The social stratification of clicks in English interaction

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Abstract

This thesis investigates how phonetic clicks work as a sociolinguistic variable embedded in interaction, adding to the growing research on the social stratification of sounds on the margins of language. While phonemic clicks occur rarely in some southern and western African languages, clicks are common as non-phonemic, interactional features in many languages, including English, and are anecdotally assumed to be used most to display a stance or attitude towards someone or something (e.g. Ogden 2013; Wright 2011; Gil 2013). There is also some evidence that clicks might vary in a similar way to more traditional linguistic variables (e.g. male and female speakers might perform clicks differently and at different rates—Ogden 2013; Pillion 2018).

Previous work on clicks in English has shown that clicks can be produced with the full range of articulation (bilabial to alveolar-lateral), and occur alongside phonetic accompaniments, i.e. audible inbreath, creaky or nasal collocated speech, and/or particles, such as *uh* and *um* (e.g. Wright 2011; Ogden 2013). Previous studies using Conversation Analysis have demonstrated that English clicks have two main interactional functions: sequence-managing in talk, e.g. marking word search, marking the shift from one speaker to another, indexing the beginning of a new topic or interactional functions; and affect-laden functions, such as displaying disapproval, disagreement, sympathy (Ogden 2013). Click presence in these interactional functions seems to vary. Clicks are rarely studied or discussed in conjunction with social factors, though there is some indication that clicks may vary according to region, style and social factors (e.g. Ogden 2013; Moreno 2016). It remains unclear how click production or interactional function may vary according to speaker gender or age.

This PhD thesis analyses clicks in a regional variety of Scottish English in Glasgow, by combining approaches from phonetics, variationist sociolinguistics, and Conversation Analysis. Specifically, it examines: (1) the phonetic form (i.e. auditorily identified place of articulation, acoustic characteristics such as spectral Centre of Gravity and duration, and phonetic accompaniments) and interactional function (sequence-managing or affect-laden) of Glasgow clicks; (2) how click phonetic form and interactional function vary according to linguistic and social factors in Glasgow; (3) how clicks in one particular interactional function, word search, are performed differently to clicks in other interactional functions *and* whether linguistic or social factors promote click presence within word search.

These research questions were investigated in the speech of a stratified sample of 50 native Glaswegian men and women between the ages of 17 and 60, who were recorded and filmed in same-gender, self-selected pairs. Participants were told to complain and tell stories of frustrating situations, in order to elicit stance-displaying clicks, which might have been less common in a different context (Moreno 2016). Clicks were identified auditorily, and coded for place of articulation, phonetic accompaniments, position in the speaker's turn (i.e. before the turn, the middle of the turn, after the turn, or in isolation), and interactional function. Word search sequences with and without a click were identified and transcribed using a strict set of criteria from Conversation Analysis (e.g. Goodwin and Goodwin 1986), and coded for phonetic accompaniments, in order to study the variation of clicks in their interactional context as well as how the interactional function itself varies with and without a click.

Results revealed systematic patterning of clicks across phonetic features, interactional function, and age and gender. Glaswegian clicks were mostly produced with dental articulation and occurred with phonetic accompaniments. The presence of phonetic accompaniments was found to be subject to the interactional context, i.e. clicks with particles were more likely to be used in sequence-managing functions than affect-laden functions. Acoustic analysis of clicks showed that spectral frequency can be used as a measure of click place of articulation, much like for phonemic stops (e.g. Chodroff and Wilson 2014), with dental, dento-alveolar, and alveolar clicks having the highest mean frequency, and labial, palatal, and alveolar-lateral clicks showing lower mean frequencies. Clicks' spectral frequency was constrained by speaker age, such that younger speakers produced clicks with higher spectral frequency, despite the lack of age-related physiological differences between younger and older speakers here. Click duration was also found to be indicative of the interactional function in which the click is embedded; clicks used in sequence-managing functions are shorter than affect-laden clicks.

Clicks could have both sequence-managing and affect-laden functions, though sequence-managing functions were far more common. These interactional categories were dependent in complex ways on who performed the click and where; women were more likely than men to perform affect-laden clicks outside of their turn, i.e. as a listener response.

Comparisons of word search clicks to clicks in other interactional functions revealed that the variation in clicks' phonetic patterning is very much due to the interactional function in which they occur; word search clicks were more likely to be produced with dental, dento-alveolar, or alveolar articulation, more likely to co-occur with a particle, and occurred more frequently mid-turn. When all word searches with and without clicks were examined, results showed that the presence of phonetic accompaniments did not vary according to whether or not a click is present for these Glaswegian speakers. However, age did play a role in who performs a click within an interactional function, such that younger speakers performed more word searches but fewer clicks than the older speakers.

Together these results indicate that much of the phonetic form of clicks is due to the interactional function in which the click is embedded and socio-indexical information about who produces the click. These findings highlight how interactional function can constrain phonetic variation in conjunction with social factors, which demonstrates that examining both phonetic features and social factors, together with interactional context can contribute to crucial information about variation in future research for phonetics, sociolinguistics, and Conversation Analysis.

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Declaration

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

Chapter 1

Introduction

This thesis presents an exploratory study of phonetic clicks—the dental variant of which is often transcribed orthographically as *tut-tut* or *tsk-tsk*—and their phonetic form, interactional function, and social stratification in one regional variety of English in Glasgow, Scotland. Though clicks have been often mentioned anecdotally in English (e.g. Darwin 1872; Gimson 1970; Stopa 1972; Ladefoged and Traill 1984; Best, McRoberts and Sithole 1988; Ladefoged and Maddieson 1996; Nathan 2001; Crystal 2011; Rogers 2014), their phonetic form and interactional function has more recently been the subject of some phonetic and Conversation Analysis studies (Wright 2005; Wright 2011; Gold, French and Harrison 2013; Ogden 2013; Ogden 2016; Trouvain and Malisz 2016; Keevallik and Ogden 2020).

Previous studies have reported that clicks in English occur at the full range of articulation, including bilabial, labiodental, dental, alveolar, palatal and alveolar-lateral articulated clicks (Ogden 2013). Clicks have been noted to aid in interactional functions, such as initiating word search (searching for a word while speaking), marking incipient speakership (the shift of one speaker to another), indexing a new sequence of talk (a shift in interactional functions or topics), displaying a stance (sympathy, disapproval, etc.), and more (Wright 2005; Ogden 2013; Keevallik and Ogden 2020). One study indicates that clicks' phonetic form may vary across interactional functions; Wright (2005; 2011) found that clicks used to index a new sequence of talk were collocated with audible inbreath, and particles (*uh* and *um*), and were mostly dentally articulated, while clicks in word search were collocated with particles (*uh* and *um*), and produced with either bilabial or alveolar articulation. Previous studies on clicks in English hint at possible differences in click form and function according to regional and gender (Stuart-Smith 2009; Ogden 2013; Moreno 2016; Pillion 2018). Conversation Analysis studies of clicks suggest that their phonetic form is largely due to the interactional function in which the click is embedded, and who performs the interactional function (e.g. Ogden 2013). It remains unclear how click phonetic form and function might pattern in a single speech community and how much of click form and function is a result of click production, the interactional function in which the click is embedded, or the person who performs the click. This is investigated through the three research questions below.

1. What is the phonetic form and interactional function of clicks in one variety of English?

This study examines click phonetic form in a stratified sample of 50 Glaswegian men and women, by analysing click place of articulation, spectral and temporal features, phonetic accompaniments, and position in the speaker's turn. Clicks' interactional functions were identified and compared for phonetic features. More nuanced than the descriptions of clicks, however, is the relationship between click form and function investigated with regards to this research question, namely the possible correlation between click place of articulation, phonetic accompaniments (e.g. audible inbreath, creak, nasality, and particles). These relationships are remain, until this thesis, largely unexplored.

The second research question was approached in two ways. First, CA studies (e.g. Brouwer 2003; Wright 2005; Ogden 2013) assert that clicks' phonetic pattern is constrained by the interactional function in which it is embedded, i.e. that some interactional functions (regardless of whether or not they contain a click) contain specific phonetic features while others do not. Previous studies show that clicks in English can be produced with many different places of articulation and can co-occur with phonetic accompaniments. However, how much the phonetic patterning of a click varies across specific interactional functions remains unknown.

Additionally, variationist sociolinguists argue that, in order to accurately capture the scope of sociolinguistic variation, one must examine all possible instances where a variable can be used (Principle of Accountability, Tagliamonte 2012:9), and be able to state exactly where they were observed (variable circumscription, Tagliamonte 2012:10). As in the first approach for this research question, CA studies argue, that without accounting for the interactional function in which the click occurs, we cannot know what phonetic patterns are due to the click or the clicks' interactional function.

These approaches allow us to analyse interactional variation (both with regards to a phonetic feature such as a click and the interactional function of word search) from two perspectives– that of the Conversation Analyst and phonetician and that of the sociophonetician. These two approaches allow us to examine the full scope of variation which might be considered in future sociolinguistic research.

Bearing these two approaches in mind, the second research question for the present study was:

2. Taking a single conversational action which can be performed with clicks, how do clicks vary in phonetic form and how does this function's phonetic form vary according to whether or not a click is present?

Previous studies suggest that women click more (e.g. Ogden 2013; Pillion 2018), but it is unclear how gender or age might affect click form or function. There is also some indication that social factors can constrain the type of interactional function performed, e.g. women might perform more affect-laden functions in certain positions in turn (Eiswirth 2019). Therefore the third research question concerns social factors.

3. Do gender and/or age constrain click form or function?

While gender and age are social factors which are typically analysed in variationist studies, their application on the somewhat enigmatic click as an interactional feature is novel. This question allows us to explore not only how speakers of different genders or age groups click differently from each other, but whether this variation is due to the speaker producing the click, or performing a specific interactional function in which a click is embedded.

These questions are aimed at investigating how clicks pattern in a single variety of English with regards to phonetic form, interactional function, and the social constraints. This might tell us more broadly how phonetic variation can result from both interactional function and social constraints working in conjunction. Investigating these questions also indicates how other phonetic features (e.g. phonemic stops) might vary across interactional function and social constraints. The third research question will additionally help to shed light on an interactional function itself varying according to phonetic features and social factors.

We know that clicks are a phonetic feature used in interaction to convey an emotion or aid in an interactional function, but we do not know where they fit in the English linguistic system. With the answers to the above research questions, clicks might be better understood beyond sounds occurring on the margins of language.

1.1 Outline of the study

This thesis uses a combination of qualitative and quantitative methods, drawing on theory from phonetics, and Conversation Analysis, sociolinguistics, in order to investigate the role of clicks in a variety of Scottish English.

Chapter 2 provides a background of the literature pertaining to click production phonemically and in interaction across the world's languages. In this chapter, clicks and the study of clicks as a sociolinguistic variable are examined at both phonemic and discourse levels, highlighting one action in which clicks can occur studied here: word search. Glasgow was chosen as the linguistic context for this study because of the presumed accessibility of the data, the large amount of known social stratification in Glasgow, and evidence of Glaswegian clicks. This work is discussed briefly in this chapter. Then, clicks are considered as a less traditional example of a sociolinguistic variable. This is accomplished by discussing examples of sociolinguistic variables at the phonological, morpho-syntactic, and discourse-pragmatic levels, in order to see where clicks best fit in the context of the sociolinguistic variable. The construct of the linguistic variable is adapted in two ways to include clicks: (1) similar to discourse-pragmatic studies, all instances of clicks are identified and their patterns observed, and (2) more in line with traditional variationist study, using the Principle of Accountability (e.g. Labov 2006:49; Labov 1969:373; Labov 1972:72) to account for where clicks do and do not occur within the interactional context of word search. Word search was chosen as an interaction function here, due to previous studies showing a large amount of word search clicks (Wright 2005; Ogden 2013; Moreno 2016) and previous research from Conversation Analysis which provides a foundation for identifying and categorising word search.

In **Chapter 3**, the study design is discussed; 50 Glaswegian speakers were recorded and filmed in 25 paired conversations with friends or family members of the same gender and around the same age. The sample is socially stratified by age (older and younger) and gender (identifying as male and female). The study was designed to elicit topic-based casual speech which is thought to be more naturalistic (e.g. Labov 1972; Milroy 1987). The topic used here was complaints and daily annoyances. These complaints were intended to elicit stance-display clicks, which occur less frequently, and encourage storytelling sequences so that many different sequence-managing functions of clicks could be observed, thus constraining the interactional functions in the data. Here, I present the phonetic methods for auditory and acoustic analysis of clicks, and the analytical methodology and criteria for identifying word search and other interactional functions. This is followed by a description of the descriptive and inferential statistical methods implemented in this thesis.

Chapter 4 is the first of the two results chapters. This chapter outlines foundational information about click production in this single Scottish English speech community, answering the first two research questions. Click rates for paired conversational style are much lower than those found in previous literature. Clicks are mostly dental and occur with expected phonetic accompaniments (audible inbreath, creak, nasality, and particles, e.g. *uh* and *um*). Then, linear and logistic mixed effects regression analysis is performed on acoustic measures of clicks (spectral Centre of Gravity (COG) and duration), place of articulation, and interactional function. Click COG varies according to click place of articulation, as anticipated, as well as position in turn, interactional function, and age. Click duration varies by interactional category (either sequence-managing functions, e.g. word search, indexing a new sequence, etc. or affect-laden, e.g. stance-display), position in turn, particle presence, and by the social factors of age and gender. Click place of articulation varies according to whether a particle is present, and the position of the click in the speaker's turn. The click's interactional category (sequence-managing versus affect-laden) varies according to whether a particle is present, the click's position in the speaker's turn, and speaker gender. These results show that click form and function vary across both linguistic and social factors, demonstrating that both interactional context and social factors can constrain phonetic variation.

Chapter 5 isolates one interactional function in which clicks were found to occur frequently: word search. In doing so, it presents results from the perspective of word search clicks, describing the phonetic form of word search clicks in relation to clicks in all interactional functions, and then performing mixed effects regression analysis to illustrate the correlations between linguistic factors and this fine-grained interactional function in which these clicks occur. Regression results show that word search clicks are produced differently from clicks in other sequence managing functions, such that they are more likely to be produced with dental, dento-alveolar, and alveolar articulation and are more likely to co-occur with a particle (*uh* or *um*) than clicks in other sequence-managing functions. The chapter then shifts in its perspective, taking a variationist sociolinguistic approach to analyse word search sequences both with and without clicks to discern if any phonetic accompaniment or social factors promotes click presence in a word search. Through further (fixed effects) regression analysis, t is observed that the presence of clicks in word search is conditioned by social factors, such that younger speakers produce more word search but fewer clicks in word search. Click presence in word search was not conditioned by the presence of phonetic accompaniments, i.e. audible inbreath, particle presence, pause presence, or creaky voice. These findings demonstrate that, for this speech community, clicks' phonetic form can vary across interactional functions, the presence of a click in interactional functions can be constrained by social factors, and that the construction of interactional functions can carry socio-indexical meaning.

The results from Chapters 4 and 5 and their implications are discussed in **Chapter 6**, returning to the general research questions of the thesis. This chapter addresses findings, with respect to previous literature, possible insights, and implications for future work. The insight gained from combining theoretical approaches from phonetics, sociolinguistics, and Conversation Analysis is highlighted, as so much can be gained from taking all three areas into account. This is followed by some conclusive remarks in **Chapter 7**.

The results here demonstrate that clicks in this dialect of English can be regarded as a sociolinguistic variable, and are subject to variation in phonetic form, interactional function, and according to social factors. Furthermore, the phonetic form of clicks' varies largely due to the interactional function in which the click is embedded, and who performs the interactional function, as suggested by Ogden (2013). These findings show that clicks pattern systematically in Glasgow, and are as much a part of the linguistic inventory as any other part of English phonology.

Chapter 2

Background

2.1 Overview

The social meaning of language variation and change has been studied often in linguistics (e.g. Labov 1963; Tagliamonte 2006, etc.). There is much evidence to suggest that segmental variation, variation in the production of phonemes (e.g. h-dropping, or the deletion of word-initial /h/ as in *'ello* for *hello*), can indicate a range of social-indexical information including gender, class, age and more (e.g. Labov 1963; Labov 1972; Eckert 1992; Tagliamonte 2006). In this study, I focus on an interactional feature, which is more elusive: phonetic clicks in English.

Phonetic clicks are produced in interactional functions along with other phonetic features (Wright 2005; Wright 2011; Gold, French and Harrison 2013; Ogden 2013; Trouvain and Malisz 2016; Pillion 2018; Keevallik and Ogden 2020). Here, clicks are treated as a sociolinguistic variable, drawing on recent discussions (e.g. Tagliamonte 2012; Pichler 2016b) of how to analyse interactional features through quantitative variationist sociolinguistics.

Though considered to be rare phonemic features of some languages, mostly situated in southwestern Africa (Beach 1938; Stopa 1972; Ladefoged and Traill 1984; Laver 1994), clicks can perform a range of stance-displaying and conversational functions in English. Clicks may also be produced in conjunction with additional phonetic material or "accompaniments", such as audible inbreath, creaky voice, nasality, or particles such as *uh* or *um* in order to perform interactional functions in talk. Clicks have been increasingly studied in sociophonetic, forensic, interactional, and phonetic studies of English (e.g. Wright 2005; Gold, French and Harrison 2013; Ogden 2013; Trouvain and Malisz 2016; Pillion 2018). There are few studies that both identify and categorise the phonetic form and conversational functions, along with the possible social meaning of click production across a single regional variety. This study therefore aims to contribute to the small but growing body of research shedding light on how we communicate and what happens alongside language that facilitates understanding in conversation and signals social meaning at the same time.

This chapter provides the background for studying clicks as a sociolinguistic variable in interaction. Section 2.2 defines clicks, Section 2.2.1 describes the glottalic egressive and velaric ingressive airstream mechanisms, and Section 2.2.2 gives a step-by-step account of the phases of click production. The next section, Section 2.2.3 describes phonemic clicks, with examples from the Nama click inventory and lexis, followed by Section 2.2.3.2, which gives an account of variation in phonemic click articulation. Section 2.2.4 touches briefly upon the first mentions of non-phonemic clicks in English and where clicks fit into linguistic analysis.

Section 2.3 introduces the crosslinguistic interactional functions of clicks. This section contains an outline of polar (yes or no) and affect-laden clicks in languages around the world (Section 2.3.2), followed by examples of click functions in selected studies (Sections 2.3.2.1-2.3.2.4). Next is Section 2.4, which describes studies of clicks indexing new sequences of talk, interactional functions of clicks, speakers' rates of click production as a forensic discriminant, and clicks as a sociolinguistic variable in English. These studies' approaches and their findings paved the way for this thesis. Because word search is one focus of this thesis, Section 3.6.3.2 highlights word search and presents previous literature on the combination of clicks and other phonetic features that can be produced together to perform a word search.

The chapter shifts from click production crosslinguistically to placing clicks in the relevant context of the sociolinguistic variable in Section 2.6, by establishing a brief history of sociolinguistic research both overall and in the linguistic context for this study: Glasgow. Glasgow was chosen for this study due to the large body of sociolinguistic work illustrating phonological variation across gender, age, and class in Glasgow (e.g. Macaulay 1977; Stuart-Smith 1999b; Macaulay 2005; Stuart-Smith, Timmins and Tweedie 2007). The social stratification of speech is discussed with regards to gender (Section 2.6.1), age (Section 2.6.2), sometimes interwoven with class. In order to give context for analysing clicks as a sociolinguistic variable in this thesis, Section 2.7 describes the traditional linguistic variable, giving examples and comparing it to discourse-pragmatic variables, which can be seen as more problematic with regards to the main tenets of the linguistic variable: Principle of Accountability and variable circumscription. This section, while likening clicks to discourse-pragmatic variables, shows how one might use variationist sociolinguistics to analyse an interactional feature. Here two approaches are used: (1) for clicks, the more common approach in discourse-pragmatic studies of isolating features of interest and studying how these features pattern across linguistic and social factors, and (2) for word search, the Principle of Accountability (e.g. Labov 1972) to count all instances of where a feature of interest does and does not occur. Finally, Section 2.8 discusses how phonetics, variationist sociolinguistics, and Conversation Analysis, i.e. the study of language in interaction, are combined to analyse clicks and word search in the present study.

2.2 What are clicks?

Clicks are non-pulmonic sounds, so, when made in isolation, are produced without air flowing out of the lungs. Their presence as phonemes in the world's languages is rare (Miller 2011), however they occur as discourse markers and stance-displayers in languages around the world (Gil 2013). Often transcribed as "tut-tut" or "tsk tsk" to signify the dental or alveolar click of disapproval (Key 1975; Ladefoged and Traill 1984; Ladefoged and Maddieson 1996; Ward 2006), they have been long-observed but only recently studied systematically in English (Wright 2005; Ogden 2013; Pillion 2018).

2.2.1 Airstream mechanisms and non-pulmonic consonants

Clicks belong to a group of consonants known as 'non-pulmonic.' Airstream mechanisms refer to where and how air flows to produce a sound. Unlike clicks, most phonemes in English are produced using the pulmonic egressive airstream mechanism, meaning "lung air is pushed through the vocal tract by the action of the respiratory system" (Ladefoged and Maddieson 1996:77). Airflow is then obstructed or modulated by the articulators. However, other airstream mechanisms can be used to produce sounds. These are the glottalic egressive and ingressive airstream mechanisms, and the velaric ingressive airstream mechanism. Phonemes that implement these systems of airflow are called 'non-pulmonic', since they primarily do not use air pushed out of the lungs, though they may be coarticulated with sounds that do implement the pulmonic airstream mechanism. While not phonemic in English, non-pulmonic consonants occur at the lexical level in many of the world's languages. Non-pulmonic airstream mechanisms can use airflow egressively, in which air is expelled, or ingressively, in which air is taken in (Laver 1994:161). Both ejectives and implosives are produced using the glottalic airstream mechanism, meaning air used for producing these sounds remains between a closed glottis and the supralaryngeal articulators which obstruct or modulate the airflow (Ladefoged and Maddieson 1996). Ejectives are made using the glottalic egressive airstream mechanism, so air is trapped between the closed glottis and articulatory closure and pushed upwards and outwards from the glottis during production. Implosives are glottalic ingressive, so air is sucked inwards by the lowered and closed glottis. Ejectives are the most common of the non-pulmonic sounds, found phonemically in 20% of the world's languages, specifically languages of Africa, and North, Central and South America (Lukas 1936; Stopa 1958; Laver 1994; Ladefoged and Maddieson 1996). Ejectives have also been reported in varieties of Northern English (Aarts and McMahon 2008) and Glaswegian high schoolers word-finally as allophones, especially of /k/, e.g. in the word 'back' (McCarthy and Stuart-Smith 2013). Implosives are most often seen in Vietnamese, Sinhalese, Sindhi and languages in Africa such as Ugandan and Uduk, native to areas of Sudan and Ethiopia (Lukas 1936; Stopa 1958; Jones 1950; Ladefoged 1968; Woodhouse 2009).

Clicks are instead made using the velaric ingressive airstream mechanism. This means that air is trapped between the velum, where the back of the tongue raises to create the posterior closure, and the front articulators. The velaric airstream mechanism is also sometimes referred to as the 'oral' airstream mechanism (Laver 1994) due to the velaric ingressive consonants resulting from air pressure change in the oral cavity. Clicks therefore involve "sucking air into the mouth" while the back of the tongue is raised to form a closure against the velum (Ladefoged and Maddieson 1996:155; see below).

2.2.2 Click production

Clicks have both an anterior articulation, sometimes referred to as an 'influx', and a posterior (velar) articulation, or 'effux', coined by Beach (1938) in reference to Nama and Khoisan languages.

Ladefoged and Johnson (2006:246) assign click production four phases, shown in Figure 2.1. Take for example a dentally articulated click. Air is trapped by the raising of both the tongue tip against the back of the upper front teeth and the back of the tongue against the soft palate to create two closures (Ladefoged and Maddieson 1996). While these closures are maintained, the body of the tongue moves downward, resulting in a rarefaction, or a reduction in air pressure, in the oral cavity. Next, the tongue tip and back of the tongue are released from their positions. This change in pressure causes air to rush into the oral cavity. Finally, the back of the tongue lowers, releasing the posterior closure and resulting in a sharp transient.

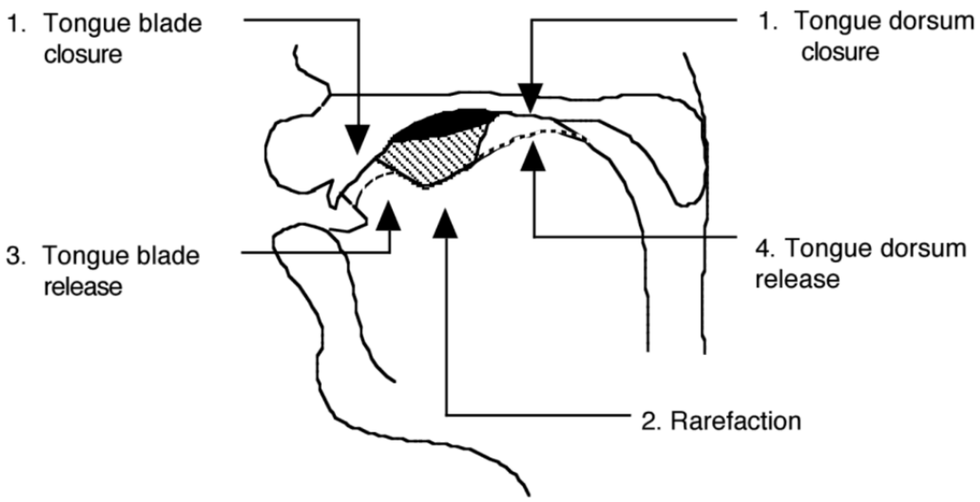

Figure 2.1: Phases of dental click production (from Johnson and Ladefoged 2006:247, Figure 1)

We rely on the location of the anterior closure to distinguish between click types. The anterior articulation can range from bilabial to lateral, previous studies having reported bilabial, labiodental, labio-alveolar, dental, dental-alveolar, alveolar, post-alveolar, alveolar lateral, palato-alveolar, and retroflex clicks (e.g. Beach 1938; Ladefoged and Traill 1994; Ladefoged and Maddieson 1996; Ogden 2013). More recent studies have included post-alveolar and retroflex clicks as subcategories of alveolar and palato-alveolar articulation respectively (Ladefoged and Maddieson 1996; Wright 2011; Ogden 2013; Moreno 2016).

2.2.3 Phonemic clicks

2.2.3.1 Languages with phonemic clicks

Clicks occur as phonemes in a few Southern and Western African languages. These languages mainly belong to the Khoisan group, though clicks are also found in the Bantu and Cushitic language families (Traill 2005). Clicks also occur in Nama, or Khoekhoe, a non-Bantu language native to Namibia, Botswana, and South Africa (Ladefoged and Traill 1984). Across languages which have clicks as phonemes, clicks vary greatly in lexical frequency. For example, clicks are very common in !Xóõ, where over 70% of lexemes begin with a click (Ladefoged and Maddieson 1996), but are much less frequent in Bantu languages such as Xhosa and Zulu of South Africa, as well as Dahalo of Kenya.

Phonemic clicks can be coarticulated with nasals, plosives and aspiration, as seen in Table 2.2, which illustrates the click inventory and permutations of coarticulation in Nama (Ladefoged and Traill 1984).

Table 2.1: Click inventory of Nama (from Ladefoged and Traill 1984:2, Table 1)

	Glottal closure	Voiceless unaspirated	Voiceless aspirated	Delayed aspiration	Voiced nasal
Dental	|	|g	|kh	|h	|n
Alveolar	!	!g	!kh	!h	!n
Palatal	ǂ	ǂg	ǂkh	ǂh	ǂn
Lateral	||	||g	||kh	||h	||n

Table 2.2: Nama example words (from Ladefoged and Traill 1984:2, Table 2)

|goa	*|kho*	*|ho*	*|no*	*|o*
‘put into’	‘play an instrument’	‘push into’	‘measure’	‘sound’
ǂgais	*ǂkharis*	*ǂhais*	*ǂnais*	*ǂais*
‘calling’	‘small one’	‘baboon’s arse’	‘turtle dove’	‘gold’
!goas	*!khoas*	*!hoas*	*!noras*	*!oas*
‘hollow’	‘belt’	‘narrating’	‘pluck maize seeds’	‘meeting’
||garos	*||khaos*	*||haos*	*||naes*	*||aos*
‘writing’	‘strike’	‘special cooking place’	‘pointing’	‘reject a present’

Each clicking language does not have every place of articulation in their phonemic inventory (Ladefoged and Traill 1994), as exemplified by the Nama click inventory, which does not contain bilabial clicks. The most common place of articulation across these languages is dental, while bilabial clicks occur the least frequently, appearing only in two clicking languages in the same language family, !Xóõ and N|uu (Miller 2011:417).

2.2.3.2 Variation in phonemic click production

In addition to dental clicks being the most common place of articulation across clicking languages, some studies suggest there is variation in the production of dental clicks across clicking languages (Louw 1977; Ladefoged and Maddieson 1996). For example, a dentally-released click can be made with the tongue tip or blade, and the actual place of contact with the tongue tip or blade in the oral cavity during the production of a dental click production can vary greatly. The exact location in the oral cavity where the tongue makes contact can range from dental to dento-palatal.

In Nama, Zulu, and sometimes Xhosa, the tip or blade of the tongue is "sucked away from the upper teeth" (Sands 1989:4), thereby making contact with the back of the upper teeth. In !Xóõ, however, dental clicks are typically articulated interdentally, with the top and bottom teeth clenched (Miller 2011). In Sandawe and Hadza, the tip of the tongue can sometimes "protrude between the teeth" (Ladefoged and Maddieson 1996:251). Besides variation across languages, there are also physiological differences, e.g. dentition and shape of the palate, which result in variation in dental click production. This suggests that there are many different possible "places" of the articulation of the "same" sound, and how there is variation in production and articulation for clicks, much like other phonemes.

2.2.4 Non-phonemic clicks

Clicks as interactional features are distinguished from phonemic clicks in that they do not occur as consonants but units occurring alongside lexis which convey an affect-laden stance (e.g. display sympathy or disapproval or display an attitude taken by the clicker) and/or have a function in interaction.

Some earlier studies which mention clicks in English (Key 1975; Crystal 1975) consider clicks to be paralinguistic, or outside but alongside language, because they are non-lexical. This is not the position taken for this thesis because of the possible negative connotation of paralinguistic features as 'non-linguistic', prioritising lexis over less tangible interactional resources like gesture, intonation, prosody and discourse markers. Clicks, and more crucially, the role they play in interaction, are assumed here to be inherently linguistic because they facilitate communication in a systematic and non-arbitrary way, which is acquired as part of an integral the linguistic communicative system of speakers for any speech community. The limits of "linguistic" meaning are not bound by traditional linguistic features (e.g. lexis, morpho-syntax, etc.), as is evident by the growing number of interactional studies, which demonstrate that interactional features can hold socio-indexical meaning as well (e.g. *um* and *uh* Tottie 2011).

Still clicks seem to occur on the margins of language and are in many ways different from what is traditionally considered to be linguistic. Keevallik and Ogden (2020:1) write in their study of interactional sounds occurring on the fringes of language, that clicks and other interactional noises (e.g. grunts, sighs, etc.) are difficult to represent orthographically, and often overlooked by linguists because,

> They do not belong to a major syntactic category, they may not conform to the phonological requirements of the language, and the relationship between their form and meaning might not be arbitrary, which to a large extent has been considered the sine qua non of linguistic forms...

Though often overlooked, these sounds contribute to interaction in a meaningful way (Wright 2005; Wright 2011; Ogden 2013; Keevallik and Ogden 2020), and the results from the present study shows that clicks, while not phonemic in English, can and do behave systematically, in some ways like other phonological features, and so can be considered as 'linguistic.'

2.3 Documented cross-linguistic interactional functions of clicks

Clicks are referred to as rare speech sounds in several studies (e.g. Ohala 1995; Nathan 2001; Gueldemann and Stoneking 2008; Wright 2011; Gil 2013; Maddieson 2013). This conception of clicks as rare does not take non-phonemic clicks into account. While clicks occur rarely as phonemes, mostly in Southern and Western African languages, studies have shown that clicks as interactional features occur frequently across the world's languages, irrespective of language family and heritage.

2.3.1 Conversation Analysis and actions-in-interaction

Most studies which examine functions of clicks in conversation implement Conversation Analysis (hereafter CA). CA is the study of language in interaction, which considers speaker turns and sequences to examine interactional functions (Heritage 1989:24). CA considers that "through processes of social interaction, shared meaning, mutual understanding, and the coordination of human conduct are achieved" (Goodwin and Heritage 1990: 283). Conversation Analysis literature refers to functions in interaction as 'actions.' This thesis draws on literature from CA to perform sequential analysis and categorise actions performed by clicks (e.g. Sections 2.3.2-2.4.4), within a socially-stratified sample of a regional dialect of English.

One way CA examines interaction is through the notion that conversation is performative, because we cannot know the internal states of participants, and therefore refer to actions as 'doing being X.' For example, a speaker who seems to be showing disapproval is 'doing being disapproving', because we cannot be sure that they really disapprove, but are displaying behaviours that exhibit disapproval, e.g. scowling, clicking, etc. For an overview of Conversation Analysis see Psathas (1995), Hutchby and Wooffitt (1998), Ten Have (1999), Sidnell (2015), particularly its intersection with linguistics in Clift (2016) and Couper-Kuhlen and Selting (2017). This thesis draws on literature and methods from CA to perform sequential analysis and categorise actions performed by clicks (e.g. Sections 2.3.2-2.4), within a socially-stratified sample of a regional dialect of English.

CA studies refer to excerpts of speech as extracts, examples, and *fragments*, the term used here. CA transcription conventions are highly detailed, as they aim to include as much information about the interaction as possible. In fragments throughout this thesis, similar transcription conventions are used. In these cases, square brackets [ ], except when placed around a click, denote overlapping speech. A period '.' Followed by any number of *h*s (e.g. *.hhh*) denotes an audible inbreath. Numbers in parentheses (e.g. (0.5)) denote the length of an embedded pause. A single colon ':' denotes elongated speech. When clicks are present in fragments, an arrow pointing right → marks the line containing a click. Other CA transcription symbols will be glossed in fragment captions.

2.3.2 Cross-linguistic click functions

Clicks handle aspects of sequence management, and, perhaps most saliently, stance-displayers (Ohala 1995; Wright 2005; Wright 2011; Ogden 2013; Keevallik and Ogden 2020, etc.). Clicks are found as imitative noises in Korean and Chinese (Nathan 2001), in repair in Chinese (Li 2020), word search in Russian (Paschen 2019), in 'searches' or the process of recalling a word in Spanish (Pinto and Vigil 2019), and with stance-displaying and interactional functions in German (Simpson 2010; Fuchs and Rodgers 2013; Trouvain 2015), and English (Ohala 1995; Ladefoged and Maddieson 1996; Ward 2006; Wright 2005; Wright 2011; Ogden 2013; Stuart-Smith 2009; Ogden 2016; etc.).

Stance-displaying clicks have been recognized in the World Atlas of Language Structures (Gil 2013). Drawing from previous studies as well as 'personal knowledge', Gil categorises click functions as either bearing logical meaning; or affect-laden meaning seen in Figure 2.2 (Gil 2013). 'Logical meaning' denotes clicks serving as a yes or no, whereas 'affect-laden meaning' refers to positive (e.g. approval) or negative (e.g. dissatisfaction) stances. Gil also notes that clicks serving as a 'no' can also convey to the listener that what they said was 'stupid.' By glancing at the map, one can see clusters of similar click functions without any one uniform pattern according to region. Logical clicks occur in northern, western, central, and eastern Africa; the Mediterranean; the Middle East, India, and even South America. Stance-displaying clicks appear on every continent around the world. Clicks falling under the 'other' category appear to be common across the world as well, indicating a need for further large-scale cross-linguistic studies of clicks in interaction in these areas.

2.3.2.1 Clicks in Chinese

According to Nathan (2001), post-alveolar [!] clicks occur in nursery rhymes in two dialect areas of China, the NingDu dialect of the Gán groups, and Mandarin, despite

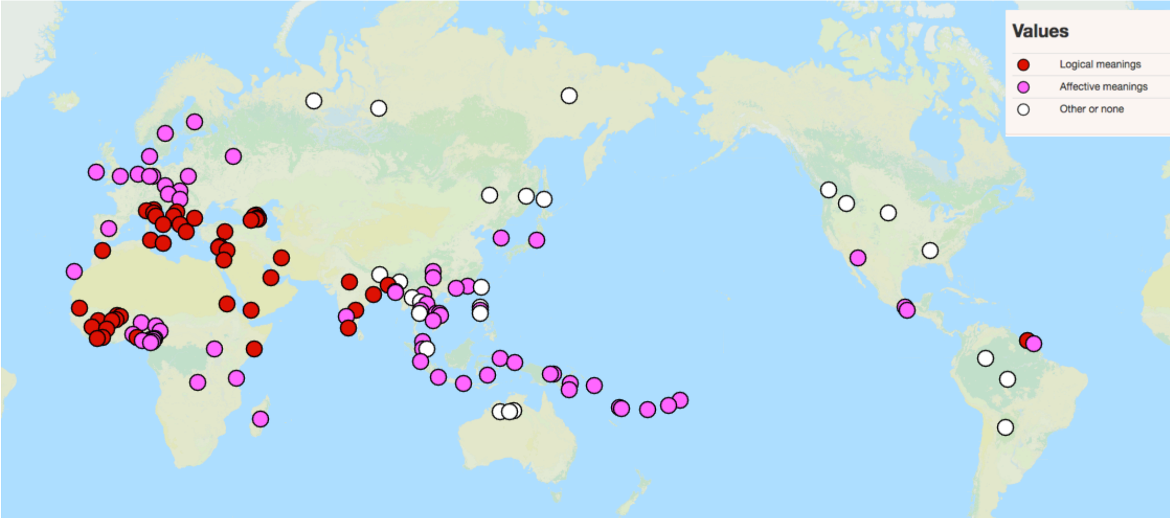

Figure 2.2: Logical and affect-laden clicks across the world (from Gil 2013, Map 142A, Section 2)

not being part of these dialects' phonemic inventory. These post-alveolar clicks, like the clicks of the 'same' place of articulation in Sandawe and Hadza, vary in articulation across these dialects of Chinese in the retelling of the same nursery rhyme (Nathan 2001). In NingDu, initial velar nasals were replaced with clicks, while in Mandarin, nasalized clicks are inserted at the beginning of words with zero initials. During some retellings of the nursery rhyme, clicks were absent altogether. This illustrates the presence of clicks as allophones in Chinese in highly specific cases.

Li (2020) reported clicks in 34 Mandarin speakers in multimodal interaction. Her CA study examined mid-turn click-initiated repair sequences and how they are used to change the trajectory of actions-in-progress. She found that (1) clicks are loud compared to their preceding and following syllables, (2) the preceding syllable is slowed down, has sustained pitch register, and is categorised by the absence of glottal and supraglottal stops, (3) the syllable following the click has a noticeably increased speed, and (4) speakers can avert their gaze and use postural shifts to shift the trajectory of actions.

2.3.2.2 Clicks in Spanish

Pinto and Vigil (2019) use multimodal methods to consider clicks in Peninsular Spanish. They found 173 clicks in word searches from 18 speakers. They call word searches simply 'searches', preferring to categorise searches as not necessarily looking for a specific word, but thinking in general. They divide clicks into two categories: 'search' and 'search-stance' clicks, the former being the act of recalling something and the latter being a hybrid of two functions: recalling something and illustrating a stance (examples in Fragments 2.3 and 2.4). The first example shows the speaker trying to recall a word using pauses and particles. The second example shows the speaker discussing an emotionally difficult time (where he/she had contracted head lice), while actively searching for what to say, illustrated through a click between a pause and a particle. In Pinto and Vigil (2019), click place of articulation is not discussed, so clicks are represented by the copyright symbol "©" as shorthand for clicks at any place of articulation.

(1) *…puse un anuncio pues un anuncio que un chaval español quería intercambiar partidos entonces* (0.73) *recibí* (0.97) © (0.00) *eh: contestación de mucha gente de afuera que quería lo mismo*
'…I placed an advertisement uh an advertisement that a Spanish guy wanted to exchange games so (0.73) I received (0.97) © (0.00) uh: an answer from a lot of people abroad that wanted the same thing'

Extract 2.3: A Spanish search click (indicated by ©), from Pinto and Vigil 2019:88

(2) *…y luego yo decía es que yo cojo piojos porque me me llevas a niñas y niños con piojos, claro que sí a algún sitio tienen que ir estos niños, no? Es que eso es muy mucho mi infancia y me me bueno no es que me condicione es que yo creo que me ha determinado absolutamente* (0.65) © (0.55) *por suerte, en el sentido de que bueno yo creo que tienes como la capacidad, no? de detectar muy rápido dónde están las necesidades*
'…and then I said that I get lice because you take me me to girls and boys with lice, of course these kids need to go somewhere, right? It's just that this is really my childhood and well it's not that it conditioned me me it's that I believe it absolutely shaped me (0.65) © (0.55) luckily, in the sense that well I believe you have the capacity, right, to quickly detect where the needs are'

Extract 2.4: A Spanish search-stance click (indicated by ©), from Pinto and Vigil 2019:89

2.3.2.3 Clicks in Russian

Paschen (2019) investigated clicks' interactional function in Russian, using six excerpts from the ORD corpus (Asinovsky et al. 2009), a corpus of spontaneous speech in Russian. Paschen (2019:254) argued that Russian speakers 'make systematic use of clicks' in day-to-day speech. He organised click functions in Russian into three categories: (1) as a resource for initiating a new sequence, (2) to negotiate turn-transitions, and (3) to display a stance, similar to studies in English (click functions in English are discussed in Section 2.4). He also finds that clicks are more often part of a larger co-construction (i.e. a sentence or phrase which is uttered by two or more speakers together; Speaker 1: "It was–" Speaker 2: "great.") comprised of 'both verbal and non-verbal elements' (Paschen 2019:254). These non-verbal elements include pauses and particles, which he argues aid in the performance of sequence-managing (i.e. interactional and/or turn-based) functions in interaction. Place of articulation of these clicks is not mentioned throughout the study.

2.3.2.4 Clicks in German

A few studies on clicks in German have examined click form, function, and phonetic accompaniments. One of the first is that of Fuchs (2013). Her articulatory phonetic study of 14 female speakers' clicks in Standard German showed that clicks occurred frequently with an audible inbreath and were often produced before a breathing noise in an acoustic signal. Following this and further study on clicks in English (Section 2.4), Trouvain (2015) investigated the function of clicks in Standard German using Conversation Analysis and phonetics on six stretches of 10-minute conversations between same sex pairs of 8 female and 4 male speakers. He theorises that clicks as discourse-markers are not as 'perceptually salient' as those in stance-display or what he called 'interjections', i.e. depictions of sounds from real life. These include imitations of horseshoes clopping on the ground and bilabial clicks/kiss sounds. Indeed, Trouvain did not find any clicks as 'interjections' but instead found mostly discourse marker clicks that he called 'feedback'– a combination of backchannels (e.g. a response token that reassures one interlocutor that the other has heard him or her and often encourages him or her to continue speaking) and assessments (e.g. affect-laden response tokens). Trouvain also found 15% of clicks occurring as part of "word-finding trouble," or word search. Speech preparation clicks were also common, usually alongside an audible inhalation noise, occurring at the beginning of a new prosodic phase. Clicks in German can be placed broadly, then, into to interactional categories: (1) those which carry affective meaning or imitate sounds from real life, i.e. stance-display, or horse-clopping, and (2) those which aid in turn-taking and sequence-management, i.e. speech preparation and word search. These findings are similar to studies of clicks in English discussed below.

2.3.3 Summary: Cross-linguistic click functions

Clicks have been noted to occur as interactional features across the world. Some functions in which clicks occur are to convey a stance or emotion (see affect-laden clicks in Figure 2.2) and serve as a yes or no (logical meaning). However, through individual studies we see repeated examples of clicks used in 'searches' or word searches and initiating a new sequence of talk in Chinese, Spanish, Russian, and German (Trouvain 2015; Paschen 2019; Pinto and Vigil 2019; Li 2020). In German, clicks have been noted occur in the broadest scope of interactional functions; in imitative noises, affect-laden or stance-displaying tokens, feedback (e.g. backchannels), word search and speech preparation. These functions are most similar to those found in English, discussed in the next section.

2.4 Clicks in English

While it stands to reason that clicks might occasionally be used as unintended allophones in English, e.g. Ohala's (1995) work on clicks as epiphenomena, similar to

Spanish, Russian, Chinese, and German, clicks in English function predominantly outside the phonemic context. The first known observation of a non-phonemic click in English is in Darwin's (1872:286) work where he writes on human and animal expressions of emotion, describing clicks in Australian English.

> According to three other observers, the Australians often evince astonishment by a clucking noise. Europeans also sometimes express gentle surprise by a little clicking noise of nearly the same kind.

English clicks have also been observed as imitations of other actions or displays of a stance. Stance-displaying clicks of disapproval are sometimes transcribed as *tut-tut* or *tsk tsk*, denoting the dento-alveolar click. Lateral clicks have been anecdotally linked to encouraging a horse to move (Gimson 1970; Best, McRoberts and Sithole 1988; Nathan 2001) while a bilabial click (sometimes transcribed as *mwah*) can indicate blowing a kiss (Stopa 1972; Ladefoged and Traill 1984; Ladefoged and Maddieson 1996). More whimsical accounts of click production have also suggested trying quadrilabial clicks with a partner (Crystal 2011; Rogers 2014).

Most anecdotal statements about clicks refer to those with dental or alveolar articulation (with the tongue tip or blade pressed against either the teeth or alveolar ridge, e.g. Gimson 1970). In Standard British English and Standard American English, stances displayed with both of these articulations have been noted as regret (Best, McRoberts and Sithole 1988), disapproval (Best, McRoberts and Sithole 1988; Johnson and Ladefoged 2006; Ward 2006), dissatisfaction (Ward 2006), irritation (Gimson 1970; Gil 2013), impatience (Laver 1994; Gil 2013) and disappointment (Gil 2013). There are also mentions of affect-laden lateral clicks to display approval or serve as a way of flirting in English (Best, McRoberts and Sithole 1988). For the most part, in observation, stances displayed by clicks are thought to be entirely negative (Gimson 1970; Best, McRoberts and Sithole 1988). Evidence for this claim is mostly vague (e.g. for impatience and dissatisfaction in Best, McRoberts and Sithole 1988; Ward 2006), and clicks displaying positive stances have been easily found in empirical research (e.g. clicks displaying approval in Ogden 2013). One aim of this thesis is to explore if these observations can be empirically illustrated and does this vary across interaction and/or in a particular speech community.

2.4.1 English clicks to index new sequences of talk

Wright (2005; 2011) identified interactional functions for clicks beyond those of stance-displaying and fillers. In her PhD Thesis, Wright (2005) identified clicks indexing a new sequence of talk, closing sequences of talk, and aiding in word search (discussed further in Section 3.6.3.2). Most relevant to this thesis is her study of new sequence indexing clicks and word search clicks. 18 hours of telephone interactions from six different corpora were analysed: the Holt corpus, the Heritage corpus, the Rahman corpus, the NB corpus, the SBL corpus, and the Pline corpus. These corpora date from the 1960s to 2001 and are all from either only British English speakers or only American English speakers.

Wright (2005) took into account social factors, such as age group, dialect, and social class. She annotated for sequential analysis, pitch, intonation, voice quality, and particle presence (most notably *uh* and *um*). She also categorised the action that the click performed using Conversation Analysis.

One of Wright's (2005) focuses, later presented in 2011, is clicks used to index a new sequence of talk, or NSI clicks. NSI clicks appear at the closing down of one sequence of talk and before the onset of the next sequence of talk. In Fragment 2.4.1, we see an alveolar click [!] which ends the sequence 'yep' collocated with an audible inbreath. This is followed by a disjunctive phrase ('anyway'), explicitly marking the next turn as separate from the prior one, along with other typical phonetic features (e.g. upward intonational pattern).

Fragment 2.4.1: NSI click followed by audible inbreath and disjunctive "anyway"
("Holt.SO.88.1.11/anyway/" from Wright 2005:142, Fragment 18)

1	Van:	hello Lesle	[y		
2	Les:		[hello: sh	[e getting confu:sed.h	[hhhh
3	Van:		[( )		[pardon
4	Les:	is she	getting confu:se	[d h	
5	Van:			[no:: she's not	[getting
6	Les:				[.hhhh
7	Van:	confu	[sed		
8	Les:		[ih–she called you	V- me Va:nna heh heh he	[h eh .h h h h h
9	Van:				[no:: she said
10		would you	like to talk to Va:nna		
11	Les:	.hh oh well	I think she meant the	other way round- I th-	
12	Van:	[ah::]			
13	Les:	[yep] (0.2)	[!] .hhh anyway	how are you h	
14	Van:	I'm fine	thanks		

Wright also reported consistency in sequences surrounding NSI clicks. Those occurring before an NSI-click often ended with sequence-closing devices such as an assessment or agreement ("Right you are"), figurative expressions ("He took it to heart"), repetitions of tokens ("Yes, yes"), or a single closing token ("Yep"). The sequences that begin with NSI clicks were accepted by the recipient, illustrating that producing a click is an appropriate method of demarcating a new sequence of talk (see Fragment 2.4.2).

Fragment 2.4.2: An NSI click accepted in a following turn
("Holt.SO.88.(II).2.4/drop/" from Wright 2005, Fragment 5)

1 Dan: yeah he'd just had his first piece of work ripped apart
2 [but I think now he's getting used to it an::d .hhh
3 Les: [.hhhhhhh
4 Dan: it's uh [( )
5 Les: [ye:s uhm and I think perhaps he took it to heart
6 (.)
7 Dan: [yeah:]
8 Les: [.hhh]
9 (0.2)
10 Les: uhm: (0.5) [ʘ] (.) right well he said to let you know that-
11 (0.3) to drop in any time [hhh huh huh huh huh huh
12 Dan: [yeah
13 Les: [.hhhhhhh
14 Dan: [well I'll pop over then

Wright also coded for place of articulation and phonetic accompaniment of NSI clicks. Phonetic accompaniments, first identified in her 2005 work, include audible inbreaths, particles such as *uh* and *um*, nasality, and creaky voice.

Wright reports that for NSI clicks, 49% were dental or alveolar, 48% were bilabial, 2% were labiodental, and 1% were alveolar-lateral in articulation. Clicks were mostly high amplitude, not usually collocated with nasal speech material (i.e. vowels or particles coarticulated with clicks), and sometimes collocated with creaky speech material. Additionally, Wright reports that percussives, or the audible separation of the articulators which are auditorily click-like (Pike 1944), were in free variation with NSI clicks.

Wright found that audible inbreaths could also be present at the sequence boundary, which, in accordance with CA literature (e.g. Local and Walker 2005), further supports the idea of these clicks being tools to implement the indexing of a new sequence. When an inbreath occurs alongside a click at the sequence boundary, clicks produced have a higher amplitude than when no audible inbreath is present. Another aspect that aligns with CA literature on sequence boundaries (e.g. Swerts 1998; Shriberg 2001; Clark and Fox Tree 2002), is the presence of the particle *uh* or *uhm* which Wright found frequently with clicks.

When NSI clicks occurred between two sequences, the preceding sequence had a lower relative pitch and relatively narrower pitch range than the sequence following the click. When there was a succession of three sequences delimited by a click, each following sequence's pitch rose higher and had a comparatively wider pitch range than the sequence before it.

Trouvain and Malisz (2016) also investigated click rate and the acoustic properties of clicks used to index a new sequence in English interaction. Their study examined apical (tongue-tip) clicks in the speech of a female Australian English speaker from her keynote talk at INTERSPEECH 2014.

Trouvain and Malisz transcribed all words, fillers (e.g. particles), silence, audible inhalation, and clicks. Clicks were considered click 'events' (i.e. instances of clicks with a single or multiple bursts), and if a click had more than one burst, each individual click burst was also segmented. They also measured the spectral Centre of Gravity, or COG, of the click bursts, finding an average of 6.5kHz across bursts in each click 'event.' The average COG was higher here than the average COG for the /t/ burst in English (e.g. Forrest et al. 1988; Chodroff and Wilson 2014).

In excerpts of a 58-minute long talk, Trouvain and Malisz (2016) found a total of 323 clicks, resulting in a rate of 9.2 clicks per minute, which is a comparatively high click rate to Gold et al. (2013) (see below, Section 2.4.2). However, click-rate fluctuated depending on where in the keynote speech they took place— there were more clicks per minute in the introductory section of the talk, though the reason is not discussed in this short paper. Clicks could be produced alongside audible inbreath noises and fillers, though most occurred without an inbreath. Clicks co-occurred with audible inbreaths about 46% of the time. When clicks occurred in pauses, 43% of the pauses also contained fillers, specifically particles (e.g. *uh* or *um*).

2.4.2 English click rates as a forensic discriminant

In a forensic linguistics study of 100 young male speakers of Standard Southern British English from the DyViS corpus, Gold et al. (2013) investigated the rate at which speakers produce clicks in order to discern whether or not clicks could be used as a forensic discriminant. To do this, they extracted five minutes of speech per speaker (four minutes for one speaker who did not produce enough speech), after eliminating the first two minutes to let speakers settle into the interaction.

In 499 minutes of analysed speech, they observed 454 clicks (a rate of 0.9 clicks per minute), after separating out 293 percussives or audible inadvertent sounds made by separation of the articulators (see Ogden 2013, Section 2.4.3). Though place of articulation was not discussed at length, clicks ranged from dental to post-alveolar with regards to the passive articulator and were auditorily judged to be apical. Clicks were separated into functional categories after Wright (2005), including word search (51.35%), NSI (48.24%) and affect-laden functions (only 2 tokens, 0.44% of the total clicks).

Gold et al. examined both intra- and inter-speaker variability, finding that individual click rate varies widely; one speaker produces 54 clicks in five minutes, while 25 speakers produce no clicks at all. 74 of the total speakers click five times or fewer over their five-minute period (i.e. one click/minute or less), but three speakers click far more frequently than the other speakers, each with a click rate of more than 4 clicks per minute. They also find intra-speaker variability in click rate across interactions, showing that individuals can accommodate towards the clicking habits of the interlocutor. Gold et al. assert that clicks could be a useful discriminant in forensic linguistics for high-rate clickers only, if their clicks pattern consistently with regards to phonetic form (e.g. place of articulation and phonetic accompaniments). Clicks could also be used as a forensic discriminant if there were a large amount of speech material from which to draw analysis (i.e. recordings longer than 5 minutes, which are not usually available for forensic analysis). They suggest click rate might still be used as a discriminant if more studies investigate how clicks pattern in language, both phonetically and interactionally, recommending further study from which forensic linguistics can draw in the future.

2.4.3 English click functions in interaction

In order to illustrate the scope of click functions, Ogden (2013) examined a combination of telephone conversations and sociolinguistic interviews from the UK and U.S. from several corpora: CallHome, SW/CK/Sym, Holt, lists, nrb, RCE25, Salford, SBL, vegtalk, and Virginia, separating out four male pairs and three female pairs of speakers between 18 and 22 years old. In 280 minutes of recordings ($\sim$40 minutes for each pair), Ogden found 222 clicks, or around 0.8 clicks per minute for the corpus. Ogden identified percussives, or the audible separation of the articulators, and removed them, like Wright (2011).

In terms of phonetic form, Ogden separated auditory click place of articulation into central and lateral due to the challenges of identifying place of articulation. He reported that it was likely the main central variant was an alveolar click [!] and the lateral variant was [ǁ]. More precisely, the alveolar variant [!] could range from dental to alveolar in articulation, having a central release. The lateral variant [ǁ], being far less common, could show a primary constriction anywhere from dental to palatal, with a lateral release.

Fragment 2.4.3: An alveolar click as part of displaying disapproval (from Ogden 2013:309, "(9) CallHome 4861.60") Note «b> TEXT» denotes breathy voice

1	M:		Obviously I didn't do a good enough	
2		j	[ob of rais	[ing you.]
3	D:		[! h↓	«b>[ah -s] to:p tha:t>

Ogden's study used CA to categorise actions in which clicks could occur. His findings supported those of Wright (2011) that percussives seem to be in free variation with NSI clicks. Ogden also finds stance-displaying clicks. Stance-displaying clicks were characterised by the formula [click] + [response token], the 'response token' being the indicator of the stance displayed. For example, Fragment 2.4.3 shows a negative stance-diplay click. In line 1, the mother ('M') says "Obviously I didn't do a good enough job of raising you," to which the daughter ('D') responds with the alveolar click followed by an outbreath. This click is followed by response token "bah, stop that" which works together with the click to display disapproval.

Ogden shows that clicks occur with phonetic accompaniments, e.g. oral and nasal collocated material, audible inbreaths, particles such as *uh* and *um* and creaky collocated material. He also shows that clicks occur as a singlet or in multiples and in all turn-positions: turn-initially, -medially, -finally, or on their own. Clicks are also present at a range of sequential locations (see Chapter 3, Section 3.6.3.5).

Ogden divided clicks into two interactional categories: (1) aspects of sequence management, i.e. interactional functions which facilitate turn-taking and topic-shifting in interaction and (2) affect-laden displays, i.e. interactional functions which display an attitude or stance towards someone or something. Affect-laden clicks could convey a compliment, appreciation, a complaint, sympathy, and more. Sequence-managing clicks could do the following: indicate word search, index a new sequence of talk, mark incipient speakership (e.g. the shift of one speaker to another) at the beginning of a turn, and repair (e.g. an interactional function that deals with a breakdown in communication).

While the three most frequent click producers in Ogden's data were female (79% of the total clicks were produced by women, with three female speakers producing nearly half of the total clicks), his study did not set out to analyse clicks as a sociolinguistic variable. Ogden (2013; 2016) argues that click production is not a result of the social attributes of people who produce clicks, but rather the conversational actions in which clicks are embedded. He argues that the click does not perform an action in isolation, but does so in context alongside other features associated with the action, e.g. turn position, particles, audible inbreath, creaky voice, and other phonetic information. The click is then one component of the action which is a combination of features, both vocalised and non-vocal (i.e. also with gestural components). Ogden's position states that social categories of speakers do not constrain the clicks usage, but instead constrain the types of conversational actions in which clicks appear, e.g. some social groups perform more conversational actions than others, which in turn constrains where clicks may or may not appear. This means that actions, rather than clicks, are constrained by social factors. This proposition is explored with specific respect to word search sequences in Chapter 5.

2.4.4 English clicks in word search sequences

Wright (2005; 2011), Gold et al. (2013), and Ogden (2013) all find clicks frequently occurring in word search sequences. As the present study also found a large proportion of clicks occurring in word search, the action of word search is considered here. First, word search actions, irrespective of whether a click is present, are summarised, then, drawing from Wright (2005), clicks in word searches are categorised and discussed.

Word search is often studied from a psycholinguistic perspective, where it is discussed in terms of lexical access, and difficulty with accessing lexical material or lexical processing, e.g. tip of the tongue syndrome (Brown and McNeill 1966; Schwartz and Metcalfe 2011; Warren 2013), sometimes due to competing forms or lexemes. In this thesis, I concentrate not on lexical access or tip-of-the-tongue syndrome, but rather on the way in which word searches are constructed (by one or more people) in interaction, often indicated by hesitation and filler words (e.g. Fox Tree 1995; Fox Tree 2001; Clark and Fox Tree 2002; Oelschlaeger and Damico 2003; Corley and Stewart 2008). Much of the aformentioned work on hesitation and disfluencies examine word search, describing false starts, filled or unfilled pauses, hesitations, and fillers (i.e. particles like *uh* or *um*).

Word search construction is well-established in the CA literature (e.g. Schegloff, Jefferson and Sacks 1977; Goodwin and Goodwin 1986; Brouwer 2003), which examines the action in context using detailed sequential analysis.

The action of searching for a word is one way speakers deal with problems that can arise in interaction, such as forgetting a word, being unable to pronounce a word, being unsure of the correct word, or a speaker losing their train of thought. Brouwer (2003) investigated word search as an interactional resource for non-native speakers of Danish to learn lexis in the target language through immersion. Although this study examines word search in L1 Dutch, sometimes in conversation with L1 Danish speakers, the characteristics of word search across languages seems to be similar. The speaker may identify a problem, or signal that there is one to come, and performs the action of searching. This is usually done with turn-holding indicators and hesitation markers, such as uh or uh (e.g. ‘uh’ in line 1 of Fragment 2.4.4), while the interactional ‘problem’ is ongoing.

Fragment 2.4.4: Word search sequence without a click. J=L1 Dutch speaker, A=L1 Danish speaker. Prior conversation was about a couple who traveled to Nepal on their honeymoon. Note: Arrows denote intonational direction, ‘*’ denotes whispered speech. Translated by and adapted from (Brouwer 2003:538)

1	**J**	in- (0.4) in uh
2		↑what is called the ih this mountain
3		(1.5)
4		the highest mountain
5		(0.8)
6		ah cannot remember it
7		(2.0)
8		what is a mountain in Nepal
9		(0.3)
10		highest ↑mountain top
11	**A**	it is ca:lled (0.3) the Nepalese mountain
12		(0.8)
13	**J**	*no::*
14		(0.2)
15	**J**	a(h) Mount Ever↓est

Typical verbal clues that can indicate an ongoing word search include: long pauses (e.g. the two-second long pause in line 7); particles e.g. uh, um (lines 1, 2 and 6); repetition or elongation of sounds (e.g. lengthened /o:/ in the whispered ‘no’ in line 13); creak; and cut off syntax (e.g. ‘in– in uh–’ in line 1) (Schegloff, Jefferson and Sacks 1977; Goodwin and Goodwin 1986; Brouwer 2003).

A word search is usually followed by a resolution of some kind (Schegloff, Jefferson and Sacks 1977). This can be done through overt references to the word search itself (much like ‘ah cannot remember it’ in line 7– though this is not the resolution), or referring to listener expertise (‘what is a mountain in Nepal?’ in line 8, though not used as a resolution here). The word search can also be resolved through a co-construction where the listener offers the word that the speaker is struggling with (e.g. failed attempt at the resolution in line 11 ‘the Nepalese mountain’), or the speaker coming up with the word or concept on their own (e.g. ‘ah Mount Everest’).

Sampling from the same corpora as for her analysis on NSI clicks, Wright’s (Wright 2005) PhD study also examined patterns in word searches with a click. Wright (2005:196) identifies that in word searches with clicks, speakers:

- always produce either an alveolar or bilabial click (or both)

- routinely initiate the word search stretch with the particle *um*
- regularly produce wh-questions, such as *what was his name*, which overtly index their search
- routinely produce clicks in one of two locations: either before a wh-question (in the fragments that contain wh-questions) or before the searched-for item
- often maintain glottal closure between the production of the click and the onset of the searched-for material
- systematically produce the particle *uhm* before the click
- routinely maintain glottal and supralaryngeal closure between the offset of *uhm* and the subsequent click

Wright (2005:225) also identifies three parts of a word search sequence containing a click: (1) the **pre word search stretch**, (2) the **word search stretch**, and (3) the **post word search stretch**.

The **pre word search stretch** is typically comprised of a syntactically incomplete turn with projection of morphosyntactic and semantic details of the 'searched-for item.' The **word search stretch** begins with the production of the particle 'uhm,' followed by a bilabial or alveolar click, and may contain a pause. The word searcher usually maintained a glottal and supralaryngeal closure, as a method of holding the floor, i.e. holding the speaker's turn. Finally, the **post word search stretch** is where the speaker produces the 'searched-for item' and usually completes the syntax.

Fragment 2.4.5: Bilabial click, pause and alveolar click used in a word search sequence ("Holt.U.88.2.2/natter/" adapted from Wright 2005:177)

1	Les:	.hhhh and there's the- the natte- uhm (0.2) [ʘ] (0.3) [!]
2		oh what's it called the natterjack's not so good now

Fragment 2.4.5 illustrates a word search with two clicks. This word search can be easily separated into the three components of a word search categorised by Wright. The **pre word search stretch** contains cut off syntax, the first indicator of word-finding trouble ("and there's the- the natte-", line 1). The **word search stretch** is initiated by the particle 'uhm', followed by a 0.2 second pause, a bilabial click, a 0.3 second pause and an alveolar click. This stretch also contains the request for recipient expertise "oh what's it called" line 2. The **post word search stretch** resolves the word search by providing the searched-for item in line 2 ("the natterjack's not so good now").

Wright (2005) also notes that speakers can rely on phonetic and gestural resources (including 'thinking face' c.f. Goodwin and Goodwin 1986) to aid in the word search sequence, though she does not discuss what phonetic characteristics or accompaniments other than particles *uh* and *um*. Wright did not analyse phonetic accompaniments for clicks in word search. In Wright's examples of word searches, audible inbreaths are transcribed, but are not discussed in the body of her thesis.

It is therefore unclear what phonetic accompaniments beyond particles for word search clicks are present, though one might expect similar phonetic features to appear in word search as those referenced from Brouwer (2003), Schegloff, Jefferson and Sacks (1977), and Goodwin and Goodwin (1986). It is also unclear how word search sequences with a click may be different from those without, i.e. some phonetic or interactional features may affect whether or not a click is present in a word search. These questions are investigated here in Chapter 6 for Glaswegian speakers.

2.4.5 Summary: Clicks in English

From these few studies of clicks in English (and those mentioned in the next section), we find some consistency in the reporting of phonetic form; clicks are mostly produced with dental or alveolar articulation and can occur with phonetic accompaniments such as creaky voice, audible inbreath, nasality, and particles. Clicks in English, while previously thought of as mostly affect-laden, have been shown to occur in many interactional functions. Clicks have been noted as part of both affect-laden (e.g. negative and positive stance-display) and sequence-managing functions (e.g. NSI, word search, marking incipient speakership). These functions seem to be consistent across studies of English, and many appear in German as well (Trouvain 2015). This suggests the possibility that clicks in interactional functions might not be language or dialect-specific and motivates analysing click form and function in a single variety to see if new linguistic or interactional features emerge (e.g. place of articulation or interactional functions).

2.5 Clicks and social meaning in English

While the above studies do not explicitly take social factors into account, to my knowledge there are to this date only three studies which take a sociolinguistic variationist approach: Stuart-Smith (2009), Moreno (2016), and Pillion (2018). These studies are organised below with regards to how they can inform on phonetic form, interactional function, and social factors of clicks and how they lead a central theme of this thesis.

2.5.1 Click phonetic form, function, and position in turn across gender and social class in Glaswegian English

Stuart-Smith (2009) investigated clicks patterning across age and class in spontaneous speech of eight Glaswegian female speakers: one older middle class pair, one younger middle class pair, one older working class pair, one younger working class pair. Clicks were identified auditorily and judged according to position in interaction.

Stuart-Smith found a total of 61 clicks in these eight speakers, with rates of click production varying across speakers; one older middle class speaker did not click at all, while her co-participant, also an older middle class speaker, clicked 16 times. Across all four pairs, more clicks in this sociophonetic study were bilabial than any other place of articulation.

For position in interaction, Stuart-Smith categorised clicks into "start of new or more information," "searching for words," "backchannelling," "end of sequence," "evaluation," and "reply and agreement." Stuart-Smith found that all pairs excluding the older working class women produced clicks more at the start of new/more information, and the older working class pair produced more clicks in word search than any other category, but only marginally more than other functions.

This small study illustrated the presence of clicks in Scots and Scottish English and introduces some theoretical questions about whether or not some speakers are "clickers" while some are not, and how affect-laden clicks relate to interactional position.

2.5.2 Phonetic form and function of clicks in three regional dialects of Scottish English

Another study that incorporates sociolinguistic elements was the pilot study for this thesis (Moreno 2016). Using speech from 9 female speakers between 40 and 60 years old from three regions in Scotland (Shetland, Buckie in the Northeast of Scotland, and Glasgow), this study investigated clicks' phonetic form and function, comparing it across these three areas. Women were selected due to the highest rate clickers in Ogden's (2013) study being female, and they belonged to a middle-older age group because of reported linguistic stability among older age groups (e.g. Labov et al. 2011; Tagliamonte 2012). Data from Glasgow was drawn from the Sounds of the City corpus (Stuart-Smith 2003), data from Buckie was drawn from the Buckie corpus (e.g. Smith 2000), and data from Shetland was drawn from the Bidialectalism corpus (e.g. Smith and Durham 2012).

In 8.5 hours of the speech of 9 speakers, 418 clicks were found (0.8/minute, a similar rate to Ogden 2013), with each recording being between 45 and 60 minutes. Clicks in this Scottish English study were mostly dental in articulation; mostly high amplitude; the speech following a click could be both high and/or low pitch; and the following speech usually had falling intonation. Analysis of phonetic accompaniments of clicks revealed that, similar to Wright (Wright 2011), clicks were mostly not collocated with nasal or creaky speech material, but *were* collocated with particles such as *oh* and *uh* and *um*. These findings of clicks' phonetic accompaniments were in line those of Wright (2011).

Click functions found in Moreno (2016) were similar to those found in previous studies (e.g. Wright 2005; Ogden 2013), with NSI clicks being the most common. Overall clicks of sequence management (including NSI, word search, marking incipient speakership, backchannel, and self repair) occurred far more frequently than stance-displaying clicks.

With regards to region, Moreno (2016) found that Shetlanders in her data produced more clicks than Buckie or Glaswegian speakers, despite the fact that the recordings from both Shetland and Buckie were also on average longer in duration than those from Glasgow. While all speakers were more likely to use clicks in sequence-managing functions (e.g. searching for a word or indexing a new sequence of talk), Glaswegian speakers were more likely than those from Buckie or Shetland to produce clicks in stance display. Recordings from Shetland and Buckie were also sociolinguistic interviews, while Glasgow recordings were casual conversations between members of speech community (c.f. Sounds of the City corpus mentioned in this section). Moreno (2016) reports these results could arise from a confound of region and/or style on click production, pending further study.

Moreno (2016) demonstrates that click form and interactional function vary substantially by individual speaker, finding that even within the same region, age, and gender there was a large range of variation. Moreno suggests this might be due to the low number of speakers in each dialect region (three in each region), or due to constraints not examined, such as the suggestion of Ogden (2013) of social actions (i.e. interactional functions) being more prevalent in particular social or regional groups.

2.5.3 Click rates by gender in speech preparation and stance displaying clicks in American English

Most recently, Pillion's (2018) sociophonetic study examined clicks and percussives and gender variation in speech preparation strategies and stance display in American English. Pillion performed analysis on recordings from the Buckeye Corpus (Pitt et al. 2005), a collection of hour-long sociolinguistic interviews of 20 female and 18 male speakers. Pillion found 2857 clicks and percussives, with more clicks and percussives produced by male speakers (57% of the total clicks and percussives, n=1627).

Once percussives were removed from the data, Pillion found a total of 504 clicks in 38 hours of speech (0.21 clicks per minute overall), a much lower rate than Ogden (2013) or Moreno (2016). The removal of percussives also revealed that female speakers were responsible for the most clicks (63% of the total clicks, n=318), despite the number of clicks produced varying immensely from speaker to speaker. Pillion examined the number of clicks each speaker produced, but not did not take into account the number of clicks per minute for each individual speaker (i.e. individual click rate).

With regards to clicks and interactional function, Pillion chose to categorize clicks in terms of broad categories of stance and discourse, corresponding to affect-laden and sequence-managing functions in CA terms (Ogden 2013). Pillion also found a higher rate of sequence-managing clicks than stance-displaying clicks.

Pillion (2018) also examined the acoustic intensity and duration of clicks and percussives in English, including intensity and duration. She found that turn management and stance display clicks are higher in intensity than percussives overall, and that stance display clicks are longer in duration than sequence-managing clicks and percussives.

2.5.4 Summary: Clicks and social meaning in English

These three limited sociolinguistic studies of clicks highlight some patterns in click form, function, and social factors. Clicks' place of articulation ranges from bilabial to palatal/lateral in English, are seldom accompanied by nasal or creaky material and often accompanied by a particle (e.g. Wright 2005; Ogden 2013; Stuart-Smith 2009; Moreno 2016). Acoustic properties of clicks can reflect functional categories; stance display clicks are longer in duration than sequence-managing clicks (Pillion 2018). Clicks can have both sequence-managing and stance-display functions (e.g. Wright 2005; Ogden 2013; Stuart-Smith 2009; Moreno 2016; Pillion 2018), though sequence-managing functions are much more common. Most notably for this thesis, click production seems to be affected by gender, class, region, and style. Women produce clicks more frequently (e.g. Pillion 2018) and older working class women click differently from middle class women and younger working class women with regards to interactional function in Glasgow (Stuart-Smith 2009). There are regional differences in click production, e.g. Shetlander speakers produce more clicks than other regions of Scotland (Moreno 2016), as well as stylistic variation, e.g. sociolinguistic interviews result in speakers producing high rates of clicks than casual conversations (e.g. ibid).

While these results provide a starting point for research into social patterns in click form and function, much about how gender and age affect clicks in interaction remains unknown. For instance, Pillion (2018) reports that women click more frequently than men, but not what interactional category clicks belong to, i.e. whether women click more because they produce more stance display than men, as would be assumed by Ogden (Ogden 2013). It is still unclear whether different social groups (i.e. age groups or genders) of speakers might produce fewer or more phonetic accompaniments alongside clicks and whether or not this is constrained by the functions in interaction in which the click is embedded. These questions are investigated in this thesis. Some answers to these questions are given here.

2.6 Language and social meaning in Glasgow

Clicks are treated as a sociolinguistic variable in this study. Glasgow was chosen as the location for analysis for several reasons. First, the study required a speech community with substantial evidence for sociolinguistic variation across age, gender, and class (e.g. Macaulay 1977; Stuart-Smith, Timmins and Tweedie 2007; Lawson 2013). Second, because of the interactional constraints desired for the study (see Chapter 3, Section 3.2.4), data had to be collected and Glaswegian speakers were considered more accessible due to this thesis being completed at the University of Glasgow. Most importantly, clicks must be present in the data and Glaswegians were found to click previously by Moreno (2016). To understand sociolinguistic variation in Glasgow and how this study considers clicks as a sociolinguistic variable, we must first step back and give a description of the sociolinguistic framework this study draws from.

It has been long acknowledged that aspects of speech can be constrained by linguistic and social factors which can work together to carry social meaning (e.g. Labov 2006; Labov 1972; Chambers 1995; Labov 2001; Tagliamonte 2012, etc.). The area of linguistics which shows this is known as variationist sociolinguistics, or the study of how linguistic variables (e.g. alternative ways of saying the "same thing", Labov 1972:188) vary across social factors.

Many social factors can influence the outcome of a linguistic variable. Two frequently-studied features in sociolinguistics considered here are the social factors of gender and age, discussed in this section in relation to Glasgow. Language variation in Glasgow has been investigated since the 1970s (e.g. Macaulay 1977) and there is a large body of sociolinguistic work which shows speech is stratified across class, gender, and age in Glasgow (e.g. Macaulay 2005; Stuart-Smith, Timmins and Tweedie 2007; Lawson 2013; Lawson 2014; Rathcke and Stuart-Smith 2016). Note that class is not reviewed here per se, as social class was not able to be included in the present study. In Glasgow, and in other sociolinguistic contexts, gender and age have been found to interact with social class. Therefore, only gender and age-related findings are given here, though they often relate to social class too.

2.6.1 Gender variation in Glasgow

Gender differences in language have been demonstrated consistently throughout sociolinguistic literature (e.g. Labov 1972; Labov 1990; Trudgill 1983). The traditional gender effect depicts more non-standard linguistic forms in male speech, while female speech gravitates towards more standard, i.e. prestigious, forms (e.g. Labov 1972; Tagliamonte 2012). With regards to language change, it is generally considered that women lead linguistic change despite tending towards standard variants (i.e. the gender paradox, Labov 1990), though there still remain some male-led linguistic variables (Labov 1972; Tagliamonte 2012).

Studies on sociolinguistic variation across gender in Glasgow report both strong and weak support for these commonly observed patterns. There is some evidence of the expected gendered pattern, such that female speakers (especially middle class women) use more standard variants. Macaulay (1977) reports class and gender differences in vowels (i), e.g. *kit* and *risk*, (u), e.g. *fool* and *book*, and (a), e.g. *cat* and *back*. Macaulay (1977) also finds gender differences in T-glottaling in Glaswegian speakers, or the replacement of /t/ with allophone [ʔ]). Middle class women produce the fewest glottal stops of all gender-class groups. Stuart-Smith (1999) findings of T-glottaling by gender and class are similar.

Macaulay (2005) also found both gender and class-based discourse variation in Glasgow. In his analysis of the discourse features *oh* and *well*, he reported that all the speakers in his study use both *oh* and *well*, middle class speakers produce *oh* more frequently and working class speakers produce *well* more frequently. Macaulay finds that gender and class can work together to cause variation; women use *oh* more frequently, like the middle class speakers, and men use *well* more frequently, similar to the working class speakers. More recently, Stuart-Smith et al. (2007) found less support for a gender difference in Glasgow. They examined eight phonological variables /θ/, /ð/, /l/, /t/, /s/, /x/, /ʍ/, and /r/ in wordlist and casual speech in Glasgow across gender, age, and class. In this study there was only a clear effect of gender for /s/ out of the eight variables, with male speakers using more retracted variants of /s/. These results suggest that many of the gender differences reported in Macaulay (1977) are no longer present in Glasgow.

The difference in /s/ production in men and women in Glasgow was also observed with regards to spectral Centre of Gravity by Stuart-Smith, Timmins and Wrench (2007). They find that both sex (i.e. sex-based differences in the size of the front cavity) and gender have a consistent effect on /s/ production such that women produce /s/ with significantly higher spectral frequency than men in Glasgow.

Much of the gender variation above depends on whether or not a variant is a prestigious. Because empirical studies of clicks are relatively recent, and there is not yet a notion of what a 'standard' click variant might be, though there is some indication that clicks appear more frequently in formal situations (i.e. keynote talk, Trouvain and Malisz 2016, as opposed to sociolinguistic interviews, Moreno 2016). Bearing this in mind, it is more possible here to say how gender might constrain click production than why. First, given the evidence of some phonological variation across gender in Glasgow, specifically with regards to place of articulation and spectral frequency (e.g. for /s/ in Stuart-Smith, Timmins and Tweedie 2007; Stuart-Smith 2007), a gender effect for these features is expected. This is particularly likely given evidence from Standard American English which show that women produce phonemic stops with a higher spectral frequency than men (Chodroff and Wilson 2014). However, physiological differences in men and women can be overcome (Simpson 2009), so it is also possible an effect will not be observed. Second, it is also expected that the interactional function in which the click occurs will vary according to gender, given Macaulay's (2005) results of gender variation in discourse markers *oh* and *well*. Third, because women clicked more frequently in Ogden (2013) and Pillion (2018), we also expect women to produce more clicks here.

2.6.2 Age variation in Glasgow

It is well known that that age affects many aspects of speech e.g. pitch, lexis, articulation, and grammatical structure (Holmes and Wilson 2013:167). There is also much evidence to suggest that there is linguistic variation across age in Glasgow (e.g. Macaulay 1977; Macaulay 2005).

Other variation as a result in age-related vocal tract size differences (e.g. Mugitani and Hiroya 2012), there are two possible reasons for linguistic differences across age: a linguistic change or age-grading. There are two ways a linguistic change can be observed, either through a real or apparent-time change. When observing a real time change, the same population (or community) is sampled at two different points in time, so that the linguistic change can be observed over a linguistic community's "lifetime." An apparent time change is observed by sampling younger and older speakers simultaneously, which can indicate how linguistic change is happening in a specific speech community (Meyerhoff 2011; Wardhaugh and Fuller 2015).

Age-related linguistic differences can also be due to age-grading, or the change of the amount of specific linguistic variants in an individual's speech over their own lifespan (Meyerhoff 2011; Sankoff 2006; Wardhaugh and Fuller 2015). In age-graded linguistic variation, a particular variant might be used more when an individual is younger, but as they grow older, it is gradually used less. Studies on age grading have shown, for stable linguistic variables (i.e. variables not in the process of a linguistic change), non-standard variants are used more often in younger people who have not yet entered the workforce. However, once they begin working life, their non-standard variants are used less as they try to be 'professional' for the working world (Labov 1972; Holmes and Wilson 2013). Non-standard variants appear less frequently when 'societal pressures to conform are greatest' (Holmes and Wilson 2013:168). 'Society pressures' are thought to be present around middle age or about 40 years to 60 years old. After middle age, vernacular or non-standard variant usage gradually increases as people retire from their careers and re-enter into a more casual environment (Labov 1972; Holmes and Wilson 2013).

Linguistic variation by age in Glasgow is exemplified in the study of T-glottaling. One example of age-grading is shown in Macaulay (1977), who investigated T-glottaling across gender and class in 10-year-olds, 15-year-olds, and adults. Macaulay found that the youngest group of male speakers (10-year-old boys) realised the glottal variant more than any other group. This is evidence of age-grading because 10-year-old boys are assumed to be the least susceptible to social pressure and have not yet learned the norms of social class with regards to the stigmatised glottal variant (Chambers 1995).

Stuart-Smith (1999) revisited T-glottalling in 32 Glaswegians in two age groups, 13-14 and 40+ years old, equally distributed across gender and class (working and middle). She found that overall, younger speakers had higher levels of glottaling than older speakers. Stuart-Smith also reported a higher proportion of the glottal variant for younger speakers than Macaulay (1977), demonstrating that previously shown age-grading can happen simultaneously with an ongoing linguistic change. Thus, we find evidence of both age-grading and linguistic changes can happen both in isolation or work together to influence variation in Glasgow (Sankoff 2006).

The studies above indicate a few possible findings regarding age and clicks for the present study. It is possible that clicks are not a stable linguistic variable, i.e. they are undergoing a linguistic change, due to previously observed variation in click rate across individual speakers (Gold, French and Harrison 2013). A linguistic change or evidence of age-grading in click usage might be observed if younger and older speakers click differently, with respect to how many clicks they produce, variation in the interactional functions in which they produce clicks, and most likely, due to the age-related phonological variation present in Glasgow (e.g. Macaulay 1977; Stuart-Smith 1999b), clicks' place of articulation. It is not expected that younger speakers and older speakers will vary in their production of click with respect to spectral frequency of the 'same' place of articulation, because all speakers in the present study were at least 18, i.e. their vocal tracts are thought to be fully developed. As in the predictions for gender above, it is possible that age will have an effect on how often clicks are produced in a single interactional function (here, word search), especially if the interactional function has both a 'standard' and 'non-standard' way in which it is performed.

2.6.3 Summary: Language and social meaning in Glasgow

Social factors, such as gender and age, clearly effect language at both the phonological and discourse level in Glasgow. Because of this evidence, we might expect social factors to influence click production as well.

Based on the study, we expect both effects of gender and age on click usage in Glaswegian, with respect to clicks' phonetic form (e.g. place of articulation, spectral frequency), proportion of usage, and interactional function. We also expect that social factors may constrain how often a click is used in word search, due to the suggestion by Ogden (2013) that social factors constrain how interactional functions are performed.

2.7 Clicks as a sociolinguistic variable embedded in interaction

There are many phonological variables that vary according to social factors in Glasgow. Some linguistic variables, however, are not so easily identifiable or do not fit into the mould of a 'traditional' linguistic variable. The linguistic variable is considered to be more than one way of saying "the same thing" (Labov 1972:188). Tagliamonte (2006:70) states that the linguistic variable and studies in variation traditionally rely on two main tenets.

The first tenet of the linguistic variable is the Principle of Accountability (e.g. Labov 2006:49; Labov 1969:373; Labov 1972:72), which takes into account every place where a variant occurs and where it does not, to study the frequency of variable use. For example, when examining patterns in T-glottaling (e.g. Stuart-Smith 1999b), one must take into account every instance of /t/ in order to study the proportion of the usage of the glottal variant.

The second tenet of the linguistic variable is variable circumscription, i.e. using a set of rules in order to know where linguistic variation may or may not occur. In circumscribing the variable context of /t/ for T-glottalling, for example, one would examine all places where the glottal variant is possible, depending on the variety of English: (in Glaswegian English) before a pause (e.g. *but #*), before a vowel (e.g. *a* *lot of*), and intervocalically (e.g. *water*) (Stuart-Smith 1999b).

2.7.1 Conforming to the notion of the 'traditional' linguistic variable

Clicks are not a linguistic variable in the traditional sense because of one cannot take into account every zero variant (i.e. they do not conform the the Principle of Accountability), and they cannot be anticipated (they are nearly impossible to circumscribe).

Tagliamonte (2012:269) argues that, when analysing discourse features (or, in this case, interactional variables), it is very difficult to satisfy both discourse and variationist research intents. She cautions,

> Quantitatively-inclined researchers will argue for sufficient similarity in usage for statistical analysis. Qualitatively-inclined researchers will say that such an approach "misunderstands" the phenomenon. Such criticisms are really the result of different research orientations: (1) discourse analysts focus on the divergent pragmatic functions of forms in the content of talk; and (2) variationists focus on the social and linguistic patterns of forms that have common functions. There is no resolution to this issue in sight.

So Tagliamonte (2012:269) argues that the conflicting focuses of quantitative (sociolinguistics and variationist study) and qualitative (discourse and interactional study) research make it nearly impossible to combine the two approaches in a way that satisfies both. Still, studies have found solutions to identifying, coding, and analysing discourse-pragmatic variables. Through their solutions, they have shown that discourse pragmatic features are "variable, changeable, and socially- indexical" (Pichler 2016a:2).

Clicks can therefore still be analysed quantitatively. To examine clicks and word search in this thesis, two approaches were taken. In the analysis of clicks, I searched for all clicks in the total recordings, examining how they pattern with regards to linguistic and social factors. This approach is similar to that generally done with discourse-pragmatic variables, in which only a particular set of variants are circumscribed. For part of my analysis of word search sequences, I take an approach more in accordance with the Principle of Accountability; I identify all possible word searches with and without clicks and examine how they pattern with regards to linguistic and social factors. These two combined approaches make it possible to study variation in form and interactional function of a particular interactional variable by drawing on variationist sociolinguistics to perform quantitative analysis on a socially stratified sample of speakers, without losing crucial information at the level of the interaction. Using Conversation Analysis to analyse clicks' interactional function is vital; as Pichler (2016) explains, taking into account the composition of a discourse (or in this case, interactional) variable is important for a productive analysis of discourse-pragmatic variation.

If we do not use CA to analyse clicks, we lose vital information about how clicks work in interactional functions, which could be constrained by social factors. In this way, we can examine the variable in its context, and CA facilitates this, because it takes into account clicks as only one component which works with other features (e.g. pitch, audible inbreath, particles *uh* and *um*) to perform an interactional function.

2.8 Analysing the social meaning of phonetic clicks in talk-in-interaction

In order to investigate click phonetic form, interactional function, and social meaning, the present study combines approaches from phonetics, variationist sociolinguistics and Conversation Analysis. Identifying clicks and classifying their phonetic accompaniments requires auditory and acoustic phonetic analysis of place of articulation and an understanding of non-pulmonic consonant production, creak, nasality, COG and duration (e.g. Ladefoged and Traill 1984; Ladefoged and Maddieson 1996; Ogden 2013; Trouvain and Malisz 2016; Pillion 2018). Conversation Analysis is crucial to identify interactional functions which clicks can be a part of, to understand the role of a click within an interactional function, and to understand what features might co-occur with a click in a given interactional function (e.g. Schegloff, Jefferson and Sacks 1977; Goodwin and Goodwin 1986; Brouwer 2003; Wright 2005; Ogden 2013). To be able to illustrate patterns and to understand the social meaning of clicks in an interactional function, it is necessary to draw on principles of gender differences, age grading, and apparent time change from variationist sociolinguistics (e.g. Labov 1972; Tagliamonte 2006; Tagliamonte 2012).

In combining phonetics, variationist sociolinguistics, and CA, the results of this thesis is divided into two chapters. The first results chapter (Chapter 4) presents results on the phonetic form of clicks in Glaswegian English, clicks' interactional functions, and linguistic and social factors (e.g. gender and age) with respect to click form and function. The second results chapter (Chapter 5) draws on Conversation Analysis to focus on and examine one action in which clicks can occur: word search. There are two ways in which word search is analysed here. First, because Conversation Analysts (e.g. Ogden 2013) argue that much of the click's phonetic form are constrained by interactional function, which in turn can be constrained by social factors, word search clicks' phonetic form was compared to clicks performing other interactional functions. Second, taking an approach more in line with the Principle of Accountability but controlling for the interactional function in accordance with CA, all word search sequences with and without a click were compared across linguistic and social factors. This is achieved by categorising word search according to CA literature (outlined in Section 3.6.3.2), which allows for a set of recognisable criteria for word search actions to be created and helps to categorise actions so that they might from a quantitative variationist perspective.

2.9 Summary

This chapter has given a key overview of theoretical approaches and previous research pertinent to this study. It has highlighted variation in phonemic click production, the phonetic form of clicks in English along with their possible interactional functions, and the potential for clicks to be stratified across gender, region and conversational style.

It has also provided the background for word search sequences, with examples of clicks in word searches from Conversation Analysis studies. The linguistic context of Glasgow has been introduced along with sociolinguistic studies which analyse variation in Glasgow. It has argued for the viability of an interaction variable as a traditional linguistic variable, a challenging issue given both the definition of a linguistic variable as two ways of saying/doing the same thing, and the Principle of Accountability. This study's theoretical approach has been discussed, with the combination of these higher level theoretical frameworks which give way to rigorous qualitative analysis, both phonetic and interactional, and quantitative analysis which may illustrate clicks as a sociolinguistic and interactional variable, and their systematic nature across Glasgow, a city with demonstrable socially stratified speech patterns.

The practical application of the theoretical framework discussed in this chapter is now taken up in the following chapter.

Chapter 3

Method

3.1 Overview

This thesis aims to analyse phonetic clicks as a sociolinguistic variable embedded in interaction from naturally-occurring speech across speakers from Glasgow. This study therefore requires (1) the type of setting to allow for naturally-occurring speech, (2) access to a stratified sample of participants, and (3) the practical application of a combination of phonetic theory, sociolinguistics, and CA. This chapter discusses how these three goals were met by presenting both unsuccessful and successful methods.

First, this chapter presents methods in accessing participants and gathering data to best elicit naturally occurring talk. Next, participant sample and studio set-up are explained. Then, I describe the process of identifying word search and coding clicks' phonetic form and interactional function. Next, a description is given of coding for sequential analysis, and position in turn. 'Turn' here refers to whose turn it is to speak, as speakers take turns in interaction. Finally, some analytical problems encountered during this study are addressed.

3.2 Methods for eliciting naturally occurring talk-in-interaction

The goals discussed here directly relate to collecting naturally-occurring speech from a socially stratified sample of speakers of Glaswegian English. It is apparent from previous studies that clicks occur as part of some specific sequence-managing functions (e.g. new sequence indexing, word search, etc.); as these functions are interactional tools which arise naturally across longer interactions (e.g. Wright 2005), they were not expected to be difficult to elicit. On the other hand, the elicitation of stance-display clicks was considered more challenging, as stance-display clicks occur more rarely (e.g. Ogden 2013; Moreno 2016; Pillion 2018).

Four methods of data collection were initially considered: (1) sociolinguistic interviews, (2) shop worker and customer interactions, (3) in-home interactions, and (4) structured conversation (e.g. topic-based discussion) between two speakers in a sound studio. Structured conversation is the model used for this study; participants were encouraged to complain in pairs. These data collection methods are discussed below.

3.2.1 Design: The sociolinguistic interview

One approach considered for data collection was the sociolinguistic interview (Tagliamonte 2006:37). Sociolinguistic interviews were not used here to collect data because I, as the interviewer, would have been a speaker of North American English, while the participants would be speakers of Glaswegian English or Glaswegian Scots. In general, speech in pairs of speakers of the same dialect is thought to be more natural (Labov 1984). In Scotland, specifically Shetland, there is also evidence of style-shifting and audience-design planning when speakers are talking to a perceived "outsider", i.e. not a member of the community, versus an "insider", i.e. a member of the community (Smith and Durham 2012). In Smith and Durham (2012), Shetlanders were interviewed by both Mercedes, a speaker of North American English and Lisa, a native Shetlander. The interviews with Lisa were characterised by local gossip and "catching up" while interviews with Durham were considered more formal in style. It is possible that this would have an effect on talk from sociolinguistic interviews in Glasgow as well, as I might be perceived as an outsider, resulting in speakers using more Standard Scottish English over Glaswegian Scots if participants are bidialectal Glaswegians.

3.2.2 Design: Shop talk

Another approach considered was to record interactions between customers and employees in shops. This approach would have allowed a single click function to be explored across a stratified sample, rather than collecting and categorising all click phonetic forms and functions across speakers. It was modelled after a CA study which analysed data recorded at kiosks in Finland (Sorjonen and Raevaara 2014). This study compared multimodal composition (including verbal and gestural components) of requests across speakers used in interactions to purchase cigarettes. Regardless of what speakers were purchasing, this method was considered because of it would elicit many instances of the same interactional function, e.g. marking incipient speakership, or the shift from one speaker to another, in requests. These incipient speakership actions could then be collected and compared across social factors such as age and gender. This plan to collect data from corner shops was discarded because of the small size and loudness of shops examined for recordings, so the data collection plan shifted to recording in any larger shop. Recording in shops was later abandoned altogether because of the difficulty in finding companies who would allow me to record both audio and video. In 2016, when data collection for this study began, new General Data Protection Regulations (GDPR) were introduced by the EU, increasing data protection. Many companies were reluctant to allow me to collect data in their shops, because customers might reveal sensitive or identifying information, e.g. bank details or passwords.

3.2.3 Design: In-home talk

Another method of data collection considered was in-home interaction, after the Corpus de Langues Parlées en Interaction (CLAPI) databank (accessed via http://clapi.univ-lyon2.fr), recorded in Lyon by the Groupe ICOR. The advantage of data collection in people's homes is the relaxed setting, eliciting more natural speech. However, after listening to some data from CLAPI, it became clear that in-home recordings could be challenging, especially if the participants were eating, as it is difficult to distinguish between clicks and general noises (lip smacking, licking, chewing, swallowing, etc.) made while eating. This would have been a considerable issue for in-home recordings, unless speakers were encouraged not to eat, which could not be entirely ensured, given that I had, at this time, planned not to be present during the recordings. Other data from the CLAPI databank included board games, which did not contain enough speech for longer analyses.

3.2.4 This study's design: Topic-focused conversations in a lab setting

The method of data collection used for this study was a departure from "field" recordings to "lab" speech. At first, collaborative tasks in pairs were considered, collecting data in the speech studio at English Language and Linguistics department at the University of Glasgow. A collaborative task, however, was not ideal because it restricted the types of interactional functions the participants might perform.

A more optimal model was that of the topic-based discussion. It is general agreed upon in sociolinguistics that casual speech is a more naturalistic speech type (see e.g. Labov 1972:112; Milroy 1987). For this reason, a topic-based discussion was chosen. This was similar to a sociolinguistic interview, in that the topic acted as questions for participants to answer (e.g. "Tell me about a time where..." see Appendix A for prompt examples), but rather than acting as an interviewer, I did not participate in the conversation.

To find a discussion topic for participants, I spoke with other researchers about their own study designs. Eiswirth's (2019) sample consisted of people with diabetes who came together to talk about shared experiences. When speakers ran out of topics to discuss, they could refer to prompts or worksheets provided by Eiswirth. This was beneficial because it encouraged participants to tell stories based around the prompts, eliciting more storytelling and avoiding having large stretches of silence which contributed nothing to the data set. This tactic also restricts the kinds of actions performed in the interaction to those one might expect to occur in storytelling sequences, such as indexing a new sequence, word search, and assessments (Mandelbaum 2012:493).

Ogden (p.c.) noted that, in his own data, he observed more sympathy clicks around discussions of sad events, for example, the death of Princess Diana. The sequence-managing clicks, such as those aiding in word search, NSI, or incipient speakership, would be produced regardless of the kind of talk. Like Eiswirth (2019), I chose a topic which speakers could discuss together. Because I wanted to elicit some stance-display clicks, the task I chose was complaining. Recordings were advertised (see Appendix A) as a "venting session" where Glaswegians could come with a friend and tell stories of times they had a frustrating problem at work, home, or another area of their lives. I used prompts similar to those in Eiswirth (2019) for the reasons listed above (see Appendix C for prompts). Finally, changing my project design to studio recordings allowed me to gain more control over the recording environment, while also allowing natural speech from two participants and ensuring studio-quality audio and video recordings.

3.2.5 Taking account for the Observer's Paradox

Because I was present during data collection, it is important to account for the Observer's Paradox (e.g. Labov 1972:113). This is the principle of sociolinguistic study according to which "in observing, or recording, everyday interaction, one is contaminating that very interaction by the procedures of observation" (Wilson 1987:161). Therefore, one should try to elicit as close to natural speech as possible with as little as possible interference. On the other hand, Wolfson (1976) argues, truly natural speech may not exist. Speech styles are a product of situations, recipients, and audience-design, as suggested by Smith and Durham (2012). If it is the case that a speaker makes choices based on audience design, then one must take into account who the talk is intended for. For this study, I planned to record in pairs so that talk was directed at the speaker's co-participant. For the recordings in this study, participants had the option of having me present. I was present for all pairs except M-28-17A and M-26-17B (Male, ages 28 and 26. Note naming conventions are explained further in Section 3.4), who specifically requested that they be recorded alone. During recordings, I spoke as little as was possible, and was only present to ensure that no speaker dominated the interaction in order to get equal speech material from both speakers to compare rates in click production. Sometimes speakers ignored me, while other times speakers would look to me for guidance, to ask a question, or for complaint prompts.

The Observer's Paradox manifested itself in two ways: either resulting in participants retelling stories that both speakers were already aware of, or simply trying to include me in the conversation. Some participants told me they would feel more comfortable if they could talk to me. Some speakers retold stories their co-participant knew for the camera or me, and at times gave context to make their stories more accessible for me or other people who might listen in the future. Participants M-55-25A and M-57-25B specifically mentioned they felt they were making their speech 'more neutral' to be understood by me, and they explained technical or Scots words like *duff* *it* i.e. to mess up a golf swing.

To account for the potential effect of the Observer's Paradox, whether recordings contained (1) retold stories for the camera or me (identified by being signalled through phrases such as "tell the one about X"), (2) speech directed at me, or (3) only speech directed at the other participant was coded for in the analysis. A table of speakers and how much they included me is shown in Table 3.1.

Table 3.1: Distribution of speakers by intended recipient

	Talked only to each other	Talked to me	Retold stories
N	18	24	8

Shown in Table 3.1 above, about half of the total speakers directed their speech towards me, while just under half only talked to each other. Eight speakers talked to each other but repeated stories each participant knew. It was unclear if retold stories were intended for me, as a person present in the room, or another person who might listen to the recording in future.

3.3 Recruiting a stratified sample

I had planned to gather a sample of around 50 Glaswegian speakers, stratified by social class, age, and gender. This stratification was necessary to investigate whether these key social factors, which are known to influence other aspects of phonology for this community, also affect click production (see Section 2.5.2). In the sections below, I outline the linguistic landscape of Glasgow, the intended social stratification of the sample used, methods in accessing participants.

3.3.1 Glasgow as a site for sociolinguistic variation

As this study analyses clicks in Glaswegian English, all participants are from the city of Glasgow or the surrounding conurbation. Glasgow is the largest city of Scotland, located in what is known as the Central Belt, the most densely populated area in Scotland (Anderson 2018:52). There is a history of separation of the working and middle classes since the industrial revolution in the early 1800s, which led to the growth of the working class population, dominating most of Glasgow (Gibb 1983:115). The increase in the working class population caused overpopulation, resulting in the establishment of a two-tier housing system, further deepening the socio-economic divide between the middle and working classes.

Glasgow's local dialect, here referred to as "Glaswegian Scots," is typically spoken by working class Glaswegians and has a mixture of features from Scots and Standard Scottish English (Macafee 1983). While Standard Scottish English is a variety of English, Scots is the collective name for dialects spoken throughout Scotland (*Scots*

Syntactic Atlas accessed via https://scotssyntaxatlas.ac.uk/faqs/), distinct from English. Standard Scottish English is usually spoken by the middle class. Glaswegian Scots originates from West Central Scots but is influenced by Standard Scottish English and Irish English, as well as having developed its own lexis.

This sharp division in social class is also reflected in Glaswegians' language and social attitudes (e.g. Macaulay 1977). Working class Glaswegians use a particular set of sociolinguistic variables. For example, Stuart-Smith et al. (2007) find that working class Glaswegians tend to use non-standard variants (in this study, TH-elision [h]*ink* for *think* and TH-fronting [f]*ink* for *think*) in their speech. Using these non-standard variants is part of their identity; working class Glaswegians can index their background and nonconformity to 'the establishment' and to distinguish themselves from those deemed 'posh' or as part of 'the establishment.'

Glasgow was selected as the linguistic context for this study for several reasons. First, we do not know how click pattern in a single variety of English, and Glaswegian speech was thought to be the most accessible for a study based at the University of Glasgow. There is also a large amount of sociolinguistic work that illustrates language in Glasgow is highly stratified by age, gender, and class (Section 2.6 in Chapter 2), (e.g. Macaulay 1977; Stuart-Smith 1999b; Macaulay 2005; Stuart-Smith, Timmins and Tweedie 2007, etc.). This occurs at all linguistic levels, from phonological variation (e.g. T-glottaling, Stuart-Smith 1999b) to interactional variables (e.g. discourse markers *oh* and *well*, Macaulay 2005). Because social stratification is evidenced throughout language in Glasgow, it is reasonable to expect that clicks in Glasgow will also be stratified by social factors.

Another reason for selecting Glasgow as the linguistic context for this study is that we know Glaswegians click (Moreno 2016) and due to very preliminary indications from Stuart-Smith's (Stuart-Smith 2009) click study, which showed that, in 8 female speakers, the pair of older working class women produced more word search clicks than any other pair of speakers. The more in depth Master's study by Moreno (2016) extended analysis to 9 female speakers across three regional varieties of Scottish English and showed that region and/or style played a role in the click's interactional function.

3.3.2 Social dimensions of the intended sample

One goal was to analyse the patterns of clicks' phonetic form and interactional function across age, gender, and social class. The intended sample of speakers for this study was around 50 speakers split into two age groups: 18-25 and 45-60. These two age groups were meant to be distinct so that two clear cohorts could be seen. This later had to be expanded to 18 years and older (that is, speakers aged 25-45 had to be included as well) due to difficulty accessing participants.

As Glasgow has a history of a linguistic divide between working and middle class speakers (e.g. Macaulay 1977; Stuart-Smith 1999b; Macaulay 2005), it was intended that this dimension be captured in the present study as well. Therefore, I planned to recruit working and middle class speakers for my study.

With regards to gender, I hoped to recruit a stratified sample of men and women for this study, so that the speculated influence of gender on click form and function could be further analysed (Ogden 2013).

3.3.3 Participant access

The method used to access participants for this study is known as convenience sampling (Battaglia and Lavrakas 2013). This method is based on how 'easy' it is to get someone to participate, specifically using routes readily available to the researcher such as e-mail lists, word-of-mouth, and flyers. This method of sampling is common in sociolinguistic linguistic studies, especially where there are both funding and time constraints; it is not always possible to get a "representative" sample. Note that by accessing participants in this way, the resulting sample was dependent on who is likely to respond to such means of advertising, and, to a certain extent, the people I am acquainted with (see Section 3.4.1).

To access participants, I advertised by posting flyers throughout areas of Glasgow; on the street and in shops, cafés, libraries, notice boards, and municipal buildings. I also posted flyers on notice boards at the University of Glasgow. I also gave short presentations before large lectures held in several buildings at the University of Glasgow, after which I passed around a sign-up sheet for parties to note their interest. I e-mailed organisers for larger email servers (e.g. JISC mail, the University of Strathclyde, Glasgow Caledonian University), some of whom disseminated my call for participants throughout their respective institutions.

I reached out to acquaintances who might have known any Glaswegians who fit the criteria of my sample. I also approached the staff members (e.g. janitors, lecturers, administrative staff) working at the University to access older speakers; however, this did not result in any participants. Many of the older participants in my data were recruited due to one participant who allowed me to go into her place of work and record her colleagues in a spare room provided by the Royal National Institute of Blind People's radio station in Glasgow.

3.4 Sample

A total of 50 participants were recorded in 25 self-selected pairs of the same gender. The age difference between pairs was no more than six years apart in all cases except one: M-33-19A and M-41-19B. Note that speaker coding reflects gender ('M' or 'F'), followed by age at time of recording, and conversational pair. So, M-33-19A refers to a male participant, aged 33 who is part of conversation 19, while his co-participant in the same conversation, M-41-19B, is a male aged 41.

Speakers were aged 17 to 60 (mean age=31.6). All participants were given consent

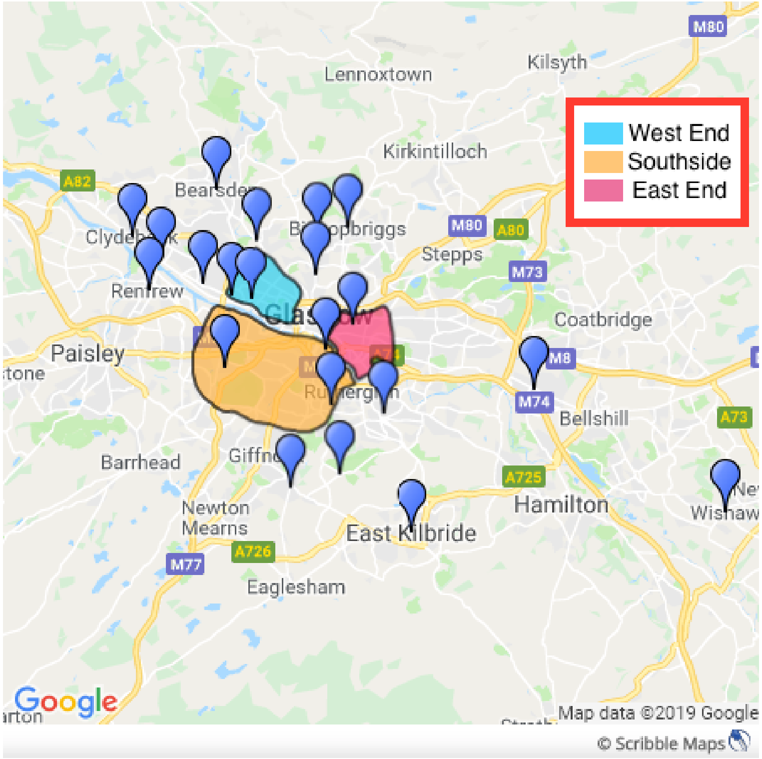

Figure 3.1: Reported participant origins (map made via Scribble)

forms and demographics questionnaires in which they reported their age, gender, ethnicity, where they were from, where their parents were from, their highest educational qualification, their parents' highest qualification, and if they had ever lived outside Glasgow and if so, how long. Questions about where participants came from were meant to shed light on socioeconomic background as highlighted in Section 3.4.1, but some speakers only wrote down areas or left half of the questionnaire blank.

All participants identified as male or female. In the call for participants, I required speakers to be aged 18 and over, but one participant wrote in the questionnaire that she was 17 after the recording occurred. As this is in accordance with data protection laws in Scotland, the recording was kept.

Participants were from Glasgow or the Greater Glasgow area, reporting themselves as being simply from Glasgow or with the specific neighbourhood in Glasgow from which they came (e.g. Hyndland, East Kilbride, Easterhouse) or the area (e.g. Southside, West End, East End). Figure 3.1 shows the spread of participants' origins across Glasgow, with the furthest participants having grown up in Wishaw, North Lanarkshire (around 18.5 miles south-east of Glasgow) and East Kilbride, South Lanarkshire (18 miles south of Glasgow).

3.4.1 Participants and social class

While there is little evidence to suggest social class might affect click production (e.g. Stuart-Smith 2009), there is overwhelming evidence for social class affecting language on phonological and discourse levels in Glasgow (e.g. Macaulay 1977; Pride and Macaulay 1979; Macaulay 2005). For this reason, social class was initially considered by the present study, though I was ultimately unable to include social class in the analysis.

Social class has been historically determined by a combination of features including education, occupation, income (e.g. Labov 1963; Labov 1972), geographical area (Trudgill 1997), or all of these factors (Ash 2013). At first, I intended to ask participants to self-report class on the demographics questionnaire. However, the Research Ethics committee judged "social class" to be too sensitive a topic. It was therefore intended that social class be measured through a combination of answers from the demographics relating to education level, geographical origin, and parents' education levels and geographical origins. However, many participants left these spaces blank or answered too broadly (e.g. saying 'Glasgow' for origin or not knowing the answer for parents' education level). The only consistent answers from the questionnaires were those relating to participant education level. This information is displayed in Table 3.2. The scale for this table is in accordance with the Scottish Credit and Qualifications Framework (SCQF).

Table 3.2: Distribution of participants across SCQF education levels

SCQF Level	Education completed	N
SCQF 6	Highers	2
SCQF 7	Advanced Highers/Higher National Certificate (HNC)	5
SCQF 7	(Advanced) Highers/HNC and some college	2
SCQF 8	Higher National Diploma (HND)	3
SCQF 8	(Advanced) Highers/HNC and some University	11
SCQF 9	Ordinary Degree (3 years)	6
SCQF 10	Honours Degree (4 years)	6
SCQF 11	Master's/Postgraduate Certificate	8
SCQF 11	Master's and some Ph.D. study	3
SCQF 12	Ph.D.	2
n/a	unknown	2

Ash (2013:351) described social class as being comprised of two central components:

> (i) the objective, economic measures of property ownership and the power and control it confers on its possessor, and
> (ii) the subjective measures of prestige, reputation, and status.

Objective measures refer to income, occupation, and education level. Subjective measures here refer to how others perceive the person's social status. With only information relating to education level, this study falls short of being able to determine social class for these speakers. In this study, education level is also often entirely aligned with certain age groups; participants under the age of 21 are not likely to have completed a postgraduate degree or indeed their first degree, though they might intend to pursue postgraduate study in future. Through the categories of analysis, however, those speakers would be considered as belonging to a cohort of comparatively "lower class" than those SCQF rank 9 or higher, which is not necessarily accurate. Unfortunately, this results in the exclusion of social class as a social factor for this study. Social factors analysed here are gender and age, for which there are consistent responses in the questionnaire.

Note, in future it would still possible to derive social class information from the above class-related features, but the questions in the demographics questionnaire would have to be extremely so as to get the most accurate information, and participants would need to be reminded to fill out both sides of the questionnaire when beginning to fill it out.

3.4.2 Participants' gender and age

Table 3.3: Distribution of speakers across gender and age groups

	Older (26-60)	Younger (17-25)	Total n
Male	15	7	22
Female	12	16	28

Two social factors are analysed in this study: gender and age. Table 3.3 shows the distribution of speakers across gender and age groups.

Age is divided into younger and older age groups. Major anatomical/physiological differences between age groups are not expected, as the vocal tract is typically fully developed by age 18 (Mugitani and Hiroya 2012).

3.5 Recordings

There were three recording locations for this study, but audio and video filming equipment remained the same across the three environments. This section discusses the equipment and recording settings for this study.

3.5.1 Equipment

All recordings were made using a LEGRIA HF G25 high-definition camcorder, which has a built-in preamplifier, together with a Class 10 64-gigabyte SanDisk Extreme PRO SDXC Memory Card. A Sennheiser MKH 8040 microphone, placed in between speakers, was also used to record audio in addition to the built-in microphone on the camcorder.

3.5.2 Set-up

Figure 3.2: Participants M-28-17A (left) and M-26-17B (right) in the University of Glasgow's sound studio

Audio and video recordings took place at three locations due to space availability constraints. The first three pairs were recorded at a professional studio at the University of Glasgow Southpark House Learning Enhancement and Academic Development Services (LEADS) with the help of their Learning Materials and Development Coordinator, Nigel Hutchins.

Due to difficulty in requesting the studio at Southpark House, data collection moved to a speech studio in the English Language building at the University of Glasgow. Finally, due to difficulty in accessing participants, the final five pairs were recorded during a break at their place of work in an unused conference room allotted to me by the Royal National Institute of Blind People (RNIB) Connect radio station.

The bulk of the recordings took place in a studio at the University of Glasgow English Language and Linguistics department, shown in Figure 3.2. The set-up was made as comfortable as possible to elicit natural speech. The participants sat in sofa chairs partially facing the camera and also angled towards each other to create a natural environment for them to speak to each other without a focus on the camera equipment.

3.5.3 Elicitation techniques

When recording, participants were asked to talk about things or events that frustrated them. This could be anything from daily annoyances (e.g. losing one's keys) to one-time occurrences (e.g. a major snowstorm that resulted in their being stranded). The reason for the topic of daily annoyances was twofold: (1) to constrain the kind of talk in interaction as CA studies argue that different interactions have different phonetic properties, and (2) to give participants a topic to elicit continuous speech. It is not uncommon to have conversational speech as a speech elicitation technique and similar techniques in speech elicitation have been used in sociolinguistics to yield large amounts of naturalistic of speech (see e.g. Labov 2001), and in sociolinguistic interviews one can elicit more natural speech by encouraging participants to begin longer narratives (e.g. in Smith 2000).

A series of prompts were created to avoid any long stretches of time where participants did not speak. Prompts were made up of topics that people typically find annoying (c.f. The Telegraph 2009; Evans 2007; Reynolds 2017). Example prompts are 'When someone jumps the queue' and 'flying with RyanAir.' These were offered upon request, with participants also given an option to talk about politically relevant topics if they wished. As mentioned in Section 3.2.5, I was present during all recordings except for one. When present, I could help speakers with prompts if they were struggling to come up with topics to talk about. I could also ensure that both participants produced about the same amount of speech material for analysis. I occasionally spoke to make participants feel more comfortable and less like they were being observed, and often had to answer questions directed to me in order to ensure the conversation continued. Other than my occasional participation, speakers were mostly left to themselves to discuss their frustrations or tell stories. The distribution of these speakers was presented at the end of Section 3.2.5.

3.6 Data processing and transcription protocol

Data was transcribed according to phonetic and CA conventions, outlined in this section. Audio and video data were imported from a memory card and uploaded to two password protected external hard drives and OneDrive, an online data storage facility offered by the University of Glasgow. Audio data was extracted from video data using VLC player and converted to WAV files with Audacity. Using Praat, clicks were segmented and coded from the WAV file to TextGrids.

Primarily audio data was used in coding and analysis. However, video data was used for two purposes: (1) to aid in identifying place of articulation if the coder was unsure and (2) classifying the interactional function, following Ogden's (2013) formula of [click] + [response token], where a response token could be a gesture or facial expression. It should be noted that this rarely occurred, and that stance-displaying token were later recategorised into "assessments" and so the exact stance being displayed was therefore made irrelevant.

Both phonetic and CA detail were coded in Praat. The coding protocol for this study has a hierarchical structure; phonetic and interactional detail were sometimes transcribed more narrowly before being placed in broader categories for analysis. This structure is outlined in Tables 3.4 with regards to phonetic transcription and 3.5 with regards to action-based transcription and sequential analysis within the relevant sections. The criteria for this coding are discussed in more detail below.

3.6.1 Calculating click rate and transcribing turns

Both overall and individual click rate were calculated for the present study, to compare these results to previous studies (Gold, French and Harrison 2013; Ogden 2013; Moreno 2016; Trouvain and Malisz 2016; Pillion 2018). First, the to compare both overall click rate (clicks produced per minute) across studies, I divided the total number of clicks found in the data by the total recording time in minutes.

Then, to get a more precise measure of individual click rate (i.e. production of clicks per minute), I segmented speaker turns to calculate the amount of time each individual spoke. The duration of each segmented turn was then added together and extracted with a Praat script. The number of clicks each speaker produced was then divided by the total number of minutes they spoke, so that these click rates were comparable across speakers.

3.6.2 Phonetic transcription

Clicks were identified impressionistically via an auditory-then-acoustic method. Ladefoged and Traill (1984) first identified phonemic clicks' place of articulation auditorily and then analysed clicks acoustically using spectrograms and waveforms. Sands et al. (1996) also identified clicks and place of articulation auditorily before performing both articulatory and acoustic analysis on phonetic structures of Hadza. A similar auditory-then-acoustic approach has been used for clicks in English in Wright (2005; 2011) and Trouvain and Malisz (2016).

Following this approach, this section outlines both auditory and acoustic analysis of clicks carried out in this study. Then, the way phonetic accompaniments were identified is presented with examples from the data. Phonetic coding is shown in Table 3.4, which illustrates the hierarchical structure of phonetic transcription described in the sections below.

Table 3.4: Outline of phonetic coding protocol

Feature	**Broad**	**Detailed**	**Reference**
Click	Click		Wright 2011; Ogden 2013
	Percussive	n/a	
	Lipsmack		
	Unsure		
	No click (for word search sequences without clicks only)		
Number of clicks	Single	n/a	Ogden 2013
	Double		
	Multiple		
Place of articulation	Labial	Bilabial	Wright 2011; Ogden 2013; original coding
		Lip separation followed by dental/alveolar click	
		Labiodental	
		Bilabial-dental coarticulated	
	Coronal	Dental	
		Dento-alveolar	
		Alveolar	
	Other	Palatal	
		Alveolar-lateral	
	Unsure		
Phonetic Accompaniments	Inbreath/no inbreath		Wright 2011; Ogden 2013
	Nasal/non-nasal		
	Creaky/non-creaky		
	Particle/no particle		
	Pause/no pause		
Particle	Name of particle (*uh*,*um*)		Ogden 2018a

3.6.2.1 Identifying clicks

Similarly to Ladefoged and Traill (1984), Wright (2005), and Trouvain and Malisz (2016), clicks were first identified auditorily. To aid in classifying place of articulation, I used video data to confirm a click was made and not another noise (e.g. snapping fingers, tapping feet, crushing a plastic cup). All clicks, percussives, and lipsmacks were identified and segmented. If I was unsure of a sound being a click, it was coded as 'unsure.' If a click was identified, it was coded as a single, double, or multiple (three or more).

Percussives are distinct from clicks because they are said to be the inadvertent separation of the articulators (e.g. Ogden 2013). This implies that clicks are made with a deliberate purpose while percussives are not. The author recognises that intent can be extremely challenging to identify. For clarity, percussives and lipsmacks were identified by their lower amplitude and often multiple bursts. Percussives were recognised by occurring usually as a sound resulting from a participant opening his or her mouth, often a lip separation followed by a small vegetative noise which barely appeared on a spectrogram. Clicks, in juxtaposition, were much clearer and more audible. For the present study, percussives were not used in analysis.

Clicks were acoustically segmented from the nearest zero-crossing on the waveform before the beginning of the first burst. The click burst refers to the release of a velaric ingressive stop. The end of the click interval was placed where the release noise was no longer apparent on the spectrogram and waveform. An example of segmentation of a bilabial-dental coarticulated click can be seen in Figure 3.3, while Figure 3.4 illustrates segmentation for a dentally articulated click from the same speaker (F-18-1B). Note all spectrograms reproduced in this thesis use the default display range of 0 - 5000 Hz.

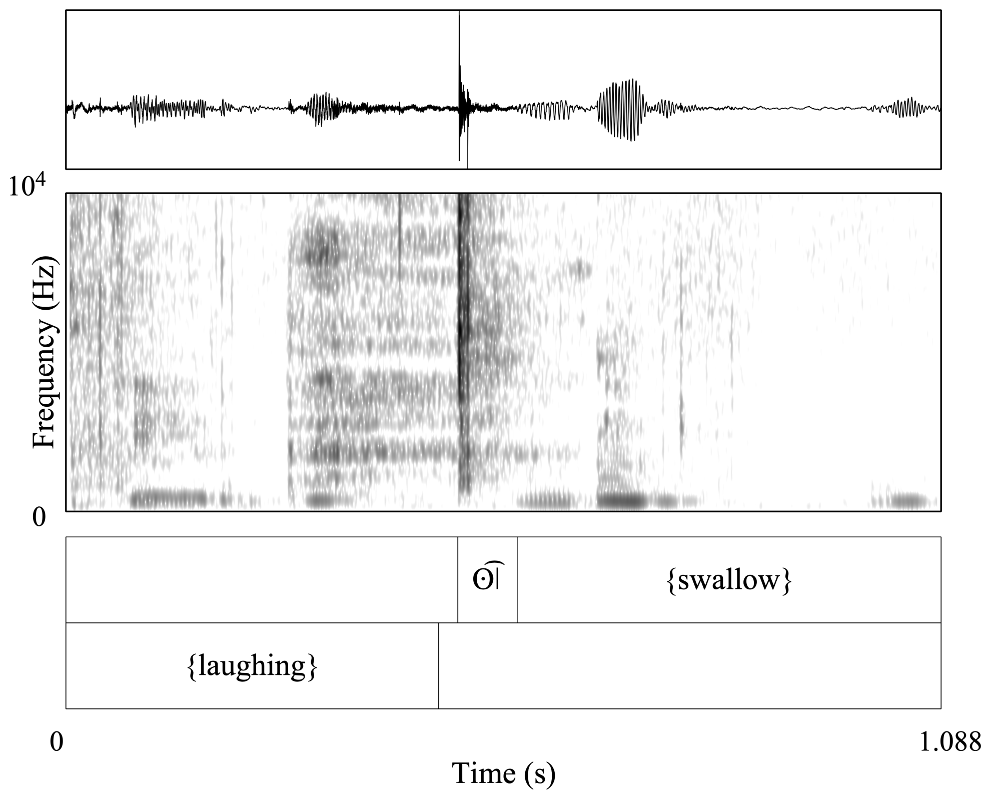

Figure 3.3: Example of segmentation of a bilabial-dental coarticulated click from F-18-1B (top tier) while speaking with F-17-1A (bottom tier)

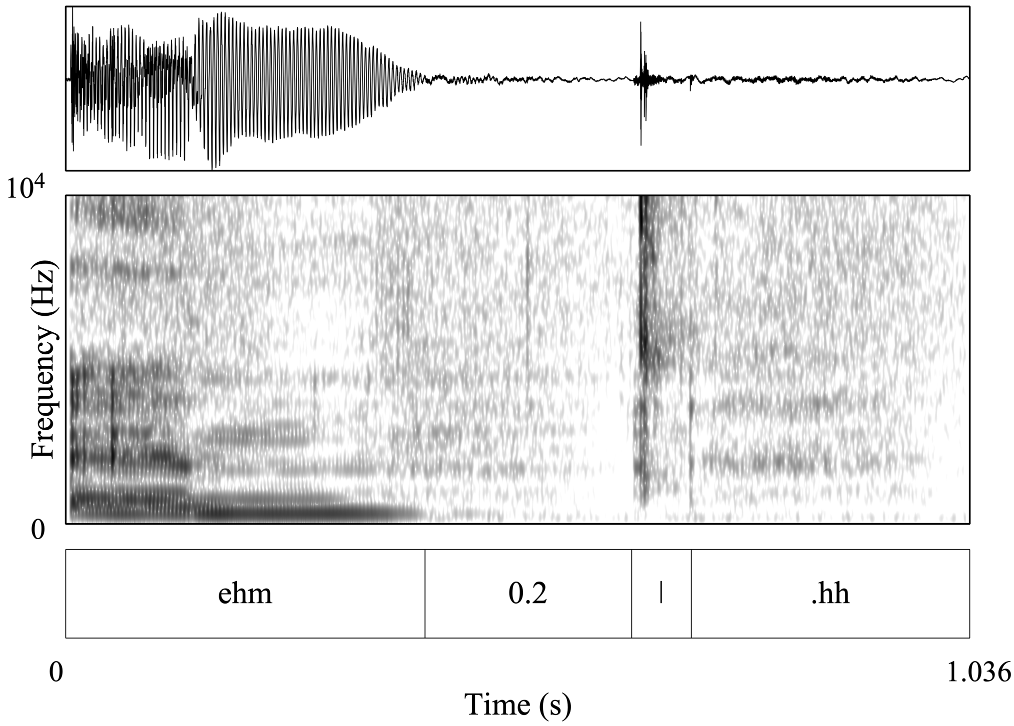

Figure 3.4: Example of segmentation of dental click from F-18-1B

Note the author is the sole annotator for the present study, due to time and financial constraints. Given what previous studies show of the number of percussives to clicks (e.g. Wright 2011; Ogden 2013; Pillion 2018, it seems that there would be a high agreement between multiple annotators for classifying clicks and percussives, but this remains open to future study.

3.6.2.2 Acoustic measures of clicks

Click duration was measured from the start of the burst to the end of the release noise using the boundaries described above. Centre of Gravity (COG) was extracted by a script in Praat (Boersma and Weenink 2010, see Appendix E). The script extracted the click segment, performing both low and high-pass Hann band filtering so that all sound with frequency lower than 450 Hz and higher than 12000 Hz was removed from the data. A spectral slice was taken from 100-millisecond Hamming window centred on the first click boundary, i.e. the first burst of the click. COG was measured from this spectral slice. More about different methods of filtering and analysis windows can be found in Johnson (2011:20) or the Praat online manual (accessed via http://www.fon.hum.uva.nl/praat/manual/Advanced_spectrogram_settings___.html).

3.6.2.3 Coding click place of articulation

Coding for place of articulation of the click was first done for fine-grained articulation (e.g. dental), after which clicks were placed into broader articulatory categories (e.g. coronal). As in Wright (2005; 2011), place of articulation of the click was judged auditorily and separated into bilabial, bilabial-dental coarticulated (i.e. a dental click with simultaneous bilabial release), labiodental, audible lip separation followed by either dental or alveolar articulation, dental, dento-alveolar, alveolar, palatal, and lateral.

Determining the place of articulation for each click was sometimes difficult. Clicks with coronal articulation (dental, dento-alveolar, and alveolar) were especially difficult to distinguish auditorily. Additionally, bilabial-dental coarticulated clicks (the dental clicks with simultaneous bilabial release) sounded similar to dental clicks and would have been indistinguishable had video data not been available. Examples of segmented bilabial-dental coarticulated and dental clicks are shown in Figures 3.3 and 3.4.

For statistical analysis, clicks were later placed in broader articulation categories. All places involving labial articulation (i.e. bilabial, bilabial-dental coarticulated, labiodental, lip separation followed by dento-alveolar clicks) were categorised as 'labial.' All dental, dento-alveolar, and alveolar clicks were categorised as 'coronal.' Palatal and lateral clicks were placed in an 'other' category. Clicks' place of articulation according to both narrow and broader categories are shown in Table 3.4.

If I could not auditorily discern place of articulation, I also looked to the video recording for reference. This only helped in some cases (e.g. where bilabial-dental coarticulated clicks sounded dental but the video revealed lip involvement). When analysing clicks, it was sometimes very difficult to determine place of articulation. On occasion, click segments had to be replayed more than 50 times, video data had to be reviewed again and again. If, after viewing the video, I was still not certain of place of articulation, the place of articulation were coded as 'unsure.' Having multiple annotators would have been beneficial here as well as for classifying percussives versus clicks, as it is possible that auditorily identifying clicks is more or less challenging for other annotators. However, given the spectral frequency results (see Chapter 4 Section 4.4.3) and how auditorily identified place of articulation seems to roughly represent spectral categories, the auditory classification of place of articulation seems far from arbitrary.

3.6.2.4 Phonetic accompaniments

Clicks can occur with phonetic accompaniments, identified by Wright (2005) and Ogden (2013). These include nasality, creaky voice, audible inbreaths, and, in word search sequences, pauses. All clicks were coded for the presence/absence of these accompaniments. Additionally, one goal of the study was to examine word search clicks and compare them with clicks in other interactional functions; and to observe how word searches were performed with and without clicks. Therefore, word searches (Section 3.6.3.2) without clicks were also coded for whether they contained the same set of phonetic accompaniments, in order to compare word searches with and without clicks. Coding for these phonetic accompaniments is described below.

Nasality Whether a click can be produced alongside nasal speech material (specifically, alongside a nasal particle) has also been discussed in previous studies (e.g. Wright 2005; Ogden 2013). Ladefoged and Traill (1994) identified velar nasals coarticulated with phonemic clicks in !Xóõ auditory and confirmed this via spectrogram by looking for low F1 and F2 values closer to vowel F3 values, characteristic of nasal consonants (e.g. Ladefoged and Traill 1994). In this study, spectrograms were not useful for identifying co-occuring nasal speech in this study because interactional clicks are often isolated and do not occur coarticulated with speech. Therefore, clicks were judged auditorily (e.g. Wright 2005; Ogden 2013) and coded as **nasal** or **non-nasal**.

Audible inbreath Wright (2011) Ogden (2013), and Trouvain and Malisz (2016) make a distinction between all inbreaths and audible inbreaths. An audible inbreath is an inhalation noise *made audible* for the listener and serves a communicative purpose, e.g. to show a speaker is preparing to speak. Since this study focuses on identifying audible inbreaths, inbreath was identified auditorily. Clicks were therefore coded as co-occurring **with an audible inbreath** or **without an audible inbreath**.

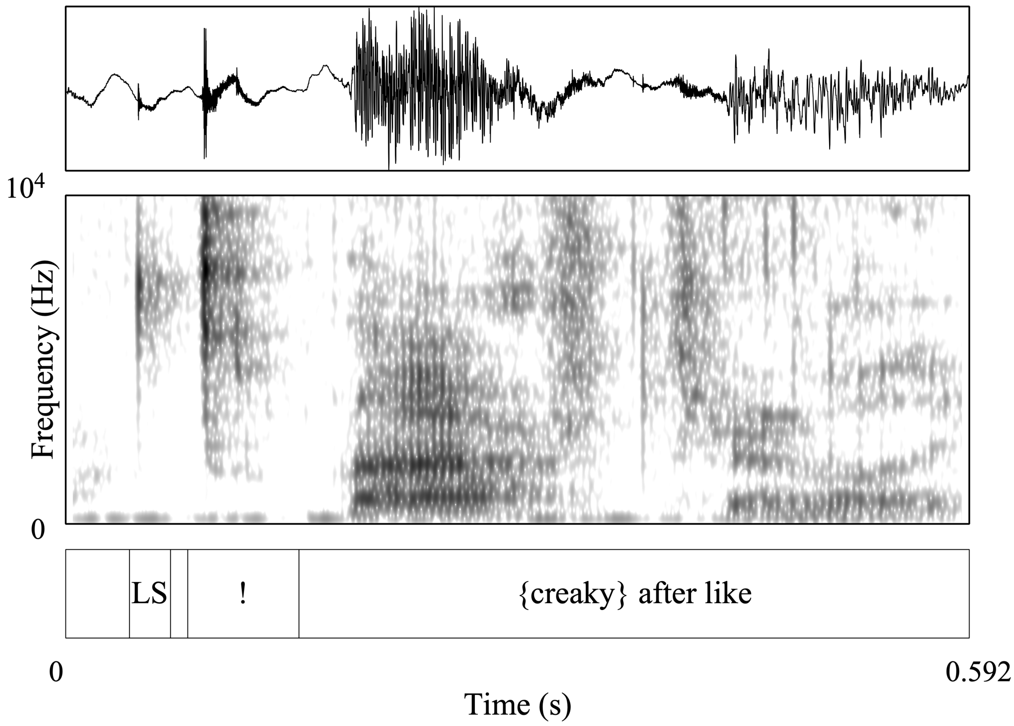

Figure 3.5: Spectrogram and TextGrid of alveolar followed by creak. Context: F-25-10B: *And then we went to bed and Joy was in the backroom which is where I usually sleep when I stay over Eilidh's I stay over a lot* {swallow} {lip separation} [!] *after like nights out or whatever*

Creaky voice Where there was collocated speech material (e.g. vowels, particles, or words), creak was identified auditorily (e.g. Wright 2005; Ogden 2013). Once creak was thought to have been heard, it was confirmed using the spectrogram (see example in Figure 3.5). Henton (1986) notes that glottal pulses in creaky voice are auditorily identifiable and visual evidence of glottal pulses along with a low F0 are characteristic of creaky voice. All clicks where audible creak was identified in the preceding or following collocated word and spectrograms reflected glottal pulses and low F0 were coded as **creaky**. If creak was not auditorily identifiable or these spectrographic correlates were not present, the click was judged as **not creaky**.

Particle Particles here describe fillers or hesitation words. Particles like *uh* and *um* are known collocates of both clicks and word search sequences with and without a click (Wright 2011; Ogden 2013; Schegloff, Jefferson and Sacks 1977; Brouwer 2003; Trouvain and Malisz 2016). All clicks and word search sequences were coded for the presence of a particle (**particle** or **no particle**) as well as an orthographic transcription of the particle itself such as *ehm*, *eh(r)*,*mmm*, *mmm-mm*, *ugh*, *uh-huh*, *aw*, *ah*, *oh(r)*, *uh*, *um*, and all other variants found. Fragment 3.6.1 shows a particle during a word search without a click in line 4.

Fragment 3.6.1: *Nam Tuk?* M-26-17B producing particle *eh* and a 0.8 second pause in a word search without a click

1	**M-26-17B**:	em we got it from:: (.)
2		what's the other place called i cannae remember
3		(0.8)
4		eh
5		(0.8)
6		Nam Tuk? (0.3) just down the road
7		down the bottom of the road

Pause Each word search and click was coded for a pause (either **pause** or **no pause**). Pauses were defined as silence after cut-off syntax (i.e. an incomplete phrase such as *And then there was*–) more than 0.3 seconds in duration without any fillers (e.g. particle or audible inbreath). This was based on research showing that word search sequences often contain pauses mid-sentence (e.g. Brouwer 2003). An example of two pauses is shown in Fragment 3.6.1 in lines 3 and 5 in the middle of this word search sequence.

3.6.3 Conversation Analysis transcription of actions, sequential analysis, and position in turn

In order to understand the interactional function of clicks as well as how their phonetic form varies across interactional context, this thesis draws heavily on methodologies from Conversation Analysis. CA was used to categorise actions performed by clicks, determine clicks' position in turn, analyse speech sequentially (especially important for New Sequence Indexing and incipient speakership clicks), and identify word search sequences. Much of this transcription protocol used here and shown in Table 3.5, was developed from Ogden's coding scheme for clicks (Ogden 2018a). This coding is discussed in the sections below.

3.6.3.1 Click-performing actions

Clicks occur in the service of many different social actions in these data (see Chapter 2, Section 2.4.3). Actions were determined using the methods described in Chapter 2; a set of criteria was created in order to determine what action was being performed. Sometimes, judgements of new click functions were identified. Clicks that did not fall under one of these categories were marked as 'other,' and those whose functions could not be identified were marked as 'unsure.' Much of the coding here is hierarchical, e.g. analysis began with more detailed coding which was later subsumed under a broader category. Both detailed and broader categories are outlined in Table 3.5.

After Ogden (2016), clicks' interactional functions are divided into two categories: sequence-managing functions (e.g. indexing a new sequence, marking incipient speakership etc.) and affect-laden functions (e.g. stance-display and assessments).

Table 3.5: Outline of CA coding protocol for clicks

	Broad	Detailed	Reference
Interactional function: Sequence-managing	New sequence indexing	NSI	Ogden 2018a
		New event	
		List item	
		Story launch	
	Post-completion comment		
	Marking incipient speakership	Incipient speakership	
		quotative	
		Within quoted speech	
	Listener responses		
	Word search		
	Collusion		
Interactional function: Affect-laden	Assessments	Assessment of third party	
		Complaint of third party	
		Compliment to recipient	
	Sympathy		
	Agreement		
	Disagreement		
	Other		
	Unsure		
Sequential analysis	First pair part		Ogden 2018a
	Second pair part		
	Third position		
	Side sequence		
	Longer turn		
	Continuation of prior turn		
	Other		
	Unsure		
Following material	Inbreath		Ogden 2013, Original Coding
	Pause		
	Particle		
	Repetition		
	Continued turn		
	Searched-for item		
	Overt indicator		
	Metalinguistic material		
	Response		
	Recipient expertise referral		

3.6.3.2 Identifying word search sequences

An important focus of this study is comparing clicks used in a single interactional function to clicks performing other interactional functions. Then I observe how the same interactional function varies with and without clicks according to linguistic and social factors. For this purpose, word search sequences were isolated and analysed. The interactional function of word search was chosen because it was previously found to be the second most frequent interactional function of clicks by Wright (2005), coming after only new sequence-indexing clicks, which Wright systematically investigates in her 2011 paper. Word searches were also found frequently by Ogden (2013) and Moreno (2016). Word searches are well researched in CA, and there is a lot of CA work which categorises the phonetic form and structure of word search (e.g. Schegloff, Jefferson and Sacks 1977; Goodwin and Goodwin 1986; Oelschlaeger and Damico 2003; Brouwer 2003; Wright 2005). The fact that word search is well-researched in CA allows the present study to identify word search more easily, and thus compare how clicks pattern across interactional function and within one interactional function. Word search sequences were characterised in line with CA literature outlined in Chapter 2 (c.f. Schegloff, Jefferson and Sacks 1977; Goodwin and Goodwin 1986; Brouwer 2003). Verbal clues used to identify word searches included cut-off syntax (e.g. *And it was –*), pauses, repetitions of sounds or words, particles (e.g. *uh* and *um*), elongated sounds (e.g. *eh:::*) and creaky phonation. These verbal clues of word searches are also discussed in Wright (2005), who analysed word search sequences containing clicks. Word searches with clicks are characterised as having a 'pre word search stretch', 'word search stretch' and 'post-word search stretch' (see Chapter 2, Section 2.4.4). Word search sequences in this thesis are equivalent to the word search stretch coined by Wright. Wright (2005) does not discuss phonetic accompaniments occurring in conjunction with word search clicks other than particles and audible inbreaths, which arise from particular fragments discussed in her work.

Fragment 3.6.2 shows an example of a word search sequence. The pre word search stretch is shown in yellow, with cut-off syntax leading to the word-finding trouble ("and one of those", line 2). The word search stretch (in red) is initiated by a particle which is followed by a dental click collocated with an audible inbreath in line 3.

Fragment 3.6.2: *Fluorescent lights* M-24-21B produces a dental word search click followed by an overt reference to word-finding trouble

1 **M-24-21B**: Oh my god it's mental (.) there's like broken glass
2 everywhere and broken mirrors and one of those
3 big ehm [||] .hh what dyou call them like the the
4 lights ehm
5 **M-22-21A**: Fluorescent lights
6 **M-24-21B**: Yeah yeah yeah those fluorescent lights one of those
7 big long tubes just smashed in half

When transcribing, word search was considered distinct from hesitation, in order to exclude cases of extended speech preparation. CA work implements the Next Turn Proof Procedure (Hutchby and Wooffitt 1998) to categorise interactional functions. Using this procedure, determining an interactional function is made meaningful by the following utterance. For this reason, only word searches which contained overt indicators of the trouble with finding a word (e.g. *I don't know*), referred to recipient expertise (*What was it again?* e.g. when asking if the word they're using is correct), the recipient offering a resolution, metalinguistic material (*I'm losing my train of thought*) or the searched-for item were marked as word search in this thesis.

Identifying material following a click Because of the observational impression that clicks might be functioning multiple ways in word search (e.g. a floor-holding, or holding speaker's turn, word search click versus a click indicative that the searched-for item has been found), drawing from Ogden's (2018) coding protocol, I also coded for what directly followed a word search click. Because of the Next Turn Proof Procedure, it would have been possible to analyse clicks and their following material and categorise their specific role within word search sequences this way. Clicks were followed by audible inbreaths, pauses longer than 0.3 seconds, a particle, laughter, the continuation of a turn, word search resolution evidence (e.g. over indicators, recipient response, recipient expertise referrals, metalinguistic material), or repetition. Note that the phonetic accompaniments mentioned in Section 3.6.2.4 were coded separately from this information.

By coding for this information, I intended to illuminate the role of clicks in word search. Due to time constraints, I was unable to use the material following clicks to categorise click functions within word search, and this information is excluded from this thesis.

3.6.3.3 Other sequence-managing functions of clicks

Sequence-managing functions are those that aid in turn-taking or managing sequences of talk in interaction (e.g. NSI and marking incipient speakership). These functions were identified according to CA literature (Schegloff 1982; Goodwin and Heritage 1990; Psathas 1995; Hutchby and Wooffitt 1998; Have 1999; Sidnell 2015; Clift 2016; Couper-Kuhlen and Selting 2017) and are laid out below.

New Sequence Indexing (NSI) These appear at the closing down of one sequence of talk and before the beginning of the next sequence of talk (Wright 2005). They are high amplitude, often occur alongside particles such as *uh* or *um*, and can follow standard sequence-closing devices such as assessments, agreement tokens, and closing tokens. NSI clicks are also followed by features indicative of a new sequence such as pitch resets, or lexical items, e.g. “Another” in Fragment 3.6.3.

Fragment 3.6.3: *Another thing*: M-55-25A producing an NSI click

1	**M-54-25B**:	He moved house
2	**M-55-25A**:	(laughing) Is that right?
3	**M-54-25B**:	So aye (.) But yeah (.)
4	**M-55-25A**:	Aye [ʘ‖] .hh Another thing and it really annoys me
5		is this new thing on motorways

New Event These were clicks used to delimit events in a story, much like indexing new sequences. See Fragment 3.6.4, line 9 for reference. These clicks are also characterised by audible inbreaths and a natural separation in events throughout a story. They were later subsumed under NSI clicks for their similarity and because phases of a story could be considered sequences (Mandelbaum 2012).

Fragment 3.6.4: *Serving story*: F-17-1A producing a New Event click

F-18-1B: Well you worked in
F-17-1A: I did I
[was a waitress
F-18-1B: [a restaurant before]
so
F-17-1A: You've heard this story and you'll get it again because
[||].hh I was really busy and uh I'm gonntae (.) I was
really busy and there was lots of tables and I had
taken a drinks order and that was fine (.) I'd written
it down I went to go and get it from the bar I was serving it
to this table [ʘ||] .hh and the guy behind me starts clicking
(snapping fingers) and he's like (snapping finger) I'm like scuse me?

List-item demarcation Like those used to separate events in a story, clicks used to separate items in a list were initially coded as being a different function to NSI clicks. However, there proved to be so few of these clicks that they were later subsumed under NSI clicks.

Beginning a story When speakers produced clicks to initiate a storytelling sequence, clicks were marked as having a 'story launching' function. This function was later included in NSI clicks (see Table 3.5) since storytelling can be considered a larger sequence (e.g. Mandelbaum 2012). An example of this is in Fragment 3.6.4 in line 7. Note how the story is initiated by a dental click followed by an audible inbreath and preceded by a signal that a story is coming (line 6: 'You've heard this story and you'll get it again because–').

Post-completion comment Ogden (2013) noted that clicks could occur in post-completion comments. These clicks occurred at the breakdown of a sequence in conjunction with sequence-closing devices like assessments, agreement tokens, closing tokens, and idiomatic expressions. However, unlike NSI clicks, they are part of the end of those sequences, rather than at the beginning of the following one. In Fragment 3.6.5, F-41-14B finishes a story about how she would correct people's grammar in school by summarising the main point ("But that's why I got highly bullied as a child//because I kept correcting people's grammar", line 1-2). This is followed by a click-initiated post completion comment; "so that was my education" in line 3.

Fragment 3.6.5: F-41-14B produces a click during a post completion comment after telling a story about correcting grammar in school

1	**F-41-14B**:	But that's why I got highly bullied as a child
2		because I kept correcting people's grammar
3		[||] so that was my
4		ed[ucation
5	**F-36-14A**:	[Yeah that that] went down well
6	**F-41-14B**:	oh yeah my social life just
7		[went right out the window
8	**F-36-14A**:	[so this is how we learn]
9	**F-41-14B**:	I'm sorry I'm a musician {high pitch}
10		plus I'm a grammar nerd

Marking incipient speakership Incipient speakership (IS) clicks mark the shift from one speaker to another. They usually indicate that the beginning of the speaker's turn is coming, though they are not always followed by talk. IS clicks are often accompanied by an audible inbreath and occur at a transition relevant place or TRP. This is a location in interaction where the speaker is likely to take over the floor (e.g. the interlocutor has paused, trailed off or gotten quieter, or asked a question). For a click to be considered marking incipient speakership, the person producing the click had to continue speaking post-click, and the click had to be recognised as marking incipient speakership by the other speaker (e.g. either by their ceasing speaking or finishing their turn). Some tokens of clicks marking incipient speakership were likely excluded, because clicks were only categorised as marking incipient speakership if they fit the criteria above.

Fragment 3.6.6: *Money under mattresses*: F-52-22A producing an incipient speakership click

1	**F-52-22A**:	they found thousands and thousands under mattresses (.)
2		and I thought that was kind of like an old wives tale
3	**F-55-22B**:	aye aye
4	**F-52-22A**:	but under mattress in drawers behind boilers
5	**F-55-22B**:	under the underwear?
6	**F-52-22A**:	[ʘ||] uh huh uh huh (.)
7		under like the spaces in the wardrobes uh::
8	**F-55-22B**:	aye cause I think years ago
9		[F-52-22A's name] the older generation they didnae
10		believe in the banks and they didnae trust
11		the banks wie their money

Quotative Clicks could also occur before quoted speech. These came after typical quotative phrases such as *and he/she was like*, *she said*, *I'm like that*, and before quoted speech. These were seen as a shift to imagined/reported speaker and thus later placed under the category of marking incipient speakership (IS).

Fragment 3.6.7: *Feeling judged*: M-19-9A producing a quotative IS click

1	**M-19-9B**:	[ǁ] do you feel like they judged you for the way you spoke? (( ))
2	**M-19-9A**	Ooh::: my god aye that was another thing (.)
3		Alex had turned round to me and said ehm [ʘǁ] oh
4		when you meet these guys
5		can you put on a really broad Scottish Glaswegian accent (.)
6		I was like no cause that's not the way I speak

Imitating another person's word search Within quoted speech, occasionally speakers could imitate someone performing a word search as part of the story. These were very much like word search sequences (see Section 3.6.3.2) but occurring within reported speech. This was later included in the category of marking incipient speakership, instead of word searches because these clicks could have been a result of a post-speech preparation return to quoted speech.

Fragment 3.6.8: *Quite suspicious*: M-19-9A producing an imitative word search click

1	**M-19-9A**:	She was there for a long time I got quite suspicious
2		so I went up to see what she's doing and
3		she was un under the couch trying to find the tin right
4		I was like what are you doing and
5		she's like "oh em [ʘǁ] I was just looking for my phone
6		I think it fell under the couch"

Imitating another speaker's assessment Within reported speech speakers could also click to perform an assessment and convey the stance of the person whose speech they were reporting. This was later included in the incipient speakership category, instead of assessments because, like imitative word search sequences, these clicks could have been a result of a post-speech preparation return to quoted speech.

Fragment 3.6.9: *Idiots*: M-19-9A producing an assessment click as someone else

1	**M-19-9A**:	they were like oh what do you study I was like
2		oh I study television production
3		and I'm at college and all that I was like and
4		I felt they were kinda like "[ʘǁ]
5	**M-19-9B**:	sneering right
6	**M-19-9A**:	OH this guy right" (.) that and I felt really intimidated
7		and then like I'd say certain things and all the rest of it and
8		and I'm just of like these are idiots

Repair Clicks also occur during self-repair sequences. Repair was identified through a participant changing speech trajectories, metalinguistic references to a repair (e.g. saying "oops"), or correcting him or herself, sometimes with the help of his/her co-participant. In CA literature (e.g. Schegloff, Jefferson and Sacks 1977), repair is discussed in terms of who initiates the repair (i.e. who indicates that a repair needs to be performed) and who performs the repair.

In Fragment 3.6.10, the two speakers are talking about people littering and not picking up after their dogs in the West End of Glasgow. This is an example of an other-initiated self-repair, meaning the person who performs the self-repair does so because someone else motivates it. M-55-25A produces the utterance which leads to the self-repair ("so aye don't poo"). M-57-25B initiates the repair ("don't p (.) litter", line 2), correcting his co-participant because what he really means is "litter." M-55-25A then takes his co-participant up on his repair-initiation and produces a click followed by the word "litter" to perform the other-initiated self-repair.

Fragment 3.6.10: *Litter*: M-55-25A producing a repair click while complaining about litter

1	**M-55-25A**:	so aye don't poo
2	**M-57-25B**:	don't p (.) litter
3	**M-55-25A**:	[ʘ||] litter
4	**M-57-25B**:	folks throwing their (.) put it like cars (.)
5		cars drivers sittin at traffic lights throwin stuff out the window

Listener responses Clicks could occur as listener responses, or material made by the listener/recipient that does not attempt to take over the floor. Most often here, these were continuers (sometimes referred to as backchannels), as in the example in Fragment 3.6.11.

Fragment 3.6.11: *Really annoying*: F-60-7A producing a backchannel click while F-58-7B laments about an unfocused colleague

1	**F-58-7B**:	Well you know how I feel about that
2	**F-60-7A**:	[||]
3	**F-58-7B**:	recently (.)
4	**F-60-7A**:	mm
5	**F-58-7B**:	I find that really annoying

Collusion Clicks were also coded for being 'collusive.' These were clicks occurring as a place-holder for some sort of inside joke, insider knowledge, or implied meaning for the two speakers. For example, in Fragment 3.6.12, line 9, F-17-1A uses a labiodental click to index some implied meaning about Johnny Depp which is understood between both her and her friend F-18-1B.

Fragment 3.6.12: *Johnny Depp*: F-17-1A producing a labiodental collusive click

F-17-1A: I feel betrayed by Casey Affleck cause he's beautiful
F-18-1B: {laughing}
F-17-1A: and I I remember Ocean's 11 favourite film and I remember
as a child watchin that being like oh my god look at how
beautiful that person is there and then I found out when
that happened and I was like no no I trusted you
F-18-1B: me with Johnny Depp to be honest
F-17-1A: I mean yeah but did you ever trust Johnny Depp
F-18-1B: no not really
F-17-1A: he looks a bit [ʘ̪]
F-18-1B: no not really I didn't really trust him but I was always like
uh he's a cool dude he's played some cool roles

While collusive clicks seem to convey as stance like affect-laden clicks of disapproval, they are different in that they do not follow the pattern of Ogden's (2013) formula for stance-displaying clicks (click + affect-laden response token), and instead seem to replace a lexical unit. For this reason they are considered sequence-managing.

3.6.3.4 Affect-laden functions of clicks

In addition to managing sequences, clicks could have affect-laden functions. This includes assessments and stance-display. Below is the outline of the affect-laden functions found in these data.

Assessments Clicks made in assessments displayed a stance or attitude towards someone or something. The following three categories were considered assessments.

Clicks used as a part of a third party assessment displayed an attitude or stance towards a party not present at the time of recording. This covered a wide range of targets and could be a person, an institution, a group of people, a food, or more. In Fragment 3.6.13 line 2, M-20-2A displays an (negative) attitude towards someone chewing gum, which is taken up by M-20-2B in line 3 "yeah I was I was yeah so I was absolutely hingin as well."

Fragment 3.6.13: *Chewing gum*: M-20-2A producing a click in an assessment of a third party

M-20-2B: And she came up and she was chewing chewing gum
M-20-2A: [ʘ||] ugh::
M-20-2B: yeah I was I was yeah so I was absolutely hingin as well like I was pff
that being like oh my god look at how beautiful that person is there
M-20-2A: [ʘ||] yeah yeah yeah
M-20-2B: like I was absolutely fleeing before and then I got in and I was
just like I can't do this

One click function suggested by Ogden's (2018) coding is a compliment to the recipient. This was marked as a second person assessment. However, there were no clicks in second person assessments present in the data.

Complaints about an absent third party (e.g. mutual acquaintance, an object, an institution) can also contain clicks. For example, in Fragment 3.6.14, the speakers are complaining about a mutual friend who was thrown out of a football game in Glasgow.

Fragment 3.6.14: *Barred*: M-20-2A producing a click in complaint about a friend who was barred from a football game

M-20-2B: He was going around it was a Scotland game
and uh he was being sectarian
M-20-2A: [ʘ||] ah bastard
M-20-2B he was chatting away like (unclear) and then he got barred
and I was like
M-20-2A: Aw f:
M-20-2B fuck you

Sympathy Clicks could be used to display sympathy for the speaker's co-participant. These come after some sort of distressing telling (like the example in Fragment 3.6.15, 'the worst sunburn I had was actually my ear') are usually collocated with sympathy tokens such as *ooh*, *aw*, or *oh dear*.

Fragment 3.6.15: *Suncream*: F-54-22A producing a sympathy click

F-52-22B: and the worst sunburn I had was actually my ear
and obviously must have fallen asleep in the sunbed
F-54-22A: [!] ooh ooh
F-52-22B: obviously I had nae suncream on and burnt my ear.

Agreement/Disagreement Agreement and disagreement can also be made using a click. These are usually collocated with tokens of agreement like *uh-huh*, *mm-mm* or *yep*, though this is not an exhaustive list. An example of display of disagreement containing a click is shown in Fragment 3.6.16 below.

Fragment 3.6.16: *All the credit*: M-19-9B producing a disagreement click

1	**M-19-9A**:	It's like they're tryin to become hipster but its just leave the west
2		end to it like the west end does it best I think
3	**M-19-9B**:	[creaky] uh::::: [ʘ‖] I don't think (.) it's
4		not fair to just give the west end all the credit

3.6.3.5 Sequential analysis

Sequential analysis is one of the central aims of Conversation Analysis (Schegloff, Jefferson and Sacks 1977) as it helps to make sense of actions in conversation. One identifiable set of sequences is the adjacency pair. Adjacency pairs are comprised of two utterances: a first pair part, and a second pair part (e.g. first: *How are you?* and second: *Well, thank you.*).

There is sometimes some acknowledgement from the speaker who produces the first pair part, which is known as being in 'third position' (e.g. first pair part: *How are you?*, second pair part: *Well thank you*, third position: *That's good to hear*, e.g. "aw (.) that's nice" in Fragment 3.6.17, line 4). Speakers could also produce clicks which were first pair part in second pair part position (e.g. first pair part: *How are you?*, first in second pair position: *Why do you ask?*).

All clicks were coded for being part of a first pair part, second pair part, a first pair part in a second slot, in third position, part of a longer turn (e.g. in a list, rant or story), quote (part of quoted speech), a continuation of a prior turn (e.g. if the speaker is interrupted or stops abruptly and gets back to their turn), and in a side-sequence (i.e. a sequence other than an adjacency pair that occurs inside or during another sequence, e.g. a mid-story explanation). This is not an exhaustive list of all sequential locations in interaction, but locations where it is more likely that certain actions will be performed (e.g. incipient speakership and new sequence indexing). Clicks that occurred outside of sequential locations listed above were placed in an 'other' category.

Fragment 3.6.17: *That's nice*: While talking about F-52-22B not having a least favourite food, F-54-22A produces a click in 3rd position

1	**F-52-22B**:	I don't think there's anything (.) I don't know
2	**F-54-22A**	oh is there not?
3	**F-52-22B**:	no
4	**F-54-22A**:	[‖] aw (.) that's nice

3.6.3.6 Position in turn

Clicks were also coded for their position in the speaker's turn. Clicks could be either pre-turn (before the speaker's turn, e.g. a non-quotative incipient speakership click), mid-turn (in the middle of the turn, e.g. a quotative incipient speakership click), post-turn (at the end of the turn, e.g. a post-completion comment), or alone (outside of a turn, e.g. a backchannel, or another click while speaker does not have the floor).

A pre-turn click is shown in Fragment 3.6.17, where a lateral click is produced at the beginning of F-54-22A's turn. In Fragment 3.6.16, M-19-19B produces a click in the middle of his turn. A click at the end of a speaker's turn is shown in Fragment 3.65, where F-41-14B produces a click as a post-completion comment, and indicates her turn is over with a summarising statement (e.g. Mandelbaum 2012), "so that was my education." Finally, a click outside of a speaker's turn can be seen in Fragment 3.6.15, where F-54-22A displays sympathy outside of her turn.

3.7 Analytical challenges

3.7.1 Transcription challenges

When transcribing, I had some occasional difficulty understanding participants. In the first recording, participants were given stuffed toys to make the environment more homely, but having participants play with a stuffed toy with Velcro hands made clicks very difficult to identify. Additionally, in the recordings made in the RNIB radio station, the room was not soundproof, and it was situated outside an office where workers continuously came and went, slamming the door. The room itself was warm and participants requested to have the window open. Both the room and the open window resulted in background noise and distractions in the recordings. Finally, recordings at the RNIB radio station were some of the shortest, since the participants were kind enough to come to record during their breaks and had to get back to work shortly after. The differences in recording length which might have an effect on click rate are accounted for via the turn segmentation described in Section 3.6.1.

3.7.2 Methodological challenges

Due to the broad scope of this study, some compromises were made in analysis in order to combine Conversation Analysis with sociolinguistics to investigate clicks. In this thesis I focus on only word search sequences which fulfill a set of criteria (see Section 3.6.3.2). This was done by excluding all examples where word searches did not have an evident resolution (e.g. the speaker finding the 'searched-for' item, the recipient providing the 'searched-for' item). It is therefore possible that some word searches could have been excluded from the analysis. However, performing a study of this scope, which analyses many different facets of an interactional feature at once (i.e. taking into account phonetic form, interactional function, and social factors), requires that some restrictions be applied for the part of the study which was on word search.

Linguistic analysis (i.e. phonetic and sociolinguistic analysis) had to be restricted as well for the present study. Due to the broad scope of this study, I chose only to select certain acoustic characteristics of clicks to analyse and I only focus on specific social factors, which are also highly socially 'gross'. For example, gender is not considered beyond a single dimension, while we know that the reflection of gender on language is far beyond the binary scope presented here (e.g. Eckert and McConnell-Ginet 2003).

Conversation Analysis also encourages multimodal analysis wherever possible because gestures and gaze are intrinsically linked to interaction and are a key resource for speakers to draw upon in interaction (Goodwin and Heritage 1990). Multimodal analysis was not performed for the present study, though video data was used to aid in categorising some stance-display actions and recognise places of articulation of clicks. In future, having multimodal recordings will be beneficial in many ways. The majority of human interactions take place in the physical space and are face-to-face. Because participants can use physical resources to communicate and rely on visual cues (e.g. 'thinking face' performed alongside word search sequences Goodwin and Goodwin 1986), only analysing audio removes this as a possible contribution to the understanding of the interaction. While this component of the recordings is not used here, this could be a crucial starting point for future research, particularly because of the large amount of CA work on multimodal word search construction (e.g. Goodwin and Goodwin 1986; Hayashi 2005; Li 2020).

For studying clicks in interaction, this would be particularly useful, especially because previous phonetic work has shown that phonological variables can work with gestures or facial expressions to perform an interactional function (e.g. GOAT-fronting and smiling, Podesva et al. 2015).

While the descriptions of analyses above depict the compromises made, we are still able to learn so much about clicks with the information analysed, especially as so much is yet unknown about these sounds. While perhaps not as detailed as a strictly phonetic, sociolinguistic, or interactional analysis on their own, these analytical 'restrictions' have allowed us to gain a much fuller picture of click variation.

3.8 Statistical Analysis

After data was extracted from Praat, statistical analysis was performed in R (RDevelopmentCoreTeam 2016). Because this study is exploratory, patterns were first examined descriptively before variables were analysed using inferential statistics.

One way to better understand relationships that seem to arise in data is through inferential statistics. Inferential statistics allows us to view systematic patterning by examining correlations of factors or variables (Tagliamonte 2006:108). This is done by the use of regression modelling (Wickham and Grolemund 2017). Modelling is a useful tool for understanding data, as Wickham and Grolemund (2017) write:

> The goal of a model is to provide a simple low-dimensional summary of a data set. Ideally, the model will capture true "signals" (i.e. patterns generated by the phenomenon of interest), and ignore "noise" (i.e. random variation that you're not interested in).

Regression is often used in hypothesis testing and is a commonly used method in sociolinguistic research (see e.g. Tagliamonte 2006:217-234 for a how-to guide in multivariate regression analysis in sociolinguistics). While the main goal of regression is usually producing a result which is replicable (Vasishth et al. 2018), it should be noted that the use of a regression model in this thesis is intended to indicate patterns in these data, as for most variationist sociolinguistic studies.

One challenge when fitting models was low tokens in particular categories. For example, there were only 9 clicks in the data produced by women which were collocated with creak and coded as coronal articulation. Including categories with low *n*s or empty cells (where a particular combination of variables does not occur at all) risks misinterpreting results or an overfitted model.

To account for this, all modelling in Chapter 4, which examines phonetic and interactional patterns in clicks in Glasgow, was done similarly. All variables and factor levels which had low numbers of tokens, zero occurrences, or strongly skewed outcomes (i.e. in a binary variable where one outcome occurred less than 10 times) were excluded from models. Additionally, for ease of analysis analytical categories were combined: place of articulation was regrouped into coronal (dental, dento-alveolar, and alveolar) or non-coronal (all other places of articulation), and interactional function was regrouped into sequence-managing or affect-laden.

Mixed effects linear regression models were fitted for click COG and log-transformed duration. These models included all variables and all possible two-way interactions. These models were then processed via stepwise regression using the `step()` function in base R, which compares all possible permutations of a model to get the best fit. The suggested model in the step table was then run and is presented and interpreted.

For the two mixed effects logistic regression models of binary categorical variables (e.g. (1) coronal or non-coronal, and (2) sequence-managing or affect-laden functions), model comparison was performed manually using ANOVAs. This was done similarly by fitting a model with all possible two-way interactions, and manually removing each non-significant two-way interaction one by one. Each time a two-way interaction was removed, the model was compared to the previously fit model and if neither of the models were a significantly better fit, the two-way interaction was permanently removed. This continued until the significantly better model remained. Then all non-significant single effects were removed.

In Chapter 5, regression modelling was used to compare word search sequences with clicks to those without clicks. Because of the low number of tokens in this small data set, no interactions could be fitted for these models. Models were first fitted only with phonetic features that might impact the presence or absence of a click in a word search. Social factors were omitted here; because of the low number of tokens per speaker, the model failed to converge. Social factors were then examined in a fixed effects model with click or no click as the response (e.g. dependent) variable and no other explanatory (e.g. independent) variables. The exclusion of phonetic features here was strategic; without individual variation accounted for in a speaker intercept in the model, many phonetic accompaniments might appear significant. This significance is not present in the mixed effects model, where individual variation is accounted for. To account for the possibility of individual variation driving any effect of age or gender, in the fixed effects social factors model, empirical individual speaker data is examined in the section alongside modelling.

3.9 Summary

This chapter has provided an account of the overall design of the study which was implemented to investigate the key research questions here. Analysis was performed on a socially-stratified sample of 50 speakers from Glasgow, with well-known sociolinguistic stratification at all linguistic levels. Talk-in-interaction was captured for this study, by designing a recording setting in which speakers complained, to elicit clicks in many different interactional functions.

Clicks were identified and segmented. Both overall and individual click rate were calculated to report the number of clicks produced per minute. Clicks were analysed for phonetic features, (i.e. place of articulation, phonetic accompaniments, selected acoustic properties), interactional function, and position in turn. Word search sequences were identified using strict criteria drawing from CA and were coded for their phonetic accompaniments.

Data was explored descriptively before performing mixed effects linear and logistic regressions on click COG, duration, place of articulation, and interactional function. A mixed effects logistic regression was also performed to compare word search clicks to clicks used in other sequence-managing functions, as well as to investigate how word searches with and without clicks were constrained by phonetic accompaniments. A fixed effects logistic regression model was fitted for click presence in word search and social factors and presented alongside empirical data to examine trends. Model comparisons in R were used in all cases to result in the best-fit model.

These theoretical, analytical, and statistical methods have given way for the results reported in the next two chapters.

Chapter 4

Form, function, and social stratification of Glaswegian clicks

4.1 Overview

In this chapter, I investigate how interactional clicks pattern in a single variety of English in Glasgow. The chapter begins with descriptive patterns observed across the data with regards to click rate, phonetic form (e.g. place of articulation, phonetic accompaniments, spectral and temporal properties), interactional function, and position in turn. This is followed by results from inferential statistics using a narrower dataset adjusted to exclude categories containing smaller counts. Then, statistical results are presented from models fitted with gender and age to investigate their impact on clicks' acoustic properties, place of articulation, and interactional functions. Finally, the implications of these results are discussed.

4.1.1 Chapter-specific research questions

The research questions here are expanded from two of the broader research questions presented in Chapter 2: "What is the phonetic form and conversational function of clicks in one variety of English?" and "Do gender and/or age constrain click form or function?" Below the research questions for this chapter are narrowed down under the headings of the broader questions.

1. What is the phonetic form and conversational function of clicks in one variety of English?
    (a) What is the phonetic form of clicks in Glasgow in relation to click rate, place of articulation, acoustic properties, and phonetic accompaniments?
    (b) What is the distribution of clicks across position in turn?
    (c) What are the interactional functions of clicks? Does one type of click (e.g. affect-laden or sequence-managing) occur more frequently?

(d) Are clicks' place of articulation, acoustic properties and/or interactional function constrained by phonetic or interactional factors?

2. Do gender and/or age constrain click form or function?

   (a) Who produces clicks and how do gender and/or age groups vary in their performance of clicks in interaction?

   (b) Are clicks' place of articulation, acoustic properties, or interactional function constrained by social factors?

Questions 1(a), 1(b), 1(c), and 2(a) are presented in the descriptive results, while 1(d) and 2(b) are presented through inferential statistics, discussed in Section 4.6.

4.2 Rates of click production in Glasgow

This section presents findings on the number of total click sounds found in this Glasgow data, including clicks and percussives across both in individual speakers and across the dataset as a whole. As in previous studies (Ogden 2013; Pillion 2018), corpus click rate is presented (total number clicks divided by total recording time in minutes) to produce the number of clicks per minute. Then, individual click rate is presented by dividing the total number of clicks each individual produced was divided by the total minutes they spoke to calculate a click rate of number of clicks produced per minute.

4.2.1 Total percussives and clicks

The dataset contained a total of 628 clicks and percussives. Figure 4.1 shows the raw count of clicks (n=525), percussives (n=96, including tokens with audible separation of the lips, sometimes termed "lipsmacks"), and tokens that could not be auditorily identified and were marked as 'unsure' (n=7). Percussives and 'unsure' tokens were excluded from further analysis. The resulting dataset used for this study consists of 525 clicks.

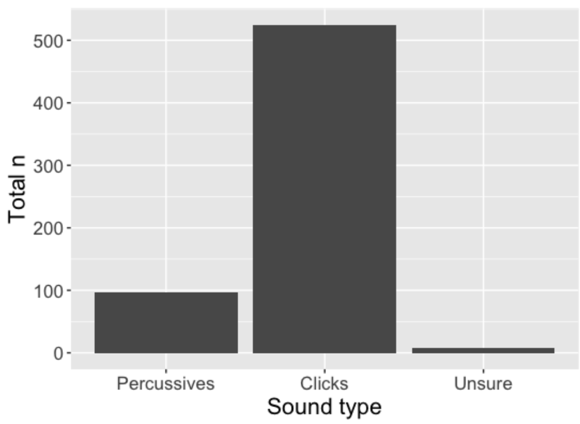

Figure 4.1: Total number of clicks, percussives and unsure tokens. 'Unsure' refers to sounds which could not be categorised as clicks or percussives. (n=628)

4.2.2 Overall and individual click rates

Over a total recording time of 21 hours and 58 minutes, there were 525 clicks. This results in an overall click rate of 0.36 clicks per minute.

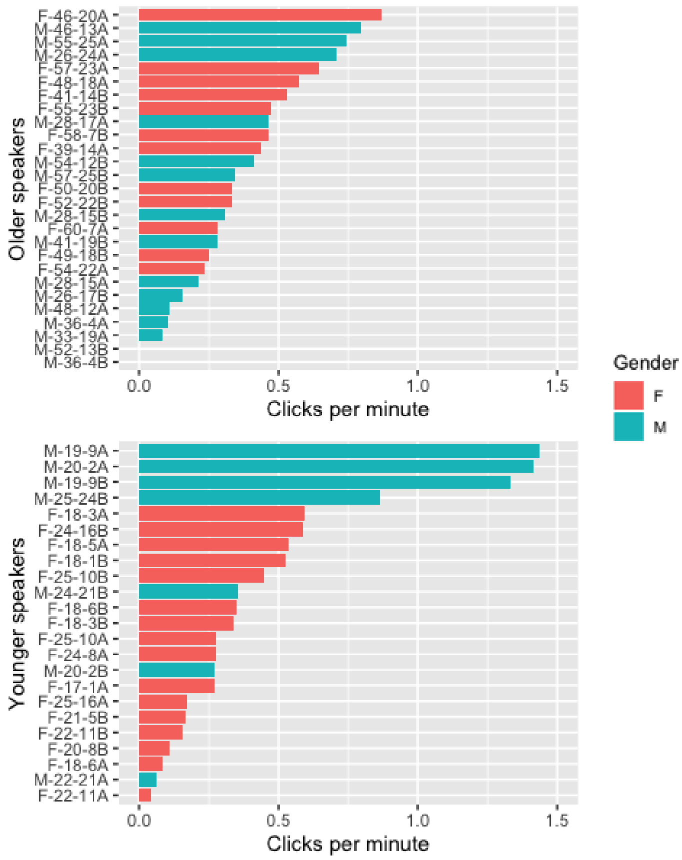

Figure 4.2: Number of clicks per speaker by minute, adjusted for speaker's own talk duration. Top plot shows older speakers (>25 years old) and bottom plot shows younger speakers ($\leq$ 25 years old). n= 525

Figure 4.2 shows individual click rate across age and gender. There was substantial speaker variation in individual click rate. Out of 50 speakers, two speakers who were in separate conversational pairs did not click at all, M-36-4B and M-52-13B (both male, aged 36 and 52 respectively). These two speakers are excluded from further analysis, resulting in a dataset of 48 speakers. The speaker who had the highest click rate was M-19-9A (male, 19 years), with a rate of 1.43 clicks per minute. Of those speakers who produced clicks, the lowest rate clicker was F-22-11A (female, 22 years), producing only one click (0.04 clicks/minute). Some speakers across both age groups and genders are low-rate clickers; F-54-22A, M-28-15A, M-26-17B, M-48-12A, M-36-4A, M-33-19A, F-25-16A, F-21-5B, F-22-11B, F-20-8B, F-18-6A, M-22-21A, and F-22-11A produce fewer than 0.25 clicks per minute (i.e. one click in four minutes of speech). Some speakers across both age groups and genders are higher rate clickers; F-46-20A, M-46-13A, M-55-25A, M-26-24A, F-57-23A, F-48-18A, F-41-14B, M-25-24B, F-18-3A, F-24-16A, F-18-5A, and F-18-1B have a click rate of more than 0.5 clicks per minute. Only three speakers produce more than one click per minute: M-19-9A, M-20-2A, and

M-19-9B. These are all male speakers in the younger age group (the bottom plot in Figure 4.2).

4.2.3 Single and multiple clicks

There were two sets of double clicks (one directly after another produced by the same speaker), and one set of three clicks. All other clicks were singles. Clicks occurring as doubles or multiples are illustrated in Fragments 4.2.1 through 4.2.3 from the transcript.

Fragment 4.2.1: *Asperger's*: A set of double lateral search clicks preceded by a bilabial trill

1	F-18-1B:	Jonah has (bilabial trill) || || Asperg- a-
2		[a-a:::::sperger's]
3	F-17-1A	[Asperger's]
4		There you go. Words.

Fragment 4.2.2: *When was it*: Three palatal search clicks

1	M-20-2A:	When was it? It was a::::h ‡ ‡ ‡ .hhh
2		oh god I can't even mind

Fragment 4.2.3: *Gives me a tenner*: Two lateral collusive clicks. Note that the double parenthesis denotes the transcription of unclear speech.

1	M-20-2A:	She's a shitty old woman
2	M-20-2B:	mmhmm
3	M-20-2A:	She's nice to me though
4	M-20-2B:	That reminds me of
5	M-20-2A:	(percussive) Gives me a tenner every time
6		I see her
7	M-20-2B:	Ah there you go
8	M-20-2A:	|| ||
9	M-20-2B:	Ah there you go ((as well))

In Fragment 4.2.1, F-18-1B recalls a peer with whom she and F-17-1A went to high school, in a discussion about available support for disabled students at school. While searching for the word *Asperger's* or signalling she needs help to pronounce the word, F-18-1B produces a bilabial trill followed by two lateral clicks with the repeated beginning of the word "Asperger's". F-17-1A offers F-18-1B the word, which resolves the search with the metalinguistic comment, "There you go. Words" in line 4.

Fragment 4.2.2 depicts M-20-2A at the beginning of a storytelling sequence. He tries to recall the date in which the story takes place by producing the particle "ah," a variant of *uh*. This particle is followed by three palatal clicks and an audible inbreath before the speaker abandons his search and offers metalinguistic commentary "Oh god, I can't even mind," which in Scots means "Oh god, I can't even remember."

Finally, in Fragment 4.2.3, M-20-2A talks about his grandmother whom he had described earlier in the conversation being prejudiced against someone. He follows the discussion with the assessment in line 1 ("She's a shitty old woman"), but says that despite this, she is nice to him, giving him money which is emphasised by the double lateral clicks ("|| ||") in line 8. These clicks act as a sort of collusion meant to convey a shared knowledge. The two participants share the implied meaning of the click, as evident in the following turn by the acknowledgement illustrated in M-20-2B's token "Ah there you go ((as well))" in line 9.

These are the only examples of multiple clicks in the data. There are some similarities between the examples of multiple clicks: a set of double and a set of triple clicks are used in word search sequences, while the double click in Fragment 4.2.3 conveys collusion, or shared implied meaning between the two speakers. The multiple clicks in Fragments 4.2.2 and 4.2.3 are from the same speaker, M-20-2A, and are both examples of clicks with less frequent places of articulation (see Section 4.3.1): palatal and lateral. Both word search click examples are collocated with some phonetic material, e.g. a bilabial trill or audible inbreath, while the collusive clicks have no apparent collocated material.

These findings are in line with previous reports of rare multiple clicks (Ogden 2018b). All other clicks occurred as singles and spanned the whole range of functions (see Section 4.4).

4.3 Auditory analysis of Glaswegian clicks

This section reports the distribution of clicks across place of articulation and the presence of phonetic accompaniments, including nasality, creaky voice, inbreath, and particle presence.

4.3.1 Clicks' place of articulation in Glasgow

The full range of place of articulation is present in Glaswegian clicks. There are eight places of articulation found here; bilabial, labiodental (with the top teeth creating suction on the front of the bottom lip), lip separation followed by a dento-alveolar release (referred to as 'lip-then-dentoalv' where plotted), bilabial-dental coarticulated (with a simultaneous release at the lips and the tongue tip or blade from the teeth), dental (with the tongue tip or blade pressed against the back of the upper front teeth), dento-alveolar (with the tongue tip or blade pressed against both the back teeth and the alveolar ridge), alveolar (with the tongue tip or blade pressed against the alveolar ridge), palatal (with the tongue tip or blade pressed against hard palate), and lateral.

Figures 4.3-4.10 show examples of clicks at all places of articulation. Acoustically, clicks usually showed a period of silence followed by a burst, reflecting a build up and release of pressure, much like voiceless stops, particularly visible in the spectrograms in Figures 4.3 and 4.7. While most clicks had one burst (e.g. the bilabial click in Figure 4.3 or the dental click in Figure 4.7), other clicks could have multiple bursts, especially when the release of the velum can also be seen at the end of the segmented click.

Figure 4.11 depicts the distribution of clicks according to place of articulation. Clicks were mostly dental (n=239, or 45.6% of the total clicks) or bilabial-dental coarticulated (n=178, or 34% of total clicks). The least frequent place of articulation was bilabial (n=3, or $>$1% of total clicks). The third most frequent articulation was alveolar (n=39, or 7% of total clicks), followed by 21 lip-then-dento-alveolar clicks (1.7%), 14 dento-alveolar clicks (2.7%), 13 palatal clicks (2.5%), 9 labiodental clicks (1.7%), and 9 lateral clicks (1.7%).

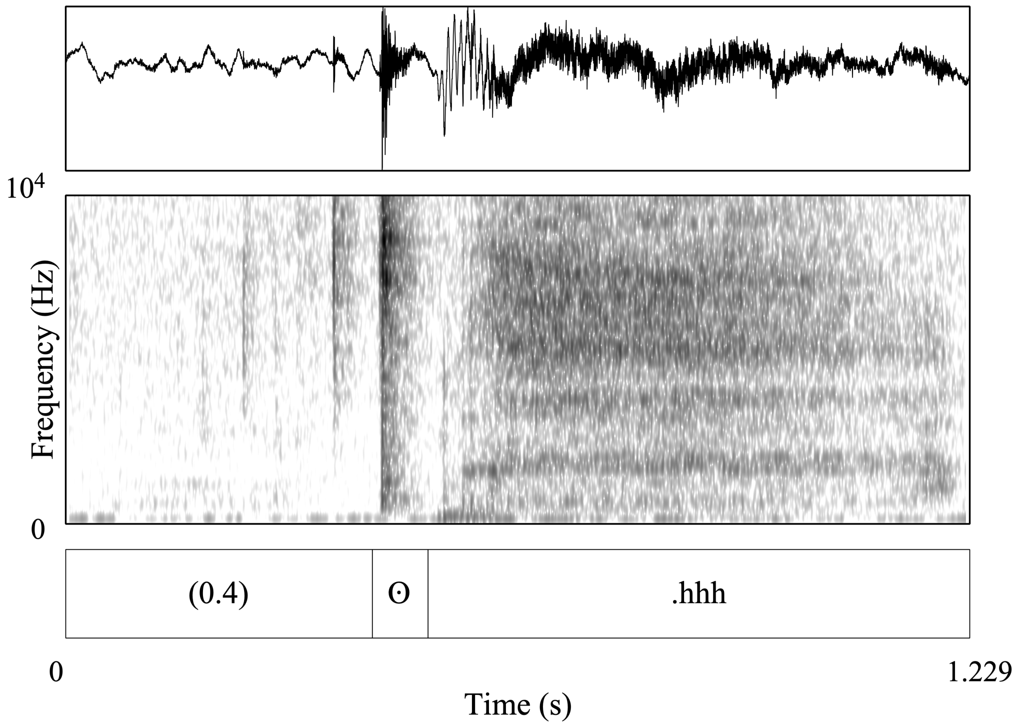

Figure 4.3: Spectrogram and waveform of bilabial click. Context:**F-22-11B:** But don't worry that ravin' Mavis shrine would have been pristine. (1.1) [ʘ] .hhh I don't know what we're gonna do with it when we move out

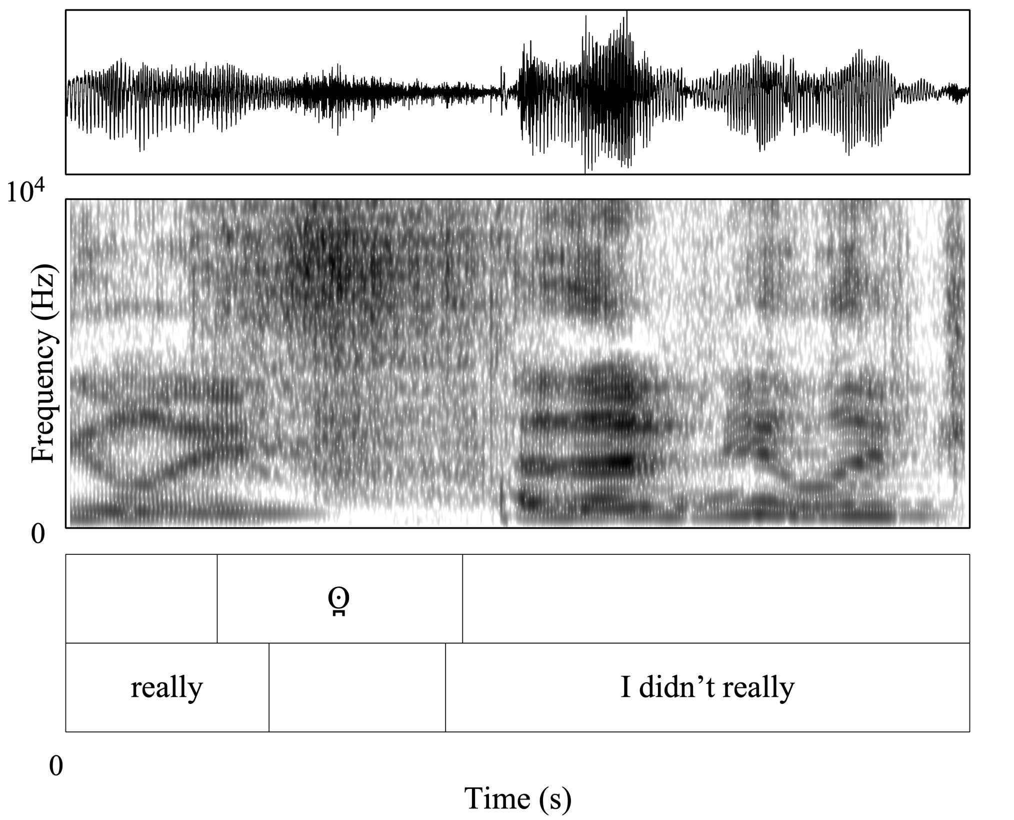

Figure 4.4: Spectrogram and waveform of labiodental (teeth on lips) click. Context: **F-18-1B:** I mean yeah but did you ever trust Johnny Depp he looks a bit [ʘ̪] **F-17-1A:** [Not really] I didn't really trust him

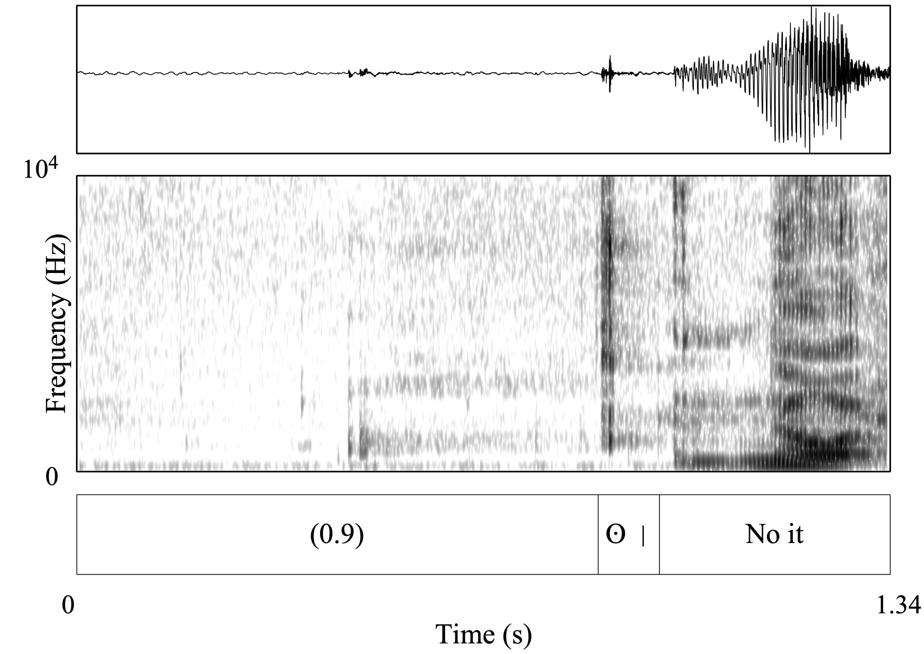

Figure 4.5: Spectrogram and waveform of the lip-then-dentoalveolar click. Context: **M-20-2A:** You've had to clean up actual human shit before though **M-20-2B:** I've had to clean up actual human shit before yeah ʘ| No it **M-20-2A:**.hh {tapping} big fuckin smelly Davey–what was his name? **M-20-2B:** Ah fuck fuck

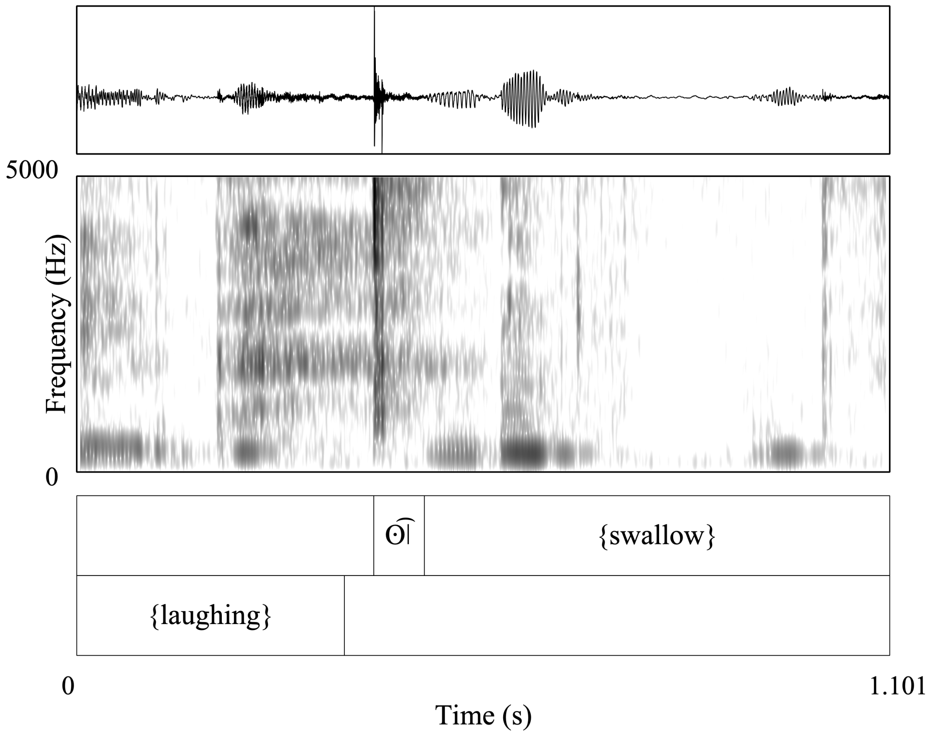

Figure 4.6: Spectrogram and waveform of bilabial-dentally coarticulated click. Context: **F-18-1B:** We're just matter floatin about **F-17-1A:** Oh jeez **F-18-1B:** But **F-17-1A:** It's like 3 o'clock can we not get this deep {laughs} **F-18-1B:**[ʘ͡|] .hhh (0.7) it just there's something {claps twice} wrong with Channing Tatum

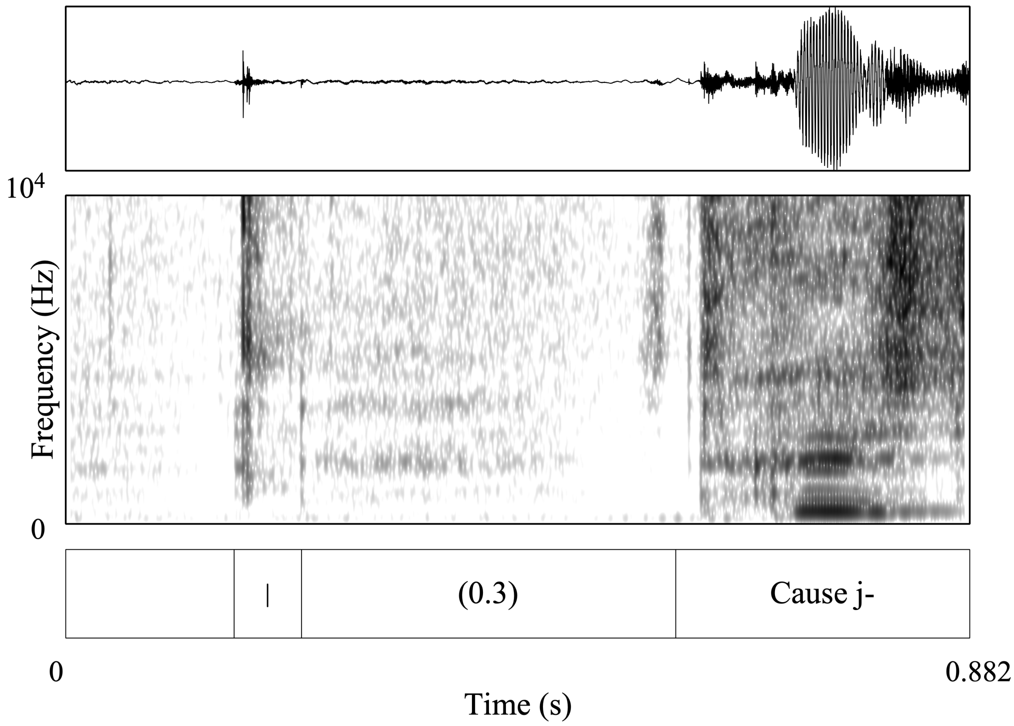

Figure 4.7: Spectrogram and waveform of dental click. Context: **F-18-1B:** They didn't like pass it on and they told like ehm **F-17-1A:** [Aw boy] **F-18-1B:** [|] Cause j- her mum she even had to get her mum and Jonah's mum's not even like the most attentive

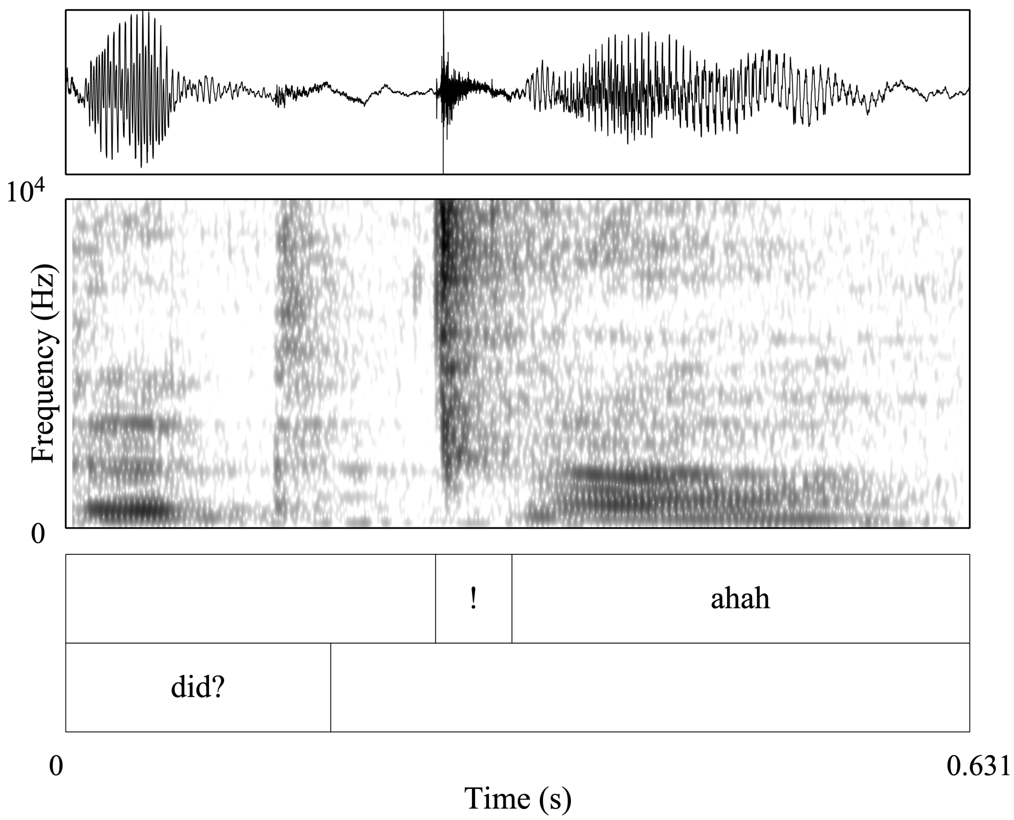

Figure 4.8: Spectrogram and waveform of alveolar click. Context: **F-22-16B:** Was it callie uni you did? **F-25-16A:** [!] ahah yeah **F-22-16B:** so yours must've been about two or three years ago

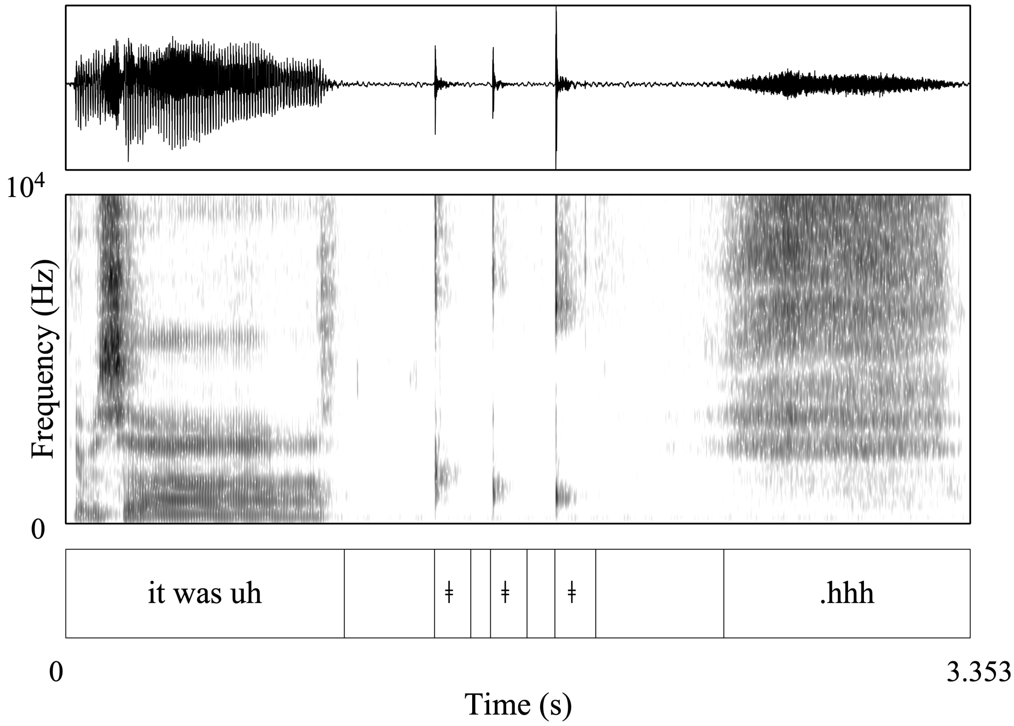

Figure 4.9: Spectrogram and waveform of the palatal click. Context: **M-20-2B:** Oh yeah that was like the ohh we had to like yeah when was it it was uh [ǂ] [ǂ] [ǂ] .hhh oh god I can't even mind

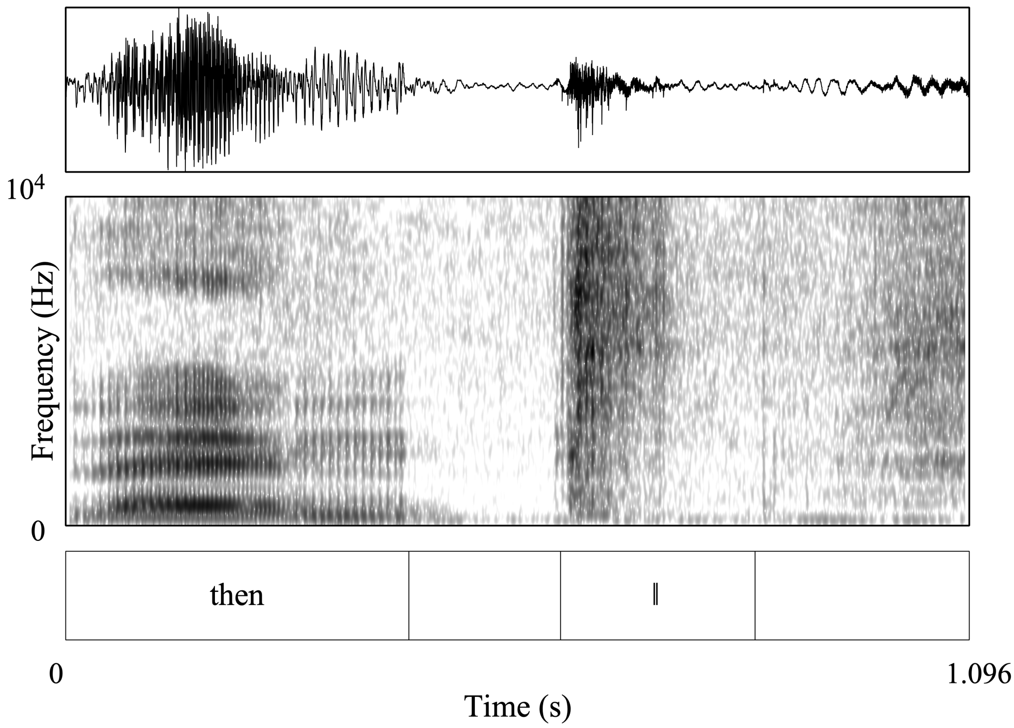

Figure 4.10: Spectrogram and waveform of lateral click. Context: **F-18-1B:** So if we go alone then [||] **F-17-1A:** Yeah that's **F-18-1B:** it but cause we're not guaranteed to get back in

For further quantitative analysis, clicks were reorganised into three groups because the low number of observations of some click articulations would lead to large numbers of empty cells in regression analyses. First, click place of articulation was regrouped into the following categories:

- All clicks involving the lips were reclassified as **labial** (i.e. bilabial, labiodental, lip-then-dento-alveolar, and bilabial-dental coarticulated)
- All clicks occurring from the teeth to the alveolar ridge with no lip involvement were reclassified as **coronal** (i.e. dental, dento-alveolar, and alveolar)
- All other clicks were reclassified as **other** (i.e. palatal and lateral)

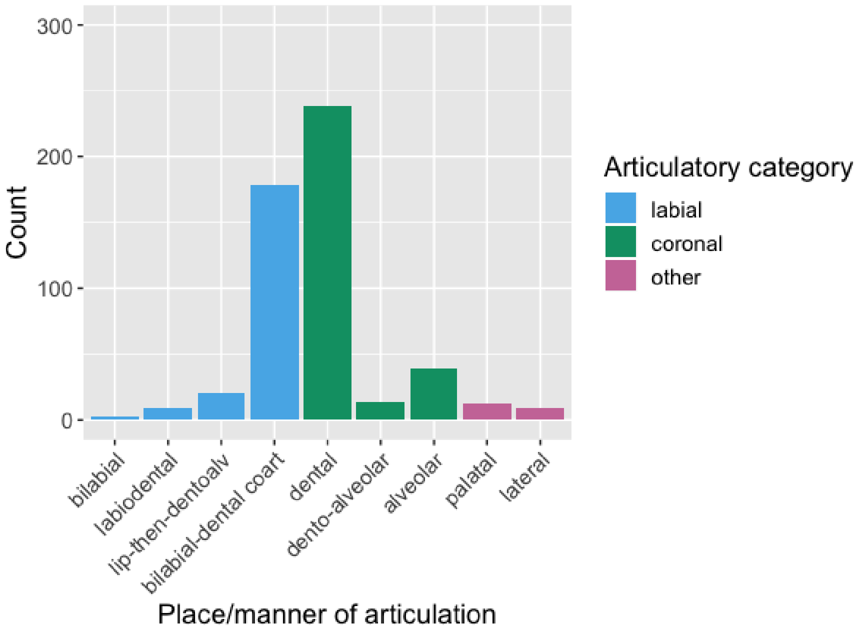

Figure 4.11: Distribution of total clicks across place of articulation

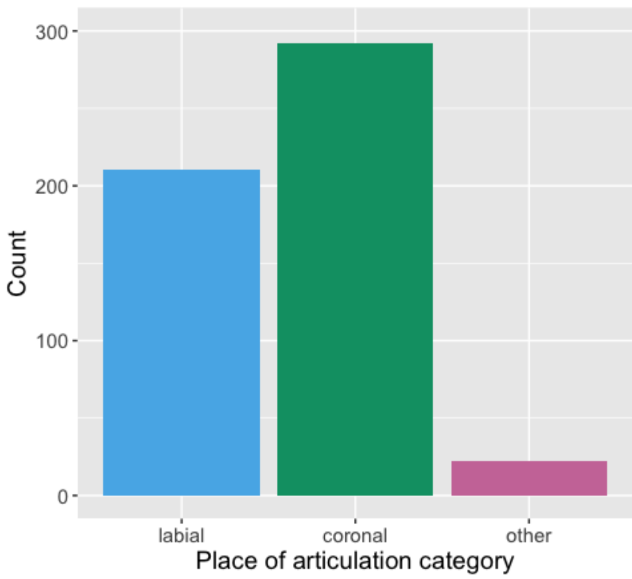

Figure 4.12: Distribution of total clicks by articulatory category

Figure 4.12 shows the distribution of clicks across this regrouping. The largest proportion of clicks are coronal (n=292, 55%), the next largest are labial articulation (n=210, 40%), and the smallest proportion are dorsal (n=22, 5%). This is later narrowed down further to a binary categorical variable of coronal and non-coronal articulation for regression analysis in Section 4.6.

4.3.2 Phonetic accompaniments of clicks in Glasgow

Four phonetic accompaniments were judged auditorily: collocated (1) audible inbreaths, (2) creaky material, (3) nasal material, and (4) particles, e.g. *uh* and *um*.

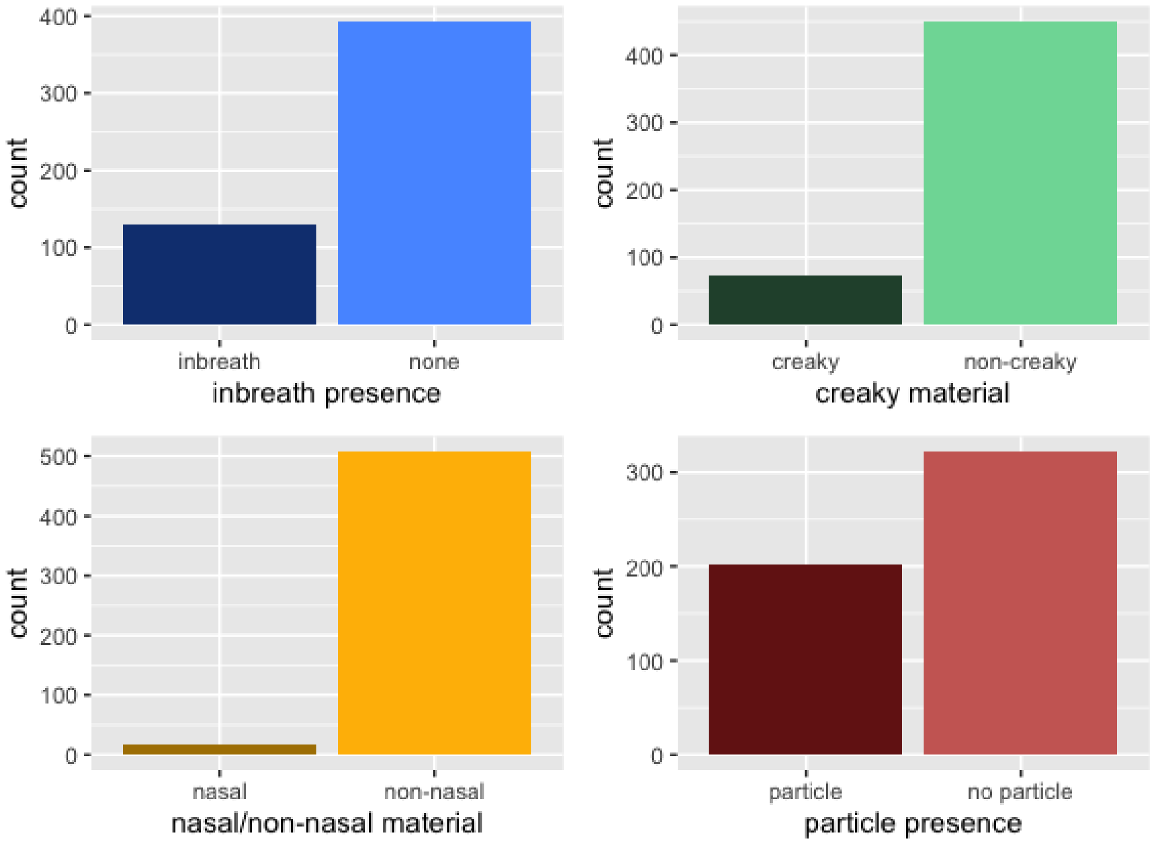

Figure 4.13: Distribution of clicks with phonetic accompaniments

Figure 4.13 shows the distribution of the four phonetic accompaniments. Recall that pause was only only considered a phonetic accompaniment of word search for Chapter 5 (see Chapter 3, Section 3.6.3.2). On each y-axis is the total number of clicks, while each x-axis depicts the relevant accompaniment's presence or absence. Clicks occurred more frequently without an audible inbreath (n=394, 75% of total clicks). Only 14% (n= 74) of clicks were collocated with creaky material. Clicks were nearly always produced completely orally, i.e. without collocated nasal material (n=509, 97% of total clicks). Due to this very small proportion of accompanying nasal material, this category was removed from the regression analyses later in this chapter. Clicks could co-occur with many different particles including variants of *uh* and *um* (*ah*, *ar*, *eh*, *ehm*, *ih*, *uh*, *uhn*, *um*, *up*, *urh*), variants of *oh* (*oh*, *ooh*) or other particles *mm*, *mm-mm*, *fuckin*, and *like*. Particles co-occurred with less than 50% of the total clicks (n=203, 38.7% of total clicks) and the most common particles were variants *uh* and *um* (n=175, 86% of total particles).

Clicks could occur with more than one phonetic accompaniment at once, but examples of this are rare. Most frequently, clicks could occur with collocated creak and a particle (n=31, 5.9%), or an audible inbreath and a particle (n=37, 7%). 11 clicks occurred with a nasal particle (2.1%), 7 clicks occurred with both creak and an audible inbreath (1.3%), 6 clicks occurred with creak, an audible inbreath, and a particle (1.1%), and 1 click occurred with nasality, an audible inbreath, and a particle (0.02%).

4.4 Turn position and interactional functions of clicks

4.4.1 Clicks by position in turn

Figure 4.14 displays the distribution of clicks across position in turn. Clicks could occur pre-turn (i.e. at the beginning of a turn), mid-turn, (i.e. in the middle of a turn), post-turn (i.e. at the end of a turn), and standalone (i.e. outside of the speaker's turn). If the click's position in turn was unclear, the click was marked as "unsure." The largest proportion of clicks occurred mid-turn, with 311 tokens (58% of the total clicks). The next most common position found was pre-turn (n=149, 28%), with standalone clicks occurring 8.7% of the time (n=47), and post-turn clicks occurring only 1% of the time (n=7).

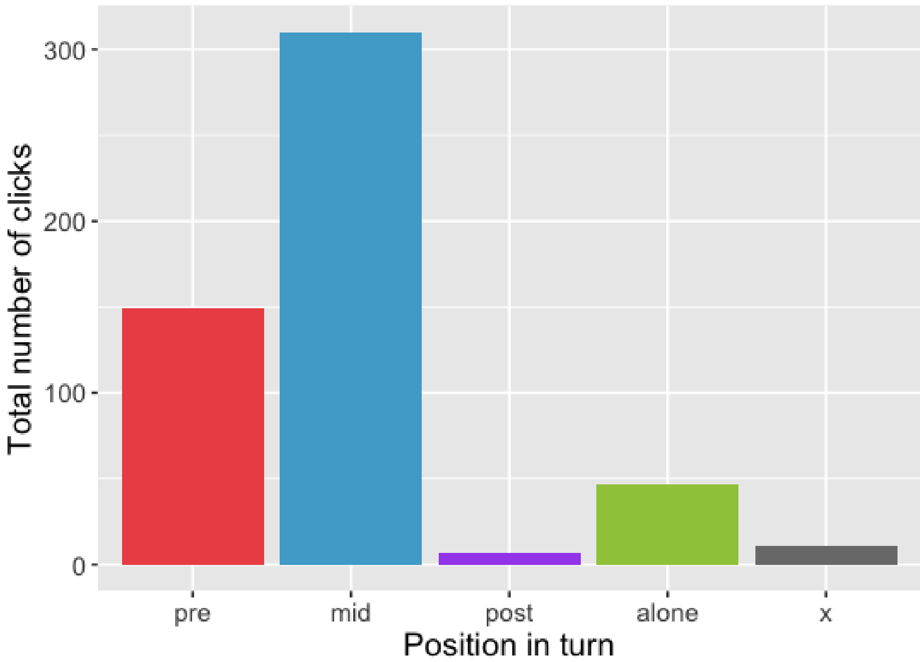

Figure 4.14: Distribution of clicks across position in turn. Note 'x' refers to unsure tokens.

4.4.2 Interactional functions of clicks

Clicks in this data set could occur in many interactional functions, including both affect-laden and sequence-managing functions. Affect laden functions included assessments (e.g. stance-display) and sympathy, while sequence-managing functions included word search, backchannel (e.g. listener responses), closing down sequences of talk, marking collusion (implied meaning shared by speakers), holding the floor, marking incipient speakership, indexing a new event, indexing a new sequence, post completion comments, and repair. The distribution of these functions can be seen in Figure 4.15.

Sequence-managing functions were far more frequent than affect-laden functions. Within this category, the most frequent function in which clicks occurred was marking incipient speakership (n=137, 26%). The next most common functions were word search (n=78, 15%), marking a new event (n=58, 11%), and indexing a new sequence of talk (n=53, 10%). Much less frequent were affect-laden click functions, like assessments (n=37, 7%), and sympathy (n=4, 0.8%). Some sequence-managing functions occurred infrequently, like repair (n=31, 6%), and backchannel (n=26, 5%). The least common function in which a click could occur was holding the floor (n=1, 0.1%). As some functions are demonstrably less frequent than others, click functions were reclassified into two categories for ease of analysis: affect-laden and sequence managing. This binary grouping of interactional function can be seen in Figure 4.16. Most clicks aid in sequence-management functions (e.g. new sequence indexing, marking incipient speakership, new events, word search) (n=404, 75.5% of total clicks).

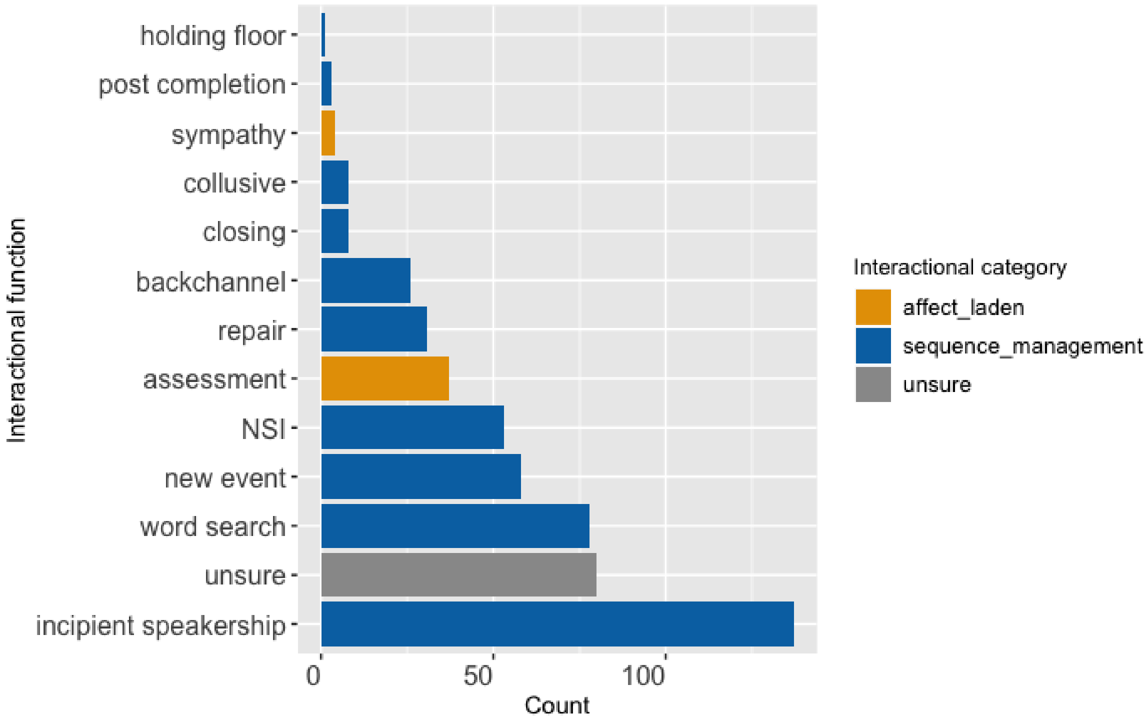

Figure 4.15: Distribution of clicks across interactional function

4.4.3 Clicks' Centre of Gravity (COG)

The acoustics of non-phonemic clicks, such as click COG, remain under-researched, with only one study examining the COG of one speaker's dental clicks (Trouvain and Malisz 2016). There is much evidence illustrating that place of articulation for stops, including fine-grained differences in articulation, can be discerned using a measure of COG; e.g. dental or alveolar place of articulation in bilingual speakers (Sundara 2005). Therefore, the present study aims to investigate to what extent spectral frequency reflects click place of articulation as well. For the clicks in this data set, I report both average COG for all clicks and COG across place of articulation to examine how these patterns may be observed in a non-phonemic and non-pulmonic stop sound.

Figure 4.17 shows COG across click place of articulation, and Figure 4.18 shows COG according to the three macro category groupings labial, coronal and other. Both plots illustrate that coronal clicks (especially dento-alveolar) have higher COG than labial (especially bilabial) and other (especially lateral) articulated clicks.

The average COG for all clicks for these speakers is 4780 Hz, with variation in COG by place of articulation. Two places of articulation have lower COG values, bilabial and lateral. Labiodental and labio-dento-alveolar clicks show a relatively higher spectral frequency. Bilabial-dental coarticulated, dental, alveolar, and palatal clicks have a higher mean COG, with dento-alveolar clicks having the highest mean COG.

Figure 4.18 shows that when these places of articulation are grouped into the macro articulatory categories (i.e. labial, coronal and other), variation in COG across place of articulation is still visible. Labial clicks have a mean COG of 4540 Hz, while coronal clicks have a higher mean COG at 5013 Hz and clicks in the other category have a mean COG of 3966 Hz. These results are modelled with relation to other linguistic and social factors in Section 4.6.

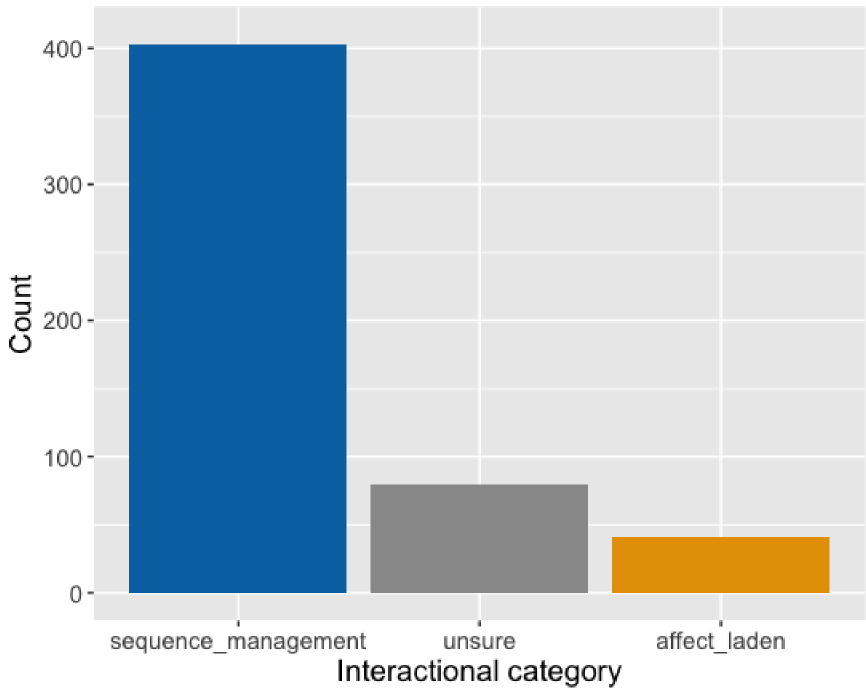

Figure 4.16: Distribution of clicks across interactional category

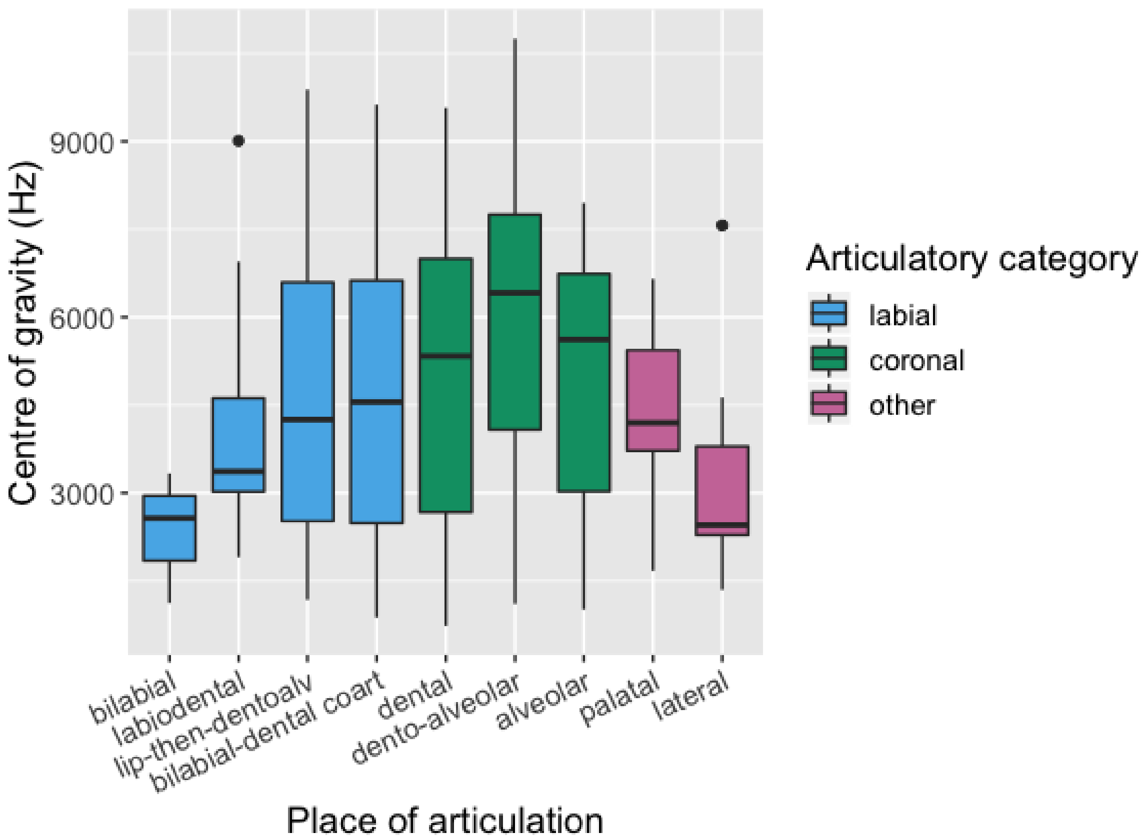

Figure 4.17: Clicks' COG across place of articulation

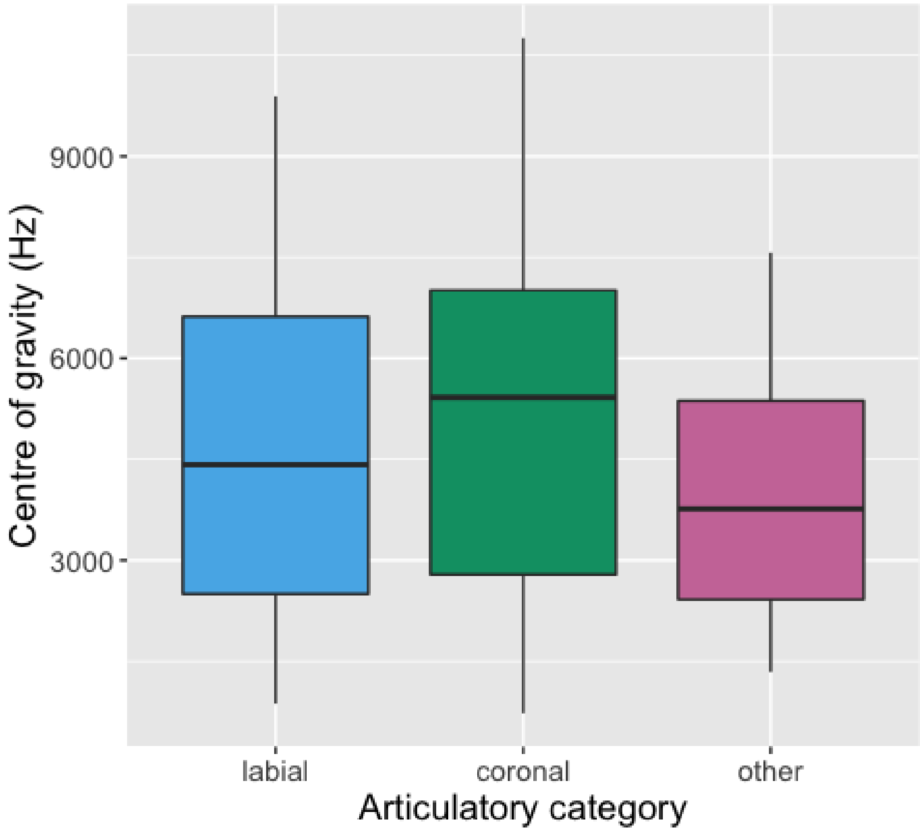

Figure 4.18: Clicks' COG across articulatory category

As COG has been found for sibilants to vary according to gender in Glasgow (e.g. Stuart-Smith 2007), clicks' spectral frequency according to social factors in shown in Figure 4.19. Here, younger speakers produce clicks with a higher mean COG (5233 Hz) than older speakers (4304 Hz), while men and women produce clicks with similar mean COG (4957 Hz and 4608 Hz, respectively).

4.4.4 Click duration

The mean duration for all clicks in the data is 82 milliseconds. As previous research on clicks in American English has suggested a constraint of interactional function on duration (Pillion 2018), duration is also presented by interactional function here.

Figure 4.20 shows that there is a small but visible difference in duration between stance-displaying or sequence management clicks in the empirical data. Sequence management clicks (n=403) have a mean duration of 81.5 milliseconds and stance clicks (n=41) have a mean duration of 77.8 milliseconds.

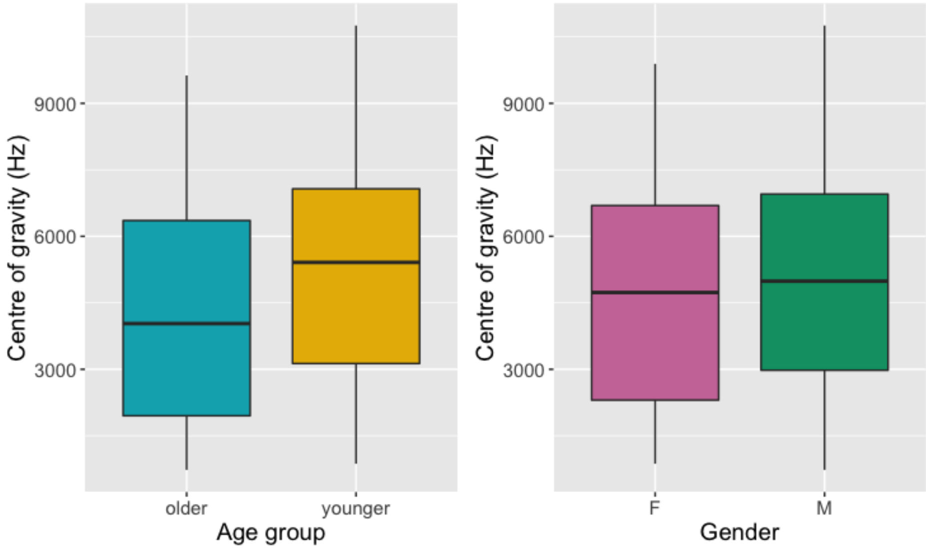

Figure 4.19: Click COG by social factors. *Left*: Click COG by age group. *Right*: Click COG by gender

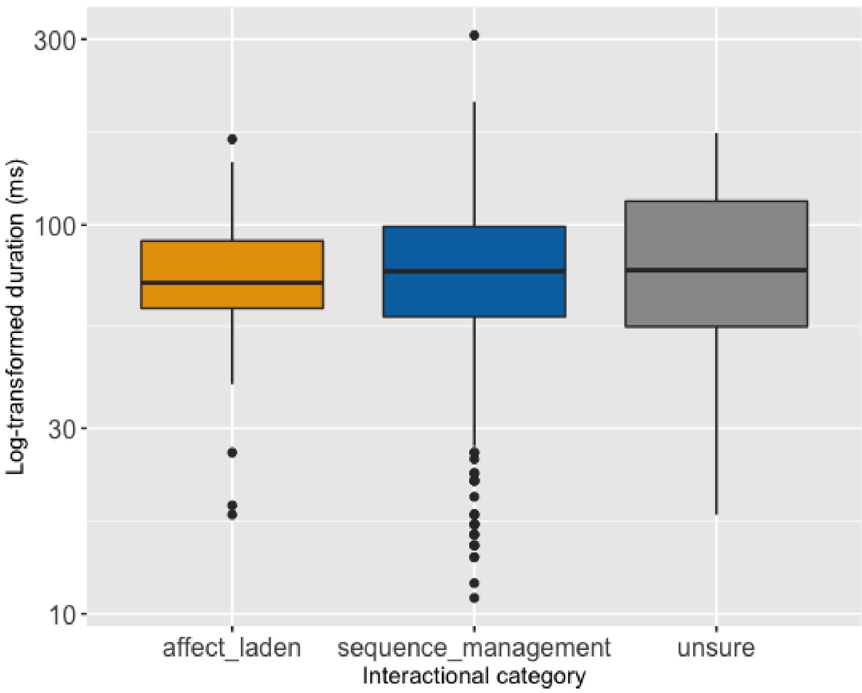

Figure 4.20: Clicks' duration on log-scale by interactional category. Note that 'unsure' denotes clicks whose interactional function was too difficult to identify.

4.5 Preparing data for statistical analysis

The following sections investigate patterns in spectral (COG) and temporal (duration) acoustic analysis, place of articulation (binary categorical: coronal and non-coronal), and interactional category (binary categorical: sequence-managing or affect-laden). For this exploratory study, initial models were fitted by testing all possible two-way interactions and using model comparisons with either `step()` for linear regression, or ANOVAs for logistic regression (see Chapter 3 Section 3.8). The resulting best-fit model was then fitted. Because of the low number of click tokens, the only factors used as explanatory variables (e.g. independent variables) that could be included in interactions are position in turn, particle presence, interactional function, coronal articulation, age group, and gender. Both initial and final models are presented here.

Before running the statistical analysis, categories with smaller counts were removed, so that models could converge successfully.

A summary of included factors for single effects and two-way interactions is as follows:

- Interactional Category (sequence-managing, affect-laden)
- Position in turn (pre-turn, mid-turn, standalone)
- Coronal articulation (coronal, non-coronal)
- Age group (younger, older)
- Gender (female, male)

A summary of removed tokens is as follows:

- Interactional Category (levels=sequence-managing, affect-laden, unsure):
  - All 'unsure' tokens
- Position in turn (levels=pre-turn, mid-turn, post-turn, standalone, unsure)
  - All post-turn clicks
  - All 'unsure' tokens

This results in the new data set used here. To avoid confusion, this dataset will be referred to as Dataset A.

4.6 Social factors in Dataset A

Dataset A consists of 429 clicks from 47 speakers. The distribution of clicks across individual speaker, gender, and age group for the new dataset (Dataset A) is displayed in Table 4.1.

Table 4.1: Distribution of clicks across speakers in **Dataset A**

	Older		Younger		Total	
	N	%	N	%	N	%
Female	97	22.6	124	28.9	221	48.5
Male	111	25.9	97	22.6	208	51.5
Total	208	48.5	221	51.5	429	100

Men and women clicked at nearly equal rates. Women produced 52% of the total clicks (n=221) and men produced 48% of the total clicks (n=208). Age groups were also similar in regard to number of clicks. Younger speakers ($\leq$ 25 years old) produced around 51.5% of the total clicks in the data (n=221), while the older age group (> 25 years old) produced 48.5% of the clicks in the data (n=208).

The distribution of clicks across individual speakers with regards to gender and age can be seen in Figure 4.21, which depicts two plots of click counts for individual speakers. The top plot shows the younger speakers and the bottom plot shows the older speakers. Both plots have speaker codes on the x-axis, with male speakers coloured in blue and female speakers coloured in red.

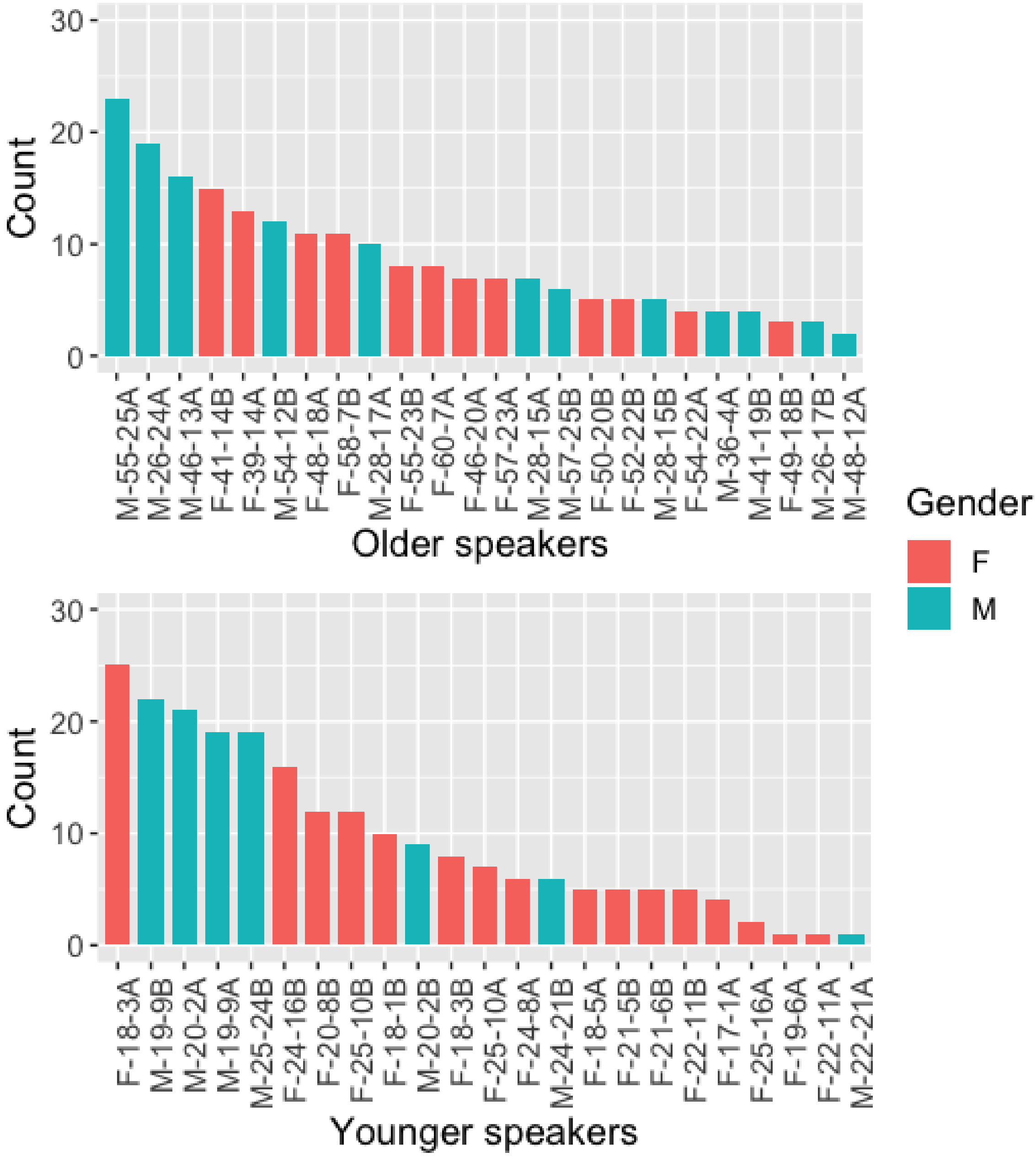

Figure 4.21: Distribution of clicks in Dataset A across individual speakers by age group and gender (n=429)

4.6.1 Regression modelling of clicks' acoustic spectral and temporal features

Here, results are presented on what factors constrain click COG and duration for these data. The models of COG and duration are presented together because they are both acoustic properties resulting in measures which can modelled as linear continuous variables.

4.6.1.1 Inferential results for click Centre of Gravity

The first variable explored here is the spectral analysis of COG. The initial model with COG as a response variable is below:

```
lmer(COG ~ (coronal + agegroup + particle + turn_position + gender + interactional_func
^ 2 + (1|speaker), data=DfA)
```

The above model shows Centre of Gravity with regards to `coronal` (coronal '1' or non-coronal '0'), age group, `particle` presence (particle or no particle), `turn_position` (pre, mid, or standalone), gender, and `interactional_function` (sequence managing '1' or affect-laden '0'). It then compares all possible two-way interactions for explanatory variables within parentheses. After this model was run, the best-fit model resulting from the `step()` function included coronality (p=0.007), age group (p=0.007), and an interaction between position in turn and interactional category (p=0.003). The best model is as follows:

```
lmer(COG ~ coronal + agegroup + turn_position +
interactional_function + (1 | speaker) +
turn_position:interactional_function, data=DfA)
```

The fitted model includes coronal articulation, age group, position in turn, and interactional function as single effects, and includes an interaction between position in turn and interactional function. The model summary is shown in Table 4.2. In this table, the intercept is clicks which are affect-laden, pre-turn, non-coronal, and produced by younger speakers

Significant single effects are found for age group and coronal articulation. Shown in Table 4.2, clicks with coronal articulation have a higher mean COG than non-coronal clicks (β=619.89, p=0.007). Older speakers produce clicks with lower COG than younger speakers ($\beta=-1042.42$, p=0.006).

There is a significant interaction between position in turn and interactional function. This is displayed in the effects plot in Figure 4.22, which illustrates the significant interaction. There is a difference in standalone and pre-turn affect-laden clicks, and between pre-turn clicks by interactional function. First, standalone affect-laden clicks (represented by 0) have a significantly lower COG than pre-turn affect-laden clicks ($\beta=-2669.69$, p=0.002). Mid-turn affect-laden clicks show significantly lower COG than pre-turn affect-laden clicks ($\beta=-2366.99$, p=0.005). Second, pre-turn sequence-managing clicks have a significantly lower COG than pre-turn affect-laden clicks ($\beta=-1465.97$, p=0.023).

Table 4.2: Model output of **COG** regression using explanatory variables coronal articulation (coronal '1' or non-coronal '0'), age group, position in turn, and interactional function (sequence-managing '1' or affect-laden '0'). Intercept = clicks made by younger speakers pre-turn which are affect-laden and non-coronal.

	COG		
Predictors	*Estimates*	*CI*	*p*
(Intercept)	6194.88	4889.18 – 7500.58	**<0.001**
coronal [1]	619.89	174.86 – 1064.92	**0.006**
agegroup [older]	-1042.42	-1751.83 – -333.01	**0.004**
interactional_func [1]	-1465.97	-2724.60 – -207.33	**0.022**
turn_position [mid]	-2366.99	-4037.27 – -696.71	**0.005**
turn_position [alone]	-2669.69	-4372.76 – -966.62	**0.002**
turn_position [alone] * interactional_func [1]	2872.79	971.48 – 4774.11	**0.003**
turn_position [mid] * interactional_func [1]	2512.17	776.32 – 4248.01	**0.005**

Particularly striking here, is the non-significant result of gender and COG. Though there appears to be no large difference in the empirical data (see Section 4.4.3), this finding is contra previous work on both sex and gender differences in sibilant production in Glasgow and phonemic stops in American English (Stuart-Smith 2007; Chodroff and Wilson 2014, see the discussion for this chapter).

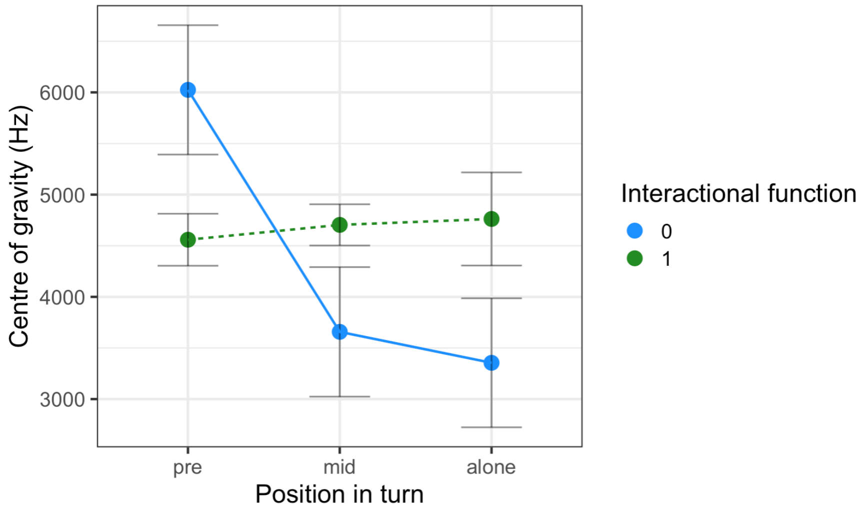

Figure 4.22: Interaction effects plot of COG across position in turn by interactional function (sequence-managing=‘1’, affect-laden=‘0’)

4.6.1.2 Inferential results of click duration

As duration is a linear continuous variable, modelling here also requires linear mixed effects regression. Duration here is log-transformed because the raw duration was left-skewed. This is displayed in Figure 4.23 which shows density plots for raw duration in Plot A and for log-scale duration in Plot B. Using log duration also accounts for any skewed variable, thus normalising the distribution of the variable and avoiding heteroscedasticity (e.g. Stuart-Smith, Sonderegger et al. 2015; Schertz et al. 2015).

The initial model for duration was fitted using the following terms:

```
lmer(log(duration) ~ (coronal + agegroup + particle + turn_position + gender
+ interactional_function) ˆ 2 + (1|speaker), data=DfA)
```

The best-fit model was computed with `step()`, which recommended including age group (p<0.001), gender (p=0.002), interactional category (p=0.040) and an interaction of particle co-presence and position in turn (p=0.014). This resulted in the final model below.

```
lmer(log(duration) ~ agegroup + particle + turn_position + gender + interactional_func
+ (1 | speaker) + particle:turn_position, data=DfA)
```

The model above tests clicks’ log duration by age group, particle presence, position in turn, gender, and interactional categories as single effects. There is also an interaction between particle presence and position in turn. The results of this model are displayed in Table 4.3.

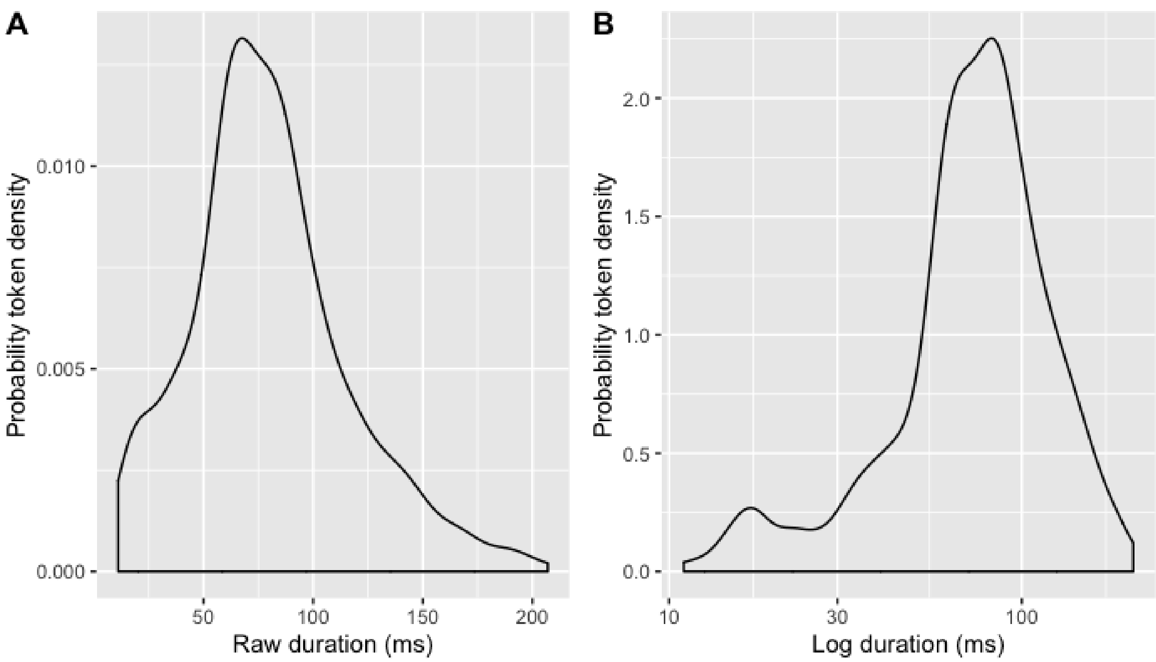

Figure 4.23: Density plots for duration across Dataset A. Plot A displays raw duration. Plot B displays log duration. Y-axis in both plots displays probability density per duration.

Table 4.3: Model output of **duration** regression results. Predictors include age group, gender, interactional function (sequence-managing '1' or affect-laden '0'), position in turn, and particle presence. Intercept = pre-turn clicks made by younger, male speakers with a particle which are affect-laden

	log(duration)		
Predictors	*Estimates*	*CI*	*p*
(Intercept)	4.12	4.20 – 4.66	**<0.001**
agegroup [older]	0.36	0.18 – 0.54	**<0.001**
gender [F]	0.31	0.12 – 0.49	**0.001**
interactional_func [1]	-0.13	-0.26 – -0.01	**0.040**
turn_position [mid]	-0.04	-0.20 – 0.11	0.604
turn_position [alone]	-0.31	-0.54 – -0.08	**0.008**
particle [no particle]	-0.15	-0.30 – 0.01	0.063
particle [no particle] * turn_position [mid]	0.25	0.07 – 0.43	**0.007**
particle [no particle] * turn_position [alone]	0.32	0.05 – 0.60	**0.021**

The results of the single effects of this model show variation in click duration across gender, age group, position in turn, and interactional function. Older speakers produce clicks significantly longer in duration than younger speakers (β=0.363, p>0.001). Women produce clicks significantly longer in duration than men (β=0.306, p=0.002). Overall, sequence-managing clicks are significantly shorter in duration than affect-laden clicks (β=−0.135, p=0.040).

There is also an interaction of the click's position in turn and whether it occurred alongside a particle. This is illustrated in Figure 4.24, an effects plot of log-transformed click duration across position in turn by particle presence. When a particle is present, seen in green here, standalone clicks

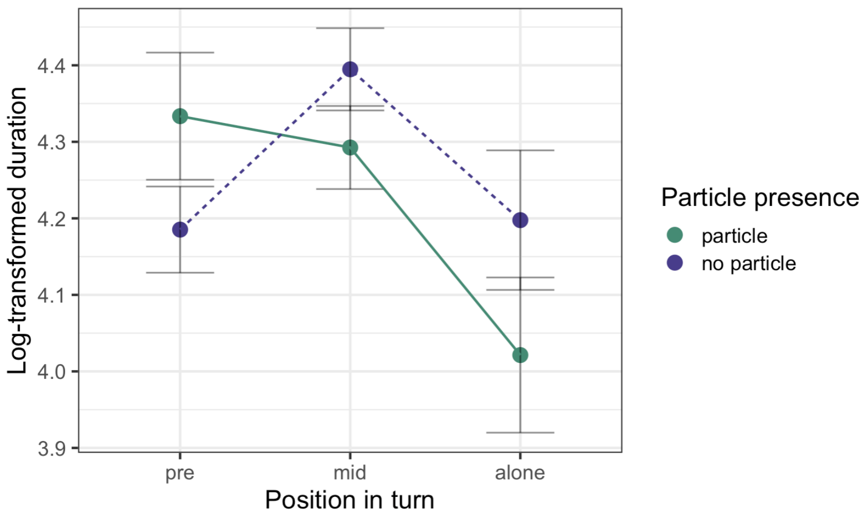

Figure 4.24: Interaction effects plot for duration across position in turn by co-occurrence with particle

are significantly shorter in duration than pre-turn clicks (β=−0.312, p=0.008). Further releveling of factors indicates that when occurring with a particle, standalone clicks are also significantly shorter in duration than mid-turn clicks (β=−0.271, p=0.007). Where clicks occur without a particle, standalone clicks are shorter than mid-turn clicks (β=−0.197, p=0.027).

Finally, when clicks' co-presence with a particle across position in turn is examined, the only significant difference within turn position is in mid-turn clicks. Clicks occurring mid-turn without a particle are longer than those with a particle (β=0.102, p=0.037). While standalone clicks seem to have variation in duration by particle presence, this difference is non-significant and likely appears significant due to individual variation.

In summary, older speakers produce longer clicks than younger speakers, women produce longer clicks than men, and there is variation in click duration across and within position in turn.

4.6.2 Inferential results of click place of articulation (coronal versus non-coronal)

Coronal articulation is used to capture the following anterior click places of articulation: dental, dento-alveolar, and alveolar (see Section 4.3.1). Clicks are analysed as coronal and non-coronal because coronal articulation is the largest category of articulation in the data. All labial places of articulation (bilabial, lip-then-dento-alveolar, labiodental, bilabial-dental coarticulated) or 'other' places of articulation (palatal, lateral) were marked as non-coronal for logistic regression.

As coronal place of articulation was treated as a binary categorical variable, inferential statistical analysis was performed using logistic regression analysis. As in the previous linear regression modelling, an initial model was fitted including all possible two-way interactions with factors which had high enough counts. Model comparison was then done manually by excluding each individual two-way interaction one-by-one, comparing models using ANOVAs. If no significant difference between the models was found, the simpler model (i.e. the model using fewer effects or only significant single effects) was used to continue comparisons.

The initial model fitted was as follows:

```
glmer(coronal ~ (agegroup + particle + turn_position + gender + interactional_function)
^ 2 + (1|speaker), family='binomial', data=DfA)
```

The above model fits coronal articulation (coronal '1' and non-coronal '0') with regards to age group, particle co-presence, position in turn, gender, and interactional category. All possible two-way interaction for terms within parentheses were tested during manual comparisons. Using ANOVAs, the best-fit model was one that included only main effects of position in turn and particle presence and no interactions (Df=5).

```
glmer(coronal ~ particlefactor + turnpos + (1|speaker), family = 'binomial',
data=DfA)
```

The output of this model can be seen in Table 4.4. Here, coronal is represented by '1' and non-coronal is represented by '0'. Therefore, positive estimates are *more coronal* and negative values are *less coronal*.

Table 4.4: Model output for place of articulation regression (coronal '1', non-coronal '0'). Predictors include particle presence and position in turn. Intercept = mid-turn clicks without a particle

coronal articulation

Predictors	*Odds Ratios*	*CI*	*p*
(Intercept)	1.18	0.75 – 1.85	0.480
particlefactor [particle]	2.01	1.24 – 3.25	**0.005**
turnpos [pre]	0.75	0.45 – 1.23	0.248
turnpos [alone]	- 0.36	0.16 – 0.83	**0.016**

The intercept in Table 4.4 has been releveled so that it represented clicks occurring mid-turn without a particle. When the data is presented in this way, all significant differences present in the model are visible.

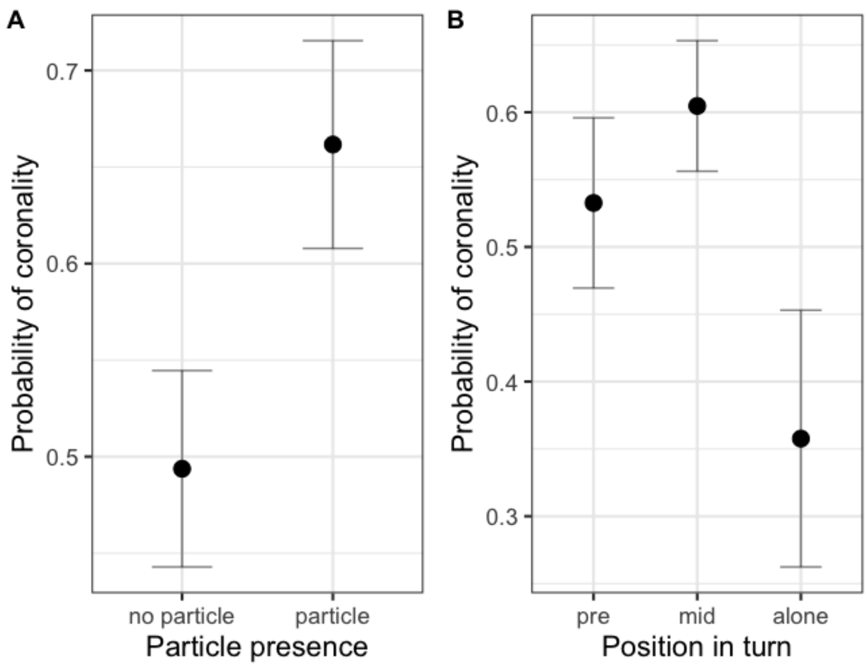

Figure 4.25: Effects plot for coronal articulation. Plot A displays the probability of a click being coronal by particle co-presence. Plot B displays the probability of a click being coronal by position in turn

The two main effects shown here are between clicks with and without a particle and mid-turn and standalone clicks. Clicks occurring with a particle are significantly more likely to be coronal (β=0.696, p=0.005). Standalone clicks are significantly less likely to be coronal (β=−1.011, p=0.016).

In summary, place of articulation (specifically coronality) is constrained by particle presence and position in turn.

4.6.3 Interactional function modelling

The role of interactional function (sequence managing, coded as '1' and affect-laden, coded as '0') was shifted to a response (e.g. dependent) variable here. This is due to the fact that this study is exploratory and how interactional function may or may not be correlated with click use is as of yet unknown.

As interactional function is a binary categorical variable, it is modelled through logistic regression, using the same procedure as for coronal articulation (above). The initial model fitted was:

```
glmer(interactional_function ∼ (agegroup + particle + turn_position + gender
+ coronal) ˆ 2 + (1|speaker), family = 'binomial', data=DfA)
```

The above model shows interactional function modelled with regards to age group, particle presence, position in turn, gender, and coronal articulation with two-way interactions between all factors within parentheses. Using ANOVA model comparison, the best-fit model is:

```
glmer(interactional_function ∼ particle + turn_position + gender + (1|speaker)
+ turn_position:gender, family= 'binomial', data=DfA)
```

The above model includes particle presence, position in turn, and gender as main effects, with an interaction between position in turn and gender. The output of this model is shown in Table 4.5. To illustrate the full range of effects here, the intercept displayed is standalone clicks without a particle produced by female speakers.

Table 4.5: Model output of interactional function regression (sequence-managing '1', affect-laden '0'). Predictors include particle presence, position in turn, and gender. Intercept = standalone clicks made by women with a particle.

	interactional function		
Predictors	*Odds Ratios*	*CI*	*p*
(Intercept)	1.31	0.30 – 5.81	0.722
particle [no particle]	0.31	0.12 – 0.82	**0.019**
turnpos [pre]	35.54	5.93 – 213.12	<**0.001**
turnpos [mid]	97.69	16.06 – 594.20	<**0.001**
gender [M]	9.16	1.28 – 65.27	**0.027**
turnpos [pre] * gender [M]	0.09	0.01 – 0.86	**0.037**
turnpos [mid] * gender [M]	0.04	0.00 – 0.38	**0.005**

The single effect of particle presence is significant for interactional function; clicks are more likely to be sequence-managing with a particle (β=1.156, p=0.019).

There is a significant interaction between the gender and position in turn. These results are shown in Figure 4.26 and most easily understood when considered within gender. When men click in standalone position, they are more likely than women to perform sequence-managing functions (β=2.214,

p=0.027). Across turn position, however, women's clicks vary significantly in their interactional function. Women's clicks are more likely to be sequence-managing mid-turn (β=4.582, p<0.001) and pre-turn than standing alone (β=3.571, p<0.001).

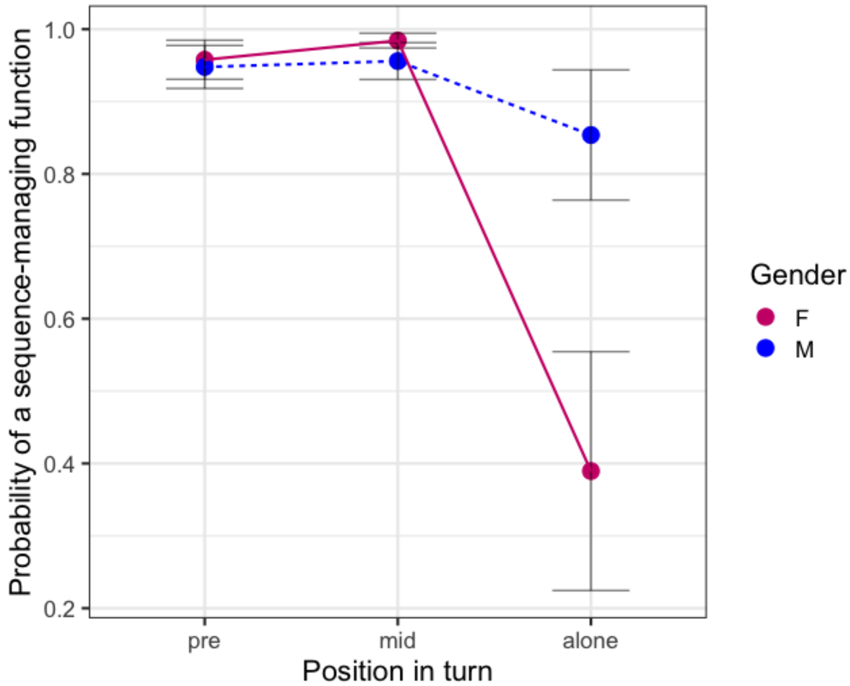

Figure 4.26: Effects plot for interactional category (sequence-managing '1' or affect-laden '0') across position in turn by gender.

In summary, clicks' interactional functions vary according to particle co-presence and gender and position in turn, such that (a), clicks co-occurring with particles are more likely to occur in sequence-managing functions and (b) women perform fewer sequence-managing clicks than men in standalone position.

4.7 Discussion

Results of click rate, phonetic form, interactional function, and patterning of clicks across social factors are discussed in this section, with reference to previous literature and possible explanations of results.

4.7.1 Click rates in Glasgow and speech style

Overall, the click rate for the total corpus was 0.36 clicks per minute, with individual click rate varying substantially. This overall finding differs from previous studies (Ogden 2013; Gold, French and Harrison 2013; Trouvain and Malisz 2016; Moreno 2016; Pillion 2018), which may be due to a combination of factors including speech style, individual differences in click rate, and data management. It should be noted that no previous studies other than Pillion (2018) overtly compared click rates across studies, and most studies do not specifically report corpus click rate. The possible reasons for the difference in speech rates across studies are numbered and discussed below.

1. Casual conversations incur lower click rates than other speech styles.

Click rates might be high for studies in more formal contexts where more sequence and turn organisation is necessary, e.g. Trouvain and Malisz (2016), who report a click rate of 9.2 clicks per minute. Trouvain and Malisz analyse one female Australian English speaker presenting a keynote talk at a conference. There is some evidence to suggest that actions in conversation are constrained by institutional context (e.g. Drew and Sorjonen 2011); it stands to reason that in a conference talk, several organisational skills are needed: the speaker needs to make complex, detailed material accessible to a non-specialist audience and topic shifts and ideas must be demarcated. In order to give this talk successfully, the speaker must include many sequence-managing actions in their talk, where clicks might occur. It's possible that these organisational cues are more frequent in formal talks than in casual conversations or sociolinguistic interviews.

Sociolinguistic interviews might also promote more click usage than casual conversations. One of the focuses of sociolinguistic interviews is to have the interviewee speaking as much as possible. Just as actions are constrained in a conference talk, we expect particular actions in sociolinguistic interviews that might result in more frequent clicks, e.g. more new sequence indexing and word search. Moreno (2016) reports higher click rates for sociolinguistic interviews in Shetland and Buckie than in casual conversations in Glasgow, with an overall click rate of 0.8 clicks per minute. However, this difference could have been due to either speech style (sociolinguistic interviews versus casual conversations) or regional variation in click production.

One exception to high click rates in sociolinguistic interviews is Pillion (2018). This may be because the data consist of a single speech community in the U.S., and all other studies (other than this thesis) use English from more than one region. It is possible that speakers in this area of the U.S. (Columbus, Ohio) may simply click less frequently than speakers of other varieties of English.

In the casual conversations studied here, however, actions performed are different to those in phone calls, sociolinguistic interviews, or conference presentations. Firstly, speakers can use visual cues as a resource for communication, unlike in phone calls, and may provide responses and/or assessments through nods or gaze, so speakers may produce fewer clicks. In casual conversations, when not in the middle of a story-telling sequence, speakers might shift turns more frequently, results in lower numbers of actions that clicks can be a part of such as backchannel and new sequence indexing.

2. Analysing clips of speech versus entire recordings will yield different click rate results.

The intention for this study was to investigate clicks' phonetic form and interactional function. Data was collected and transcribed by me and corpus click rate was calculated by dividing the total number of clicks I observed by the combined length of all recordings.

The telephone call data analysed in both Ogden (2013) and Gold et al. (2013), are different from the present study in that they are casual conversations, but analysed for distinct purposes. Ogden set out to categorise click-performing actions in data containing clicks, rather than collecting data, hoping to find clicks. Likewise, Gold et al., who report a click rate of 0.8 per minute, used only five-minute stretches where speakers produced clicks, discarding speakers who did not click and excluding them in their final overall click rate.

The sampling methods mentioned in relation to Ogden (2013) and Gold et al. (2013) do not apply for the present study, which finds a corpus click rate closer to that of Pillion (2018), who found 0.21 clicks per minute in 38 white American English speakers. This may be because Pillion, like the present study, examined long stretches of data searching for clicks instead of isolating and extracting clicks.

3. Click rate is subject to individual variation.

Here, individual click rate varied widely; some speakers click more than once per minute, and others produced no clicks at all. Evidence of idiosyncrasy in click production (e.g. Gold, French and Harrison 2013; Moreno 2016), i.e. that some people click more than others, also suggests that the single speaker in Trouvain and Malisz (2016) could have simply been a high-rate clicker. Trouvain and Malisz's individual speaker, however, was also confounded by speech style (see above), and they reported more clicks at the introductory stage of the talk.

Two speakers in the present study did not produce clicks at all. These are M-36-4B and M-52-13B. These two speakers were both in the older male group but in different conversational pairs. This could be evidence of idiosyncrasy in click rate; it is possible they produce clicks, but did not in during their recording time.

3. Researchers make individual choices when identifying clicks.

This final point is in regard to how researchers actually code clicks and percussives in their studies. Judgements of what constitutes a percussive or click are entirely determined by the coder. Without a universal method for identifying and transcribing clicks, it cannot be certain that click rates across these studies are as different or similar as they seem. It is likely that transcriber differences only play a small part, if any, as previous studies were conducted by well-trained auditory phoneticians.

To summarise, there are several plausible explanations of variation in overall click rate across this and previous studies. Possible contributing factors include speech style, research goals, idiosyncrasy in click rate, and transcriber differences.

4.7.2 Patterns in place of articulation in Glasgow

In line with both previous phonemic and English interactional studies of clicks (e.g. Miller 2011:417; Wright 2011), clicks were mostly dental in articulation (Figure 4.11). This was followed closely by bilabial-dental coarticulated clicks, which are, to my knowledge, unreported elsewhere. The presence of bilabial-dental coarticulated clicks is not surprising, given that clicks coarticulated with other stop sounds is well-documented in the phonemic click literature (e.g. Ladefoged and Traill 1984). It is important to note that bilabial-dental coarticulated clicks would not have been identified without the video data taken for this study, so this place of articulation may be present in other studies but reported differently (e.g. Wright 2005). When analysed auditorily, they were nearly indistinguishable from dental clicks. The high number of both dental and bilabial-dental coarticulated clicks in English could be due to the resting position of the tongue in the oral cavity, with the tongue resting in contact with the back of the upper front teeth (e.g. Kotsiomiti and Kapari 2000). The simultaneous pressure built up behind the lips could be due to residual pressure from having the lips closed. If a speaker's lips are closed when a dental click is made, their lips must separate as well, resulting in the coarticulation.

When click place of articulation is placed in broader categories of coronal and non-coronal, regression analysis in Section 4.6.2 shows that two factors constrain place of articulation: clicks with a particle were more likely to be coronal, and standalone clicks were less likely to be coronal.

Again, clicks co-occurring with particles might be more likely to be coronal because of the tongue resting position if the particle precedes the click. The position of the particle (i.e. before or after the click) was not transcribed for the present study, but Wright (2005) indicates that word search sequences and indexing a new sequence are often initiated with a particle preceding a click. If particles here were also produced prior to the click, this rationale holds true, as word search was a relatively frequent interactional function here.

Standalone clicks might be less coronal because of the interactional functions in which they occur. If they are produced outside of a turn, they are not being used in an attempt to take over the floor. Though amplitude was not analysed here, Moreno (2016) mentions dental clicks as having the highest amplitude. It could be that using louder, more noticeable clicks more frequently draws attention to the action being performed. It is reasonable to assume that actions that occur in a standalone position are would contain fewer attention-drawing features, and therefore promoting the quieter non-coronal clicks.

4.7.3 Descriptive patterns of phonetic accompaniments of Glaswegian clicks

Clicks tended to occur without audible inbreaths, creaky voice and nasalised verbal material. Fewer than 25% of all clicks in this Glasgow data were produced with an audible inbreath, possibly due to how frequently certain action types occurred in these data. Most of what we know about the presence of inbreath (e.g. Wright 2011) is in relation to clicks used to index a new sequence, which make up a smaller number of the total clicks in this data set. Audible inbreaths are also reported to co-occur with clicks at the beginning of a turn (e.g. Wright 2011), where, for the present data, results indicate just under 150 clicks (29% of the Glasgow clicks) are located. There is also no evidence that inbreaths are more likely to occur at the start of a turn for these data.

Clicks occurred with creaky material only 14% of the time. Because creaky voice is known to occur turn-finally (e.g. Ogden 2004), this result is unsurprising. In these data, there were very few clicks at the end of a turn or closing down a sequence, which has been noted as a location where one might expect creaky voice in addition to a drop in pitch and amplitude (Wright 2011; Ogden 2013).

Because of previous reports of clicks accompanied by nasality (e.g. Wright 2005; Ogden 2013), nasality was also expected here. However, there is very little nasality present with these Glaswegian clicks. One plausible explanation for less collocated nasality with Glaswegian clicks is that nasality is highly stigmatised in Glasgow (e.g. Stuart-Smith 1999a), and speakers would produce less nasality in an attempt to avoid stigmatised speech.

Clicks co-occurred with particles 40% of the time. While this could be due to the type of interactional function being performed, the regression results in Section 4.6 and discussed below in Section 4.7.2 suggest that the presence of a particle is linked to the click's position in turn and place of articulation.

Because multiple phonetic accompaniments co-occur with clicks rather infrequently, it is difficult to examine any underlying patterns in the data. It would be interesting to examine more about the order of phonetic accompaniments relative to the interactional function in future.

4.7.4 Acoustic results for clicks in Glasgow

The acoustic characteristics of clicks are found to be constrained by linguistic and social factors, discussed below.

4.7.4.1 Click spectral Centre of Gravity in Glasgow

Click COG was constrained by both linguistic and social factors. Coronal clicks had a significantly higher COG than non-coronal clicks. Older speakers produced clicks with a lower spectral COG than younger speakers in this data set.

Results for coronal (dental, dento-alveolar, and alveolar) clicks having a higher COG are in line with phonemic studies of pulmonic alveolar stops showing higher spectral frequencies (e.g. Forrest et al. 1988; Sundara 2005; Chodroff and Wilson 2014), so these results are unsurprising. Younger speakers producing higher COG clicks than older speakers might relate to studies on COG for sibilants in English where younger speakers have been shown to exhibit a higher COG for sibilants than older speakers (e.g. Reidy 2015). However, in this study, the younger speakers who exhibited higher COG were adolescents whose vocal tracts were not yet fully developed (e.g. Mugitani and Hiroya 2012). This cannot be the case here, as younger speakers are between the ages of 17 and 25. The more likely reason for the age effect on COG is fine-grained articulatory differences in coronal clicks. Because coronal refers to three places of articulation, one of which has the highest mean COG for the total data (dento-alveolar, see Figure 4.17), it is possible that younger speakers are using more clicks with place of articulation which show higher frequency COG.

There was also an interaction of interactional function and position in turn for click COG. This mostly centred around clicks occurring pre-turn; pre-turn affect-laden clicks had a higher COG than both standalone affect-laden clicks and pre-turn sequence-managing clicks.

It may be that producing clicks with higher or lower spectral frequency, reflected in COG differences, is one way speakers can perform multiple interactional functions at one position in turn, e.g. using a click with higher COG pre-turn could work to both display a stance and secure listener attention.

4.7.4.2 Click duration in Glasgow

Here, click duration is constrained by interactional function, gender, age, and an interaction between particle presence and click position in turn.

Sequence-managing clicks were shorter than affect-laden clicks, in line with previous literature (e.g. Pillion 2018). Women produced longer clicks than men, and older speakers produced longer clicks than younger speakers.

It is likely that the social results of click duration reflect differences in speech rate, and that click duration relative to speech rate might not be different. Previous studies have found that women's speech rate is on average slower than men's speech rate and that older speakers have a slower speech rate than younger speakers (e.g. Jacewicz et al. 2009). Second, it is possible that the durational differences between gender and age groups is a result of the action types performed by speakers, especially given results that clicks in sequence-managing functions are shorter than affect-laden clicks. Third, these results could be due to a difference in click rate, such that younger speakers and older speakers perform clicks with different duration, and men and women produce clicks with different duration.

The interaction of clicks' position in turn and particle presence on click duration illustrates that where clicks co-occur with particles, clicks are longer pre-turn and mid-turn than in standalone position. Where clicks occur without particles, they are longer mid-turn. Within turn, mid-turn clicks with a particle are shorter than mid-turn clicks without a particle. With only 42 clicks in standalone position, caution is needed when addressing this result. If clicks performing sequence-managing functions are shorter overall and more likely to co-occur with particles, it seems sensible that mid-turn clicks with a particle, which aid in sequence-managing functions, might be shorter than mid-turn clicks occurring without a particle (e.g. aiding in affect-laden functions). Results involving standalone clicks are less straight-forward. Standalone clicks have a higher proportion of affect-laden functions (31% are affect-laden versus 5% mid-turn and 10% pre-turn), so one would expect that standalone clicks could be longer than those in other positions in turn. As there is no interaction between interactional function and position in turn or particle for click duration, it is likely these results are products of clicks' fine-grained interactional function.

4.7.5 Clicks' interactional function

Overall, sequence-managing functions (i.e. marking incipient speakership, word search, new event, indexing a new sequence, repair, backchannel, closing, collusion, post completion, and floor holding) were far more common than affect-laden functions (i.e. assessments, display of sympathy), with 91% of the total clicks aiding in the performance of sequence-managing functions. When clicks were modeled with regards to interactional function, clicks with a particle were more likely to contribute to sequence-managing functions than those in affect-laden functions. Again, this seems sensible because particular actions are known to contain particles, while others would not. For example, *um* would occur in NSI, word search, floor-holding, and perhaps incipient speakership, while particles would occur rarely, if at all, in assessments and listener responses.

Regression results showed that, in standalone position, men were more likely than women to produce a sequence-managing click. However, women varied in their use of clicks in interactional function across position in turn; they were more likely to click in the aid of a sequence-managing function pre-turn and mid-turn than in standalone position, where a click was more likely to be affect-laden.

One plausible explanation for this difference is that these Glasgow women are performing more affect-laden functions (regardless of whether or not a click is produced) in this position than men, i.e. there is a gender difference in interactional functions performed, not click production. There is a vast amount of sociolinguistic literature that describes gender variation in style, interaction, and discourse (e.g. Bucholtz and Hall 2005; Eckert 2008; Moore and Snell 2011).

One specific example of this is from a recent study of Eiswirth (2019), who studies listener response tokens and speaker gender in English. Note that listener refers to the recipient and the speaker refers to the interlocutor. Eiswirth reports that women listeners, regardless of the gender of the speaker, provide more assessments than men as listener responses (i.e. tokens produced outside of their turn). This is reflected here as well, if we consider listener responses to be any token in the standalone position.

4.7.6 Social factors: Gender and age play a role in Glasgow clicks

One of the main research questions of this thesis is how, if at all, gender and age constrain click form and function. Examining this more closely, it seems to that men and women and speakers in different age groups vary in their production of clicks. These results have been presented in the previous sections but will be discussed again here.

Glaswegian men and women seem to be subtly adjusting the duration of their clicks. This might be due to previous findings on gender differences in speech rate (e.g. Jacewicz et al. 2009), but could be indicative of an effect of gender on click duration. If we take into account the fact that clicks' interactional category (i.e. sequence-managing or affect-laden) are another constraint on click duration (see Section 4.6.1.2), this could be evidence that men and women produce more or less of certain interactional functions, regardless of whether a click is produced in those interactional functions. This is further supported by the finding that women produce more affect-laden clicks in standalone position, which could be indicative of women producing more affect-laden functions in that position in turn overall (e.g. Eiswirth 2019).

One place where a gender effect was expected but did not occur was clicks' spectral Centre of Gravity. Previous studies show that women and men in Glasgow differ in their production of /s/, such that they show higher frequency /s/ than men (e.g. Stuart-Smith 2007). More broadly, there has been shown to be a gender difference for spectral frequency of phonemic stops as well, such that women produce stops with higher spectral frequencies than men (Chodroff and Wilson 2014). The fact that this gender effect is not found for clicks suggests that women are deliberately, albeit unknowingly, compensating for physiological difference in vocal tract size (e.g. Simpson 2009).

Younger and older speakers seem to be using different articulatory strategies, such that younger speakers produce clicks with higher spectral Centre of Gravity than older speakers. This difference cannot be due to age-related physiological differences in vocal tract size, as the younger speakers (17-25) are thought to have fully developed vocal tracts (Mugitani and Hiroya 2012). Therefore, this subtle difference in articulation could be an indication that click COG may contribute to socio-indexical meaning for speakers, i.e. presenting as a "younger" or "older" either due to (1) a linguistic change in progress, or (2) age-grading in these Glaswegian speakers. This is discussed in greater depth in Chapter 6.

These results of the subtle differences in how gender and age affect click production and interactional function suggest that click phonetic form is largely due to (1) the interactional functional function in which the click occurs and (2) who produces the click.

4.8 Summary

This chapter has investigated the main research questions of phonetic form, interactional function, and social constraints of clicks in Glasgow, providing results and discussion of click rate, place of articulation, phonetic accompaniment, acoustic properties, position in turn, interactional function, and the impact of gender and age on or in conjunction with these features.

From this chapter, clicks in Glasgow English can be categorised as mostly coronal, sometimes occurring with audible inbreath, creaky voice, nasality, and particles such as *uh* and *um*, as previous literature suggests. The spectral frequency of clicks varies across place of articulation, position in turn, interactional function, and age, while click duration varies according to particle presence, position in turn, interactional function, gender, and age. Clicks can occur in all positions in turn as part of sequence-managing functions (e.g. new sequence indexing, incipient speakership marking, word search, listener response, etc.) and affect-laden functions (e.g. assessments, display of disapproval and agreement, etc.). Click place of articulation is constrained by position in turn and co-occurrence with a particle, while click function is constrained by co-occurrence with a particle, position in turn, and gender. These results illustrate that clicks are constrained by a range of linguistic and social factors. This relationship between clicks' form and social factors was suggested but not previously explored in previous work on English clicks (e.g. Stuart-Smith 2009; Ogden 2013; Moreno 2016; Pillion 2018). The question remains as to whether these factors are themselves dependent on the fine-grained interactional function performed by the click, or the click itself. This is now taken up in the following chapter.

Chapter 5

Clicks in word search strategies

5.1 Overview

While the previous chapter presents results from all clicks in the data, this chapter focuses in depth on a single interactional function: word search. In doing so, it takes an approach of (1) comparing phonetic and social patterns of word search clicks to clicks in all other interactional functions and (2) comparing phonetic and social patterns within word search sequences with and without clicks. Clicks in the present study have been found to aid in the performance of sequence-managing (e.g. marking incipient speakership, NSI) and affect-laden (e.g. displays of sympathy, assessments) functions. By highlighting one function of clicks here, we gain a more detailed view of clicks across and within interactional functions. Both sociolinguistics and Conversation Analysis emphasise examining language in context; for sociolinguistics 'context' refers to social meaning, and for CA it refers to interactional context.

This chapter first takes into account variation in the phonetic form and social factors of clicks occurring in word search, comparing word search clicks to clicks in all interactional functions appearing Chapter 4. This allows for a better understanding of how linguistic and social factors constrain click across a fine-grained interactional function. Next, taking a variationist approach, this study considers word searches with and without clicks, conforming more closely to the Principle of Accountability (Labov 1972).

Word searches were categorised according to CA criteria laid out in Chapter 3, Section 3.6.3.2. Word searches have been previously separated by Wright (2005) into the "pre word search stretch," or all verbal material leading up to the word search sequence itself, the "word search stretch," the word search sequence, and the "post word search stretch," or the material directly following the word search in which a resolution or clear mark of the end of the word search is found. While the "pre word search stretch" and the "post word search stretch" were used to identify word search sequences, word search here refers to the "word search stretch."

5.1.1 Narrow research questions for this chapter

Presented in Chapter 2 Section 2.9, the broad research question this chapter draws on is:

> Taking a single conversational action which can be performed with clicks, how do clicks vary in phonetic form and how does this function's phonetic form vary according to whether or not a click is present?

Word search clicks were analysed with respect to two angles in this chapter. CA studies (e.g. Brouwer 2003; Ogden 2013) emphasise that phonetic features arise due to interactional functions performed, but previous studies (e.g. Stuart-Smith 2009; Gold, French and Harrison 2013; Moreno 2016) also reported that clicks, regardless of their interactional function, can be produced at the full range of articulation and occur with phonetic accompaniments, i.e. audible inbreath, creaky voice, nasality, and particles. The extent to which phonetic features are a result of the click or the interactional function remains unknown. Therefore, the first narrower research questions are the following:

1. How do word search clicks pattern differently from clicks in all interactional functions with regards to phonetic form (i.e. place of articulation, spectral and temporal properties, presence of phonetic accompaniments) and position in turn?
2. Which linguistic or social factors are more likely to co-occur with a word search click rather than a click in another sequence-managing function?

Another approach for word search was taken more in line with variationist sociolinguistics. Variationist sociolinguists argue that, in order to appropriately capture the scope of variation for a sociolinguistic variable, one must examine all possible instances where the variable can be used (Principle of Accountability, Tagliamonte 2012:9), and be able to state exactly where they were observed (variable circumscription, Tagliamonte 2012:10). Again, CA studies assert that, without controlling for the interactional function itself, it is not possible to know which phonetic features are due to click presence and which features are due to interactional function. So, analysis was performed to investigate how word search sequences with and without clicks vary in their phonetic form, comparing word searches with and without clicks across both phonetic accompaniments and social factors. The resulting research questions concerning this approach are below:

1. How do word search sequences pattern with regards to phonetic form and sequential positions (e.g. adjacency pairs)?
2. Do word searches with and without clicks differ across phonetic and social factors?
3. Can the presence of a click in a word search be predicted by the presence of phonetic accompaniments or social factors? If so, which features correlate with a click occurring in a word search?

The answers to these research questions provided in this chapter show that clicks' phonetic patterns are very much due to the fine-grained interactional function in which they are embedded, and that the presence of a click in an interactional function is subject to who is performing the interactional function.

5.2 Word search click phonetic form and position in turn in Glasgow

5.2.1 Clicking frequency in word search

Out of 176 word searches, 81 (46%) were constructed with a click, while 95 were constructed without one. Figure 5.1 displays the distribution of word searches across individual speakers. Shown here, the amount of word searches varied across speakers. F-18-1B produced the highest number of word searches (n=18), while two men in the same conversation, M-19-9A and M-19-9B, produced the next highest number of word searches, with 16 each. In contrast, many speakers produce only a single word search, such as F-24-16B, F-50-20B, F-57-23A, M-26-17B, M-26-24A, M-28-15B, and M-33-19A.

Speakers varied in how often they produced clicks in word search sequences. Figure 5.2 shows total number of word searches on the y-axis and the speaker I.D. on the x-axis, for younger and older speakers respectively.

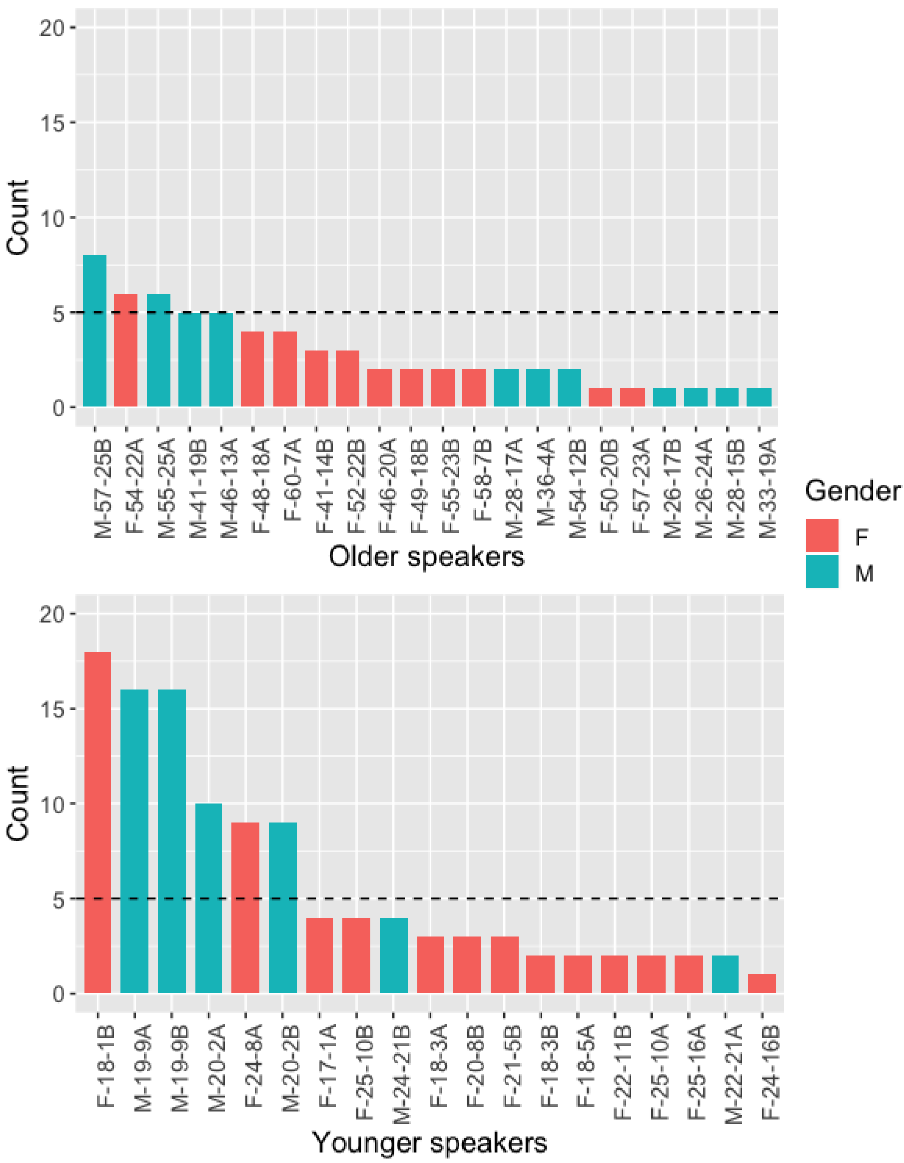

Figure 5.1: Total raw number of word searches by speakers across age group and gender. Dashed line shows where speakers performed more than 5 word searches. $n = 176$

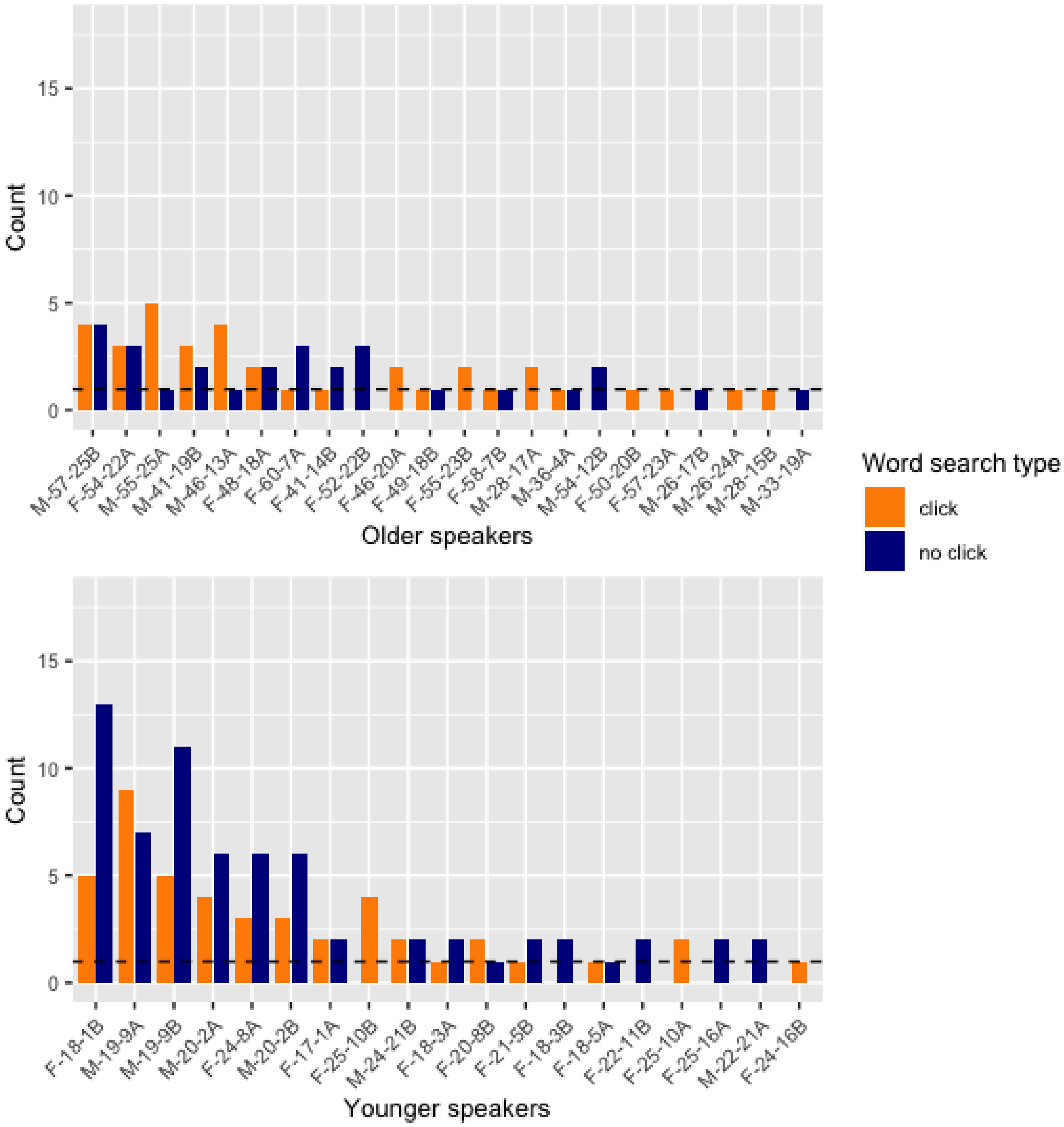

Figure 5.2: Distribution of word searches with and without clicks across speakers by age group in order of frequency of total word searches. Dashed line shows where speakers performed only one word search.

As Figure 5.2 shows, some speakers produced word searches without a click (in blue) more frequently, like speakers F-18-1B and M-19-9B, while some produced word searches with a click (in orange) more often, e.g. M-19-9A and F-20-8B. Some speakers produced only one kind of word search (i.e. only with or only without clicks). For example, 10 speakers only construct word searches with clicks: F-24-16B, F-25-10A, F-25-10B, F-46-20A, F-50-20B, F-55-23B, F-57-23A, M-26-24A, M-28-15B, and M-28-17A. In contrast, 8 speakers only produce word searches without clicks: F-18-3B, F-22-11B, F-25-16A, F-52-22B, M-22-21A, M-26-17B, M-33-19A, and M-54-12B. Younger speakers produced more word searches overall, and more word searches without clicks (n=67, around 60% of 112 total word searches produced by younger speakers). Note that caution is required when viewing such a low number of tokens and that these numbers might not be representative of consistent patterns.

Table 5.1 shows the number of word search sequences produced by both genders and age groups. Note the number of word search sequences is consistent across gender and within age groups but not across age groups. For example, both older male and female speakers produced about the same number of word searches (34 (19.3%) and 30 (17%) respectively) and younger male and female speakers exhibited similar rates of word search (57 (32.4%) and 55 (31.3%) respectively). Younger speakers overall, though, performed more word searches than older speakers (112 (63.7%) and 64 (36.3%) respectively).

Table 5.1: Distribution of word searches across gender and age groups

	Older		Younger		Total	
	N	%	N	%	N	%
Female	30	17	55	31.3	85	48.3
Male	34	19.3	57	32.4	91	51.7
Total	64	36.3	112	63.7	176	100

5.2.2 Word search click place of articulation

The results for word search click place of articulation are shown in Figure 5.3. Word search clicks are mostly dental (n=45, 55.5%), with some bilabial-dental coarticulated clicks (n=16, 19.7%), a few alveolar clicks (n=9, 11.1%), and all other places of articulation occurring fewer than five times.

These results mostly mirror those found for clicks in all interactional functions (Chapter 4, Section 4.3.1, which reported the most common place of articulation as dental (∼50%), with the next most frequent place of articulation as bilabial-dental coarticulated clicks (34%). Similarly, alveolar place of articulation was the next most common place of articulation for all clicks (7%). One notable difference here is the absence of bilabial or labiodental word search clicks, unlike clicks in other interactional functions, where these two categories occurred only infrequently.

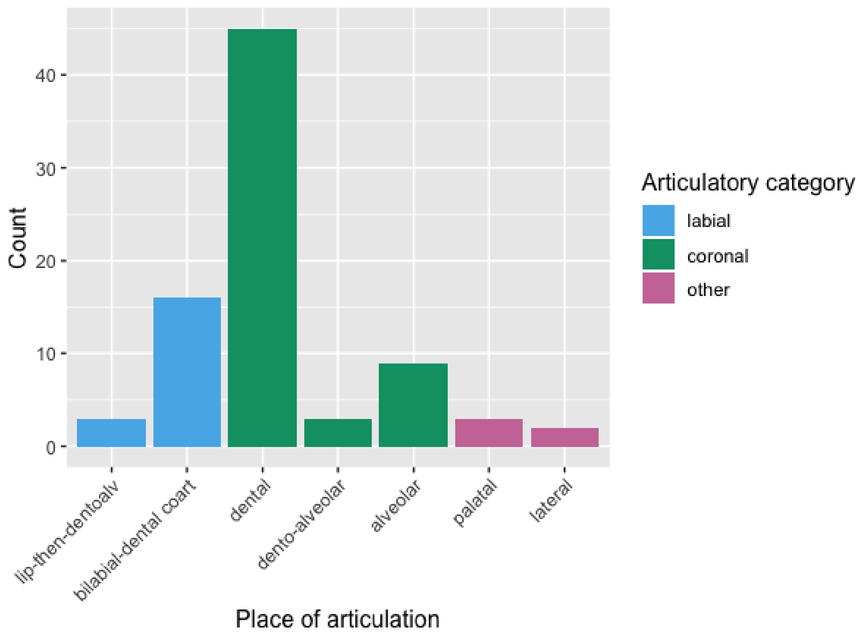

Figure 5.3: Distribution of word search clicks across place of articulation. n=81

Because of the low number of tokens overall, place of articulation for word search clicks was regrouped, as in Chapter 4, into the macro articulatory categories of labial, coronal, and other (palatal and lateral) articulation. The distribution of these macro articulatory categories is shown in the colors of the bars in Figure 5.3. Word search clicks were mostly coronal (n=60, 74%), with 5 "other" articulated clicks (palatal and lateral, 6% of the total word search clicks), and 16 labial clicks (20% of total word search clicks). Coronal articulation here makes up a much larger percentage than for clicks in all interactional functions, where only 55.5% of clicks are coronal, while 40% are labial, and 22% are palatal or lateral.

5.2.3 Phonetic accompaniments for word search clicks versus clicks in other interactional functions

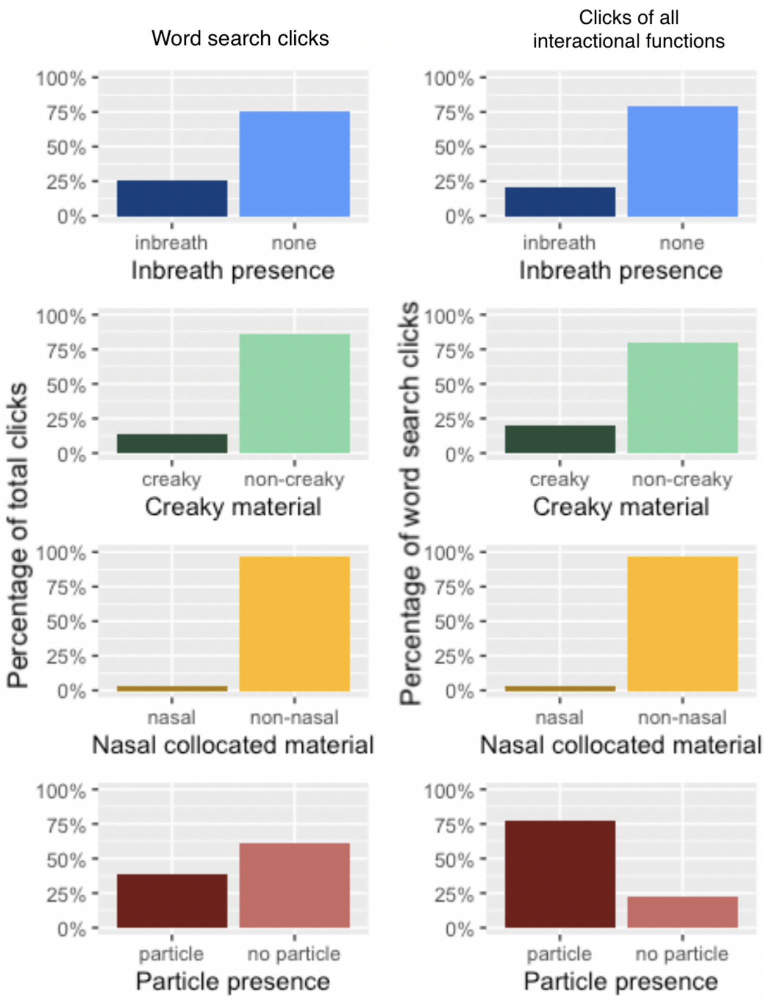

Figure 5.4: The distribution of clicks by across phonetic accompaniments. *Right column*: Word search clicks *Left column*: Clicks of all interactional functions

Figure 5.4 consists of 8 plots, which illustrate the proportions of phonetic accompaniments for word search clicks and all clicks. Most phonetic accompaniments pattern similarly across word search clicks and clicks in other interactional functions. Clicks in word search sequences occurred more often without an inbreath (n=64, 79%) than with an audible inbreath (n=17), which is similar to results for all clicks, 75% of which occurred without an audible inbreath. Clicks were also usually not collocated with creaky material (creaky n=16, 19.8% of word search clicks), like clicks in all interactional functions (14% of total clicks were creaky). Nearly all word search clicks were collocated with oral rather than nasal material (n=3, 3.7% word search clicks), which is similar to the low amount of collocated nasal material observed for all clicks (3% of total clicks). However, the proportion of clicks co-occurring with a particle is different for word search clicks. Particles were frequently present alongside word search clicks; there were 63 word searches containing clicks which also contained particles (77.8% of total word searches with clicks). This pronounced difference from clicks in all interactional functions, which co-occur with a particle only 38.5% of the time, shown in the fourth row of Figure 5.4.

5.2.4 Acoustic properties of word search clicks

The acoustic features examined here are Centre of Gravity and duration. Figure 5.5, Plot A displays Centre of Gravity for all word search clicks. The mean COG for word search clicks was 4615 Hz. The mean here is similar to findings from clicks in all interactional functions in the previous chapter, where the reported mean COG for all clicks is 4780 Hz.

On the right side of this figure, Plot B displays the distribution of COG across articulatory category. These patterns are similar, but less extreme than those found for clicks in all interactional functions. Coronally articulated word search clicks have a higher mean COG (=4816 Hz) than labial word search clicks (mean COG = 4236.5 Hz), and a much higher mean than word search clicks belonging to the 'other' category (mean COG = 3407.8 Hz). Comparing the mean values of word search click COG to clicks in all interactional functions, 'other' (palatal and lateral) word search clicks have a slightly lower mean COG than all clicks (mean 'other' COG for all clicks = 3966 Hz). Coronal clicks for all interactional functions also have a slightly higher COG than coronal word search clicks (mean coronal COG for all clicks = 5013 Hz).

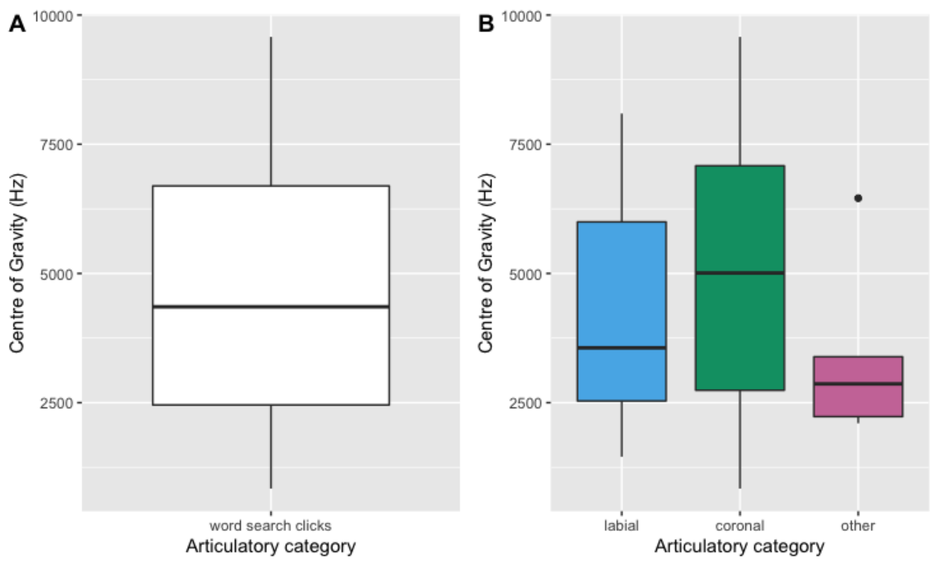

Figure 5.5: **A.** Summary of word search clicks' spectral Centre of Gravity. **B.** Word search clicks' spectral Centre of Gravity by articulatory category

Word search clicks were on average 85 milliseconds in duration, shown in Figure 5.6. These results are similar to duration results for clicks in all interactional functions, where the mean duration was 82 milliseconds. Duration was again log-transformed for word search clicks, as before (see Chapter 4, Section 4.6.1.2).

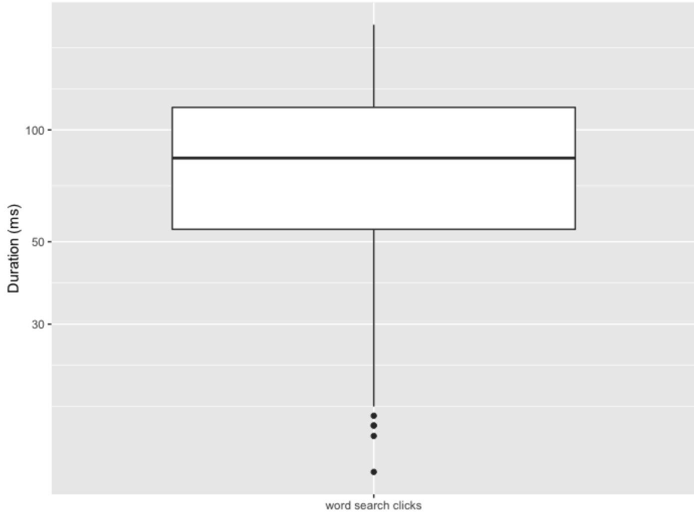

Figure 5.6: Summary of log-transformed duration for word search clicks

5.2.5 Position in turn for word search clicks

Table 5.2 shows that nearly all word search clicks occurred mid-turn (n=73, 90% of total word searches). Only 7 clicks occurred pre-turn, 1 occurred post-turn, and 0 word searches occur outside of a turn (i.e. standalone position). Only one word search click could not be categorised (marked as 'unsure') due to overlapping turns. Note that this heavily skewed pattern of results for word search clicks by position in turn means that it cannot be modelled statistically in Section 5.2.6 below.

Table 5.2: Distribution of word search clicks across position in turn

Position in turn	N	%
pre-turn	7	7.4
mid-turn	73	90
post-turn	1	1.2
standalone	0	0
unsure	1	1.2
Total	81	100

The proportion of word search clicks occurring mid-turn here is much higher (90%) than for clicks in all interactional functions. Though mid-turn was also the most common position in turn for all clicks (n=311), only 53% of the total clicks occurred mid-turn, with more clicks in all interactional functions occurring at other positions in turn.

5.2.6 Inferential results of clicks used in word search versus sequence-managing functions

The previous sections outline the form and function of word search clicks and illuminate differences between these clicks and those used in all other interactional functions presented in Chapter 4. Here, I quantify these results through logistic regression analysis of the response variable: clicks used in word search versus clicks used in other sequence-managing functions. Models were fit using using the procedures described in Chapter 3 Section 3.8 and implemented in Chapter 4 Sections 4.6.

In Chapter 4 Section 4.6.3 I find statistically significant differences in clicks in sequence-managing functions and clicks in affect-laden functions. For this reason, modelling in this section uses a smaller dataset, reduced from Dataset A (Chapter 4, Section 4.5). The dataset used in this section, will be referred to here as **Dataset B**. Starting with Dataset A, Dataset B is further reduced by excluding all affect-laden clicks. Dataset B therefore includes only sequence-managing clicks in the present study. There are a total number of 390 clicks in Dataset B; 76 used in word search (19%) and 314 occurring as a part of other sequence-managing functions (81%). Before presenting results from regression analysis, observe the distribution of click tokens across speakers by age group and gender in Figure 5.7.

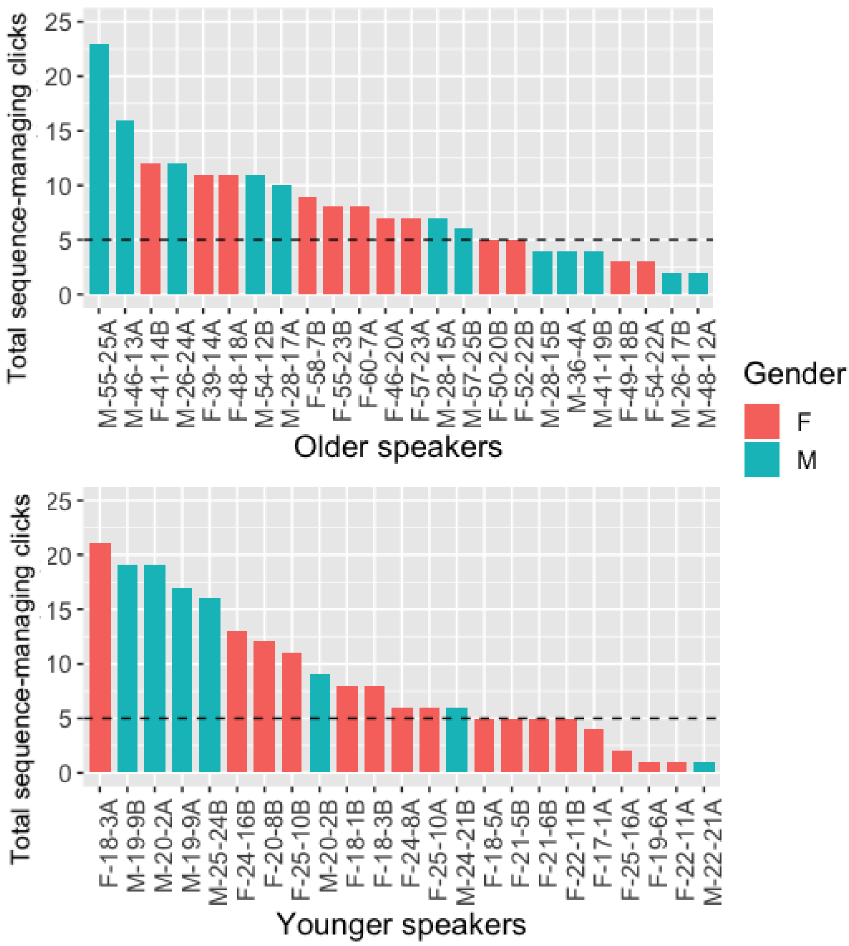

Figure 5.7: Distribution of all sequence-managing clicks in Dataset B across individual speakers by age group and gender (n=390). Dashed line shows where speakers produced only 5 clicks.

The goal of the regression analysis was to explore the extent that word search clicks are performed differently to clicks in other sequence-managing functions. Similarly to the regression analyses performed in the previous chapter, I first examined cross-tabulations of all variables to determine all possible combinations of two-way interactions. From this, I determined that, of the features used in models for Dataset A, only a few predictors could be included: place of articulation (coronal ‘1’ or non-coronal ‘0’), particle co-presence, age group, and gender. This resulted in the initial model laid out below.

```
glmer(ws_vs_other~(particle+coronal+agegroup+gender)^ 2+(1|speaker), data=DfB,
family=“binomial”)
```

This model analyses clicks in sequence managing functions using the response variable `ws_vs_other`, either word search (‘1’) or other sequence-managing functions (‘0’). The explanatory (e.g. independent) variables are particle presence, coronal articulation, age group, and gender, which are all tested for a possible two-way interaction. After comparing multiple models using ANOVAs, the best-fit model is as follows:

```
glmer(ws_vs_other~particle+coronal+(1|speaker), data=DfB, family= "binomial")
```

Table 5.3: Model output table for regression of word search clicks versus clicks in other sequence-managing functions. Intercept = Non-coronal clicks without a particle.

	word search vs	**sequence-managing**	
Predictors	*Odds Ratios*	*CI*	*p*
(Intercept)	0.05	0.02 – 0.10	<**0.001**
particle [particle]	7.74	4.04 – 14.80	<**0.001**
coronal [1]	2.03	1.04 – 3.97	**0.037**

The output of the final model is shown in Table 5.3, where the intercept is non-coronal clicks occurring without a particle. There is an effect of both particle presence and coronal articulation on the probability of a click being used in word search as opposed to other interactional functions. Clicks occurring with particles are much more likely to be used in word search than other sequence-managing functions (β= 7.74, p<0.001). Coronal clicks are slightly more likely to be used in word search rather than other sequence-managing functions (β=2.03, p=0.037).

5.3 Word search sequences with and without clicks

This section now addresses the second group of research questions in Section 5.1.1, which shifts in focus to analyse word searches with and without clicks. To compare word search sequences with clicks to those without, the distribution of phonetic features across word searches must be compared. This section begins by presenting results on the sequential location of word searches (e.g. as part of an adjacency pair, quote, or part of a longer turn) after Ogden (2018, see Chapter 3, Section 3.6.3.5). It then examines how word search sequences pattern by phonetic accompaniments (i.e. inbreath, creak, nasality, particle presence, and pause presence). Finally, using mixed and fixed effects logistic regression models, the effects of phonetic and social features on the presence of a click in a word search is presented.

5.3.1 Sequential location of all word searches

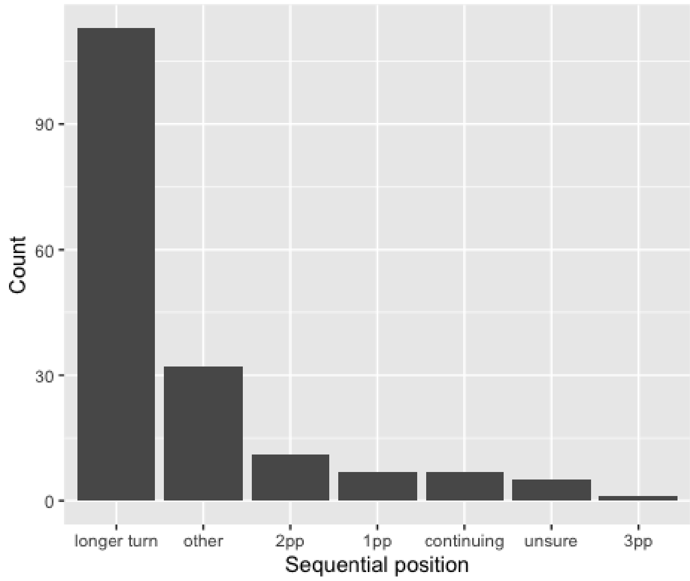

Figure 5.8: Distribution of word searches across sequential locations. Note 1pp=first pair part, 2pp=second pair part, 3pp=third position.

Word searches were coded for their sequential location after Ogden (2018) specifically to analyse clicks as parts of adjacency pairs. Word searches could occur in an adjacency pair (first pair part, second pair part or third position), part of continuing a turn, or part of a longer turn. Word searches could also fall into an 'other' category which includes responses to their co-participant or side sequences. If the sequential location could not be identified, it was placed in the 'unsure' category. Results of word searches' sequential location are displayed in Figure 5.8.

Most word searches were part of a longer turn like telling a story (n=113, 64.2%). 32 word searches (18%) belonged to the 'other' category. Seven word searches (4% of the total word searches) were part of continuing a turn (e.g. after the other participant interjected and the interlocutor continued their previous turn). Only seven word searches are part of a first pair part in an adjacency pair (4% of total word searches), 11 word searches are part of a second pair part (6.3%), and one word search occurs in third position (0.6%). Recall that third position refers to a response by the producer of the first pair part to the content of the second pair part (e.g. first: *How are you doing?*, second: *Well, thank you.*, third: *That's good*). No word searches appear as part of reported speech, and five tokens' sequential locations could not be determined, categorised as 'unsure' (2.8%).

5.3.2 Phonetic accompaniments in word searches with and without clicks

Since interactional functions can vary in their composition (e.g. Pichler 2016b), word search might vary in its presence of phonetic accompaniments with and without a click. These results are presented here followed by the results of the effect of social factors on click production in word search.

5.3.2.1 Variation of word search across phonetic accompaniments

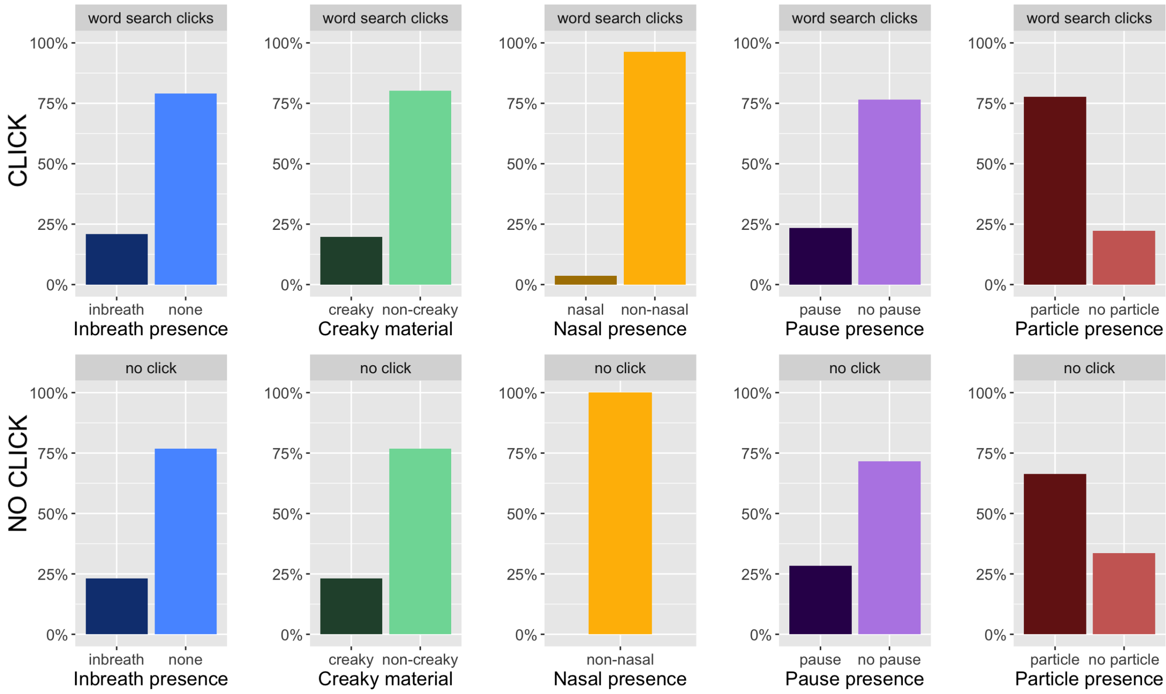

Figure 5.9: Distribution of phonetic accompaniments in word searches with and without clicks. *Top row*: Word searches with clicks. *Bottom row*: Word searches without clicks.

Figure 5.9 shows that word searches pattern similarly with regards to phonetic accompaniments both with and without clicks. Word searches with and without a click are more likely to occur without an inbreath (with a click n=64, 79%, without a click n=73, 77%). Word searches with and without clicks are also more likely to be non-creaky (with a click n=65, 80%, without a click n=73, 77%). Nasality is infrequent in word searches altogether, only appearing three times in word searches with clicks (4%) and never without clicks. Word searches with and without clicks include around the same proportion of pauses (pauses with a click n=19, 23.5% and without a click n= 27, 28.4%). One phonetic accompaniment which occurs in word search in slightly different proportions with and without a click is the presence of a particle. Particles occur in word searches with clicks 63 times (77% of total word searches with clicks) and 63 times in word searches without clicks (66%).

To discern whether these phonetic accompaniments constrain click presence in word search, a model was fitted with "click presence in word search" as a response variable. Modelling here is again (see Section 5.2.6) done by way of a mixed effects logistic regression, which allows the model to control for individual variation across speakers by fitting a speaker intercept. Models here were fit differently to previous models because of the low number of word searches here. It was not possible, due to the low number of tokens, to fit any interactions. Therefore, the initial model was fitted for all possible single effects (excluding nasality and position in turn due to low ns) and no two-way interactions. Note that social factors are not present in this model as there are so few tokens that we risk a singular fit (i.e. the model will not converge) by including them (see Chapter 4 Section 4.6). The initial model fitted is below.

> glmer(click_noclick∼ pause + particle + inbreath + creaky + (1|speaker), family = 'binomial', data= WS.df)

In the above model, click_noclick refers to word searches with and without clicks, where '1' represents click presence and '0' represents click absence. The explanatory variables are pause presence ('pause' or 'none'), particle presence ('particle' or 'no particle'), inbreath presence, ('inbreath' or 'none'), creak presence ('creaky' or 'none').

Table 5.4 displays the results of the logistic regression, where the intercept is word searches with a pause, particle, inbreath, and creak. No phonetic accompaniment has a significant effect on whether or not a click occurs in a word search sequence, as p values for all variables are non-significant (p>0.05).

Table 5.4: Results of regression model for phonetic accompaniments and presence of a click in word search. Intercept = word searches with a pause, particle, inbreath, and collocated creak.

	click or no click		
Predictors	*Odds Ratios*	*CI*	*p*
(Intercept)	0.64	0.20 – 2.09	0.463
pause [no pause]	1.24	0.61 – 2.54	0.557
particle [no particle]	0.56	0.28 – 1.14	0.112
inbreath [none]	1.13	0.53 – 2.41	0.742
creaky [non-]	1.30	0.60 – 2.83	0.502

5.3.2.2 Social factors and click presence in word search

One of the broader research questions of this thesis is how click form and function vary across social groups. Here, this is investigated through how word search with and without a click varies according to gender and age. It was intended that social factors be modelled together with linguistic factors, but this model was not possible because of the small size of the dataset. When a mixed effects model was fitted with gender and age, it failed to converge, resulting in a singular fit. This means the random effects structure is too complex to be supported by the data in the model (i.e. speakers producing only one word search are too strongly correlated with another particular factor). To combat this, rather than fitting an initial model with all possible linguistic and social factors, I first took the opposite approach of fitting social factors without linguistic factors. This also failed to converge, meaning that a mixed effects model with social factors is not possible for this data. This is due to the low number of tokens across social factors and by individual speaker. We have already seen from Figure 5.7, that some speakers perform very few word searches overall, and some produce only word searches with clicks or only word searches without. This makes modelling using a speaker intercept challenging.

Because the intention of this thesis is to illustrate patterns, a fixed effects logistic regression model was fitted, using gender and age group and excluding a speaker intercept. All linguistic factors were excluded from this regression model because Table 5.4 shows that there were no significant effects. Without a speaker intercept, results could appear misleading in a subsequent regression model. In the model containing social factors, where significant effects were observed, I inspect the results also for individual speakers with social groups, to discern whether regression results can be assumed to be representative for the sample, and not the result of outliers.

Eliminating a speaker intercept, the final model was fitted as below:

```
glm(click_noclick~gender + agegroup, family= 'binomial', data=WS.df)
```

The model results are presented in Table 5.5.

Table 5.5: Summary of model output for the effect of social factors on the presence of clicks in word search. Intercept = word searches performed by older and female speakers

	click or no click		
Predictors	*Odds Ratios*	*CI*	*p*
(Intercept)	0.153	-0.43 – 0.74	0.609
gender [M]	0.185	-0.42– -0.79	0.546
agegroup [younger]	-0.646	-1.27– -0.02	**0.042**

Table 5.5 shows that the younger group of speakers click significantly less frequently in word search sequences than the older speakers (β=-0.646, p=0.042). Figure 5.10 repeats the raw data in Figure 5.2 (from Section 5.2.1) by individual speakers, and shows that overall younger speakers construct more word searches without clicks than older speakers. It does not appear that one individual is driving this result, evidenced by the several taller blue bars which represent word searches without clicks in the top half of the figure. Therefore, we can infer that there is an effect of age on click presence in word search.

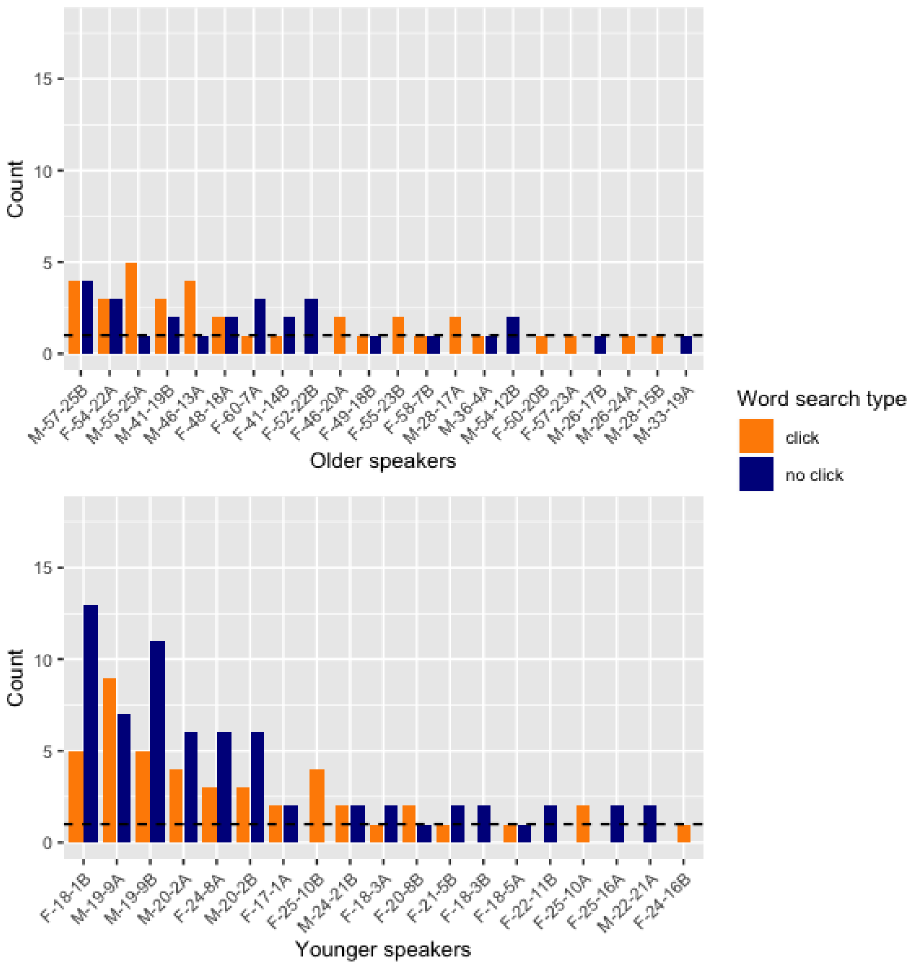

Figure 5.10: Reproduction of distribution of word searches with and without clicks across speakers by age group

5.4 Discussion

Out of 176 word search sequences roughly half were constructed with a click (n=81). Word search clicks are performed differently than clicks in other interactional functions with regards to place of articulation and particle co-presence. Within word search, linguistic factors do not seem to have an effect on whether or not a click is present, but social factors do; older speakers produce more clicks in word searches than younger speakers.

The results reported lead to several conclusions. First, clicks vary in their phonetic from across fine-grained interactional functions. Second, interactional functions are comprised of multiple linguistic features which work together to perform the function, i.e. clicks, phonetic accompaniments, etc. Third, the performance of interactional functions can vary across social factors (in this case, age). These statements are discussed in this section alongside results and previous phonetic and CA literature.

5.4.1 Word search clicks versus clicks in other interactional functions

Word search clicks are performed differently from clicks in all other function and clicks within the same broad interactional category (sequence-managing). Specifically, word search clicks occur more frequently mid-turn, are more coronal, i.e. more likely to be produced with dental, dento-alveolar, and alveolar articulation, and more often collocated with particles.

5.4.1.1 Word search click place of articulation

While the full range of articulation (bilabial to lateral) is present for clicks in all interactional functions in the Glaswegian recordings, there are no bilabial or labiodental word search clicks, which both occur only infrequently in clicks in all interactional functions. However, for both word search clicks and all clicks in the data, dental clicks are the most frequent place of articulation, followed by bilabial-dental coarticulated clicks and alveolar clicks. The proportions of clicks at these places of articulation when used in word search as opposed to other interactional functions is slightly different.

Particularly interesting is the absence of bilabial clicks altogether in word search. Bilabial clicks are infrequent for clicks in all interactional functions. These findings are contra Wright (2005:196), who reports that clicks in word searches are always bilabial or alveolar. There are two possible reasons for the difference between place of articulation for word search clicks here and reported by Wright (2005).

First, it is possible that Wright (2005) refers to the bilabial-dental coarticulated clicks I find in this study. Note that I used video data to help identify place of articulation (see Chapter 3, Section 3.6.2.3). Wright relied on audio data only, and may have been able to identify involvement of the lips in these clicks but not the tongue tip or blade against the upper front teeth. I would not have recognised this place of articulation without the video data.

Second, the difference could be indicative of a dialectal difference in place of articulation for word search clicks. If this is the case, fine-grained click place of articulation such that Glaswegians do not produce the "same" type of labial click in word search as the Standard British English and American English examined by Wright. Glaswegians, then, seem to use a particular type of labial click in word search that may not be used in other varieties of English.

When the places of articulation are regrouped in their larger categories of labial, coronal, and 'other', the variation in proportions of places of articulation can be seen clearly; a higher proportion of word search clicks are coronal, i.e. dental, dento-alveolar, and alveolar (74.4%), while for all clicks, though the most frequent articulatory category is coronal, the proportion of coronal clicks is lower

(55.5%). The model summary confirmed that word search clicks are significantly more likely to be coronal than clicks in other interactional functions.

One plausible reason for the large proportion of coronal clicks, as opposed to clicks at other places of articulation, is that, just as some actions are more likely to contain specific features (e.g. the action of indexing a new sequence is likely to contain in breath, e.g. Wright 2005, or word search actions are likely to contain particles *uh*/*um* e.g. Brouwer 2003), it is possible that certain actions contain clicks with specific places of articulation more frequently than other actions. This may not have been apparent in the previous chapter because how the relationships between form and function were analysed (i.e. in larger groups of sequence-managing and affect-laden rather than specific interactional function).

5.4.1.2 Acoustic properties of word search clicks versus clicks in other interactional functions

The descriptive results from duration of word search clicks versus clicks in all other interactional functions show click duration is similar for word search clicks and clicks in all interactional functions.

Bearing in mind Pillion's (2018) findings of affect-laden clicks being longer in duration than sequence-managing clicks, it seems plausible that the duration for word search clicks might be similar to the duration for all clicks because of the high number of sequence-managing clicks (n=403, 91% when 'unsure' tokens are removed) compared to affect-laden clicks in the total dataset.

Coronal word search clicks have a higher spectral COG than clicks with labial and other places of articulation (c.f. Trouvain and Malisz 2016). The results for COG of word search clicks' versus clicks in other interactional functions are also similar except for one articulatory category: the 'other' category, which includes palatal and lateral clicks. Palatal and lateral word search clicks had an average lower COG than palatal and lateral clicks in all interactional functions.

This maybe be due to two reasons: (1) there are fewer instances of word search clicks in the 'other' category (n=5) or (2) clicks occurring as doubles or multiples in word search were the only palatal and lateral word search clicks.

First, the low number could account for the large contrast between word search clicks' COG and all clicks' COG for this macro articulatory category. Second, of those 5 instances, two are part of a double click and three are part of a triple click. It might be, then, that palatal and lateral clicks are only used in word search sequences in multiples.

5.4.1.3 Word search clicks' position in turn

More word search clicks (and word searches overall) occur mid-turn than any other position in turn. The proportion of word search clicks occurring mid-turn (90%) is much higher than for clicks in all interactional functions (58%). Because of the heavily skewed nature of this data, it was unfortunately not possible to model this as a constraint on whether a click occurred in a word search as opposed to another function, though the results presented here strongly suggest this might be the case. There are plausible explanations for this: (1) previous research on word search and getting back to prior talk (Schegloff, Jefferson and Sacks 1977; Goodwin and Goodwin 1986; Brouwer 2003; Local 2004) and (2) the process of identifying word searches used in this thesis which derives from this literature.

First, many CA studies on word search (also called self-initiated repair by Schegloff, Jefferson and Sacks 1977), identifies word searches beginning "mid-sentence, after cut-off syntax" (Goodwin and Goodwin 1986:55). For example, in Fragment 5.4.1, F-58-7B says in line 2 "Did I ever tell you about the time when I worked in ehm—". She then pauses and produces a click before producing the 'searched-for item' (c.f. Wright 2005) "Bridgeton." The talk produced in line 2 is an example of cut off syntax which is accepted as a signal of a projected word search. For this cut-off syntax to occur, the speaker's turn has to have already begin, i.e. it is highly probable that the word search will occur mid-turn.

Fragment 5.4.1: *Bridgeton?* F-58-7B produces a dental word search click before recalling a word

F-60-7A: But it is you're right it is one of those things that completely
F-58-7B: Did I ever tell you about the time when I worked in ehm (.)
[||]↑ Bridgeton (.) and you couldn't park at the off they didn't
have parking so across the road up on sidestreets there was lots
of houses

Second, the transcription protocol used to identify word search sequences here is based on the above research, i.e. cut-off syntax was used as a criterion of identifying word searches. This then results in mostly mid-turn word searches occurring (both with and without clicks).

5.4.1.4 Phonetic accompaniment in word search clicks and clicks in other interactional functions

All phonetic accompaniments occurred in similar proportions across word search clicks and clicks in other interactional functions except for the co-presence of a particle. These descriptive results are supported by the regression results in Section 5.2.6 which show that clicks are significantly more likely to occur in a word search sequence if a particle is present as well. The proportional difference in phonetic accompaniments between word search clicks and clicks in all interactional functions is likely due to the features that are known to co-occur with word search in general.

One plausible reason for the fact that particles co-occur more frequently with word search clicks is found in the CA literature. Particles are a well-established feature which can−and frequently do−occur in word search sequences (e.g. Schegloff, Jefferson and Sacks 1977; Goodwin and Goodwin 1986; Brouwer 2003; Local 2004). Particles are nearly always mentioned in conjunction with word searches and self-initiated repair. Goodwin and Goodwin (1986:55) report that "speech perturbations such as sound-stretches and *uhs*" occur in word search; Oelschaeger and Damico (2003:215) also report the occurrence of "speech perturbations, e.g. *uh/um*" in word search; Schegloff et al (1977:397) report that most word searches "have a particle"; and Local (2004:9) reports that *uh* or *um* can "appear as an indicator of a repair in process." More specifically with regards to clicks in word searches, Wright (2005:212) reports that word searches with clicks are routinely initiated with a particle. It is no surprise then, that the presence of a particle is a significant predictor of a click being used in a word search sequence.

5.4.1.5 Summary of word search clicks compared to all other interactional functions of clicks

There are three main differences between word search clicks and clicks in other interactional functions: word search clicks are more likely to be produced with dental, dento-alveolar, or alveolar articulation, are more likely to co-occur with a particle, and are more likely to occur in the middle of a speaker's turn.

5.4.2 Comparison of word searches with and without clicks

5.4.2.1 Variation in word search sequences with and without a click

Phonetic accompaniments mostly patterned similarly across word searches with and without clicks. One exception is the empirical evidence for the presence of a particle in word search, such that there were more particles in word searches with clicks. This trend is unconfirmed by regression analysis in Section 5.3.2.1, which reports no significant findings for any phonetic accompaniment as a predictor for click presence in word searches in these data.

Though it seems likely in this small dataset that there might be a relationship between particle presence and click presence, overall, the findings suggest that all word search sequences contain some clicks, few audible inbreaths, creak, nasality, and pauses, and many particles. These results reflect Pichler's (2016) assertion that interactional functions are comprised of a combination of features. It also seems likely from these findings that phonetic patterning of clicks in interaction might be due to the interactional function in which they occur, rather than the click itself, as suggested by Ogden (Ogden 2013).

Furthermore, the presence of the click seems to be very much due to social factors. There was an observed effect of on word search such that (1) younger speakers produced more word searches overall, but (2) older speakers produced significantly more clicks in word searches.

One possible explanation for this could be that performing many word searches is part of a 'younger' speaker identity, but that there is a linguistic change (i.e. an apparent-time change) ongoing such that clicks are being produced less frequently than previously. To investigate this proposition, we would require prior recordings of spontaneous speech to examine clicks in word search.

These results might indicate socio-indexical meaning of clicks in word searches and reflect anecdotal observations of older (matriarchal women) tutting (mostly to show disapproval). This could be investigated in future via a perception study to examine whether clicks in word search are perceived as an "older" or "younger" quality. If this is the case, clicking in word search could be seen as age-grading, such that this feature is restricted to one age-group, here older speakers and less used by other age groups. Recall that age is possibly confounded with education level for this study (originally intended to be indicative of social class, see Chapter 3, Section 3.4.1). This may obscure age-grading results.

5.5 Conclusion

This chapter has examined one interactional function in which clicks can occur in English: word search. First, word search clicks were compared to clicks in all other interactional functions, demonstrating that word search clicks are different with regards to place of articulation, particle presence, and position in turn. Then, the variation of word search sequences with and without a click was illustrated, finding that, despite the trend in word searches with clicks containing a particle more frequently, phonetic accompaniments observed here do not constrain click presence in word search. We found instead, that despite younger speakers performing more word searches, older speakers click more in word search. Together these findings show that much of clicks' phonetic form is a result of the interactional function in which it is embedded, and click presence in interactional functions is constrained by social factors. This has implications for other phonetic features as well, such that variation of these features can be subject to both the interactional context and socio-indexical information about the speaker who produces those features.

Chapter 6

General Discussion

6.1 Overview

This thesis aimed to investigate clicks as a sociolinguistic variable in Glaswegian interaction. Through analysing clicks' phonetic form, overall interactional functions in which clicks can occur, and how clicks vary in one interactional function (i.e. word search), the present study has broadened our understanding of the patterning of an interactional feature across phonetic features, position in turn, interactional function, and social factors. This chapter discusses these results, with respect to the research questions below.

The first research question investigated **phonetic form and interactional functions of clicks in one regional variety of English**. Phonetic form here refers to click place of articulation, phonetic accompaniments, and acoustic properties, while conversational functions refers to fine-grained interactional function (e.g. word search, backchannel), as well as macro interactional categories, i.e. sequence managing– interactional functions which facilitate turn-taking and topic-shifting in interaction– and affect-laden functions– interactional functions which display an attitude or stance towards someone or something. Click rate, or the number of clicks produced per minute, overall and across individuals was considered here. Click rate, the auditory and acoustic characteristics of Glaswegian clicks, and how these relate to their interactional functions, are discussed in Section 6.3.

The second research question aimed to **investigate one interactional function in which clicks occur**: word search. Here, two approaches were taken for separate reasons. CA studies (e.g. Brouwer 2003; Wright 2005; Ogden 2013) emphasise that phonetic patterning as a result of interactional function, i.e. that some interactional functions contain specific phonetic features while others do not, but we also know that clicks, regardless of interactional function, can be produced with many different places of articulation and can occur with phonetic accompaniments, i.e. audible inbreath, creaky voice, nasality, and particles. However, how much the phonetic patterning of a click varies across specific interactional functions remains unknown. This question was investigated by comparing the phonetic form of word search clicks to clicks in other sequence-managing functions, finding that clicks' phonetic form varies across interactional function.

This second research question was also considered in from another perspective. Variationist sociolinguists argue that, in order to appropriately capture the scope of variation for a sociolinguistic variable, one must examine all possible instances where the variable can be used (Principle of Accountability, Tagliamonte 2012:9), and be able to state exactly where they were observed (variable circumscription, Tagliamonte 2012:10). As in the first approach for this research question, CA studies assert that without controlling for the interactional function itself, it is not possible to know which phonetic features are due to click presence, and which are due to interactional function. Therefore, an approach of looking at all word searches with and without a click was taken, comparing these across both phonetic accompaniments and social factors.

These two perspectives on word search illustrated that clicks vary in their place of articulation and phonetic accompaniments across interactional functions, but that the presence of clicks within interactional functions is dependent on social factors. These results are discussed in Section 6.4.

The third research question was **how clicks and the production of clicks in word search pattern according to social factors**. This was investigated in two ways. First, click phonetic form (i.e. place of articulation, spectral frequency, and duration) and interactional category (i.e. sequence-managing or affect-laden functions) were investigated across age and gender. Main findings demonstrated effects of gender and/or age on all features tested except click place of articulation. Second, social factors and word search were considered in two ways: with regards to (1) the effect of social factors on whether a click was more likely to be used in word search or another sequence-managing function, and (2) the effect of social factors on whether or not a click was produced in word search sequences with and without clicks. These findings showed that social factors did not play a role in whether a click is more likely to occur in word search compared to other functions, but they did play a role in click presence in word search sequences with and without clicks; though younger speakers performed more word searches, they used clicks in those word searches less frequently than the older speakers. These results are discussed in Section 6.5.

This chapter discusses these results, first with a summary of findings, then by answering the research questions above, comparing results to previous research, and considering explanations for these results. Some additional results are also explored in the relevant sections. The chapter concludes with a summary of proposed future research, and reflections upon the present study.

6.2 Summary of findings

Glaswegian men and women, age 17 and over all produce clicks. In nearly 22 hours of spoken Glaswegian from 48 of the 50 speakers recorded, 525 clicks were identified. This resulted in an overall click rate of 0.36 clicks produced per minute of recording. Individual click rate varied; two men did not produce any clicks, while three men had high click rates, producing more than one click per minute.

Clicks were realised with bilabial, labiodental, bilabial-dental coarticulated, dental, dento-alveolar, alveolar, palatal, or lateral place of articulation. Glaswegians produced mostly dental clicks, i.e. with the tongue tip or blade pressed against the back of the upper front teeth. When click were regrouped into coronal (i.e. dental, dento-alveolar, and alveolar) and non-coronal (i.e. all other places of articulation) categories, clicks were more likely to be produce with coronal articulation if they co-occurred with a particle (*uh* or *um*), and if they occurred at the beginning or in the middle of a speaker's turn.

Clicks occurred as a single, or as part of a double or triple click (i.e. one occurring directly after the other). The only clicks that were used in double or triple clicks were less frequent places of articulation for the data set overall: palatal (with the tongue broadly against the palate) and lateral (an alveolar click with a lateral release).

Glaswegian speakers produced clicks with audible inbreath, nasality, creak, and particles, e.g. *uh* and *um*. Mostly, these clicks were not produced with inbreaths, nasality, or creaky voice frequently, but particles did sometimes co-occur with clicks.

Click place of articulation was reflected in their mean spectral frequency; clicks with dental, dento-alveolar, and alveolar articulation had higher average frequencies than clicks with a release at the lips, or with more backed places of articulation. Clicks produced at the beginning of a turn differ in their spectral frequency depending on their interactional function.

One of the more intriguing findings here is that younger speakers have clicks which acoustically show a higher spectral frequency than older speakers for these data. As the younger speakers are young adults and therefore their vocal tracts are fully developed, this suggests that speakers are deliberately varying in their fine-grained articulation of clicks.

Clicks were longer in duration if they were part of affect-laden functions (e.g. assessments, display of sympathy), and shorter if they were part of sequence-managing functions (e.g. word search, backchannel). Older Glaswegians produced longer clicks than younger Glaswegians, and women produced longer clicks than men here. Clicks were also shorter with a particle if they occurred outside of the turn, i.e. if the speaker who produced the click was not the interlocutor.

In Glasgow, speakers used clicks to aid in many interactional functions. Clicks could occur as a part of sequence-managing functions– interactional functions which facilitate turn-taking and topic-shifting in interaction– and affect-laden functions– interactional functions which display an attitude or stance towards someone or something. Clicks were more likely to occur in sequence-managing functions than affect-laden functions, especially if they were produced with a particle. When women produced clicks outside of their turn, i.e. when they were not the interlocutor, these clicks were more likely to be affect-laden.

Then, the focus of the present study shifted to word search, i.e. one fine-grained interactional function in which clicks occur. First, word search clicks were compared to clicks of other sequence-managing functions, which illustrated that Glaswegian speakers clicks produced with specific places of articulation and alongside a particle were more likely to be used as a part of word search. Word search clicks (and word searches without clicks) were overwhelmingly produced in the middle of a speaker's turn.

The second perspective for word search was to examine phonetic accompaniments in word searches with and without clicks. Results for this perspective showed that word searches do not contain more or fewer phonetic accompaniments if a click is present, but that click presence is dependent on who is performing the word search. Younger speakers, despite performing more word searches overall, produced proportionally fewer clicks in word search, compared to the older speakers.

The above results show that click phonetic form and interactional function can vary according to linguistic and social factors, but, perhaps more importantly, that much of this variation is due to the interactional function in which the click is embedded, and not the presence of the click. However, click presence, form and interactional function all seem to be subject to social factors.

The sections below consider these results, placing them in the context of the broad research questions for this thesis presented in Chapter 2.

6.3 Phonetic form and conversational function of clicks in Glasgow

6.3.1 The phonetic form of clicks in Glasgow

Clicks' phonetic form was investigated here in relation to (1) click rate across speakers, (2) place of articulation, (3) phonetic accompaniments (e.g. audible inbreath, nasal and/or creaky collocated material, particle presence), and (4) acoustic spectral and temporal properties (e.g. clicks' Centre of Gravity and duration).

6.3.1.1 Click rate in Glaswegian speakers

The overall click rate found was 0.36 clicks produced per minute. Click rate varied across individual speakers, with some high rate clickers (producing more than one click per minute), some low rate clickers (producing fewer than 0.25 clicks per minute), and two speakers who produced no clicks at all (and therefore had to be removed from the sample, Section 3.4). The three highest rate clickers were younger male speakers, though the proportion of the total clicks produced by gender was roughly equal. This variation in individual click rate is similar to Gold et al. (2013), who report no apparent pattern to suggest what constrains click rate. Though it should be noted that only Pillion (2018) overtly compares click rate across studies, the overall click rate here was lower than most previous studies (e.g. Wright 2011; Gold, French and Harrison 2013; Ogden 2013; Trouvain and Malisz 2016; Moreno 2016).

The difference in results of overall click rate here compared to previous studies might be due to three reasons: (1) the speech style used for analysis, (2) transcriber differences, (3) individual variation, and (4) data collection versus data selection.

First, speech style could have played a part in the variation of overall click rate across studies. Click rates are high for studies which analyse more formal speech, e.g. 9.2 clicks per minute at keynote talk at a conference (Trouvain and Malisz 2016). They also report click-rate varied depending on where in the keynote speech they took place; there were more clicks per minute in the introductory section of the talk. As there is evidence to suggest interactional functions are constrained by the kind of talk being performed (e.g. Drew and Sorjonen 2011), it is plausible that actions performed by a speaker giving a keynote speech at a conference (e.g. sequence-managing functions to shift topics, delimit ideas, and convey ideas to the audience) might promote higher click rates because clicks occur in these interactional functions. Furthermore, it's likely these actions are more frequent in formal presentations than in paired casual conversations or sociolinguistic interviews

Another speech style which might incur higher click rates is the Sociolinguistic Interview. This is because one goal of the sociolinguistic interview is to gather as much speech from the participant. Therefore, interactional functions which occurred more frequently in the present study might also occur in sociolinguistic interviews more frequently, e.g. more clicks in indexing a new sequence or in word search. This is shown in Moreno (2016), who reported a higher number of clicks in sociolinguistic interviews in Shetland and Buckie than in casual conversations in Glasgow, though it is unclear if this difference is truly due to speech style (sociolinguistic interviews versus casual conversations) or regional variation in click production.

It is possible that for the casual conversations in the present study, people use clicks in interactional functions which occur less frequently overall, so click rates are lower. For example, clicks in assessments and affect-laden functions occur relatively infrequently here, but Moreno (2016) found that casual conversations in Glasgow had more affect-laden clicks compared to those in Buckie and Shetland. It could be, then, that though there are more sequence-managing clicks in the present data set overall, there are comparatively fewer than in other speech styles.

It is also possible that judgements made by the transcriber have contributed to the discrepancy in overall click rates across studies. Researchers might have identified and coded clicks differently. Transcribers have a choice of what to code as a click, and, especially when only having access to audio data, this is highly variable. At the moment, there is no universal criteria for identifying and transcribing clicks (e.g. criteria for acoustic segments in Turk, Nakai and Sugahara 2012), it cannot be certain that what is considered a click by the present study is also considered a click by another study, or vice versa.

Another reason for the differences in click rates across studies could be individual variation. Gold et al. (2013) report broad variation in click rates across speakers within one study, and the Australian English speaker in Trouvain and Malisz (Trouvain and Malisz 2016) producing 9.2 clicks per minute could simply have been a high rate clicker.

Finally, research intent could play a role in the overall click rate across studies. The present study set out to analyse clicks' phonetic form, interactional function, and how they are performed in word search in spontaneous speech. To do so, data was collected and analysed regardless of whether the speaker produced a click. Previous studies (Gold, French and Harrison 2013; Ogden 2013 specifically examine only recordings which they know contains clicks. For example, Gold et al. (2013) report a click rate of 0.8 clicks per minute, but only analysed 5-minute recordings of speakers who clicked, and excluded speakers who did not click enough to meet the 5-minute requirement.

It is unclear if results of individual click rate support Gold et al.'s (2013) conjecture that clicks might be used as a forensic discriminant in high rate clickers, which they argue is only possible if there is enough idiosyncrasy in click phonetic form. Though there is not enough evidence to support this proposition here, results in Chapter 5, which show that younger speakers produce fewer clicks in their performance of word search, indicate that interactional function might be used as a forensic discriminant in future as they may carry socio-indexical meaning (see Section 6.5.2).

These propositions could be investigated in future study of variation of non-lexical interactional features (e.g. usage of *um*, clicking frequency, and pause duration) across style. Speakers could be recorded in different settings (e.g. word list, sociolinguistic interview, and casual paired conversations) to elicit different speech styles. This would broaden our understanding of how speakers vary in their usage of non-verbal interactional cues across speech styles; and more generally, allow us to examine the relationship between interactional function and speech style.

6.3.1.2 Glaswegian clicks' place of articulation

The most common place of articulation for Glaswegian clicks was dental, or, when placed in larger articulatory categories, coronal, though the full range of places of articulation from bilabial to dental was represented in the data. Bilabial clicks were the least common place of articulation for this data set. Statistical analysis revealed that the likelihood of clicks being coronal was higher if it co-occurred with a particle (*uh* or *um*), and lower if it occurred in standalone position, i.e. outside of the speaker's turn.

The finding of coronal articulation being the most frequent here is in line with both phonemic click studies (Ladefoged and Traill 1994) and some studies on clicks in English (Wright 2005; Ogden 2013). The most common clicks found by Wright (2005) were dental, while Ogden (2013), despite difficulties in classifying place of articulation, suggested the most common place of articulation for clicks in his study was alveolar. Findings of very few bilabial clicks in the present study are contra Wright (2005; 2011). Wright reported that 48% of clicks used to index a new sequence have a bilabial place of articulation. One plausible reason that the present study reports relatively few bilabially articulated clicks could be that Wright is possibly referring to bilabial-dental coarticulated clicks as bilabial, since I was able to identify this place of articulation using video data, which Wright did not have access to. This seems even more plausible, given bilabial-dental coarticulation is the second most common place of articulation here, and both bilabial and bilabial-dental coarticulated clicks involve a bilabial release.

In both phonemic and interactional studies, clicks seem to be overwhelmingly produced with dental and/or coronal articulation. One reason for this could be the speaker's articulatory setting. For the Glaswegian speakers analysed here, this could be a result of their articulatory setting, which was previously reported in conversational speech as an advanced tongue-tip and/or blade (e.g. Stuart-Smith 1999a). This might promote more coronal over palatal clicks. More generally, the tongue resting position could contribute to the high number of coronal articulated clicks crosslinguistically. The tongue resting position has been noted in Lebrun (1985) and Kotsiomiti and Kapari (2000) as the tongue tip near the upper incisors or the alveolar ridge. It is possible that the tongue's resting position results in more coronally articulated clicks, especially if there is a bilabial closure prior to the click (i.e. the tongue returns to resting position before a click is produced).

The statistical results for click place of articulation, particle co-presence, and position in turn are novel findings. Still, there are some plausible explanations for these findings. First, the high number of coronal clicks co-occurring with a particle might also be due to the tongue resting position prior to the click; it is especially likely that if a particle is produced before the click, particularly a particle ending in a bilabial closure (*um*), the tongue returns to its resting position and any following click would be coronally articulated because of the preceding particle.

The lower proportion of coronal clicks occurring outside of a speaker's turn is a perplexing finding. At first glance, it might seem like this is due to the interactional functions which occur at different positions in turn that might contribute to place of articulation, but there was no significant effect of interactional function on place of articulation found for the present study. It may be that, because the lowest number of clicks occurred standalone compared to pre- and mid-turn (see Section 4.4.1), the effect size is exaggerated. This remains open to interpretation and might be considered in future research.

Future research might be done on the propositions made in this section; the articulatory setting impacting place of articulation for clicks could be investigated via a conversational articulatory study. This would contribute to previous research on articulatory setting and place of articulation in Glasgow (e.g. Stuart-Smith 1999a), and, more generally, shed light on variation in the production of interactional clicks.

6.3.1.3 Phonetic accompaniments of Glaswegian clicks

Clicks co-occurred infrequently with audible inbreaths, were almost never collocated with nasal or creaky speech material (e.g. single words, particles, or vowels), and sometimes co-occurred with particles. Most particles in this study were variants of *uh* or *um*.

The presence of phonetic accompaniments has been noted in several previous studies. Wright (2005) reported that 46% of clicks co-occur with audible inbreaths, but only pre-turn and only for new sequence indexing clicks (which is not the case for the present study). Ogden (2013) noted that clicks could co-occur with nasal particles, creaky voice, audible inbreaths, and particles. Trouvain and Malisz (2016) reported that 43% of clicks occurred with fillers, specifically *uh* and *um*, and that 46% of clicks co-occurred with audible inbreath.

The relatively high presence of particles co-occurring with clicks here compared to other phonetic accompaniments might be due to the the interactional functions in which the clicks occur. Particles have been reported in many interactional functions (regardless of click presence) including repair (Schegloff, Jefferson and Sacks 1977), word search (Goodwin and Goodwin 1986), returning to prior talk, i.e. indexing a new sequence (Local 2004), and in hesitations (Scobbie, Schaeffler and Mennen 2011). There are clicks which occur in many of these interactional functions here.

6.3.1.4 Acoustic properties of Glaswegian clicks

Two acoustic features of clicks were analysed here: spectral frequency (specifically, Centre of Gravity or COG), giving a fine-grained acoustic perspective on place of articulation, and duration.

Coronal clicks had a significantly higher Centre of Gravity than labial clicks or clicks of other places (e.g. palatal and lateral) of articulation. These results reflect the common observation that the main area of spectral energy for phonemic dental and alveolar stops is comparatively higher than labial and retracted (i.e. palatal and velar) places of articulation (Halle, Hughes and Radley 1957; Lousada, Jesus and Pape 2012). The mean COG for Glaswegian dental clicks (5211 Hz) is lower than the only study to previously examine click COG: Trouvain and Malisz (2016). They reported average COG for dental clicks in their Australian female speaker as around 6500 Hz. There are several plausible explanations for the differences between the present study and Trouvain and Malisz's finding: (1) the social stratification of the speakers analysed here versus in Trouvain and Malisz, (2) fine-grained differences in articulation, (3) the variety of English analysed.

First, Trouvain and Malisz analyse clicks in the speech of one female English speaker Trouvain and Malisz analyse a woman, who could produce clicks with high COG due to gender differences in front cavity size, i.e. women have smaller front cavities and produce sounds with higher frequencies (e.g. Stuart-Smith, Timmins and Wrench 2003). The clicks in the present study are from 48 Glaswegian female and male speakers. Therefore, the men in the present study could be lowering the overall COG for dental clicks.

Second, phonemic studies of clicks report variation in dental click articulation (Ladefoged and Traill 1984), e.g. some dental clicks are more fronted, some are produced closer to the alveolar ridge, some with tongue protrusion, etc. It may also be the case that dental clicks in interaction, i.e. that the dental clicks here are articulated differently from the dental clicks in Trouvain and Malisz's study.

The third point here is expanded from the previous proposition; click COG is subject to dialectal variation, i.e. there are fine-grained differences in click place of articulation across varieties of English, and not just individual speakers. There is much research that illustrates phonological variation in phonemic click production (e.g. Ladefoged and Traill 1994; Miller 2011) and many phonemes across varieties of English (e.g. t/d deletion, Tagliamonte and Temple 2005; Tanner, Sonderegger and Wagner 2017). This could also be the case here for interactional clicks in Glaswegian as opposed to Australian English.

Click COG is also constrained by an interaction between position in turn and interactional function, where the largest effect is seen for pre-turn clicks. Affect-laden pre-turn clicks have a higher COG than sequence-managing pre-turn clicks and affect-laden pre-turn clicks have a higher COG than affect-laden standalone clicks. Thus, high COG clicks are encouraged by both (1) pre-turn position and (2) affect-laden status. Why might this be?

Firstly, clicks having higher COG in pre-turn position rather than standalone position could be due to the click's role in securing the floor. While these clicks were coded as affect-laden, it is possible that clicks can aid in the performance of several interactional functions at once, as argued by Pillion (2018). This proposition is also supported by Pinto and Vigil's (Pinto and Vigil 2019) findings that clicks in Spanish could perform two functions at once, i.e. word search and stance-display. Therefore, pre-turn clicks might aid in both an affect-laden function while at the same time aiding in securing listener attention by having a higher frequency. For click COG to be used to capture listener attention, higher COG would have to be salient. Sounds or words can be salient if they are unexpected (e.g. Zarcone et al. 2016)– so the click would have to be noticeably different from surrounding speech. Wright (2011) also finds that at the beginning of a turn are high amplitude. Clicks at the beginning of a turn being salient could be a result of COG or amplitude, then.

The second result of this interaction is that affect-laden clicks occurring pre-turn might have a higher COG than sequence-managing clicks occurring pre-turn. This could be for a similar reason, i.e. they indicate the turn is beginning and the affect-laden click is not being performed as part of a listener response, but rather to secure the floor. For higher COG clicks to be considered more salient, we would have to know if they were really more noticeable to the listener.

Both of these propositions could be investigated through a future perception study on click COG together with amplitude to see how these may work together to contribute to the interactional function of clicks occurring at the beginning of a speaker's turn.

Click duration in Glasgow is constrained in complex ways by where the click is sequentially in the talk, what interactional function it is performing, and its immediate phonetic accompaniments. Specifically, click duration is affected by both the click's interactional category and a two-way interaction between click co-presence with a particle and position in turn. First, clicks used in sequence-managing functions are significantly shorter in duration than clicks aiding in affect-laden functions in line with Pillion (2018), though she did not examine the interaction between position in turn and particle presence. Duration is also constrained by age and gender, discussed later in Section 6.5.

The interaction between co-presence of a particle and position in turn can be summarised by three statements. When co-occurring with a particle, standalone clicks are shorter than pre-turn and mid-turn clicks. When occurring without a particle, standalone clicks are shorter than mid-turn clicks. In mid-turn position, clicks without particles are longer than clicks with particles.

One reason for this is proposed in Chapter 4; clicks are longer with a particle pre- and mid-turn because of the fine-grained interactional functions which speakers perform in these positions with and without particles. For example, indexing new sequences, word searches, and incipient speakership can all include particles (Local 2004; Wright 2005; Wright 2011), and all frequently occur pre- or mid-turn. Interactional functions which typically occur outside of a turn are more likely to occur without a particle (e.g. assessments and backchannels).

Shorter standalone clicks could be one part of indicating that a click is sequence-managing and not affect-laden (working together with other linguistic features), as the overall findings for shorter sequence-managing clicks and longer affect-laden clicks suggest. Additionally, clicks occurring mid-turn without a particle could still be aiding in sequence-managing functions, i.e. floor holding, and thus longer in duration than standalone clicks without a a particle. Finally, shorter clicks occurring with a particle mid-turn could be performing functions like word search and NSI, while longer clicks without a particle might be performing more interactional functions like floor-holding or affect-laden functions.

The difference in duration between position in turn is more obscure here but invites the opportunity for further research into clicks' position in turn. This could be explored through a listening experiment, where participants listened to clicks of different durations and guessed what the meaning or intent of the click was. Phonetic accompaniments could also be added to see whether duration and particles signaled certain interactional functions, especially in standalone position.

6.3.2 Interactional functions of Glaswegian clicks

Glaswegian speakers produced clicks in many different interactional functions. Clicks could be a part of sequence-managing functions– interactional functions which facilitate turn-taking and topic-shifting in interaction, e.g. indexing a new sequence, word search– and affect-laden functions,– interactional functions which display an attitude or stance towards someone or something, e.g. assessments or displays of sympathy. Clicks were more likely to be produced as as a part of sequence-managing functions rather than affect-laden functions. Sequence-managing and affect-laden clicks occurred pre-turn, mid-turn, post-turn or in isolation.

6.3.2.1 Clicks' patterning across interactional function

Clicks had a wide range of interactional functions in Glasgow. Clicks could be produced as an assessment, backchannel, in closing, marking collusion, holding the floor, marking incipient speakership, indexing a new event or sequence, as a post completion comment, in repair, displaying sympathy, and marking word search. The most common function of clicks here was marking incipient speakership (see Section 4.4.2), followed by indexing a new event or sequence, and marking word search. These results were also present for Ogden (2013), who reported a high number of clicks marking incipient speakership, NSI, and word search; and for Moreno (2016) who reported the most common interactional function for clicks was NSI, followed by word search and marking incipient speakership.

Clicks used in marking incipient speakership occur often in these data might be because the recordings are paired conversations in which turn-taking is regulated frequently. Speakers will shift in their turns often, and where these shifts occur, speakers have the opportunity to mark incipient speakership. Additionally, the large number of NSI clicks might be due to the long storytelling sequences present here. According to Mandelbaum (2012), when telling a story, the interlocutor manages sequences of the narrative, resulting from new events and topic changes, both of which are locations where a new sequence might be indexed. Finally, frequent word search clicks may be a result of the fact that the data here consist of spontaneous speech. Hesitating or having to recall words are actions which arise naturally when producing spontaneous speech as opposed to read speech (e.g. Maclay and Osgood 1959; Scobbie, Schaeffler and Mennen 2011).

Overall sequence-managing clicks (75.5%) occur more frequently than affect-laden clicks in Glasgow, which is in line with previous studies e.g. Ogden (2013) who finds higher proportions of sequence-managing clicks and Moreno (2016), who reports around 70% of total clicks were sequence-managing. This could be a result of the speech style; Moreno (2016) found comparatively more affect-laden clicks in casual conversations in Glasgow than in sociolinguistic interviews in Buckie and Shetland, but she still found more sequence-managing clicks overall.

These overall results of interactional function bring forth another question: if sequence-managing clicks occur consistently more frequently in empirical studies of interactional clicks in English, why do nearly all anecdotal observations describe only affect-laden or imitative clicks?

One possible explanation for this is salience. Trouvain (2015) argues that stance-display clicks are more perceptually salient. Therefore, it may be that clicks aiding in sequence-managing functions are not mentioned anecdotally because they are less noticeable than sequence-managing clicks. I personally observed that speakers were only aware of affect-laden clicks and did not know clicks could occur in sequence-managing functions. After participants were recorded, I would explain the goal of the study. One speaker, M-55-25A, responded that he did not produce clicks and apologised because I was unlikely to get any usable data from him. That speaker did produce 25 clicks which contributed to this study, 0 of which were coded as affect-laden.

Another plausible explanation is that affect-laden clicks, particularly those used in stance-display are salient *because* they occur infrequently. This effect has been found for lexical frequency (e.g. Jaeger and Weatherholtz 2016; Ruette, Ehret and Szmrecsanyi 2016), proposing one method of determining salience through a measure of how surprising a lexical form is, presupposing that that less frequent words are unexpected and surprising, thus more salient. The interactional functions in which clicks occurred in these data was subject to particle presence, such that particles occurred more frequently with clicks in sequence-managing functions. It should be noted, however, that clicks' interactional function was also constrained by both the click's position in turn and speaker gender, discussed further in Section 6.5.

A likely explanation for sequence-managing clicks occurring with particles more frequently is the phonetic form interactional function itself, both with and without clicks. Particles are known to occur more frequently in many sequence-managing functions, including NSI (e.g. Local 2004; Wright 2011), word search (e.g. Goodwin and Goodwin 1986; Brouwer 2003; Wright 2005), and more generally, at the beginning of a turn, where speakers mark incipient speakership (e.g. Local 2004; Ogden 2013). These results demonstrate how important the interactional function is when examining clicks' phonetic form, i.e. that the phonetic form may be largely due to the interactional function being performed.

In summary, the types of actions performed with clicks are related to speech style (e.g. casual paired conversation), which result in a higher number of sequence-managing functions, though likely less than other styles (e.g. sociolinguistic interviews, Moreno 2016). There are many interactional functions which arise here in these data, due to the recordings of paired casual conversation, and longer storytelling sequences, while there are fewer examples of clicks in interactional functions like closings simply because a closing will happen at the end of an interaction. These recordings are comprised of one long interaction, rather than several smaller ones (as in Wright 2005; Ogden 2013).

6.3.2.2 Glaswegian clicks and position in turn

More clicks occur mid-turn than pre-turn, post-turn, or on their own (see Section 3.6.3.6). The second most common position in turn was pre-turn, while each other position in turn accounted for less than 10% of the data. Recall that post-turn clicks occur infrequently and were therefore excluded from regression analysis (see Section 4.5). In order to understand the position in turn patterns, we need to think about the interactional functions performed at these positions in turn, so these two are considered together here.

One explanation for more pre- and mid-turn clicks is that sequence-managing functions, in which clicks occur more frequently here, i.e. marking incipient speakership, indexing and new sequence, and word search, are more likely to occur at these positions in turn. Thus, there is a potential confound between position in turn and fine-grained interactional function. The most common interactional function found for Glaswegian clicks was marking incipient speakership (see Section 4.4.2), an interactional function which usually occurs at the beginning of a turn, unless used in reported speech. NSI clicks occurred both pre-turn and mid-turn, and word search clicks occurred mid-turn nearly always. Infrequent interactional functions for clicks here, e.g. backchannels, usually occur in standalone position, and clicks in actions that occur at the end of turns, e.g. in closings or post completion comments, occur rarely in these data. The proposition that fine-grained interactional functions vary across position in turn could be investigated more thoroughly in future with the present data set.

6.4 Shifting focus to word search clicks

One goal of this thesis was to illustrate one interactional function in which clicks can occur so that clicks could be better understood in their embedded context. This was investigated in two ways. First, CA studies (e.g. Brouwer 2003; Wright 2005; Ogden 2013) argue that some interactional functions contain specific phonetic features while others do not, but previous studies also show that clicks can be produced with the full range of articulation and co-occur with phonetic accompaniments; how the phonetic pattern of clicks varies across fine-grained interactional functions was unclear. To investigate clicks phonetic form across interactional function, an approach was taken to first compare word search clicks descriptively with clicks to all other functions, and then, because interactional category was found to constrain clicks' phonetic form, compare the word search clicks to clicks in other sequence-managing functions only.

A second approach was taken to capture the scope of click variation (according to variationist sociolinguistics, i.e. Principle of Accountability and variable circumscription, see Section 2.7). According to CA studies, so much of the phonetic form in due to the interactional function in which clicks occur. To accommodate to both sociolinguistics and CA, all word searches with and without clicks were examined and compared with regards to phonetic accompaniments and social factors.

6.4.1 Word search clicks compared to clicks of all other functions

Clicks occurred in nearly half of all word search sequences. As for clicks of all functions examined in this study, word search clicks were analysed with regards to phonetic form (i.e. place of articulation, COG, duration, phonetic accompaniments) and position in turn. Descriptively, there are both similarities and differences across word search clicks and clicks of all other interactional functions; both groups of clicks have similar acoustic properties and show similar proportions of some phonetic accompaniments (i.e. audible inbreath, creaky voice, nasality), but differ in place of articulation and particle co-presence. Statistical analysis revealed that this difference is apparent between word search clicks and clicks in other sequence managing clicks as well; word search clicks are significantly more likely to co-occur with a particle and significantly more likely to be produced with coronal (i.e. dental, dento-alveolar, alveolar) articulation than clicks in other sequence managing functions.

6.4.1.1 Word search click place of articulation

Word search clicks differed descriptively from click in other interactional functions in two ways: (1) bilabial articulation was entirely absent from word search clicks, and (2) there was a higher proportion of coronal (dental, dento-alveolar, alveolar) clicks in word search than other interactional functions. The high proportion of coronal clicks was also reflected in statistical analysis when word search clicks were compared to clicks of other sequence-managing clicks.

Particularly of note here is the complete absence of (fine-grained) bilabial place of articulation in word search clicks, as Wright (2005:176) reported clicks in word search as being either bilabial or alveolar. There are two proposed reasons that Wright finds bilabial word search clicks while the present study does not: (1) video data availability and (2) dialectal differences in click articulation. Firstly, both Wright and I coded place of articulation auditorily and impressionistically. However, I had access to video data for my participants, while Wright relied on audio data only. Wright (2005:126) notes that place of articulation is "fairly easy to identify both auditorily and acoustically" but it is possible that many of the clicks I report here which were later regrouped into the "labial" articulatory category, could have been considered bilabial by Wright. This could be especially true for bilabial-dental coarticulated clicks, which make up the second largest place of articulation both for word search clicks and all clicks here.

Secondly, it is possible that the bilabial clicks identified by Wright (2005) refer to the place of articulation which occurs with an anterior articulation at the lips and no co-articulation (other than the velum for these velaric ingressive stops). If this is the case, there may a dialectal difference in fine-grained click place of articulation such that Glaswegians do not produce the "same" bilabial clicks in word search, but seem to use a particular type of labial click in word search that may not be used in other varieties of English. There is a vast amount of literature which investigates and acknowledges cross-dialectal phonological variation for stops (e.g. coronal stop deletion Guy 1980; Tagliamonte and Temple 2005; Tanner, Sonderegger and Wagner 2017). This variation in phonemes across varieties of English might carry over to click articulations within an interactional function, so perhaps speakers of Standard Southern British English and American English use this type of bilabial click in word search, while Glaswegians do not. This could be further investigated with an articulatory study of clicks crosslingusitically, such as the study suggested in Section 6.3.1.2.

The descriptive results of a high proportion of coronal word search clicks reflects Wright's (2005) report of bilabial and alveolar word search clicks. When comparing word search clicks to clicks in other sequence-managing functions, statistical analysis revealed this relationship to be significant, i.e. that word search clicks were more likely to be coronal than clicks in other sequence-managing functions. This may be due to a relationship between click place of articulation and fine-grained interactional function, which was previously unreported because interactional function had to re-grouped into interactional categories (i.e. sequence-managing and stance-displaying) for statistical analysis (see Section 4.6). This could be further examined in future with the present data set, using only interactional functions which occur more frequently (e.g. incipient speakership, NSI, and word search).

6.4.1.2 Acoustic properties of word search clicks

Word search clicks were not different from click of other functions with respect to acoustic and temporal properties. Descriptive comparisons of word search clicks and clicks of all other functions showed word search clicks had mean Centre of Gravity similar to clicks of other interactional functions. As for clicks in all interactional functions, coronal clicks had the highest mean COG, in line with studies on the spectral acoustic properties of phonemic alveolar stops (e.g. Halle, Hughes and Radley 1957; Sundara 2005). The mean duration of word search clicks was similar to those of other clicks as well (only 4 milliseconds longer than clicks of other functions). Note COG and duration were not included in regression analyses (see Section 5.1.1), due to the nature of the research question (i.e. what predicts that a click will be a part of word search as opposed to other sequence-managing functions?). These could be included in future research.

One question which arises from this is: if coronal clicks show the highest mean COG overall, and word search clicks are more coronal than clicks of other functions (see above), why is the spectral frequency of word search clicks not higher than clicks in other interactional functions?

It is possible that there is a statistical difference in COG, but that this was not found, because it wasn't tested as a response variable. This could be tested with the present data set in future, which might show us that word search is a significant predictor of higher frequency clicks because alveolar stops have been reported to have the highest mean frequency (Halle, Hughes and Radley 1957) compared to labial and retracted places of articulation, which occur less frequently for word search clicks.

6.4.1.3 Word search clicks' phonetic accompaniments compared to other sequence-managing functions

Recall that statistical analysis was performed to compare word search clicks to clicks in other sequence-managing functions (see Section 5.2.6) because of the findings that clicks in sequence-managing functions pattern differently from clicks in affect-laden functions (see Section 4.6.3).

Statistical results show that most phonetic accompaniments pattern similarly regardless of the click's interactional function. The exception to this is the click's co-occurrence with a particle (*uh* or *um*); a click was significantly more likely to be used in word search, rather than another sequence-managing function, if it co-occurred with a particle.

One possible reason for this is that the phonetic patterns are a reflection of the interactional function and not the click itself. Particles occurring in word search sequences are frequently mentioned in CA literature (e.g. Schegloff, Jefferson and Sacks 1977; Schegloff 1982; Shriberg 2001; Clark and Fox Tree 2002; Brouwer 2003). Wright (2005) also reported that word searches with clicks are routinely initiated with a particle. Given the similar proportion of word searches in the present study containing a particle, discussed in the section below, it is clear that particles predict a word search sequence, and not necessarily a word search click.

6.4.2 Word searches with and without clicks in Glasgow

Word search sequences both with and without clicks were considered here. This was to be able to account for how clicks varied within one interactional function across phonetic accompaniments (discussed below) and social factors (discussed further in Section 6.5.2).

Statistical results demonstrated that click presence in word search was not determined by phonetic accompaniments. Some explanations for this are proposed in the sections below.

6.4.2.1 Word searches with and without clicks: phonetic accompaniments

When analysing word searches with and without clicks, the phonetic accompaniments present in the word search sequence did not seem to affect whether or not a click was produced in the word search. Social factors, specifically age, did affect click presence in a word search (discussed further in Section 6.5).

One plausible reason for this is stated in Section 6.4.1.3, where it was proposed that particles predict a word search sequence, not necessarily a word search click. This could be true of other phonetic features as well; interactional functions can include specific phonetic features (e.g. audible inbreaths, particles, etc.) and click presence is simply one of those phonetic features which is subject to individual variation, or, more likely, socio-indexical meaning, as discussed more in Section 6.5.2).

6.4.3 Summary: shifting focus to word search clicks

From the exploration of word search clicks and word search sequences, one important conclusion emerges; a single interactional function has phonetic features which occur regardless of whether or not a click is present, and much of the variation in click phonetic form may be due to the click's fine-grained interactional function. This is apparent in the difference in place of articulation and co-presence with a particle for word search clicks versus other sequence-managing clicks, and the lack of a significant difference for phonetic accompaniments in word search sequences with and without clicks. This demonstrates that analysing a collection of clicks and phonetic accompaniments in a data set, phonetic accompaniments are an indicator of the click's interactional function rather than a byproduct of producing a click, illustrating the insight that can be gained from analysing interactional features in context.

6.5 Variation in click production across social factors

This thesis brings a unique perspective to the study of clicks in English that has seldom been previously explored: sociolinguistic variation. Results show that click production varies across gender and/or age with regards to phonetic form and interactional function, and that younger and older speakers vary in their strategies of constructing word searches in spontaneous speech. These results are discussed below, first with respect to gender and next with respect to age.

6.5.1 Gender and click production in Glasgow

As previous research in Glasgow reported little gender variation across phonemes in Glasgow (e.g. there was only a gender effect for one out of eight phonemes examined in Stuart-Smith 1999b), we expected to find little if any gender variation in click phonetic form and interactional function, but that women would produce more clicks, as found in previous click studies (Ogden 2013; Pillion 2018). In the present study, the three highest rate clickers were younger male speakers, each with a click rate of more than one click per minute. Despite this, there was no difference in the proportion of clicks across gender; men and women produced roughly the same number of clicks (see Section 6.5.1).

This lack of difference is somewhat surprising, considering how women have been observed to click more frequently (e.g. Pillion 2018) and Ogden's (2013) the three highest rate clickers were female. It could be that a gender difference in click rate appears in other varieties of English, or that there is too much individual variation in the present study to discern a gender difference.

6.5.1.1 Gender and acoustic properties of clicks in Glasgow

Gender did not have an effect on clicks' Centre of Gravity. This finding is surprising because of the research on Centre of Gravity of Glaswegian phonemic sibilants /s/ and /ʃ/ (e.g. Stuart-Smith, Timmins and Wrench 2003; Stuart-Smith 2007). These studies report a gender difference in /s/ COG such that middle class women produce /s/ with higher COG than men, except in the working class. As class was not able to be including in the analysis for the present study, it was expected that women would exhibit clicks with higher COG, due to physiological differences in vocal tract size (Stuart-Smith, Timmins and Wrench 2003). For American English, these findings extend to phonemic stops; women have found to produce stops with higher frequency COG than men (e.g. Chodroff and Wilson 2014).

Previous studies have shown that women can compensate for physiological differences during speech production (Ohara 1999; Simpson 2009). Therefore, if women are not producing clicks with higher COG, it is possible that this is a result of a deliberate, albeit unconscious choice, which can be used to convey social meaning.

There was also an effect of gender on click duration; men produced shorter duration clicks than women. The cause of these results is unclear, without a measurement of speech rate for the participants in this study. As men have been previously reported to have a faster speech rate than women, it is possible that these results are a result of previously reported gender differences in speech rate (e.g. Jacewicz et al. 2009; Binnenpoorte et al. 2005). In future, this could be explored by studying click duration with regards to speech rate and social factors. Such a study could also improve our understanding of the relationship between mid-turn clicks and click duration and the effect of age on click duration, discussed further in Section 6.5.2.

6.5.1.2 Gender and click interactional function in Glasgow

The probability of a click being sequence-managing or affect-laden depended on the gender of the speaker and the click's position in turn. The crucial effect concerned clicks occurring in standalone position; women's clicks were more likely than men's clicks to be affect-laden when in standalone position. Clicks produced by women were also more likely to be affect-laden when in standalone position rather occurring pre- or mid-turn.

One possible reason for this that women may perform more affect-laden functions than men in standalone position, regardless of whether a click is present. This has been found by Eiswirth (2019), who investigated gender and listener response tokens (i.e. tokens that recipients can produce to acknowledge the interlocutor, display an assessment, mark surprise etc.). She found that women produce more affect-laden response tokens. As response tokens only occur when the recipient does not make an attempt to take over the floor, they occur in standalone position, which could explain the findings of this thesis in which women produce more affect-laden clicks in standalone position.

6.5.2 Age and click production in Glasgow

Despite stereotypes that *older* women tut (in disapproval) more frequently than other groups, younger and older speakers produced around the same number of clicks. Despite this, speakers of different ages produce clicks which vary in their acoustic characteristics and whether they occur in word search sequences.

6.5.2.1 Age and acoustic properties of clicks in Glasgow

Younger speakers ($\leq$ 25 years old) produced clicks with higher COG than older speakers. This result is similar to assertions of one study which shows younger speakers producing sibilants with higher peak frequency than older speakers (e.g. Reidy 2015). However, the younger speakers in Reidy (2015) are adolescents, while the younger speakers here are young adults. There is little evidence to suggest the age difference here is due to physiological differences in the vocal tract, because the vocal tract is fully developed by around age 18 (Mugitani and Hiroya 2012). The younger speakers are ages 17 to 25 and therefore not anatomically different from the older speakers (aside from individual differences in vocal tracts). Therefore the finding that younger speakers have high click COG than older speakers may have two possible causes: (1) fine-grained differences in articulation of clicks having the 'same' place of articulation, which, in turn, is due to (2) a choice on the behalf of the individual speaker that contributes to the social meaning of clicks.

First, fine-grained differences in articulation may be present which result in the difference of COG across age groups. We know that there are differences for phonemic dental clicks even within the same language (Ladefoged and Traill 1984), and more broadly, there is evidence fine-grained gender differences in articulation for /s/ and /ʃ/ in Glasgow (Stuart-Smith 2020) in Glasgow. Fine-grained differences in click place of articulation could both be (1), within coronally articulated clicks, because coronal articulation includes dental, dento-alveolar, and alveolar, and (2) within dental, dento-alveolar, or alveolar clicks. This could be tested in future with the present data set.

Second, if it is the case that younger speakers produce higher COG clicks because their fine-grained place of articulation differs from that of the older speakers, then this may be a deliberate, albeit unconscious, choice on behalf of the speaker, and click COG may contribute to socio-indexical meaning for speakers, i.e. presenting as a "younger" or "older" Glaswegian.

Note that because of how participants were accessed, age is confounded with education level for these participants. It is also possible that education level plays a role in the effects of age observed in this study.

A difference in click duration between younger and older speakers was observed for this study; younger speakers produced shorter clicks than older speakers. Without information on speech rate for individual speakers and age groups in this study, these results are perplexing. However, previous studies report a difference in age groups and speech rate, i.e. that older speakers have a slower speech rate than younger speakers (e.g. Jacewicz et al. 2009). It is likely that this plays a role in these results, and this age effect would benefit from further investigation of click duration, speech rate, and the effect of social factors.

6.5.2.2 Age and word search strategies in Glasgow

The purpose of analysing social factors and their impact on word search construction is to better understand how and why speakers choose to perform a click or not in this particular interactional function. Results indicated that click presence in a word search was not subject to gender variation, but click presence in word search did vary across age groups.

Younger speakers produced far more word searches (n=112, 63.6% of total word searches) than the older speakers, but produced clicks less frequently in these word searches than the older age group. These results could be viewed in two different ways: (1) a linguistic change (e.g. Eckert 1997; Labov 2001), or (2) evidence of age-grading (e.g.Labov 1984; Labov 2001; Labov et al. 2011) in word search construction.

If producing clicks in word searches is viewed as a linguistic change (i.e. apparent time change), then Glaswegian speakers have shifted in their usage over time to use fewer clicks in word search sequences. Alternatively, producing clicks in a word search could be seen as carrying socio-indexical meaning of being an older speaker, while using clicks less frequently is indicative of a 'younger' identity. This is also evidence that younger and older speakers' clicks might differ in their interactional functions; a result that did not previously emerge in Chapter 4, due to the fact that fine-grained functions had to be regrouped into the larger interactional categories (sequence-managing versus affect-laden) for statistical analysis.

If the effect of age on click presence in word search is evidence of age-grading, this could mean that using clicks is seen as a more standard way of constructing word search, while word searches without clicks are non-standard. This could be investigated through a perception study of word searches with and without clicks, which includes social class as a key factor.

6.5.2.3 Summary of social factors and click production in English

Through acquiring a stratified sample, this study was able to analyse social factors with respect to click production and presence in word search. Gender and age had an effect on click phonetic form, interactional function, and/or click presence in word search.

Some of the results discussed above can be explained by the interactional function in which the click occurs; women produce more affect-laden clicks in standalone position because women perform more affect-laden functions in this position. Additionally, while clicks' spectral frequency varies according to age, this result is more likely the result of fine-grained articulatory differences in how older and younger speakers produce clicks not captured by the present study.

The results of age and word search clicks here add to the assertion made in Section 6.4.3, that the phonetic features included in interactional functions are not due to the presence of a click in an interactional function, but rather the interactional function itself, and, as discussed in this section, who performs the interactional function.

These findings demonstrate that gender and age play a role in how clicks are produced (e.g. COG and duration) and when clicks are produced (i.e. in word search).

6.6 Implications and reflections

One striking finding that seems to consistently arise from results of clicks' phonetic form, position in turn, and social factors is how much the interactional function contributes to phonetic form. In nearly every section of this chapter, interactional function matters; in click rates, i.e. speakers perform vary in their interactional functions across different speech styles, in phonetic accompaniments

(Section 6.3.1.3), i.e. *uh* and *um* occurring more frequently with clicks in sequence-managing functions (Section 6.3.2.1), with regards to spectral frequency, i.e. click COG could be used both to secure listener attention *and* as part of an affect-laden function (Section 6.3.1.4), and gender and interactional function, i.e. high numbers of affect-laden clicks for women in standalone position are due to the higher number of affect-laden functions performed by women in this position, rather than the higher number of clicks being used to perform these functions (Section 6.5.1.2). Furthermore, results from word search clicks show that click accompaniments vary across interactional functions, but that word search itself does not vary in phonetic accompaniments with and without clicks. This suggests that the phonetic features typically collocated with clicks are actually due to the interactional function in which the click is embedded, rather than the fact that these features typically co-occur with clicks. This conjecture could be just as true for phonological variation. This might be similar to GOAT-fronting and smiling in Podesva et al. (2015), who reported that higher F2, or auditorily fronted GOAT, positively correlates with whether speakers are smiling while articulating the vowel and their self-reported comfort levels in the interaction.

Upon further reflection, the results here have implications for future sociolinguistic, phonetic, and CA research. Referring back to the research questions outlined in Chapter 1, we have found that clicks are an interactional feature whose form and presence are a result of the communicative function in which they are embedded, as well as the person performing that function. For future sociolinguistic study, this shows that interactional context accounts for some portion of phonetic variation and should not be discounted. For Conversation Analysts, these results show that social factors can contribute to the composition of an interactional function or "action" in interaction.

Clicks, however, are not necessarily discourse markers, and are certainly not phonemic– though they occur as phonemes in other languages. This therefore demonstrates that non-phonemic, non-verbal communicative features vary in their form and function much like phonemes– systematically, according to linguistic and social factors.

6.6.1 What exactly are clicks?

There has been some mention in this thesis (see Chapter 1 Section 1.1) and by other researchers (e.g. Keevallik and Ogden 2020) that clicks are "sounds on the margins of language." Indeed, clicks are phonetic features which exist outside a phonemic context, specifically in interaction. The interactional context in which clicks occur does not appear to be limited to English: clicks can be used in the performance of word search in English (e.g. Wright 2005; Ogden 2013; Moreno 2016; Pillion 2018, and this thesis), German (Trouvain 2015), Spanish (Pinto and Vigil 2019), and Russian (Paschen 2019). This may mean that clicks are a universal communicative feature rather than a language-specific one. Despite this, clicks have been observed in culturally specific contexts (see e.g. "le tchipe" in France or "teeth-sucking" in U.K. and USA, as a display of dissent and disapproval, considered to originate in Black U.S. and Caribbean culture– Muir 2013; Samuel 2015) . Notably, these two interactional functions above—word search and assessment/stance-display—pattern vastly differently from each other in this thesis. So perhaps sequence-management is not language-specific, while stance-display may be language–or culture–specific.

Situating clicks in the broader scheme of linguistics is not a simple task. Clicks behave systematically. They are constrained by the interactional function in which they are embedded and information about the speaker who performs the interactional function (see Section 6.6 for longer discussion). Clicks, however, are not phonological, because they part of the rule-governed system of distributing phonemes and their alternations. Despite this, clicks seem to vary similar to phonemes; they can occur at difference places of articulation and vary according to linguistic and social factors. Perhaps the closest linguistic feature to clicks is the discourse marker. Especially because clicks can co-occur with other phonetic features (much like set-extension, Waters 2016:45) and have a communicative nature they could be considered a discourse-pragmatic feature. Like discourse-pragmatic variables, it is difficult to discern a zero variant when analysing the variation of clicks. However, they still do not neatly fit into this moniker, as it is more likely that clicks are actually one in a set of components performing a broader interaction function, whose presence varies according to constraints (as in word search sequences in Chapter 5).

Perhaps future research could explore this topic more thoroughly. We might be able to learn more about what clicks are if we can study how and when they are acquired, as there is a vast amount of research on the different stages of language acquisition (e.g. Clark 2019 for a thorough summary on first language acquisition research). Future researchers might also consider investigating the cross-linguistic functions of clicks more thoroughly, to determine whether any one interactional function in which clicks can occur is language-specific. The answers to these questions will help us better identify the click's place in the wider context of the linguistic system.

6.6.2 Reflecting on challenges

One very challenging aspect of this study was collecting enough clicks to be able to statistically analyse in a study of this size and scope. There are some alternative approaches, which would have been more suitable to the statistical analysis of clicks and interactional functions.

First, for a study with different research goals, a much larger, pre-existing corpus of one regional dialect of English, could be used to examine click form patterns. Recall that pre-existing corpora, such as the HCRC Map Task Corpus which contains Glaswegian speech component, was not used here due to the interactionally-constrained speech material desired for the present study. Segmenting clicks could have been made easier with automatic spontaneous speech segmentation adapted for clicks. This would still have been time-consuming, because interactional function would still have to have been identified, because so much of the clicks' phonetic form is constrained by interactional function. Additionally, as clicks are not traditionally though of during automatic speech segmentation, it is highly likely that other noises could have been identified as clicks.

Instead of focusing on regional variety, it might have been possible to examine clicks from many different pre-existing corpora, to have as many tokens as possible for statistic analysis. This could have allowed us to observe patterns more broadly across a many more tokens.

The most important aspect of the present study that I might have changed, is only focusing on one interactional function of clicks. Were it not for time constraints involved in categorising and identifying all tokens of a single interactional function, this could have added further valuable insight to how interactional function might constrain click form.

6.7 Suggestions for future research

Expanding on this, it might also be possible to carefully design a perception experiment to find out how sensitive listeners are to click duration, and if variation in duration of clicks occurring outside of a turn are perceived as being part of a specific interactional function. For instance, listeners could be played a longer or shorter click and could be asked to describe the speaker's mood.

Another perception study which might illustrate why interactional function and position in turn constrain click COG is a listening study. In the proposed study, participants would be exposed to clicks produced with different spectral frequencies, duration, and in different positions in turn, and would tap the screen (or click a mouse) every time they heard a click. Drawing on recent research (e.g. Loy, Rohde and Corley 2019), we know that listeners process social, pragmatic, and lexical information at the same time. Through this study, we could test (1) the relationship between click COG, position in turn, and interactional function by examining whether or not clicks with higher COG are more salient to listeners, and (2) if affect-laden clicks really are more salient than sequence-managing clicks through showing the click's interactional function in context and manipulating the click duration. We would also be able to deduce from response time how noticeable or salient the click is. Furthermore, if the proposed perception study were reshaped to illustrate word search sequences with and without a click, with and without particles, etc. we could test the listener's association of word search composition with social factors. Do speakers who click in word search sound older? Do speakers who produce more *uh* and *um* sound younger? What cues do listeners rely on when identifying speaker age? These studies would add to the small but growing body of sociolinguistic work on interactional clicks in English.

Note that future collaborations on and access to the data used in this thesis are possible if working in connection with the author or the University of Glasgow.

6.8 Chapter summary

This chapter has discussed the effect of linguistic and social factors on click production across interactional categories and in word search. It has also suggested some future studies of clicks. As suggested by previous studies, clicks occurring outside the phonemic context are not as rare as previously anecdotally suggested. Clicks have many interactional functions in English beyond imitating a horse clopping or a kiss, or tutting in disapproval. In fact, these functions actually occur far less than those used to manage naturally-occurring talk in interaction, and are not present in this data set at all.

This thesis has demonstrated that clicks are communicative features within this regional English dialect pattern systematically according to phonetic, interactional and social factors.

Chapter 7

Conclusion

By combining approaches from sociolinguistics, phonetics, and Conversation Analysis, this thesis has demonstrated that clicks in Glaswegian English are a sociolinguistic variable, which can vary according to phonetic, interactional, and social factors. This thesis has also illustrated how and why interactional context is crucial to our understanding of variation. Two central themes have re-emerged throughout the analysis. These are discussed below as concluding remarks.

The interactional function in which the click is embedded, both broadly (i.e. sequence-managing or affect-laden) and narrowly (i.e. word search versus other sequence-managing functions), plays a large role in click production. There was a complex set of relationships between interactional function and click place of articulation, the presence of phonetic accompaniments (especially a particle, *uh* and *um*), the click's position in the speaker's turn, and who produced the click. This was illustrated with respect to both click spectral frequency, i.e. spectral frequency was found to be dependent complexly on both position in turn and interactional function; and click duration, whereby clicks varied in their duration depending on what type of interactional function they were in. For example, clicks at the beginning of a speaker's turn tended to be relatively long and, if affect-laden, had high spectral frequency too. The strong influence of interactional function on clicks' phonetic patterning was further supported by the findings with regard to word search; word search clicks' place of articulation and phonetic accompaniments were different from those of clicks in other sequence-managing functions, but word searches with and without clicks did *not* vary in phonetic accompaniments. Taken together, these findings demonstrate that much of the variation in these data is due to the interactional function in which the click occurs.

Speakers' age and gender constrained how and when clicks were produced. Women performed longer clicks than men, and women produced more affect-laden clicks outside of their turn. This finding of more affect-laden clicks in this position returns to the idea that these results reflect interactional function and gender; women are more likely perform more affect-laden functions which can (but do not have to) contain clicks in this position in turn. Younger and older speakers produced clicks differently; younger speakers produced shorter clicks with higher spectral frequencies, presumably a result of fine-grained articulatory differences. Younger speakers were also less likely to use a click in a word search. These results show that *who* performs an interactional function is crucial to our understanding of how that interactional function is realised.

These results demonstrate that clicks are a sociolinguistic variable subject to variation across both linguistic and social factors and that clicks are as much a part of the linguistic inventory as any other part of English phonology. These results also highlight the need for combining sociolinguistics, phonetics, and CA to study interactional clicks, as so much can be gained from the insight such an analysis can provide. Without studying the interaction itself, the phonetic variation of clicks across interactional function would not be clear; and without taking gender and age into account, we lose a dimension with which to understand how and why some clicks' vary in specific contexts. Together, these findings demonstrate that clicks' occurrence in interaction in Glasgow is constrained by both linguistic and social factors.

Appendix A

Advertising materials

Get paid to complain for a PhD study!

Are you from Glasgow or the Glasgow area?

Are you 18-25 or 45-60?

Do you want to make £5 by venting?

If you answered yes to these questions, and can bring a friend of the same gender and in the same age range as you, you could help out by participating in a PhD study on the conversation of airing frustrations.

To express interest, please e-mail Julia Moreno at **j.moreno.1@research.gla.ac.uk** or go to **whenisgood.net/letmevent** to fill out a calendar with your availability and contact info.

I look forward to hearing from you.

This study has been approved by the College of Arts Research Ethics Committee at the University of Glasgow.

Want to vent for a study on the speech of airing frustrations?

You must:

- Be Glaswegian or from the Greater Glasgow area
- be 18-25 or 45-60
- Have a friend in the same age group and the same gender to bring with you
- Have an hour and a half to spare

What will it be like?

- You and your friend will sit at either a sound studio or at home (your choice) and talk about anything that bothers you.
- If you run out of topics to talk about I'll be there to help you along.
- You will be recorded by camera and microphone
- All recordings will be anonymised and no one will hear or see them besides myself and my supervisors.

Why should I volunteer?

- You'd be helping me write my thesis as well as furthering the study of conversation in Glasgow
- You and your friend would each be paid £5 for your time. ☺
- It's a great opportunity to vent and express annoyance without anyone ever finding out.
- We all love a whinge---Get paid to complain!

I’m interested.. What now?

- Sign up at the sheet I’ve left at the front of the classroom and leave a preferred time for you and your friend to be recorded

OR

- Access a whenisgood poll and sign up for a slot at

www.whenisgood.net/letmevent . Put your e-mail address in the comments section when you state your availability and you will receive an e-mail from me advising you with a date and time based on your submission.

Thank you!

Appendix B

Demographics questionnaire and consent form

Demographics Questionnaire

Reminder: All data will remain strictly confidential.

What is your age group? (circle one)

16-20

21-30

31-40

41-50

51-60

61-70

What is your gender? (circle one)

male

female

transgender

non-binary

Other: ___________________________

I prefer not to say

What is your ethnicity?

____

____

____

____

Which area of Glasgow are you from?

____

____

____

____

Where are your parents from (area)?

Highest qualification achieved?

Parents' highest qualification achieved?

Have you ever lived outside of Glasgow? If so, please explain.

University of Glasgow

CONSENT TO THE USE OF DATA

I understand that Julia Moreno is making recordings for a study investigating natural conversation in Glasgow for her PhD in English Language and Linguistics, at the University of Glasgow.

☐ I give my consent to the use of data for this purpose on the understanding that:

- My participation in this experiment is voluntary, so I may opt out at any stage.
- The information will be processed by the University in accordance with the provisions of the Data Protection Act 1998.
- All names and other material likely to identify individuals will be anonymised
- My data will be treated as confidential and kept in secure storage at all times.
- My data will only be listened to, and/or analysed using phonetic and conversational analysis, by Julia Moreno and her supervisors.
- Short anonymised extracts and/or words may be used in the dissertation, and in any presentations and/or publications arising from this project

In addition:

☐ I give my consent for ONLY the use of my audio recording for future linguistic research and teaching by bona fide academic students and researchers from the English Language and Linguistics at the University of Glasgow.

☐ I give my consent for the use of my video and audio recording for future linguistic research and teaching by bona fide academic students and researchers from the English Language and Linguistics at the University of Glasgow.

☐ I do not wish for my data to be anonymised, as detailed above, and I wish to remain identified in this project and any presentations and/or publications which may arise from it.
(Please note, this is entirely optional and you are under no obligation to be identified in this project if you do not wish to be)

Signed by the contributor:

____ Date: _____________

Researcher's name: **Julia Moreno**

Researcher's email: **j.moreno.1@research.gla.ac.uk**

Supervisor's names: **Prof Jane Stuart-Smith, Dr. Rachel Smith**

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12 University Gardens
Glasgow
G12 8QQ
0141 330 6852 (Prof Jane Stuart-Smith)
Jane.Stuart-Smith@glasgow.ac.uk

Appendix C

Recording prompts

Waiting

Call centers

A TIME WHEN..
someone jumped the queue even though you had been waiting a while

A flight delay that resulted in more than a minor inconvenience

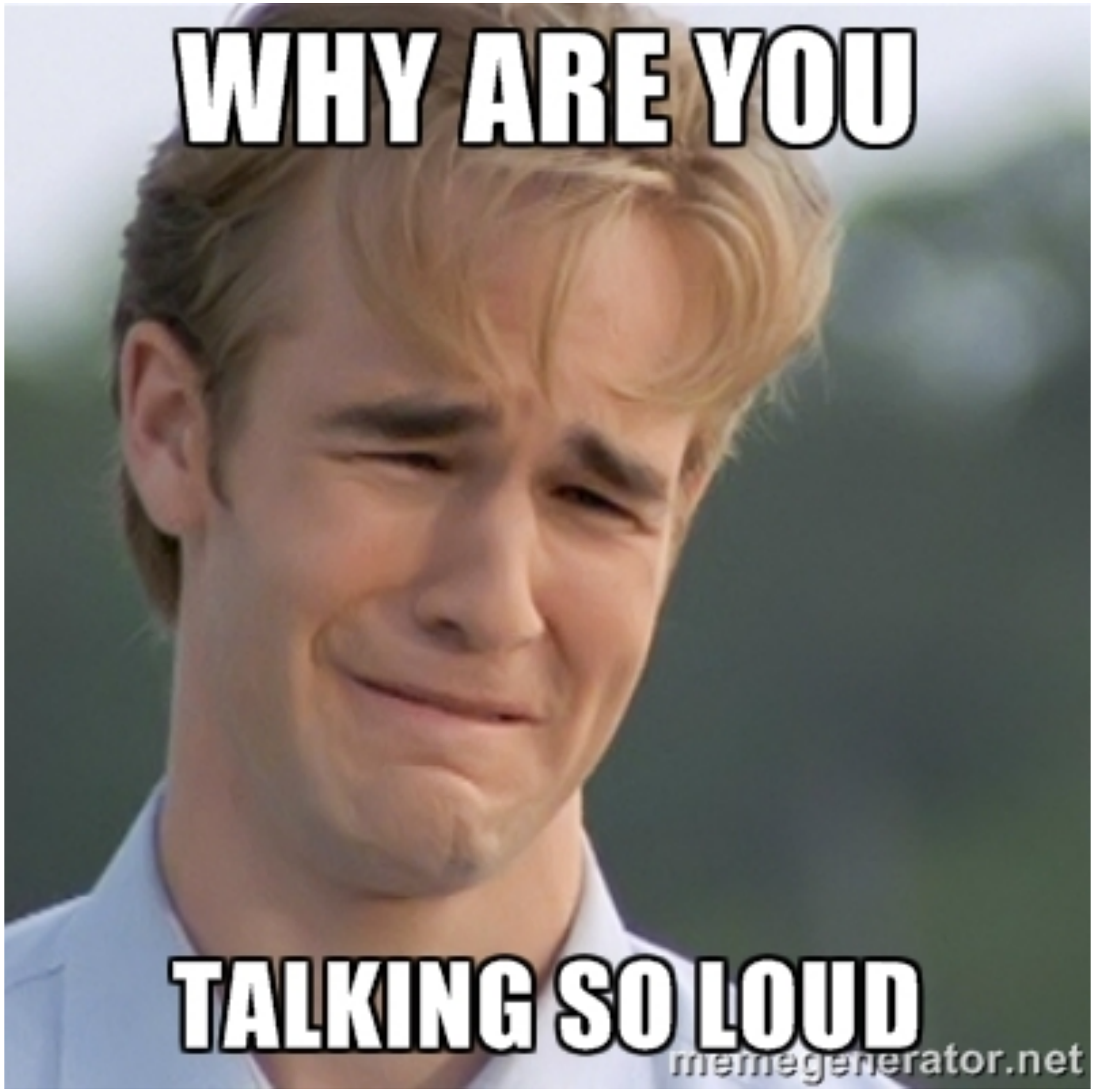

RYANAIR

Noise

When your fire alarm goes off for no apparent reason

An annoying car alarm
that just won’t stop

When someone is talking loudly and you want a bit of peace and quiet



When someone beeps at you in traffic
and you can’t go anywhere

Frustratio
n in the
workplace

Your boss

Too-chatty coworkers

Coworkers who do nothing

Rude customers

Boring but necessary Admin work

Have you ever had trouble getting the printer to work?

When people accidentally hit “reply all”

Money

Cashpoint charges

Overdraft fees

Bank	£200 overdrawn* (agreed)	£200 overdrawn* (unagreed)
Lloyds TSB	£2.96	£217.96
Halifax Rewards (4)	£25	£145
Alliance & Leicester (1) (2)	£0	£125
Barclays	£2.55	£88
RBS/NatWest	£3.01	£67.48/£67.46
Halifax High Interest (1)	£2.48	£67.26
Abbey (1) (2)	£0	£64.25
Nationwide BS	£2.71	£22.71

*Based on a one-off card transaction leaving you overdrawn for one month. (1) Minimum monthly funding requirements apply (2) Zero pc for 12 months (3) No penalty fee as long as you haven't breached agreed overdraft limit within last six months (4) Customer earns £5-a-month regardless of

Tell a story about a time someone owed you money and didn’t pay you back OR took a long time to pay you back

When your work or the bank messes up your paycheck

Other People

When someone doesn’t buy their round at the pub

When food service workers are rude

or

When people are rude to food service workers

Have you ever had a flatmate who didn't pull their weight in your flat?

What is the worst backhanded compliment you've ever received?

Can you think of a time someone you know was blatantly hypocritical?

That one person who is always taking a selfie

Has a stranger ever asked you a question that got a bit too personal?

Have you ever been pick-pocketed?

The

Government

Brexit

Underfunded NHS?

Dishonest Politicians with hidden motives

IndyRef

Glasgow
CITY COUNCIL

Miscellaneous

Nuisances

Have you ever made plans and then found the weather forecast was wrong?

- Your least favourite food

- Coming back from a holiday with sunburn

- Mispronunciations (e.g. ‘expresso’ for espresso)

All prompts and information accessed from:

- https://www.buzzfeed.com/lukebailey/things-you-can-do-to-immediately-annoy-a-british-person?utm_term=.tr45WVeZX#.qkrLaMpE4
- http://metro.co.uk/2017/03/02/40-really-trivial-things-that-make-all-british-people-want-to-explode-with-rage-6482078/
- http://www.express.co.uk/life-style/life/788748/what-makes-Britons-angry-do-you-agree-anger-annoying

Appendix D

Ogden transcription protocol

From Ogden 2018a

C **Manner**: Central, Lateral

D **Number**: how many clicks are present (1, 2, 3…)

E **Airflow**: (voiceless) oral, (voiced) nasal

F-G-H **Followed by**:
(H), in-breath, (SIL) silence from speaker, (PRT) particle, (LM) lexical material), standalone (0)
There are three of these slots, so if there is more than one element present, it can be included.

I **If PRT, which one?** Put in particle: *oh, aw, ah, well*, etc.

K **Position of the click in its host TCU**: pre-, mid-, post; standalone. Note: this is for position in the TCU, not in the turn!

L **Prior turn**: (S) same speaker, (O) other speaker, (L) lapse. Lapse = where no particular participant is selected as next speaker.

M **Position of TCU relative to prior talk**: (1) in overlap before TRP, (2) in overlap at/after TRP, (3) in the clear, (4) after a silence (gap, pause, or lapse).

Main action of turn the click is embedded in:

1. N **Regulatory functions**: (NSI), New sequence indexing; (IS) incipient speakership: include only if there is evidence in the TCU such as continued talk or an in-breath (i.e. do not use for standalone clicks), (SR) self-repair: include if there is a TS and Repair, (WS) word search: include if there is evidence such as cut-off syntax, overt lexical markers, and a resolution from either party; 0 if none of these. *These categories are based on what the literature has shown; if there are lots of 0s in this category, don't worry.*
2. O **Affect-laden functions**: (A3) assessment of 3rd party, (A2) compliment to recipient, (AP) appreciation of news or telling, (C3) complaint about third party, (SY) sympathy… ; (A+, A-, AB) other affect-laden function (+ve or -ve; ambiguous); (NO) no affect-laden function. *Affect-laden functions should only be included where there is sequential or lexical evidence for it. This can include e.g. a prior turn by another speaker with an Extreme Case Formulation; an overt complaint or other action which overtly seeks alignment; it can also include evidence within the turn by the same speaker.*
3. P **Alignment**: (AL): TCU aligns with the action of the prior TCU; (MA) TCU is misaligned with the action of the prior TCU; 0 alignment not relevant
4. Q **Affiliation**: (AF) TCU affiliates with the action of the prior TCU; (DA) TCU is disaffiliative with the prior TCU, e.g. a dispreferred action in a 2PP; 0 affiliation not relevant.

R **Sequential location**: (CONT) continues prior TCU (e.g. lexical evidence such as initial *and, but, then*…); 1PP, 2PP, 3rd; (LT) longer turn (e.g. in a story); (QUOT) after a quotative; (1in2) 1PP in 2PP slot; (O) other

S **If 2PP**: markers of dispreference (Y/N)

Appendix E

COG extraction Praat script

```
#CoG_jssx
#author: Jane Stuart-Smith
#date: revision for Julia cog measurement for clicks, 14 Oct 2019,
from 15 August 2009
#Praat: 5.3.57, original 5.0.06
#edited by James Tanner 20/11/2019
#This script takes first four spectral moments from a labelled burst
after high and lowpass filtering. Its steps are:
#1. the form sets up the output filename, and allows you to specify
the numbers of the relevant tiers
#2. the headings for the output file are specified
#3. the sound and textgrid files are pulled into the Object window
#4. the sound file is high pass filtered (allowing frequencies above
450Hz, and so removing those below - this is to
#   remove those frequencies in the spectrum which might be
particularly affected by low frequency hum from electricity, also
from clothing
#   noise from microphone)
#5. then the high pass filtered sound is lowpass filtered (allowing
frequencies below 12000Hz, and so removing those above - this to
#   minimize the effects of aliasing, i.e. the effective folding in
of higher frequency information into the frequency range of the
spectrogram)
#6. the point tier label for the burst is taken, and the time of the
burst
#7. a spectrogram is taken from the filtered soundfile (window 10ms,
Hamming to ensure that spectrum taken at burst time will be centred
#   on the burst)
#8. a spectrum is taken from the spectrogram, centred on the burst
#9. the first four spectral moments are taken from that spectrum
#10. the main data are printed in the info window to allow tracking
of the script
#11. the column contents are appended to the file specified earlier
in the form

#Script tips@
# script must run from the object menu, and be in the same directory
as the sound and textgrid files
# sound and textgrid files must have exactly the same names
# the script will only take moments from one point in the point tier
# the output file is a csv file (comma separated) - if the comment
has comments in it, then new columns are formed, that is why the
# comment is the final column of the spreadsheet


form Julia cog script
        word sound_extension .wav
        word textGrid_extension .TextGrid
        comment output file will be created in same directory as
sound files
        comment type in name of output file (must end in .csv)
        text filename Thesis_Results.csv
        comment enter number of tier which contains click (=
'click')
```

```
        natural click_tier 1
        comment enter number of tier which contains accomp (=
'accomp')
        natural accomp_tier 2
        comment enter number of tier which contains contains (=
'contains')
        natural contains_tier 3
        comment enter number of tier which contains followedby (=
'followedby')
        natural followedby_tier 4
        comment enter number of tier which contains click particle
(= 'particle')
        natural particle_tier 5
        comment enter number of tier which contains tcu (= 'tcu')
        natural tcu_tier 6
        comment enter number of tier which contains function (=
'function')
        natural function_tier 7
        comment enter number of tier which contains location (=
'location')
        natural location_tier 8
        comment enter number of tier which contains context (=
‘context’)
        natural context_tier 9
        comment enter number of tier which contains topic (=
‘topic’)
        natural topic_tier 10

endform

clearinfo


fileappend "'filename$'" Name, Click, Accomp, Contains, Followedby,
Particle, Tcu, Function, Location, Context, Topic, Tburst, Durms,
Cog, Mean 'newline$'


mySounds = Create Strings as file list... sounds *'sound_extension$'
nSounds = Get number of strings

for iSound to nSounds
        select mySounds
        sound$ = Get string... iSound

        name$ = sound$ - sound_extension$
        printline 'name$'

        textGrid$ = name$ + textGrid_extension$

        mySound = Open long sound file... 'sound$'
        myTextGrid = Read from file... 'textGrid$'

                select myTextGrid
```

```
                ninterval = Get number of intervals... click_tier
                writeInfoLine: 'ninterval'

                   for iinterval to ninterval


                        click$ = Get label of interval...
click_tier iinterval
                        printline 'click$'

                        if click$ <> ""

                                accomp$ = Get label of interval...
accomp_tier iinterval
                                contains$ = Get label of
interval... contains_tier iinterval
                                followedby$ = Get label of
interval... followedby_tier iinterval
                                particle$ = Get label of
interval... particle_tier iinterval
                                tcu$ = Get label of interval...
tcu_tier iinterval
                                function$ = Get label of
interval... function_tier iinterval
                                location$ = Get label of
interval... location_tier iinterval
                                context$ = Get label of
interval... context_tier iinterval
                                topic$ = Get label of interval...
topic_tier iinterval

                                tburst = Get start point...
click_tier iinterval
                                tend = Get end point... click_tier
iinterval
                                dursec = tend - tburst
                                durms = dursec * 1000

                                select mySound

                                Extract part: tburst, tend, "yes"

                                highpass = Filter (pass Hann
band)... 450 0 100

                                select highpass
                                lowhighpass = Filter (pass Hann
band)... 0 12000 100

                                select lowhighpass
                                To Spectrogram... 0.01 12000 0.002
20 Hamming (raised sine-squared)
                                To Spectrum (slice)... tburst
```

```
                                    cog = Get centre of gravity... 2
                              mean = Get standard deviation... 2

                                    printline 'click$', 'tburst:3',
'cog:0', 'mean:0'
                                    printline

                                    #fileappend "'filename$'" Click,
Accomp, Contains, Followedby, Particle, Tcu, Function, Location,
Topic, Context, Tburst, Durms, Cog, Mean 'newline$'

                                    fileappend "'filename$'" 'name$',
'click$', 'accomp$', 'contains$', 'followedby$', 'particle$',
'tcu$', 'function$', 'location$', 'context$', 'topic$', 'tburst:3',
'durms:0', 'cog:0', 'mean:0' 'newline$'

                              endif

                    select myTextGrid

                    endfor
          select all
          minusObject: mySounds
          Remove

endfor
```

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