditionally involves taking one midpoint measurement of formants, the investigation of diphthongs necessitates multiple timepoint measurements in the vowel to account for changes in the formant trajectory. For example, in a diphthongal realisation of FACE, e.g. as [eɪ], one would expect to see decrease in F1 (correlating with raising) and increase in F2 (correlating with fronting) over the duration of the vowel. As this study is investigating the presence of diphthongisation in FACE and GOAT, multiple timepoint measurements are required.

Methods of measuring diphthongs vary between studies. Many studies have taken formant measurements at two timepoints in the vowel, e.g. at 25% and 75%. Lonergan, in his 2013 study of Dublin IrE, used this method and subsequently quantified the degree of diphthongisation by calculating the percentage change in F1 and F2 between the two time points. Others studies, which have also taken two timepoint measurements, have calculated the vector length, i.e. the Euclidean distance (incorporating both F1 and F2) between the first and last measurement time points in the vowel (Lee et al., 2014; Tanner et al., 2022).

Formants can also be measured at several time points in the vowel to gain a more detailed understanding of the vowel formant trajectory. Again the number of timepoints measured varies between studies and a balance must be achieved between obtaining a representative

trajectory of a vowel and optimising research resources and time. Following Jacewicz, Fox & Salmons (2011) – and subsequently Mayr & Davies (2011) and Lippus & Asu (2019) – for this study it was decided to measure F1 and F2 at 20%, 35%, 50%, 65% and 80% timepoint intervals of each vowel’s total duration. Additionally, a measure of Trajectory Length (TL), also conceptualised by Jacewicz et al. (2011), was calculated for each vowel to quantify the overall change in the formant values over the duration of the vowel. It is the sum of the Euclidean distances between each successive formant measure (e.g. 20-35%, 35-50%, etc.). As TL measures the overall formant movement within a vowel, vowels with a higher degree of diphthongisation will have a higher TL and more monophthongal vowels will have a lower TL, representing steadiness of formants.

The FACE and GOAT tokens were all taken from read sentences and included the following words. These words included both pre-nasal and pre-oral consonant environments in line with Ó Siadhail’s (1989) reports of possible mid vowel raising in Irish:

Table 20. Words in read sentences containing the FACE and GOAT vowels.

FACE	GOAT
came x2	hode x2
hayed x2	don’t
stayed x2	foal
name x2	no
made x2	loaf
	oaf

6.2.2 Descriptive and statistical methods

In total, 240 tokens of FACE and 240 tokens of GOAT were extracted across bilingual and monolingual speakers. A Praat script was written to measure F1 and F2 at the 5 timepoint intervals for each vowel token. This resulted in 10 formant measurements per vowel (5 each for F1 and F2). Two methods of data visualisation were then used; line plots mapping the vowel trajectories (using F1 and F2 averages) and traditional two-dimensional vowel plots showing the trajectories from first to last timepoint measurement, both created using `ggplot2` (Wickham, 2016) in R (R Core Team, 2023).

The two-dimensional plots were created to contextualise the distribution and trajectories of the vowels within the speakers' vowel space.

To investigate the potential effects of sociolinguistic predictor variables on vowel realisation, the TL (for each vowel) was modelled in linear mixed effects models (LMM) using `lme4` (Bates et al., 2015) in R. The first LMM investigated the effect of linguistic background (bilingual vs. monolingual) and subsequent LMMs investigated sociolinguistic predictors for bilinguals and monolinguals separately. These are detailed in §7.4.2.

The following subsections in §7.3 present the results of the descriptive and statistical analyses and will elaborate further on the methods used. A visualisation of FACE and GOAT within the wider vowel space of bilinguals and monolinguals is firstly presented, followed by the descriptive and statistical results for FACE and GOAT individually.

6.3 Results

The results of the acoustic analysis for FACE and GOAT in relation to the wider vowel space are presented firstly in this section. This is followed by a presentation of the auditory, acoustic and statistical results for the FACE and GOAT vowels individually.

6.3.1 *FACE and GOAT within wider vowel space*

Figure 29 displays the average Lobanov-normalised F1 and F2 for FACE and GOAT vowels (onset at 20% and offset at 80%) for bilinguals in the context of their various other vowels.¹ Figure 31 displays the parallel data for monolinguals. Black arrows indicate the direction of formant movement between onset and offset. Ellipses were chosen for this plot to simplify its design. The ellipses cover 67% of the data, corresponding roughly to one standard deviation in a normal distribution. This convention was followed on the recommendation of Stanley (2018). Note that the other vowels are those from 'h_d' contexts, whereas the FACE and GOAT averages include all elicited words for each vowel.

¹ For a discussion of the other vowels in this figure, consult Chapter 4.

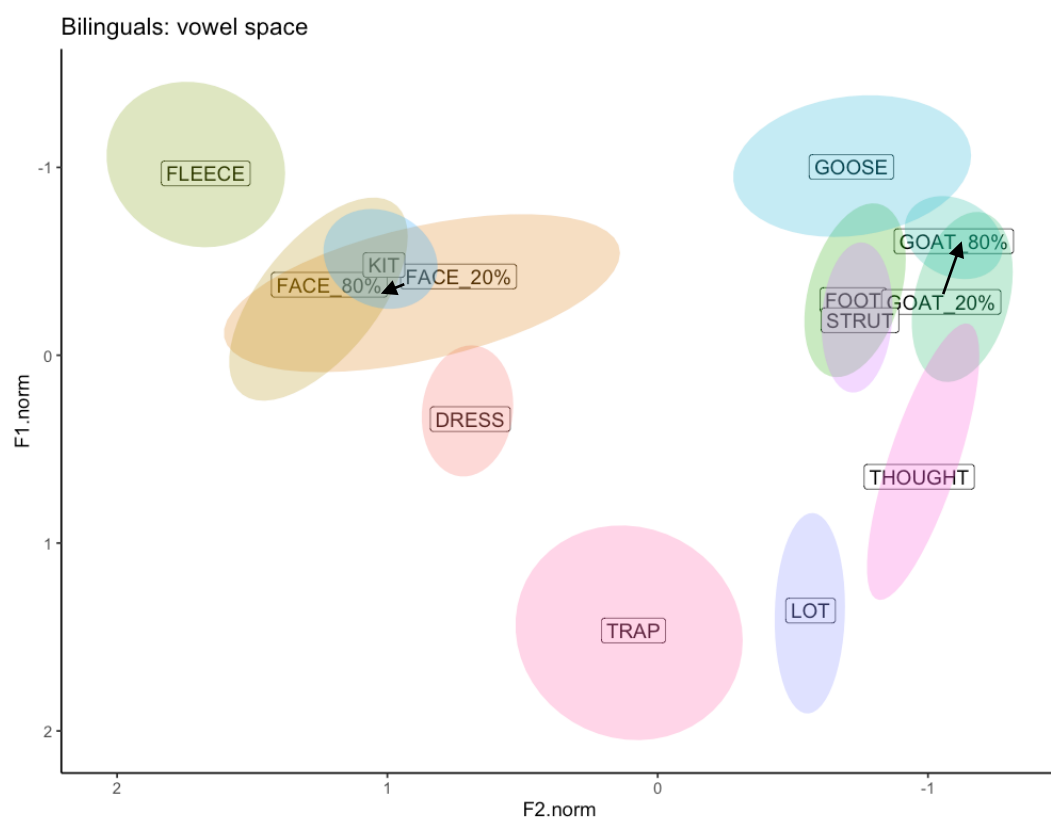


Figure 29. Average normalised values of F1 and F2 for bilingual vowels, including FACE and GOAT onsets (20%) and offsets (80%).

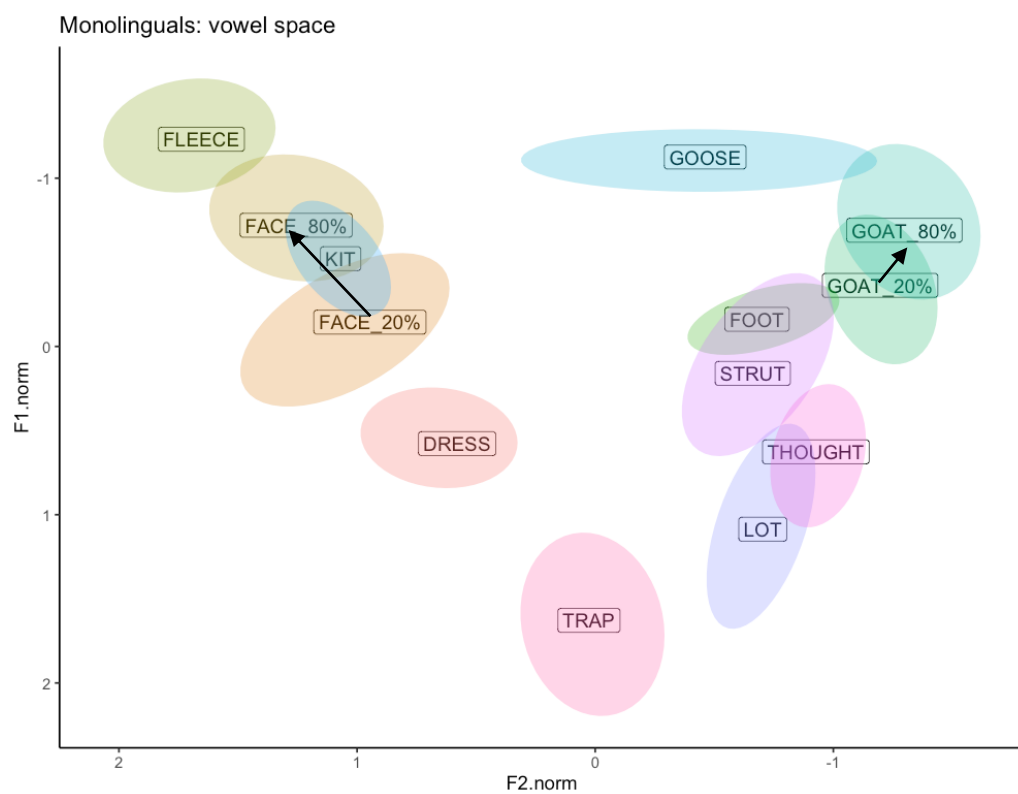


Figure 30. Average normalised values of F1 and F2 for monolingual vowels, including FACE and GOAT onsets (20%) and offsets (80%).

It is apparent from Figure 29 that, for the bilinguals, the FACE vowel appears to remain stable in terms of height; F1 maintains a similar value at 20% and at 80%. However, F2 shows more variation between onset and offset. The FACE onset appears to be relatively central to near-front with considerable variation with a relatively fronted offset. Note however, that there is a considerable degree of overlap between the onset and offset ellipses. Turning to the GOAT vowel, there appears to be a slight degree of raising between the onset and offset, with an evident degree of overlap between the two. The degree of variation in the formant dispersion in FACE and GOAT is explored in following sections.

In Figure 31, the onset of the monolingual FACE vowel appears more fronted than that of the bilinguals and there is also more separation and variation between the onset and offset in terms of raising and fronting, suggesting a more diphthongal realisation than that of the bilinguals. The GOAT vowel shows a degree of overlap between the onset and offset and, compared to the bilinguals' vowel, has more variation in the offset. The range of the onset (F1) appears to be quite similar between the speaker groups, however.

6.3.2 FACE: auditory, acoustic and statistical analyses

This section details the findings for the FACE vowel. It includes auditory, acoustic and statistical analyses. Initially, the vowels in 'h_d' environments were auditorily analysed to discern between monophthongal and diphthongal realisations for each speaker. This binary classification method has been the most common in studies of IrE FACE and GOAT to date; the use of this method here facilitates cross-study comparability with other IrE dialects. Subsequently, the vowels were acoustically analysed, using the continuous measures of F1, F2 and Trajectory Length (TL), followed by additional statistical analysis to quantify sociolinguistic influences.

Auditory analysis. Tokens of the FACE vowel in the word 'hayed' (x2 per speaker) were categorised as diphthongal or monophthongal. The results of the auditory analysis are presented in Table 21.

Table 21. FACE variants for all speakers, based on tokens of 'hayed'.

<i>Monolingual</i>			<i>Bilingual</i>		
SPEAKER ID	GENDER, AGE	VARIANT	SPEAKER ID	GENDER, AGE	VARIANT
P1	F, 57	e:	P2	M, 29	e:
P18	M, 66	e:	P3	M, 68	e:
P20	F, 63	e:	P4	M, 32	e:
P21	M, 64	e:	P5	F, 79	e:
P10	F, 55	eɪ	P6	M, 67	e:
P14	M, 60	eɪ	P9	M, 38	e:
P16	M, 30	eɪ	P13	F, 26	e:
P17	M, 30	eɪ	P7	F, 25	eɪ
P22	M, 27	eɪ	P8	F, 39	eɪ
P23	F, 30	eɪ	P12	F, 27	eɪ
P24	F, 29	eɪ	P11	F, 60	eɪ
P25	F, 30	eɪ	P15	F, 20	eɪ

The results suggest that the diphthongal variant of FACE is slightly more common in monolingual speakers than bilingual speakers. Within the monolingual group, the monophthong [e:] is only found for older speakers (of both genders), while for the bilingual group the monophthong is present across ages and is more common for men. The diphthong [eɪ] is only present for women.

From this initial impression of the FACE vowel, it appears that there is a degree of gender-based variation among the bilingual speakers. Note that there are two women who produce a monophthong [e:]. For the monolingual speakers there appears to be age-based variation, with the monophthongal variant [e:] only present in older speakers. It is important to note however, that this variation may also be explained by other factors, such as language dominance (LPS) or local attachment (LAS), not displayed here. The following section presents the results of the acoustic analysis, examining the formant trajectories of the FACE vowel in more detail for various social factors.

Acoustic analysis. This section explores the frequencies of F1 and F2 in the FACE vowel which were measured at five timepoints in each vowel (20%, 35%, 50%, 65%, 80%) within several words (see Table 20). Line plots were created to visualize the average trajectories of the vowel, according to these F1 and F2 measurements. These results are presented in the following subsections, according to the linguistic background of the speakers (bilingual vs. monolingual), along with age and gender. The additional social factors of LPS and LAS are included in the subsequent statistical analysis results.

Figure 31 displays the average Hz values of the FACE vowel formants for bilingual women, according to age group.

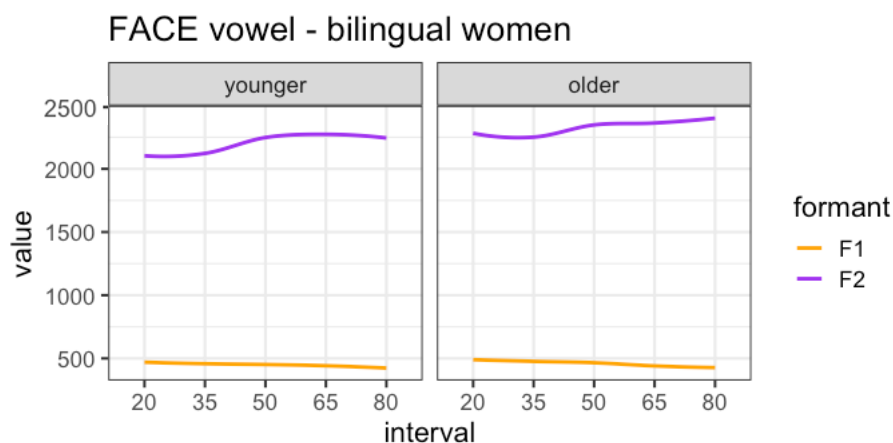


Figure 31. Average F1 and F2 of FACE for bilingual women, according to age.

The younger bilingual women show a lower overall F2 value (indicating a lesser degree of fronting) than their older counterparts. Both groups however, show a degree of movement across the vowel's duration, with an overall increase in F2 of around 200 Hz. The younger women's F2 ranges from ~2050-2250 Hz and the older women's F2 ranges from ~2250-2450 Hz.

A spectrogram of a diphthong production is shown in Figure 32, depicting the production of 'name' by a young bilingual speaker. This can be compared with Figure 33, which displays a monophthongal variant of an older bilingual male.

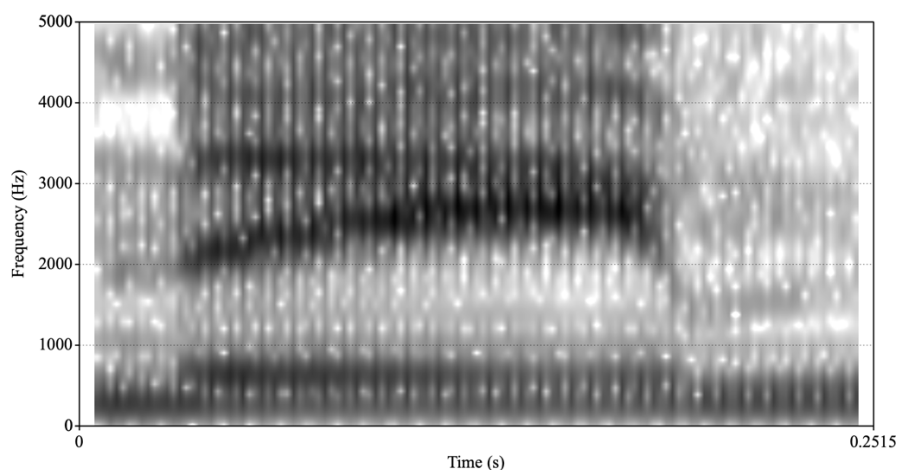


Figure 32. Spectrogram of 'name' showing a degree of diphthongisation (F, bilingual, 20).

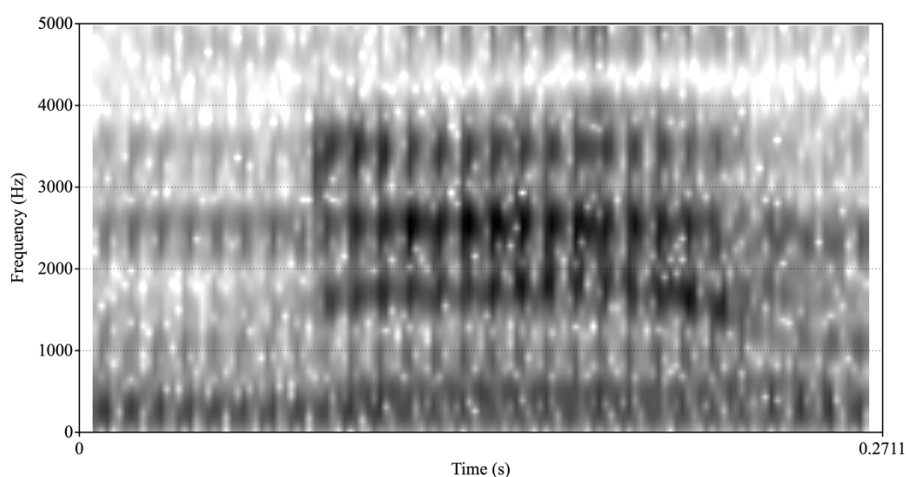


Figure 33. Spectrogram of 'name', produced with a monophthongal realisation (M, bilingual, 29).

Figure 34 displays the average formant Hz values for the bilingual men's FACE vowel. The formants are relatively steady across the vowel for both groups of speakers, suggesting an overall monophthongal quality. This supports the findings from the auditory analysis, which indicated that all bilingual men produced 'hayed' with a monophthong [e:]. There appears to be a small degree of age-based variation, whereby the younger speakers have a lower F2 and slightly higher F1, indicating a more backed and slightly lower vowel than the older men.

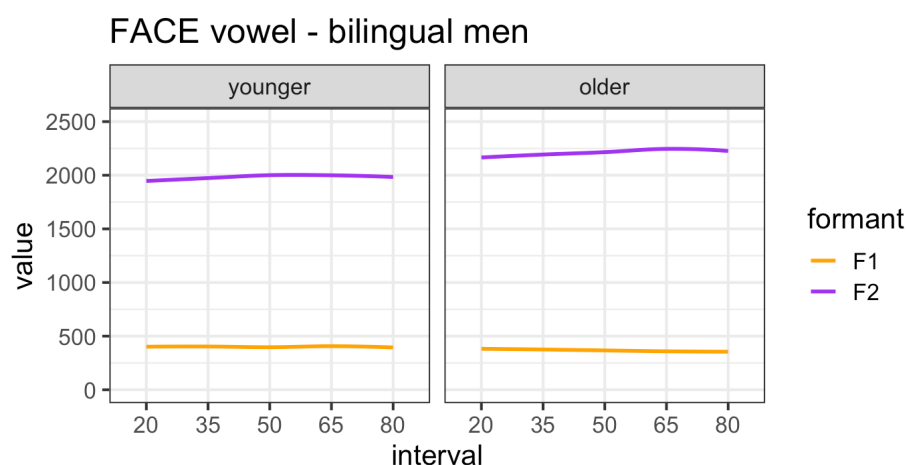


Figure 34. Normalised average F1 and F2 of FACE for bilingual men, according to age.

Figure 35 illustrates the formant values of FACE for monolingual women, according to age. As with the bilingual speaker groups, there appears to be age-based variation whereby the F2 is lower overall for the younger women. Additionally, the younger women show a notable degree of F2 movement (a change of around 300 Hz in F2 and ~50 Hz in F1) suggesting fronting and raising over the course of the vowel. Both groups of monolingual women show more F1 movement than was observed for the bilingual women. Taken together, these findings indicate a more diphthongal vowel for monolingual women than for bilingual women, which is more prominent for the younger group.

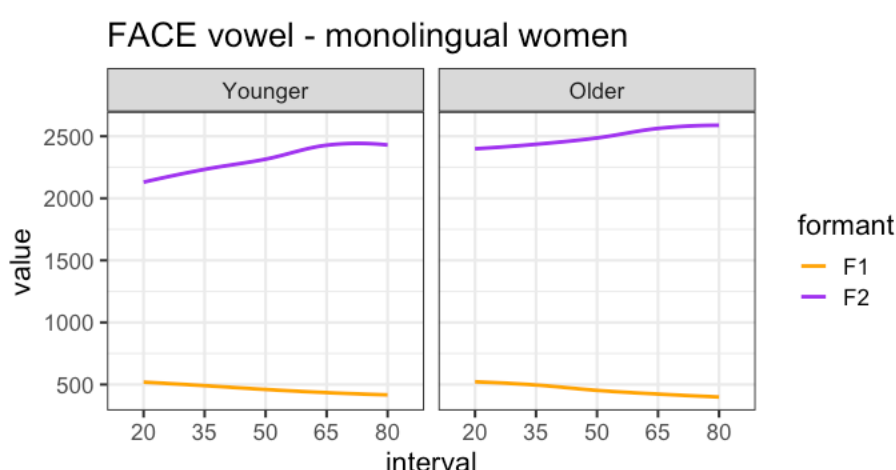


Figure 35. Normalised average F1 and F2 of FACE for monolingual women, according to age.

Figure 36 displays the average formant values (Hz) for monolingual men, according to age. The younger men show slightly more F2 movement (fronting over course of vowel) compared to their older counterparts. In this regard, the young monolingual men diverge from the young bilingual men who showed a relatively steadier F1 and F2 values. Both groups of monolingual men show more F1 movement than was seen for bilingual men, however, this is relatively minimal.

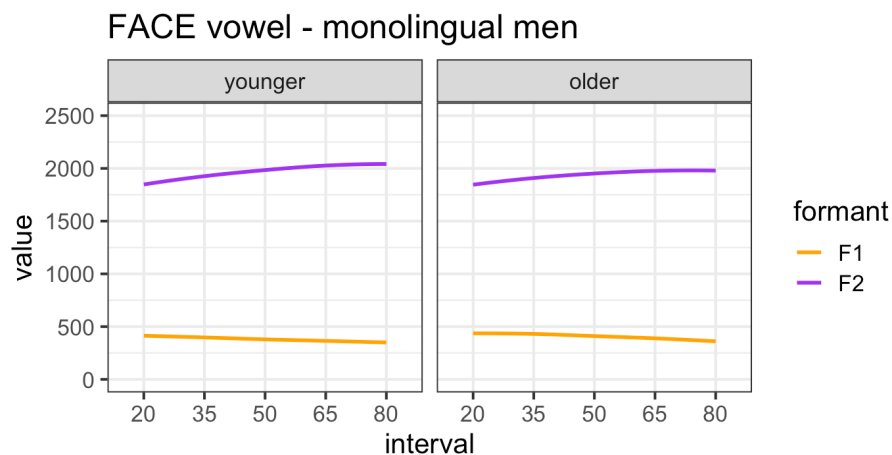


Figure 36. Normalised average F1 and F2 of FACE for monolingual men, according to age group.

The normalised formants for FACE in both bilingual and monolingual speakers, according to age group and gender are displayed in Figure 37. Broadly, younger speakers tend to show a more noticeable F2 change, particularly monolingual females; amongst the males, the F2 shift is more apparent in younger monolinguals. Overall, the observed variation in the realisation of the FACE vowel appears to be both age-based and gender-based to varying degrees.

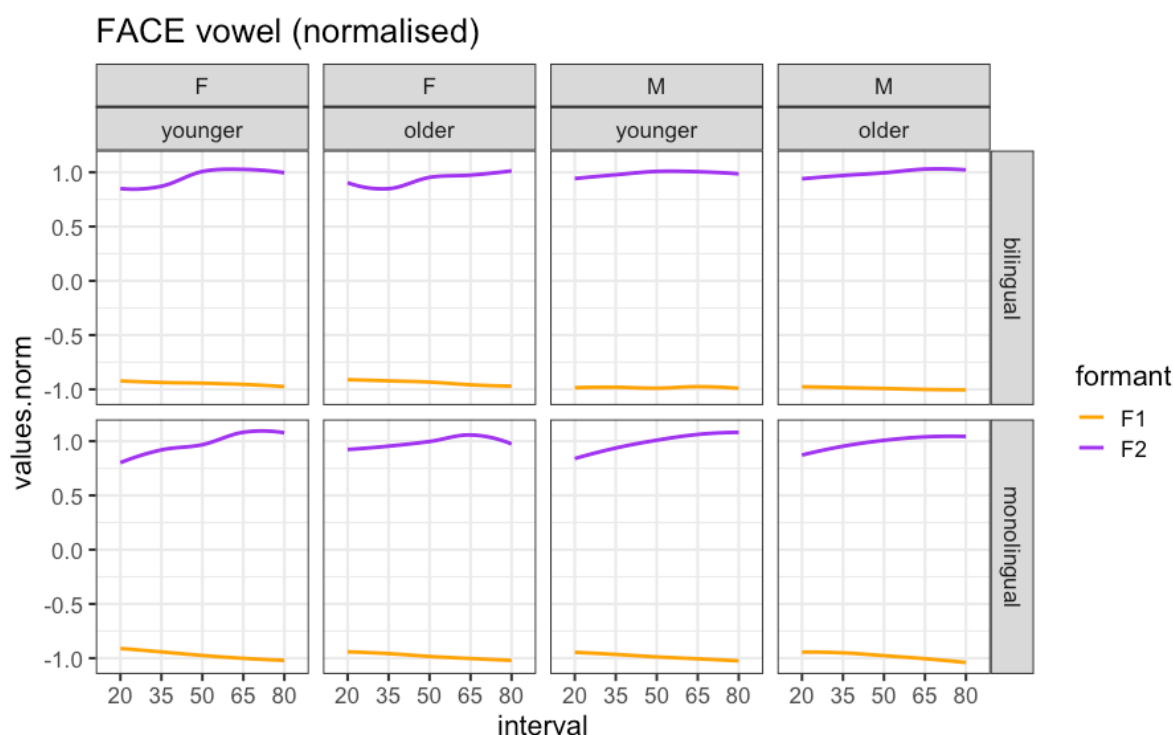


Figure 37. Normalised average F1 and F2 of FACE according to linguistic background, age group and gender.

Irish data. As bilingual speakers show a higher degree of monophthongal FACE than monolinguals, we can return to Hickey and Ó Baoill’s comments that Irish may have played a reinforcing role historically in the retention of this feature and wonder whether a reinforcement from Irish can explain its frequency in the English of the native Irish bilinguals analysed here. While a reinforcement cannot be easily ‘proven’, we can compare the English FACE vowels of the bilingual speakers (in terms of relative degree of movement) with their Irish /e:/ vowel.

Normalised average F1 and F2 values for the Irish and English vowels are displayed in Figure 38, organised by age and gender. The Irish vowels were extracted from the words *cén* (‘which’), *sé* (‘he/it’ or ‘six’), *tae* (‘tea’) uttered twice per speaker, totalling 75 tokens overall. For the Irish /e:/ there was an interesting pattern observed for the women, whereby F2 decreased at the end of the vowel, indicating backing. On further inspection however, this was due to the word ‘*cén*’ showing coarticulation between the velarised /n/ and the vowel, causing backing of the front vowel /e:/. A more controlled phonetic environment for the vowels between languages would allow for a tighter comparison.

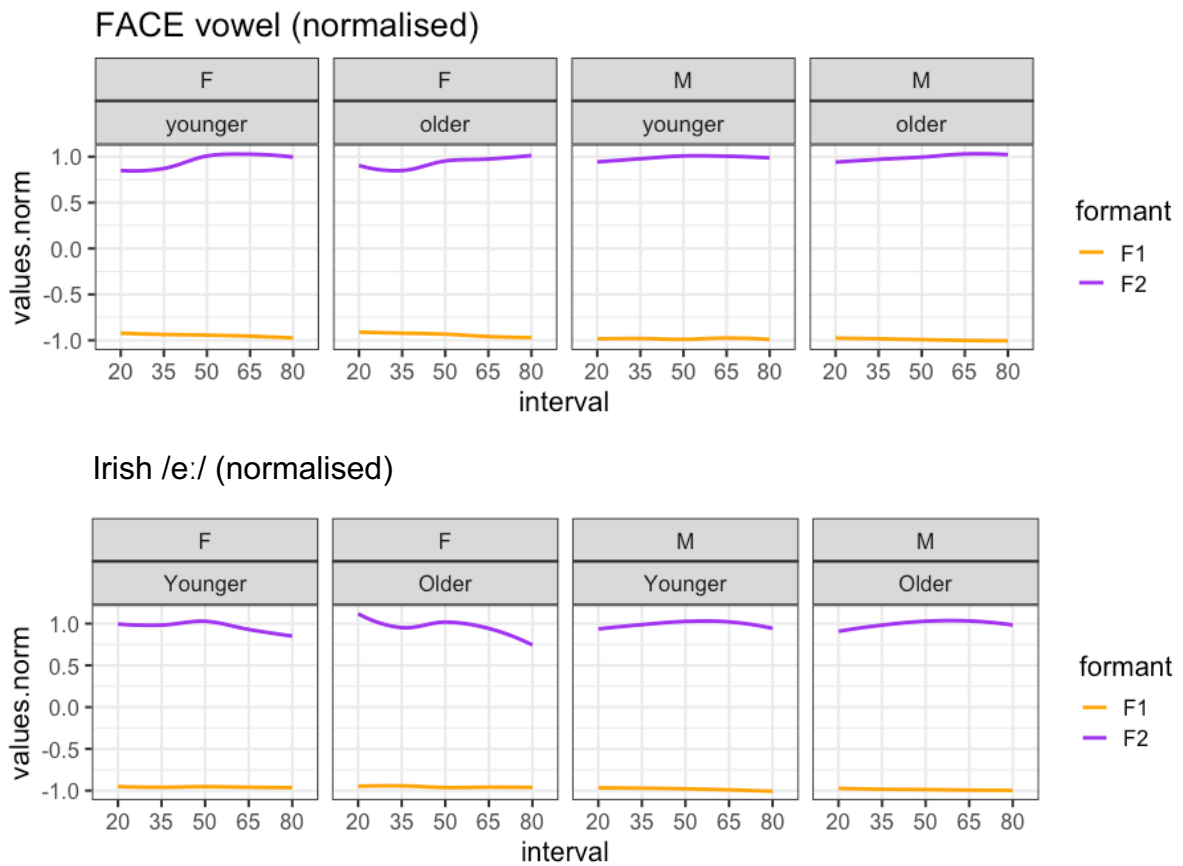


Figure 38. Normalised F1 and F2 values for bilingual speakers' English and Irish vowels, according to age and gender.

Statistical analysis. As described in above, Trajectory Length (TL) was calculated for each vowel to measure the degree of movement over the course of the vowel, as an approximate guide to the degree of diphthongisation. TL was then modelled as a dependent variable in a linear mixed effects model (LMM) to investigate the effect of linguistic background (bi- vs. monolingual) on the degree of diphthongisation. Subsequent LMMs investigated the effects of age, gender, LPS and LAS on the realisation of FACE for bilinguals and monolinguals separately. All models were run using *lme4* in R (Bates et al., 2015).

Table 22 provides the model output for the LMM that investigated the effect of linguistic background on Trajectory Length (TL) of the FACE vowel. No significant effect of linguistic background was found, suggesting that monolinguals and bilinguals do not differ substantially in their degree of formant movement in the FACE vowel.

Table 22. Results of linear mixed effects model investigating the effect of linguistic background on Trajectory Length of FACE.

Bilinguals vs monolinguals					
<code>lmer(TL ~ ling + (1 word) + (1 speaker))</code>					
Conditional R2: .43; Marginal R2: .01 ; Obs: 240					
	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	489.650	80.10	24.98	6.11	<0.001**
lingMonolingual	-53.690	109.62	24.00	-0.49	0.629

Table 23 displays the model output for the monolingual speakers, investigating the effects of various sociolinguistic factors on trajectory length. An interaction effect between age and gender was included based on the descriptive analyses which suggested that the effect of age may differ between gender groups.

There was a significant negative correlation between male speakers and TL ($p < 0.05$), suggesting that male speakers show significantly less formant movement than female speakers. Age also had a significant negative effect on TL; with every one unit increase in age, there was a decrease in TL by -9.978, suggesting that the younger the speaker, the more vowel movement they displayed.

Table 23. Results of linear mixed effects model for monolingual speakers, investigating the effect of various social factors on Trajectory Length of FACE.

Monolinguals					
<code>lmer(TL ~ age*gender + LPS + LAS + (1 word) + (1 speaker))</code>					
Conditional R2: .46; Marginal R2: .20; Obs: 120					
	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	813.40	396.17	11.93	2.05	0.063
genderM	-704.96	297.51	11.96	-2.37	0.036*
age	-9.98	4.46	11.94	-2.24	0.045*
LPS	-16.94	23.51	11.93	-0.72	0.485
LAS	79.97	57.72	11.94	1.39	0.191
genderM:age	10.95	6.44	12.06	1.70	0.115

Table 24 displays the output of the bilingual model, investigating the effects of sociolinguistic factors on trajectory length. The results show that, similar to the monolinguals, the bilingual men show significantly less vowel movement for FACE than the bilingual women ($p < 0.05$). Additionally, there was a significantly negative correlation of LPS, whereby an increase in LPS led to a decrease in TL ($p < 0.05$). This indicates that bilingual speakers who are more dominant in Irish, show a lesser degree of diphthongisation.

Table 24. Results of linear mixed effects model for bilingual speakers, investigating the effect of various social factors on Trajectory Length of FACE.

Bilinguals					
<code>lmer(TL ~ gender*age + LPS + LAS + (1 speaker) + (1 word))</code>					
Conditional R2: .38; Marginal R2: .37; Obs: 120					
	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	2192.00	396.24	11.88	5.53	<0.001***
genderM	-617.72	212.69	12.04	-2.90	0.013*
age	4.90	2.34	11.88	2.09	0.058
LPS	-53.02	17.57	11.99	-3.02	0.011*
LAS	-29.57	35.84	12.04	-0.83	0.425
genderM:age	6.55	4.71	11.92	1.39	0.190

To summarise, the auditory, acoustic and statistical results presented here indicate the following: (i) when considering TL only, monolinguals and bilinguals do not significantly differ in their realisation of FACE, (ii) social factors play a significant role in the degree of trajectory movement; within both the bilingual and monolingual groups, male speakers show less vowel movement. Additionally significantly less vowel movement was found for bilinguals who are more dominant in Irish (higher LPS), and older monolinguals.

We will now turn to the analysis of the GOAT vowel.

6.3.3 GOAT: auditory, acoustic and statistical analyses

This section details the results of the GOAT vowel analysis, including auditory, acoustic and statistical findings. The auditory impressions of ‘hode’ tokens are provided, before delving into the formant trajectories for various speaker groups and statistically investigating potential effects of social factors.

Auditory analysis. The preliminary auditory investigation involved the classification of the ‘hode’ tokens as either monophthongal or diphthongal for each speaker (2 tokens per speaker). Perceptible changes in vowel quality were noted. A vowel was deemed to be diphthongal if it contained an audible glide or transition from one vowel to another. Vowels that remained relatively stable in their quality were noted as monophthongs. The results are provided in Table 25.

Table 25. GOAT variants for all speakers, based on tokens of ‘hode’.

<i>Monolingual</i>			<i>Bilingual</i>		
SPEAKER ID	GENDER, AGE	VARIANT	SPEAKER ID	GENDER, AGE	VARIANT
P14	M, 60	o:	P2	M, 29	o:
P18	M, 66	o:	P3	M, 68	o:
P20	F, 63	o:	P6	M, 67	o:
P21	M, 64	o:	P9	M, 38	o:
P10	F, 55	ou	P12	F, 27	o:
P1	F, 57	ou	P11	F, 60	o:
P16	M, 30	ou	P13	F, 26	ou
P17	M, 30	ou	P7	F, 25	ou
P22	M, 27	ou	P8	F, 39	ou
P23	F, 30	ou	P15	F, 20	ou
P24	F, 29	ou	P5	F, 79	ou
P25	F, 30	ou	P4	M, 32	ou

The diphthongal variant of GOAT is marginally more common in monolingual speakers than bilingual speakers. For the monolingual group the [o:] variant is only found in older speakers (of both genders), while for the bilingual group the monophthong is present

across a range of ages and genders. For both bilinguals and monolinguals, women are more likely than men to use the diphthongal variant [oʊ], which is also the more popular variant for younger speakers.

The auditory analyses suggests that there is a degree of gender-based variation among the bilingual speakers and age-based variation among the monolinguals. Note that this pattern was also found for the FACE vowel. The following section presents the results of the acoustic analysis, examining the formant trajectories of the GOAT vowel in more detail across the factors of age and gender.

Acoustic analysis. This section explores F1 and F2 trajectories of the GOAT vowel, obtained from five timepoints (20%, 35%, 50%, 65%, 80%) within a selection of words from the read sentence corpus (see [Table 20](#)). Line plots were created to visualize the average F1 and F2 trajectories for various subgroups of speakers. These results are presented in the following subsections, examining F1 and F2 across linguistic background (bilingual vs. monolingual), age and gender.

Figure 39 displays the raw Hz values for the formant trajectories of bilingual women, according to age. The two groups of women show formant patterns, with an F2 starting point of ~1100 Hz which descends to ~900-950 Hz, suggesting backing over the course of the vowel. The F1 values for both groups also show a similar trajectory starting at ~500 Hz and descending to ~400 Hz, indicating raising over the course of the vowel.

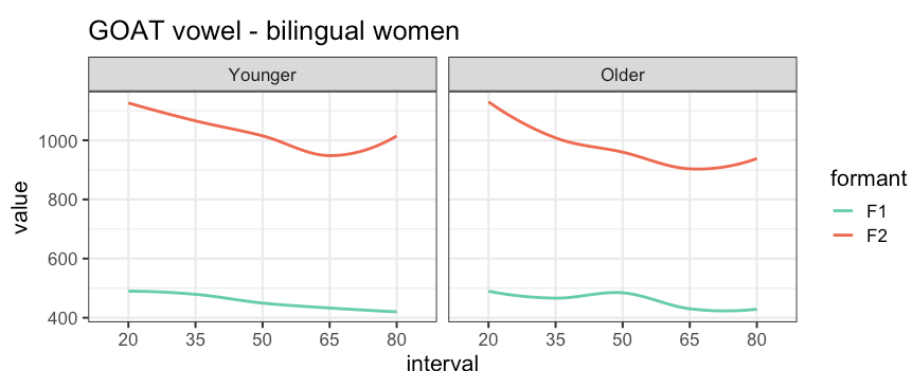


Figure 39. Average F1 and F2 of GOAT for bilingual women, according to age.

Figure 40 displays the average formant values (Hz) for the bilingual men's GOAT vowel. The older men have a lower F2 overall, suggesting a more backed vowel. The younger men show the final uptick of F2, which was also observed for the bilingual women in Figure 39. This pattern may be a result of coarticulatory effects. The F1 values for both groups of bilingual men remain relatively steady, suggesting minimal change in vowel height. Overall, the bilingual men's GOAT vowels, within the older group in particular, appear more monophthongal in quality than those of the bilingual women. This supports the findings of the auditory analysis, which indicated that bilingual men favour the monophthongal [o:] variant.

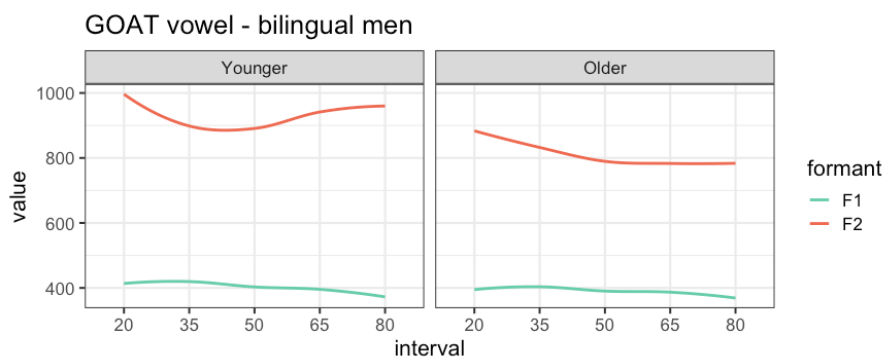


Figure 40. Average F1 and F2 of GOAT for bilingual men, according to age.

Figure 41 illustrates the average formant values of GOAT for monolingual women, according to age. A similar formant pattern is observed for both age groups, with similar values as those found for the bilingual women. F2 has a starting point of ~1100 Hz which descends to ~1000 Hz for the younger group and ~900 Hz for the older group, suggesting backing over the course of the vowel. The F1 values for the younger monolingual women are notably higher than those of both their older counterparts and the younger bilingual women, suggesting a relatively lower onset quality of GOAT.

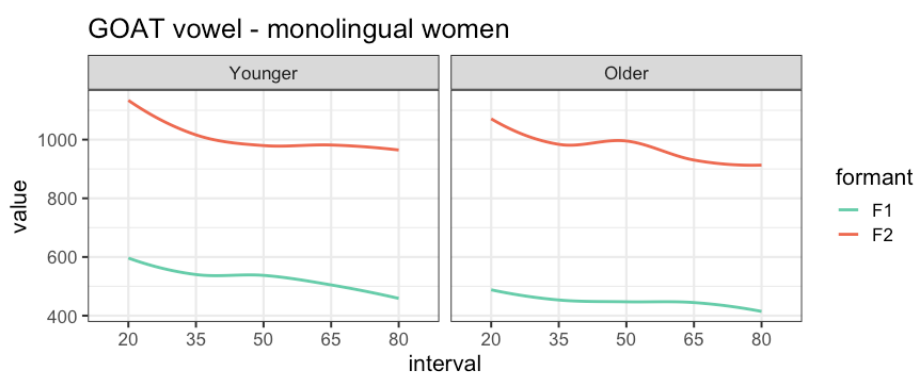


Figure 41. Average F1 and F2 of GOAT for monolingual women, according to age.

Figure 42 displays the average formant values (Hz) for the monolingual men's GOAT vowel. The younger men show a relatively sharp decline in F2 values during the first half of the vowel, indicating backing. There is a slight decrease also in F1 values over the course of the vowel, suggesting a degree of vowel raising, though this is very minimal (~50 Hz difference).

The older monolingual men display less extreme movement in both their F1 and F2 trajectories. This indicates that, overall, the older bilingual men's GOAT vowels are more monophthongal in quality. This correlates with the findings from the auditory analysis which suggested that all of the older monolingual men had a monophthongal variant for GOAT.

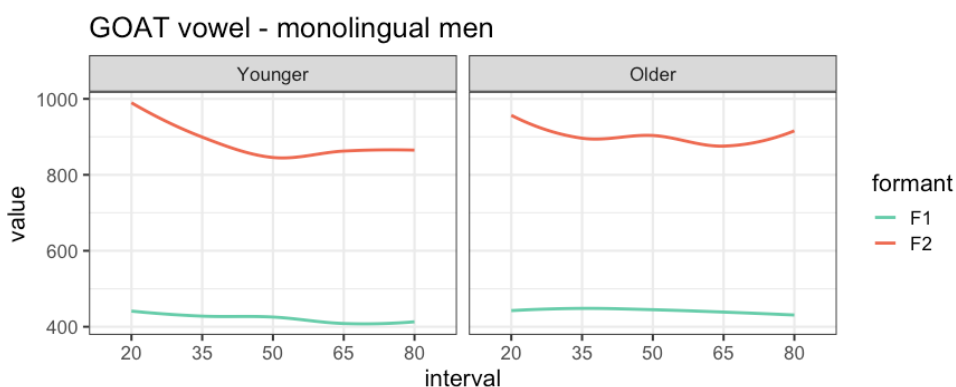


Figure 42. Average F1 and F2 of GOAT for monolingual men, according to age.

As can be seen in the line plots for GOAT, there is a relatively steep decline in F2 values between 20-35% timepoints, observed across speaker groups. This pattern was unexpected, particularly when present for those speakers who have audible monophthongal GOAT vowels, e.g. older bilingual males. The coarticulatory effects of the preceding phonetic context were therefore investigated across the recorded words. For the word ‘no’ there was a substantial decline in F2 at the start of the vowel, which may explain the decline seen in the averaged line plots. The variation between F2 in the words ‘no’ versus ‘oaf’ can be seen in Figure 43. This variation must be taken into account when analysing the trajectories displayed in the previous line plots.

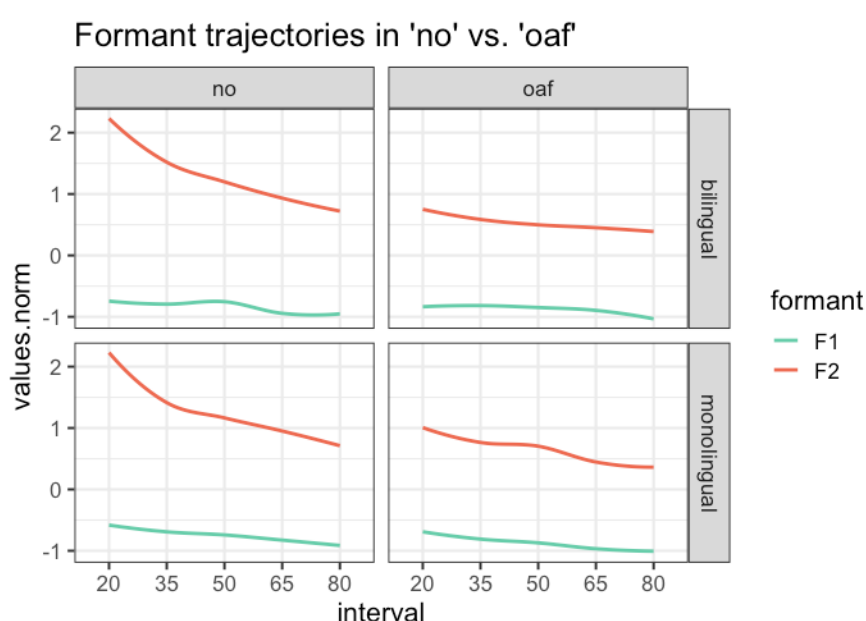


Figure 43. Formant trajectories of 'no' vs. 'oaf' for bilingual and monolingual speakers.

Irish data. The normalised average F1 and F2 values for the Irish /o:/ and English GOAT vowels are displayed in Figure 44, organised by age and gender. The Irish /o:/ vowels were extracted from the words bó (‘cow’), cóta (‘coat’), dó (‘to him’), fón (‘phone’), and nócha (‘ninety’), uttered twice per speaker, totalling 92 tokens overall (cases where nócha was uttered as ‘naoicha’ – a dialectal feature – were omitted). The F2 trajectories in particular show interesting patterns, specifically for the older women, who show a relatively sharp increase in F2 values in the second half of the vowel. Again, when the vowels with surrounding nasal consonants were investigated individually, they showed a substantial degree of coarticulation, whereby the F2 was higher in the context of a nasal. This may explain a considerable degree of the formant movement seen in the Irish data.

The analysis of additional data, considering other phonetic contexts would be needed to shed more light on the formant trajectory of these vowels.

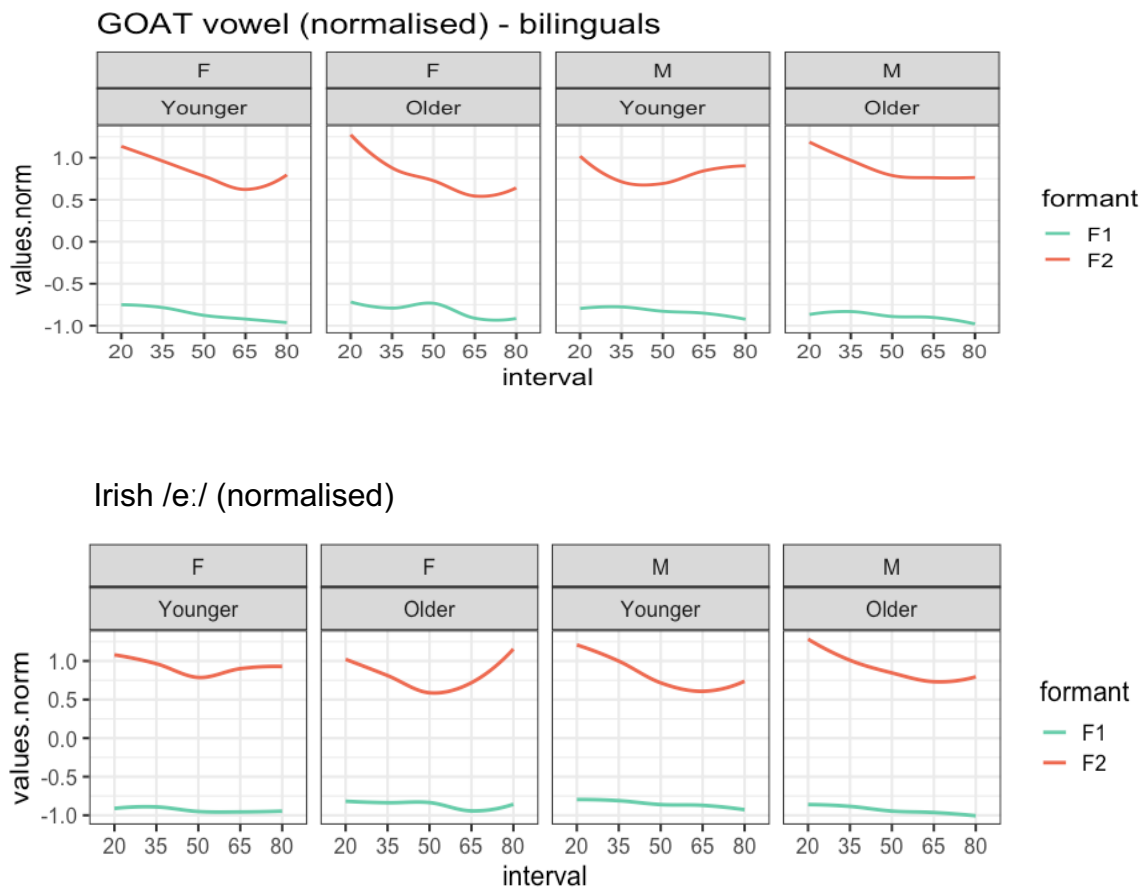


Figure 44. Normalised F1 and F2 values for bilingual speakers' English and Irish vowels, according to age and gender.

Statistical analysis. To investigate the effect of linguistic background (bi- vs. monolingual) on the degree of diphthongisation, the Trajectory Length (TL) of each vowel and was modelled as a dependent variable in a linear mixed effects model (LMM), with linguistic background as the independent/predictor variable. Subsequent LMMs investigated the effects of age, gender, LPS and LAS on the realisation of GOAT for bilinguals and monolinguals separately. All models were run using `lme4` in R (Bates et al., 2015).

Table 26 provides the model output for the LMM that modelled the effect of linguistic background on Trajectory Length (TL) of the GOAT vowel. No significant effect of linguistic background was found, suggesting that monolinguals and bilinguals do not

differ substantially in their degree of formant movement in the GOAT vowel when analysed at a macro mono- vs bilingual level.

Table 26. Results of linear mixed effects model investigating the effect of linguistic background on Trajectory Length of GOAT.

lmer(TL ~ ling + (1|word) + (1|speaker))
Conditional R2: .21; Marginal R2: .002; Obs: 240

	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	469.84	58.55	18.43	8.02	<0.001
lingMonolingual	27.59	60.70	22.88	0.46	0.654

Table 27 indicates that for monolingual speakers, LPS had a significantly negative effect on the TL of GOAT. As LPS increased by one unit, TL decreased by -40.378. This suggests that those speakers who had a higher proficiency in Irish showed relatively steadier formant trajectories in GOAT, indicating less diphthongisation. No other social factors were significant predictors of TL.

Table 27. Results of linear mixed effects model for monolingual speakers, investigating the effect of various social factors on Trajectory Length of GOAT.

lmer(TL ~ age + gender + LPS + LAS + (1 | word) + (1|speaker))
Conditional R2: .16; Marginal R2: .08; Obs: 120

	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	841.85	253.06	11.93	3.33	0.006**
age	-3.55	2.15	11.61	-1.65	0.125
genderM	90.90	79.24	11.65	1.15	0.274
LPS	-40.38	15.30	11.68	-2.64	0.022*
LAS	18.48	38.11	12.12	0.49	0.636

For the bilingual model on GOAT TLs, the inclusion of speaker as a random effect caused singularity issues with the model and so was omitted. The results of this model are presented in Table 28. The results indicate that both age and gender had significant

negative effects on the TL of GOAT, which was significantly lower for both older speakers and male speakers compared to younger and female speakers respectively. This indicates that the male speakers and older speakers display a more monophthongal GOAT. This correlates with the patterns observed in the auditory analysis.

Table 28. Results of linear mixed effects model for bilingual speakers, investigating the effect of various social factors on Trajectory Length of GOAT.

lmer(TL ~ age + gender + LPS + LAS + (1 | word))

Conditional R2: .24; Marginal R2: .13; Obs: 120

	Estimate	Std. Error	df	t-value	Pr(> t)
(Intercept)	101.39	252.08	118.97	0.40	0.688
age	-3.79	1.73	114.80	-2.20	0.030*
genderM	-197.39	55.57	114.11	-3.55	0.001***
LPS	9.18	10.64	113.87	0.86	0.390
LAS	42.12	24.72	113.46	1.70	0.091

To summarise, for bilinguals there appears to be an overall effect of gender on the degree of diphthongisation in both FACE and GOAT with a tendency for men to produce more monophthongal vowels. Additionally, age was a significant predictor for bilinguals' GOAT vowels and monolinguals' FACE vowels. As age increased, degree of diphthongisation decreased in both cases. Finally, LPS had a significant effect on monolinguals' GOAT vowels and bilinguals' FACE vowels. In both cases those with a higher LPS showed less vowel movement.

6.4 Discussion, limitations and conclusions

This section addresses the research questions posed at the beginning of this chapter. It will place the results of the FACE and GOAT analyses within the framework of previous research. The first research question concerned the variation in the realisation of FACE and GOAT between monolingual and bilingual speakers, as well as the possible reinforcing role of Irish:

RQ1a Relative to monolingual Irish English to what extent does the English of native Irish speakers show monophthongal realisations of FACE and GOAT?

The auditory and acoustic analyses at the beginning of this chapter suggested that bilinguals and monolinguals differed in their realisation of FACE and GOAT vowels. When plotted alongside other vowels within the wider vowel space, the monolinguals' FACE vowel showed a notable degree of raising (F1) between the onset and offset and a small degree of fronting (F2 variation). The bilinguals' FACE vowel, however, remained relatively steady in terms of height, and instead showed a degree of fronting over the course of the vowel. Regarding the realisation of GOAT, the bilinguals and monolinguals did not differ to any notable degree; both groups, on the whole, displayed backing and raising of the vowel between onset and offset.

However, the statistical results found that monolinguals and bilinguals did not significantly differ in their degree of diphthongisation (measured by Trajectory Length) for either FACE or GOAT vowels. This discrepancy may be due to the fact that while TL is a measure of movement, it does not account for the direction of formant change. In the figures showing the FACE and GOAT vowels in the overall vowel space with ellipses, it was evident that F2 varied for the bilinguals more than the monolinguals, and F1 varied more for the monolinguals than the bilinguals. Thus, the vowels did not vary in the same way for each group. As a simple measure of distance, the TL was not able to account for this. Alternative methods of analysis are discussed later in the present section.

RQ1b To what extent do sociolinguistic factors influence the realisation of FACE and GOAT?

Although bilinguals and monolinguals did not significantly differ in their TL measures for FACE or GOAT vowels, there was evidence of sociolinguistic conditioning within each group. Bilingual speakers with a higher LPS (measuring Irish dominance and usage) showed less movement in the formant trajectories of FACE, suggesting a more monophthongal realisation. Additionally, gender had a significant effect on both FACE and GOAT vowel realisation for bilinguals, with men more likely to have more

monophthongal variants. Monolingual men mirrored this pattern, also showing significantly less movement in their formant trajectories for FACE. Age was a significant predictor for FACE vowel diphthongisation in monolinguals and GOAT vowel diphthongisation in bilinguals, with younger speakers showing more trajectory movement. These findings, in combination with the results of the auditory and acoustic analyses, echo those of Frost (2000, as cited in Bessell, 2023), who found that women and younger speakers in Cork were more likely to adopt a diphthongal variant for GOAT, whereas male speakers and older speakers used the more conservative monophthong [o:]. While additional data is needed, the results are suggestive of a change in progress toward diphthongisation in these cases.

RQ2 To what extent does L1 Irish appear to influence this variation for bilingual speakers?

Quantifying the extent of an Irish reinforcing/ transfer effect on monophthongal variants is not straightforward. The first finding we might consider is the difference between monolinguals and bilinguals, with the hypothesis that if the monophthongal vowels of /e:/ and /o:/ in Irish are reinforcing monophthongal FACE and GOAT in bilinguals' English, then we might expect a higher degree of monophthongs for bilinguals vs. monolinguals. If the difference between the two groups is measured in terms of Trajectory Length, one would conclude that there is no significant difference and that bilinguals produce FACE and GOAT in a similar way to monolinguals.

However, another avenue for quantifying Irish reinforcement is to consider intra-group variation for the bilingual speakers, looking at the influence of LPS on monophthongal realisations. If Irish is a reinforcer of the monophthongal variant, then those who are more dominant in Irish might be expected to have monophthongs to a higher degree. The LMM for bilingual speakers' FACE vowel showed that LPS had a significant negative effect on the TL of FACE, suggesting a more monophthongal vowel. One might take this finding to indicate that FACE is reinforced by Irish. However, a similar effect was not found for GOAT.

A further point of interest is the Irish data. Irish has monophthongal phonemes /e:/ and /o:/, which are said to have reinforced the presence of monophthongal FACE and GOAT in

IrE, which were initially brought to Ireland via British English. The Irish vowels were explored in this chapter merely to confirm their presence in the bilingual speakers' Irish. The trajectory plots showed a considerable degree of movement, however this might be accounted for by the fact that Irish vowels are heavily influenced by neighbouring consonants. It is concluded that the present comparison of IrE and Irish vowels does not offer much insight.

Limitations. There are several limitations to this analysis. The first relates to the data sample, which is limited in terms of phonetic contexts. A more systematic and comprehensive approach to the design of the data sample would have potentially avoided this limitation. As the initial intention was to collect a wide range of features, some features were not as prioritised as others, in the interests of keeping within the scope of the study. The inclusion of additional phonetic contexts would add further value to this study by facilitating a wider investigation of contextual effects on the realisation of FACE and GOAT. Doing so would facilitate a comparison with Collins' (1997) study of Galway English, which found that for the GOAT vowel there was no evidence to link diphthongisation to phonological environment.

Additionally, the inclusion of speaking style as a potential predictor would provide further details on the sociolinguistic variation of the FACE and GOAT vowels. A study of FACE and GOAT in York English (Haddican et al., 2013) reported that read speech had a significant positive effect on the production of a diphthongal FACE vowel, but that style was not a significant predictor of GOAT realisation. The inclusion of spontaneous speech would facilitate an investigation of the effects of speaking style on FACE and GOAT for Connemara English.

A further limitation concerns the methods used to statistically analyse diphthongisation. Jacewicz et al.'s (2011) Trajectory Length (TL) was used to quantify the degree of formant movement over the course of the vowel's duration. This was calculated as the sum of the Euclidean distances between the F1 and F2 measurements between the various timepoints (i.e. 20-35%, 35-50%, etc.). However, there are certain limitations to this methodology that may impact the interpretation and generalisability of the study's findings. One such limitation concerns the simplicity of TL. Hualde et al. (2022), in their

study of the /aɪ/ diphthong in Chicago English, note that the reduction of formant trajectories to a single value per vowel token does not provide a clear understanding of where the formant differences lie or their magnitude at different time points. As could be seen in the present study, this may have led to the apparent discrepancies between the acoustic (descriptive) and statistical results. The evident F2 variation in the bilingual's FACE vowel was levelled (via the calculation of TL) by the F1 change for monolinguals. Although the shapes of these distributions visually varied within the vowel space, the statistical analyses indicated that any variation was minimal.

Looking to the future, to better account for FACE and GOAT diphthongisation, Generalized Additive Mixed Models (GAMMs) would be worth exploring. GAMMs are a statistical approach that offer a more comprehensive way to explore variation in vowel formant trajectories. Although relatively challenging to conduct and interpret, GAMMs can capture the variability in vowel formants across multiple conditions, while also accommodating the continuous formant changes that occur over the duration of the vowel. GAMMs have been gaining in popularity in phonetic studies within recent years and have proven to be effective in analysing time-varying formant data (e.g. Kirkham et al., 2019; Sóskuthy, 2021). The use of GAMMs would facilitate a more nuanced understanding of the dynamic properties of FACE and GOAT, along with their potential sociolinguistic predictors offering additional valuable insights.

7 Epenthesis

7.1 Background and research questions

Chapter 2 provided an overview of IrE schwa epenthesis within liquid+sonorant coda clusters. This phenomenon is commonly attested for /lm/, less so for /rm/ and more rarely in /rn/ and /rl/ clusters (Hickey 2007; Maguire, 2020). This pattern was quantitatively verified for Galway City English by Sell (2012), who found that across generations and gender groups, 77% (of 94) ‘film’ tokens had epenthesis, but only 3% of (712) other clusters had epenthesis. The prevalence of epenthesis in ‘film’ is also reported by Hickey (2007) for IrE generally, and by Maguire (2018) for Mid Ulster English. Additionally, Sell (2012) found epenthesis to be significantly more likely for older speakers and in spontaneous speech. Beyond Maguire and Sell’s studies, there is a lack of quantitative research into the sociolinguistic patterning of IrE liquid+sonorant epenthesis and the majority of descriptions remain anecdotal.

Regarding the origins of epenthesis in IrE, most accounts suggest an Irish source (Hickey, 2007a; Ó Baoill, 1997; Ó hÚrdail, 1997). However, Maguire’s (2018) recent study of Mid Ulster English (MUE) highlighted that similar epenthesis was present in British English and Scots varieties imported to Ulster. He adds that MUE epenthesis resembles epenthesis found in these varieties more closely than it does Irish epenthesis. Thus, he suggests that the roots of IrE epenthesis may stem primarily from English (and Scots in the north), rather than from a widely-believed Irish source. Maguire does leave room for Irish as a possible historical ‘reinforcer’ of this feature in MUE but highlights the difficulty of proving such a role.

To date, epenthesis has not been systematically investigated in the English of native Irish speakers, which is said to be heavily influenced by Irish. Exploring epenthesis patterns in Gaeltacht English will add empirically-based findings to the description of epenthesis in IrE and may shed light on the possible present-day reinforcing role of Irish on this IrE feature and, in turn, further inform hypotheses regarding a historical Irish influence.

To achieve this, the following research questions were proposed for epenthesis:

- RQ1a** Relative to monolingual Irish English to what extent does the English of native Irish speakers show epenthesis within liquid+sonorant coda clusters?
- RQ1b** To what extent do sociolinguistic factors influence the presence of epenthesis?
- RQ2** What can the findings from RQ1 and RQ2 tell us about a possible historical Irish influence for this feature?

7.2 Methods

The following subsections present the methods used for data extraction and coding, along with the descriptive and statistical methods used for analysis of epenthesis.

7.2.1 Data extraction and coding

314 tokens of eligible liquid+sonorant clusters within monosyllabic words in both read and spontaneous speech were annotated and measured in Praat. Table 29 presents the words which contained the relevant clusters, according to speech style.

Table 29. Words containing liquid+sonorant clusters eligible for epenthesis in read and spontaneous speech.

Words containing liquid+sonorant clusters	
Read speech	Spontaneous speech
arm	barn
barn	born
corn	girl
elm	girls
farm	learn
film	learned
girl	storm
pearl	turn
	weren't

Auditory and acoustic analyses were carried out, accompanied by visual inspection of waveforms and spectrograms for each token. Epenthesis was coded binarily, marked as either present or absent for each token. Visual indicators for epenthesis included evidence of vowel formants, i.e. darker striations on spectrogram, and increased amplitude in the waveform. In some cases, a syllabic [ŋ] or [l] was present in the final segment of the liquid+sonorant cluster (i.e. in ‘-rl’ or ‘-rn’ words). In such cases, the /r/ was realised as an approximant [ɹ]. Descriptions of this latter realisation are not readily found in phonological accounts of IrE. However, despite its rarity, I believe it to be a feature that many IrE speakers are aware of and one that is generally stigmatised.

The spectrograms of three example words are provided below. The first (Figure 45) shows an example of schwa epenthesis in the word ‘film’, produced by a young female bilingual speaker. The epenthetic vowel is highlighted in the yellow box.

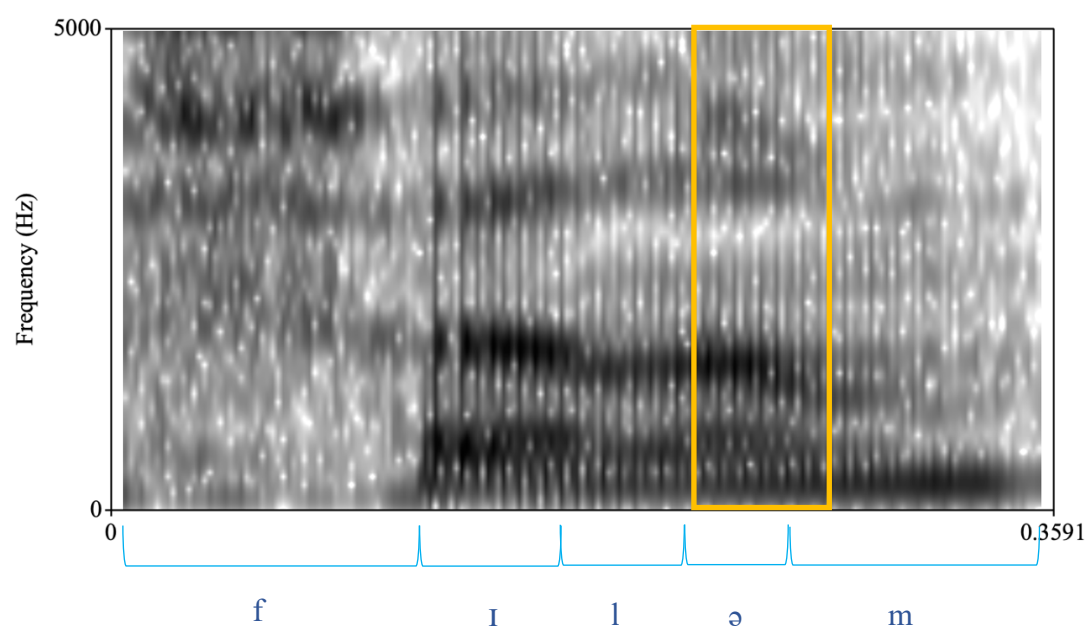


Figure 45. Spectrogram of the word ‘film’ produced by Participant 15 (F, 20, bilingual) with an epenthetic schwa /ə/.

The second spectrogram, in Figure 46, shows the word ‘film’ without epenthesis, produced by an older monolingual woman.

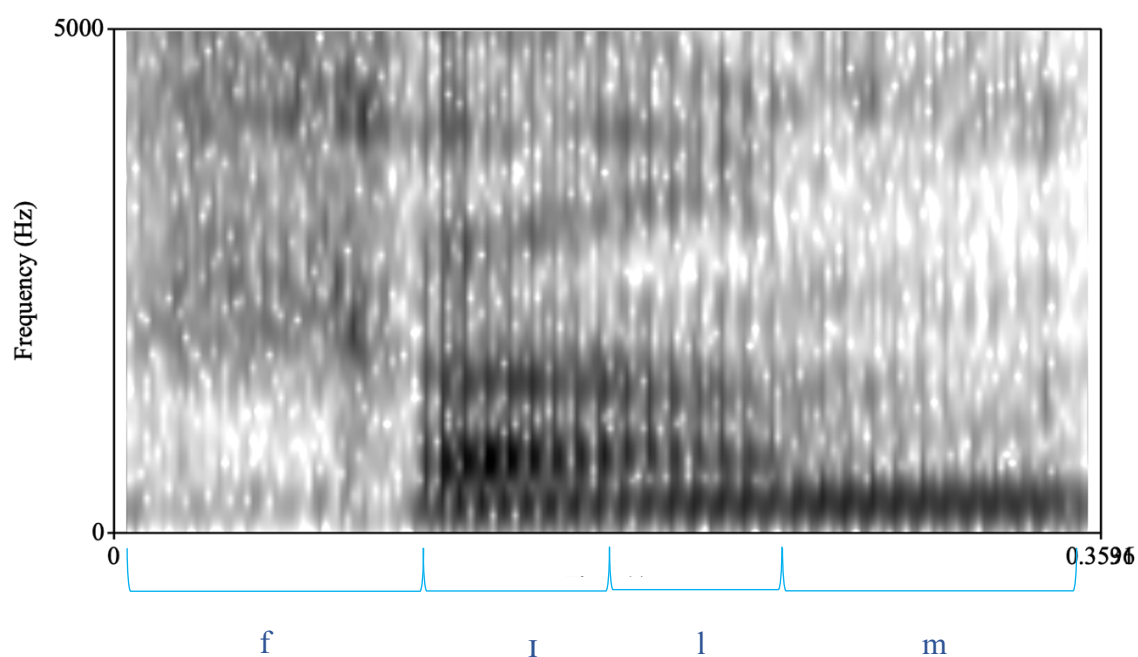


Figure 46. Spectrogram of the word 'film' produced by Participant 10 (F, 55, monolingual) with no evidence of epenthesis.

The third spectrogram (Figure 47) shows an example of a final syllabic [l] (highlighted in the yellow box) in the word 'girl', produced by an older bilingual man.

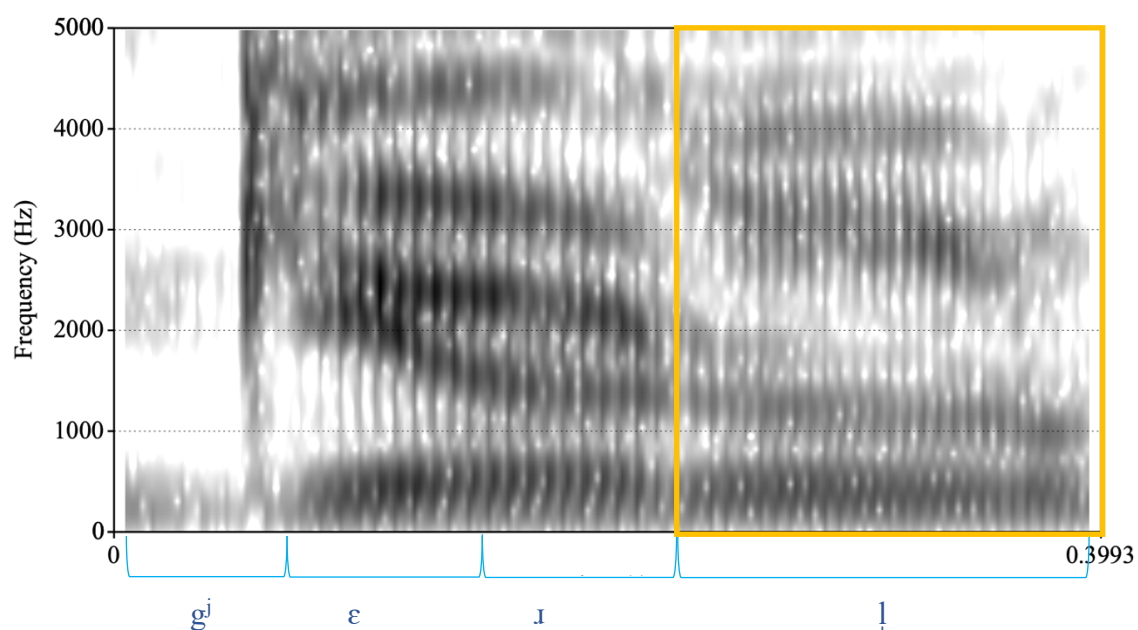


Figure 47. Spectrogram of the word 'girl' produced by Participant 6 (M, 66, bilingual) with a final syllabic /l/.

Of the 314 tokens extracted, 164 were from bilinguals and 150 from monolinguals. The number of tokens from spontaneous speech (interviews) was low (total $n = 20$) and inconsistent across speakers. It was therefore decided not to statistically analyse the effects of speaking style, as had been initially intended. The resulting tokens of liquid+sonorant clusters are detailed in Table 30, according to cluster type.

Table 30. Token count of liquid+sonorant clusters for bilinguals and monolinguals.

Liquid + sonorant cluster distribution					
	lm	rl	rm	rn	total
Bilingual	41	38	37	48	164
Monolingual	37	39	36	38	150

7.2.2 Descriptive and statistical methods

Descriptive analyses were facilitated by the visualisation of the data using bar charts to plot the rates of epenthesis within speakers or clusters. These were created in R (R Core Team, 2023). To investigate the effects of sociolinguistic factors on the occurrence of epenthesis, three generalized linear mixed models (GLMM) were carried out in R using the *lme4* package (Bates et al., 2015). The first model investigated epenthesis variation between bilingual and monolingual speakers, with two further models investigating epenthesis as a function of various sociolinguistic factors within monolinguals and bilinguals separately. In each case epenthesis was modelled as a binary categorical variable (presence vs absence). The latter two models analysed social factors (age, gender, LPS (Linguistic Profile Score) and LAS (Local Attachment Score) as fixed effects (along with cluster type for bilinguals), with word and speaker as random effects. As mentioned, speech style (read vs. spontaneous) was not included as a predictor variable as there were insufficient tokens from spontaneous speech.

The following sections present the descriptive results, exploring various sociolinguistic variables, followed by the statistical findings of the GLMMs.

7.3 Results - Descriptive analysis

Bilingual vs. monolingual speakers. The bar chart depicted in Figure 48 illustrates the rates of epenthesis, represented as a percentage, for bilinguals and monolinguals. It includes instances where the final sonorant within the cluster (e.g., /l/ or /n/) was realized as syllabic. Notably, bilinguals exhibited a markedly higher rate of epenthesis at 24%, more than double that of monolinguals (11%). Moreover, bilingual speakers demonstrated a final syllabic /l/ or /n/ in 12% of eligible clusters.

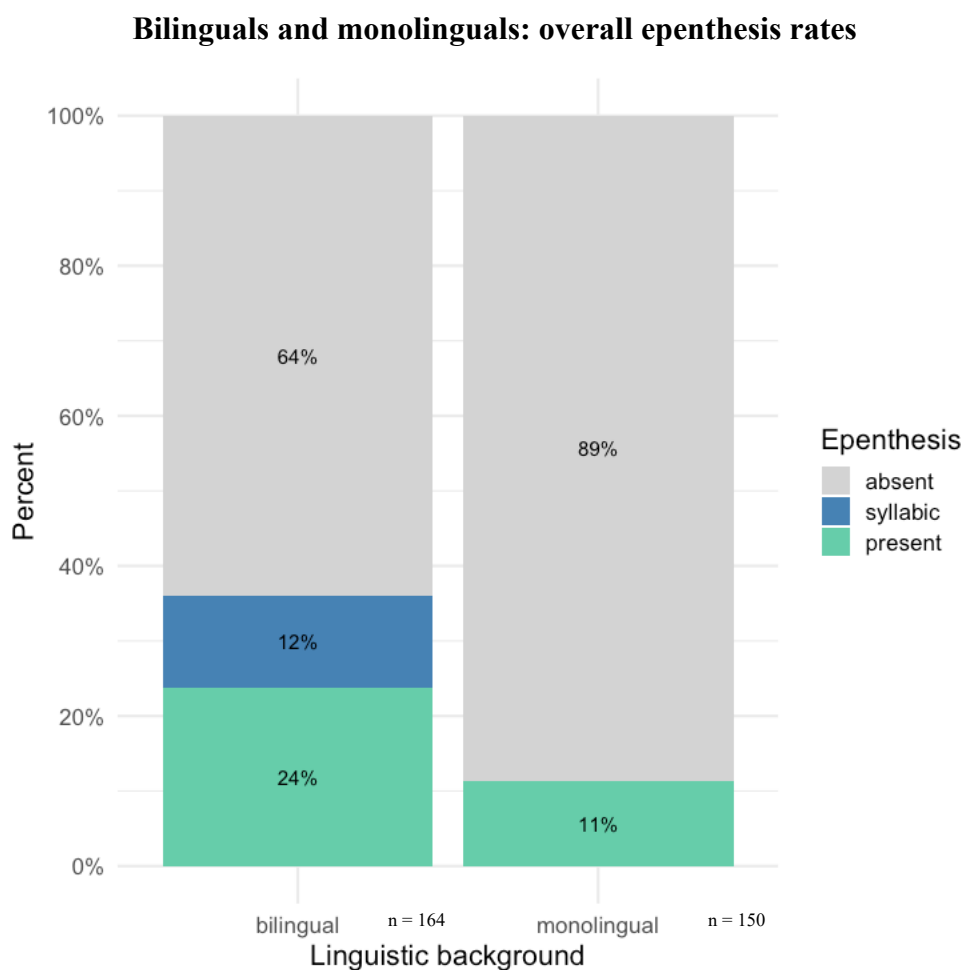


Figure 48. Bar chart showing the rate of epenthesis and syllabic /l/ or /n/ as a percentage of all eligible tokens. Bilingual speakers are shown on the left and monolingual on the right.

Cluster type. Sell's (2012) study of Galway City English indicated that the /lm/ cluster – the word 'film' in particular, showed notably higher rates of epenthesis than the other liquid+sonorant clusters. Hickey (2007) also reports that /lm/ epenthesis is “universal” in IrE and less common in /r/-initial clusters. Figure 49 investigates this pattern for bilingual speakers. It is apparent that the /lm/ cluster ('film' and 'elm') shows substantially higher rates of epenthesis, occurring in over 65% of cases. The /rm/ cluster has the second highest rates of schwa epenthesis (~22%), followed by the /rl/ and /rn/ clusters. These latter two clusters, however, are the only to show a final syllabic /l/ and /n/, respectively. Figure 50 displays the corresponding data for monolingual speakers, showing the epenthesis rates by cluster type. The occurrence of epenthesis was notably lower for the monolinguals and only present in /lm/ clusters (in both 'film' and 'elm'). Additionally, the monolingual speakers did not have the syllabic /n/ or /l/ that was present for the bilinguals.

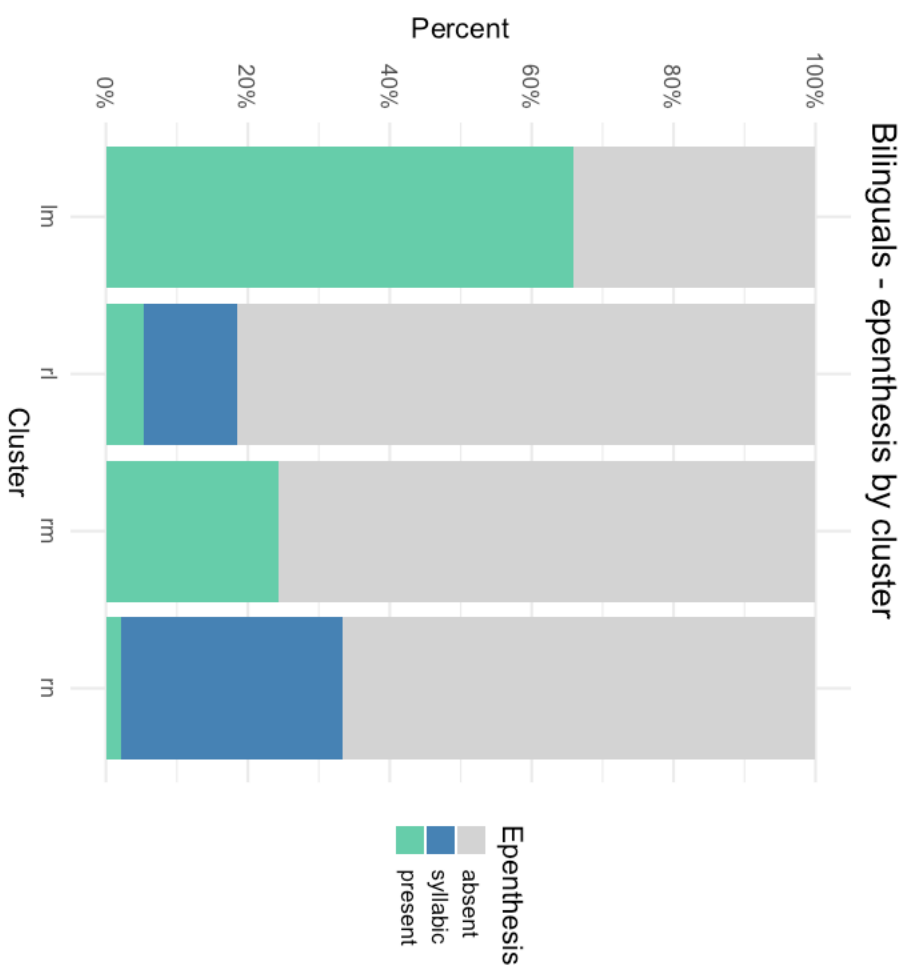


Figure 49. Rates of epenthesis across cluster types for bilingual

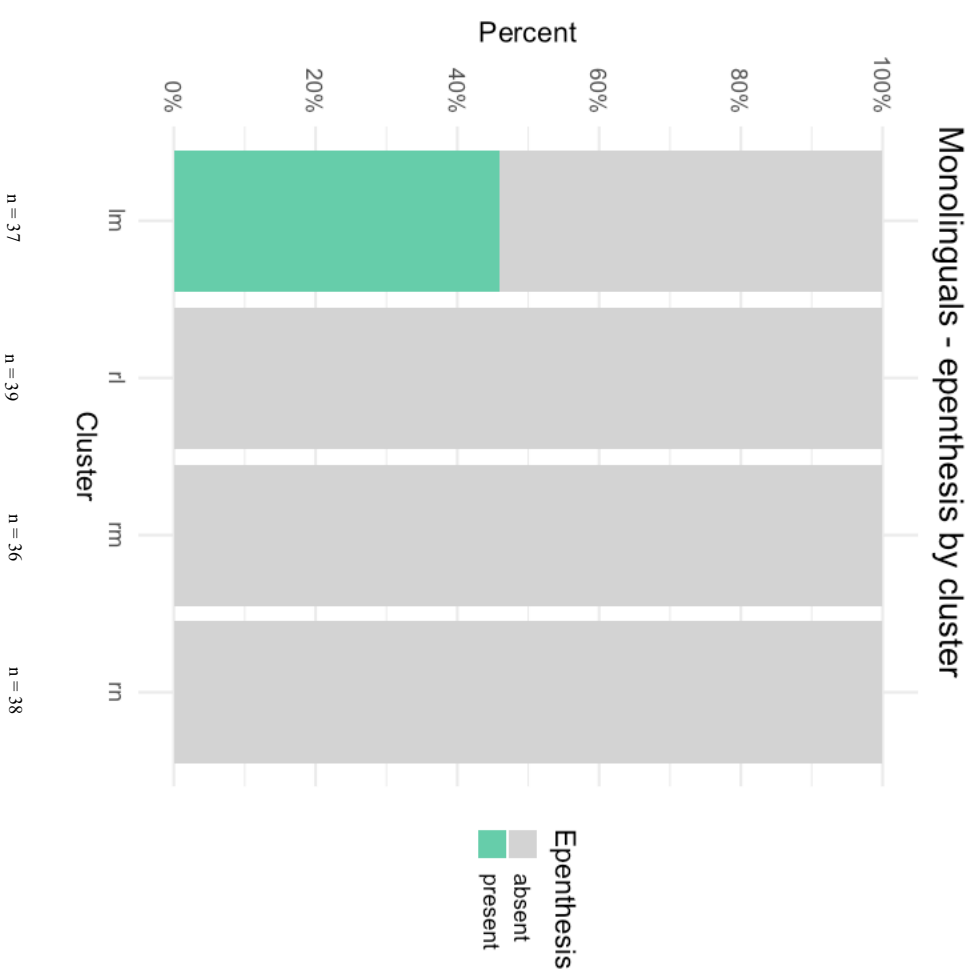


Figure 50. Rates of epenthesis across cluster types for monolingual speakers.

Age. Age was shown by Sell (2012) to have a significant effect on epenthesis rates for Galway City English, with younger speakers showing lower rates than older speakers. However, she found that this age-based variation did not apply to the word ‘film’, in which rates of epenthesis remained relatively high across age groups.

Figure 51 illustrates the rate of epenthesis for bilinguals, according to age group.

There is a notable difference between younger and older speakers, whereby the older speakers show more than double the rates of their younger counterparts. Additionally, the older speakers show a syllabic /l/ or /n/ in over 25% of cases. There was no evidence of this realisation in the younger bilinguals. Finally, epenthesis in the younger bilinguals was largely accounted for by the /lm/ cluster (~50% of all their /lm/ tokens had epenthesis) and one instance of epenthesis in /rn/ by a younger male speaker.

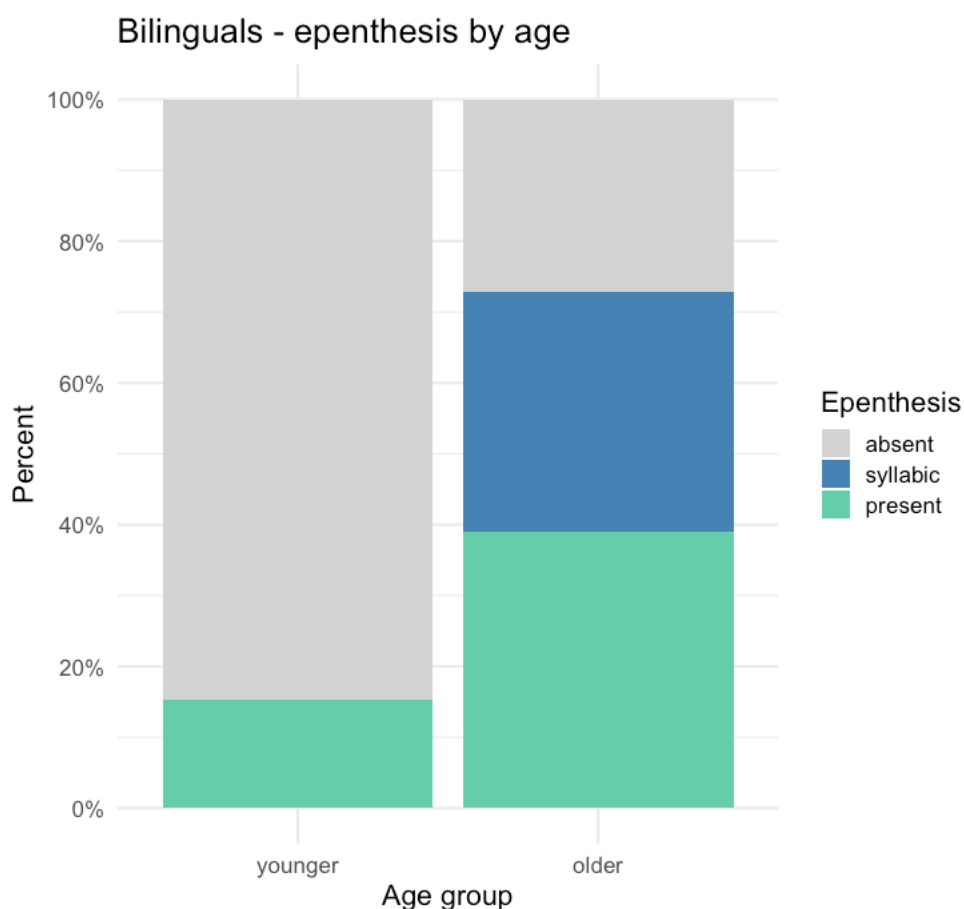


Figure 51. Rates of epenthesis across age groups for bilingual speakers. Count = 93 tokens for younger speakers, 71 for older speakers.

Figure 52 displays the corresponding data for the monolingual speakers, who only had epenthesis in /lm/ clusters. In contrast to the bilingual speakers, the rates of /lm/-epenthesis remain low across the age groups with no age-based variation.

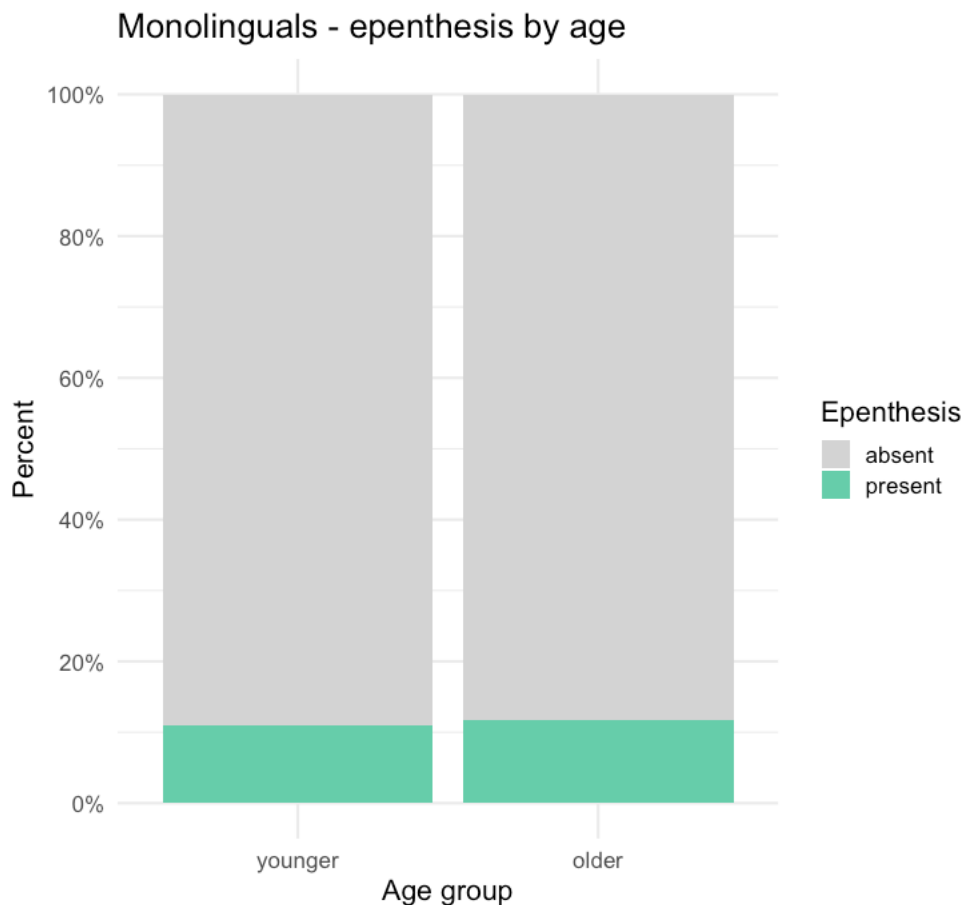


Figure 52. Rates of epenthesis across age groups for monolingual speakers. Count = 73 tokens for younger speakers, 77 tokens for older speakers.

Gender. Figure 53 displays the epenthesis rates for bilingual speakers, according to age and gender. The distinctly higher occurrence of epenthesis in older speakers remains across the genders, although the syllabic /n/ and /l/ variants are more common for older men. In both age groups, female speakers have lower rates of epenthesis than male speakers, although this variation is minimal for the younger group. The older bilingual men have a notably higher epenthesis rate of 94% of all eligible liquid+sonorant clusters. This figure stands in contrast to that of the younger bilingual women who have an

epenthesis rate of 12% of all eligible clusters. Again, the occurrence of epenthesis in the younger bilingual speakers is largely accounted for by /lm/ clusters, barring one instance of epenthesis in ‘barn’ by a young bilingual male.

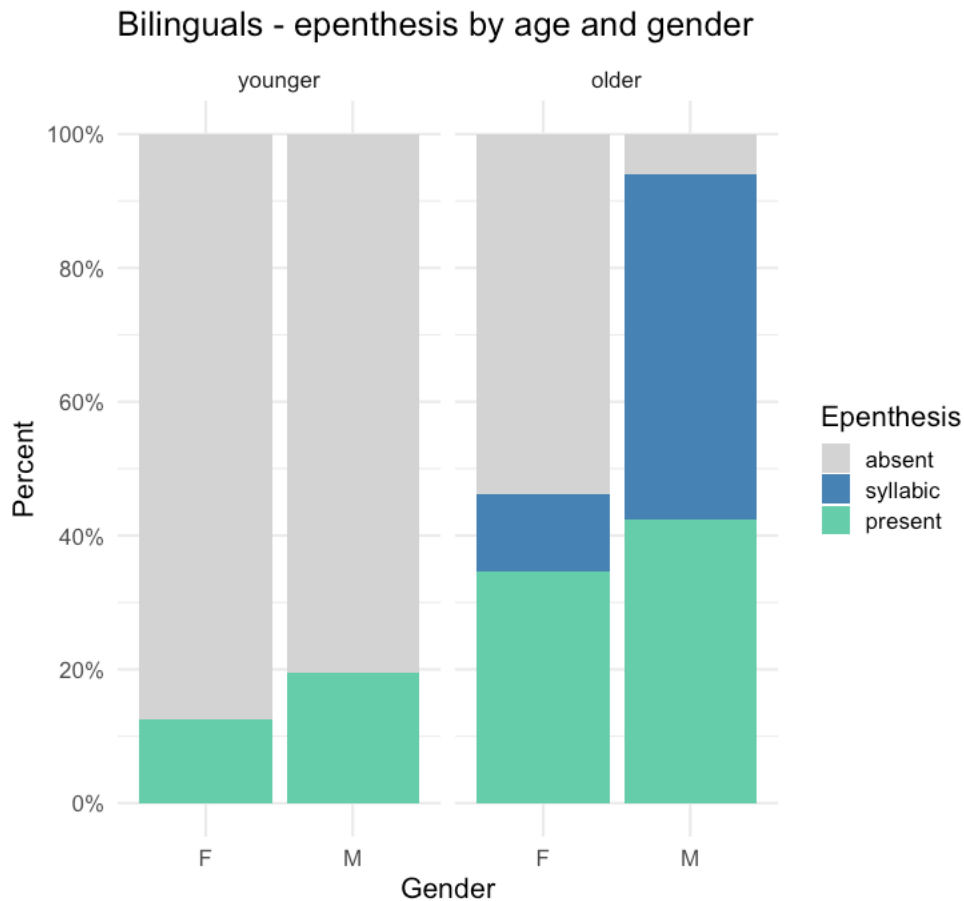


Figure 53. Rates of epenthesis in bilingual speakers, according to age group and gender.

Count = Young F: 52; Young M: 41; Older F: 38; Older M: 33.

Figure 54 displays the corresponding data for monolingual speakers, categorising rates of epenthesis (/lm/ clusters only) by age and gender. Variation between genders is minimal and all speakers show rates of epenthesis between 8-15%. The younger women appear to have higher rates of epenthesis than younger men but the difference is minimal.

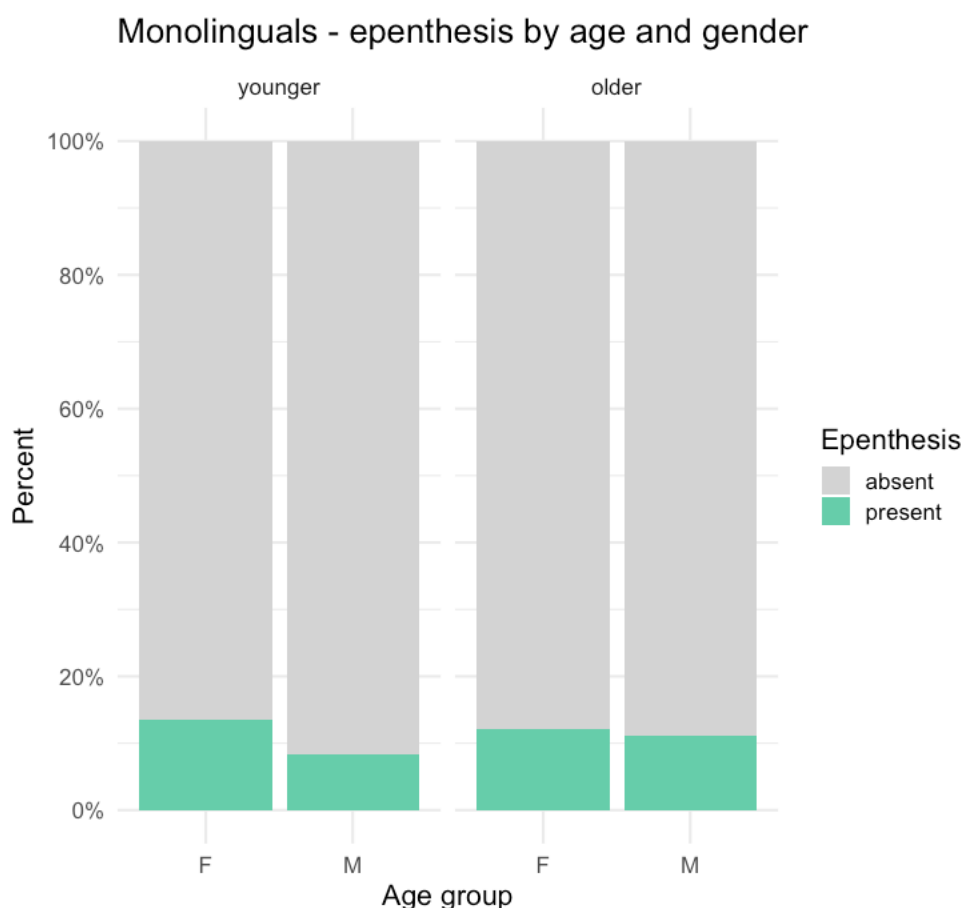


Figure 54. Rates of epenthesis in monolingual speakers, according to age group and gender. Count = Young F: 37; Young M: 36; Older F: 41; Older M: 36

Style. Sell (2012) found that formality of speech significantly influenced epenthesis rates for Galway City speakers. Due to the low rates of eligible liquid+sonorant clusters in spontaneous speech (16 for bilinguals, 4 for monolinguals) statistical analyses could not be carried out to investigate the effect of style in this study. In the available data, older bilinguals showed epenthesis in 8 out of 11 words in spontaneous speech, with younger speakers showing epenthesis in 0 out of 5 words. In the 4 spontaneous tokens for monolinguals (2 for older speakers, 2 for younger), both age groups showed no occurrence of epenthesis. These results are displayed in Figure 55, but the low occurrence of spontaneous tokens must be kept in mind when interpreting the graph. For context, read tokens numbered 148 for bilinguals and 146 for monolinguals (compare to 16 and 4 spontaneous tokens, respectively). Without further data collection in spontaneous speech, the effect of speaking style remains inconclusive for these speakers.

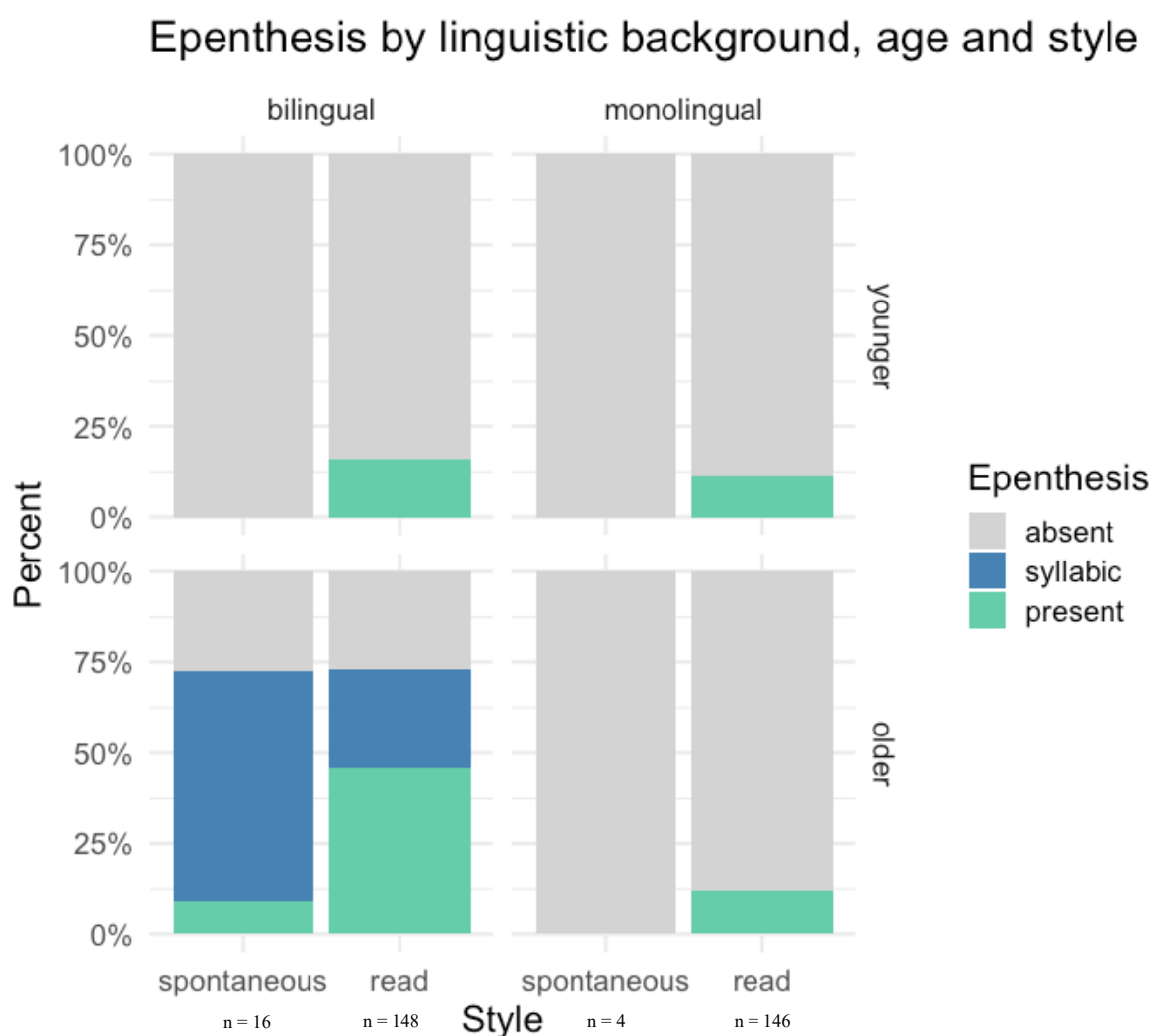


Figure 55. Rates of epenthesis in bilingual and monolingual speakers, according to speaking style. Note that there are large discrepancies between the numbers of read and spontaneous tokens due to the rarity of liquid+sonorant cluster words in English.

Linguistic Profile Score (LPS) – bilingual speakers only. Exploring the potential influence of Irish on the occurrence of epenthesis among these speakers naturally raises the question of whether epenthesis rates among bilinguals differ based on their dominance in Irish. It stands to reason that if Irish reinforces the occurrence of epenthesis, greater dominance in Irish might correspond with higher epenthesis rates. Figure 56 displays the rates of epenthesis for bilingual speakers according to their LPS (a measure of dominance in Irish). The same data is visualised in the scatter plot in Figure 57. Both figures indicate a positive correlation between LPS and epenthesis rates, suggesting that speakers with higher LPS are more likely to have epenthesis.

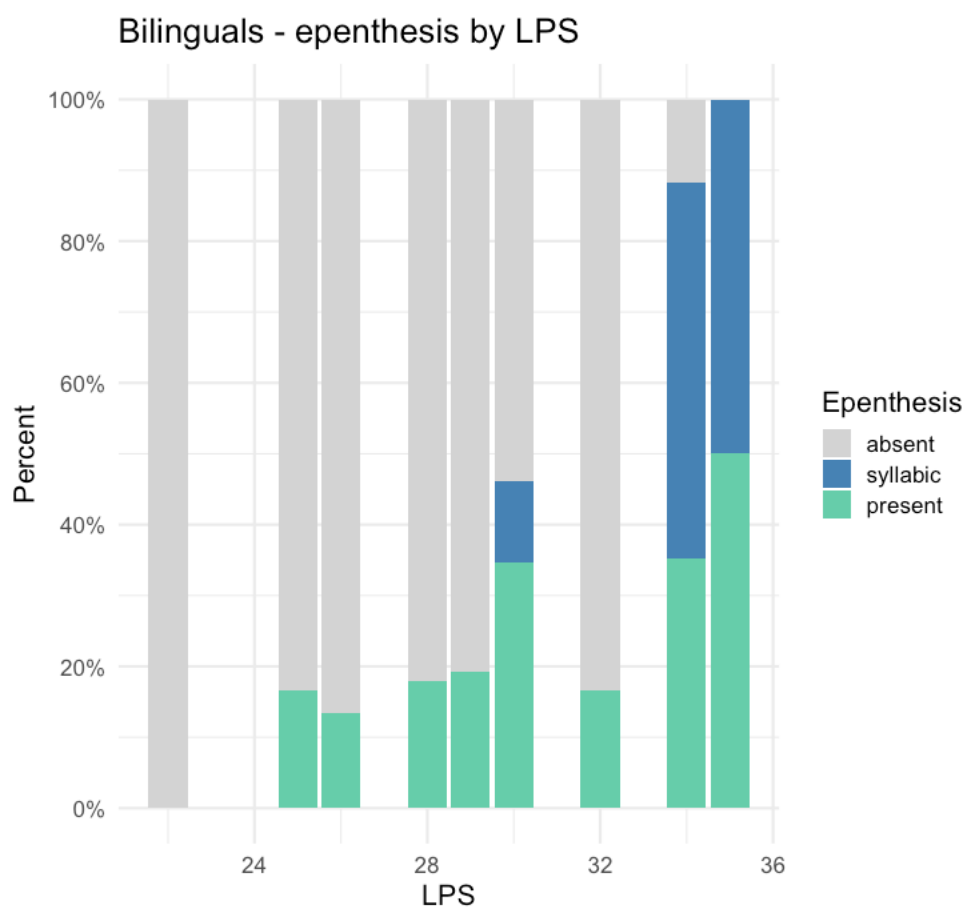


Figure 56. Rates of epenthesis in bilingual speakers, according to LPS.

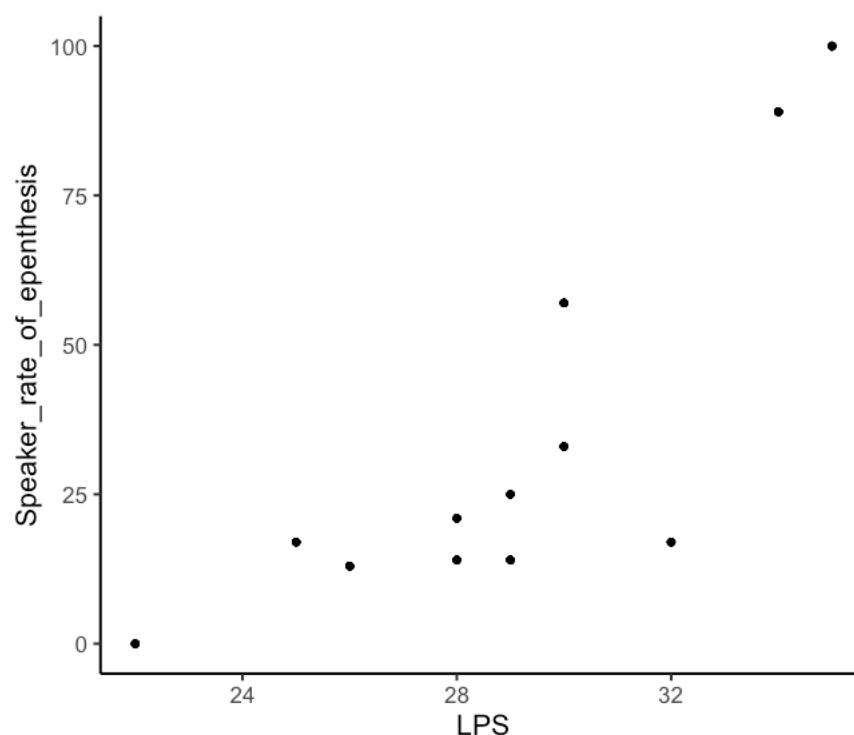


Figure 57. Rates of epenthesis in bilingual speakers, according to LPS.

Bilinguals – Irish data. Although there is no disputing that epenthesis occurs in the Irish language within a wide range of consonant clusters (see Ní Chiosáin, 1999), it was still considered important to examine a set of Irish language data for the bilingual speakers as a comparison. The words collected (in read sentences) were: *bholg* ‘stomach’, Colm (name), *fearg* ‘anger’, *gorm* ‘blue’ and *leanbh* ‘baby’ (all x2 per speaker).

Figure 58 shows the epenthesis rates for the liquid+sonorant clusters in Irish from all bilingual speakers. Note that the clusters displayed in Figure 58 represent a very small selection of epenthesizing clusters in Irish. Additionally, the displayed data is from read speech only. Of a total of 106 tokens, 4% showed no epenthesis. These latter cases were in the words *fearg* (‘anger’) (x2) and *gorm* (‘blue’) (x2), produced by 3 young female speakers. Additionally, there was a general tendency for younger speakers to use an approximant [ɹ] in /rm/ and /rg/ clusters (in cases of both epenthesis and no epenthesis), where older speakers used a tap [ɾ]. While more data would be needed to investigate these patterns, they may be indicative of a more general change in progress within Irish, possibly due to English influence on Irish.

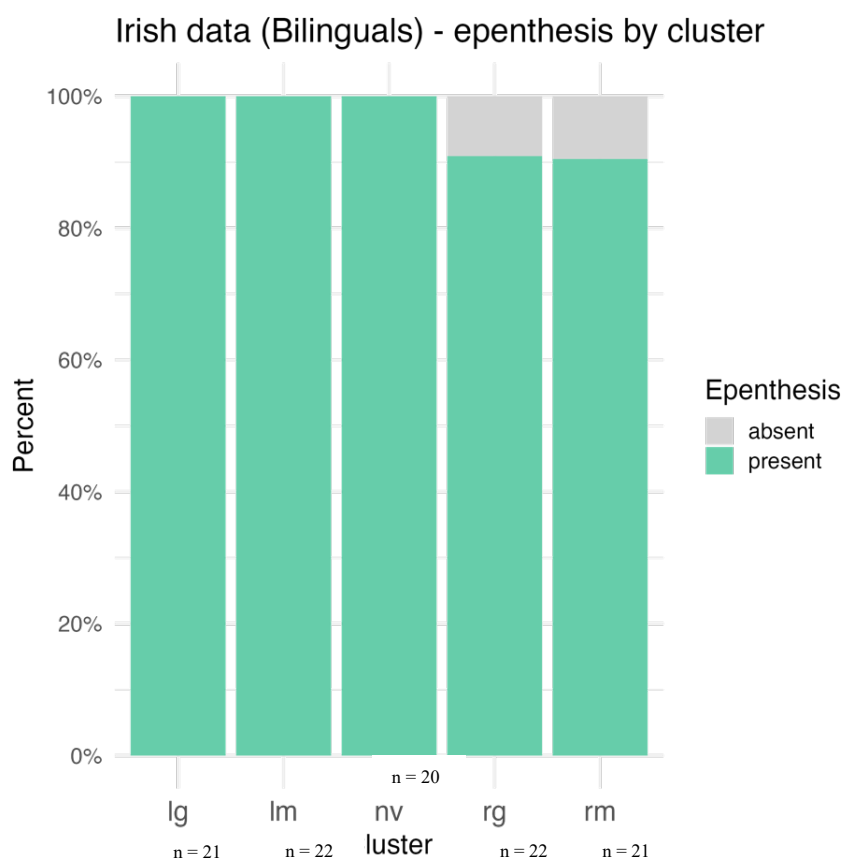


Figure 58. Rates of epenthesis in bilingual speakers' Irish, according to cluster type.

7.4 Results - statistical analysis

Bilingual vs. monolingual speakers. The first generalized linear mixed model (GLMM) investigated the effect of linguistic background (bilingual vs. monolingual) on the occurrence of epenthesis. Epenthesis (binarily coded as present (1) or absent (0)) was modelled as the dependent variable, with linguistic background as the predictor variable. Speaker and word were included as random effects to account for dependencies in the data. The results of the model are provided in

Table 31.

Table 31. Results of GLMM investigating the effect of linguistic background on the production of epenthesis.

epenthesis ~ linguistic_background + (1|speaker)+(1 | word)

Conditional R2: .82; Marginal R2: .14; Obs: 314

	Estimate	Std. Error	z	Pr(> z)
(Intercept)	-1.82	1.11	-1.64	0.101
lingMonolingual	-3.19	1.29	-2.48	0.013*

Random effects:

Groups	Name	Variance	Std.Dev.
speaker	(Intercept)	6.944	2.635
word	(Intercept)	5.454	2.335

These results suggest that epenthesis is significantly associated with linguistic background. Monolingual speakers demonstrate a significantly lower occurrence of epenthesis than bilinguals.

Bilinguals – sociolinguistic factors. A second GLMM was run to examine the association between the presence of epenthesis (in English) sociolinguistic predictors for bilingual speakers. This modelled epenthesis as a dependent variable, with the following factors as fixed effects: age, LPS, LAS, and cluster types. Word was included as a random intercept but speaker was omitted as it caused singular fit. The factors of gender and /rn/ clusters were ultimately excluded as their inclusion caused convergence issues. The results of this model are presented in Table 32.

Table 32. Results of GLMM investigating the effect sociolinguistic factors on the production of epenthesis in bilingual speakers.

epenthesis ~ age + LPS + LAS + /lm/ + /rm/ + /rl/ + (1|word)

Conditional R2: .9; Marginal R2: .75; Obs: 164

	Estimate	Std. Error	z	Pr(> z)
(Intercept)	29.75	7.19	-4.14	<0.001***
age	0.08	0.02	3.76	<0.001***
LPS	0.99	0.27	3.69	<0.001***
LAS	-0.76	0.58	-1.30	0.193
clusterlm	5.57	2.40	2.32	0.020*
clusterrm	0.69	2.01	0.34	0.731
clusterrl	-0.38	2.05	-0.19	0.854

The model indicated that, for bilingual speakers, epenthesis is significantly associated with age and LPS, showing a positive correlation. Furthermore, the /lm/ cluster (i.e. ‘film’, ‘elm’) had a significant positive association with epenthesis, unlike the other clusters investigated. This finding echoes Sell’s (2012) report of particularly high rates of /lm/ epenthesis in Galway City English. The random effects analysis reveals substantial variability in epenthesis occurrence across different words, with a variance of 4.874 (SE = 2.208).

Monolinguals – sociolinguistic factors. The generalized linear mixed model (GLMM) for monolingual speakers examined the association between the presence of epenthesis and the sociolinguistic fixed effects of age, gender, LPS and LAS. Cluster was omitted, as monolinguals only had epenthesis in /lm/ clusters. Word was modelled as a random intercept and speaker was omitted from the model as it caused a singular fit. None of the fixed effects exhibited statistically significant outcomes. The results of this model are provided in Table 33:

Table 33. Results of GLMM investigating the effect sociolinguistic factors on the production of epenthesis in monolingual speakers.

epenthesis ~ age + gender + LPS + LAS + (1|word)

Conditional R2: .95; Marginal R2: .004

	Estimate	Std. Error	z	Pr(> z)
(Intercept)	-7.96	4.20	-1.90	0.058
age	0.01	0.02	0.50	0.617
genderM	-0.77	0.76	-1.01	0.313
LPS	-0.10	0.17	-0.59	0.553
LAS	-0.19	0.37	-0.52	0.603

Summary of statistical results. The statistical findings confirmed patterns that were indicated in the descriptive analyses. The monolinguals had significantly lower rates of epenthesis than the bilinguals and only had epenthesis in ‘film’ and ‘elm’. The rates of epenthesis in these words did not vary according to the investigated sociolinguistic predictors. For the bilinguals, however, epenthesis significantly varied according to age, LPS and cluster type, with older speakers, those with higher LPS, and /lm/ clusters showing significantly higher rates of epenthesis.

7.5 Discussion, limitations and conclusion

In light of the findings from the descriptive and statistical analyses, the research questions posed at the beginning of this chapter will now be addressed. Limitations of this analysis will also be discussed.

RQ1a Relative to monolingual speakers, to what extent does epenthesis within liquid+sonorant coda clusters occur in the English of native Irish speakers?

As the English of Irish speakers is said to show particularly heavy Irish influence, it was hypothesized that if epenthesis is an Irish transfer feature (as believed by many), native Irish speakers would exhibit it to relatively higher degree.

It was found that, overall, the native Irish speakers showed significantly higher rates of epenthesis in their English compared to the monolingual English speakers. It was also found that older bilingual speakers had instances of syllabic /ɲ/ or /l/ (e.g. ‘barn’ → [baɲ]) in /r/+C clusters. Accounts of this realisation in IrE are hard to find, although I believe it to be a feature that is familiar (and generally stigmatised) among IrE speakers and is not unique to native Irish speakers of English. However, an acoustic and perceptual study might confirm this. This syllabic realisation has also been reported for Scots (Dieth, 1932 (as cited in Maguire 2017); Maguire, 2017; Wettstein, 1942 (as cited in Maguire 2017)) for which Maguire proposes an Old or early Middle English origin. In light of Maguire’s (2018) findings of parallels between Ulster English and British English (and Scots), it would be interesting to research these syllabic realisations in older British English input varieties, e.g. Middle or Early Modern English to further investigate possible parallels. There are no reports of these syllabic realisations of liquid+sonorant clusters in Irish and so an Irish source for this specific variant does not seem plausible. However, this does not mean that it was not historically found in Irish.

The investigation of sociolinguistic effects on epenthesis will now be addressed.

RQ1b To what extent do sociolinguistic factors influence the occurrence of epenthesis?

Age, Linguistic Profile Score (LPS), and /lm/ clusters emerged as statistically significant predictors of epenthesis among bilingual speakers. While, on the whole, bilinguals showed significantly more epenthesis than monolinguals, this was not the case when age was included as a factor. Younger bilinguals showed relatively low epenthesis rates and patterned more closely with monolinguals (young and old) than with their older bilingual counterparts. The low rates of epenthesis were maintained for monolingual speakers across age groups. This age-based variation pattern mirrors that found by Sell (2012) for Galway City English speakers. Sell reported a significant positive correlation between age and epenthesis, whereby epenthesis was more common for older speakers, suggesting possible change in progress.

The higher rates of epenthesis found in the present study for /lm/ clusters also echoes Sell's (2012) findings that the age-based variation did not impact /lm/ cluster epenthesis, which showed high rates for all speakers of Galway City English. Both 'film' and 'elm' in the present study showed a relatively high tendency for epenthesis.

The significant effect of LPS in bilingual speakers is of particular interest in the investigation of an Irish transfer source for this feature. The positive correlation between LPS and epenthesis indicated that bilingual speakers with higher dominance and more frequent usage of Irish are more likely to have epenthesis in their English. While further data would be needed to confirm this, given the relatively small sample size in this study, this might be considered a finding which supports an Irish transfer or reinforcement role in the presence of IrE epenthesis. The role of Irish in the presence of this feature is discussed further in the following section, addressing RQ2.

RQ2 What can the findings from RQ1a and RQ1b tell us about a possible Irish source or influence for this feature?

For bilingual speakers in this study, dominance and usage of Irish (measured via LPS) had a significant positive association with rates of epenthesis. What, if anything, might this tell us about an Irish influence? This question can be approached in two ways. The first is a top-down approach, where one assumes from the start an Irish source for this feature, and finds positive evidence suggesting that speakers who use Irish more have increased levels of epenthesis. If we start with a bottom-up approach, however, i.e. without assumptions about origins of this feature, a correlation between dominance in Irish and increased epenthesis is just that; a correlation. Taking this correlation to be 'proof' of an Irish influence would be falling victim to the confirmation bias that was present in early IrE linguistic studies, whereby a simple parallel in Irish is seen as confirmation of an Irish transfer. Maguire's (2018) convincing arguments about similarities with historical British English epenthesis and the differences in epenthesis patterns between IrE and Irish cannot be ignored in this case. An Irish source seems less likely when a simpler explanation can be found in the closer parallels between IrE and older British English epenthesis. In other words, although the bilingual speakers have higher rates of epenthesis, it is not necessarily due to an L1 Irish influence, which is a more complex idea than its pre-existence in English varieties brought to Ireland.

Given the existing characterisation of the English of native Irish speakers – i.e. as a variety that shows particularly heavy Irish influence – it might be odd to consider it as sharing segmental features with earlier British English varieties. However, this concept is not far-reaching if we consider Ceantar na nOileán English simply as a conservative variety of IrE, i.e. one that displays features once more widespread in IrE that have since changed in other IrE varieties. Such features do not necessarily stem from Irish. In light of Maguire’s (2018) proposals, some aspects of these varieties, including epenthesis, might be more accurately explained by considering historical British English. This idea will be explored further in Chapter 10, in the context of other features investigated in this thesis.

Overall, for these speakers, the present-day role of L1 Irish in the occurrence of epenthesis cannot be ruled out, given the findings for LPS. Historical influences of Irish on this feature must also remain inconclusive. For now, Maguire’s proposal of a British source, being the most straightforward, is certainly convincing.

8 /t/-lenition

8.1 Background and research questions

As detailed in Section 2.2, a wide range of variants have been reported for post-stressed syllable-coda /t/ in IrE (Hickey, 2007a; Skarnitzl & Rálišová, 2022). Both Hickey (2007) and Skarnitzl & Rálišová (2022) characterise all of these variants as part of a scale of lenition (outlined, along with some issues in §.2.2)¹. Of the multiple IrE /t/ variants, the fricative ‘slit-t’ is considered a shibboleth for IrE and is reported to occur cross-dialectally (Hickey, 2007). Notably, however, Hickey (1984) reports that native Irish speakers of English do not show lenition of /t/, i.e. that the plosive [t] is the only variant present in this dialect. This has not yet been empirically investigated.

The primary motivation behind exploring /t/-variation is thus to quantitatively interrogate Hickey’s (1984) claim that Gaeltacht English exhibits no lenition of /t/, unlike other (monolingual) IrE dialects. A secondary aim is to explore the potential influence of sociolinguistic factors on /t/-variation among both bilingual (if present) and monolingual speakers. While the origins of different /t/ variants are intriguing, they are not the central focus of this analysis. Bearing this in mind, the research questions concerning /t/-variation are as follows:

- | | |
|-------------|--|
| RQ1a | Relative to monolingual Irish English to what extent does the English of native Irish speakers show absence of /t/ lenition in post-stressed syllable coda position? |
| RQ1b | To what extent do sociolinguistic factors influence the realisation of /t/? |

¹ While there are considerable issues with the characterisation of all IrE /t/ variants as belonging to a scale of lenition, the term lenition will be used here, in the style of Hickey (2007) and Skarnitzl & Rálišová (2022) to refer to variants other than plosive [t].

8.2 Methods

The following subsections describe the methods used for annotation and acoustic analysis of /t/ tokens, along with the statistical methods used.

8.2.1 Annotation and categorisation of /t/ allophones

A total of 688 tokens of syllable-coda /t/ were extracted in post-stressed word-medial and word-final positions. Variants of /t/ were identified via acoustic analysis of the spectrograms and waveforms of each token in Praat, supplemented by auditory classification. The identification of each variant was carried out according to the methods outlined below, with spectrogram examples provided.

Fricative [t̪] ('slit-t'): the apico-alveolar fricative variant was identified through the presence of high energy aperiodic continuous noise, i.e. a relatively consistent band of energy in the higher frequencies as within the highlighted region in Figure 59:

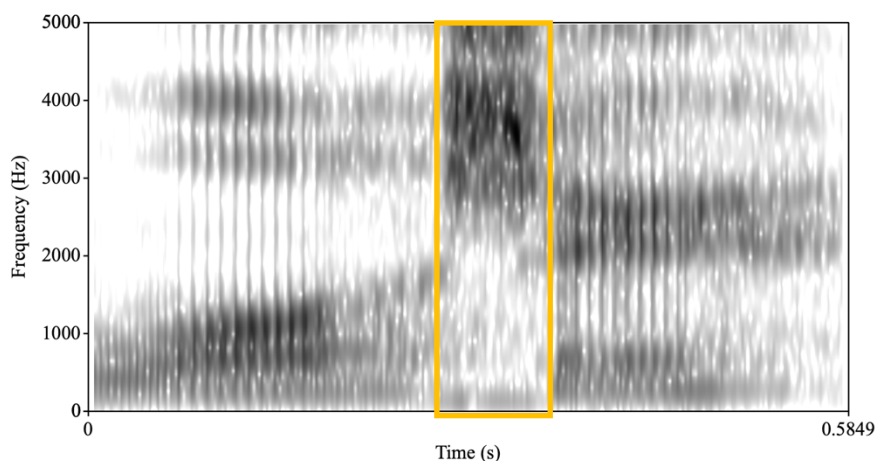


Figure 59. Spectrogram of 'water' produced with a slit-t (F, bilingual, 20).

Plosive [t]: the plosive/stop variant was visually confirmed through the presence of a pause and subsequent burst of energy, visible as a dark vertical bar as highlighted in Figure 60 below:

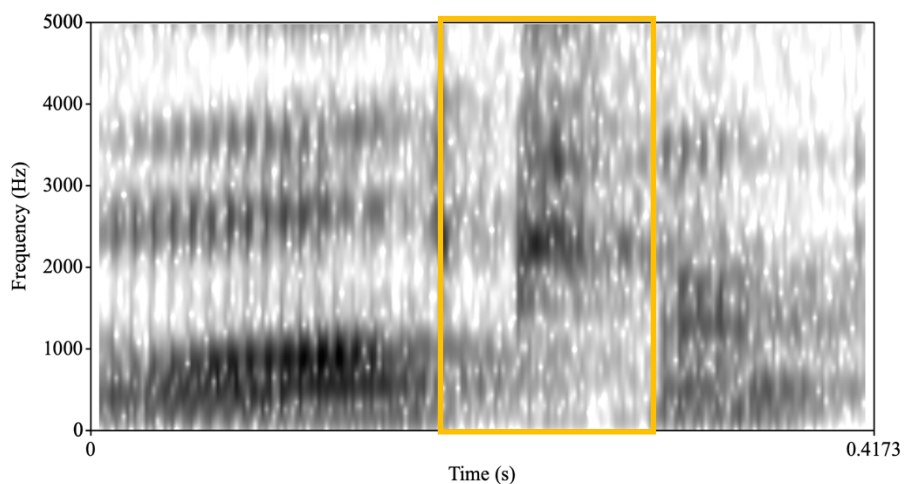


Figure 60. Spectrogram of 'water' produced with a plosive [t] (M, bilingual, 29).

Tap [r]: The tap variant, occurring in intervocalic position only, was identified through a very brief pause in the airflow. This was also confirmed by inspection of the waveform, where amplitude decreased substantially:

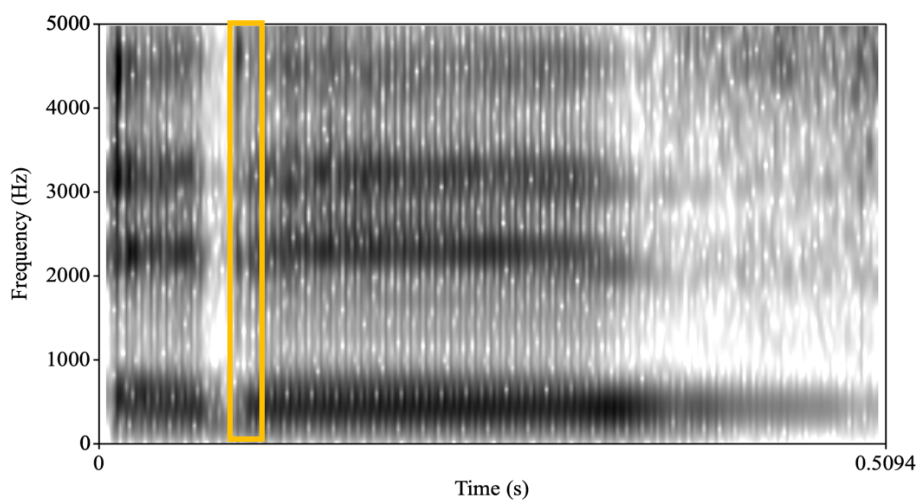


Figure 61. Spectrogram of 'it is' produced with a tap (F, bilingual, 20).

Glottal/glottalised [ʔ] : Many glottalised variants (i.e. no lingual gesture) in this dataset were characterised by creaky phonation. In such cases an increasing glottal period was evident – as seen in Figure 62 – rather than a complete closure. This phenomenon has been reported cross-dialectally, for example, by Ashby & Przedlacka (2014) in a study of glottal variants in Southern British English. The glottalisation was also accompanied by a distinctive decrease in amplitude in the waveform.

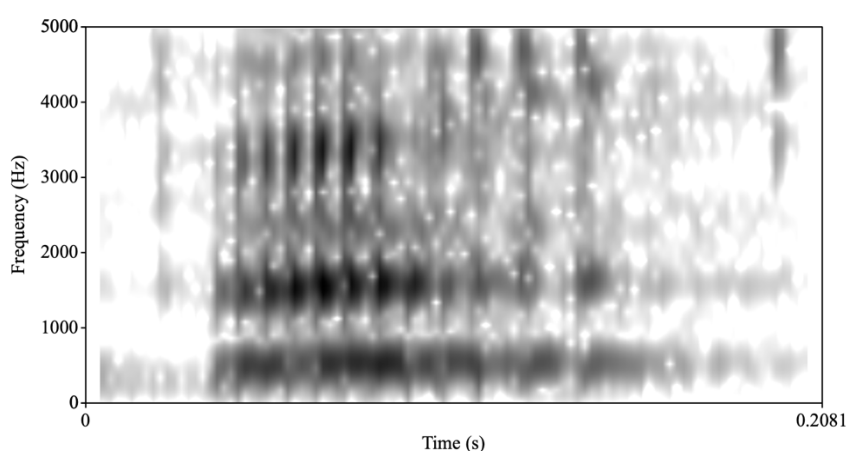


Figure 62. Spectrogram of ‘bit’ produced with a final glottal variant and creaky voicing (M, bilingual, 32).

Dentalised [t̪]: There were three tokens of a dentalised alveolar plosive [t̪] in the data. These were all in the word ‘water’ and from two speakers. This variant was not included in Hickey (2007) or Skarnitzl & Rálišová’s (2022) typology of /t/ variants. The acoustic correlates of this variant resemble the plosive [t] but have a more prominent period of silence caused by a more solid closure. For the dentalised [t̪] the tongue tip comes into contact with the hard surface of the teeth, whereas for the non-dentalised plosive (see Figure 63) there is a higher chance of lenition as the alveolar ridge presents a softer surface for the tongue and a more ‘leaky’ seal. However, for the dentalised variant there is a concentration of energy at a relatively higher frequency:

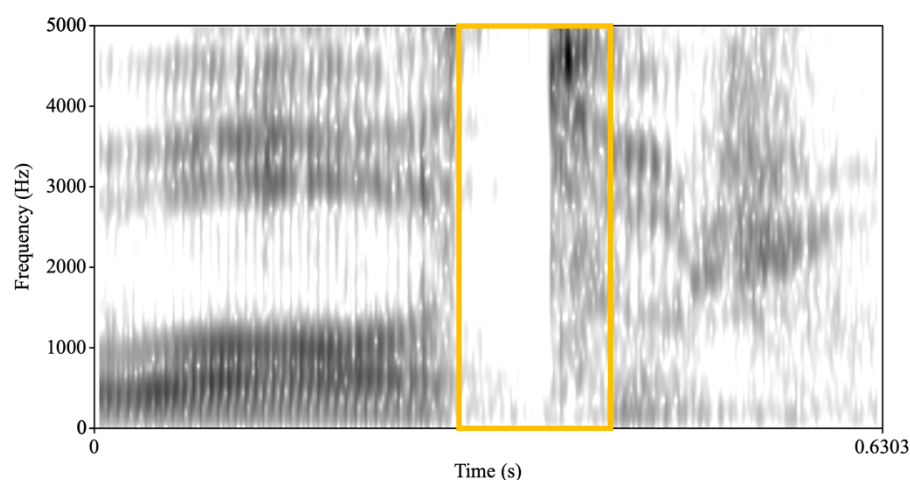


Figure 63. Spectrogram of 'water' produced with a dentalised [ɬ] variant (M, bilingual, 66).

All tokens of /t/ were exported via a Praat script. Tokens of the dentalised variant, although included in descriptive analysis, were not included in subsequent statistical analysis of lenited variants due to their low rate of occurrence.

Table 34 details the frequency and distribution of the variants for bi- and monolinguals.

Table 34. Frequency and distribution of /t/ variants in bilingual and monolingual speakers. Note: *Taps occurred in intervocalic position only.

<u>/t/ variants</u>						
Ling. background	Variant					Total
	[t]	[ɬ]	[ɾ] *	[ʔ]	[t̪]	
Bilingual	170	97	34	25	3	329
Monolingual	59	201	57	42	0	359

Along with the social factors of age, gender, Linguistic Profile Score (LPS), style and Local Attachment Score (LAS), linguistic factors were investigated, partly based on findings by Schulte (2020) and Skarnitzl & Rálišová (2022) (see Section 2.2). The

linguistic factors considered for analysis included semantic status of the word (lexical vs grammatical), the word position of /t/ (medial or final), the preceding phonetic context (obstruent consonant, sonorant consonant, vowel) and following phonetic context (obstruent consonant, sonorant consonant, vowel, pause).

8.2.2 Descriptive and statistical methods

In order to explore the allophonic variation in the data, /t/ variants were firstly visualised via stacked bar charts, created using `ggplot2` in R (Wickham, 2016). Stacked bar charts were chosen as they allow for easy comparison of proportions between the multiple /t/ variants and an understanding of the distribution patterns according to various sociolinguistic factors. While the bar charts provide a decent level of analytical understanding of the data, variation patterns were further explored and verified statistically where necessary.

The statistical analyses consisted of mixed effects logistic regression models (generalised linear mixed models) run in R using `glmer()` from the `lme4` package (Bates et al., 2015; R Core Team, 2023). A logistic model (as opposed to a linear one) was required as the response variable (variants of /t/) was categorical. It is worth noting that, in theory, for multinomial data it is also possible to run a mixed effects multinomial logistic regression where all possible allophones are modelled within the dependent variable. However, the binomial method was used here as the multinomial approach was deemed overly complex for addressing the specific questions at hand.

This section presents the results of the descriptive and statistical analyses on the allophones of /t/, addressing various sociolinguistic predictors in turn.

8.3 Results - descriptive analysis

Bilinguals vs. monolinguals. As seen in Figure 64, the most striking difference between the monolingual and bilingual groups on the whole is the distribution of the plosive [t] and slit-t. The most common variant for the bilingual speakers is the plosive [t] (51%) ; for the monolingual speakers it is the slit-t (56%). Additionally, monolingual speakers

show higher rates of taps (intervocalic) and glottal stops than bilingual speakers. Furthermore, three tokens of a voiceless dental plosive [t̪] were present within the bilingual group.

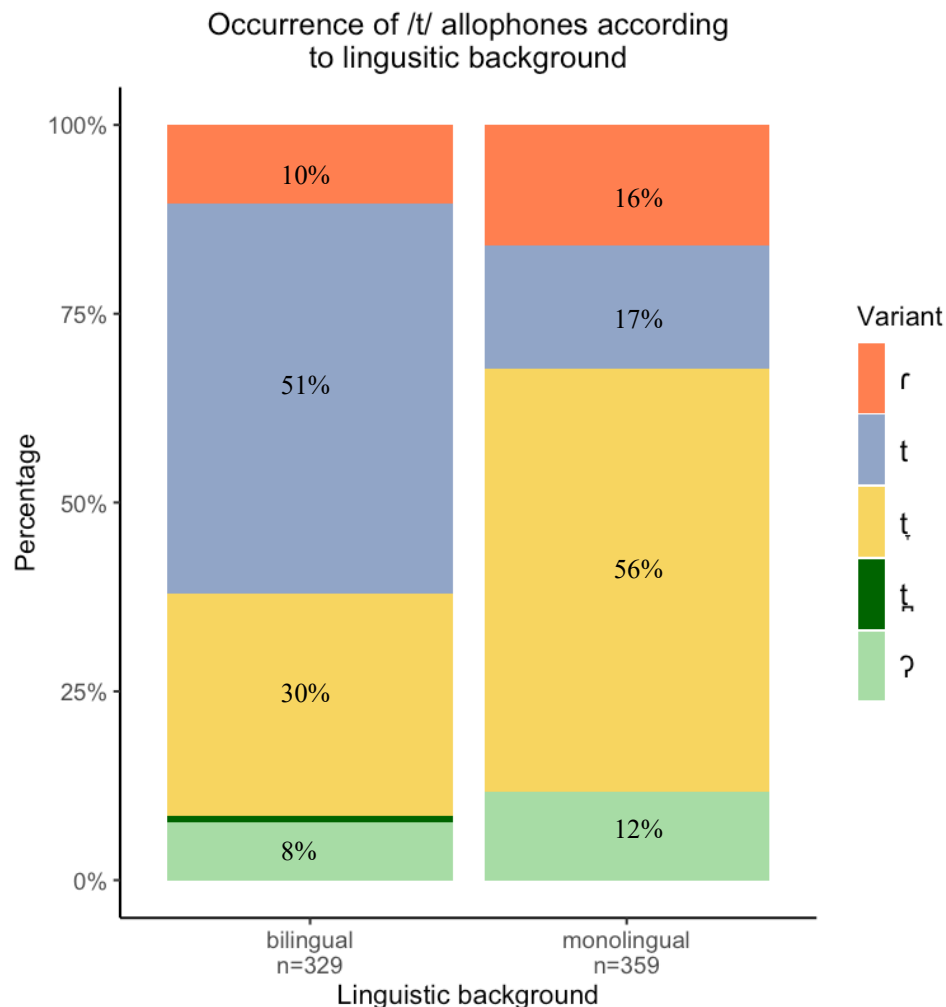


Figure 64. Occurrence of /t/ allophones according to linguistic background.

Gender. Previous quantitative studies of /t/ in IrE have not explored gender as a predictor of /t/-realisation. As a result, no definitive hypotheses were formulated regarding gender-related variation in this dataset. Figure 65 indicates minimal gender-based variation within both the monolingual and bilingual speaker groups, i.e. the distribution of the /t/ allophones is similar for both males and females within each group. Based on this finding, gender was not deemed to be a relevant predictor for /t/-variation.

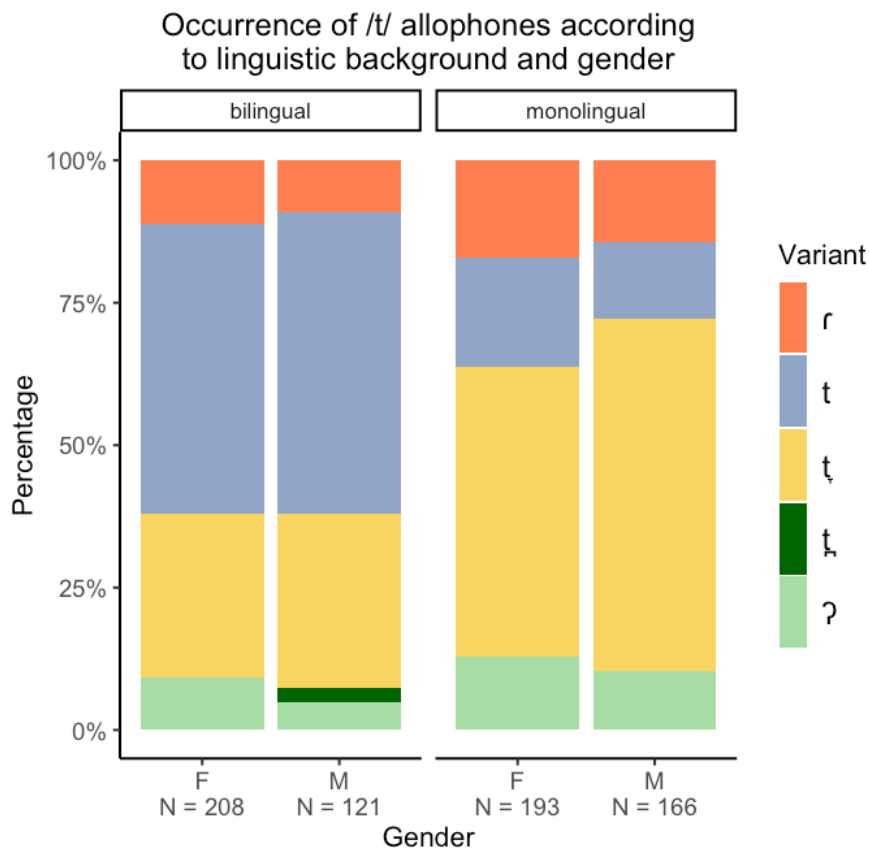


Figure 65. Occurrence of /t/ allophones by linguistic background and gender.

Age. Similar to the treatment of gender as a factor, age has not yet been systematically analysed in previous studies of IrE /t/-variation. However, in a description of Dublin English, Hickey says that the tap variant occurs mainly for younger ‘non-local’¹ speakers. Figure 67 suggests that while within-group gender-based variation is still minimal across age groups, age-based variation has higher explanatory value for both monolinguals and bilinguals.

¹ Hickey indirectly attributes this term to middle or upper class speakers of Dublin English, who used less ‘stigmatised’ variants associated with the inner city.

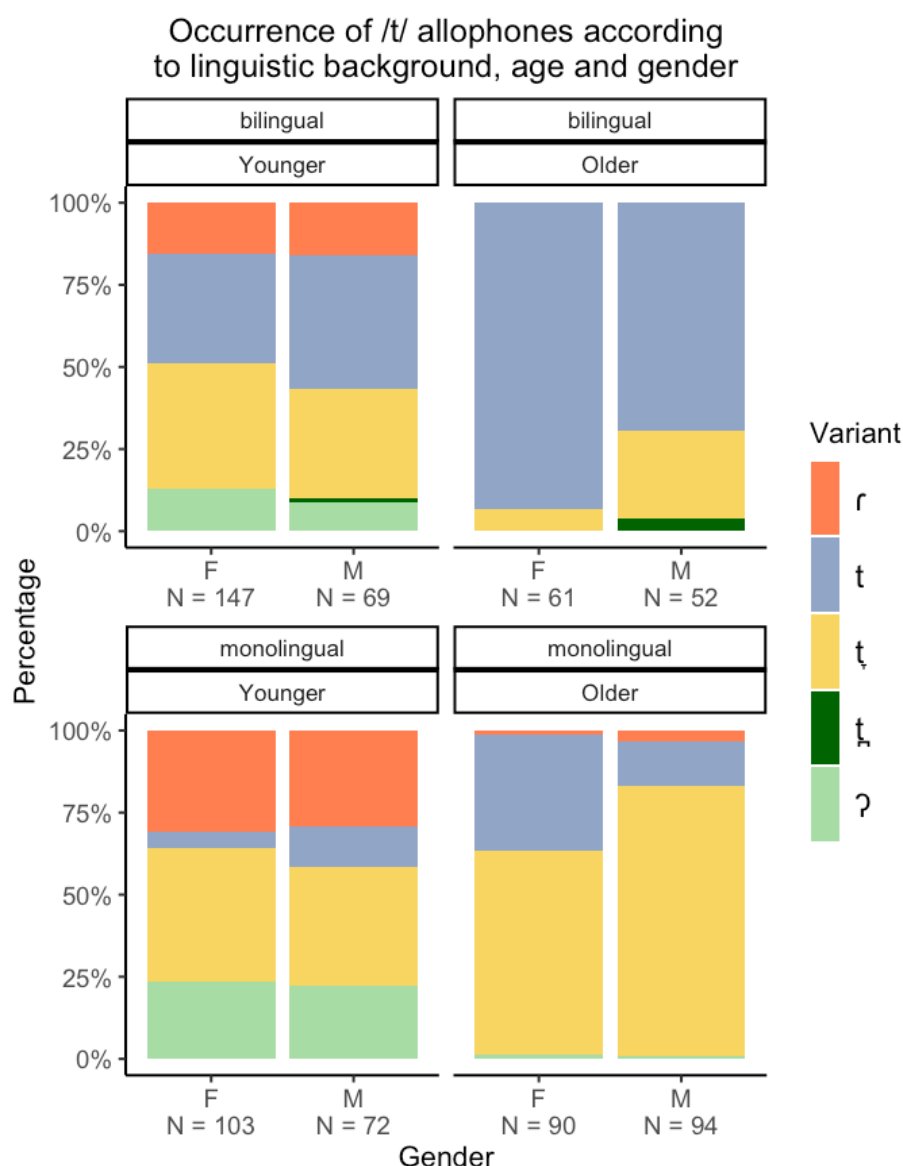


Figure 66. Occurrence of /t/ allophones by linguistic background, age and gender.

Considering the bilingual speakers in the top row (Figure 66), for example; the younger group exhibits a broader range of variants (including the tap and glottal allophones) compared to the older group who favour the plosive [t] in the majority of cases. For the older bilingual women in particular, the plosive [t] accounts for 90% of tokens.

These findings suggest that Hickey's (1984) assertion regarding the absence of /t/-lenition in Gaeltacht English remains partly valid, albeit only for the older bilinguals. The younger bilinguals use a wider range of /t/ variants, suggestive of a change in progress.

A substantial degree of age-based variation is also evident for the monolingual speakers. Similar to the older bilinguals, the older monolinguals lack the range of variants present for their younger counterparts. However, unlike the older bilinguals, they favour the slit-t in the majority of cases. Among older monolingual males, the slit-t is notably prevalent, appearing in over 75% of instances. Finally, the younger monolinguals have a higher occurrence of tap and glottal variants than the younger bilinguals, who have a higher rate of the plosive [t].

Style. Skarnitzl and Rálišová (2022) provided supporting evidence for Hickey (2007), indicating that the slit-t remains a consistent marker of Irish English (IrE) regardless of speaking style, suggesting its stability. In contrast, Schulte (2020) observed a positive correlation between the use of word-list or monitored style and the occurrence of slit-t, suggesting a potential influence of speaking style on its usage. Regarding glottal and tap variants, Skarnitzl and Rálišová (2022) found a positive association with spontaneous speech, particularly in word-final glottal variants and word-medial taps.

The following two figures explore the impact of speaking style (read vs. spontaneous) within the groups of bilinguals and monolinguals, respectively. Figure 67, focusing on bilinguals, indicates that, akin to the observations by Skarnitzl and Rálišová (2022), speaking style does not appear to significantly influence the presence of slit-t for these speakers. Among younger bilinguals, there is only a 1% discrepancy in slit-t frequency between the two styles, while older speakers show a 3% difference. However, glottal and tap variants seem to correlate with spontaneous speech among younger bilinguals,

aligning with Skarnitzl and Rálišová's findings, and plosive variants are more common in read speech for younger bilinguals.

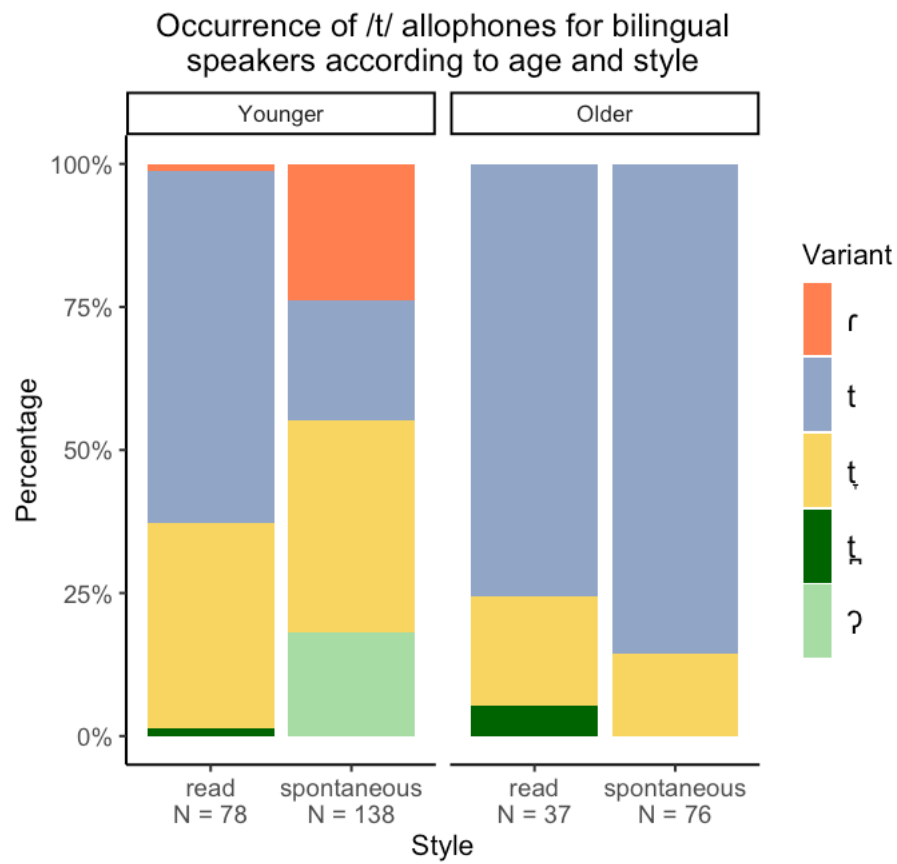


Figure 67. Occurrence of /t/ allophones for bilingual speakers, subdivided by age and speech style.

Figure 68 illustrates the parallel data for the monolinguals based on the same factors of age and style.

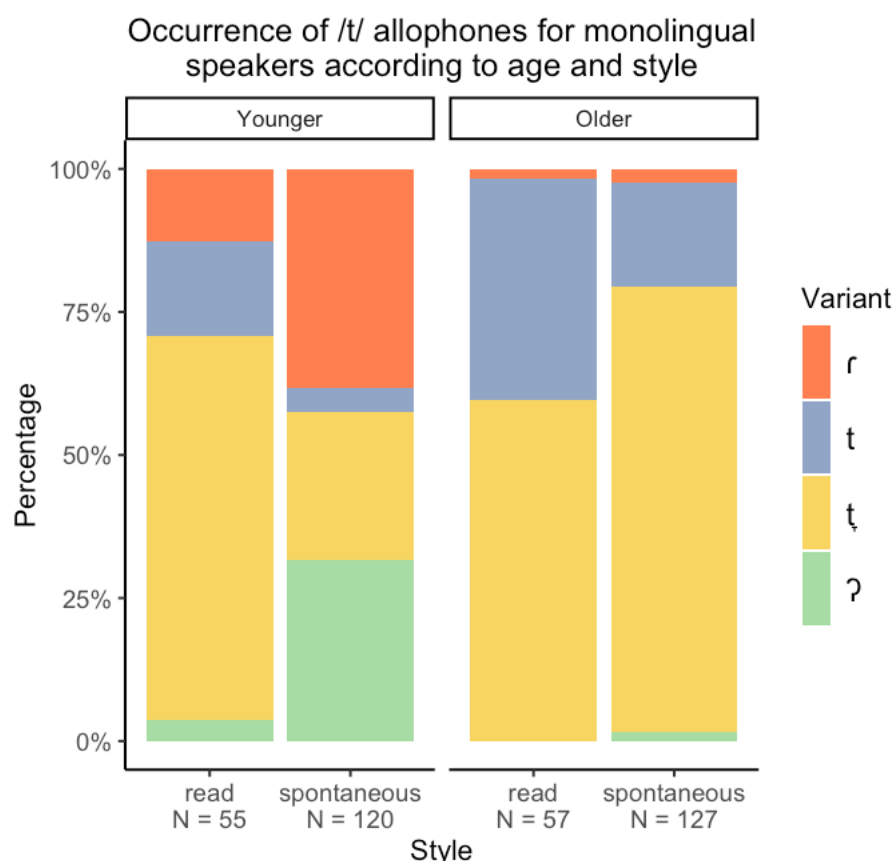


Figure 68. Occurrence of /t/ allophones for monolingual speakers, subdivided by age and speech style.

For the older monolinguals, there is a small degree of variation between styles, whereby plosive [t] usage increases in read speech. This pattern was also observed for the younger bilinguals. However, this variation within the older group is relatively minimal compared to the younger monolinguals, who show a higher degree of style-based variation. Notably, they increase their usage of glottal and tap variants in spontaneous speech. This age-based difference was also evident for the bilinguals.

Comparing the bilinguals (Figure 67) and monolinguals (Figure 68) further, the most striking contrast lies in the prevalence of the plosive [t] among bilinguals compared to the prominence of the slit-t among monolinguals. Across all groups, except for older bilinguals, there seems to be an increase in the usage of the plosive variant in read speech.

This observation aligns with the findings of Skarnitzl and Rálišová (2022).

When the data from Figure 68 and 69 are considered on the whole, speaking style appears to be a relevant predictor for /t/-variation in younger – but less so in older – speakers.

While the younger speakers display a wider range of variants in spontaneous speech, the older speakers largely maintain either plosive [t] (bilinguals) or slit-t (monolinguals) across speech styles. Furthermore, in spontaneous speech, the difference between younger bilinguals and monolinguals is relatively minimal. However, this is not the case for read speech, where the younger bilinguals favour a plosive, and the younger monolinguals a slit-t.

The following sections will explore the effects of further linguistic factors on /t/-variation within the younger speakers, who display a wide range of variants.

Following phonetic context. As phonetic context has been found to be an important predictor for IrE /t/-variation (Schulte, 2020; Skarnitzl & Rálišová (2022). Figure 69 and Figure 70 present the /t/ variants according to their following context and word position. Note that the tap variant only occurs in intervocalic position. Figure 69 shows that for the young bilingual speakers, /t/ shows the widest range of variants before a vowel (due to the occurrence of the tap variant, which is only in intervocalic position). This applies in both word-final (cross-lexically) and word-medial positions with minimal difference between the two. In word-final pre-pausal position, a slit-t is favoured. Furthermore, the rate of plosive [t] remains relatively steady across conditions.

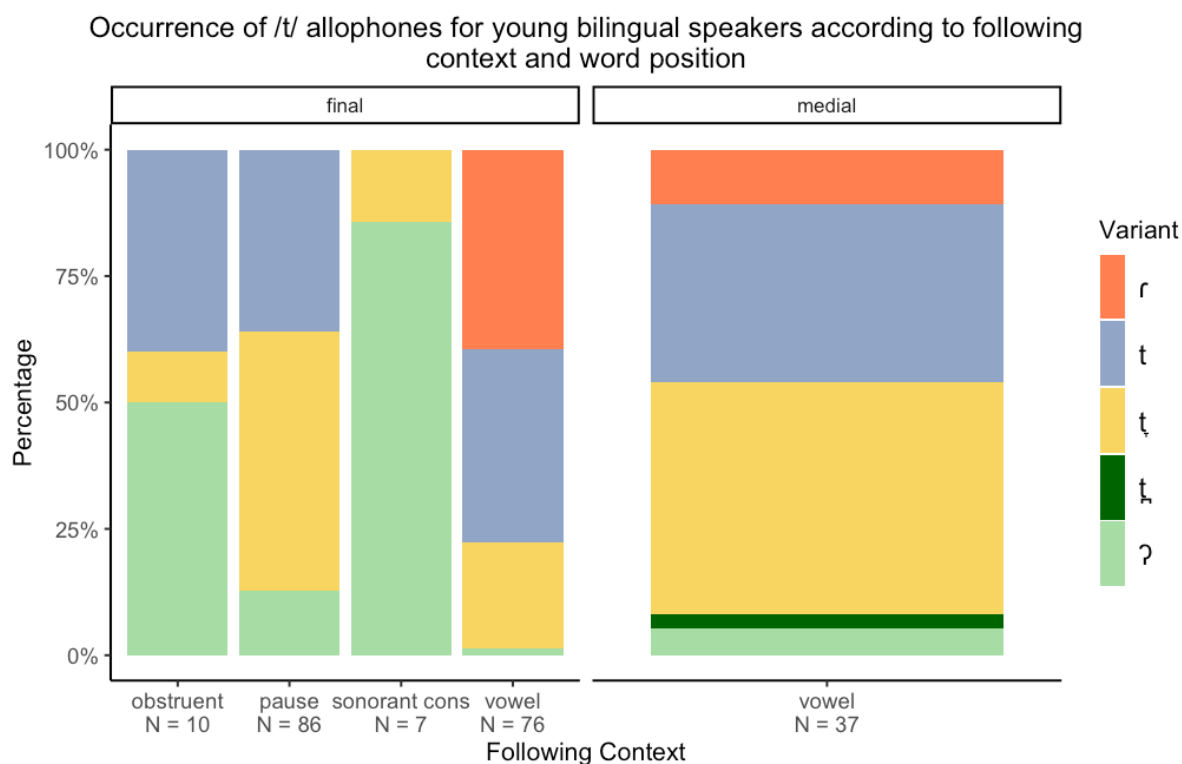


Figure 69. Occurrence of /t/ allophones for young bilingual speakers according to following phonetic context and word position.

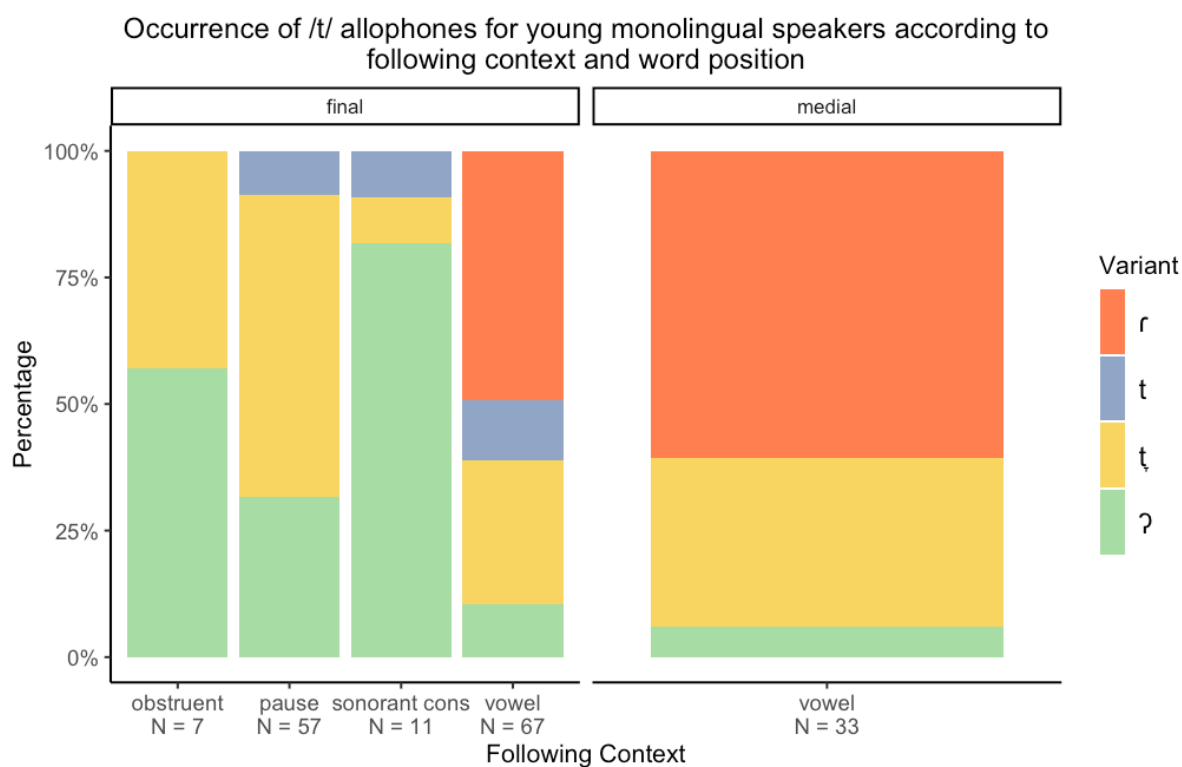


Figure 70. Occurrence of /t/ allophones for young monolingual speakers according to following phonetic context and word position.

When comparing the young bilinguals (Figure 69) and monolinguals (Figure 70), the most notable difference is the occurrence of the plosive [t]. Young bilingual speakers consistently use the plosive [t] across all contexts, while monolingual speakers use it infrequently and entirely avoid it in certain contexts. The monolinguals favour a slit-t in word-final pre-pausal position, similar to the bilinguals. However, the groups differ in their usage of the tap and glottal variants which are more popular with the monolinguals.

Preceding phonetic context. Figure 71 (young bilinguals) and Figure 72 (young monolinguals) show that the preceding phonetic context is a relevant linguistic factor for /t/-realisation in these speakers. Comparing these two figures, it is evident that in word-final position, there is only slight variation between younger bilinguals and monolinguals. Both groups, unsurprisingly, have a plosive [t] in all post-obstruent tokens (e.g. in ‘just’). In post-sonorant position, plosive [t] is also favoured. However, within this category there are some instances of slit-t, e.g. in post-/r/ contexts (e.g. ‘start’) and more surprisingly in post-/n/ contexts, as seen in the spectrogram of ‘aunt’ (Figure 73). This latter instance is interesting, as Hickey (2009) has previously reported /t/-lenition after /r/ but not after /n/.

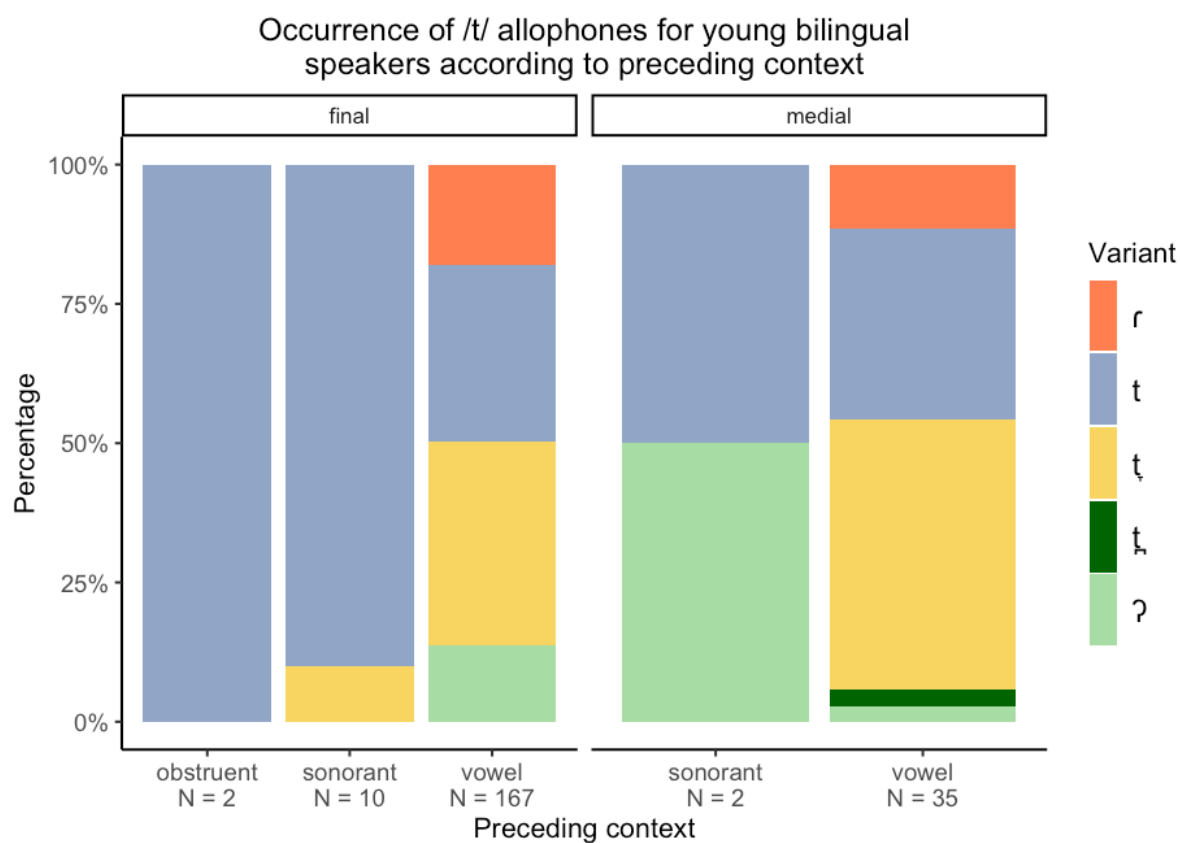


Figure 71. Occurrence of /t/ allophones for young bilingual speakers across preceding phonetic context.

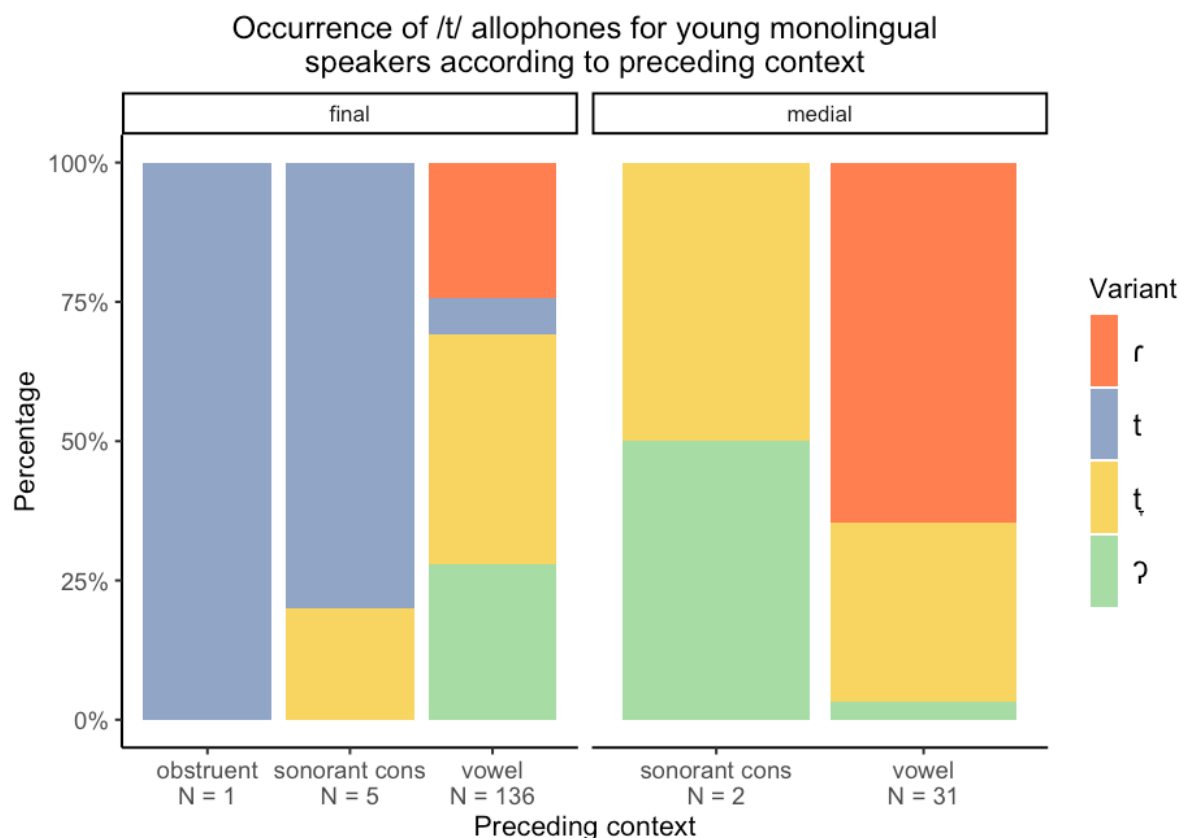


Figure 72. Occurrence of /t/ allophones for young monolingual speakers across preceding phonetic context.

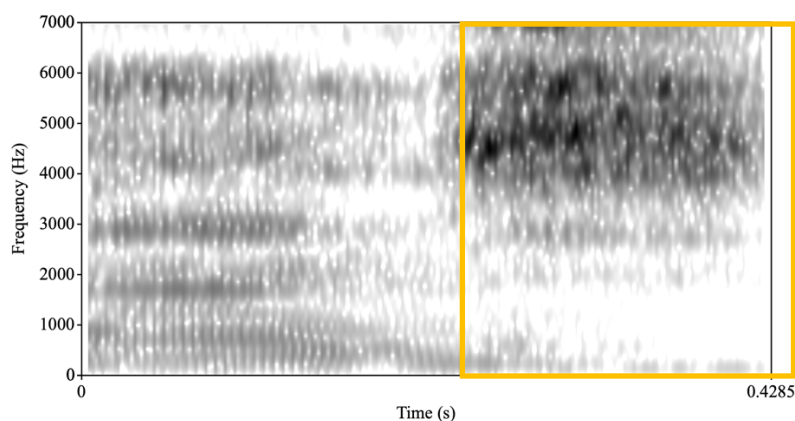


Figure 73. Spectrogram of 'aunt' produced with a slit-t (F, bilingual, 26).

Intervocalic /t/ Figure 74 compares intervocalic /t/ allophones between younger bilinguals and monolinguals, as this is the only environment in which the tap variant is present. It is evident that the younger monolinguals produce a relatively higher proportion of tap variants in this context and that, on the contrary, bilinguals have a notably higher

proportion of plosive [t]. The slit-t and glottal variants show less variation between groups.

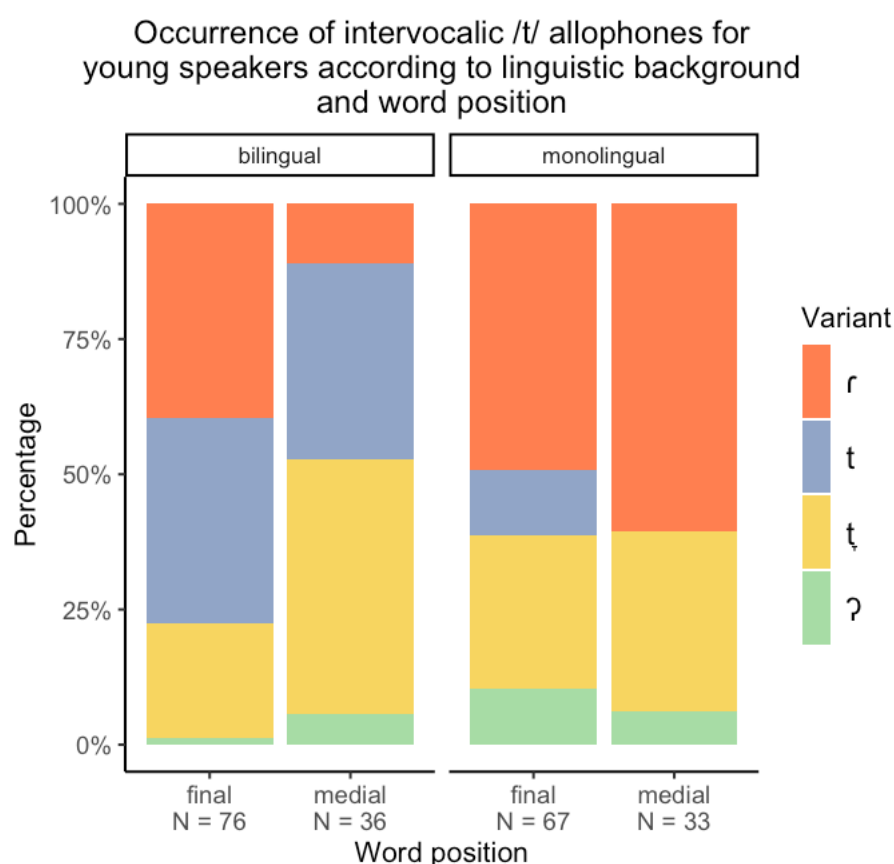


Figure 74. Occurrence of /t/ allophones of younger speakers according to word position and linguistic background.

It is evident that phonetic context substantially influences /t/ variation among these speakers. Glottal variants are more prevalent when adjacent to a consonant for both groups of speakers, and both groups tend to favour a slit-t preceding a pause in word-final position. While the rates of slit-t are generally comparable between the two groups across various contexts, the primary distinction, observed when analysing bilinguals and monolinguals collectively, is the higher frequency of the plosive [t] among bilinguals across all phonetic contexts.

Semantic status. The effect of semantic status was analysed to facilitate comparison between the younger speakers in this study with those in the study by Skarnitzl and Rálišová (2022), who also analysed younger speakers of IrE. They found that /t/-

realisation significantly varied as a function of semantic status; tap variants were more likely in grammatical words and slit-t in lexical words (both in word-final position).

Figure 76 displays the allophones of /t/ for the younger bilinguals, according to semantic status and word position. The variation between these groups is not substantial, however it appears that there is increased lenition (tokens that are not plosive) within grammatical words, where plosive [t] is less common. The increased use of the word-final tap in grammatical words – although marginal here – correlates with Skarnitzl and Rálišová’s finding for taps. An additional correlation is the heightened use of slit-t in lexical words, however this only applies to word-medial position for these speakers.

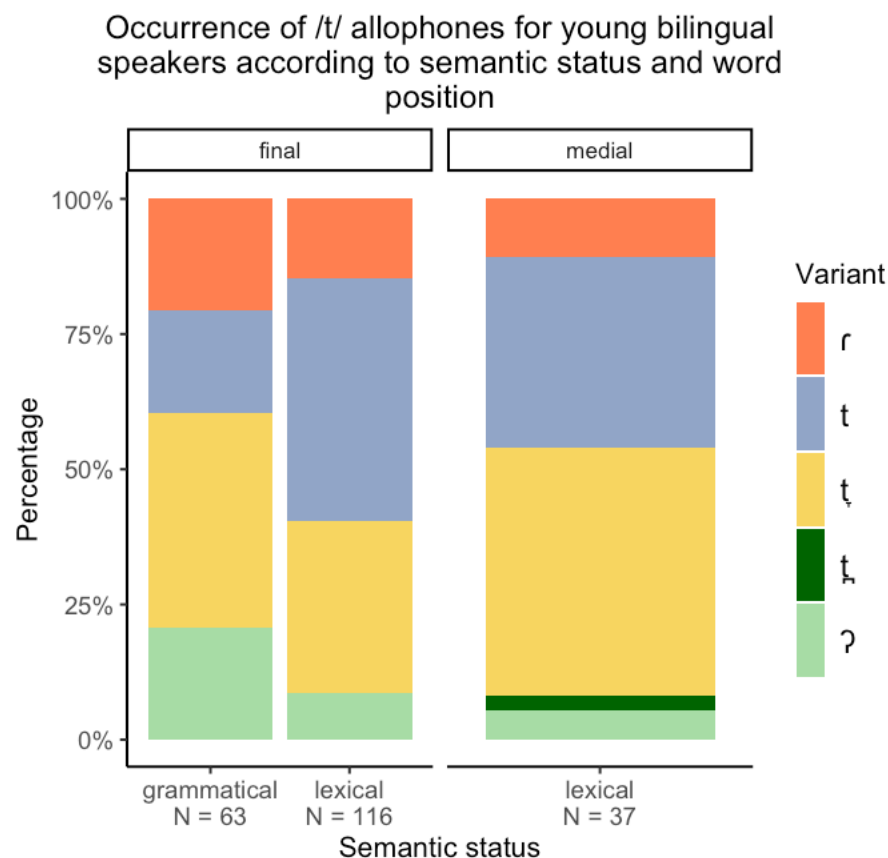


Figure 75. Occurrence of /t/ allophones for younger bilingual speakers, according to semantic status and word position.

Figure 76 displays parallel data for the young monolingual speakers.

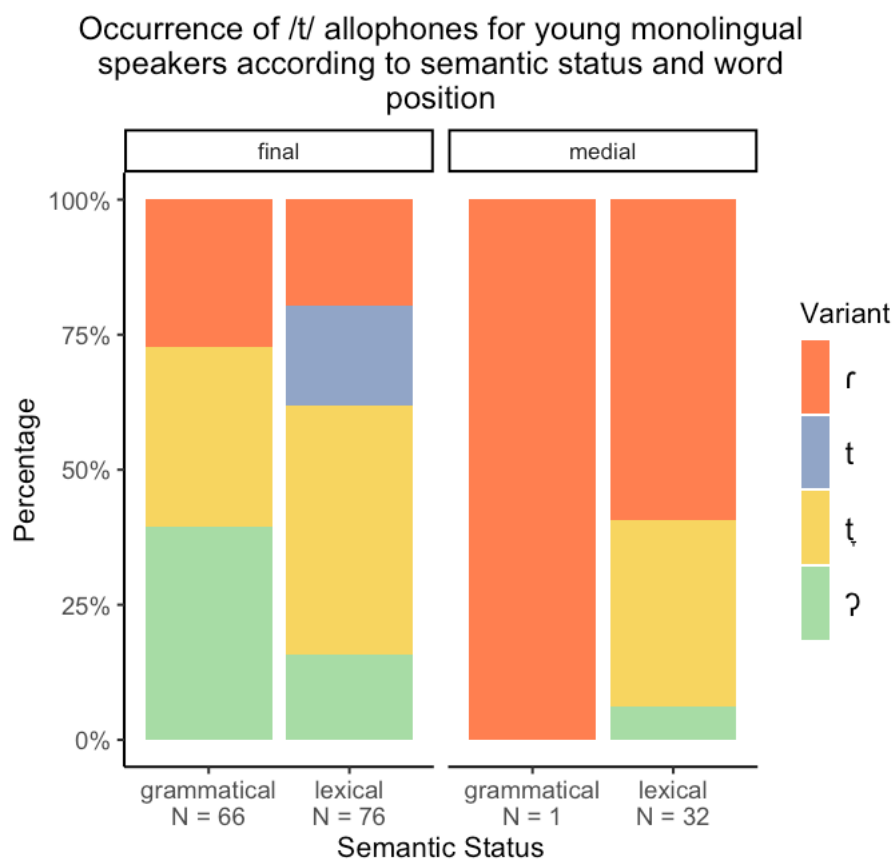


Figure 76. Occurrence of /t/ allophones for younger monolinguals, according to semantic status and word position.

Semantic status has a comparable impact on word-final taps and glottal variants for young monolinguals as it does for young bilinguals. Grammatical words show a correlation with higher rates of tap and glottal variants in both groups. Moreover, the increased prevalence of slit-t in word-final lexical contexts among young monolinguals aligns with findings from Skarnitzl and Rálišová's (2022) study. However, a notable distinction persists: young bilinguals exhibit a relatively higher occurrence of the plosive [t] compared to young monolinguals.

8.4 Results - statistical analysis

This section details the statistical analyses conducted following the exploration and visualisation of the data. Aligning with the structure of the prior subsection on descriptive analysis, it systematically examines the data according to the various social and linguistic factors. Given the minimal impact of gender on /t/-realization as indicated by the

descriptive data, gender was not further explored statistically.

Bilinguals vs. monolinguals (linguistic background and age). The first research question in the study of /t/-variation was whether monolinguals and bilinguals differ significantly in their degree of /t/-lenition, motivated by Hickey’s (1984) report that bilingual speakers have no lenition of /t/.

To statistically investigate the variation between bilinguals and monolinguals, a logistic mixed effects model (GLMM) was run in R, using `glmer()` from the `lme4` package (Bates et al., 2015). As each participant produced multiple tokens of /t/ and words were repeated within the data, there are dependencies. This calls for the use of a mixed model. Furthermore, as the response variable (/t/-realisation) is categorical, a logistic regression model (GLMM) is required. See Chapter 3 for a more detailed account of GLMMs.

For the bilingual vs. monolingual model, tokens of /t/ were binarily coded as lenited vs. plosive and were modelled against the factor of linguistic background (monolingual vs. bilingual) and age, with speaker and word as random intercepts. The model results are displayed in Table 35:

Table 35. Results of GLMM investigating the effect of linguistic background and age on the production of /t/.

`glmer(lenition ~ ling*age_group + (1 | word) + (1|speaker))`
Conditional R2: .94; Marginal R2: .23; Obs: 688

	Estimate	Std. Error	z-value	Pr(> z)	Odds ratio
(Intercept)	-0.03	0.97	-0.03	0.976	0.97
lingMonolingual	-4.4	1.44	-3.06	0.002**	0.01
age_groupOlder	3.61	1.54	2.35	0.019*	36.87
lingMonolingual:age_groupOlder	-1.13	2.1	-0.54	0.591	0.32

Table 35 shows that linguistic background and age both had significant effects on the likelihood of plosive [t]. However, the interaction effect between these two factors and /t/-lenition was not significant. The intercept in Table 35 represents younger bilinguals and has a value of -0.02871. As this is a logistic regression, this value is in log odds, and -

0.02871 is a 49% probability (calculated with `plogis()` in R), i.e. the model estimates that a /t/ produced by young bilingual speaker has a 49% likelihood of being a plosive [t]. The monolingual estimate is -4.39666, which means the model estimates that /t/ produced by a monolingual has log odds of being a plosive of -4.42537, which equates to a 1% probability.

The estimate for older speakers is 3.61250, indicating that older speakers are estimated to have higher log-odds of plosive [t] compared to the reference group (younger). The probability of observing a plosive [t] is 97% higher for older speakers compared to younger speakers. This difference is statistically significant ($p = 0.018$). Finally, the interaction effect between age and linguistic background on the occurrence of plosive [t] was not statistically significant. Overall, the results of this GLMM show significant effects of linguistic background and age on the occurrence of plosive tokens.

Younger speakers. In the descriptive analysis a wide range of variants was evident for the younger speakers. It was decided to investigate their sociolinguistic conditioning further. Two GLMMs (bilinguals and monolinguals) were thus created to explore the effects of semantic status, style and (for bilinguals) LPS and LAS on /t/-realisation. The inclusion of phonetic contexts (preceding and following) proved too complex and caused model convergence issues. Regarding the inclusion of LPS and LAS for the bilinguals, is hypothesized that increased use of plosive [t] will correlate with a higher LPS, mirroring the ‘traditional’ plosive [t] which is dominant in the older bilinguals.

While there are ways to conduct a multinomial logistic mixed effects model, whereby all /t/-variants are modelled at once, this proved too complex and so a series of logistic mixed effects models – using `lme4` (Bates et al., 2015) in R – were run in a one vs. rest fashion. This means that one model was run to investigate the probability of observing a particular /t/ variant e.g. a tap [ɾ] as opposed to the other possible variants, and so on for each variant.

Young bilinguals. For each variant model semantic status, style, LPS and LAS were modelled as fixed effects and speaker and word as random intercepts. For the tap and glottal variant models, the inclusion of speaker resulted in a singular fit and was therefore omitted. The results for each model are as follows:

Tap [r]:

Table 36 provides the output for the tap model for young bilingual speakers.

Table 36. Results of GLMM investigating the effect of various social factors on the production of [r] vs. other /t/ variants for younger bilingual speakers.

tap ~ semantic_status + style + LPS + LAS + (1 | word)

	Estimate	Std. Error	z	Pr(> z)	Odds ratio
(Intercept)	-6.12	2.92	-2.10	0.036*	0.002
semantic_statusLexical	-0.73	1.07	-0.68	0.500	0.48
styleSpontaneous	2.83	1.42	1.99	0.047*	16.98
LPS	0.01	0.10	0.12	0.908	1.01
LAS	0.16	0.27	0.62	0.537	1.17

The coefficient for style (spontaneous vs. formal) is 2.83368, and it is statistically significant ($p = 0.047$). This indicates that, all else being equal, the log-odds of observing a tap are higher for spontaneous speech compared to formal speech. No significant effects of semantic status, LPS or LAS were found. While phonetic context is not modelled here (for reasons outlined above) it is worth bearing in mind that tap variants only occur in intervocalic contexts.

Plosive [t]:

Table 37 provides the output for the plosive [t] model:

Table 37. Results of GLMM investigating the effect of various social factors on the production of [t] vs. other /t/ variants for younger bilingual speakers.

plosive ~ semantic_status + style + LPS + LAS + (1 | word) + (1 | speaker)

	Estimate	Std. Error	z	Pr(> z)	Odds ratio
(Intercept)	12.63	17.73	0.71	0.476	
semantic_statusLexical	1.62	4.14	0.39	0.695	5.06
styleSpontaneous	-4.45	3.70	-1.20	0.229	0.01
LPS	-0.26	0.68	-0.38	0.704	0.77
LAS	-0.69	1.54	-0.45	0.654	0.5

As seen in the descriptive analysis, plosive [t] was relatively common for bilinguals (compared to monolinguals). None of the fixed effects were significant for the plosive in younger bilingual speech.

Slit-t [t̚]:

Table 38 provides the output for the slit-t [t̚] model.

Table 38. Results of GLMM investigating the effect of various social factors on the production of [t̚] vs. other /t/ variants for younger bilingual speakers.

slit ~ semantic_status + style + LPS + LAS + (1 | word) + (1|speaker)

	Estimate	Std. Error	z	Pr(> z)	Odds ratio
(Intercept)	-6.58	6.09	-1.08	0.279	0.001
semantic_statusLexical	0.03	0.51	0.06	0.950	1.03
styleSpontaneous	-0.79	0.49	-1.62	0.105	0.45
LPS	0.28	0.25	1.12	0.265	1.32
LAS	-0.27	0.53	-0.50	0.614	0.76

No significant predictors were found for slit-t in young bilinguals.

Glottal [ʔ]:

Table 39 provides the output for the glottal [ʔ] model.

Table 39. Results of GLMM investigating the effect of various social factors on the production of [ʔ] vs. other /t/ variants for younger bilingual speakers.

glottal ~ semantic_status + LPS + LAS + (1 | word)

	Estimate	Std. Error	z	Pr(> z)	Odds
(Intercept)	8.88	3.41	2.61	0.009***	
semantic_statusLexica	-2.79	1.48	-1.89	0.059	0.061
LPS	-0.48	0.14	-3.39	0.001***	0.62
LAS	0.38	0.31	1.23	0.218	1.46

Glottal variants only occurred in spontaneous speech and, as such, style was excluded as

an effect in the glottal model. LPS had a highly significant effect ($p < 0.001$) on the occurrence of glottal variants. A higher LPS is associated with lower odds of a glottal variant occurring.

Young monolinguals. GLMMs of the same format were run for younger monolingual speakers in a one vs. rest fashion. Semantic status and style were modelled as fixed effects and speaker and word as random effects (LPS and LAS were not of interest for the monolinguals as no effects were hypothesized or expected). For the glottal model, the inclusion of style resulted in convergence issues and was omitted. The results are as follows:

Tap [ɾ]:

Table 40 provides the output for the tap [ɾ] model.

Table 40. Results of GLMM investigating the effect of various social factors on the production of [ɾ] vs. other /t/ variants for younger monolingual speakers.

`tap ~ semantic_status + style + (1 | word) + (1|speaker)`

	Estimate	Std. Error	z	Pr(> z)	odds
(Intercept)	-3.56	1.50	-2.37	0.018*	0.03
semantic_statusLexical	0.42	0.97	0.43	0.664	1.52
styleSpontaneous	2.64	1.23	2.14	0.032*	14.03

For younger monolingual speakers, spontaneous speech had a significantly positive effect on the occurrence of taps ($p < 0.05$) with a 29% probability of occurrence. This mirrored the outcome for bilingual speakers, where taps were also more likely in spontaneous speech.

Plosive [t]:

There were convergence issues with the plosive model that included both style and semantic status. Each were omitted in turn and the model that omitted semantic status had a lower AIC indicating better performance and therefore was selected. The results for this

model are presented in Table 41.

Table 41. Results of GLMM investigating the effect of various social factors on the production of [t] vs. other /t/ variants for younger monolingual speakers.

plosive ~ style + (1 word) + (1 speaker)					
	Estimate	Std. Error	z	Pr(> z)	odds
(Intercept)	-20.05	8.68	-2.31	0.021*	
styleSpontaneous	-0.72	4.87	-0.15	0.882	0.48

The outcome for this model indicated no significant effect of speech style on plosive variants for younger bilinguals.

Slit-t [t]:

Table 42 provides the output for the slit-t model.

Table 42. Results of GLMM investigating the effect of various social factors on the production of [t] vs. other /t/ variants for younger monolingual speakers.

slit ~ semantic_status + style + (1 word) + (1 speaker)					
	Estimate	Std. Error	z	Pr(> z)	odds
(Intercept)	1.74	0.94	1.84	0.065	5.70
semantic_statusLexical	-0.87	0.57	-1.53	0.127	0.42
styleSpontaneous	-2.74	0.62	-4.43	<0.001***	0.06

The slit-t model indicated a highly significant effect of style on the occurrence of slit-t. Slit-t was less likely to occur in spontaneous speech than in read speech, with a probability of 27%.

Glottal [ʔ]:

For glottal stops, the monolingual model which included both style and semantic status failed to converge. A comparison between models, which omitted one of these predictors at a time, resulted in a lower AIC for the model which omitted semantic status and so this was used. The results of this model are presented in Table 43.

Table 43. Results of GLMM investigating the effect of various social factors on the production of [ʔ] vs. other /t/ variants for younger monolingual speakers.

glottal ~ style + (1 word) + (1 speaker)					
	Estimate	Std. Error	z	Pr(> z)	Odds
(Intercept)	-3.82	0.94	-4.07	<0.001***	0.02
styleSpontaneous	2.55	0.87	2.92	0.004**	12.82

The model results for the glottal variant indicate that spontaneous speech led to an increase in the glottal variant. There was a 22% probability that a /t/ would be a glottal stop in spontaneous speech. This effect was significant.

Summary of findings. The GLMM for monolinguals vs bilinguals showed a significant effect of linguistic background in the production of plosive [t], with the bilinguals being significantly more likely to produce a plosive [t] overall. Additionally, age had a significantly positive effect on the occurrence of plosive [t], indicating that older speakers were more likely than younger speakers to produce a plosive variant.

An examination of the sociolinguistic effects on the wide range of variants within the younger speakers showed that speech style has a substantial influence on the realisation of /t/. For both bilinguals and monolinguals, spontaneous speech had a significantly positive effect on the occurrence of taps. Additionally, for monolingual speakers, glottal variants were significantly more likely in spontaneous speech, while slit-t variants were significantly more likely in read speech. For the young bilinguals, LPS was revealed to be an significant predictor in the occurrence of glottal stops; an increase in LPS (more dominance in Irish) negatively correlated with the occurrence of glottal variants. Finally, for these young speakers, semantic status did not significantly correlate with any /t/ variants.

8.5 Discussion, limitations and conclusion

Before contextualising the findings and exploring the limitations of this analysis on /t/ variation, each research question will be revisited and addressed.

RQ1a Relative to monolingual Irish English to what extent does the English of native Irish speakers show absence of /t/ lenition in post-stressed syllable coda position?

The first research question concerned the variation between monolinguals and bilinguals in the realisation of /t/. This was motivated by Hickey's (1984) claim that bilingual speakers showed no lenition of /t/. Linguistic background (bilingual vs. monolingual) emerged as a significant predictor of /t/-variation. Hickey's assertion holds some truth for the older cohort, who consistently favour the plosive [t] across all contexts, although not exclusively.

Hickey's assertion holds less truth for the younger bilingual speakers, who use the plosive variant less than the older bilinguals. Their increased use of tap and glottal variants is akin to that of younger monolinguals. Yet, these younger bilingual speakers notably use the plosive [t] more frequently than their monolingual counterparts across various linguistic conditions.

The prevalence of the plosive [t] among bilingual speakers – especially the older demographic – surpasses the reported occurrence rates observed in IrE (monolingual) speakers analysed by Schulte (2020) and Skarnitzl & Rálišová (2022). Plosive [t] in this dataset does appear to be somewhat of a marker for bilingual speakers and may be a shibboleth of Connemara Gaeltacht English, although more data would be needed to confirm this.

RQ1b To what extent do sociolinguistic factors influence the realisation of /t/?

The significant effect of age on the occurrence of plosive [t] was an interesting find as this had not yet been reported in previous studies of IrE. The variation between older and younger speakers suggests a change in progress, applicable to both bilinguals and monolinguals, toward the incorporation of a wider range of /t/ variants (glottal and tap) and decreased use of the slit-t and plosive variants for monolinguals and bilinguals respectively.

The further investigation of the wide range of variants in younger speakers revealed some interesting findings. Focusing on the younger demographic also had an added bonus of

facilitating a more meaningful cross-study comparison with the research conducted by Schulte (2020) and Skarnitzl & Rálišová (2022), who both analysed younger IrE speakers. Speech style emerged as a significant predictor of /t/ realisation. The increased occurrence of glottal variants in spontaneous speech (for the monolinguals) aligns with the findings of Skarnitzl & Rálišová (2022), and confirms the trends observed in the descriptive/acoustic analysis. Regarding slit-t, both Hickey (2007) and Skarnitzl & Rálišová reported no influence of speaking style. Interestingly, however, for the younger monolinguals in this study, this was not the case; read speech led to an increase in slit-t. This result aligns with Schulte's (2020) finding that slit-t is a marker of more monitored speech for young Dublin women.

Although phonetic context was not statistically analysed here, it is clear that it is an important factor in /t/ variation for younger speakers. For example, slit-t was notably the most common variant word-finally pre-pausally for all younger speakers. Semantic status, although shown to be a significant predictor of /t/ variation in Skarnitzl & Rálišová's (2022) study, did not have any significant effects here.

This analysis on /t/-variation represents a significant undertaking for several reasons: (i) it marks the first documentation of /t/-variation in the English spoken by native Irish speakers, (which until now had been characterised as having no lenition of /t/) (ii) it provides a comparative examination between bilingual and monolingual Irish English (IrE), and (iii) it encompasses cross-generational analyses. The findings of this study have important implications within the context of IrE, revealing an ongoing apparent-time change in /t/-realisation – evident among both bilingual and monolingual speakers – and providing an updated, empirically-based account of /t/-lenition in Gaeltacht English. Additionally, this study found evidence of a lesser-reported variant: the dentalised alveolar plosive [t̪], which was found in intervocalic word-medial position.

9 /l/-velarisation

9.1 Background and research questions

As mentioned in §2.2, phonological descriptions of IrE often highlight the absence of clear-dark /l/ allophony ([l] ~ [ɫ]) as found in Standard British English, for example. /l/ is traditionally reported as clear in all word positions for IrE (Barry, 1982; Wells, 1982).

Two possible exceptions to this pattern are: (i) younger urban speakers of IrE, who have been reported to have dark/velarised [ɫ] in word-final position (Bessell & Mulhall, 2014; Hickey, 2007a; Wells, 1982), and (ii) native Irish speakers of English who have been reported to display a dark [ɫ] in “post and pre-vocalic positions” (Hickey, 2007; Ó Baoill, 1997).

A further feature of interest, in the case of laterals, concerns the potential IrE distinction in word-medial position between a clear alveolar lateral [l], as in ‘milling’ and an alveolo-palatal [ɭ], as in [mɪɭən] ‘million’.¹ As a contrast, in British English words like ‘million’ or ‘William’ are realised with an /lj/ sequence. The [l] - [ɭ] distinction is reported by Henry (1957) for Roscommon English and Ní Chasaide (1979) for Donegal English. Additionally, Ó Baoill (1997) reports this for “most varieties spoken north of a line stretching from Dublin to Galway.” The use of the alveolo-palatal [ɭ] is regarded as a direct borrowing from Irish, which generally possesses a three-way phonemic distinction between a velarised /ɫ/, a palatalised /lʲ/ and a ‘neutral’ /l/ (Ní Chasaide, 1999).

In light of these descriptions of /l/-variation, the following questions are investigated within this chapter, the first set of questions relate to /l/-velarisation in Gaeltacht English specifically, the second set to syllable-final /l/-velarisation in younger speakers (monolingual and bilingual), and the third set to /l+/j/ sequences. Note that these questions diverge in number formatting from the previous chapters and from the

¹ Note that the segment transcribed here as [ɭ] and found in many languages, including Spanish, Italian and Irish, though typically referred to as ‘palatal’ is argued to have an alveolo-palatal place of articulation - see Ní Chasaide (1999).

overarching research questions stated in the thesis introduction.

1. /l/-velarisation in English of L1 Irish speakers

RQ1a Relative to monolingual Irish English to what extent does the English of native Irish speakers show /l/-velarisation in pre- and post-vocalic positions?

RQ1b To what extent do sociolinguistic factors influence the realisation of /l/?

RQ1c How do these English lateral realisations compare to the realisation of the velarised /ɫ^v/ of Irish?

2. /l/-velarisation in younger speakers

RQ2 To what extent do younger IrE speakers (both monolingual and bilingual) show velarisation of syllable-final /l/?

3. /l/+/j/ vs. /ɿ/

RQ3a To what extent are potential /l/+/j/ clusters, in words such as ‘million’ realised as an alveolo-palatal lateral approximant [ɿ]?

RQ3b How do these English lateral realisations compare to the realisation of the /ɿ/ and /ɿ/ contrast of Irish?

9.2 Methods

The following subsections detail the methods used for annotation and measurement of /l/ tokens, alongside the descriptive and statistical methods used.

9.2.1 *Annotation and measurement of /l/*

In general, F2 variation has been regarded as the primary acoustic correlate of /l/ quality (including velarisation and palatalisation). F2 is directly related to the length of the front cavity in vowels. Front articulations are characterised by high F2 and this measure falls as the tongue body restriction is retracted. Thus, the retraction of the tongue body when producing a velarised token results in a low F2, while palatalisation results in a high F2 (Bladon, 1979; Fant, 1960; Kochetov et al., 2020). Along with a lower F2, velarisation of /l/ has been shown to be associated with a higher F1 (Recasens, 2004; Sproat & Fujimura, 1993). As such, F1 can be subtracted from F2 as a measure for the fronting or retraction of the lateral, with a smaller F2-F1 value for darker /l/ and a greater F2-F1 distance for clear or palatalised laterals. This measure of velarisation has been used to investigate /l/-variation in Manchester English, (Turton & Baranowski, 2021), Welsh English (Morris, 2013) and African American English (Van Hofwegen, 2010).

For the current investigation, the decision was made to initially incorporate both F2 and F2-F1 as distinct measures of velarisation. This choice was driven by the need for cross-study comparability; a previous study on velarisation of /l/ in IrE and Irish by Ní Chasaide (1979) had used F2 measurements only, yet comparability with other languages in studies that used F2-F1 was also of interest. However, it was ultimately determined that using F2 alone would suffice for quantifying /l/-velarisation in this study. This decision stemmed from the observation that there was minimal variation in F1 across speaker groups and word positions, where F2 showed higher variation. Consequently, it was determined that the inclusion of F1 did not significantly enhance the study and added unnecessary complexity when comparing with existing data on Irish English /l/ variation, which became the primary focus. This will be outlined in further detail below.

The alveolar /l/ tokens in this study were coded continuously using F2, i.e. they were not assigned a binary clear or dark label based on a notional F2 boundary separating the two categories. This decision was informed by recent studies which suggest that the traditional clear and dark /l/ allophones of e.g. American and British English are best represented as existing on a continuum as opposed to a binary opposition (Kirkham et al., 2019; Recasens & Espinosa, 2005; Sa, 2021). However, to give some cross-linguistic context, Recasens (2012) suggested formant boundaries to differentiate between clear and dark /l/, which were noted for context within the present study. These relate to his

findings from a study of 23 languages/dialects (male speakers), showing that the F2 value of clear /l/ generally exceeds 1500 Hz, whereas for dark /ɫ/ it approximates 1000 Hz. In cases where the lateral of words like ‘million’ were auditorily judged to be alveolo-palatal laterals, they were transcribed as [ʎ].

Tokens of /l/ in both read and spontaneous speech were included in the following contexts:

- (i) word-initial pre-vocalic (#_V) e.g. ‘like’
- (ii) word-medial intervocalic (V_V) e.g. ‘milling’
- (ii) word-medial /l+/j/ clusters (_j) e.g. ‘million’
- (v) word-final post-vocalic (V_#) e.g. ‘feel’

For pre-vocalic tokens, the offset of /l/ was marked at the point where there was a visible increase in intensity, i.e. from a lower intensity lateral to a higher intensity vowel. For pre-consonantal tokens, the offset was marked where there was a visible change in formant patterns and/or intensity, or where there was evidence of vocal closure (in the case of stop consonants). For post-vocalic tokens the onset of /l/ was marked at the point where there was a visible decrease in intensity, i.e. from a higher intensity vowel to the lower intensity lateral.

Word-medial tokens labelled as [ʎ] had relatively higher F2 values than /l/ and this formant frequently had a lower amplitude. Note that the lower amplitude of F2 in these cases appears to be a consequence of an antiresonance in this frequency range, something discussed in detail in Ní Chasaide (Ní Chasaide, 1977). Examples of word-initial /l/, word-medial /l/ and word-medial [ʎ] from the same speaker (a young bilingual female) are produced in the following figures, with the relevant segment framed in a yellow box.

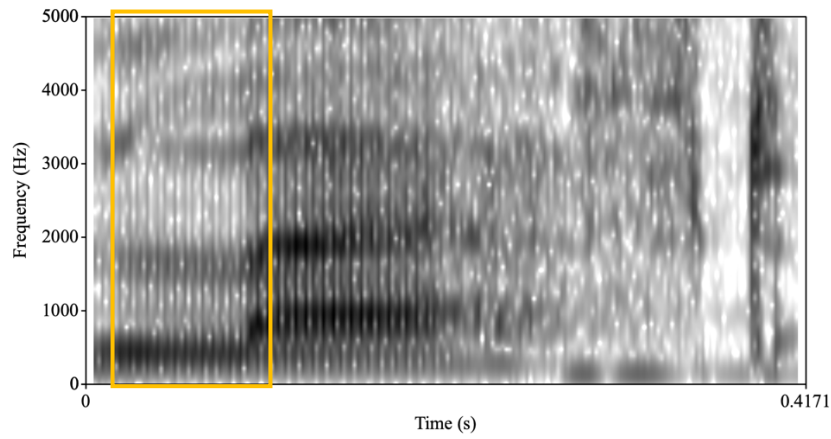


Figure 77. Spectrogram of 'left' with word-initial [l] highlighted (F, bilingual, 20).

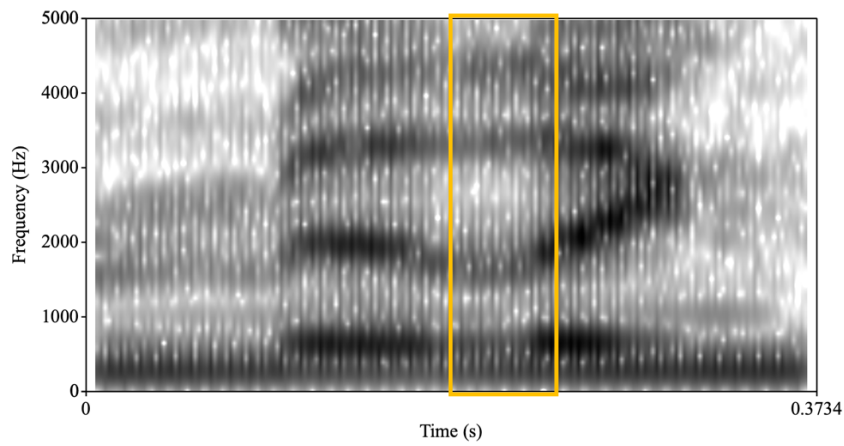


Figure 78. Spectrogram of 'milling' with word-medial [l] highlighted (F, bilingual, 20).

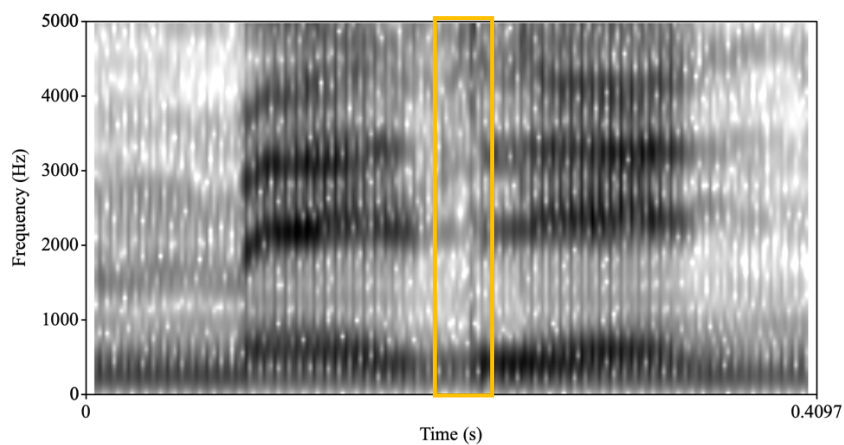


Figure 79. Spectrogram of 'million' with word-medial [ʌ] highlighted (F, bilingual, 20).

A Praat script was written to extract F1 and F2 at midpoint for each token. These values were further processed using Z-score/Lobanov normalisation via the `scale()` function in

R (see Chapter 3 for more on normalisation). A total of 696 lateral tokens were extracted, comprising 355 from bilingual speakers and 341 from monolingual speakers. For bilingual speakers, Irish tokens of [ɫ], [ɭ] and [ʎ] in initial, medial and final positions were also collected ($n = 372$). These are included below in the comparative analyses of bilingual speakers' English and Irish laterals.

9.2.2 Descriptive and statistical methods

Descriptive analyses of /l/-velarisation were facilitated via the creation of violin plots using `ggplot` in R (Wickham, 2016). The rationale for using violin plots and guidance on their interpretation were outlined in Chapter 3. Multiple plots were created to explore the effects of various sociolinguistic factors on /l/-velarisation. Additionally, a series of linear mixed models (LMMs) were carried out in R (R Core Team, 2023) (see Chapter 3 for explanation of LMMs). All models were conducted via maximum likelihood estimation using the `lmerTest` package (Kuznetsova et al., 2017). The first set of models investigated the effect of linguistic background (bilingual vs. monolingual) on velarisation in various word positions. Subsequent models investigated the effects of various sociolinguistic factors on /l/-velarisation in specific word positions, modelling bilinguals and monolinguals separately. These group specific models analysed both linguistic factors (word-position, style) and social factors (age, gender, Language Profile Score (LPS) and Local Attachment Score (LAS)) as fixed effects, with word and speaker as random effects. In cases where the random intercept of speaker created a singular fit for a model, it was excluded to simplify the model. The results of the LMMs and the violin plots are presented within the following subsections.

9.3 Results

The structure of this Results section differs from that of previous chapters. The results for /l/ are organised based on word positions, with descriptive and statistical findings integrated within each sub-section. Initially, the three word positions (initial, medial, and final) will be collectively considered before being analysed individually.

9.3.1 All word positions

Figure 80 presents the normalised F2 values for bilingual and monolingual speakers¹, showing word-initial, medial and final /l/ (not including realisations of potential /l+/j/ contexts). It appears that, for both groups of speakers, word-final /l/ is darker (lower F2) than both word-initial and word-medial tokens. This pattern aligns with Recasens' (2012) cross-linguistic findings that /l/ is generally darker word finally. Figure 80 suggests minimal overall variation between bi- and monolinguals across word positions.

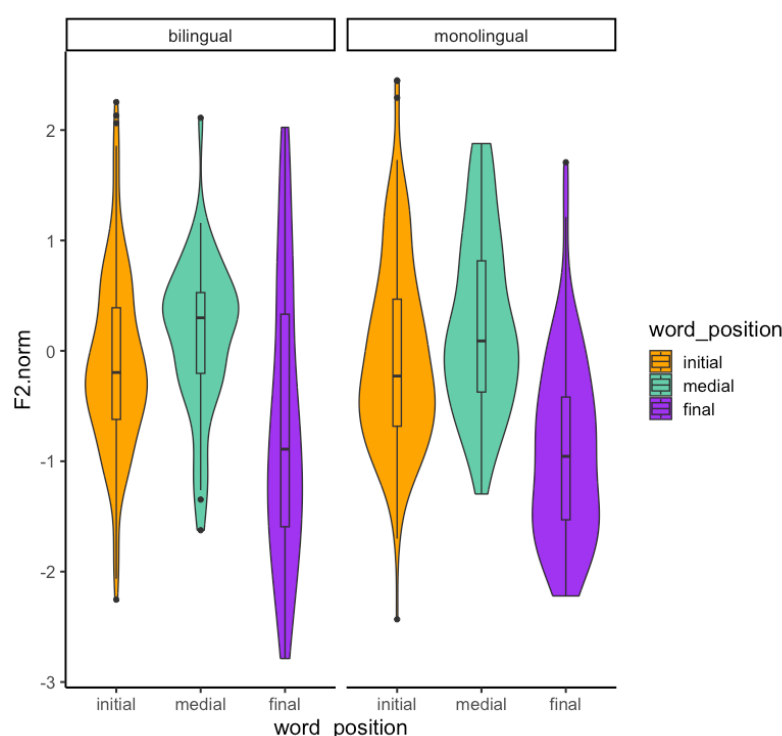


Figure 80. Normalised F2 values for /l/ in bilingual (N=355) and monolingual speakers (N=341), subdivided by word position. The width of the curve in the plot shape corresponds to the frequency of data points in that region. The violins are overlaid with box plots which show the median (thick black horizontal line) and the interquartile range (1st – 3rd quartiles) and the highest and lowest values excluding outliers (indicated by the vertical whiskers).

¹ As Figure 80 includes combined data for both male and female speakers, only normalized F2 values are plotted. The raw Hz measurements are provided in the subsequent figures which show bilingual and monolingual female and male speakers separately, which facilitates comparison of Hz measurements against those of both Ní Chasaide (1979) and Recasens (2012) detailed in §10.2.1.

Figure 81 plots the same configuration using normalised F2-F1 measures, which were used for reasons outlined in §10.2.1.

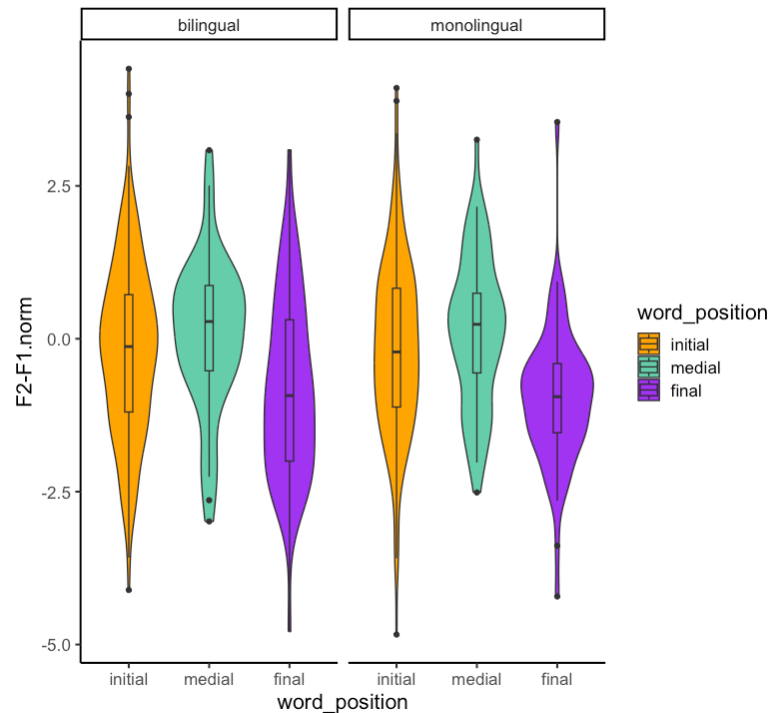


Figure 81. Normalised F2-F1 values for /l/ in bilingual speakers (N=355) and monolingual speakers (N=341), subdivided by word position.

Comparing the F2-F1 measures (Figure 81), with F2 alone (Figure 80), it is apparent that the two treatments are very similar in outcome. That is, the addition of F1 does not contribute much to the results. This becomes more evident when we isolate F1 (Figure 82 below), which shows distinctly less variation (by word position) than the F2 values. Whereas an inverse relation between velarisation and F1 height could be argued in the case of the data for the bilingual speakers, i.e. word-final /l/ has a relatively high F1 compared to other positions (corresponding with the low F2 in Figure 80), such a conclusion does not seem warranted, given the absence of a similar pattern in the F1 values for monolinguals.. However, delving into the reasons behind this phenomenon exceeds the scope of this investigation. The lack of F1 variation is perhaps unsurprising when we consider findings from Bladon and Al-Bamerni's (1976) study on the coarticulation of /l/. They found that the same F1 value could characterise either a clear or a dark /l/, while F2 values do not overlap in such a manner and can therefore more

reliably characterise /l/ velarisation. Taking these points into consideration, it was decided to use F2 values only for the measurement of /l/-velarisation from this point forward.

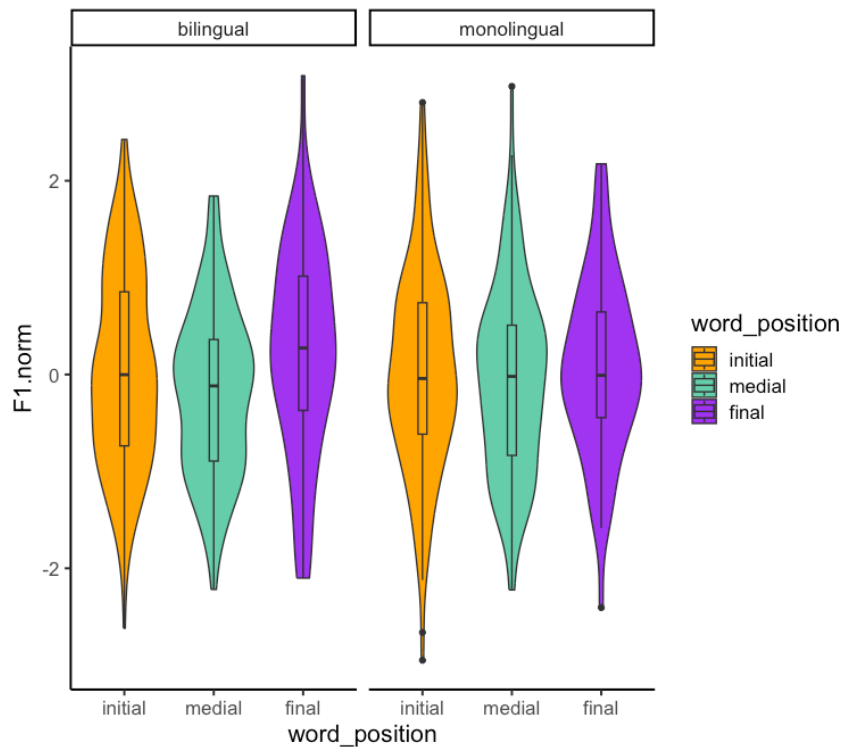


Figure 82. Normalised F1 values for /l/ in bilingual (N=355) and monolingual speakers (N=341), subdivided by word position.

The following two subsections delve further into /l/-variation patterns within (i) bilingual and (ii) monolingual speakers across word positions.

Bilinguals (all word positions). While the above figures suggested that bilinguals and monolinguals do not greatly diverge in the position-based variation of /l/, a more complex pattern emerges in Figure 83, which displays the relative degree of /l/-velarisation across word positions for bilingual speakers by age and gender.

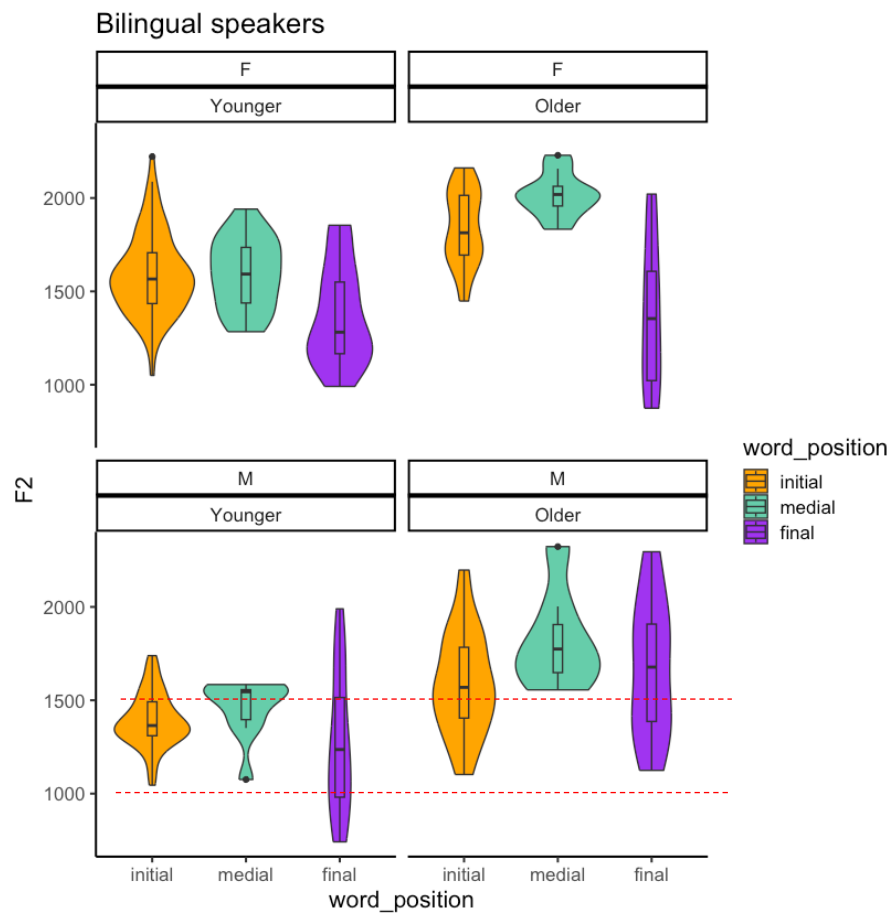


Figure 83. F2 values of /l/ in all word positions for bilingual speakers, subdivided by age and gender. Recasens' boundaries of dark /l/ (1000 Hz) and clear /l/ (≥ 1500 Hz) are marked with a red dashed lines for male speakers.

In Figure 83 it is evident that, younger female speakers have darker /l/s than older female speakers in initial and medial positions. In final position the lateral has a darker realisation (relative to other word positions) for both age groups, who align closely.

Regarding the older male speakers, word-initial and medial /l/ have a notably clearer realisation than that of the younger men. Using Recasens' clear-dark /l/ boundary (dashed red line) it is clear that the older speakers have a distinctly clear quality, whereas the younger speakers exhibit a more borderline/neutral quality, i.e. neither clear nor dark. In word-final position, the younger cohort show a relatively darker realisation (though still mid-way between Recasens' clear-dark boundaries). For the older male speakers, word-final /l/ closely aligns with /l/ in word-initial position and is notably clear according to Recasens' boundaries.

Monolinguals (all word positions). Figure 84 displays the relative degree of velarisation for monolingual speakers by age and gender. Regarding word-position, it is apparent that for all monolingual speakers /l/ is the most velarised in word-final position, a pattern that was also evident (but to a lesser degree) for all but older male bilingual speakers. There is also evidence of age-based variation within the monolingual group; younger speakers (of both genders) show relatively darker /l/s than older speakers, mirroring the bilinguals. In particular, the younger monolingual speakers have a distinctly dark /l/ in word-final position.

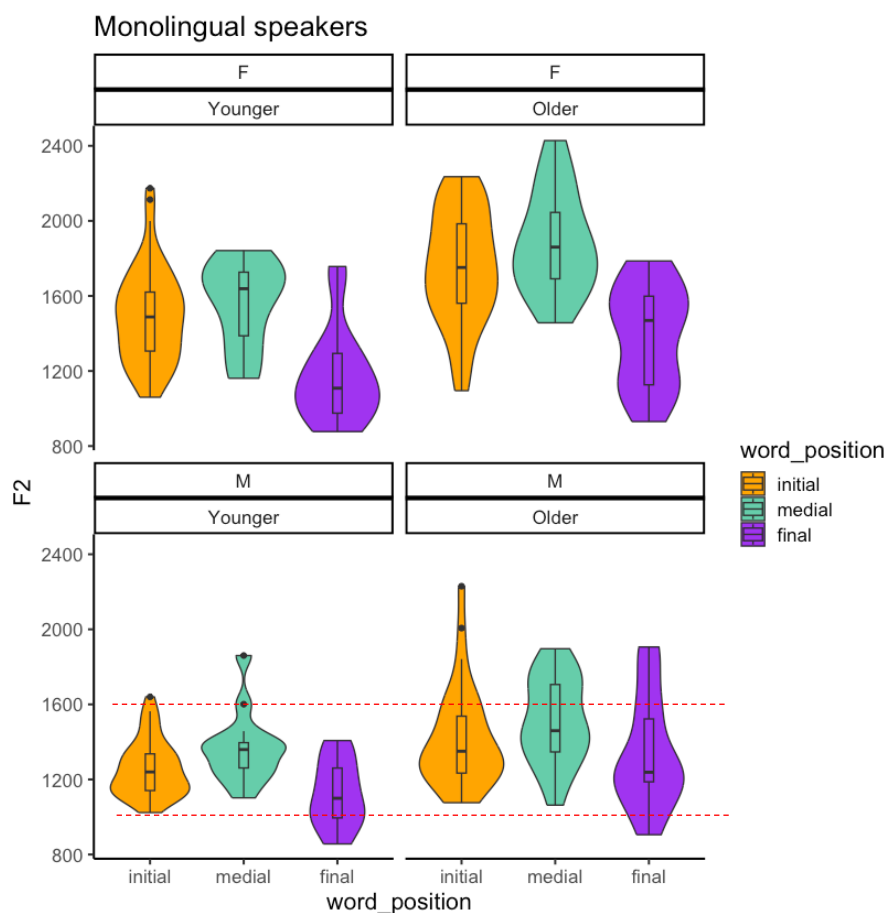


Figure 84. F2 values for /l/ in all word positions for monolingual speakers, subdivided by age and gender. Recasens' boundaries of dark /l/ (1000 Hz) and clear /l/ (≥ 1500 Hz) are marked with a red dashed lines for male speakers.

Overall, /l/ appears to be more velarised for monolingual speakers than bilingual speakers, a pattern that is apparent when each group is sub-analysed by age and gender. For both groups, there appears to be age-based variation, whereby younger speakers have darker /l/s.

9.3.2 Word-initial position

One of the motivations for investigating /l/ in word-initial position was to quantify previous reports that bilingual Irish-English speakers can display [ɫ] word-initially as a transfer feature from their Irish velarised /ɫʲ/ phoneme (Hickey, 2007; Ó Baoill, 1997). To investigate this, bilingual speakers' word-initial /l/s ($n = 195$) are firstly compared below to those of monolingual speakers ($n = 163$) to establish whether bilinguals show relatively more velarisation. A comparison with their Irish /ɫʲ/ is then presented. Finally, the effect of the following vowel on the quality of word-initial /l/ is explored, based on the findings of Bladon and Al-Bamerni (1976).

Bilinguals vs. monolinguals. Figure 85 plots the normalised F2 values for word-initial /l/ for bilingual and monolingual speakers. It is evident that there is very little variation between the speaker groups. This pattern was confirmed by a LMM modelling normalised F2 against linguistic background (mono- vs. bilingual), with a random effect of word. The plot in Figure 85 shows the relative overall F2 difference between the bi- and monolingual speaker groups.

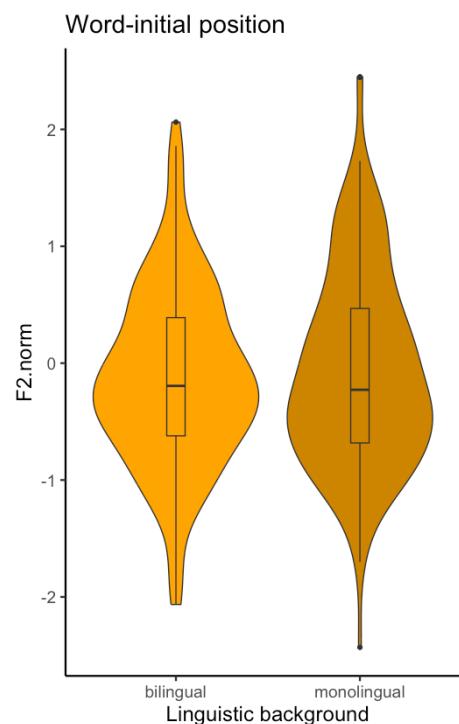


Figure 85. Normalised F2 values for word-initial /l/ in bilingual (N=193) and monolingual (N=162) speakers.

Figure 86 provides the raw Hz values for word-initial F2, subdivided by gender and indicates minimal variation between mono- and bilingual female speakers in terms of the quality of their word-initial /l/. A lack of variation is also observed between the male speakers but the monolinguals have a slightly lower average.

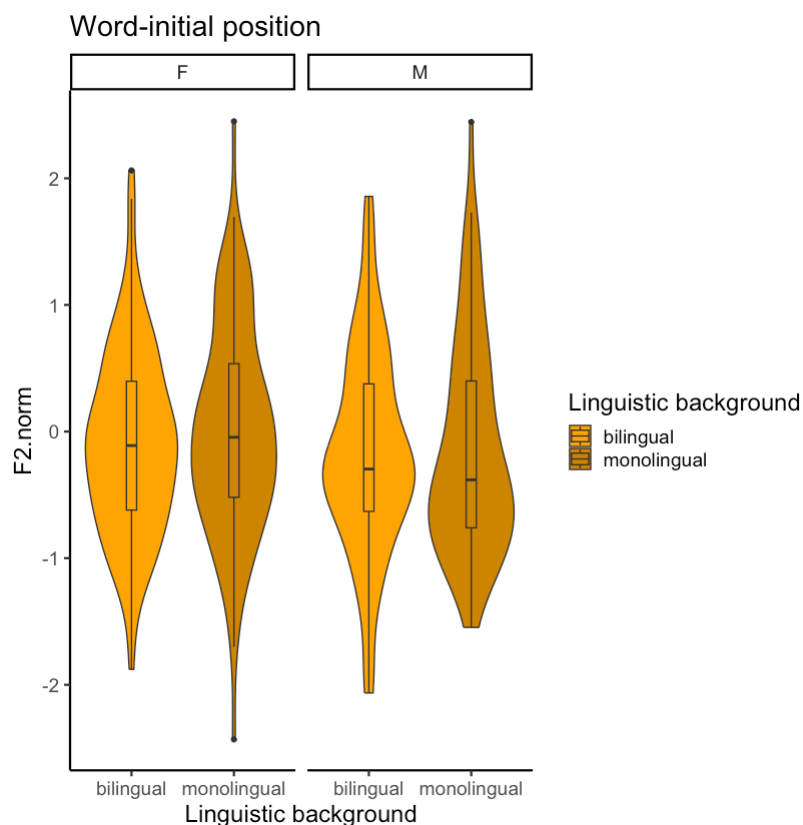


Figure 86. F2 values (raw Hz) for word-initial /l/ tokens in monolingual and bilinguals, subdivided by gender.

Addressing the previous accounts regarding velarised pre-vocalic /l/ in bilingual IrE, one can say that, overall, these bilingual speakers do not show a particularly dark /l/ word-initially, when compared with monolinguals. In addition, there does not appear to be any distinct gender-based variation between the groups. When we further divide speakers by age (Figure 87, below), however, it is apparent that younger speakers have darker /l/s than their older counterparts in word-initial position and that this variation pattern applies for both monolinguals and bilinguals.

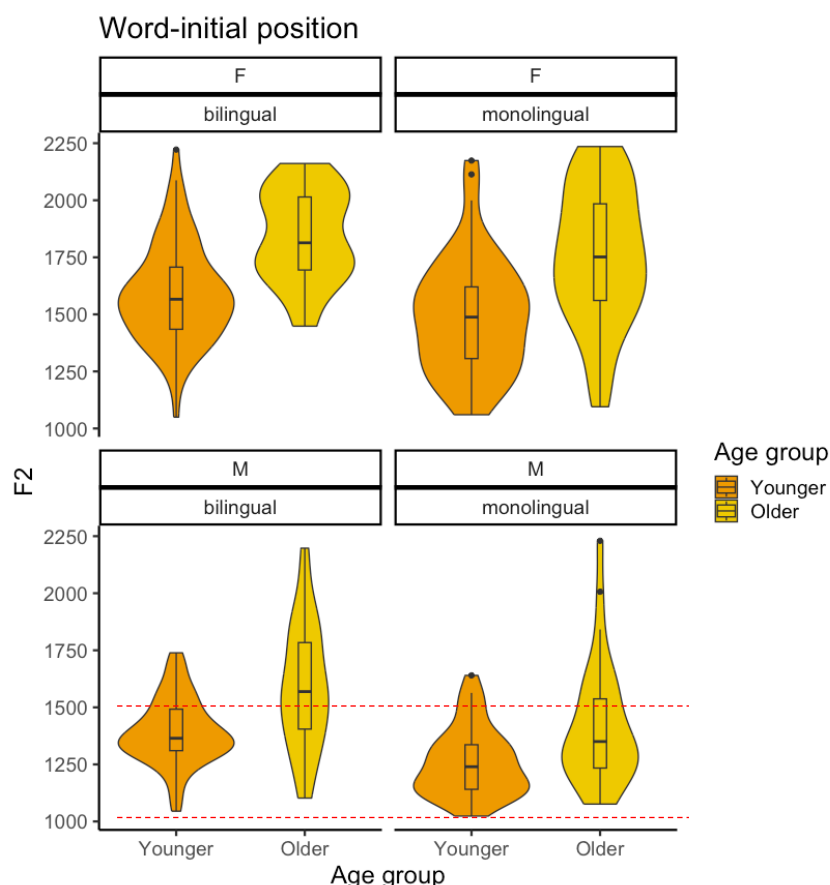


Figure 87. F2 values (raw Hz) for word-initial /l/ in bilingual and monolingual English, subdivided by age and gender. Recasens' boundaries of dark /l/ (1000 Hz) and clear /l/ (≥ 1500 Hz) are marked with a red dashed lines for male speakers.

Bilinguals: Irish vs. English. The above figures suggested that age was a more important predictor of /l/-velarisation than linguistic background (bi- vs monolingual) for these speakers. However, as mentioned above Hickey (1986) suggests that bilinguals may have pre-vocalic /l/-velarisation as a transfer from their Irish. It was therefore decided to investigate whether the bilingual's English /l/ patterns had parallels in their Irish. It must be noted however, that it is the younger bilinguals that exhibit a darker /l/ in this case and for younger speakers, the possibility of Irish-to-English transfer is assumed to be minimal. Nonetheless, it was decided to further investigate English-Irish parallels by comparing bilinguals' English word-initial /l/ with their Irish velarised /ɫ/ (also in word-initial pre-vocalic position). These phonemes are plotted in Figure 88.

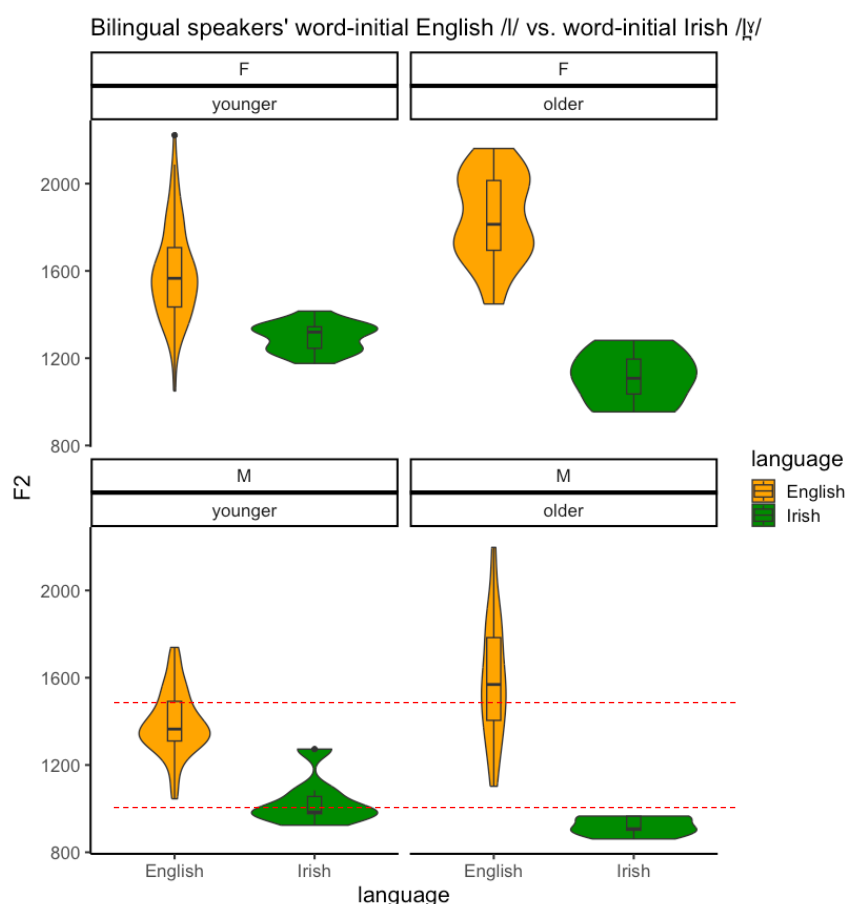


Figure 88. Raw F2 values for word-initial English /l/ and Irish /ɫ/ in bilinguals, subdivided by age and gender. Recasens' boundaries of dark /l/ (1000 Hz) and clear /l/ (≥ 1500 Hz) are marked with a red dashed lines for male speakers.

Figure 88 shows that, for male speakers, Irish velarised /ɫ/ aligns with Recasens' (2012) cross-linguistic dark /l/ threshold (1000 Hz). Overall, the bilinguals' Irish /ɫ/ is distinctly darker than their English /l/. Figure 88 also indicates that older speakers may have a darker Irish /ɫ/ than their younger counterparts, suggesting that the younger bilinguals may be reducing the degree of velarisation in this Irish phoneme. The shorter distance (compared with older speakers) between their Irish initial velarised lateral and their English initial lateral may point to convergence, whereby the sounds of each language come to resemble one another. Morris (2013) found that for bilingual speakers of Welsh English and Welsh /l/ appeared to show convergence. However, additional data would be needed to confirm this pattern.

Statistical analysis: bilinguals and monolinguals (English /l/). While the effects of age and gender were explored in the above figures, there is the possibility that other factors

influence the degree of /l/-velarisation in initial position. However, the LMMs (described in § 10.2.2.) found that neither the bilingual nor monolingual speakers showed any significant effects of social or linguistic factors on normalised F2 values.

However, when gender groups were analysed separately (using raw Hz values) there was a significant effect of age for bilingual female speakers (Est = 4.289, SE = 1.046, $p < 0.001$), i.e. F2 values were significantly higher for older bilingual females. No significant fixed effects were found for male bilinguals. In a similar vein, when gender groups were analysed separately for monolinguals, the women showed significant effects of age (Est = 8.572, SE = 1.778, $p < 0.001$), as did the men (Est = 3.593, SE = 1.394, $p < 0.05$) confirming the general pattern of clearer /l/ among older speakers.

In summary, Hickey's report of a velarised word-initial /l/ in bilingual speakers is not supported in this dataset. Additionally, age-based variation is apparent, with younger speakers /l/ having a darker quality than that of older speakers. The younger speakers' darker English /l/ does not align, however, with their Irish velarised /l^v/, which is notably darker. In comparison, and from auditory impressions, it seems rather neutral in quality. This suggests (but does not 'prove') the absence of a present-day Irish transfer process or reinforcement for these speakers. This conclusion is further supported by the fact that a similar quality of word-initial /l/ is found for younger monolinguals.

Word-initial /l/-coarticulation. Bladon and Al-Bamerni (1976) found that English /l/ varied considerably under coarticulatory influence of adjacent vowels. Recasens (2012) also found coarticulation patterns for /l/, reporting that clear /l/ shows a higher degree of coarticulation than dark /l/ and that this was more evident in word-initial than word-final position. It is possible then, that coarticulation with the following vowel could explain a degree of the variation found for word-initial /l/. To investigate this, the average F2 Hz values for /l/ within each gender and age group were plotted according to their following vocalic contexts (Figures 90 and 91 below). Note that there are between-group inconsistencies in the phonetic contexts (X-axes) due to token discrepancies in the spontaneous speech data. The bilingual and monolingual groups are discussed below in turn.

Figure 89 shows lateral F2 values as a function of the following vowel among younger

(left) vs. older (right) bilingual women. It reveals an overall trend of lower F2 values among younger bilingual women compared to their older counterparts. For both groups of women word-initial pre-vocalic /l/ is generally higher in front-vowel contexts and lower in back contexts, however this is not a smooth trajectory. These inconsistencies may be accounted for by the lack of data for some contexts. The overall observed pattern echoes findings from Recasens' (2012) cross-linguistic study which compared F2 values for pre-vocalic /l/ in back (/a/) and front (/i/) vowel contexts and found higher values for the latter.

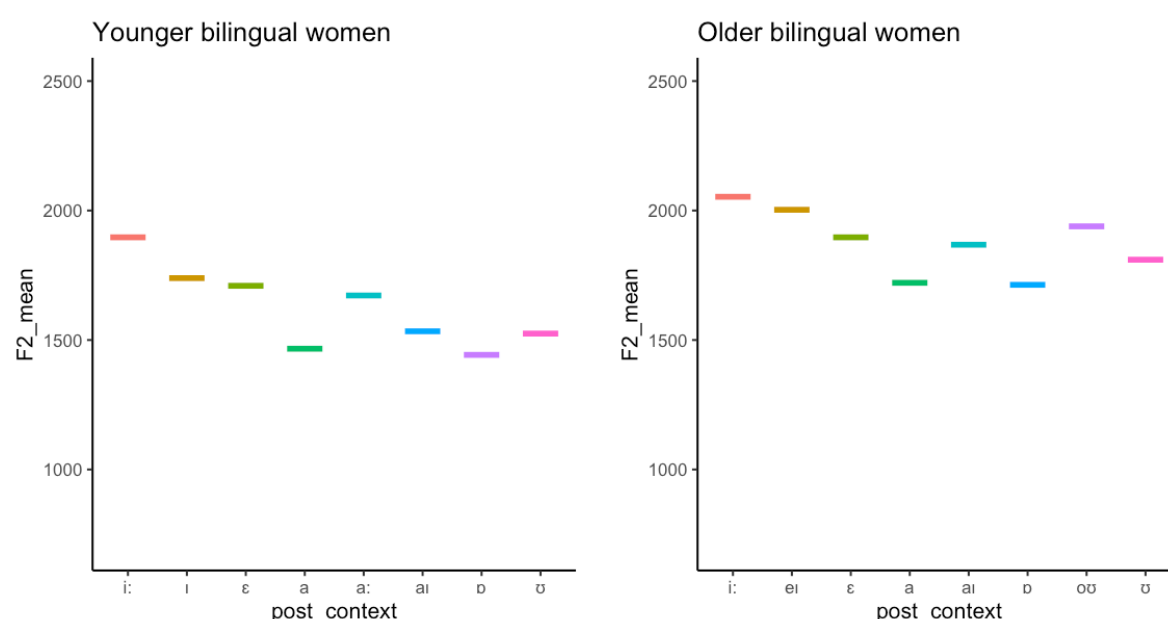


Figure 89. Bilingual women's average F2 values for word-initial /l/ as a function of following vowel. *Note the vowel labels along the X axis vary for each group.*

The male bilingual speakers (Figure 90) also appear to show relatively higher F2 values in front-vowel contexts. On average, younger bilingual males exhibit lower F2 values, indicating an overall darker quality compared to older males. Comparing the males' F2 values to Recasens' (2012) clear-dark F2 boundaries, /l/ in all positions can be considered 'clear' for the older speakers, with a slightly more neutral to dark quality for younger speakers; values do not approximate the dark /l/ threshold of 1000 Hz.

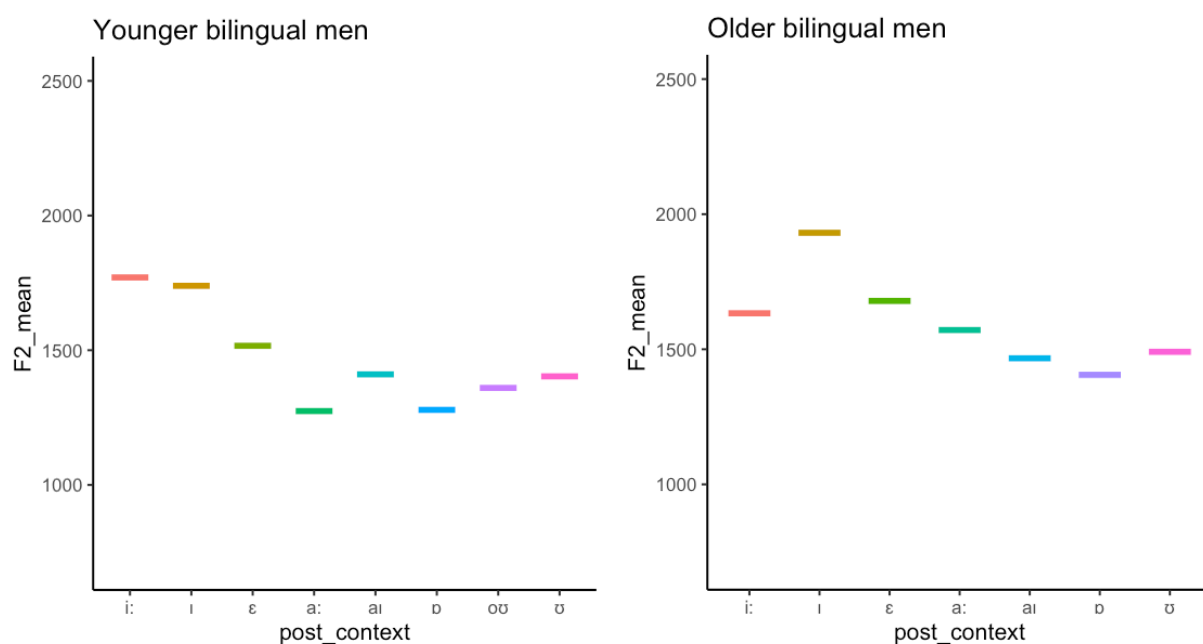


Figure 90. Bilingual men's average F2 values for word-initial /l/ as a function of following vowel.

As indicated in Figure 91 (below), monolingual women display a similar pattern to bilingual women in terms of word-initial /l/. F2 is higher before front vowels and generally lowers as vowels are articulated with more retracted tongue positions: the final uptick before the /u/ vowel is likely to reflect that this vowel has a rather fronted articulation. The young monolingual women in particular show a wider range of F2 values than their older counterparts, indicating a greater degree of coarticulation with the following vowel.

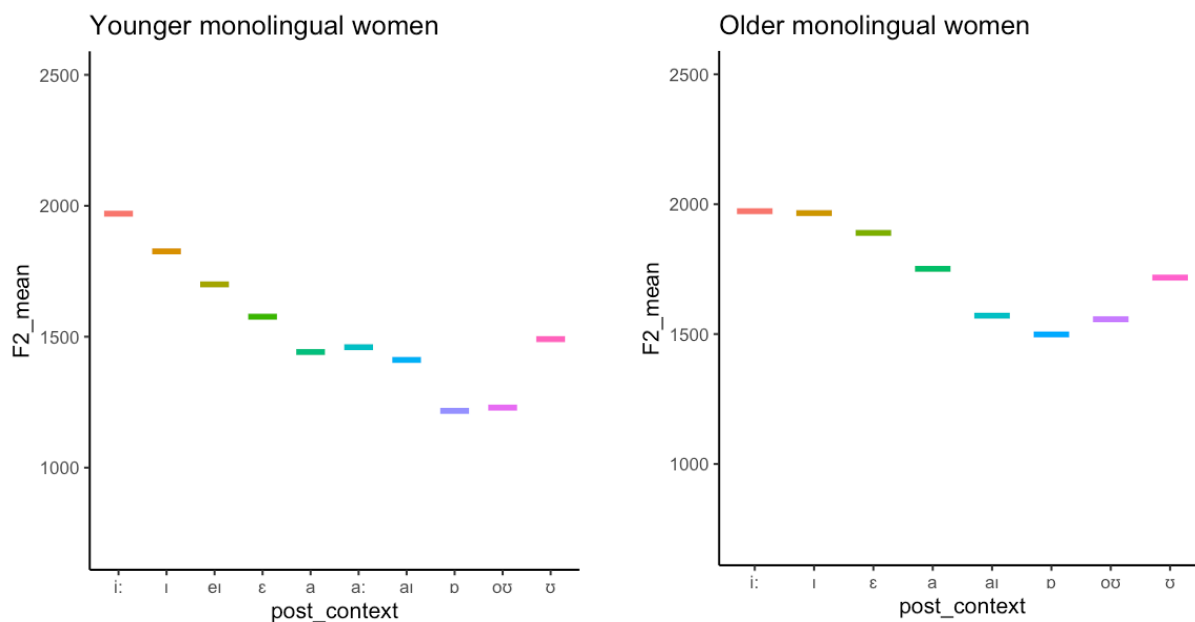


Figure 91. Monolingual women's average F2 values for word-initial /l/ as a function of following vowel.

Figure 92 (below) displays the F2 values for word-initial /l/ in monolingual men. The younger speakers (left) demonstrate lower F2 mean values and a much more limited degree of coarticulation. F2 values for older monolingual men vary approximately between 1100 and 1700 Hz, whereas for younger men, the range is smaller, around 1200-1450 Hz. This differs from the pattern observed for monolingual women, where it appeared that younger women showed more extensive coarticulation than the older women.

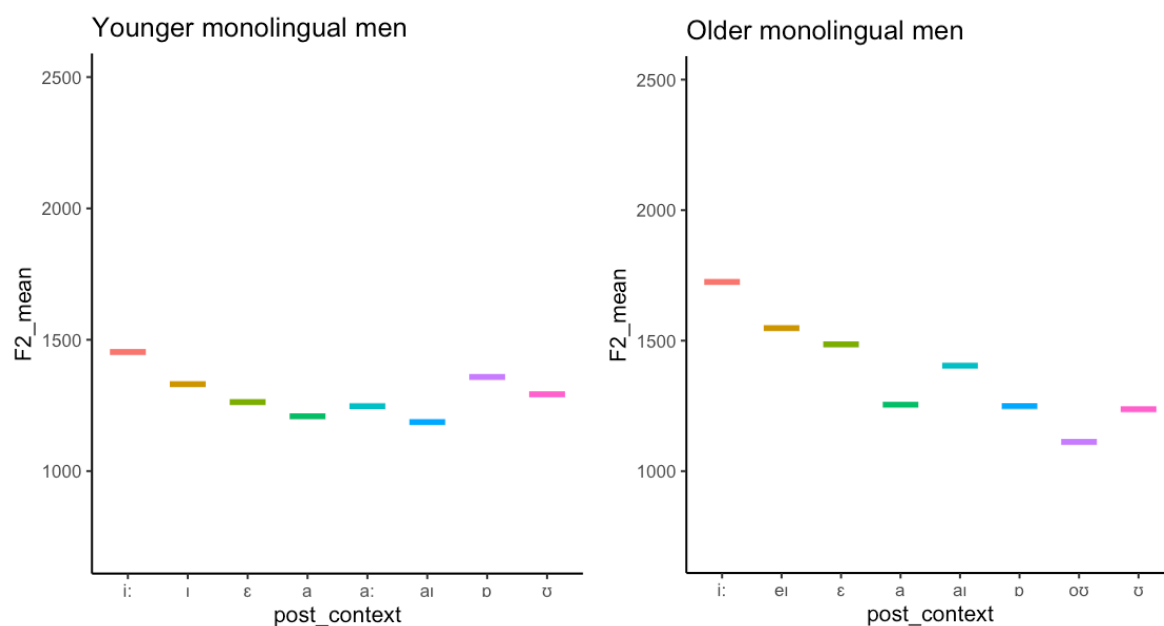


Figure 92. Monolingual men's average F2 values for word-initial /l/ as a function of following vowel.

The investigation into the coarticulation of word-initial /l/ indicates that its F2 values change depending on the following vowel, indicating a level of coarticulation. When the following vowel moves further back in the mouth (resulting in a decrease in F2), the /l/ also tends to be darker. Therefore, it is important to recognise that coarticulation might account for a degree of the F2 differences that were observed in the violin plots in previous sections.

9.3.3 Word-final position

In §2.2 the following two questions regarding /l/-variation in word-final position were raised:

- (i) To what extent do bilingual speakers show the velarised /l^v/ of their Irish in post-vocalic word-final position (as has been previously reported)? Is there evidence of sociolinguistic effects on velarisation?
- (ii) To what extent do younger speakers (bilingual and monolingual) show velarised /l/ in word-final position (in line with findings for younger urban IrE speakers)?

Bilinguals vs. monolinguals. It was firstly investigated whether bilinguals and monolinguals diverge in their realisations of word-final (post-vocalic) /l/. Figure 94 plots the normalised F2 values for word-final /l/ in bilingual and monolingual speakers. Minimal variation is observed between the two groups.

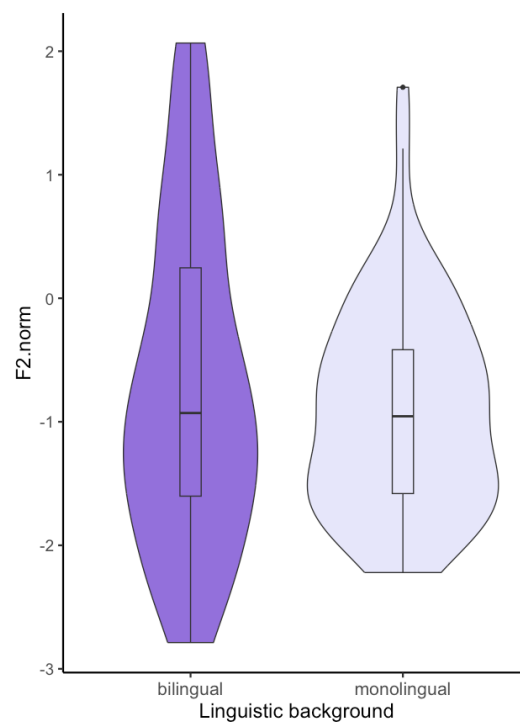


Figure 93. Normalised F2 values for word-final (post-vocalic) /l/ in bilinguals (N=59) and monolinguals (N=62).

As anticipated, when we divide this dataset by age and gender (Figure 94, below), the variation becomes more complex. In Figure 94 for word-initial /l/, all younger speaker groups – both bilingual and monolingual – exhibit darker /l/s compared to their older counterparts. However, this contrast is less evident for bilingual women, as the older women demonstrate a relatively dark /l/ in word-final position, resembling that of the younger women.

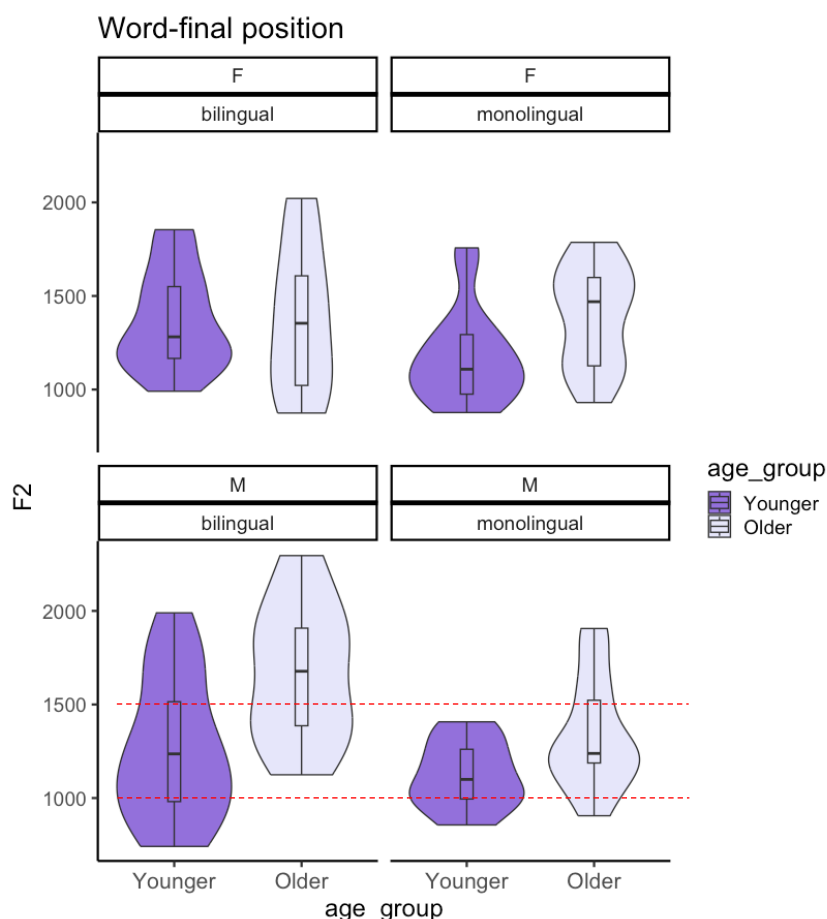


Figure 94. F2 values (Hz) of word-final /l/ in bilinguals and monolinguals, subdivided by age and gender. Recasens' boundaries of dark /l/ (1000 Hz) and clear /l/ (≥ 1500 Hz) are shown with red dashed lines for male speakers.

The F2 values (for male speakers) can be examined against Recasens' (2012) cross-linguistic F2 markers for clear and dark /l/s (marked with a red dashed line). The word-final /l/ for older bilingual men (median ~ 1700 Hz) – which is notably clearer than that of all other groups – sits above Recasens' clear /l/ boundary (1500 Hz), while younger bilingual men exhibit a darker /l/ (median ~ 1250 Hz) halfway between the Recasens' boundaries (1000 and 1500 Hz). The young monolingual male speakers show darker word-final /l/s than bilinguals, with values closer to the 1000 Hz mark. Overall, there is a degree of age-based variation in the realisation of word-final /l/, echoing the findings for word-initial /l/.

Bilinguals: Irish vs. English. Figure 94 suggested a global pattern of F2-lowering among younger bilingual speakers for word-final /l/. Additionally, the older bilingual women

appeared to have /l/s that were, on average, darker than those of older monolingual women. As raised in previous sections, it has been claimed that bilingual speakers can display dark /l/s post-vocally as a transfer from their Irish (Hickey 2007, Ó Baoill 1997). However, it may be more likely that the younger bilinguals are partaking in the more widespread IrE tendency towards darkening of word-final /l/ – observed for younger urban IrE speakers (e.g. Bessell & Mulhall 2014) – rather than transferring their Irish velarised /ɫʲ/ into their English. This is supported by the fact that a similar trend toward velarisation was also found for the younger monolingual speakers. For the older bilingual women, who also displayed a degree of /l/ velarisation, the possibility of an Irish influence could be more plausible. To investigate parallels between the velarised Irish /ɫʲ/ phoneme and the English final allophone of /l/ for bilinguals, the F2 values for these sounds are plotted in Figure 95.¹

¹ F2 Hz values (as opposed to normalised F2) were considered sufficient here as the main investigation is the relative difference between each speaker group's Irish and English phonemes. The Hz values also allow for better cross-linguistic contextualisation with e.g. Recasens' (2012) F2 findings for male speakers.

Bilinguals – Irish and English

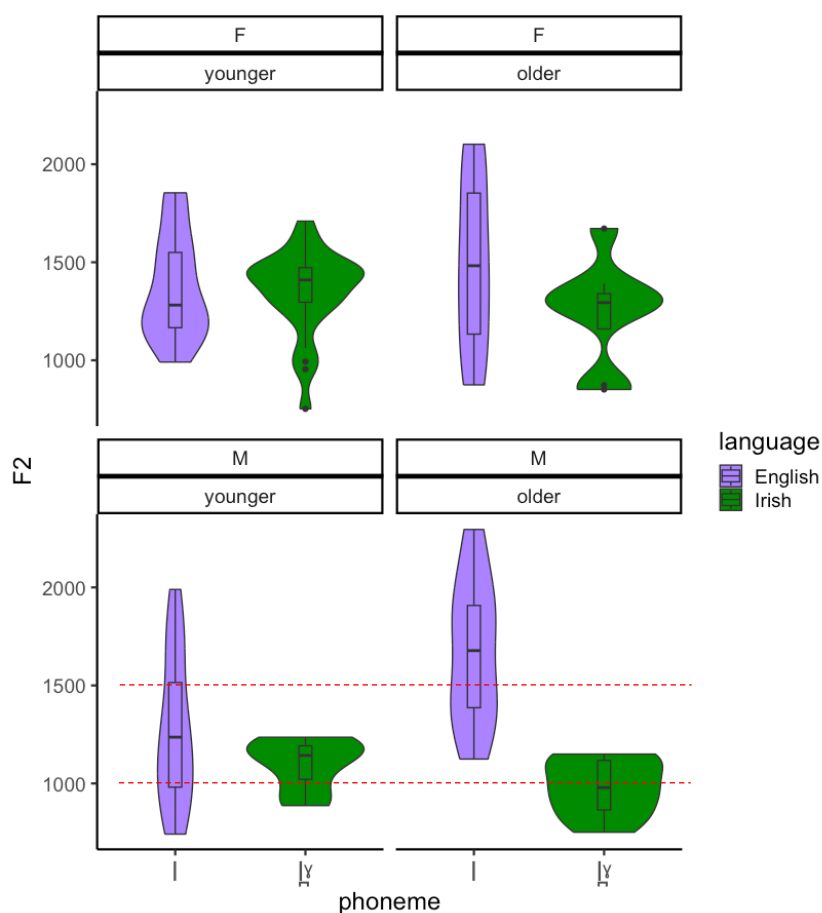


Figure 95. F2 values for word-final English /l/ and Irish /ɫ/ in bilinguals, subdivided by age and gender. Recasens' boundaries of dark /l/ (1000 Hz) and light /l/ (≥ 1500 Hz) are marked with a red dashed lines for male speakers.

Figure 95 indicates that bilingual speakers show divergence in terms of the F2 median values and distributions for the word-final Irish velarised /ɫ/ compared to the English word-final /l/. Older males show a distinct difference in the quality of these laterals across the two languages (highlighting their relatively clear quality of the word-final English lateral, and the clearly velarised quality of the Irish phoneme – in line with Recasens' cross-linguistic dark /l/ at ~ 1000 Hz). The younger males show overlapping distributions and much closer median values; their English lateral is darker than that of the older men and their Irish lateral less velarised. For the older women, the cross-language pattern is rather similar to that of the younger males and does not resemble the clear differentiation

of the older males. For the younger females, the median values and distributions suggest that the velarised Irish lateral is realised with a clearer quality (highest F2 of all groups) than their English final lateral (lowest F2 of all groups).

Again, this apparent shift could be interpreted as cross-linguistic convergence within the younger generation, which is a widely reported outcome of language contact (e.g. Loudon & Page, 2005; Morris, 2013). That said, it may seem unlikely that the English of these younger bilinguals was being influenced by their Irish in a significant way. This is for a couple of reasons; firstly, considering the decline of Irish usage among the younger native speakers in general, along with heightened consumption of English language media within their cohort (reflected in younger speakers' lower LPS (dominance in Irish)), it seems more likely that the cross-linguistic influence is predominantly one-sided, with English exerting a greater influence on Irish than vice versa. Indeed, Ó Murchadha et al. (2013) and Ó hIfearnáin and Ó Murchadha (2011) claim that the Irish of younger native speakers shows greater English influence/interference than that of older speakers. Both studies found that younger native Irish speakers frequently substitute English phonemes into their Irish (Ó Murchadha et al., 2013, p. 75). Ní Ghallchóir's (1981) study of Donegal Gaeltacht bilinguals also found that younger speakers used English phonemes in place of Irish ones (e.g. English alveolar stops replacing Irish dental stops). A further reason that English-to-Irish influence seems unlikely in this case is that the young monolingual speakers parallel the young bilingual speakers in their word-initial /l/ F2 values, as was seen for word-initial /l/.

Instead it is more plausible here that the velarised lateral reported by Hickey (2007) and Bessell & Mulhall (2014), a feature of urban IrE youth speech, has spread to these young Gaeltacht speakers and that their clearer realisation of the Irish velarised phoneme reflects an influence from their English lateral. More data would be needed to explore these patterns in Irish, however.

Statistical findings: bilinguals vs monolinguals. Two LMMs were carried out for bilinguals and monolinguals separately to investigate the possible effects of various factors on /l/-velarisation. These models were outlined in Section 10.2.2 and the results are presented in the following two paragraphs.

The monolingual speaker model examined the relationship between normalised F2 values and the predictors of age, gender (and their interaction), LPS, LAS, and style, with a random intercept for each word. Speaker was excluded as a random intercept as its inclusion generated a singular fit. Fixed effects estimation showed a significant effect of age group, with older individuals exhibiting higher F2 values (Est = 0.38209, $p < 0.05$). No other significant effects were revealed. Overall, the findings suggest that age has a significant effect on L2 for monolingual speakers, with younger speakers exhibiting lower F2 values i.e. darker /l/s.

Parallel to the monolingual model, the linear mixed model for bilinguals examined the relationship between normalised F2 values and fixed effects of age, gender (and their interaction), LPS, LAS, and speaking style, with a random intercept for word. Again, the random intercept of speaker was excluded as it caused singularity issues. The analysis did not find any significant effects for the individual predictors when considered alone, indicating that they may not individually influence F2 values in this context. However, when combined with gender, the factor of age reached significance (Est = 0.038335, SE 0.015061, $p < 0.05$), suggesting that older males were more likely to have clearer /l/s. Of the fixed effects, the interaction between age and gender was significant; those with a higher LPS had higher F2 values (i.e. clearer /l/s).

The variation seen for word-final /l/ ultimately suggests that /l/ quality is not conditioned by linguistic background, i.e. that the property of being an L1 Irish speaker does not predict /l/-velarisation (as has been previously suggested). Other factors, such as age and gender may be more relevant predictors of /l/ quality for both bilinguals and monolinguals.

9.3.4 Word-medial position

The investigation of /l/ in word-medial position was centred around a possible /ɫ/ - /l/ distinction e.g. in words such as ‘million’ vs. ‘milling’, respectively, (as opposed to realisations, such as /l+j/ vs. /l/, typical of British and other varieties of English). The

words ‘million’ (x2 per speaker), ‘William’ (x2 per speaker) and ‘value’ (x1 per speaker) are analysed here.

To begin with, an auditory analysis was carried out to classify the lateral tokens as [l] or [ʎ] with the latter variant having a distinct palatal quality. The findings indicated that the alveolar variant [l] occurred more frequently among monolinguals compared to bilinguals and was more common among younger monolinguals than their older counterparts. The tokens were also acoustically analysed via the measurement of F2. A relatively higher F2 value was expected for the alveolo-palatal [ʎ] (see for example Ní Chasaide, 1979). Spectrograms illustrating the different realisations are shown in §10.2.1 (Figures 79 and 80).

[l] vs. [ʎ]. Figure 96 (below) shows that the various groups of speakers varied considerably in their realisation of ‘million’-type words (‘value’, ‘William’ and ‘million’). Although the alveolo-palatal [ʎ] appears across all cohorts, differences are evident between bilinguals and monolinguals, as well as across ages within each group. It is evident that, on the whole, the bilingual speakers have a higher rate of the alveolo-palatal [ʎ] than the monolingual speakers. The older bilinguals, male and female, display only [ʎ] in these words. It is also the dominant realisation among the younger bilinguals. Among the monolinguals, [ʎ] is also the dominant realisation for the older group. However, younger monolinguals show a preference for [l] (+[j]).

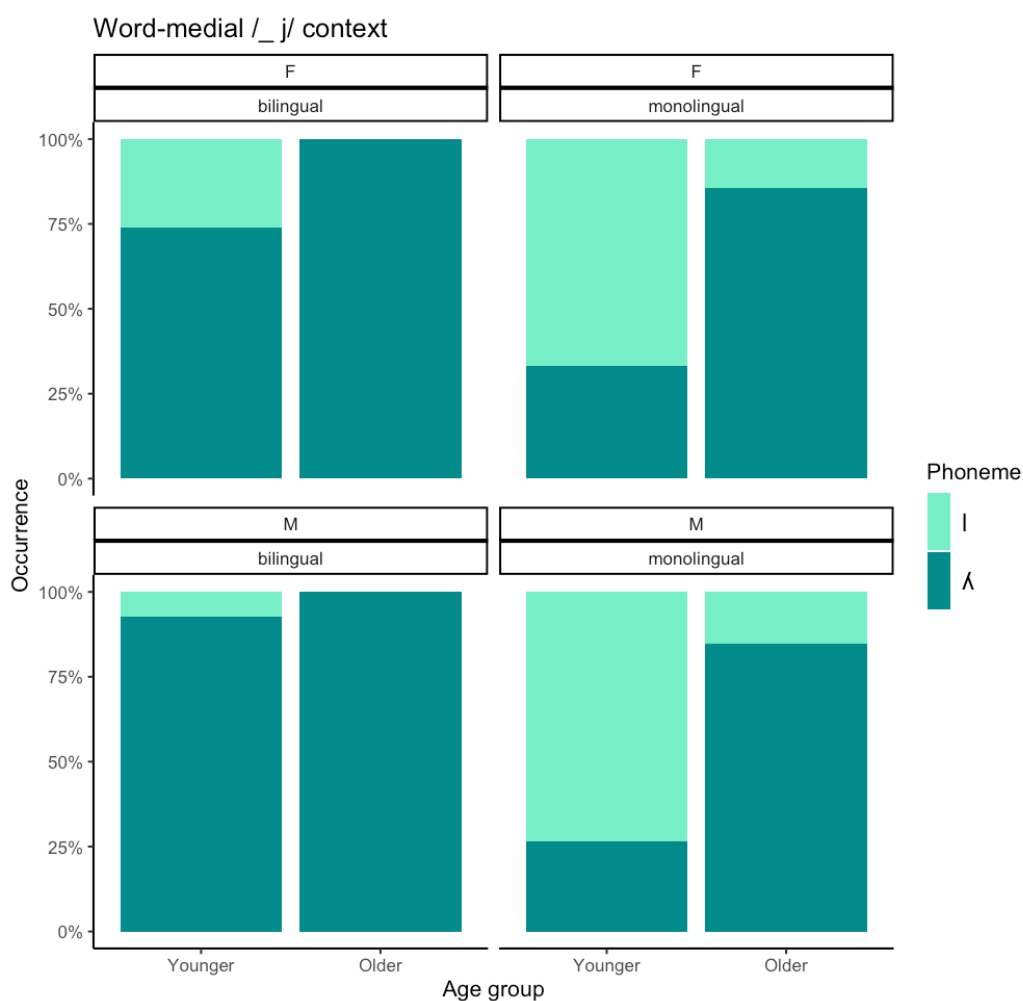


Figure 96. Distribution of [l] and [ɫ] in word-medial /_j/ contexts for bilinguals and monolinguals by gender and age group.

An example of an alveolar /l/ realisation in the word ‘million’ is shown in the spectrogram below (Figure 97) produced by a young monolingual male speaker. This can be compared with the same speaker’s spectrogram for ‘milling’ (also containing /l/) in Figure 98.

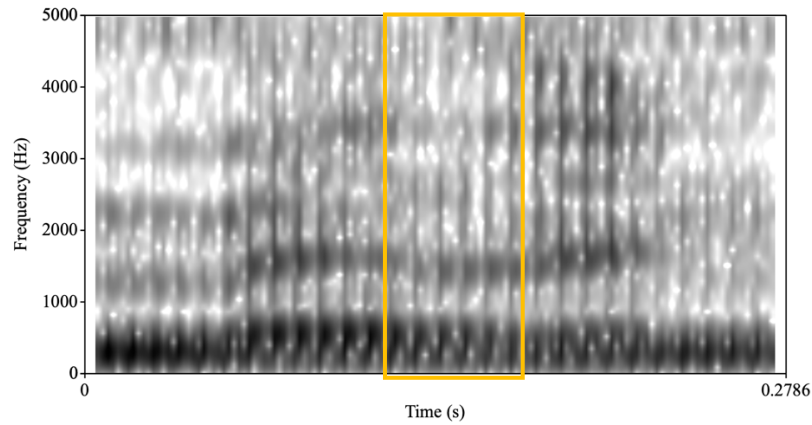


Figure 97. Spectrogram of 'million' produced with [l] (highlighted in yellow) (M, monolingual, 30).

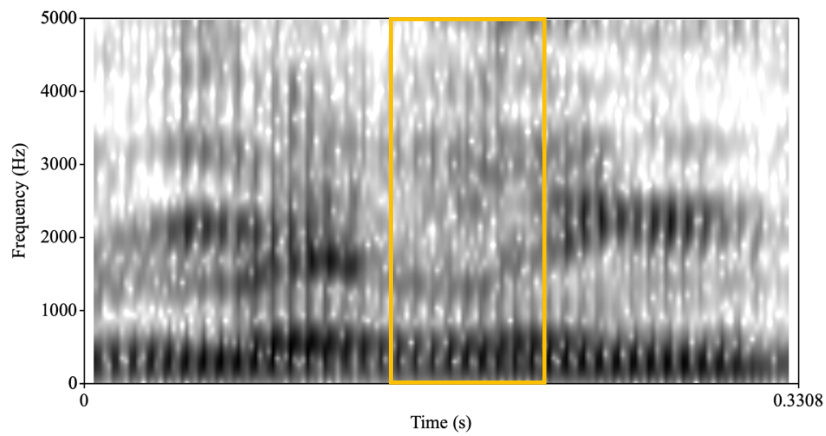


Figure 98. Spectrogram of 'milling' with [l] highlighted in yellow, (M, monolingual, 30).

The normalised F2 values for the alveolar and alveolo-palatal laterals are presented in Figure 99 below, with the former category including the light /l/s of other intervocalic contexts. The overall higher (normalised) F2 for the alveolo-palatal lateral (for both bi- and monolinguals) is evident.

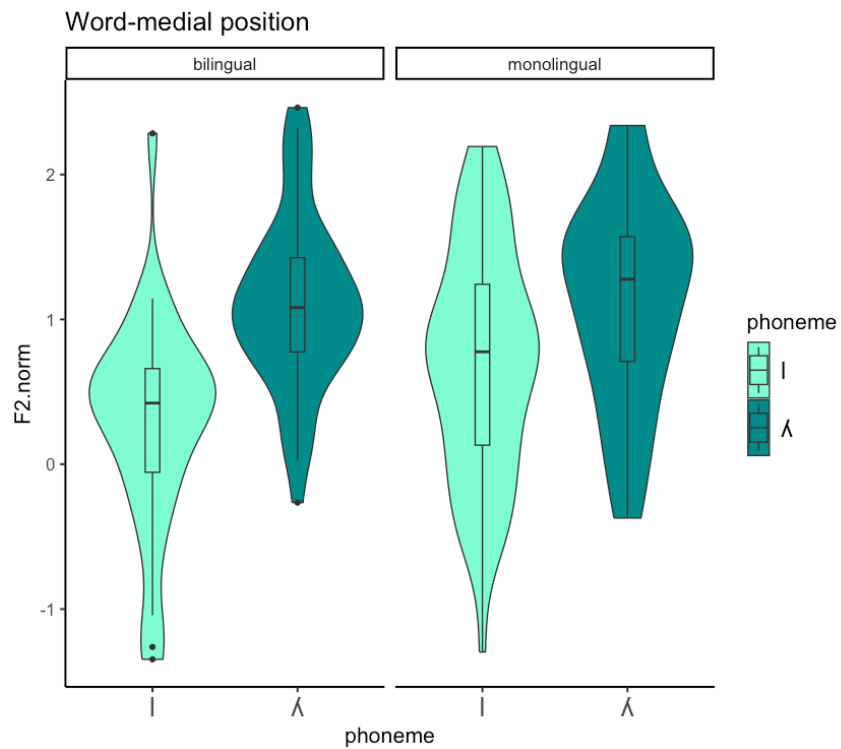


Figure 99. Normalised F2 values for [l] and [ʎ] in bilingual and monolingual speakers.

Bilinguals: Irish vs. English. To investigate parallels between Irish and English, the bilingual speakers' [ʎ] tokens (both Irish and English) are plotted in Figure 100. Regarding cross-linguistic variation within speaker groups, there is no evidence for age- or gender-based conditioning. However, the older male speakers do show slightly more differentiation between the Irish and English phonemes. When looking at the Irish data alone, the younger speakers appear to have a lower F2 for Irish [ʎ]. Additionally, for English [ʎ], the younger speakers also have lower F2 overall. These patterns could suggest a change in progress but more data would be needed to confirm this.

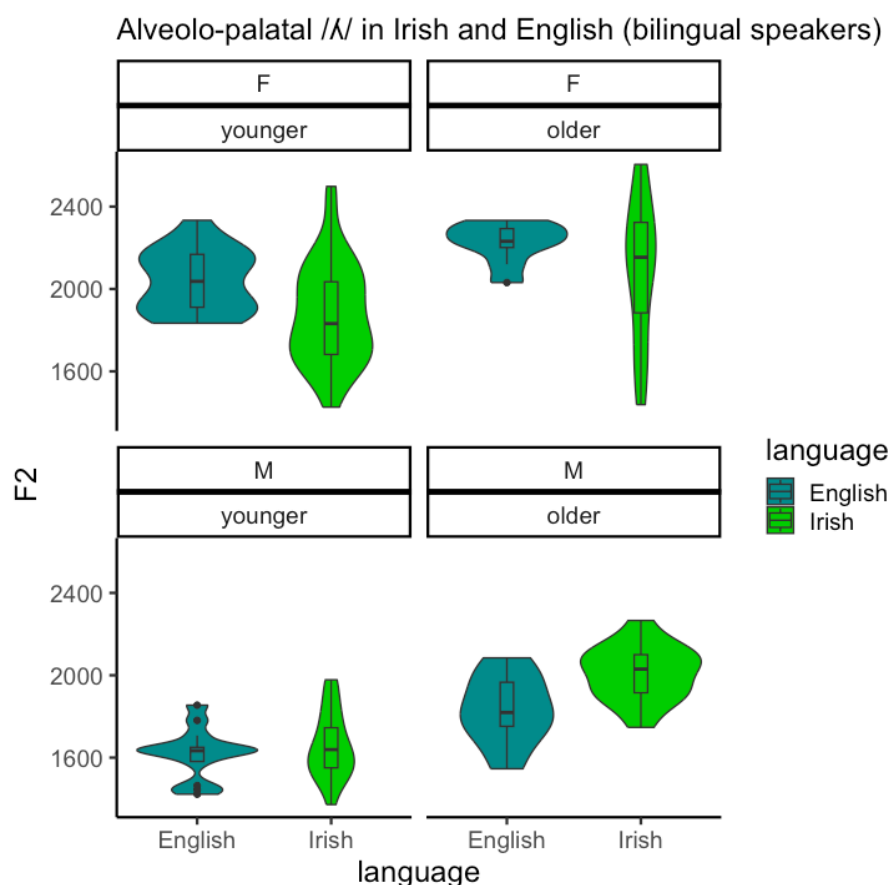


Figure 100. Raw (Hz) F2 values for Irish [ʎ] vs. IrE [ʎ] in bilingual speakers by age and gender.

Summary – word-medial position. The analysis of word-medial /l/ explored the extent to which speakers, both bilingual and monolingual, use the alveolo-palatal [ʎ] in the words ‘million’, ‘William’ and ‘value’. Specifically, the analysis aimed to discern whether the lateral in ‘million’ vs. ‘milling’ was clearly differentiated for these speakers. As the alveolo-palatal [ʎ] is an assumed Irish transfer, it was predicted that bilingual speakers may show a higher degree of this phoneme, potentially as a result of reinforcement from their Irish /ʎ/.

It was shown that not all speakers exhibit the alveolo-palatal in these words, with some speakers using a clear alveolar /l/ in both ‘milling’ and ‘million’. The alveolar /l/ was particularly prevalent among younger monolingual speakers. The bilingual speakers had a distinct overall preference for the alveolo-palatal in these words. Thus, the occurrence of the alveolo-palatal does appear to be conditioned by linguistic background, and within that, there is further age-based variation.

9.4 Cross-linguistic comparison of laterals

The F2 ranges for the lateral phonemes of Irish and English analysed here (for male speakers only) are displayed in Figure 101. Values for the alveolar clear lateral /l/, the alveolo-palatal [ʎ], and the dental velarised lateral /ɭʲ/ of Irish are shown. Alongside these are shown the F2 ranges for the English laterals of the male bilingual and monolingual speakers (separately). Additionally, to provide further context, the F2 ranges of /l/ in RP (Received Pronunciation, i.e. Standard British English) are provided and are modelled on Recasens' (2012) research. Relative to RP /l/, the range of F2 values for IrE /l/ (both bi- and monolinguals) is notably wider. The Irish velarised /ɭʲ/ shows the lowest F2 overall, as was to be expected from the previous graphs.

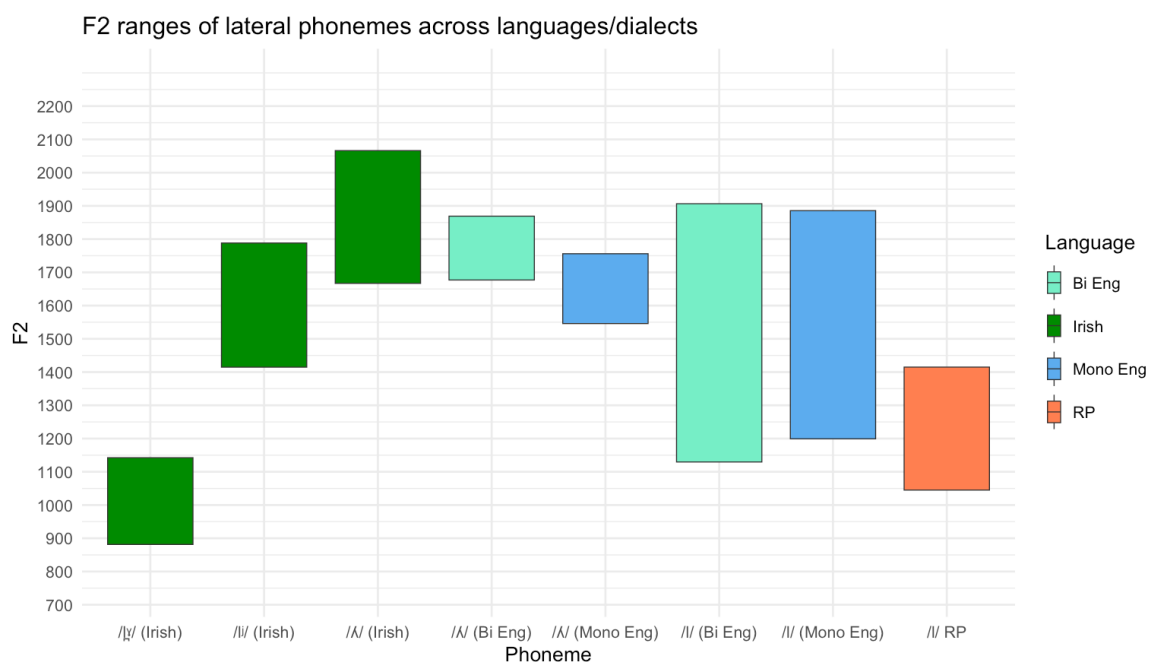


Figure 101. Cross-linguistic F2 values for laterals in male speakers.

9.5 Discussion and conclusion

It was noted previously that /l/ has traditionally been reported as clear in all positions in IrE (Hickey, 2007; Wells, 1982). There have, however, been suggestions of velarisation in pre- and post-vocalic position for native Irish speakers of English (Ó Baoill, 1997) and

word-finally for younger IrE speakers (Bessell & Mulhall, 2014; Hickey, 2007). The main analytical aim of this chapter was to quantitatively explore these two reported exceptions, while also investigating the possible effects of various social factors on /l/-variation. Additionally, the variation of word-medial /l/ was explored, with a focus on a possible /l/-/ɫ/ distinction. This section will follow the layout of the research questions proposed at the beginning of the chapter under the themes of (i) bilingual variation, (ii) younger speaker variation and (iii) word-medial variation.

9.5.1 Bilingual variation (RQs 1a, 1b, 1c)

On the matter of pre-vocalic dark /l/ for bilingual speakers of English, there was no evidence of a dark /l/ word-initially, compared to monolingual speakers. This was confirmed in the overall lack of significant difference between monolinguals and bilinguals in the LMM. However, there was an age-conditioned difference in quality, i.e. a relative lowering of F2 seen in both younger monolinguals and bilinguals. This points to a generational shift, with a trend towards a darker quality among the younger speakers. In addition, there was a degree of coarticulation found for all speakers, whereby /l/ quality varied with that of the following vowel, i.e. F2 of /l/ lowers in line with F2 lowering of the vowel, caused by tongue lowering and retraction.

While it did not seem plausible that the younger bilinguals were using their Irish velarised /ɫʲ/ in their English, it was nonetheless deemed worthwhile to compare the bilingual speakers' word-initial English /l/ and Irish /ɫʲ/. This revealed that, although a relatively darker quality was evident for younger bilinguals' English (compared to the older bilinguals), their word-initial English /l/ did not approximate their Irish velarised /ɫʲ/. This casts doubt over an explanation that the lateral quality shows any direct influence from Irish.

English /l/ was darkest in word-final position (compared to other positions) for all speakers, apart from older bilingual males. The word-final darker quality aligns with Recasens' (2012) cross-linguistic findings of lower F2 utterance finally. A distribution pattern emerged that was comparable to the findings for word-initial /l/, whereby any evidence of lower F2 values among the bilinguals appeared to be age-conditioned

(characteristic of younger speakers) and applicable to monolinguals also, with younger bilinguals and monolinguals having the darkest word-final /l/.

A comparison of bilingual speakers' English /l/ and Irish /ɫʲ/ in word-final position showed that the older bilingual males, who had distinctly clear word-final /l/ in English, had no degree of overlap between that and their Irish dark /ɫʲ/. This latter Irish phoneme was similar to the dark /l/s of other languages studied by Recasens (2012). The younger bilingual groups showed overlap between the Irish /ɫʲ/ and their English lateral, which suggested a possible change in progress, whereby the English /l/ is becoming darker and Irish /ɫʲ/ clearer. Of course, a larger study would be required to ascertain the trends in Irish for young native speakers to track the evolution of the three-way contrast of laterals.

9.5.2 Younger speakers (RQ2)

Bessell & Mulhall (2014) and Hickey (2007) reported word-final velarisation of /l/ in younger urban IrE speakers (Cork and Dublin respectively). A trend in this direction was found in the present data insofar as the younger speakers of both bilingual and monolingual groups had darker word-final /l/s than the older speakers, with younger monolinguals having the darkest word-final /l/s overall. For the younger males, these word-final /l/s approximated Recasens' (2012) cross-linguistic values for dark /l/ (~ 1000 Hz). The LMM for monolingual speakers reflected this variation as younger speakers had a significant effect on F2 values (lowering). It may be that the /l/-darkening found in the bilingual group is likely linked to the previously observed changes regarding word-final dark /l/ in younger urban speakers of IrE, rather than to any distinct influence from Irish. Overall, the age-based variation seen in this dataset suggest a change in progress toward darker /l/s, applicable to both word-final and word-initial positions for younger speakers.

9.5.3 Word-medial /l/ – 'million' words (RQ3)

The analysis of word-medial /l/ found that for most speakers, the alveolo-palatal [ʎ] was used where in British English, for example, one finds an /l+/j/ cluster. However, the extent of usage varied with age and bi- vs mono-lingual status. The older bilinguals only used the alveolo-palatal. It was also the dominant pattern among the younger bilinguals.

However, it was rather rare in the speech of the younger monolinguals: note however that where /l/ is found in this context, i.e., in words like ‘million’, one does not find /l+j/ cluster of other varieties of English, but rather a loss of distinction between ‘milling’ and ‘million’. The use of the alveolo-palatal [ʎ] does appear to be a direct borrowing from Irish, and its occurrence is conditioned by linguistic background (bi/monolingual), as well as by age.

To conclude, the analysis of /l/ consisted of three main parts, resting on previous claims about its variation in IrE. The claim that bilingual speakers have pre- and post-vocalic /l/-darkening (Ó Baoill, 1997) was not apparent for these speakers. Bilinguals and monolinguals largely align in their production of /l/, which is relatively clear in its F2 range when compared with e.g. British English. The bilingual speakers’ /l/ did not appear to align with their Irish velar lateral. Evidence of syllable-final /l/ darkening, which has been reported for younger speakers of IrE (Hickey, 2007a) was found here for both monolingual and bilingual younger speakers. Additionally, variation of word-medial laterals in ‘million’-type words was found to be conditioned by linguistic background and age.

PART V – DISCUSSION & CONCLUSION

10 General discussion

This chapter will synthesize the findings from the preceding chapters on each phonetic feature examined. It will present a discussion of the implications and significance of the findings within the wider research landscape. Firstly, the study's descriptive aims, concerning the sociophonetic variation of Connemara Gaeltacht English will be addressed, with reference to the existing body of knowledge on this dialect. Subsequently, the secondary, more theoretical aim – addressing the questions that remain regarding the origins of certain Irish English features – will be discussed. In doing so, a nuanced understanding of present-day sociophonetic variation in Connemara English and its relation to the historical development of Irish English will be sought.

10.1 Research aims and questions

The first aim of this study was to quantitatively investigate sociophonetic variation within Connemara Gaeltacht English. This aim was motivated by existing anecdotal descriptions of this variety, regarding its segmental structure and its reported Irish influences. The second aim was to explore how a synchronic description of Gaeltacht English may shed light on historical phonological developments within IrE. This was motivated by Hickey's (2004a) assertion that the current Irish-English language contact setting of the Gaeltacht replicates the historical language shift setting of past centuries. In essence, this second aim explores the possibility that the present-day language contact situation in Connemara can inform us about historical language contact mechanisms and the possible phonological origins of IrE.

To fulfil the study's aims, two sets of features were investigated. The first set comprises those features occurring across multiple varieties of IrE which have been reported as resulting from possible Irish reinforcement of British English input features. These are the

PEN-PIN merger, FACE and GOAT monophthongs and liquid+sonorant epenthesis. The second set of features are those anecdotally reported to occur in the English of native Irish speakers: /l/-velarisation (pre- and post-vocally) (Hickey, 2007a; Ó Baoill, 1997) and absence of /t/-lenition (Hickey, 1984).

The research aims, along with their related questions are restated below:

Aim 1: Investigate sociophonetic variation for a selection of segmental features in Connemara English.

Research questions relating to Aim 1:

RQ1a Relative to monolingual Irish English, to what extent does the English of native Irish speakers display (i) features with a proposed Irish influence (ii) features anecdotally reported for Gaeltacht English varieties?

RQ1b To what extent do sociolinguistic factors influence the variation of features that (i) have a proposed Irish origin, and (ii) have been anecdotally reported for the English of native Irish speakers?

Aim 2: In light of the descriptive findings for Connemara English (Aim 1), explore the possibility that present-day variation in the English of L1 Irish speakers in can shed light on historical language contact processes and segmental origins of Irish English.

Research question relating to Aim 2:

RQ2 To what extent can the synchronic variation patterns in Connemara English shed light on the possible Irish origins of specific IrE phonological features?

The following sections will address each research question in turn, contextualising the study results and exploring their implications.

10.2 Research Question 1a

RQ1a Relative to monolingual Irish English, to what extent does the English of native Irish speakers display (i) features with a proposed Irish influence
(ii) features anecdotally reported for Gaeltacht English varieties?

With the exception of /l/-velarisation (which was not found in the reported contexts for Gaeltacht English), each feature exhibited a higher occurrence for bilinguals than for monolinguals. Among the other features, FACE and GOAT realisations were the only features that did not show significant differences between monolinguals and bilinguals. Table 44 summarises the findings for RQ1a for each feature. Note that RQ1a has been rephrased in the table for the sake of brevity.

Table 44. Summary of findings for RQ1a by feature.

Feature	Is this feature more common for bilinguals than monolinguals?
PEN-PIN merger	Yes. Significantly so.
FACE & GOAT monophthongs	Not significantly so.
Liquid+sonorant epenthesis	Yes. Significantly so.
Absence of /t/-lenition	Yes. Significantly so.
/l/-velarisation	No evidence of pre-vocalic /l/ velarisation. Syllable final /l/-velarisation found for younger bilinguals and monolinguals.

As seen in Table 44, the PEN-PIN merger, FACE and GOAT monophthongs, epenthesis and absence of /t/ lenition were all found to be more common in bilingual speech than in monolingual speech. For both the PEN-PIN merger and epenthesis, the correlation between bilingual speakers and the occurrence of these features reached statistical significance

(examined via LMMs and GLMMs, respectively). For FACE and GOAT, no significant effect of linguistic background was found for diphthongisation (measured using Trajectory Length within LMM).

Overall, these findings indicate that, with respect to these features, monolingual and bilingual Connemara English are significantly divergent. This is not a wholly surprising finding, given that the English of Irish speakers has been described as showing particularly heavy Irish influence in the form of parallels with Irish (e.g. Ó hÚrdail, 1997).

These results can be interpreted in two ways. The higher occurrence of these features in the English of native Irish speakers may initially lead to the assumption that reported parallels in their L1 Irish may be ‘reinforcing’ these features through a direct interference/transfer from their L1. This interpretation is partly led by Kallen’s (1986) assertion that such processes are evident for Irish-English bilinguals, and also from findings from the wider research on bilingualism that demonstrate that L1 effects can also be found for early bilinguals (Baker & Trofimovich, 2006)

The possibility that these are direct phonetic transfers from Irish is diminished however, when the parallels are sought in their Irish. For instance, in the case of PEN-PIN merger, this study found that bilingual speakers did not display the reported (Ó Siahail, 1989) parallel process of pre-nasal mid-vowel raising in their Irish. The possibility of a direct/contemporary L1-to-L2 interference is also further diminished when we consider Maguire’s (2018) assertion – in the case of epenthesis – that parallels with earlier British English varieties offer a simpler explanation. In the study of language contact (and in linguistics generally) the simplest explanation is often the best one.

In light of this, an alternative explanation is that certain characteristic features of English spoken by native Irish speakers do not reflect contemporary L1 transfer effects from Irish (as suggested by Kallen, 1985, for instance) but rather, they are indicative of a more conservative variety of IrE. In this sense – and taking Maguire’s (2018) points into account – the characteristic features of this variety might reflect both substratal Irish traces and features retained from earlier British English. This assertion necessarily leads to a need for the recharacterisation of phonological descriptions of Gaeltacht English,

which, thus far has been described one-dimensionally as heavily influenced by Irish. We must consider that this variety shows greater complexity than previously assumed, and that a contemporary L1 Irish influence/reinforcement is not needed to explain the occurrence of those features, which have parallels in earlier British English varieties.

Although English has been spoken for a shorter time in the Connemara Gaeltacht than in urban centres, it may be the case that it is more conservative in linguistic structure. As with other rural IrE varieties, one can assume that innovations and sound changes occurring in urban IrE varieties (e.g. in Dublin or Galway City English) are slower to spread to rural Gaeltacht areas. This concept finds support in Milroy's (1992) research which has suggested that innovation is slower in rural regions and in traditional urban communities, where social ties are stronger. Trudgill (2020) also highlights that speech communities characterised by relative isolation and dense social networks tend to exhibit slower rates of language change and greater linguistic conservatism. Similar findings have been reported for heritage languages – isolated from their original speech community used relatively infrequently by their speakers – which often retain older speech patterns (e.g. Polinsky, 2018; Woolard, 1989). This variety of Gaeltacht English may be considered relatively isolated in that, as it is not the primary language of the Irish-speaking community of Ceantar na nOileán, it is not commonly 'in contact' with monolingual varieties, including Galway City English.

To conclude, the English of native Irish speakers in Connemara differs substantially from that of their monolingual counterparts, with reference to the features studied. These differences are not surprising, given past characterisations of Gaeltacht English as distinct from other IrE varieties (Hickey, 2007; Ó hÚrdail, 1997). The reasons for these differences, however, are worth further investigation. The findings here do not suggest that bilingual speakers show synchronic interference, as would have been the case, for instance, for the first native Irish learners of English, or indeed in any adult learner of a new language. This contradicts assertions by Kallen (1986) that suggest this to be the case in Gaeltacht English. A recharacterisation of Gaeltacht English was proposed. It may be better to view Gaeltacht English as a variety that is mainly conservative in nature toward older IrE forms, be they from past varieties of Irish, British English or from other independent developments.

10.3 Research question 1b

RQ1b To what extent do sociolinguistic factors influence the variation of features that (i) have a proposed Irish origin, and (ii) have been anecdotally reported for the English of native Irish speakers?

Recent sociophonetic studies into IrE have shown that phonetic variation is heavily influenced by a diverse array of social factors. These encompass both macro-category variables, such as age, gender and social class, as well as more nuanced ethnographic concepts like communities of practice and social networks (Collins, 1997; Lonergan, 2013; Peters, 2016, 2023; Schulte, 2020). This understanding underscored the importance of prioritising the analysis of social factors in the present study.

This study included a range of social and linguistic factors that were investigated for the various phonological features. The sociolinguistic factors included age, gender, Linguistic Profile Score, (LPS) Local Attachment Score (LAS) and speaking style, along with phonetic context and case-specific factors, such as word position or consonant cluster. Due to the large number of sociolinguistic factors and phonetic features analysed in this study, a single hypothesis has not been provided for RQ1b. Chapters 5-10, relating to each feature, provided information on predictions for each feature based on the findings of previous studies.

The sociophonetic approach of the present study addresses gaps in the understanding of phonetic variation within Gaeltacht English. While other dialects of IrE have been investigated in terms of sociolinguistic effects, the accounts of Gaeltacht English have remained relatively one-dimensional, with the main defining trait being that these varieties are heavily influenced by Irish (Hickey, 2007a; Ó hÚrdail, 1997). Furthermore, descriptions of Gaeltacht English have generally been brief and anecdotal in nature. On the assumption that Gaeltacht English would exhibit sociolinguistic complexity akin to other Irish English varieties, the sociolinguistic factors were included in the study.

Table 45 summarises the significant sociolinguistic factors/predictors for each feature relating to RQ1b.

Table 45. Summary of findings for RQ1b by feature. *Note.* LPS = Linguistic Profile Score.

Feature	Significant social predictors	
	Bilingual speakers	Monolingual speakers
PEN-PIN merger	Age, gender, style	None.
FACE & GOAT monophthongs	FACE: gender, LPS GOAT: age, gender	FACE: age, gender GOAT: LPS
Liquid+sonorant epenthesis	Age, LPS	-
Absence of /t/-lenition	Age	-
/l/-velarisation	Age (syllable-finally)	Age (syllable-finally)

The most distinctive pattern of variation, when considering the results on an overall scale, is the notable degree of age-based variation, particularly evident for the bilingual speakers. The findings suggested that ongoing language change (in apparent time) is occurring within bilingual Gaeltacht English and, to a less extreme degree, within monolingual English. Within the bilingual group, the younger cohort appear to have adopted speech patterns aligned closely with urban varieties of IrE (also observed in monolinguals), whereas the older bilinguals display a higher proportion of more traditional features. For the majority of features studied, the younger bilinguals patterned more similarly to the monolingual speakers than to their older counterparts.

The younger speakers of both groups had similar realisations overall, which diverged from the older groups. These findings may indicate a possible process of dialect levelling, whereby regional variations are reduced over time in favour of features that have a wider geographical spread. This involves the reduction of marked variants and leads to convergence of speech patterns between groups of speakers, with a resulting variety that lacks strongly localised features (Kerswill, 2003). Possible dialect levelling, and the resultant recession of the more traditional variants found in older Gaeltacht English speech have caused notable differences between the older and younger bilinguals. The speech of the younger bilinguals and monolinguals is largely in line with Hickey's

description of supraregional Irish English, a variety of IrE that is not localised and can be viewed as a standard dialect of IrE (Hickey, 2007a). However, the younger speakers show additional variants that Hickey does not report for supraregional IrE, including fronted GOOSE, glottal and tap /t/ variants, and syllable-final /l/-darkening, for example. The monolingual older group are, in fact, the most reflective of the supraregional variety of IrE described by Hickey. It must be noted that this variety is linked to higher levels of education. Hickey reports that educated middle class speakers use the lowest proportion of vernacular/ locally-bound forms in IrE (Hickey, 2012). For the findings here, we must be aware that age alone cannot offer the best explanation for dialect levelling. Although not formally analysed in this study, the younger bilinguals had all received college education and additionally were less attached to their local community. These factors may explain a degree of the changes observed here.

It is crucial to recognise that a significant correlation between age and the presence of a phonetic feature should not be analysed in isolation. As mentioned above, a simple binary generational division cannot always offer the best framework for describing linguistic variation. The influence of age on phonetic variation may be intertwined with other factors, which when considered together can offer a more comprehensive explanation than age alone. Along with increased levels of education, the consumption of English-language digital media among the younger Gaeltacht speakers is a plausible explanation for these generational changes in bilingual IrE. A further, related explanation may lie in Hickey's (2007) theory regarding linguistic dissociation, which he proposed for changes in Dublin English. He suggested that changes seen in southside Dublin English during recent decades may be a result of linguistic dissociation, whereby speakers diverge from local and more stigmatised variants. For the present study, it may be the case that the younger female Gaeltacht English speakers are dissociating from the variants that characterise their local community. Such an explanation is partly justified by their relatively lower Local Attachment Scores (LAS). It would be interesting to investigate perceptions of the features studied here to explore possible stigmatisation and subsequently investigate language change patterns with the incorporation of additional social data relating to the social networks and social mobility of the speakers. Labov's (2001) observations about the Gender Paradox – that women lead in both “change from above” and “change from below” – may shed light on the behaviour of the younger female speakers; if the younger women are dissociating from local variants, they may be

adopting variants associated with prestige varieties outside their community. This could reflect broader societal influences, aspirations for upward mobility, or alignment with external norms.

Within the bilingual group, younger women in particular appear to be leading the change regarding the lack of PEN-PIN merger (aligning with monolinguals) and presence of more diphthongal FACE and GOAT variants (an emergent feature reported for other IrE varieties (Bessell, 2023; Collins, 1997; Hickey, 2007a)). This gender-based pattern echoes findings from various studies that have reinforced Labov's (1990) assertion that women tend to use a

fewer non-standard or stigmatized variants than men in many situations, adhering more closely to overtly prestigious norms but that women lead in 'changes from below', innovating in the adoption of forms that become markers of linguistic change. In this study, the younger women's speech patterns largely aligned with Hickey's (2007) supraregional IrE, which does not exhibit the locally marked variants of PEN-PIN merger and monophthongal FACE and GOAT variants. However, gender and age do not neatly account for the variation observed in this study. To illustrate, one young bilingual woman in this study, who had the maximum value for Irish dominance (measured by Linguistic Profile Score, LPS) and attachment to the local community (measured by Local Attachment Score, LAS), diverged from her peers in her usage of more traditional variants such as plosive [t] (where they used weakened variants), indicating intragroup variation for young women. The other young women had relatively lower scores of LPS and LAS.

Regarding the factor of LPS, it was hypothesized that bilingual speakers who were more dominant in Irish (reflected with a higher LPS) would display the reportedly Irish-influenced features to a higher extent than those who were less dominant in Irish. This was partly based on findings from previous studies indicating effects of dominance on L1-to-L2 transfer features (e.g. Flege, Schirru & McKay, 2003). The sociolinguistic findings in [Table 45](#) above, indicated that, for the bilingual speakers, LPS was a significant predictor for the occurrence of liquid+sonorant epenthesis and monophthongal realisations of FACE, i.e. a higher dominance in Irish correlated with the presence of these features. In the investigation of reinforcement from Irish, this might be taken as positive

evidence. That is to say that those speakers who use Irish more frequently in their daily lives may be reinforcing parallel features in their English. However, the issues with proving such a mechanism have been discussed already and so only speculation is possible at this point.

To summarise, age was revealed in this study to be a highly important predictor of phonetic variation. The findings indicate change in progress for bilinguals and monolinguals and verify previously reported patterns of the recession of more traditional/conservative features (e.g. Peters, 2016). While changes appear to be happening for both the monolingual and bilingual speakers, they are more extreme for the latter group. The suggested changes in progress within Gaeltacht English point toward a more supraregional variety of IrE (Hickey, 2007) and a potential process of dialect levelling. While age appears to be a salient sociolinguistic factor in this study, it should not be considered in isolation. Age is intertwined with other factors, such as gender, language dominance and local attachment in determining language change. To expand on these findings, further studies could consider social mobility, education levels and social attitudes as possible valuable predictors of speech variation.

10.4 Research Question 2

Having explored and contextualised the findings for RQ1a and RQ1b, we now turn to RQ2, which is intended to address the secondary, more theoretical aims of the study.

RQ2 To what extent can the synchronic variation patterns in Connemara English shed light on the possible Irish origins of phonological features in Irish English?

The idea of applying the synchronic findings for phonetic variation in Gaeltacht English to a wider consideration of past language contact processes in IrE was motivated by Hickey's (2004a, p.28) claim that Gaeltacht areas provide understudied settings "in which the language shift scenario of previous centuries is replicated, this enabling linguists to view the process of language contact and transfer *in vivo*." The idea implied here is that we can know more about the potential historical Irish-to-English transfer by exploring present-day transfer effects in Irish-English bilinguals, who have been reported to display

direct L1 interference effects (Kallen, 1985). It is presumably on this assumption that Hickey views the current Gaeltacht setting as a replica of the past, where Irish speakers were acquiring English and may have transferred their L1 phonemes into English.

The main inquiry, although perhaps impossible to prove, revolves around whether it is plausible that L1-Irish historically reinforced the maintenance of specific segmental variants in IrE, which have subsequently remained in monolingual IrE varieties. This investigation involves assessing whether contemporary L1-Irish speakers of English show indication of an Irish reinforcement or transfer within these features and using these findings to infer past processes. However, it remains uncertain whether L1-Irish influences can explain the occurrence of the variation observed in this study. For instance, in the case of the PEN-PIN merger, which is notably prevalent among older bilingual men, the lack of a similar trend in Irish points toward the lack of direct L1-influence, whereas for a feature such as the lack of /t/ lenition, an Irish source may be more plausible. The relatively higher occurrence of epenthesis for older bilinguals, on the other hand, may be more simply explained as a traditional/conservative IrE variant with roots in earlier input British English varieties (Maguire, 2018). However, these hypotheses can only remain as such. Even in the present day, a parallel between Irish and English is only a parallel and cannot be taken as ‘proof’ of transfer.

In seeking explanations of historical processes in present-day patterns, it must be noted that the current situation of language contact and variation in the Gaeltacht can only tell us about the past scenario and mechanisms of contact between Irish and English if we believe it to be a representative mirror of the past, such as that proposed by Hickey (1986). It must be recognised that the current setting of the Gaeltacht, although it may be the closest modern-day approximation to historical situation of language shift in Ireland, is fundamentally different to past scenarios in multiple ways. The social surroundings are fundamentally different, as are factors such as education, social mobility and language attitudes. Additionally, the influence of English language digital media cannot be underestimated in its effects on younger bilinguals’ speech patterns in English. These factors mean that the present-day Irish-English language contact scenario may not be taken as a “replica” (Hickey, 1986) of past contact settings and as such can tell us little of possible historical transfer processes from Irish to English. This idea may be too simplistic of a concept. The patterns found in the present-day speakers can only be seen

for what they are, mere patterns. Hickey's assertion that the Gaeltacht provides an opportunity to study the language transfer process "in vivo" loses validity when we view Gaeltacht English as a rural, conservative variety, characterised by structured rules and well-established norms, rather than resembling the production of an L2 learner's dialect.

In summary, the answer to RQ2 is not a straightforward one. It must be recognised that synchronic variation can only go so far in shedding light on past processes and that linguistic features should be considered on a case-by-case basis. Doing so avoids the pitfalls of painting varieties such as Connemara Gaeltacht English with one brush (i.e. as a variety that shows heavy Irish influence and synchronic L1 interference). Certain findings may be seen as counting in favour toward (but not proving) a present-day Irish influence, such as the higher occurrence of investigated features in the English of bilinguals than in the English of monolinguals. However, other findings seem to work against an Irish influence. Yet, these ideas cannot be proven, as language contact, in both the present-day and from historical perspectives, is a complex topic.

This study can only go so far in answering that question, partly due to the need for more data and partly due to theoretical limits; the mere parallel of a feature with Irish cannot be taken as proof of transfer but can only be used as a departure point on which to base further hypotheses or questions.

10.5 Limitations

Several limitations specific the analysis of each phonetic feature have been detailed in the previous chapters (Chapters 6-10). These limitations will be briefly summarised here before discussing further limitations relating more generally to the research project.

This analysis of PEN-PIN merger used a top-down approach, grouping DRESS vowels into binary categories (pre-nasal vs. pre-oral consonant), which overlooked nuanced variation across different phonological contexts. A bottom-up approach, examining DRESS vowels in a range of contexts before categorizing them, would have been more effective, as low F1 values indicative of raising were found in other environments, such as before voiced

stops, not just pre-nasal contexts. Additionally, the small sample size of Irish data and limited phonetic contexts constrain the findings, highlighting the need for more extensive data collection to validate and expand upon these patterns.

In the statistical analysis of /t/-variation in the younger bilinguals and monolinguals, a series of logistic mixed effects models were run in a one vs. rest fashion. However, this method could be improved upon by conducting a multinomial logistic mixed effects model, whereby all /t/-variants are modelled at once (Bates et al., 2015). This would simultaneously make the analysis more efficient and interpretable.

In analysing the quality of FACE and GOAT vowels, the use of Trajectory Length (TL) may have been overly simplistic, as it reduces formant trajectories to a single value per token. While using TL facilitated the creation of linear mixed effects models, it fails to capture where and to what extent differences occur over time, obscuring potentially meaningful variation. Generalized Additive Mixed Models (GAMMs), which account for continuous formant changes over the duration of vowels, would provide a more robust and nuanced approach to studying diphthongisation and its sociolinguistic predictors.

In the analysis of epenthesis in liquid+sonorant clusters, the small number of tokens available from spontaneous speech prevented the accurate assessment of effects of speaking style, which in turn prevented a direct comparison with previous studies on Galway English, e.g. Sell (2012). A much larger speech corpus would be required to gather more spontaneous tokens to investigate the effects of style on epenthesis rates.

The analysis of /l/-velarisation had several limitations, including the presentation of raw Hz formant measurements. It was decided to keep the measurements in Hz to enable easy comparison with Recasens' (2012) cross-linguistic boundaries for dark /l/ and light /l/. However, doing so enabled a comparison of these latter boundaries with the F2 /l/ measurements for male speakers only, excluding females. To improve upon these findings, the data would need to be normalised alongside Recasens' measurements. This would allow for cross-speaker comparison.

Beyond the feature-specific limitations, there are more general limitations inherent in this study. The first relates to the social factor of age. This study employed the apparent time

construct/ hypothesis to examine language change within Connemara English, analysing speech of participants of different generations. The apparent time hypothesis posits that the speech of older individuals reflect past linguistic norms, while that of younger individuals reflects the current state of the language variety. In line with this hypothesis, this study suggests that both bilingual and monolingual speakers of Connemara English are undergoing potential changes, with younger speakers diverging from more traditional Irish English (IrE) features. However, the use of apparent time is not without limitations. One issue with this construct is the assumption that individuals maintain consistent speech patterns throughout their lives, which contradicts findings indicating that speech patterns may evolve with age (e.g. Harrington et al., 2000). Thus, what may seem like ongoing change could actually be indicative of age-related linguistic patterns, repeating across generations. These patterns are not the result of language change but of aging. To validate whether apparent changes truly signify linguistic evolution, a longitudinal study yielding real-time data would be necessary. However, there are obvious obstacles to carrying out such a study, including its resource-intensive nature. The results of the present study can only suggest that language change is potentially taking place, rather than ‘prove’ it to be the case.

Further limitations concern the data collected and the related methodologies. Due to the sparsity of token count and phonetic context for certain features analysed, the results of this study remain to be verified via the analysis of larger sample sizes and the inclusion of additional phonetic contexts for the majority of features. The narrow range of phonetic contexts examined may have obscured the findings in this study. Specifically, the analysis of the FACE and GOAT vowels, which had few collected phonetic contexts, could benefit from additional tokens in various phonetic contexts, given that the findings suggested that some observed variation resulted from coarticulation with adjacent nasals. Overall, adopting a more systematic approach to study design and data structure would yield a more comprehensive corpus of data and more detailed results.

The structure of the elicited data could be enhanced. For the read sentence data, multiple phonemes of interest were collected within individual sentences, initially intended as an efficient method to collect a maximal amount of data. This design broadly followed the model of Hickey’s Sound Atlas of Irish English (2004), in which he elicited simple sentences containing key words. It appears that Hickey avoided using word-lists or carrier

phrases to obscure from the speaker the key words or pronunciations being analysed. To enable more fine-grained phonetic analysis, a word-list format may be preferable, streamlined to include only essential tokens of investigated phonemes. This would also present a more time-efficient method of data collection and analysis.

Regarding data collection methodologies, it is important to assess the suitability of reading tasks (sentences, passages, word lists) in a study such as this one, which involves older speakers with varying levels of English proficiency and literacy in both English and Irish. One older bilingual participant in the present study, who left school in their teenage years, had some difficulty identifying words within the sentence reading task. This is perhaps not surprising, given that rural areas in Ireland have been shown to have the highest proportion of individuals with “No formal/primary” as their highest education level (CSO, 2016). Further research into the speech of older individuals in Gaeltacht or rural populations in Ireland would benefit from considering this factor. It may be advantageous to adapt data collection methods as needed, potentially incorporating the use of picture naming or identification tasks to elicit relevant words.

10.6 Directions for future work

This study makes a much needed quantitative contribution toward the understanding of Connemara English. However, much research remains to be done on both English and Irish speech patterns in Gaeltacht areas. Building on the present study, further research might consider firstly a comparative study with English in other Gaeltacht areas, e.g. in Munster or Ulster, which, compared to Connemara, show divergent segmental aspects in their Irish. It would be interesting to see whether the English in these areas displays parallels with features unique to these other Irish dialects and whether sociolinguistic effects similar to those found in the present study can be identified.

While Irish English was the main focus of this study, future research could focus on aspects of the Irish segmental system of Connemara, questioning possible influences of English and ongoing language change within Irish. The present study attempted to advance past descriptions of Gaeltacht IrE by exploring the Irish data alongside the English data. This was in an effort to acknowledge the fact that Irish cannot provide a static comparison when searching for parallels with IrE, neither temporally nor

geographically. More could be done in this regard, however. There is evidence to suggest that early bilinguals can show bi-directional linguistic influence (Baker & Trofimovich, 2006) and indeed, Ní Ghallcháoir's (1981) preliminary study on Donegal Irish-English bilinguals suggested that younger Gaeltacht speakers incorporate certain English sounds into their Irish (e.g. using [d] or [t] for Irish /ḍ/ or /t̪/). A further investigation of such reports would enable a deeper understanding of Irish and English phonological interaction. Related to this, an additional research avenue could include the investigation of potential convergence between the segmental systems of English and Irish in bilingual speakers. Such a study might follow, for example, Morris' (2013) study on Welsh and Welsh English /l/ convergence.

Focussing on Irish, a more detailed comparison of Irish speech data between younger and older generations may reveal patterns of dialect levelling, as was seen for the English data in this study. Observing dialect levelling in Irish would shed much needed light on the linguistic changes happening within Irish and would result in findings not only comparable to the English data analysed in the present study but also to other endangered minority language contexts.

11 Conclusion

This thesis presented a quantitative sociophonetic investigation of a selection of segmental aspects of Connemara English, exploring the role of various social and linguistic factors on the variation of these features. The primary aim of this study was to shed light on the segmental system of the understudied variety of Connemara Gaeltacht English, a dialect that is in contact with Irish through bilingual speakers. By contrasting the English of native Irish speakers with that of monolingual English speakers, this study identified distinctive segmental differences between these groups.

To account for the phonetic variation found in this study, one must look beyond the binary speaker property of bilingual or monolingual. Rather, the observed variation can be better explained by considering the complex interplay of various sociolinguistic factors, on a feature-by-feature basis. In particular, the results of this study indicate that age plays a significant role in accounting for much of the observed variation. Specifically, among the bilingual group, younger speakers showed a considerable degree of divergence from the speech patterns of their older counterparts; these younger bilinguals have speech patterns that closely align with those of monolinguals, both younger and older (but more notably with the former). This phenomenon may be indicative of an ongoing process of dialect levelling in Ireland, characterized by a shift from locally-marked variants to supraregional forms (Hickey, 2007). Other factors, however, such as gender, language dominance and usage, and attachment to the local community were shown to be intertwined with age. By uncovering these speech patterns and their relation with social factors, this study sheds light on the fine-grained variation of previously unexplored varieties of Connemara English.

An important implication of this study is that it prompts a much-needed ‘re-characterisation’ of Gaeltacht English. As mentioned above, thus far the English of L1 Irish speakers has been anecdotally characterised as a dialect that shows particularly heavy Irish influence, specifically coming directly from the bilingual speakers’ Irish. This study concludes that such a characterisation is overly simplistic and does not account for intra-group variation within the bilingual community. The fact of having Irish as a first

language does not neatly explain the variation observed in the bilingual speakers' English and it cannot be concluded definitively that an ongoing L1-to-L2 influence in these speakers is at work. Without strong evidence for reinforcement of these features from an Irish source, it is best (and simpler) to view the English of Irish speakers as a variety of IrE that may show conservatism toward older stages of IrE, displaying features that have since changed in more urban monolingual areas. These features might reasonably be attributed to past substratal influences of Irish or may be explained with reference to earlier British English input.

An additional, theoretical objective of the thesis was to explore the extent to which the descriptive findings could illuminate historical language contact processes. However, the study revealed limitations in using present-day findings from the Gaeltacht to understand past contact scenarios in Ireland. Given the significant differences between the present and historical contexts, it is challenging to extrapolate and generalise the findings of this study to broader historical contexts.

This study makes significant contributions to our understanding of ongoing language change in IrE by investigating a selection of segmental aspects in Connemara English. It has crucially advanced our comprehension of sociophonetic variation in IrE by examining Irish-English language contact in the Gaeltacht from a contemporary standpoint. It has underscored the significance of using sociophonetic methods to offer valuable insights into varieties of IrE, both within and beyond the Gaeltacht. In the use of quantitative methods, this study has addressed the lack of empirically-based findings specifically for Gaeltacht English but also for IrE more generally.

In offering valuable insights into sociophonetic variation of Connemara Gaeltacht English, it is hoped that this study will pave the way for future exploration of Gaeltacht English varieties and into other language varieties in long-term minority-language contact settings. Further research of this kind is more urgent than ever, given the decline of Irish in the Gaeltacht and the diminishing opportunities to study its phonological interaction with Irish English.

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Appendix A: Participant information sheet



Trinity College Dublin: PhD Research at the Phonetics and Speech Lab

Participant Information Sheet

Researchers: Kate Tallon, Prof. Ailbhe Ní Chasaide

You have been asked to take part in a research project by Kate Tallon (PhD student in Linguistics). The aim of the project is to explore the linguistic interaction between Irish and English and to document the dialects of these languages in the Conamara Gaeltacht.

What will taking part involve? Participation in this project will involve reading a list of sentences out loud in Irish and/or English and having these sentences recorded. Participation is voluntary and even if you decide to participate now, you may change your mind at any time.

What will the recordings be used for? The recordings made today will be used for linguistic analysis as part of my ongoing research on the sound systems of Irish and English. As a participant, you will remain anonymous within the study and can request to have any part of your recordings deleted at any time. In addition, you may obtain a copy of your recordings if desired.

What if I have more questions about the project? If you have any further questions please get in touch with me (Kate) at [redacted] [@tcd.ie](mailto:[redacted]@tcd.ie).

Appendix B: Participant consent form



Trinity College Dublin: PhD Research at the Phonetics and Speech Lab

Participant Consent Form

Researchers: Kate Tallon, Prof. Ailbhe Ní Chasaide

- I voluntarily agree to participate in this research study and agree to have my voice recorded.
- I understand that even if I agree to participate now, I can withdraw at any time without consequences of any kind.
- I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that under freedom of information legalisation I am entitled to access the information I have provided at any time.
- I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

Signature of research participant:

Date: _____

Signature of researcher:

I believe the participant is giving informed consent to participate in this study.

Date: _____

Appendix C: Participant questionnaire

Note the location questions were adapted for Furbo participants.

Participant Survey Ceantar na nOileán

Thank you for taking the time to do this survey. It should only take a few minutes to complete. The information you give will be kept confidential and anonymous and will only be used for my own academic research. Please let me know if you have any questions about the questions!

Kate

What is your year of birth?

Where are you originally from? (town/ village name **and** county, e.g. Spiddal, Galway)

Do you currently live in Ceantar na nOileán?

- ☐ Yes
☐ No

How long **di** ' ' in Ceantar na nOileán?

How long have you lived in Ceantar na nOileán?

Do you work locally? (i.e. in Ceantar na nOileán or the surrounding area)

- ☐ Yes
☐ No

Can you speak Irish?

- ☐ Yes
☐ No

What is your level of Irish?

- ☐ A few phrases
☐ Conversational
☐ Advanced
☐ Fluent / native speaker

How often do you speak Irish?

- ☐ Daily
☐ Weekly
☐ Monthly
☐ Less often

Appendix C ctd.

How often do you speak English?

- ☐ Daily
☐ Weekly
☐ Less often

What language(s) did you speak at home growing up? (Select all that apply)

- ☐ English
☐ Irish
☐ Other

Which language did you learn first?

- ☐ Irish
☐ English
☐ Both at same time

What language do you use the **most** in the following situations? (You can select both if you use them **equal** amounts)

	Irish	English
At work	☐	☐
With family	☐	☐
With friends	☐	☐
Talking to yourself/ in your head	☐	☐

Were you educated through Irish?

- ☐ No
☐ Yes - Primary school
☐ Yes - Secondary school
☐ Yes - University

Have you ever lived outside of the Gaeltacht for more than a year? (Please give place and length of time, e.g. "Canada, 5 years")

Do you have other family members in Ceantar na nOileán?

- ☐ Yes
☐ No

Do you socialize (e.g. cafés/pubs/shops/meeting friends) mostly within the Gaeltacht area?

- ☐ Yes
☐ No - Other places

How strongly attached do you feel to the community in Ceantar na nOileán and the surrounding area?

Appendix C ctd.

Not attached A little attached Quite attached Very attached
0 1 2 3

Click and drag the slider

To what extent are the following statements true:

0 1 2 3 4 5

"I feel like myself when I speak Irish"

"I feel like myself when I speak English"

Powered by Qualtrics

Appendix D: Sentence corpus (English)

Feature/ lexical set	Sentence elicited	Word
DRESS	Say ____ again.	bed, beg, best, bet, den, head, met, net, pen, stem, ten
	They sent him a new car.	sent
KIT	Say ____ again.	hid
	They put mint in the water.	mint
	Through thick and thin we've stayed together.	thick, thin
	They were milling corn on the farm.	milling
FACE	Say ____ again.	came, hayed, made
	'Leaf' was the name of the film.	name
	Through thick and thin we've stayed together.	stayed
GOAT	Say ____ again.	hode, no, own
	Run past the canyon and don't stop.	don't
	Loaf rhymes with oaf .	loaf, oaf
Epenthesis	–	"Leaf" was the name of the film .
	–	On his left arm he had a cut.
	–	That barn is worth a million euro.
	–	The button looked like a pearl .
	–	The girl was cutting down the elm trees.
	–	They were milling corn on the farm .
/t/	Say ____ again.	cut, met, net, bet, best
	He's cunning but he won't win the bet .	bet
	They put mint in the water .	mint, water
	Rest is good for the soul.	rest
/l/	–	Which bottle of milk is the best value ?
	–	Leaf was the name of the film.

- Did you see the new **foal**?
- That barn is worth a **million** euro.
- **William** can't whistle.
- What did you **feel**?
- They were **milling** corn on the farm.

h _ d (vowel space)

Say _____ again.

Monophthongs: heed, hid, head, had, half, hod,
hawed, hud, hood, who'd

Diphthongs: hayed, how'd, hode, hoyed, hide

_ /r/: heard, here'd, hoard, cured

Appendix E: Sentence corpus (Irish)

Investigated feature	Carrier sentence	Word
/o:/:	Abair ____ arís. (Say ____ again)	fón, nócha, bó, cóta,
	–	Thóg sí mo bhrú fola.
/e:/:	Abair ____ arís.	cén, sé, tae
/ε/:	Abair ____ arís.	ceimic, meicneoir
/ɪ/:	–	D’ith sé arán agus mil .
	–	Bhris sé an fhuinneog.
Epenthesis	Abair ____ arís.	leanbh
	–	Bhí pian i mo bholg .
	–	Colm is ainm dó.
	–	Bhí fearg uirthi.
	–	Tá dath gorm ar an gcailc .
/i/:	–	Bhí mé ag léamh Cré na Cille .
	–	Ná habair mil, abair mill .
	Abair ____ arís.	leanbh
	–	Tháinig na gaill .
/i/:	–	Ná habair mil , abair mill .
	–	Tá dath gorm ar an gcailc .
	–	Cheannaigh sé coileach .
/ɪy/:	–	–
	–	Tá na coinnle ag soilsiú go geal . Briotanach, sasanach nó gall .