DIPLOMARBEIT / DIPLOMA THESIS

Titel der Diplomarbeit / Title of the Diploma Thesis

“The closing diphthong /əʊ/ and the GOAT-GOAL distinction in Southern British standard usage”

verfasst von / submitted by

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angestrebter akademischer Grad / in partial fulfilment of the requirements for the degree of

Magister der Philosophie (Mag.phil.)

Wien, 2020 / Vienna, 2020

Studienkennzahl lt. Studienblatt / degree programme code as it appears on the student record sheet:	A 190 344 333
Studienrichtung lt. Studienblatt / degree programme as it appears on the student record sheet:	Lehramtsstudium UF Englisch UF Deutsch
Betreut von / Supervisor:	Univ.-Prof. Mag. Dr. Gunther Kaltenböck, Privatdoz.

Acknowledgements

I would like to thank my supervisor, Gunther Kaltenböck, for his invaluable support and guidance before and during the writing of this thesis. You were able to steer me in the right direction while allowing me the freedom to explore the areas that interested me. Your input, feedback and moral support have helped me to achieve a thesis I am proud of. Thank you.

I would also like to thank the professors and lecturers who taught me in other courses and contributed to this thesis through the many discussions and exchanges we had. Thank you especially to Alexandra N. Lenz and Anke Sennema – I was able to take a lot from your courses on standard language and experimental phonetics respectively, and from our discussions together, and apply it to this project.

I am indebted to my colleagues, friends and other supporters who are probably not aware of the huge impact they have had on my professional and personal development. Especially Amy Bruno-Lindner and Gabrielle Smith-Dluha – you both encouraged and inspired me more than you know. Thank you to everyone else who supported me in various ways with this thesis – Katie Bray, Klara Kager, Vanessa Krebs – and of course to David Grace, for always giving me a boost when I need it.

I am very grateful to all the participants who took part in the empirical part of this study. Without volunteers like you who give their time and lend their voices, projects like these would not be possible.

I am incredibly thankful for my loving and supportive family, who have been behind me with everything I have done. You supported my decision to move to Vienna, and even when we have been far apart, you have always been there for me. Mum and Dad – thank you so much for everything you have done for me.

Most of all, I want to thank my partner, Daniel. Without you, I would not be where I am. You gave me the courage to see this degree through, and supported me academically and emotionally through times when I was ready to pack it in. You gave me strength and hope, and it is thanks to you that I have come through the other side. You will never know how much I appreciate your being there for me through everything.

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cps	cycles per second
CUBE	*Current British English* (pronunciation dictionary)
F1	first formant
F2	second formant
GA	General American
Ger.	German
Hz	Hertz
IPA	International Phonetic Association / International Phonetic Alphabet
L1	first language
RP	Received Pronunciation
SSBE	Standard Southern British English

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1. Introduction

This thesis builds on a growing body of work on the contemporary pronunciation of the closing diphthong /əʊ/ in British English, particularly in Standard Southern British English (SSBE). It has been frequently acknowledged that this diphthong is often pronounced in two increasingly distinct ways, one being of a central quality and one being markedly more back. This phenomenon is often referred to by researchers and academics as the GOAT-GOAL distinction, using the terminology of the lexical sets established by the esteemed phonetician John C. Wells (1982a: 120). While the presence of this split has not been neglected in the literature *per se*, it has largely been described as phonetic in nature, for instance as a relation of allophony. There have been comments within works that suggest phonological implications of this split, with some claiming that a phonemic split has taken place (Wells 1982a: 148), yet there remains to be a consensus as to whether or not two distinct phonemes have indeed arisen. The aim of this thesis is to contribute to the debate and to offer insight as to the current state of play regarding the pronunciation of /əʊ/ in SSBE, and the factors affecting its pronunciation.

Variation in the pronunciation of speech sounds can be attributed to a vast number of factors. For instance, variation can be caused by the phonetic environment of the segment through processes such as assimilation. Differences in pronunciation may be rooted in the respective accent of the speaker, or brought about as a result of the speaker's language community and other sociolinguistic dimensions such as class, age or gender. The pronunciation of any given segment might exhibit general tendencies, but is often highly individual and idiosyncratic. It can be affected by numerous speaker-specific factors, ranging from conscious or unconscious personal preference (Gruhn, Minker & Nakamura 2011: 25) to self-efficacy in the context of phonetic aptitude (Leisser 2018: 97). All of these considerations naturally apply to the diphthong /əʊ/, perhaps the most commonly discussed being its phonetic environment. Neighbouring segments such as the lateral approximant /l/, more specifically the dark [ɫ], are frequently cited as reasons or catalysts for the centralisation or backing of /əʊ/. However, if only phonetic factors were involved in the GOAT-GOAL split, it would be relatively easy to discern whether or not the split is phonemic. As will be discussed in the course of this thesis, there appear to be other factors at play, for example on the morphological or the lexical level. Furthermore, what makes this distinction particularly elusive are the differences between individual speakers, even between those who otherwise speak with comparable accents. As such, the same word may be pronounced with the GOAT or with the GOAL sound and be equally acceptable, implying allophony and speaking against the possibility of a phonemic contrast between the two sounds. By way of example, this can be observed in the following conversation between the three hosts of the British podcast series *My Dad Wrote A Porno*, Jamie Morton, James Cooper and Alice Levine, where all three speakers utter the word *tombola*:

James:	She's totally in this *tombola*.	təmˈb**əʊ**lə	GOAT
Jamie:	"OK", the tall man shouted. "Let's tumble the *tombola*!"	tɒmˈb**əʊ**lə	GOAT
Alice:	You don't say that, can I just say, you don't– that's not the terminology of a *tombola*.	tɒmˈb**ɒ**ʊlə	GOAL
James:	Let's tumble the *tombola*?	tɒmˈb**əʊ**lə	GOAT
Alice:	You don't ever say that.		
Jamie:	"Let's tumble the *tombola* and see what the three lucky numbers are!"	təmˈb**əʊ**lə	GOAT
James:	Mm, lucky.		
Jamie:	The *tombola* went round and round…	tɒmˈb**əʊ**lə	GOAT
Alice:	He's stolen that from the wheels on the bus.		

(Morton, Cooper & Levine 2015 [19:14-19:37])

As can be seen above, James and Jamie both pronounce *tombola* with the centralised [əʊ] (GOAT), while Alice produces the variant [ɒʊ] (GOAL). The difference between Alice and the other two speakers in their pronunciation of /əʊ/ gives rise to the possibility that Alice may interpret the morphological structure of *tombola* differently, for instance. Possible factors such as this are among those that will be explored in this project, as well as potential causes for inter-speaker variation in this regard.

However, in the following passage, taken from the same episode, Alice shows inconsistencies in her repeated pronunciation of *tombola*:

Alice:	So we have to have been to the *tombola* previously, the fictitious *tombola*, to know what the prizes are.	tɒmˈb**əʊ**lə tɒmˈb**ɒ**ʊlə	GOAT GOAL

(Morton, Cooper & Levine 2015 [13:55-14:01])

Here, Alice uses both variants within the space of two seconds. This indicates not only inter-speaker, but also intra-speaker inconsistency concerning the variant of /əʊ/ used in *tombola*. This phenomenon will also be explored in the empirical section of this thesis.

The objective of the study presented in this paper is to document the pronunciation of /əʊ/ among speakers of SSBE, with a view to using the results to inform a discussion on the factors affecting the frontness of the diphthong. The intention of the study and subsequent discussion is to answer the following research questions:

1. How is the closing diphthong /əʊ/ pronounced by speakers of Standard Southern British English (SSBE)?
2. What is the role of the dark [ɫ] in the frontness of this diphthong?
3. Are there any other factors which affect the frontness of this diphthong, such as morpheme structure, orthography or context of speech?
4. What are the implications on the phonology and phonemic transcription of this diphthong?

To this end, auditory and acoustic analysis will be undertaken, and used as a basis for the consideration of the GOAT-GOAL split as phonemic or allophonic. Of course, it must be considered that the empirical study presented here only provides an analysis of the speech produced by the 14 speakers who participated. It is therefore only possible to draw tentative conclusions regarding /əʊ/ in general based on this relatively small-scale study. Nonetheless, these conclusions may still form a basis for wider assumptions concerning /əʊ/. As Fry (1976: 13) states,

> [a]coustic analysis must obviously be applied to *particular* samples of speech, to utterances by individual speakers using a given language; but the results of the analysis will be *generally* useful, to the extent that they provide a basis for generalizịng [sic] about sounds […]. [original emphasis]

The results of such studies hence must not be assumed to be fully representative of the speech behaviour of any one speech community, yet at the same time should not simply be disregarded due to their limitations since they can still provide important insights and thus inform further research. For even if solid conclusions cannot be drawn at this time, any data to which the academic community has access can one day help to "provide answers to as yet unknown research questions" (Thieberger et al. 2015: 2).

This thesis is divided into four main sections. The first will investigate what constitutes a standard variety generally, and what is considered the current standard variety for British English specifically. Here, the concept of standard usage will be introduced with a view to identifying and delimiting the variety of English spoken by the participants of the empirical study. Next, the diphthong /əʊ/ will be investigated in terms of its diachronic development, synchronic variation and potential factors influencing its pronunciation. After that, a discussion on the analysis and transcription of vowel sounds in general will be undertaken. The objective of this section is, on the one hand, to outline ways in which /əʊ/ is transcribed in order to decide on suitable notation for the remainder of the thesis and, on the other hand, to investigate ways in which vowels may be analysed, both auditorily and acoustically. This will inform the methodology of the empirical study, which will be presented in the final section. The results of the study will form the basis of a discussion on whether or not a phonemic split has occurred between central and back variants of /əʊ/. It is hoped that this study will provide valuable insight which may serve as a foundation for future research.

2. Standard varieties

2.1. What is a standard?

The notion of a 'standard', or a 'standard' variety, is an extremely difficult concept to pin down (Volkmann 2015: 149; Milroy & Milroy 2012: 18). It has been heavily disputed particularly, but not exclusively, within sociolinguistics (Deppermann, Kleiner & Knöbl 2013: 83), and definitions of what can be considered 'standard' vary greatly among linguists and laypeople alike. Among linguists, attempts to define what a standard is have not led to any single consensus (Cheshire & Stein 1997: 1-2; Bex & Watts 1999: 1) due to diverging views on what constitutes a standard, which criteria must be met, and whether it is even practical or viable to pursue the demarcation of 'standard' as a concept at all (Cheshire & Stein 1997: 2). Especially in the specific case of English, which holds a relatively unique status of functioning as a global lingua franca, a standard variety is an abstract concept, existing only "as an idea in the mind rather than a reality" (Milroy & Milroy 2012: 19). Even the term *Standard English* (used e.g. by Seidlhofer 2017; Trudgill 1999, among many others) is problematic in itself, since it implies one single, dominating standard in spite of the many varieties of English which may function as a standard in their own geographical or temporal contexts. Trudgill (1999: 124) admits that standard English "comes in a number of different forms", for instance, "Scottish Standard English, or American Standard English, or British Standard English". This essentially undermines the idea of one overarching 'standard English' if it can nonetheless manifest itself in various ways, each still considered 'standard'. In Seidlhofer's (2017: 86) words, the very notion of standard English "presupposes a stability that is an illusion". Among laypeople, however, the concept of a standard variety exists perhaps more tangibly, but is often described using more evaluative terms such as *Hochdeutsch* for German, or *bon usage* for French

(Auer 2011: 486). In English, lay terms such as *proper English* or *the Queen's English* are sometimes used to refer to what linguists may call a standard variety, especially in British English.

The lack of a universally accepted definition of *standard* has led to numerous sets of criteria suggested by linguists which can be used to determine which varieties may be considered standard. Cheshire (1997: 68), for instance, conceives of the term *standard* as "a set of norms about [a given language], to which speakers – and writers – conform to a greater or lesser extent" (cf. also Milroy & Milroy 2012: 19). This essentially implies a prescriptive aspect, albeit here arguably in a passive sense. Cheshire's view of a standard is that of a model towards which to strive. Crowley (2003: 78-79) notes two differing senses of the term *standard*, dating back to John Locke in the 17th century. The first of these is that of a *standard* which "serve[s] as a[n] […] instrument of unity" (Crowley 2003: 79). A standard variety in this sense is a marker of social groups; speakers of a common 'standard' belong together, which implies that those who diverge from the standard may be excluded. The second sense of *standard* that Crowley identifies is that of "a linguistic value to be reached and one that could be communally recognised" (Crowley 2003: 79). While this second sense partially overlaps with the first, there is a greater emphasis on the standard being an ideal to which people can aspire. This naturally leads to prescriptive attitudes towards whichever variety constitutes the standard, since an ideal is inherently elite. In this sense, while Crowley's and Cheshire's views of *standard* both have prescriptive implications, Cheshire's definition shows a *standard* as a set of rules as opposed to a variety, whereas Crowley appears to consider a *standard* a variety in itself to which people can aspire in order to be socially included and esteemed.

Auer (2011: 486) combines and elaborates on these definitions, and offers three criteria for the definition of a standard variety, or rather three features by which it can be recognised:

1. a standard variety is a common language, i.e. one which (ideally) shows no geographical variation in the territory in which it is used;
2. a standard variety is an H [high] variety, i.e. it has overt prestige and is used in situations which require a formal way of speaking (if a spoken standard exists at all), as well as in writing; and
3. a standard variety is codified, i.e. 'right' or 'wrong' plays an important role in the way in which speakers orient towards it.

According to these features, a standard must be widely understood and not attributable to one particular place, it must be considered more formal and more prestigious than other varieties, and it must be codified. However, it is generally understood that a variety does not simply grow into being a standard. For, as Haas (1982: 2) puts it, "a standard does not 'evolve itself'".

In order to fulfil these criteria and become established as a standard, a variety must undergo multiple processes of interaction between a number of so-called "normative agents" (Deppermann, Kleiner & Knöbl 2013: 86). Ammon (2003: 2) identifies four "social forces" which act as agents in this regard, as seen in Figure 1 below:

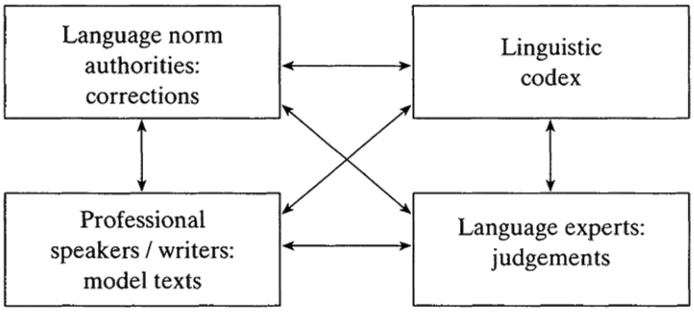

Figure 1. The "social forces" that govern what is considered 'standard' (Ammon 2003: 2)

While this model was conceived with the German language in mind, its application may be extended to other languages which operate within similar socio-political systems, such as English. The four main agents, these being language norm authorities, professional speakers and writers, linguistic codices, and language experts, all contribute to the establishment of a variety as a standard.

One of the clearest indications that a variety has become or is in the process of becoming something of a standard is its codification. In their discussion on what makes a 'standard' variety, Smakman and Barasa (2016: 28) imply that full standardisation even depends on complete codification of the respective variety, whereby codification in progress means that a variety "is not yet fully standardised".[1] Both written and spoken language can be codified, the latter often in terms of standard pronunciation, although the majority of codices appear to focus on written language. According to Ammon (2003: 4-5), a codex must be published, making it generally available to the public, and must be valid as a language codex, which means it must be approved by norm authorities for use as a resource for correcting "the language behavior of their norm subjects". Examples of codices include dictionaries and grammar books, whereby nowadays a codex does not necessarily need to be published in paper form, rather there are many online or electronic resources which may serve this purpose. The purpose of a codex is

[1] It must be stated that, at a later point in their publication, Smakman and Barasa (2016: 33) do admit that "it is possible for certain language varieties to function as standard languages *without* having undergone (or completed) the codification process" [my emphasis]. This may be seen as a contradiction, but it is likely intended to mean that while a variety whose codification is not yet complete may be considered as not yet fully standardised, it can still be in use as a *de facto* standard within a language community. This ties in with the concept of *standard usage*, which will be discussed in the next section.

to record a standard variety in order for norm authorities to refer to it in their corrections. One significant issue here, however, is that standard varieties are constantly being renegotiated as language continues to evolve, resulting in any one variety never being able to be fully standardised. As such, "[c]odices are practically never complete, which means they do not contain all standard forms" (Ammon 2003: 5). In fact, Milroy and Milroy (2012: 19) go as far as to argue that "the only fully standardised language is a dead language". The issue of inherent incompletion is ameliorated through the ability to continually update online codices with relative speed and ease in comparison to printed books. Despite codified norms arguably never being able to completely reflect a current standard, the codification of a certain variety still encourages and even intensifies prescription since the codices that are available to the wider public are often considered authoritative (Milroy & Milroy 2012: 22). Such resources are essentially taken to be rulebooks of sorts, whether they are intended for this purpose or not, and are referred back to in cases of doubt. The power of the codex as an authority is only possible since "people *believe* that there is a 'right' way of using English" (Milroy & Milroy 2012: 25 [original emphasis]), and if there is to be a correct version, it is to be the version that has made it into the dictionaries.

As previously mentioned, a codex may be considered as such if it is determined to be valid through its use by norm authorities. Language norm authorities are those who, in a professional or non-professional capacity, take a prescriptive approach to language and provide corrections on their "speech or writing behavior" (Ammon 2003: 3). This inherently entails that these authorities have one variety which they consider 'correct', which they enforce through their teaching. They may operate in a professional context, for example school teachers, or a non-professional context, for example family members such as parents and grandparents. In any case, as the term *language norm authority* suggests, these agents must be in a position of authority and their expertise respected as such in order for their corrections to be accepted and adopted. Furthermore, the 'standard' set and perpetuated by norm authorities can sometimes contradict that of the codices, and authorities such as teachers often operate according to their own beliefs regarding what is correct, even when these diverge from a codified norm (Hundt 2010: 36). Their relative autonomy in this regard enables them to play an increased role in establishing the standard, since they can function as mediators and gate-keepers between codified norms and so-called "language norm subjects", deciding what is taught as standard and what is rejected (Ammon 2003: 3).

As well as playing a prescriptive role, agents such as teachers may also operate as model speakers and writers, although this status is usually held by people of more widespread prominence. A model speaker or writer is typically recognised as such if they are "a member of the intellectual elite or even, more specifically, as a professional speaker or writer", as well as having their linguistic output available to the wider population (Ammon 2003: 2). Hundt (2010: 37) argues that it is not the conscious objective of model speakers and writers to provide texts to perpetuate a standard; in fact, unlike the other three social forces, they are often unaware "of their own norm-stabilising and norm-spreading role". In this regard, they may be the 'purest' of the social forces in the sense that their position in the negotiation of a standard is circumstantial, and is likely not the result of deliberate decisions or even personal agendas. Examples of model speakers or writers may include newsreaders and actors for spoken language, and journalists and authors for written language (Ammon 2003: 2). In certain language communities, there may exist some types of model speakers and writers that would not apply in other communities, such as the Queen for British English (see layperson's term *the Queen's English*).

Norm authorities and model speakers are the main forces involved in creating large-scale and repeated exposure to a single variety. Due to their positions of authority, their linguistic output and teachings are respected as being 'correct'. When this 'correct' variety is codified, it is established as being a relatively stable source of reference. However, there is a fourth social force at play, namely the language experts, who give a variety validation and ultimately more prestige through their qualified commentaries, and have the influence to affect and alter what is seemingly fixed in codices. By criticising what is taught by norm authorities, what is produced by model speakers, but most importantly, what is published in codices, language experts help to shape general attitudes towards a variety and determine (sometimes forcefully) whether or not elements of this variety should enjoy the status of being 'standard'. Seidlhofer (2017: 87) argues that it is these experts who have the most clout in the negotiation of standard English in particular, proposing that they are the agents "who decide what counts as the English standard language".

As Ammon's model suggests, the nature of interaction and influence among the four social forces is not unidirectional, but rather each agent has the power to affect each of the other agents at work. In accordance with this model, language experts do not sit at the top of any hierarchy in this regard, and can be influenced or overruled by any of the other three social forces. In this context, Ammon (2003: 6) describes a case exemplifying the reciprocal negotiation between codifiers and experts. With the introduction of the 35th edition of the *Österreichisches Wörterbuch* ('Austrian dictionary') in 1979, many language experts declared their disapproval at the inclusion of previously non-standard words and expressions, and called for amendments to be made and such entries to be removed. In some cases, these criticisms appear to have been heeded in following editions of the codex, especially those voiced by Wiesinger (1980), which demonstrates the dominating influence of language experts. However, many criticisms were not taken into account in subsequent editions, and hence many new entries were retained, which shows the power of codifiers to operate as language authorities without their output being wholly determined by university experts. As Ammon (2003: 6) puts it, "[t]hrough clinging to at least some of their earlier decisions the codifiers could demonstrate their autonomy". In fact, it has been repeatedly observed that the influence of language experts is minimal compared to the other three social forces. Experts constitute a minority in the wider population, "form[ing] a very small group in the language community", and their direct influence on the so-called "norming process" has been shown to be minimal (Hundt 2010: 37). Their commentaries must first reach a sizable audience for them to be considered, and even when this is achieved, their criticisms can be ignored or contested, as evident in the case of Wiesinger and the *Österreichisches Wörterbuch*. Of course, this is not to say that the role of language experts in the negotiation of a standard variety is completely negligible, but the level of their influence in the wider population must be recognised as limited.

In an earlier publication, Ammon (1995: 80-81) identifies a fifth social force at work, namely the majority of the population (Ger. *Bevölkerungsmehrheit*), whereby the effect of this fifth agent is only indirect. Ammon (1995: 81) argues that the influence of the general population on what is determined to be the standard variety is limited to the fact that the main four social forces largely either consist of or are created by members of this same population, and so are influenced by the dominating language policies as well as the attitudes of the layperson. Actual spoken language output by the general population, or indeed by the select group of model speakers, necessarily differs from codified norms, and varies more so than written language, to the point where some doubt the existence of a standard in spoken language at all (Auer 2011: 486). In spite of this, spoken language is nonetheless compared to codified norms and corrected according to these norms. Furthermore, there is increasing interest in the study of spoken language in terms of a 'standard', this mainly being discussed using terminology such as *standard usage*. In the following section, the concept of *standard usage* will be introduced and discussed.

2.2. Standard usage and standard pronunciation

It is important to recognise that the concept of 'standard' applies differently to spoken language than it does to written language. While aspects of standard speech such as pronunciation can be recorded in codices using specially developed notation (Lenz & Plewnia 2010: 11), Kauhanen (2006: 34) writes that norms concerning "everyday spoken language" remain generally uncodified. However, it is possible for norms to be considered standard norms without codification, simply because they are used by model speakers and writers (Dürscheid & Elspass 2017: 92; cf. also Smakman & Barasa 2016: 33). Ammon (2003: 2) terms this *standard by (mere) usage*: if a language feature is implemented repeatedly by model speakers and writers, and this feature starts to become recognised or even adopted by the population at large,[2] it may become standard simply because it is used as the standard would be. Deppermann, Kleiner and Knöbl (2013: 83) prefer the term *standard usage*, and describe it as "a more realistic conception of [a] (spoken) standard" due to the tendency for codified standards of spoken language to diverge significantly from the actual natural speech, "even of educated speakers". Dürscheid and Elspass (2017: 92) argue that such differences between a codified standard and standard usage should not exist since codices should reflect actual language behaviour in the first place; however, since this is largely not the case, one may consider the two terms *standard usage* (Ger. *Gebrauchsstandard*) and *codified standard* (Ger. *kodifizierter Standard*) to be in semantic opposition with each other (Ammon 1995: 88). Whereas a codified standard must per definition be codified, standard usage is determined primarily by model speakers and writers (Ammon 1995: 94). Furthermore, codified standards tend to focus on written language (with some exceptions), while the term *standard usage* is generally used in the context of oral communication. This is not to say that both concepts of 'standard' operate independently, and that standard usage may develop without the influence of codification; rather "standardization of a language always starts with the codification of writing", meaning that "[t]he first determinant of the spoken standard therefore is correspondence to the written norm" (Deppermann, Kleiner & Knöbl 2013: 85-86). Standard usage should hence be considered and analysed not only as a purely oral concept, but also in relation to its codified counterpart. Conversely, the codified norms of spoken language must be updated regularly to respond to changes in the standard (usage) of a variety.

[2] This does not explicitly appear to be a critical criterion for Ammon (2003: 2), though it is implied.

The term *standard* in general tends to be discussed primarily in terms of grammar and lexicon in the literature, at least as part of attempts to define the term. This mainly holds true for codified standards, whereas issues concerning pronunciation tend to remain relatively neglected in such discussions outside of publications specifically dedicated to pronunciation. With regards to standard usage, however, pronunciation is becoming more of a key object of investigation in comparisons between standard pronunciation in codified norms and that in standard usage.

The emergence of a standard of pronunciation, particularly in British English, seems to have come about as a result of criticism towards what was perceived by influential writers as non-standard. Hickey (2012: 11) explains:

> The standard would seem to have arisen not through an explicit specification of what it entailed, but rather by a process of exclusion. In a way, the standard pronunciation arose by default: it was what remained after all the 'unacceptable' features had been weeded out.

This is not dissimilar to the way in which language experts provide commentary and criticism on language features that are (newly) codified; critique based on prestige serves to perpetuate an ideal and dismiss departures from this ideal as non-standard, possibly to prevent their becoming standard. Hickey (2012: 14-15) notes the use of evaluative and sometimes even contemptuous language to refer to pronunciation that does not fit the desired norm, with deviant pronunciations being branded *undesirable* or their commonality *unfortunate*. This is likely to have led to the term *Received Pronunciation*, popularised by Daniel Jones, which is intended to denote the standard pronunciation for British English. In place of a term which emphasises the pronunciation considered most standard with respect to supra-regionality or unity, *Received Pronunciation* foregrounds the discrimination between what is tolerated and what is not; pronunciation which is not rejected as being vulgar or provincial (see Hickey 2012: 10) is 'received'. As such, this view of standard pronunciation is that of a variety which consists of language forms that are not denigrated. This is necessarily an elitist view towards standard pronunciation, one which places emphasis on prestige, and on inclusion and exclusion. In the following section, this will be explored specifically with respect to the British standard pronunciation.

2.3. The British standard (usage)

In the previous section, the term *Received Pronunciation* (henceforth RP) was introduced. This is considered by many to be the standard accent for British English, or perhaps more accurately for the present day, “the standard accent of English in England” specifically (Altendorf 2003: 27). While there have been various suggestions for alternative terms to replace RP over the years, such as *General British* (Windsor Lewis 1972: xiv) or *BBC pronunciation* (Roach 2010: 3), RP appears to remain the most prevalent expression to denote the British English standard. The term *RP* is used extensively in the literature, carries with it significant prestige, and is “thoroughly familiar” to speakers of English, especially of British English (Wells 1982b: 279). The variety it signifies fulfils the criteria for a standard since it is extensively codified, originally in Jones’ *English Pronunciation Dictionary* in 1917 (Altendorf 2003: 28), and traditionally constitutes the variety generally used by model speakers such as “radio and television announcers and news-readers and […] many other public figures” (Wells 1982b: 279). According to Altendorf (2003: 27-28), it also exhibits very little variation, and as such, is completely supra-regional. In this context, however, Wells (1982b: 279-280) takes a diametrically opposite view of RP, arguing that it is not one single variety, but rather it shows a considerable amount of variation, such that there are numerous subtypes of RP that have been recognised and classified. Examples of these subcategories include *mainstream RP*, *U-RP*, *adoptive RP*, *near-RP*, *conservative RP*, *general RP* and *advanced RP*, to name but a few (cf. also Gimson 1980). These differ in various respects, such as the speaker’s social class (U-RP is the RP of the upper class, for instance), chronology (conservative RP and advanced RP are considered “chronologically related varieties”), and breadth and prominence of use (mainstream RP and general RP may fall into this category), among others (Wells 1982b: 279-280). Cruttenden (2001) even acknowledges multiple regional RPs, which speaks against the notion that a standard cannot be attributable to a specific region.

Wells, Gimson and Cruttenden, among others, hence appear to take a more inclusive approach to the British standard, allowing for deviation from one single ‘prototypical’ RP through peripheral RPs. In Trudgill’s view, this is not acceptable; he maintains that

> [s]peakers either have an RP accent or they do not. There are many who have a so-called ‘near-RP’ accent, but this is by definition not an RP accent. When it comes to employing a codified language variety, a miss is as good as a mile. (Trudgill 2002: 174, cited in Altendorf 2003: 28)

This approach implies that while near-RP approaches RP, it does not constitute RP and therefore is not standard. As previously discussed, however, actual standard usage can – and often does – differ greatly from the codified standard. Since the 1980s, when Wells' *Accents of English* was originally published, there has been a rise in what could be considered advanced RP, described by Altendorf (2003: 31) as "the language of the young and trendy".[3] The changes from general/mainstream RP to advanced RP appear to jeopardise the overall supra-regionality of the standard, since the majority of influence are specifically typical of pronunciation features heard in south-east England, especially London (Altendorf 2003: 31). It is likely for this reason that a number of new terms have arisen to describe the British standard variety which include an element of regionality, such as *Standard Southern British English*, used for instance by Hamann (2016) and Harrington et al. (2011), among others. Since the British standard is generally – and now explicitly – associated with the south-eastern region of England, south-eastern British varieties are becoming ever more prevalent in the context of standard pronunciation, particularly standard usage. Such influential, non-RP varieties include so-called *Estuary English*, a variety of "hybrid status" (Kaltenböck 2002: 433) considered halfway between RP and "London speech" (Rosewarne 1994: 5), and the so-called *London / South-Eastern Regional Standard*, regarded as closer to RP and therefore very similar to near-RP (Wells 1982: 303). Features that are now considered no longer to be deviations from RP, but rather to be modern *changes* to RP, include /t/-glottalisation, yod-dropping, final [ɪ]-tensing, and – perhaps most relevant to the present study – dark [ɫ] vocalisation and /u/ fronting, or rather /u/ centralisation (Altendorf 2003: 32). Vowel fronting in the British standard pronunciation will be discussed in more detail in the following chapter.

It has been recognised that RP "has changed not only phonetically, but also in terms of its status", where "other accents have clearly gained in prestige" (Kaltenböck 2002: 433). One now famous example of the RP of the upper classes giving way to modern, middle-class pronunciation can be observed during the wedding of Prince William and Catherine Middleton, now the Duke and Duchess of Cambridge, in 2011.[4] During the exchange of vows, the then Archbishop of Canterbury Rowan Williams reads aloud the phrase *to have and to hold from this day forward*, which is then repeated by Prince William. Rowan Williams, being 60 years of age on the day of the wedding and belonging undeniably to the upper classes, pronounces the word *hold* with the diphthong [əʊ], in accordance with typical RP pronunciation norms (see Wells 1982b: 312). Prince William, being just 28 years of age at the time of the ceremony, yet also unmistakably part of the upper class, repeats the word *hold* but instead uses the more

[3] It is unclear whether the description *young and trendy* is meant favourably, neutrally, or even derogatively.
[4] A video of the wedding vows is available online at youtube.com/watch?v=-RFL4iyoi4s (15 Nov. 2019). The excerpt referred to here begins at [04:03].

horizontally retracted allophone [ɒʊ] and vocalises the dark [ɫ], two features which at most are attested in near-RP (Wells 1982b: 313). This is one instance that shows the growing prevalence of a feature of pronunciation from a lower class becoming increasingly standardised (in usage), until it becomes more common and attested in the upper classes. Here, chronology is also implied through apparent time when the ages of the two speakers in question are taken into account. The difference in the pronunciation of the diphthong /əʊ/ in this example is central to the key research questions of this thesis. In the next chapter, this diphthong will be investigated in more detail in terms of the development and variation of its pronunciation.

3. The frontness of /əʊ/

This chapter is concerned with the fronting or centralisation of /əʊ/, and the factors affecting its frontness. Firstly, the centralisation of back vowels in general will be discussed. Here, the main focus will be the high back vowel /u:/; this is because it has received particular attention in the literature and shows potentially similar developmental patterns to /əʊ/, which will provide a useful basis for comparison later. Secondly, the diphthong /əʊ/ in (standard) British English will be examined with respect to its pronunciation, and while there are multiple dimensions of this diphthong that have changed over time, such as its openness, the focus here will be its frontness. Finally, potential explanations as to what accounts for the variation in the frontness of /əʊ/ in British English will be explored, with a view to informing the later discussion of the results of the empirical part of this thesis.

3.1. The diachronic centralisation of back vowels

It is well-known that the high back vowels of English have been centralised or even fronted in many of the world's English varieties.[5] The long high back vowel /u:/ has received particular attention due to its "becom[ing] increasingly centralized rather than fully back" in so-called "inner circle English" (Wiltshire 2014: 19), whereby the "inner circle" constitutes part of Kachru's model of world Englishes and "refers to the traditional bases of English – the regions where it is the primary language" (Kachru 2015 [1985]: 154). Examples of inner circle English varieties that have experienced such shifts include American English (Fought 1999; Fridland 2008: 432), Australian English (Cox 1999; Cox & Palethorpe 2001), and – most importantly

[5] Some parts of this section have been adapted from Green (2019: 47-49).

for the present thesis – British English, this being the source of some of the earliest documentation of modern /u:/ centralisation, dating from as early as the mid-20th century (Wells 1962, 1982a; Gimson 1966; Henton 1983; Deterding 1997; Roach & Hartman 1997; Hawkins & Midgley 2005; Harrington, Kleber & Reubold 2008; Hamann 2016). Wells (1982b: 310) notes that this vowel, also frequently referred to as the GOOSE vowel, has not only been fronted, but also diphthongised in some varieties, for example so-called "Popular London" English, with /u:/ having experienced a shift to [ʊʉ]. Whether it is realised as a diphthong or as a (near) monophthong, /u:/ now has "a definitely central rather than back quality" in the majority of modern varieties of English, rendering back variants largely ascribable to conservative accents (Wells 1982a: 148).

Despite its general centralisation, the back variant of /u:/ still exists in modern English as an allophone, most notably before a dark [ɫ]. This split between the centralised and back variants of /u:/ is sometimes referred to as the GOOSE-GHOUL split. Wells (1982a: 148) identifies that /u:/ tends to be centralised more easily and more often when preceded by the palatal [j], and less so when followed by dark [ɫ]. This view implies that the back variant of /u:/ is still the base form whose centralisation depends on various factors. This essentially also suggests that /u:/ centralisation is a momentary phenomenon, occurring only due to the immediate phonetic environment as opposed to there having been a diachronic shift in the underlying form of /u:/. It has been argued, however, that the centralised variant of /u:/ now constitutes the norm; rather than back /u:/ being centralised in all phonetic environments except before dark [ɫ], it is more logical that centralised /u:/ now be understood to undergo a process of retraction when followed by a dark [ɫ] (Green 2019: 59). This is supported by data showing that within varieties in which diachronic /u:/ centralisation has taken place, centralised /u:/ remains the most frequent allophone, and only reverts to being more back in the relatively less frequent context of preceding a dark [ɫ].[6]

It has been suggested that variation as a result of /u:/ centralisation is not simply allophonic. Wells (1982a: 148) proposes that a phonemic split now exists between centralised /u:/ and back

[6] *CUBE* lists, for instance, 11,541 words or phrases that contain /əʊ/ in some capacity, of which only 931 contain the string /əʊl/ where /l/ is not followed by a vowel and is therefore assumed to be a dark [ɫ]. This means that in only approximately 8% of words containing /əʊ/ is this diphthong followed by a dark [ɫ] (as of 2 Dec. 2019). It must be considered, however, that this is merely an approximation since *CUBE* contains many words not frequently used in English, and may contain some gaps, so a margin of error must be expected. Nevertheless, it is clear from these numbers that /əʊ/ occurs far more frequently in English when not followed by a dark [ɫ] than when it is.

/u:/, partially owing to the vocalisation of post-vocalic /l/ to a sound approaching [ʊ][7] and practically disappearing altogether after back /u:/. In this context, the symbol /ʉ:/ may be used to represent the phoneme of the centralised /u:/, leaving /u:/ to represent the back variant. This phonemic split between /ʉ:/ and /u:/, along with /l/ vocalisation, entails that the words *drew* and *drool*, for instance, would constitute minimal pairs: /drʉ:/ and /dru:/. However, this phonemic split may exist independently of /l/ vocalisation, as Wells (2012) identifies with the example of the possible minimal pair consisting of *ruler* (meaning 'leader') and *ruler* (meaning 'measuring instrument'). He explains the minimal pair as follows:

> [I]n southeastern England /**u**:/ has developed two very distinct allophones: a truly back [**u**:] before tautosyllabic (or stem-final) /**l**/, but a fronted quality approaching [**y**:] in other positions. The kingly *ruler*, ˈ**ru**:**lə**, is taken as transparently bimorphemic, *rule#(e)r*, so retains the back **u**: of *rule*; but the measuring *ruler*, ˈ**ry**:**lə**, has lost touch with its origins and is taken as an unanalysable unit, with a corresponding clear **l** and fronted vowel **y**:. (Wells 2012 [original emphasis])

In this example, it is stated that *ruler* clearly consists of two morphemes, the free lexical morpheme *rule* and the derivational suffix *-(e)r*. Without any affixes, *rule* is monosyllabic, meaning that the liquid /l/ occurs in the coda and therefore realised as a dark [ɫ]. It hence stands to reason that the vowel in *rule* would be pronounced as the back variant [u:] as opposed to the centralised [ʉ:] or fronted [y:]. However, in the polysyllabic *ruler*, the liquid /l/ occurs before a second vowel. It has been shown that /l/ retains its clear quality when followed by a vowel, regardless of whether or not it is in the coda of a syllable, and irrespective of word or morpheme boundaries (Wells 1982a: 258). Since /l/ is followed by a schwa in *ruler*, it would be reasonable to expect that /l/ not be realised as dark [ɫ], but as clear [l]. The back [u:] is carried over from *rule* to *ruler* in spite of the change from dark [ɫ] to clear [l], suggesting a newly developed independence of /u:/ from the articulation of the following /l/. This supports the argument that /ʉ:/ and /u:/ are becoming distinct phonemes, and that the pronunciation of /u:/ may depend not only on the articulation of /l/ in the same word, but also on its articulation in any potential derivatives or bases. Furthermore, it provides evidence against Hamann's (2016: 145) argument that this split is not phonological. She argues that if /ʉ:/ were no longer to be considered a back vowel, it would need to behave phonologically as a front vowel. Her (solitary) example for this is glide insertion: She claims that when [-back] vowels are followed by [ɪ], the palatal approximant [j] is inserted, for instance in *see*[j] *it*. Since /ʉ:/ is also a [-back] vowel, it would follow that [j] is also inserted after [ʉ:], for example in **do*[j] *it* as opposed to

[7] As Wells (1982a: 258) acknowledges, "[t]he precise quality varies". The sounds [ɤ] and [o] are also possible to replace /l/ in this context.

do[w] *it*. As this is not the case, Hamann (2016: 145) claims that the non-back [ʉ:] still behaves phonologically as a back vowel. However, this argument disregards the role of lip rounding in this respect; [j] is more readily inserted when the lips are spread, and [w] when the lips are rounded (O'Dell & Broadhead 2008: 85), the latter of which is still the case with [ʉ:]. Moreover, as has been shown in the *ruler* example, it is possible for the pronunciation of a segment to be retained even in spite of a change in its phonetic environment which would otherwise have affected its articulation. The arguments in favour of a phonemic split between /u:/ and /ʉ:/ therefore remain intact.

While some may argue that /l/ vocalisation and consequently its effects on /u:/ have no phonemic relevance in standard British English since they are largely understood to be dialectal, at least in terms of origin, a couple of points must be considered. Firstly, as discussed in the previous chapter, definitions of standard (British) English are unclear and can vary, and if the concept of standard usage is to be taken seriously, then /l/ vocalisation is widespread enough among both model speakers and the population at large to be considered part of standard usage. Secondly, it seems /l/ vocalisation "is now beginning to seep into RP" and it is predicted to "become entirely standard in English over the course of the next century" (Wells 1982a: 259). This statement was made by Wells almost 40 years ago, and when the example of the 2011 Royal Wedding is once again considered, Prince William's /l/ vocalisation shows that this feature has already reached the upper classes. It must therefore no longer be considered dialectal, non-standard or even irrelevant; instead, the impact of /l/ vocalisation and the phonemic split between /u:/ and /ʉ:/ should be considered with regard to the evolution of the phonemic system of standard British English and the future of phonemic transcription in this respect.

The centralisation of /u:/ and the GOOSE-GHOUL split is a well-documented shift that illustrates the tendency towards back vowel centralisation in the 20th century. There is divided opinion as to whether or not the split is phonemic (see e.g. Wells 1982a: 148; Harrington, Kleber & Reubold 2008: 2833) or merely phonetic (see e.g. Hamann 2016: 145). This being said, the focus of the present thesis is not the monophthong /u:/, but the closing diphthong /əʊ/. Being a diphthong, it consists of a glide between two distinct vowel sounds rather than a single, mostly consistent vowel, which may make any potential centralisation processes somewhat more complicated. However, the discussions presented in this section are far from irrelevant to the main research questions of this paper. Firstly, the diphthong /əʊ/ has undergone a similar process of centralisation, as will be detailed in the following section. Furthermore, the factors affecting the frontness of /u:/ may also be relevant in the frontness of /əʊ/, and so they may serve as a basis for comparison when investigating /əʊ/ in the empirical study presented later. The following section will introduce and discuss the diphthong /əʊ/ in more detail.

3.2. The case of the closing diphthong /əʊ/ in British English

The diphthong /əʊ/ is one of the five closing diphthongs in the (British) English phoneme inventory and can be heard in words such as *home*, *boat* and *toast*. As is the case with all diphthongs, it consists of two distinct vowel sounds with a glide from the first to the second, entailing a "change in vowel quality", within a single syllable (Ladefoged & Disner 2012: 29). Despite being categorised as a closing diphthong, /əʊ/ – along with the other four closing diphthongs – "often do[es] not reach a position that could be called close" due to the endpoint of the diphthong being much weaker than the starting point (Roach 2009: 18). Instead, the term *closing* refers to relative closeness, that is, the endpoint of the diphthong constitutes a relatively closer vowel than the starting point (Roach 2009: 18; Deterding 2015: 78). As the notation suggests, /əʊ/ typically begins at a position approaching the schwa, and as it moves towards a closer vowel, the lips are rounded to produce a sound approaching [ʊ], although lip rounding may occur pre-emptively during the diphthong's starting point (Roach 2009: 18).

While its conventional notation as /əʊ/ suggests its starting point to be a schwa [ə] and its endpoint to be the high back [ʊ], this diphthong exhibits significant variation in its actual realisation, as is the case with all vowels (Jakielski & Gildersleeve-Neumann 2018: 237). It is therefore also often termed the GOAT vowel by way of reference to the lexical sets established by Wells (1982a: 120). The classification of this diphthong as the GOAT vowel allows for the inclusion of other variants which are considered standard for other varieties of English, without "impos[ing] a specific phonetic realisation of the represented vowels" (Hoffmann 2011: 154). Furthermore, it helps to avoid prescriptive reference to this sound by using one notation over others (Deterding 2015: 79). For instance, according to Wells (1982a: 121), the GOAT vowel is pronounced as the monophthong [o] in American English, even though it is often transcribed as /oʊ/ in the majority of reputable dictionaries. However, even within one overarching variety, the GOAT vowel can be pronounced in many different ways. Particularly the first element, or starting point, of the diphthong experiences marked variation, and as such, more attention appears to have been paid to the first element in the literature. This may have to do with the second element in general being notably weaker, shorter and quieter (Roach 2009: 17), with [əʊ] consequently even being "potentially neutralizable" with the monophthong [ɜ:] in RP

(Wells 1982a: 237). With regard to first-element variation, the variants [əʊ], [oʊ], [ɜʊ] and [ɛʊ] have been attributed to RP, and the additional [ʌʊ] and [ɒʊ] to London varieties (Wells 1982b: 312). These variants are largely consistent within the respective (sub)variety and bring with them a number of connotations, mainly concerning social class (Wells 1982b: 312). For example, Altendorf (2003: 72) observes three key variants which each correspond to a given social classification: [əʊ] as the aerolectal (RP), the more open [ɐʊ] as the mesolectal (middle to working class), and the still more open and fronted [aʊ] as the basilectal (working class).

Despite being less prominent in the literature, there is also variation with regard to the second element of /əʊ/. For instance, Altendorf (2003: 72) notes that particularly on the mesolectal level "the endpoint can be further open and centralised", which corresponds with the general centralisation of high back vowels in the 20th century. In this context, the notation [ɐɤ̈] is suggested for the variant with a more centralised and open first and second element (Altendorf 2003: 72). Furthermore, [ʊ], [o] and [ɤ] are all attested in southern (specifically London or Cockney) varieties (Wells 1982b: 313). The second element has also been documented in south-eastern British varieties as being significantly more fronted, for instance [ʏ] and even unrounded [ɪ], among younger speakers (Kirkham & Moore 2013: 281). The factors involved in the variation of the starting point of /əʊ/ are not limited to age and social class only, with aspects such as the gender of the speaker also playing a role in some varieties (see Hickey 2013: 553; Hickey 2005: 88-91).[8]

The variation of /əʊ/ is not only a synchronic phenomenon. Like all vowels, it has undergone a number of shifts historically. Around the turn of the 19th century, the so-called "Long Mid Diphthonging" took place, during which the long mid vowels [e:] and [o:] in RP were diphthongised to [eɪ] and [oʊ] in FACE and GOAT respectively (Wells 1982a: 210). Due to the GOAT sound developing from a long back vowel, the first element of the diphthong retained its back quality for a time, before it began to undergo a process of centralisation.[9] This forward movement has been termed the "GOAT advancement" and, despite having possibly started as early as the 1800s, has only enjoyed its current status as the standard, or the

[8] The example given by Hickey (2013: 553) is that of speakers of contemporary Irish English, where the pronunciation of the starting point of /əʊ/ as a schwa is generally connotated with female speakers and considered "effeminate when used by males".

[9] This centralisation seems not to have occurred to as great an extent in American English, although there are some varieties which do contain a centralised GOAT vowel (Wells 1982a: 237). Due to space and relevance, this discussion will be limited to (standard) British English, and therefore American English will not be dealt with further here.

"'correct' or 'beautiful'", variant in RP since the mid-20th century (Wells 1982a: 237). A number of centralised or even fronted variants can now be heard as part of the southern British standard, such as [ɜʊ], [ëʊ] and [ɵʊ], with the mid central schwa [ə] having been selected by Gimson (1962) to represent the first element of the newly centralised GOAT vowel in phonemic transcription (Wells 1982a: 237). With regard to the second element, despite the fronting of the high back vowels [u:] and [ʊ] and the centralisation and fronting of the endpoint of /əʊ/ in some varieties of south-eastern British English, there has been no (successful) change with regard to the notation, possible due to second-element fronting of /əʊ/ being documented relatively more recently. Reference to the GOAT advancement in the literature tends to focus on the diphthong having been "given central or front starting-points" (Wells 1982a: 146), with little mention of the same applying to its endpoint in the context of diachronic change.

In addition to diachronic change and synchronic variation across varieties, there is also a key synchronic split that has been widely documented, namely the so-called GOAT-GOAL split. According to Wells (1982a: 147), the diphthong /əʊ/ is generally pronounced in its central form [əʊ] unless "a following /l/ triggers an allophonic variant", this being the more back [ɒʊ]. As such, *goat* would typically be pronounced as [gəʊt], but *goal* as [gɒʊɫ]. This split has been confirmed in multiple studies on southern British English since Wells' observation (see e.g. Tollfree 1999: 167). As with the GOOSE-GHOUL split discussed previously, the split between a centralised and a back variant of /əʊ/ may no longer be merely allophonic, but rather a phonemic split appears to have occurred (Wells 1982b: 312). Similar arguments for a phonemic split may be made here as were made with /u:/, such as the emergence of potential minimal pairs as a result of /l/ vocalisation, for instance *mow* /məʊ/ and *mole* /mɒʊ/. The role of the dark [ɫ] in the centralisation or retraction of /əʊ/, as well as other potential factors determining the frontness of /əʊ/, will be explored in more detail in the following section.

3.3. Possible explanations for the synchronic variation of /əʊ/

3.3.1. Vowel assimilation

Vowel assimilation, sometimes called vocalic assimilation (Pavlik 2009: 5), refers to the phenomenon whereby the quality of a vowel sound diverges from its normal or expected pronunciation to completely or partially match a neighbouring or nearby sound (Pollock 2013: 283). This is not to be confused with vowel harmony, which refers to a set of language-specific constraints which govern the types of vowel sounds that may occur adjacently, and this –

crucially – within a single word (Sapir 1969: 12), or more specifically, "within phonological word boundaries" (Brown 1972: 32). Vowel harmony is a more phonological, systematic and fixed phenomenon; neighbouring vowels within a word in a language with vowel harmony must be close to each other in terms of tongue position, and this 'harmonised' pronunciation is stored as standard, accepted, or correct. Vowel assimilation, on the other hand, is largely surface-level, less fixed, and "is neither a pervasive nor a particularly regular system" (Sapir 1969: 12). It is also dependent on how the speaker is speaking at any given moment; as Roach (2009: 110) states, assimilation (in general) "is more likely to be found in rapid, casual speech and less likely in slow, careful speech". The quality of a vowel can be affected by both surrounding consonants and vowels in English, both of which will be explored in more detail in this section, with particular focus on the diphthong /əʊ/.

Before a discussion is possible, it is necessary to establish terms for the segments involved in assimilation. To this end, the compound phrase *tin can* will be taken as an example. This phrase is commonly pronounced as [tɪŋ kæn];[10] here, the velar consonant [k] affects the preceding consonant, usually pronounced as an alveolar nasal [n], such that it becomes a velar nasal [ŋ]. There are three consonant sounds that are relevant here: [k], [n] and [ŋ]. In the literature, there are various terms which denote the roles fulfilled by these sounds. Pavlik (2009: 4) offers a particularly neat and logical set of terms in this regard: *assimilator, assimilee* and *assimilant*. According to Pavlik (2009: 4), the assimilator is the sound that influences another sound, and the assimilee is the sound undergoing assimilation. The altered sound that is produced as a result of the assimilation is known as the assimilant. In the example *tin can* [tɪŋ kæn], [k] is the assimilator, [n] the assimilee, and [ŋ] the assimilant. This terminology does not appear to be widely established, however. The assimilator and the assimilee are often referred to as the "conditioning sound" and the "assimilating sound" respectively (Celce-Murcia, Brinton & Goodwin 1996: 159), whereby the assimilator is sometimes also called a "'donor' segment" (Anyanwu 2008: 176). These terms may carry connotations for some; for instance, *donor segment* creates the implication that a certain phonetic feature is passed from one segment to another, or that the donor segment is the source from which a phonetic characteristic is taken by a neighbouring segment. *Conditioning sound*, on the other hand, does not imply a 'passing on', but rather suggests more coercion and agency. The sounds involved in assimilation are also often simply described according to their position, with non-standardised terms such as

[10] For the sake of simplicity, most elements typically included in narrow transcription, such as stress and aspiration, are not included here.

preceding consonant or *following segment* being commonplace in the literature. Despite not being widely established, the terminology proposed by Pavlik (2009: 4), i.e. *assimilator*, *assimilee*, and *assimilant*, will be used for the remainder of the thesis on account of its conciseness, neutrality and ease of understanding.

There are numerous types of assimilation which can be categorised according to their direction. The example given above, [tɪŋ kæn], is an example of regressive, or "anticipatory" (Anyanwu 2008: 176), assimilation. This occurs when a segment influences or conditions a segment that precedes it. Contrary to this, progressive assimilation – also called "perseverative" assimilation, among other terms (Anyanwu 2008: 176) – entails that the assimilator precedes the assimilee. For instance, in the word *happen*, the alveolar nasal [n] commonly adopts the place of articulation from the preceding bilabial plosive [p], resulting in a bilabial nasal [m]. As such, *happen* is often pronounced [ˈhæpm̩]. Progressive assimilation is markedly less common than regressive assimilation, particularly in English (Cruttenden 2014: 313; Skandera & Burleigh 2016: 91).

Progressive and regressive are both examples of unidirectional assimilation, meaning that one sound is the assimilator and one sound is the assimilee; the phenomenon whereby both sounds affect each other in some capacity is referred to as bi-directional assimilation, which encompasses processes such as coalescence.[11] Pavnik (2009) also offers a concise yet comprehensive typology of the known types of assimilation. For the sake of space and keeping within the boundaries of the core aims of this thesis, they cannot all be discussed here.

Assimilation can occur both word-internally and across word boundaries, and can happen between consonants, between a consonant and a vowel, and between vowels. Since the present thesis is concerned with the pronunciation of /əʊ/, only vowel assimilation, i.e. assimilation whereby the assimilee is a vowel sound, will be discussed further.[12] Most commonly, vowel assimilation in English is associated with the assimilation of vowels to neighbouring consonants, for instance in the nasalisation of vowels which are followed by nasal consonants, which happens to be highly regular in English (Yule 2010: 47). In the case of /əʊ/, one of the most common (or most attested) types of consonant-to-vowel assimilation appears to be regressive assimilation involving the dark [ɫ]. As previously discussed, the dark [ɫ] is an allophone of /l/ which, in many varieties of English, including British, is produced in the coda

[11] For explanations of the key types of assimilation, see Cruttenden (2014) or Roach (2009), among others.
[12] As the most common type, consonant-to-consonant assimilation has been covered extensively in the literature, see sources mentioned above for introductory explanations.

of syllables when it is not directly followed by a vowel. Whereas a clear [l], a lateral approximant, is articulated through contact between the tip of the tongue and the alveolar ridge (Arnold & Hansen 1996: 132), a dark [ɫ] is characterised by an additional raising of the back of the tongue (Roach 2009: 48) along with a more concave middle and a slightly further back contact point between the tip and the alveolar ridge (Kantner & West 1960: 91). Since the quality of the dark [ɫ] is itself similar to the back vowels [u] and [o] (Roach 2009: 48; Arnold & Hansen 1996: 133) due to its overtone, it stands to reason that neighbouring vowels adopt the backness of the dark [ɫ] too, in order to reduce tongue movement between adjacent sounds and hence facilitate fast and fluid pronunciation (Skandera & Burleigh 2016: 89). This, along with the generally weaker and untensed articulation of dark [ɫ] compared to clear [l] (Arnold & Hansen 1996: 133), also explains why dark [ɫ] is often vocalised to a sound approaching [u] or [ʊ]. Reetz and Jongman (2009: 47) note that the dark [ɫ] may even trigger the monophthongisation of preceding /əʊ/, whereby the second element – the offglide [ʊ] – is elided. In the event that the dark [ɫ] is vocalised to [ʊ], this elision is practically negated anyway. Any immediately neighbouring assimilee vowels must necessarily precede the dark [ɫ] since /l/ is realised as a clear [l] when directly followed by a vowel, be it within or across word and morpheme boundaries. Therefore, vowel assimilation to the backness of neighbouring dark [ɫ] must be regressive, and so vowels preceding dark [ɫ] are likely to be retracted.

In the previous section, it was discussed that any fronting or centralisation that has occurred over time in the GOAT vowel in southern British English appears to be reversed when the diphthong is followed by a dark [ɫ]. This results in a centralised and a back variant, e.g. [ʌʊ] and [ɒʊ] respectively in the London standard, with the back variant being produced according to this general rule (Wells 1982b: 312):

/əʊ/ → [ɒʊ]   / _lC
              / _l#

Similar to the /u:/ vowel, this rule implies that the underlying form is now the central variant, and the back variant is now the exception. It has also been mentioned that central variants of the monophthong /u:/ tend "to be favoured by preceding [j] and disfavoured by following dark [ɫ]" (Altendorf 2003: 73; cf. also Wells 1982a: 148; Gimson 1989: 121). In cases of conflict, where both prevocalic [j] and post-vocalic dark [ɫ] are present, it has been found that the palatal [j] often causes the vowel /u:/ to retain its central quality, even when the vowel is followed by a dark [ɫ], for instance in the word *fuel* (Green 2019: 54-56). The same cannot be said for the diphthong /əʊ/, however; not because this would be impossible, but because there are simply no words in the current (standard) English lexicon whereby /əʊ/ is simultaneously preceded by a palatal [j] and followed by a dark [ɫ], which means this cannot be tested. The only three words given in the *CUBE* database which contain the string /jəʊl/ are *Carmignola* (an Italian name), *Yolanda* (a first name) and *YOLO* (an abbreviation of *you only live once*). In all three of these examples, the liquid /l/ is intervocalic and is therefore would not be pronounced as a dark [ɫ]. Therefore, it cannot be said whether prevocalic [j] would have an effect on the frontness of /əʊ/ with dark [ɫ] without testing non-words.

It is not only possible for vowel quality to be affected by neighbouring consonants; they can also assimilate to other vowels. However, this tends to constitute a deviation from what is considered the 'correct' or widely accepted pronunciation of a vowel in a given word. As such, instances of vowel assimilation are often regarded by some "as 'lazy' or 'sloppy' speech" (Celce-Murcia, Brinton & Goodwin 1996: 159), or occur as mistakes or errors, such as *[ˈkɪki] instead of [ˈkʊki] for *cookie* (Pollock 2013: 283). In this example of regressive assimilation, the high front vowel [i] affects the preceding high back vowel [ʊ], even despite there being an intermediate consonant. There does not appear to be much literature on vowel-to-vowel assimilation, especially where the vowels are not directly adjacent, with much of the research in this respect seemingly being limited to vowel harmony.

Brown (1972: 30-31) argues that vowel assimilation can only occur in what is often termed a *phonological phrase*, which is to be understood "as the maximal unit within which assimilation of vowels can occur". She also acknowledges and differentiates between intra-word and inter-word vowel assimilation, whereby the former occurs exclusively "within word boundaries" and the latter exclusively "across word boundaries" (Brown 1972: 32). Inter-word assimilation is sometimes used synonymously with *sandhi*, which refers to a process by which word-final or word-initial sounds are adapted according to the respective neighbouring sound in an utterance (Chalker & Weiner 1994: 250). This suggests that there may not be any other segments between the assimilator and the assimilee for a classification as inter-word assimilation. However, a broader definition of inter-word assimilation, which will be adopted in this paper, includes the adaptation of a sound in one word to a sound in a neighbouring word, even if other sounds occur in between. In a similar way to [ʊ] being assimilated to [ɪ] in *[ˈkɪki] *cookie*, vowel sounds which approach other vowel sounds in close proximity across word boundaries as well as intermediate consonants will be included as instances of inter-word assimilation. In the empirical part of this thesis, it will be investigated whether or not inter-word vowel assimilation plays a role in the pronunciation of the diphthong /əʊ/ in adjacent words both containing /əʊ/.

3.3.2. Further potential factors

Aside from geographic and sociolinguistic influence, which has been discussed in previous sections, and assimilation to neighbouring sounds, there are other possible factors which may play a role in the pronunciation of /əʊ/. These include language-centred factors, such as morpheme boundaries and the special case of /əʊ/ in interjections, as well as speaker-centred factors, such as momentary mistakes, personal preference and speech disorders.

As demonstrated with the examples of *ruler* (‘leader’) and *ruler* (‘measuring instrument’) given by Wells (2012; see section 3.1.), the frontness of a vowel may depend on the perceived morpheme boundaries of a given word. It was shown that where the morpheme structure is more transparent and any suffixes are more consciously acknowledged as such, the pronunciation of the base morpheme is more likely to be retained in complex words in spite of a dark [ɫ] becoming a clear [l]. This may also be the case with words containing /əʊ/. For instance, the words *holy* and *holey*, while both conventionally transcribed as /ˈhəʊli/, have potentially differing pronunciations based on their seemingly differing morphological structures. Wells (2009) comments on this as follows:

> It depends […] on the homophony of *hole-y* (full of holes) and *holy* (sacred). But they are not homophones for the many speakers in England who use a special allophone [ɒʊ] for /əʊ/ before morpheme-final /l/. (These are the people for whom a *goalie*, where the /l/ is morpheme-final, doesn’t really rhyme with *slowly*, where it is morpheme-initial.)

It is clear that *holey* is derived from *hole*, a common lexical word in its own right. Since *hole* contains a dark [ɫ] in its coda, the diphthong /əʊ/ is likely to be retracted to a more back position. This back variant is subsequently likely to be retained in the complex word *holey*. However, since the morphological structure of *holy* is less transparent and the word is nowadays analysed by speakers to be simplex, the diphthong is likely to have been centralised without being retracted by a dark [ɫ] in a potential base morpheme. While etymologically the word *holy* is connected to the Old English complex word *hāliġ*, which consists of a base (*hāl*) and a suffix (*-iġ*), comparable to the modern German *heilig* ‘holy’ (see Hoad 2003, ‘holy’), this structure is no longer perceived by speakers nowadays. This is a possible argument that the GOAT-GOAL split constitutes a phonemic split similar to GOOSE-GHOUL. The words *holy*, *holey* and *wholly* will be included in the empirical study and discussed in the context of morpheme boundaries in the discussion chapter.

The diphthong /əʊ/ can occur in a special class of words whose pronunciation is particularly unstable or variable, namely interjections. These often exhibit characteristics that would otherwise be impossible or ill-formed in other word classes, frequently flouting tendencies concerning phonotactics and syllable structure. For instance, interjections are unique in English in that they can be composed purely of consonant sounds, such as *shh* (Stange 2009: 42), and can feature otherwise impossible consonant clusters, such as *pff*. They can even include sounds otherwise absent from the standard phoneme inventory, such as *ugh* [ʊx] with a velar fricative (Stange 2009: 42; Jones 2006: viii). In general, interjections tend to be shorter than content words, both in terms of vowel and consonant length (Stange 2009: 41). The variation in their pronunciation may owe to the fact that they are often produced "quasi involuntarily" as reflexes to an immediate stimulus or circumstance (Stange 2009: 63-64).

Examples of interjections typically pronounced with the diphthong /əʊ/ include *oh* and *woah*, which are both included as tested words in the empirical part of this thesis. *Oh*, while it does not typically carry semantic meaning in itself, is mostly used to express surprise, similar to other interjections such as *ah!* (Aijmer 2002: 103). It is monosyllabic and consists only of a single nucleus filled by a diphthong. According to Wells (2008: 560), *oh* can be pronounced as either [əʊ] or [oʊ], although these pronunciations are ascribed to British English and American English respectively. Similarly, *woah* is also a monosyllabic interjection which consists of a nucleus filled by the diphthong /əʊ/, but its onset is filled with the bilabial semi-vowel /w/. Unlike *oh*, it has two main orthographical variants, the other being *whoa*. The pronunciation of *woah*, or rather its variant *whoa*, is listed in Wells (2008: 899) as [wəʊ] for British English and [woʊ] for American English,[13] again, with the difference in frontness here being attributed to the variety of English. The fact that these two interjections are transcribed with the same British/American difference as other words with /əʊ/ suggests that the pronunciation of /əʊ/ would be no different in interjections than in lexical words. Since there is no dark [ɫ] in the coda of either *oh* or *woah*, it is hence also to be expected that the diphthong in both interjections be central in accordance with the shift discussed in sections 3.1. and 3.2. However, as Stange (2009: 64) points out, "[i]nterjections can defy phonological and phonotactic rules of a language, thus giving the impression of being para-linguistic", giving rise to the possibility that

[13] Along with these two variants, [hwəʊ] / [hwoʊ] and [həʊ] / [hoʊ] are also given as possible pronunciations.

the diphthongs in *oh* and *woah* do not adhere to the same tendencies as in regular, lexical words after all. At the same time, while they may constitute reflex reactions, interjections are still “conventionalised forms” (Stange 2009: 64) and appear to be “deeply entrenched in a speaker’s linguistic system” (Stange 2016: 32), which suggests that the pronunciation of an interjection is learnt along with the rest of a speaker’s vocabulary, and that this pronunciation is relatively fixed. It will be investigated in the empirical study whether /əʊ/ is articulated differently in these interjections than in the other tested words, with particular focus on frontness.

It may happen that /əʊ/ is pronounced differently in the moment, for instance as a slip of the tongue. Phenomena such as anticipation (i.e. the production of (a feature of) a sound which the speaker anticipates to pronounce after the target sound, as in **dop dog* for ‘top dog’), perseveration (i.e. the production of (a feature of) a sound which the speaker has already pronounced, as in **top tog* for ‘top dog’) and exchange (i.e. the swapping of two segments, as in **dop tog* for ‘top dog’) have been found to be more prevalent with consonants as opposed to vowels (Poulisse 1999: 9-10). Nevertheless, it is possible for vowels and diphthongs to also be subject to such slips. For instance, whole vowels may be substituted, or individual qualities of vowel sounds such as closeness and frontness can be affected, possibly as a result of vowel-to-vowel assimilation (see chapter 3.3.1.). Concerning the diphthong /əʊ/ in particular, slips in the dimension of vowel frontness may be crucial due to the potentially phonemic GOAT-GOAL split, and so a mistake in this respect could constitute the undeliberate realisation of a different phoneme. Whether or not such mistakes are then detrimental to communication is a further matter to be considered.

Mistakes involving vowel frontness have been shown as noticeable enough to listeners for them to be classified as mistakes. For example, in a study by Small and Bond (1984), 95% of mispronunciations involving vowel frontness were identified by subjects who listened to spoken speech and had to mark these mistakes on a written transcript. It can furthermore be observed that momentary slips concerning the GOAT-GOAL split in particular are perceived by the speakers themselves as being mistakes. To give one example, during her speech in the wake of the 2017 terrorist attack on Westminster, the former UK prime minister Theresa May utters the words “[…] home to the world’s oldest parliament, […]” (Guardian News 2017), whereby she breaks off the word *oldest* after the first syllable and repeats it in full immediately afterwards. During the first utterance of *oldest*, the diphthong /əʊ/ is centralised, constituting a pronunciation which does not adhere to the typical assimilation tendencies involving the dark [ɫ] as previously discussed. She ‘corrects’ herself by repeating *oldest* with the conventional back variant of /əʊ/. The initial pronunciation of /əʊ/ using the centralised variant may have arisen due to vowel-to-vowel assimilation to the diphthong in *home*, a type of assimilation which is usually attributed to slips of the tongue (see e.g. Pollock 2013: 283). This example shows that the pronunciation of /əʊ/ may depend on the degree of careful speech, and its frontness may in some instances be ascribed to mispronunciation, but when this is the case, it is evidently possible that the speaker is aware that this constitutes a variant that is deviant from the norm. The example of Theresa May's speech will be revisited during the discussion of the empirical study.

Finally, with all other factors aside, it must be considered that all speakers are different, despite belonging to their respective language communities, and exhibit features of pronunciation that are unique to them. Hall (2003: 7) refers to *individual variation* in this respect, which is "caused by the preferences, habits and peculiarities of the individual". It is this idiosyncratic speech behaviour which helps to allow people to identify speakers by hearing their voice alone, for instance (Hall 2003: 7), and without which fields such as forensic phonetics would not be able to exist and operate in the same capacity. In addition to personal preference and habit, individual variation may also arise due to physical differences between speakers with regard to the articulators involved in the production of certain sounds, particularly in cases of speech disorders. While speech disorders may affect the articulation of any vowel, Cummings (2018: 36) notes that diphthongs are especially prone to mispronunciation, commenting that "the additional articulatory complexity of diphthongs can put [them] at particular risk of phonetic deviance". In a study on children with apraxia of speech, Pollock and Hall (1991) found various errors in diphthong production, such as monophthongisation, a form of reduction (cited in Cummings 2018: 36). In addition to articulatory impairments, hearing impairments have also been shown to affect individuals' pronunciation of diphthongs. For instance, in his study on the pronunciation of children with hearing impairments, Markides (1983: 61) observed mistakes involving the prolongation of diphthongs, which often led to the omission of the second element of the respective diphthong. While the diphthong /əʊ/ was not tested specifically here, studies such as these demonstrate how diphthongs in general may be affected by speech or hearing disorders. Furthermore, the dark [ɫ], which has been shown to be a key factor in the frontness of /əʊ/, should also be considered in the context of articulatory impairments. Ball and Müller (2011: 240) report that /l/ vocalisation is frequently found to be "a speech error requiring intervention" among people with speech disorders. While there is little research on this as of yet, this implies that dark [ɫ] may be more frequently vocalised due to articulatory irregularities, which may in turn also affect the backness of /əʊ/, though at this stage this remains to be tested.

While care has been taken to ensure that the subjects of the empirical study of this thesis do not have speech or hearing disorders which may affect the pronunciation of /əʊ/, it must be considered that each individual may show slight differences, even in spite of having acquired the same or similar varieties of English. When analysing and discussing the articulation of /əʊ/, it is not only important to take into account the phonology of /əʊ/, its neighbouring sounds and hence potential assimilation, the socialisation of the speaker and sociolinguistic factors such as gender, age and class. It is also crucial to consider the possibility that subjects exhibit idiosyncratic pronunciation, make slips and mistakes, and consequently even display intra-speaker inconsistency with their pronunciation. A small margin of error must therefore be anticipated and accounted for.

This chapter has focused largely on the articulation of /əʊ/ and its development as a diphthong over time. It has also discussed variation of /əʊ/ across and within varieties, and elaborated on some of the possible reasons as to why this variation exists. This will inform the discussion of the results of the empirical study in a later chapter. However, in order to carry out a study on the diphthong, two things are necessary. Firstly, a set of symbols must be decided on to represent the sounds captured in order to accurately present the results. Secondly, the methodology involved in the acoustic analysis of /əʊ/ must be clarified, especially with regard to the ascertainment of the frontness of the diphthong based solely on acoustic data. These aspects will be investigated and discussed in the following chapter.

4. Analysing and representing vowel sounds

4.1. Conventions of transcription

Since its foundation in 1886, the International Phonetic Association has established a system by which to notate speech sounds: the International Phonetic Alphabet, or IPA.[14] This alphabet was introduced with the aim of being both "convenient to use" and "comprehensive enough to cope with the wide variety of sounds found in the languages of the world" (IPA 1999: 3). While the basis of IPA transcription is the Roman alphabet, the sheer number of speech sounds that

[14] The abbreviation *IPA* is often used to refer to both the International Phonetic Association and the International Phonetic Alphabet (cf. IPA 1999: 3). This is also the case in the present thesis.

exist and have existed in the world exceeds the number of symbols at our disposal with this alphabet alone. To cater for this range of speech sounds, additions outside of this alphabet must be made to the IPA, some of the letters of the Roman alphabet must be altered in some way to produce new IPA symbols, and additional signs must be added to existing symbols in order to adapt them (diacritics). Whereas with phonemic (broad) transcription it is often sufficient to represent categories using simpler symbols, as long as each category is unambiguously identifiable, phonetic (narrow) transcription requires more detail and therefore necessitates the use of more unfamiliar symbols. Furthermore, the IPA only documents "linguistically relevant" features of speech, which include aspects such as vowel length or nasality, but exclude factors like "personal voice quality" (IPA 1999: 3).

One issue that arises concerning the IPA is the choice of symbol used to signify a given segment. Within most known languages there are multiple varieties, dialects and accents which cannot realistically and practically all be accounted for in phonemic transcription. Moreover, even within a single variety, there are various allophones which correspond to each phoneme and which may each correspond to a different phonetic symbol. While in descriptive narrow transcription this may not be problematic, the representation of phonemes in a language needs to be carefully considered in order for it to be convenient, useful, meaningful and applicable across as many variations within a variety as possible. To this end, phonemic transcription is largely based on standard varieties in order to be applicable or intelligible to as many speakers as possible. For English, the two main standard varieties referred to by the IPA are General American (GA) and Standard Southern British (IPA 1999: 4). However, as already mentioned, even after a general standard has been defined, each phoneme still has a number of allophones, which makes the selection of an appropriate symbol for the phoneme difficult. For example, the speech sounds [l], [l̥] and [ɫ] are all allophones of a single phoneme, which begs the question as to which of these symbols should be used to represent the phoneme. In this context, there are a number of recommendations made by authorities which are intended to inform and facilitate such decisions. For instance, Gimson (1994 [1962]: 48) offers the following two guidelines:

> (a) Use the phonetic symbol for the most frequent allophones.
> (b) Replace non-roman symbols arising from (a) by roman symbols where these are not already in use.

With regard to recommendation (a), it is presumed that the word *frequent* refers to the frequency of an allophone occurring in unique words, as opposed to the total frequency of the allophone uttered within a variety. Following Gimson, if [l] is assumed to be the most frequent allophone, then it would make sense to adopt the same symbol for the phoneme: /l/. This would adhere to recommendation (a). Similarly, if [ɫ] were the most frequent allophone, recommendation (a) would require that /ɫ/ be used as the phonemic symbol. However, since /ɫ/ does not constitute a symbol from the Roman alphabet, and the symbol /l/ is not otherwise in use as a phonemic symbol, recommendation (b) suggests that it is appropriate to adopt /l/ in spite of it potentially being the less frequent variant. The benefits of selecting a Roman symbol as opposed to non-Roman symbols include ease and efficiency of transcription, particularly using computer technology and standard keyboards, as well as ease of recognition due to potential similarities to orthography. This principle is shared by the IPA itself, who encourages the use of the Roman alphabet "as far as is practicable", but recognises the necessity of other symbols where Roman symbols do not suffice (IPA 1999: 159).

Windsor Lewis (2003: 145) proposes two further recommendations in this regard:

(a) Any phonemic symbolisation of a word that coincides with the traditional orthography of a different word should be avoided.
(b) Any phonemic symbolisation, whether or not surrounded by slashes, should be recognisable as such.

Windsor Lewis' approach focuses on the distinctiveness and uniqueness of the symbols used. Here, recommendation (a) refers to instances where the transcription of one word looks identical to the orthographical spelling of another. In this context, Windsor Lewis discusses the transcription used by Peter MacCarthy in some of his publications, and provides the example /boot/ as a possible transcription for *bought*. In this case, the sound conventionally symbolised by /ɔː/ is represented here by /oo/, resulting in a transcription that coincides with the orthography of the word *boot* (Windsor Lewis 2003: 144). While it may be impractical to test recommendation (a) with every possible word to prevent coincidental similarities, recommendation (b) is more easily implemented. However, for phonemic symbolisation to be instantly recognisable as such without slashes, traditional orthography ought to be avoided, which stands in direct opposition to Gimson's recommendation that Roman symbols are to be preferred. If Windsor Lewis' recommendations were to be followed in the example with the allophones [l], [l̥] and [ɫ], it may be considered appropriate to take /ɫ/ as the phonemic symbol since it cannot coincide with traditional orthography in English, and is unmistakable as a phonemic symbol, even without slashes. Still, the symbol widely used to represent the phoneme is /l/, implying that Gimson's recommendations – that the symbol for the most frequent allophones should be used, and that Roman symbols should be prioritised – take precedence over other possible factors.

As the organisation who established the IPA, the International Phonetic Association are arguably the single most important authority concerning the use of their alphabet. However, while they acknowledge the potential for diverging phonemic transcriptions, they appear to maintain that it is “permissible to choose [any] symbol as the one to represent the phoneme” if the respective symbol represents an allophone of that phoneme (IPA 1999: 30). This means that, for example, both /e/ and /ɛ/ are possible representations of the same phoneme, since [e] and [ɛ] constitute allophones (IPA 1999: 30). It appears that their principle condition for the acceptance of any one symbol is that it “conform[s] fully to the principles of the IPA”, which results in “the fact that more than one phonetic symbol may be appropriate for a phoneme” (IPA 1999: 30). While this is certainly liberating and allows users of the IPA to choose a style of transcription they deem to be more appropriate, it contradicts the principles of convention. Windsor Lewis (2003: 150) advocates a consensus among users of the IPA, particularly for the benefit of “the overwhelming majority of dictionary users”, since contradictory transcriptions of the same phonemes may lead to confusion. He further asserts that an “ever wider non-specialist audience” may be reached and included when "harmony reign[s]”, as was the case after the introduction of Gimson’s edition of Jones’ *English Pronouncing Dictionary* in 1977 (Windsor Lewis 2003: 143). It therefore appears to be the case that, while variation in transcription is technically acceptable according to the IPA, it is certainly beneficial to maintain unity for the sake of more widespread understanding. With these considerations in mind, the next section will discuss the transcription of the closing diphthong /əʊ/.

4.2. Phonemic transcription of /əʊ/

Since diphthongs consist of a glide between two vowel sounds, they are typically transcribed using two adjacent vowel symbols, sometimes with an accompanying diacritic to indicate that the sounds form a single segment. This diacritic usually takes the form of an inverted breve underneath the second vowel, signifying that this second vowel sound is non-syllabic and that the stress is placed on the first vowel sound. Hence, with the diphthong in words like *late* or *gay*, the transcription may look like /eɪ/ or /eɪ̯/, depending on the convention.

The GOAT vowel, also being a diphthong, is expected to be transcribed using two vowel symbols. A brief review of five readily available, non-specialist online dictionaries shows the following transcriptions of the word *goat* in British English:[15]

Table 1. Phonetic transcription of *goat* in five online dictionaries

Online dictionary	Transcription
Cambridge Dictionary (2019)	/ɡəʊt/
Collins (2019)	/ɡəʊt/
Macmillan Dictionary (2019)	/ɡəʊt/
Merriam-Webster (2019a)	\ˈgōt\
Oxford Learner's Dictionaries (2019)	/ɡəʊt/

These dictionaries were chosen due to their high profile and reputation, as well as their focus on British English. Table 1 above shows that the most common phonemic transcription of the diphthong in the word *goat* in British English is /əʊ/, unsurprisingly. This transcription follows the traditional Gimsonian style and indicates that the basic form of the diphthong consists of a glide from a mid-central to a roughly high back tongue position. Whether or not this corresponds to the actual standard pronunciation of the diphthong will be investigated later. While /əʊ/ may be provisionally assumed to constitute the most conventional transcription of this diphthong, other transcriptions appear to be possible, such as in *Merriam-Webster*'s \ˈgōt\. Aside from the use of reverse slashes, the alternative symbol for /ɡ/, and the inclusion of a redundant stress marker, this transcription differs significantly in that the nucleus is represented by a singular vowel symbol complemented with a macron, as opposed to two adjacent vowel symbols. In the IPA, a macron is used to indicate mid-level tone, which does not appear to be the desired expression here. However, since *Merriam-Webster* does not use IPA transcription, instead utilising its own system, IPA conventions cannot be referred to. According to their 'Guide to Pronunciation' (*Merriam-Webster* 2019b), the symbol \ō\ corresponds to the IPA transcriptions [o], [oʊ] and [ou], depending on stress and phonetic environment. It is acknowledged in this guide that when this sound is produced as a diphthong, the first element is often pronounced as [ə] in southern England. This would produce the diphthong [əʊ], which is in line with the other transcriptions of *goat*. Still, the basic form is given as \ō\ and the pronunciation with [ə] is given as a variation. From this, there appears to be a consensus that the pronunciation of this diphthong in (southern) British English approaches [əʊ], as well as a widespread agreement that the underlying phoneme is /əʊ/ when using IPA transcription.

[15] On each online dictionary, the word *goat* was entered into the search bar. In some cases, it was necessary to navigate to British English where American English was the default.

Nonetheless, there also appear to be individual discrepancies in terms of both transcription conventions and assumptions concerning the basic form of the phoneme.

The uniformity of transcription among most of the major online English dictionaries underscores the apparent inclination to adhere to convention for the sake of comprehensibility, especially since phonemic transcription is only concerned with meaning-distinguishing segments. Consultation of other reference literature beyond online dictionaries shows much more variation, especially depending on where their focus lies. For instance, Catford (2001: 200) transcribes the phoneme as /oʊ/, explicitly classifying the diphthong under the group of "[r]emaining back vowels". In this way, he bases his phonemic transcription not on convention alone, but on his analysis of the underlying form. It is acknowledged, however, that in so-called "modern RP" this diphthong is either centralised to [əʊ] or [əɤ], the latter remaining unrounded throughout, or monophthongised in some varieties to [o:] (Catford 2001: 200). In any case, the choice of phonemic symbol appears to be based on the assumption that the basic sound is back rounded [oʊ], with variations occurring due to processes of centralisation and unrounding. Since the centralisation of back vowels in English is very widely attested (see sections 3.1. and 3.2.), this does not initially appear to be an unfounded assumption. This being said, the centralisation of some back vowels in varieties such as southern British English appears to be the result of a diachronic shift as opposed to constituting a synchronic phenomenon, with the retention of back variants seemingly resulting from coarticulatory processes (Green 2019: 56-57). It therefore appears as though Catford's choice of /oʊ/ either stems from the assumption that the back variant is more common across multiple varieties of English, adhering to previously discussed principles of symbol selection, or possibly that an earlier form of the diphthong may take precedence over more recent shifts. Either way, it is still assumed here that the GOAT vowel is a full diphthong consisting of two distinct vowel sounds.

In the *Handbook of the International Phonetic Association* (1999), this is not necessarily the case. Here, the only variety of English for which transcriptions are suggested is American English, with transcriptions being based on "younger educated Americans in the Far-Western and some of the Mid-Western parts of the United States" (IPA 1999: 41). Nevertheless, the transcription of diphthongs in general may be observed. In this publication, only the vowel sounds appearing in *buy*, *bough* and *boy* are given as full diphthongs: /aɪ/, /aʊ/ and /ɔɪ/ respectively (IPA 1999: 43). The other two expected diphthongs, i.e. the vowel sounds appearing in *bayed* and *bode*, are given as monophthongs, with the only indication of their being diphthongs given in the form of an offglide: /e^{j}/ and /o^{w}/ respectively (IPA 1999: 42). It must be noted that the diphthongs /aɪ/ and /aʊ/ are also listed with their alternative transcriptions with offglides, /a^{j}/ and /a^{w}/, where /ɔɪ/ is only given as a full diphthong (IPA 1999: 43). Although the present thesis does not centre around American English, it is important to consider the possibility for diphthongs to instead be interpreted as (mostly) monophthongal nuclei and offglides, or in other words, as single vowel segments followed by a semi-vowel.

There appear to be two main transcription styles of diphthongs, namely the Gimsonian vowel-to-vowel and the alternative vowel-to-offglide versions. In the *Current British English* pronunciation dictionary (*CUBE*), an online resource which allows users to search for words and their pronunciation in British English, both forms of transcription are used, among others. The default transcription consists of a set of symbols proposed by Geoff Lindsey, one of the designers of *CUBE*. Table 2 below shows the symbols used in *CUBE* alongside the corresponding Gimsonian symbols and the lexical sets they are used to transcribe:

Table 2. Comparison of Gimsonian (traditional) and *CUBE* transcriptions of English vowels and diphthongs (Lindsey & Szigetvári 2019b)

Lexical set	**Gimson**	***CUBE***	**Lexical set**	**Gimson**	***CUBE***
KIT	ɪ	ɪ	**GOAT**	əʊ	əw
DRESS	e	ɛ	**CHOICE**	ɔɪ	oj
TRAP	æ	a	**GOOSE**	uː	ʉw
STRUT	ʌ	ʌ	**MOUTH**	aʊ	aw
LOT	ɒ	ɔ	**NEAR**	ɪə	ɪː
FOOT	ʊ	ɵ	**SQUARE**	eə	ɛː
COMMA	ə	ə	**PALM**	ɑː	ɑː
FLEECE	iː	ɪj	**NURSE**	ɜː	əː
FACE	eɪ	ɛj	**THOUGHT**	ɔː	oː
PRICE	aɪ	ɑj	**CURE**	ʊə	ɵː

As can be seen above, there are some symbols from the Gimsonian transcription style that have been adopted by *CUBE* (/ɪ/, /ʌ/, /ə/, and /ɑː/). However, the majority of vowel sounds are transcribed differently in *CUBE* than is traditional. Most noticeably, the diphthongs are transcribed using a glide as the second, unstressed element, which leads to the assumption that this second element is not (or is no longer) considered a full vowel, but an offglide. This is in line with the observation that the endpoint of a diphthong is usually much weaker than the start (Roach 2009: 17). As such, the GOAT diphthong is transcribed here as /əw/ as opposed to /əʊ/. In addition, some traditional diphthongs are now transcribed as monophthongs, and vice versa

(FLEECE, GOOSE, NEAR, SQUARE, CURE). However, on the *CUBE* interface it is possible to toggle to a style of transcription in which the second element is a full vowel, which sees the GOAT diphthong transcribed as /əu̯/, nonetheless still constituting a deviation from Gimsonian tradition.

A further significant change is the acknowledgement of the centralisation of the high back vowels. For instance, the FOOT vowel is transcribed with the central /ɵ/ as opposed to the more back /ʊ/, and the CURE diphthong is notated as /ɵː/ rather than /ʊə/. The centralisation of /uː/ is another development that is considered in the *CUBE* transcription, with /ʉw/ representing the GOOSE vowel rather than /uː/. While these transcriptions may provide a more accurate picture of contemporary standard British, it must be mentioned that still no distinction is made between the GOAT and GOAL diphthongs, nor between the GOOSE and GHOUL vowels in terms of frontness. This is likely because *CUBE* provides phonemic as opposed to detailed phonetic transcriptions. As discussed in the previous chapter, however, it is possible that the GOAT-GOAL and GOOSE-GHOUL splits are phonemic splits, which would potentially necessitate separate notation. Whether or not separate phonemic transcriptions are actually necessary for GOAT and GOAL will be discussed following the empirical part of this thesis. In any case, there appears to be a growing need for a shift from traditional transcription in this regard since it is becoming increasingly outdated and less representative of actual spoken British English. This poses a problem: on the one hand, as Lindsey and Szigetvári (2019c) observe, "[t]he phonetics and phonology of standard British English have changed during the past half-century, particularly in the vowels". This is perhaps most noticeable with the high back vowels and the GOAT-GOAL diphthong(s). On the other hand, however, Windsor Lewis (2003: 150) argues for the upholding of convention, noting that the "[t]he General British vowel phoneme set has hardly changed in a century". On the tentative assumption that there now exists a central and a back phoneme of /əʊ/, it would be beneficial to decide on two distinct symbols for the remaining discussion.

Since it appears that transcription variants with offglides are less frequent in phonemic transcription, they will not be adopted here. Wells (1982b: 213) offers the notation [ɒʊ] and [ʌʊ] for the back and central variants respectively, yet this is specific to London varieties. This would also mean the conventional notation /əʊ/ is dropped altogether, which would be a significant break from convention. Moreover, it does not take into account the centralisation of the second element [ʊ]. For this second element, the symbol [ʉ] is a possibility since it is often used in the context of /uː/ centralisation. However, [ʉ] denotes a tense and not a lax vowel, and since the endpoint of a diphthong is notably weaker, it would be more logical to use a symbol for a lax vowel. The symbols [ɤ̆], as used by Altendorf (2003: 72), and [ʏ], a more fronted variant proposed by Kirkham and Moore (2013: 281), are potential candidates in this regard. Still, it must be remembered that the aim of phonemic transcription is to represent categories, not precise speech sounds. In order not to propose too stark a deviation from convention, the second element [ʊ] will be retained in both the central and the back phonemes, on the one hand to maintain a visible connection between both phonemes, and on the other hand since it is the weaker element anyway. With regards to the first element, the central variant will keep the notation /əʊ/ for purposes of recognition, and for the back variant, Wells' (1982a: 147; 1982b: 213) suggestion of [ɒʊ] will be adopted: /ɒʊ/. This is partly due to its frequency of use in the literature, particularly by Wells, who uses it in his *Longman Pronunciation Dictionary* (2008) as an alternative pronunciation to /əʊ/ in words such as *bowl* and *hole*. The adoption of /ɒʊ/ also adheres to the principles of symbol selection proposed by Windsor Lewis (2003: 145), since it cannot coincide with conventional orthography, and it uses characters that are easily identifiable as phonetic transcription even in the absence of slashes or brackets. While Gimson's (1994: 48) recommendation of prioritising Roman symbols is not followed, the use of /ɒʊ/ as opposed to /oʊ/ allows for the back phoneme in British English to be distinguishable from the American English phoneme /oʊ/.

Some may disagree with the decision to adopt /əʊ/ and /ɒʊ/ as the symbols for the central and back diphthongs respectively for reasons which may be well-founded. In light of the vast amount of variation that can be observed in this diphthong in south-eastern Britain alone, it is a tall order to settle on a single set of symbols that will satisfy everybody. By keeping /əʊ/ as the more common phoneme, convention is preserved as much as it can be. By retaining /ʊ/ in /ɒʊ/, the back diphthong is still recognisable as belonging to the English set of closing diphthongs, and its close relation to /əʊ/ is still clearly visible. For these reasons, /əʊ/ and /ɒʊ/ will be used henceforth in this thesis.

In order to determine whether /əʊ/ or /ɒʊ/ has been produced in a given utterance, the vowel sounds must be analysed carefully, not least due to the significant variation and overlap possible. The following section will discuss vowel analysis in more detail, with a view to informing the methodology of the empirical part of the thesis.

4.3. Vowel analysis

When analysing spoken data with a view to ascertaining the vowel sounds produced and deciding on the suitable notation, either auditory or acoustic analysis may be undertaken. Auditory analysis entails playing the audio data to listeners, whose responses are recorded or tabulated; this necessarily relies on the listener's individual perception of the speech sounds (Johnson 2003: 60). Although this may be a more efficient method, it is decidedly more subjective since there are more factors at play than simply the sound waves. For instance, "the visual image of the talker [if present] plays a role in perception – and perception takes place in the context of a lifetime of experience with language" (Johnson 2003: 59). This means that it is practically impossible to conduct an auditory analysis with a human rater without the influence of additional external factors such as experience and expectation.

An alternative to auditory analysis is the examination of the sound waves produced. An English vowel may be uniquely identified according to the height and position of the tongue during its production, as well as the length of the vowel. While an approximation of the relative length of the vowel is possible through auditory analysis, the precise length of the vowel can only be ascertained by analysing the sound wave itself. Likewise, while the approximate tongue height and position may be estimated auditorily, the actual height and position of the tongue *per se* cannot be determined. In order to obtain more reliable measurements without directly observing articulation, it is possible to examine the frequencies of the vowel.

Each speech sound is composed of layers of frequencies which give each segment its characteristic sonic features. These "bands of energy" can be referred to as the sound's *formants* (Gimson 1989: 21), a term coined by the German physiologist Ludimar Hermann (Chen 2016: ix). Despite vowels existing on a continuous spectrum whereby categories do not have clearly defined boundaries, it is possible to distinguish between segments on the basis of their formants, which are measured in Hertz (Hz).[16] The main quality of a vowel sound is dependent on "the location of [these] formant frequencies, specifically, the first three formants" (Reetz & Jongman 2009: 182). These formants roughly correspond to the size and type of space created by the tongue in the oral cavity, whereby the first formant (or F1) relates to the height of the tongue, and the second formant (F2) relates to the position of the tongue (Gimson 1989:

[16] In many, usually older publications, frequency is often measured in *cycles per second* (cps), which is the case in Gimson's (1989) publication. This term has been replaced by *Hertz* (Hz), which is now the more conventional term for the measure. Despite the change in terminology, the measures are identical; therefore, where Gimson or any other author refers to frequency values in cps, these values will be referred to in this thesis in Hz.

23). Johnson (2003: 113) succinctly explains how the first and second formants correlate to these vowel dimensions:

> Vowel height is negatively correlated with *F_1* frequency; [high] vowels have low *F_1*, and [low] vowels have high *F_1* […]. Similarly, vowel frontness is correlated with *F_2*; [front] vowels have high *F_2*, and [back] vowels have low *F_2*.

As such, the F1 and F2 values of a vowel may be plotted against each other using a scatter graph, which can visually display the relative height and frontness of the tongue, roughly corresponding with the vowel quadrangle (see e.g. Deterding 1997: 50-51). This is illustrated below in Figure 2, taken from Fry (1979: 112), and Figure 3, taken from Johnson (2003: 115):

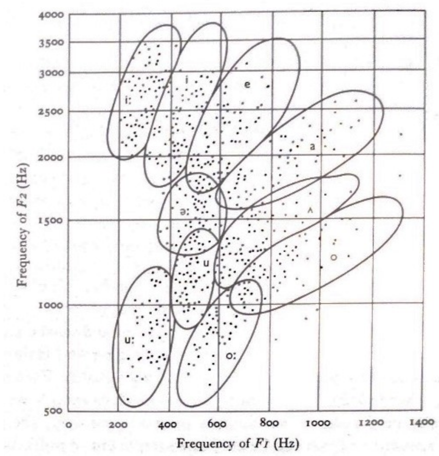

Figure 2. "Scatter diagram of F1-F2 plots for American vowels" (Fry 1979: 112)

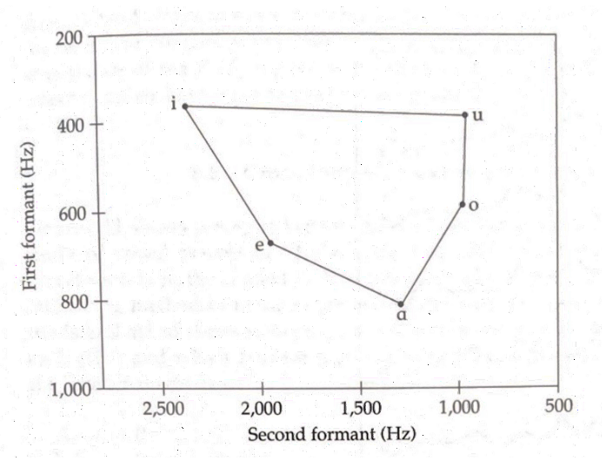

Figure 3. "The acoustic vowel space of the plain voiced vowels of Jalapa Mazatec. Average of four male speakers" (Johnson 2003: 115)

Where Figure 2 (Fry 1979: 112) retains conventional axis directions and plots the F1 along the x-axis and the F2 along the y-axis, Figure 3 (Johnson 2003: 115) demonstrates the possibility of swapping and inverting the axes so as to more accurately reflect the traditional vowel quadrangle. In this way, it is possible to visually observe and compare vowels with respect to their formant frequencies and hence the height and position of the tongue during their articulation.

Some acoustic phoneticians prefer not to plot the F2 on the x-axis, but rather the difference between the F2 and the F1 (F2-F1) (see e.g. Reetz & Jongman 2009: 179-180). The main purpose of this is usually "to normalize for speaker differences, particularly male-female differences in formant frequencies" (Deterding 1997: 51). This is considered by some to be of high importance to allow for the accurate and reliable comparison between speakers who naturally vary physically with regards to their vocal tract (Flynn 2011: 1-2). However, as Deterding (1997: 51) goes on to state, "a speaker-independent measure of vowel quality is still elusive", even in spite of measures taken to neutralise differences between speakers. It is therefore also acceptable and still widely the case that the F1 is plotted against the F2 in order to show the approximate vowel height and frontness, considering that "there is not necessarily an absolute link between vowel openness and F1 or between vowel frontness and F2" anyway (Deterding 1997: 51). This is likely why many choose not to take the extra step to calculate and use the difference between the first two formants in their graphs, instead opting for a simple F1 against F2 plot (see e.g. Hawkins & Midgley 2005: 186). For the reasons stated above, in the empirical part of this thesis, the F1 will be plotted against the F2 as opposed to F2-F1.

Figures 2 and 3 show examples of the formant frequencies of monophthongs. In such cases, the formants remain relatively stable throughout the entirely of the produced vowel, meaning that the audible vowel quality also remains consistent. It must be mentioned, however, that even monophthongs invariably exhibit even slight changes in frequency in their production due to the transitions to and from neighbouring segments, among other reasons. Kantner (1960: 67) explains that no vowel

> is ever made through an absolutely fixed position that does not waver even so much as a piston in an automobile engine. The speech mechanism is made of flesh and blood, not steel, and its "tolerance" is not to be compared with the one ten-thousandths of an inch considered acceptable for some machine parts. More important still, there is in most phonetic contexts a movement to the vowel from some other sound and from the vowel to another sound. Hence, the period of even relative stability of position tends to be short and to fall in the middle of the duration of the vowel. For this reason we define a *pure* vowel as one in which the mechanism is held *relatively* stable in contrast to the glides in which the movement is the essence of the sound. [original emphasis]

The distinction between monophthongs and diphthongs is therefore not that one involves a change in quality and one does not, but rather that monophthongs "do not involve *significant* articulatory movement" (Reetz & Jongman 2009: 21 [my emphasis]) and hence exhibit only minimal change in their formants.[17] With diphthongs, there is a glide between two relatively distinct vowels which form a single syllabic nucleus, meaning the formants also move or "bend" from one position to another in a greater way (Gimson 1989: 23). This may also be displayed using a scatter graph, but each vowel is represented by a line from the starting to the ending point, as opposed to single plots. This is shown in Figures 4 and 5 below:

[17] In much of the introductory literature, the change in vowel quality in monophthongs is downplayed or ignored since it is relatively negligible. Comments such as the assertion by Catford (2001: 134) that there is "absolutely no change of tongue- (or lip-) position" in monophthongs are slightly unrealistic in any context beside the production of a monophthong with no neighbouring sounds. Still, even then there are likely to be slight variations in vowel quality from the start to the end of the monophthong.

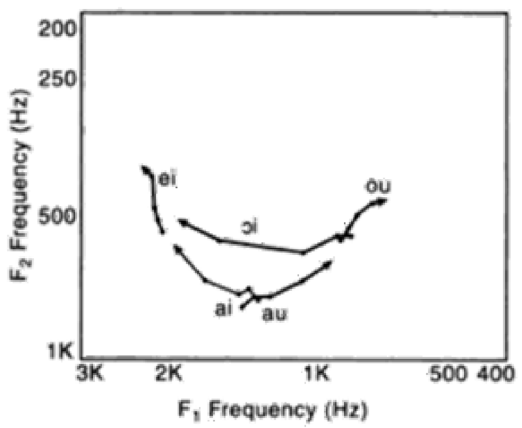

Figure 4. "First and second formants for the diphthongs" (Raphael, Borden & Harris 2007: 129)

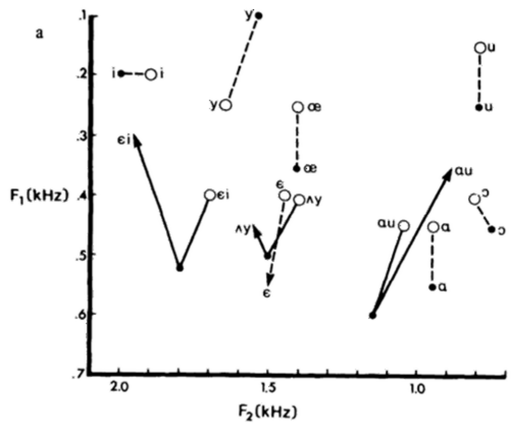

Figure 5. "Formant trajectories, in F1-F2 plane, of genuine diphthongs […] and simple vowels traditionally said to begin and end them" (Collier, Bell-Berti & Raphael 1982: 311)

Whereas Figure 4 (Raphael, Borden & Harris 2007: 129) captures some intermediate points between the starting and ending points of each diphthong, Figure 5 (Collier, Bell-Berti & Raphael 1982: 311) shows simplified transitions between the two respective diphthong elements, focusing on the quality of the two vowel sounds rather than the precise trajectory between them. Both means of visualising diphthongs have their advantages depending on what their purpose is; for instance, if the aim is merely to compare the general direction of the diphthong in terms of frontness, then Figure 5 represents a more efficient and easily readable manner by which to show this, since any intermediate stages between the two extremes are irrelevant.

As previously mentioned, formants are by no means an absolute or stable means of categorising vowels, and different speakers – or indeed the same speaker at different times – may produce a sound belonging to the same phoneme, but which is composed of different frequencies. Factors such as gender may impact the vowel formants due to differences in pitch, with male voices typically exhibiting a pitch frequency of 150Hz in contrast to female voices with 240Hz (Gimson 1989: 24). Moreover, speakers may be inconsistent with their pronunciation due to various internal and external factors, such as emotion, context, emphasis, and so on. This means that the formants for any given vowel are likely to vary from speaker to speaker, and from instance to instance. Therefore, the categorisation of vowel sounds according to specific formants is impractical and unrealistic; instead, if the F1 and F2 of a vowel fall into a given range, the vowel may be categorised according to the respective phonemic system. Multiple studies have attempted to ascertain the formant range and the average formants of vowels in the English phoneme inventory, although unsurprisingly there are discrepancies between them. One such categorisation was carried out by Catford (2001: 154), as seen in Table 3:

Table 3. Average formant frequencies of the cardinal vowels according to Catford (2001: 154)

	Formant 1 (Hz)	Formant 2 (Hz)		Formant 1 (Hz)	Formant 2 (Hz)
i	240	2400	y	235	2100
e	390	2300	ø	370	1900
ɛ	610	1900	œ	585	1710
a	850	1610	ɶ	820	1530
ɑ	750	940	ɒ	700	760
ʌ	600	1170	ɔ	500	700
ɤ	460	1310	o	360	640
ɯ	300	1390	u	250	595

The values displayed in Table 3 are intended as "[r]easonable average frequencies of F1 and F2 of the Cardinal Vowels for a male voice" (Catford 2001: 154). These formants may therefore be used as a basis from which to determine the frequencies of the remaining vowels of the English phoneme inventory. However, there are examples where these values contradict other categorisations. For instance, Gimson (1989: 23) reports that the F1 (corresponding to tongue height) of the vowel [i:] lies between 280-300Hz, whereas Catford (2001: 154) shows the average F1 of [i:] to be 240, which lies outside of Gimson's range. Similarly, according to Gimson (1989: 23), the F2 of the vowel [u:] (corresponding to tongue position) lies around 900Hz, whereas Catford (2001: 154) reports the average F2 of [u:] to be 595Hz, which constitutes a significant difference of 305Hz. Such discrepancies are frequent, as evident in the comparison between three further sets of findings by Paget (1922), Wells (1962), and Peterson and Barney (1952), as presented in Fry (1976: 93). Table 4 displays these three collections of average vowel formants, as well as the difference between the lowest and highest formants recorded for each vowel:

Table 4. Average formant frequencies according to Paget, Wells, and Peterson and Barney (Fry 1976: 93)

	Formant 1 (Hz)				Formant 2 (Hz)			
	Paget	Wells	Peterson and Barney	*Range of difference*	Paget	Wells	Peterson and Barney	*Range of difference*
i:	340	300	270	*70*	2400	2300	2290	*110*
i	360	360	390	*30*	2300	2100	1990	*310*
e	540	570	530	*40*	1930	1970	1840	*130*
a	720	750	660	*90*	1820	1750	1720	*100*
a:	790	680	730	*110*	1250	1100	1090	*160*
o	720	600	–	*120*	1150	900	–	*250*
o:	550	450	570	*120*	910	740	840	*170*
u	360	380	440	*80*	960	950	1020	*70*
u:	380	300	300	*80*	720	940	870	*220*
ʌ	760	720	640	*120*	1450	1240	1190	*260*
ə:	480	580	490	*100*	1530	1380	1350	*180*

Table 4 above shows that there are notable differences between the average formants of each vowel recorded in each study. While some differences are arguably negligible, for instance that of the F1 of the vowel [i] (range of 30Hz), some are more significant. For example, the difference between the highest and lowest second formant of the vowel [i] is 310Hz, which is greater than the difference between the second formants recorded by Wells of the two distinct vowels [i] and [e]. Furthermore, while all three studies found the F2 of [ə:] to be greater than that of [ʌ], indicating a lower tongue height, the F2 of [ʌ] recorded by Paget (1450Hz) is greater than the F2 of [ə:] recorded by Wells (1380Hz). If these two values were to be compared, this would imply that the vowel [ə:] would be lower than [ʌ], which is not the case.

Discrepancies such as those above are highly frequent, and cross-examination can highlight contradictions. This leads to the question as to the purpose of calculating average vowel formants, if these are only to be contradicted by numerous other studies. It may initially seem to be a fruitless endeavour. However, there are many possible factors which may cause these discrepancies, and these must be taken into consideration. For instance, Paget's values were determined based on the calculation of the mid-points of ranges determined through mere auditory analysis conducted by Paget himself by ear (Fry 1976: 92). Moreover, these values were found on the basis of the analysis of a single speaker – Paget himself – as opposed to the average values from a number of speakers (Paget 1922: 95). For these reasons, Paget's values may be deemed too subjective or unreliable to be used as reference values. The formants determined by Peterson and Barney which were presented in Fry's comparison were only those of the male speakers in their study (Fry 1976: 94), which may explain why the majority of their values in Table 4 are generally lower than those of Paget and Wells. In addition, the vowels analysed by Peterson and Barney were all produced by speakers of American English, whereas the other two studies were based on speakers of British English (Fry 1976: 93-94), which may further account for inconsistencies in spite of the uniform categorisation of speech sounds. With regards to Catford's (2001: 154) "[r]easonable average frequencies" of the cardinal vowels, no clear information is given as to the basis of these assumptions, i.e. whether a study was conducted which yielded the values given, under which conditions this study was conducted, and so on.

In addition to the factors already mentioned, the conditions of data collection may also be responsible for differences in these averages. For example, the geographical region in which the data was collected is central, even within a broader variety such as British English, since vowels are especially prone to variation in this respect (Jakielski & Gildersleeve-Neumann 2018: 237). Furthermore, the time at which the data was collected is also greatly significant, with vowels also being highly susceptible to diachronic change (Shay 2008: 187). When using given formant averages and ranges as a basis for reference and comparison for further studies, factors such as those mentioned above must be taken into account. Sounds analysed as part of a study of vowels in British English should not be categorised according to findings in a study with speakers of American English, for instance. Care should be taken to select a set of reference values which were determined under conditions which most accurately mirror the conditions of the respective study.

Despite efforts to control variables such as speaker demographics, recording context, and so on, studies will invariably record differing average formants due to the nature in which they are calculated, auditory analysis notwithstanding. This point will be addressed in more detail in the following section, which will discuss the methodology and software used to ascertain vowel formants.

4.4. Determining vowel formants

In 1992, a piece of software was developed by Paul Boersma and David Weenink to analyse audio input with respect to various acoustic properties and display graphics visualising such analyses. This programme, *Praat*, is described by its developers as "a general set of tools for analyzing, synthesizing and manipulating speech and other sounds, bundled into a single integrated computer program" (Boersma 2013: 375), and has made it possible to visually display and acoustically analyse audio data with ease and efficiency. Since its initial development, it has undergone numerous revisions, the latest being version 6.1.09 (as of 27 Jan. 2020), and has become an integral tool not only among acoustic phoneticians, but also in the fields of phonology, sociolinguistics and psycholinguistics among many others, due to the increasingly recognised possibilities of acoustic analysis (Boersma 2013: 375).

Aside from the practical benefits of it being free, up-to-date and widely used (Boersma 2013: 375; Ladefoged & Johnson 2015: 204), there are many advantages that *Praat* can offer. For instance, it allows users to visually display a sound file and its sonic components, such as formants and pitch trajectory. This means that users are able to look at sound and analyse visualised speech, for instance in the form of a spectrogram or a sound wave (Ladefoged & Johnson 2015: 204). In this way, acoustic analysis using programmes such as *Praat* may be beneficial as a support for auditory analysis, for instance in cases of doubt. Blume and Lust (2017: 175) mention the use of *Praat* as a means to fill gaps in analysis that arise in "areas of unclear speech". The conversion from audio to visual data can make it easier to identify plosives and voicing, for instance (Blume & Lust 2017: 175), where auditory analysis alone might be too difficult or unreliable, especially with fast or indistinct sound files.

While acoustic analysis may be utilised to make up for the shortcomings of auditory analysis, it has drawbacks of its own. One problem that is faced when dealing with acoustic data is the question of the perceived linearity and discreteness of speech. When listeners hear spoken speech, a process is undertaken which involves "the conversion of a continuous acoustic signal into a set of discrete units" (Reetz & Jongman 2009: 251). Examples of such discrete units that have been defined include "segments, syllables, and words" (Reetz & Jongman 2009: 251). However, when speech is displayed visually as sound waves, it becomes clear that audio data is not discrete, but continuous. As such, boundaries between segments are not clear, but fuzzy, as the movement between units such as phones is gradual. While there are programmes available which can automatically divide a sound file into segments,[18] there is naturally a slight level of arbitrariness to these divisions which must be accepted. As admitted by Boersma (2014: 363) himself, "Praat is not a [sic] speech recognition software", which means that external programmes must be sought for the purposes of automated segmentation. Without the use of such software and plug-ins, dependence on visual data for the analysis of sound can be unreliable, even with a trained eye. In the end, units of connected speech, such as phones and syllables, are constructs based on perception (Reetz & Jongman 2009: 251), and so even

[18] See Brinckmann (2014: 364) for more information and examples.

acoustic analysis should also entail a certain degree of auditory analysis, even if only for the purposes of verification.

For the present study, one of the most important and relevant elements of acoustic analysis is determining the formants of the vowels in question. *Praat* offers a simple and efficient way of achieving this. Firstly, it must be stressed once again that a sound wave consists of continuous data as opposed to discrete units, and so with this in mind it is possible to view the formant contours, shown by the lines of red dots as seen in Figure 6 below:

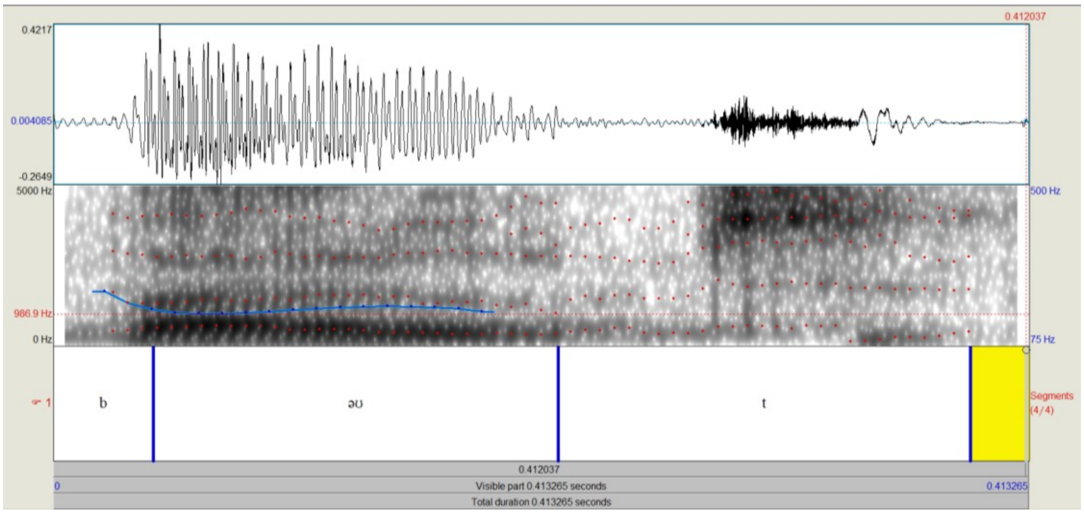

Figure 6. SoundEditor view of the word *boat* in *Praat*

As visible in Figure 6, there are four formant contours that are visible during the nucleus of the word *boat*, starting with F1 at the bottom, F2 above that, and so on. From this visualisation it can be seen, for instance, that there is a change in vowel quality from the start to the end of the nucleus. As discussed in section 4.3., the first two formants approximately correlate with the height and frontness of the vowel. Since the first formant correlates negatively with vowel height, it can be determined from this illustration that this is a closing diphthong, since the F1 contour exhibits a general downwards movement. However, in order to gain a quantifiable reading for the purposes of direct comparison and visualisation on a scatter graph, the formant contours must be queried. This can either be achieved by selecting a single moment using the cursor, resulting in "the linearly interpolated […] formant at that time", or by highlighting a selection, which produces "the mean […] formant in the visble [sic] part of that selection" (Boersma & Weenink 2004b). The main advantage of taking the latter approach is that possible momentary fluctuations in the formant frequency are smoothed out, and the likelihood of unrepresentative readings is reduced. The method of obtaining an average formant reading has been employed widely by acoustic phoneticians, both before the advent of *Praat* (see e.g.

Peterson & Barney 1976 [1952]: 115) and since its introduction (see e.g. Hoffmann 2011: 154).[19]

It must be kept in mind that (manual) formant analysis of vowels is largely an approximation as opposed to an exact science, not least due to the continuous change of quality throughout the vowel, however slight. Due to various factors, a precise and reliable formant reading for any given vowel is not easy to achieve. Deterding (1997: 49) comments that the "[d]ifficulties in clear identification of both the first and second formants of all vowels are well known". It has already been discussed how formant analysis for the purposes of inter-speaker comparison is a matter of approximation, since factors such as gender affect the absolute frequencies of a given vowel. Boersma and Weenink (2004a) suggest adjusting the formant analysis parameters to compensate for gender differences, advising that for female speakers the maximum frequency should be set to 5500Hz, and for male speakers, 5000Hz. However, even such adjustments do not completely normalise the results since there is significant variation in frequency among speakers of the same gender. Furthermore, a manual formant reading[20] is not entirely reliable since it is extremely improbable that repeated readings will result in the same formant values without reading exactly the same stretch of audio data to the millisecond. Considering these drawbacks, it is important to remember that any values gained from manual formant analysis and displayed on a scatter graph are intended to yield only approximate results for the purpose of comparison and the identification of general tendencies. Since this thesis is mainly concerned with the front-back divide in the /əʊ/ diphthong, these drawbacks do not detract from the validity of the methodology employed. In the following chapter, the empirical study will be presented on the basis of the theoretical concepts and practical considerations discussed throughout the thesis so far.

[19] Many studies unfortunately do not specify whether a momentary or a mean reading was taken, e.g. Maclagan et al. (2009), de Boer (2011), among others. While a difference between both methods of ascertaining formant values may be negligible in some cases, this is nonetheless an important detail to include in the methodology since it has potential implications on the reliability of the data.

[20] Here, the word *manual* refers to manually selecting the stretch of audio data to be analysed, as opposed to allowing an external piece of software to determine which part of the vowel should undergo formant analysis.

5. Empirical study: /əʊ/ in Southern British standard usage

In this section, the main study of this thesis will be introduced. The aim of this study is to record and document the pronunciation of the closing diphthong /əʊ/ in various phonetic contexts among speakers of SSBE, with a view to determining the effect of neighbouring sounds, morphological boundaries and other linguistic and extralinguistic factors in this regard. As stated in the introduction, the research questions of this empirical study are as follows:

1. How is the closing diphthong /əʊ/ pronounced by speakers of Standard Southern British English (SSBE)?
2. What is the role of the dark [ɫ] in the frontness of this diphthong?
3. Are there any other factors which affect the frontness of this diphthong, such as morpheme structure, orthography or context of speech?
4. What are the implications on the phonology and phonemic transcription of this diphthong?

First, the study will be introduced in terms of the methodology employed. Second, the hypotheses will be proposed. Then, the results of the auditory and acoustic analyses will be presented, before a discussion on potential implications is undertaken.

5.1. Methodology

For this study, 14 participants were recorded reading aloud stimulus words for analysis. These participants are all L1 speakers of a southern variety of British English and were all born in a southern region of England. Their accents were deemed to be relatively standard upon recording, based on subjective perception. Of the 14 speakers, 7 are male and 7 are female. All participants teach or have taught English in some professional capacity to non-L1 speakers of English, which means that they function or have functioned as language norm authorities and, to some extent, model speakers to their students (see Ammon 2003: 2). The ages of the participants range from 23 to 66 years.[21] With the exception of two participants, all hold a university degree. Of the two participants who do not have university education, one is

[21] It is acknowledged that this is a relatively large age range. Due to a limited pool of potential participants, it was decided that it was more beneficial to limit speakers not by their age, but by the variety of English they speak, and their profession. This must be taken into account when considering any conclusions that are drawn from the results of this study. Nevertheless, an advantage of including participants of a wider range of ages is that the results may indicate possible phenomena based on the age of speakers, which can then be investigated in more detail and confirmed or refuted in future studies.

currently studying English after having received A-level education, and the other is an experienced, longstanding teacher of English to non-L1 speakers.

All participants took part in the study voluntarily and willingly. However, they were not informed as to the purpose of the study in advance of their participation, so as to avoid any unwanted influence on their pronunciation. After the recordings were made and the questionnaire completed, each participant was then provided with information about the study and how their data will be used. They were given the option to withdraw from the study without negative repercussions if they did not wish for their data to be stored and used in relation to this project. All participants included in this study gave their informed consent to the use of their audio and personal data. For the purposes of anonymity, these participants will be referred to in this paper exclusively by their participant ID. One participant was removed from the study after completing the recordings due to not fulfilling the prerequisite of being born and raised in southern England. A further four participants withdrew from the study after receiving participant ID numbers but before the recordings were made. For this reason, the participant ID numbers are not fully consecutive.

In order to test the diphthong /əʊ/ in a variety of different phonetic contexts, the following 41 words were selected for analysis, all of which contain /əʊ/ as a stressed syllable:

Table 5. Words analysed, grouped according to type

Monosyllabic	**Coda: empty**	***bow*** /bəʊ/	***go*** /gəʊ/	***hoe*** /həʊ/	***row*** /rəʊ/	***toe*** /təʊ/
	Coda: plosive	***boat*** /bəʊt/	***goat*** /gəʊt/	***hope*** /həʊp/	***wrote*** /rəʊt/	***toad*** /təʊd/
	Coda: /l/	***bowl*** /bəʊl/	***goal*** /gəʊl/	***hole*, *whole*** /həʊl/	***roll*** /rəʊl/	***toll*** /təʊl/
	Coda: /l/ + plosive	***bold*** /bəʊld/	***gold*** /gəʊld/	***hold*** /həʊld/	***rolled*** /rəʊld/	***told*** /təʊld/
Disyllabic (intervocalic /l/)		***bowling*** /ˈbəʊlɪŋ/	***goalie*** /ˈgəʊli/	***holey*, *wholly*, *holy*** /ˈhəʊli/	***roller*** /ˈrəʊlə/	***tolling*** /ˈtəʊlɪŋ/
Two-word phrases		***roller coaster*** /ˈrəʊlə ˈkəʊstə/		***chrome rollers*** /ˈkrəʊm ˈrəʊləz/		***roly poly*** /ˈrəʊli ˈpəʊli/
Interjections		***oh*** /əʊ/	***woah*** /wəʊ/			
Miscellaneous		***pole*** /pəʊl/	***Poland*** /ˈpəʊlənd/	***Polish*** /ˈpəʊlɪʃ/	***polar*** /ˈpəʊlə/	***tombola*** /tɒmˈbəʊlə/

As can be seen in Table 5, the 41 tested words include five monosyllabic words with empty codas, five with a plosive in the coda, six with a singleton liquid /l/ in the coda,[22] and five with a liquid /l/ and a plosive in the coda. In these four categories of monosyllabic words, the same set of five consonants were used in the onsets. Seven disyllabic words with the diphthong /əʊ/ as the nucleus of the first syllable, followed by an intervocalic /l/, were also tested. These include the supposed homophones *holy*, *holey* and *wholly*, all included in this study for the purpose of comparison. The phrases *roller coaster*, *chrome rollers* and *roly poly*, which consist of two words each containing /əʊ/ as a stressed syllable, were included to test any potential effects of inter-word vowel-to-vowel assimilation and to determine whether these effects override any other principles or patterns detected in the other parts of the study. The two interjections *oh* and *woah* were included to test their pronunciation in relation to the lexical monosyllabic words with empty codas. The words *pole*, *Poland*, *Polish* and *polar* were recorded with a view to determining any parallelisms between (perceived) morphological structure and sound structure. Finally, the word *tombola* was included as the only trisyllabic word in this collection.

The recording stage of the study was split into two parts. First, the participants were recorded reading aloud a series of short texts which contain the 41 tested words.[23] The texts were written in such a way that participants would be able to read them without noticing what was being tested. This meant that there were often larger gaps between words containing the /əʊ/ diphthong. Following this, the participants were asked to read aloud a word list containing the same tested words amongst other words mainly taken from the texts.[24] None of the tested words appeared as the first or last word of the list, so as "to avoid beginning- and end-of-list effects in reading" (Hawkins & Midgley 2005: 185). The two-word phrases were also listed amongst a separate list of distractor phrases. The word *bow* was listed with the two-word phrases as part of the phrase *bow tie* so as to avoid potential confusion with the homograph *bow* /baʊ/ due to the lack of coherent co-text in the word list.[25] The purpose of the inclusion of both a word list and coherent texts was to allow for each tested word to be repeated, but also to assess whether or not the diphthongs were pronounced differently depending on the way in which they were

[22] The words *hole* and *whole* were both included for the purpose of comparison with the words *holy*, *holey* and *wholly*.

[23] These texts can be found in the appendix.

[24] The word list can be found in the appendix.

[25] The same could have been considered for the words *row*, which shares the same orthography as *row* /raʊ/, and *Polish*, which may be confused with *polish* /ˈpɒlɪʃ/. In the latter case, the ambiguity may have been avoided had the words in the word lists not all been capitalised. This issue is discussed briefly in section 5.3.3.

presented to the speakers. In their study of German standard usage, Deppermann, Kleiner and Knöbl (2013: 91) elicited words using tasks of varying “degrees of formality”, which relate to the “different degrees of attention paid to speech production”. They describe word lists as “the situation which requires the highest degree of attention paid to speech production”, and rank them as more formal than texts, which they describe as “a more informal condition” (Deppermann, Kleiner & Knöbl 2013: 97). For this reason, a comparable approach is taken in the present study, with the word list representing the more formal context, and the texts constituting the more informal context.

The recordings were cut in order to isolate each tested word for the purposes of more efficient acoustic analysis. To this end, the computer programme *Audacity* was used. Each word then underwent an initial auditory analysis in isolation, whereby each word was categorised into four main groups according to the perceived frontness of its diphthong. If a diphthong was perceived to be rather centralised or even fronted, it was categorised as variant 1 [əʊ]. If it was perceived to be rather back, it was labelled as variant 2 [ɒʊ]. The remaining words were grouped into those whose tested segments were pronounced as the monophthong [ɒ], and those with miscellaneous pronunciations which could not be categorised into any of the first three groups. This auditory analysis was repeated after one week to ensure reliable results.

Following the auditory analysis, the formants of the diphthongs of each tested word were ascertained using *Praat*. For this, the average F1 and F2 values of both the start (first element) and the end (second element) of the diphthong were recorded. In this way, it was possible to determine the approximate starting and ending point of each diphthong produced in terms of tongue height and position. The results of this acoustic analysis were then used to confirm or refute the findings of the auditory analysis. In order to determine the average formants of the first or second element of a diphthong in *Praat*, the diphthong was located and isolated by visual means with the spectrogram, and by auditory means. For the first element, in line with the methodology employed by de Boer (2011: 111), the part of the sound file where the acoustic energy was at its greatest was selected, as long as this was not at a point where the F1 was changing significantly as a result of co-articulation; where this was the case, the point at which the F1 peaked and plateaued was selected. Here, care was taken in any case to avoid overlap with the preceding consonant, which could have affected the resulting formant value. For the second element, the part of the diphthong where the F1 was at its lowest and most consistent was selected, again with particular attention paid to the onset of the following consonant, if present. For both elements, a small stretch of audio data was selected as opposed to one single point, so as to provide a mean formant value. This was to smooth out the frequency fluctuations within this frame and hence give as representative a reading as possible. Following the recommendation by Boersma and Weenink (2004a), the formant analysis parameters were adjusted, and the maximum frequency was set to 5500Hz for female speakers and 5000Hz for male speakers in order to account for differences caused by gender. While this measure does not normalise the data completely, it is a simple step that positively impacts the validity of the results.

5.2. Hypotheses

It is expected that the diphthongs in the monosyllabic words with empty codas (*bow*, *go*, *toe*, *row*, *hoe*) as well as those in the monosyllabic words with plosives in the codas (*boat*, *goat*, *toad*, *wrote*, *hope*) will be pronounced as variant 1 [əʊ]. The diphthongs in the monosyllabic words with a dark [ɫ] in the coda, either on its own (*bowl*, *goal*, *toll*, *roll*, *hole*/*whole*) or followed by a plosive (*bold*, *gold*, *told*, *rolled*, *hold*), are expected to be pronounced as variant 2 [ɒʊ]. Owing to their phonemic structure, the interjections *oh* and *woah* should produce the same outcomes as the other monosyllabic words with empty codas. However, since they do not constitute traditional content or function words, their pronunciation may not be governed by the same phonological rules and as such may also contain variant 2 [ɒʊ].

In each of the seven main disyllabic words (*bowling*, *goalie*, *tolling*, *roller*, *holy*, *holey*, *wholly*), there is the phoneme /l/ between the two vowels. Since the segment /l/ is intervocalic in these words, it will likely be pronounced as a clear [l] as opposed to a dark [ɫ], which would entail that the diphthongs in the first syllable of these disyllabic words is pronounced as variant 1 [əʊ]. This becomes clear when the syllable structure of these words is considered, bearing in mind the maximal onset principle:

Table 6. Syllable structure of disyllabic words with intervocalic [l]

Tested word	Syllable structure
bowling	/ˈbəʊ.lɪŋ/
goalie	/ˈɡəʊ.li/
tolling	/ˈtəʊ.lɪŋ/
roller	/ˈrəʊ.lə/
holy, holey, wholly	/ˈhəʊ.li/

As shown in Table 6, it is reasonable to assume that the segment /l/ is in the onset of the second syllable in each case, meaning that it is pronounced as a clear [l], the first syllable is open, and the diphthongs are produced as variant 1 [əʊ]. However, in spite of its adherence to both the maximal onset principle and the sonority sequencing principle, the syllabification as carried out above may not correspond with actual speaker interpretation of the structure of these words. With the exception of *holy*, these words each consist of a clearly identifiable morphological base and a suffix, whereby the /l/ is contained within the base:

Table 7. Morphological structure of disyllabic words with intervocalic [l]

Tested word	Morphological structure
bowling	{bowl} {-ing}
goalie	{goal} {-ie}
tolling	{toll} {-ing}
roller	{roll} {-er}
holey	{hole} {-y}
wholly	{whole} {-ly}

By breaking down each word into its constituent morphemes, it becomes clear that the /l/ in each base would be produced as a dark [ɫ] if pronounced as a content word on its own, leading to the assumption that the diphthongs would be pronounced as variant 2 [ɒʊ] accordingly. It therefore depends on the speaker's implicit interpretation of these disyllabic words: if the pronunciation of the base has been internalised, the addition of a suffix may not affect the diphthong drastically (see Wells 2009 and section 3.3.2. of this thesis). However, if the word has been reanalysed as a single unit and not as a base with a suffix, it is possible that variant 1 [əʊ] may be produced.

In the case of *holy*, as previously discussed, it is not immediately discernable as to whether or not this word consists of a base and a suffix, or whether it constitutes a simplex word. In the latter case, which appears more likely, the diphthong is expected to be pronounced as variant 1 [əʊ]. Similarly, the word *tombola*, included due to its variable pronunciation, is also likely to be interpreted as a simplex word and hence pronounced with variant 1 [əʊ], yet as seen in the introduction to this thesis, the back variant is also possible. It is therefore expected that both variants will be produced, but that [əʊ] will be more frequent.

The words *pole*, *polar*, *Poland* and *Polish* were also included in this study to test people's implicit analysis of words. In accordance with the previous predictions, it is expected that the diphthong in *pole* will be pronounced as variant 2 [ɒʊ] due to the dark [ɫ] in the coda. The pronunciation of *polar*, *Poland* and *Polish* may therefore provide an insight as to whether or not speakers consciously or unconsciously consider them derivatives of the word *pole*: if the diphthong is pronounced as variant 2 [ɒʊ], it may be concluded that, for the respective speakers, the word *pole* constitutes the base. If the diphthong is pronounced as variant 1 [əʊ], it may be assumed that each word has been (re)analysed as a simplex word in its own right. In any case, it is difficult to predict either outcome without relying on introspection.

Finally, the phrases *roller coaster*, *chrome rollers* and *roly poly* are expected to adhere to the predictions outlined above, depending on the interpretation by the respective speakers. However, in these cases, neighbouring sounds are also expected to play a role. For instance, while *roller coaster* is likely to be pronounced as [ˈɹɒʊlə ˈkəʊstə], assuming that the pronunciation of the diphthong in *roller* is retained from the base *roll*, it is also possible that the two diphthongs are pronounced in the same way due to their close proximity. This inter-word vowel-to-vowel assimilation would lead to either [ˈɹɒʊlə ˈkɒʊstə] or [ˈɹəʊlə ˈkəʊstə]. Here, the latter is perhaps more likely since there is no /l/ in *coaster*, nor in its base *coast*, to warrant the production of variant 2 [ɒʊ].

The main predictions are presented here in the form of four hypotheses:

Hypothesis 1 In monosyllabic words with no dark [ɫ] in the coda, [əʊ] will be the more frequently produced variant.

Hypothesis 2 In monosyllabic words with dark [ɫ] in the coda, [ɒʊ] will be the more frequently produced variant.

Hypothesis 3 In complex disyllabic words with intervocalic [l], where there is a clearly identifiable base morpheme which as a simplex word contains a dark [ɫ], [ɒʊ] will be the more frequently produced variant. Where the morphological structure is no longer transparent, [əʊ] will be the more frequently produced variant.

Hypothesis 4 In some but not all cases of the two-word phrases, both diphthongs will be pronounced with the same variant due to assimilation, regardless of the morphological structure or the presence of /l/ in the individual words.

5.3. Results

In this section, the results of the auditory and acoustic analysis will be presented in groups. The first group consists of the main sets of words beginning with [b], [g], [h], [ɹ] and [t], each followed by the tested diphthong and either an empty coda, a plosive, a dark [ɫ], a combination of dark [ɫ] and a plosive, or intervocalic [l] followed by a second syllable. These words are as follows:

Table 8. Main set of analysed words

		Onset				
		[b]_	[g]_	[h]_	[ɹ]_	[t]_
Coda	_#	*bow*	*go*	*hoe*	*row*	*toe*
	_[t,d,p]	*boat*	*goat*	*hope*	*wrote*	*toad*
	_[ɫ]	*bowl*	*goal*	*hole, whole*	*roll*	*toll*
	_[ɫd]	*bold*	*gold*	*hold*	*rolled*	*told*
	_[l]+V	*bowling*	*goalie*	*holey, wholly*	*roller*	*tolling*

Directly following this group, the three supposed homophones *holy*, *holey* and *wholly* will form a second group of their own, whereby the differences in their pronunciation and the possible effects of orthography and morphology will be discussed. The third group will consist of *pole* and some derivatives thereof, namely *polar*, *Poland* and *Polish*, with a view to ascertaining potential parallelisms between sound and meaning structures. Then, the two-word phrases *chrome rollers*, *roller coaster* and *roly poly* will be examined as a fourth group, with particular focus on possible vowel-to-vowel assimilation. The word *tombola* will be discussed individually as a special case, before the final group consisting of the interjections *oh* and *woah* are examined.

5.3.1. Group 1: Main set

The main set of analysed words, as listed in Table 8, can be split into monosyllabic words with no post-vocalic dark [ɫ], those with post-vocalic dark [ɫ], and disyllabic words with intervocalic [l]. The initial auditory analysis of /əʊ/ in the words without dark [ɫ] shows that variant 1 [əʊ] was produced in 100% of cases, both when the coda is filled by a plosive and when it is empty, and also irrespective of whether the word was read from the texts or the word list. For the sake of illustration, this can be seen in Figure 7:

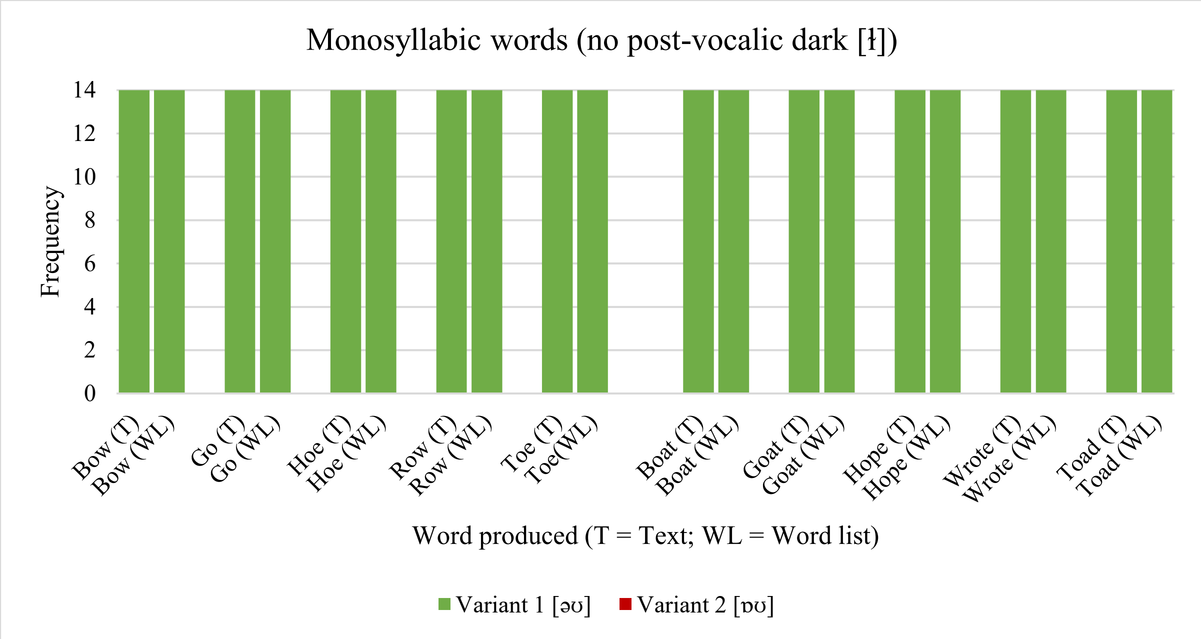

Figure 7. Pronunciation of /əʊ/ in monosyllabic words without dark [ɫ]

The auditory analysis of /əʊ/ in the monosyllabic words with post-vocalic dark [ɫ] shows that variant 2 [ɒʊ] was the clearly preferred pronunciation, albeit not exclusively, as can be seen in Figure 8:

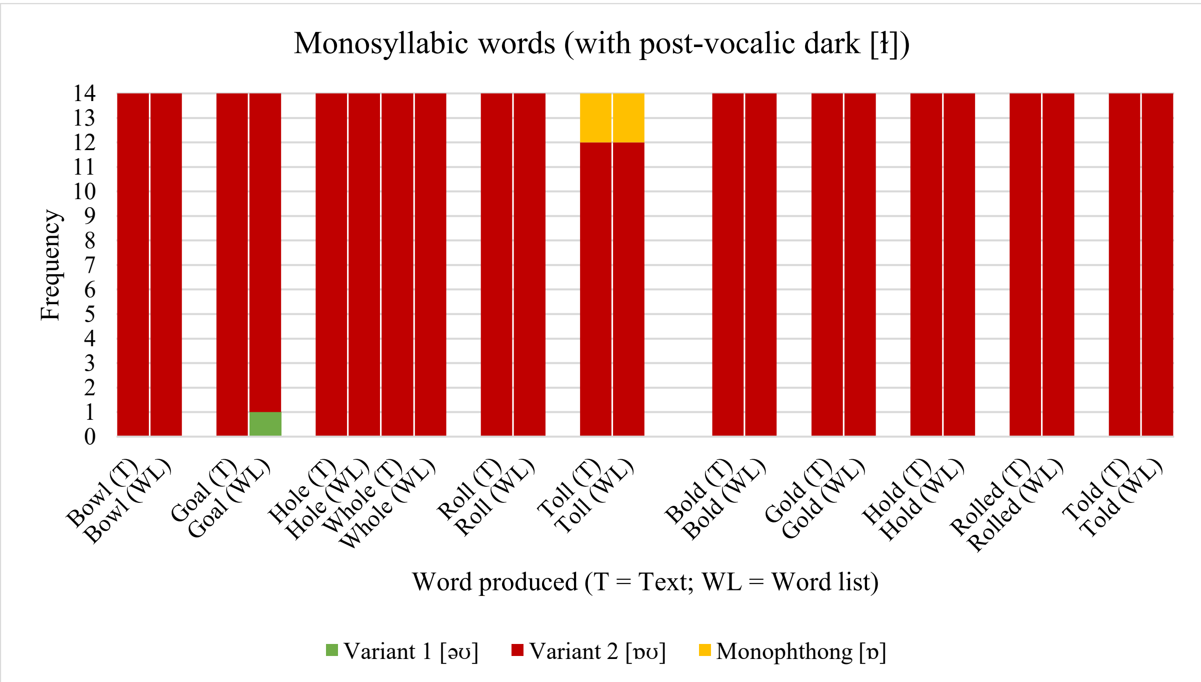

Figure 8. Pronunciation of /əʊ/ in monosyllabic words with dark [ɫ]

As shown in Figure 8, the only divergences from variant 2 [ɒʊ] can be observed in four pronunciations of *toll*, two in the text and two in the word list, and one pronunciation of *goal*, this being in the word list. In the case of *toll*, the vowel produced was not variant 1 [əʊ], but rather the monophthong [ɒ], as audible in words such as *hop* and *lot*. This is unsurprising since words orthographically ending in <oll> may contain either /ɒ/, such as *doll* (Wells 2008: 243), or /əʊ/, such as *roll* (Wells 2008: 694). The word *toll* is particularly ambiguous, however; Wells (2008: 828) lists its standard pronunciation as /təʊl/, but also gives /tɒl/ as a widespread but nonetheless localised variant which is "judged to fall outside RP" (Wells 2008: xix). Since the participants of this study are speakers of SSBE, the pronunciation of *toll* as /tɒl/ may cautiously be considered a mispronunciation, whereby this could also be understood as a mere deviation from the more common pronunciation rather than a mistake. Aside from the influence from other varieties of British English, one possible explanation for this pronunciation could be that the majority of participants in this study teach in Austria and have at least some knowledge of German. In this case, the participants who pronounced *toll* with [ɒ] were P03 (text only), P18 (text and list) and P05 (list only). P03 states in their questionnaire that they are fluent in German and have been living in Austria since 2005; P18 states they are of C1/C2 level in German and has lived in Austria since 2012; and P05, while not being fluent in German, has lived in Austria since 2006 and therefore has likely been exposed to a high level of German. It is thus naturally very probable that these participants frequently hear and/or use the German word *toll* 'great', which is typically pronounced /tɔl/. Since the relative frequency of the German word *toll* is higher than that of the English word *toll*, especially in everyday spoken language use, and due to these participants living in Austria at the time of the study, it is understandable that their interpretation of <toll> may have been influenced by the German pronunciation. Furthermore, as Bauer, Lieber and Plag (2013: 48) state, an orthographical double consonant after a stressed vowel is a common indicator that this vowel is short. In the cases where *toll* is an unfamiliar or infrequently used word for speakers, the orthography (double consonant) may influence the pronunciation and cause deviation from the norm.

The single pronunciation of *goal* with variant 1 [əʊ] occurs during the word list task and is produced by P06. This is notable since this participant pronounced markedly more words using variant 1 [əʊ] than the other participants, although such instances are otherwise limited to disyllabic words with an intervocalic [l]. This participant, who at the time of recording was 59 years of age and claimed to have a "BBC accent", did not pronounce any other monosyllabic word containing a dark [ɫ] with the back variant [ɒʊ]. It is therefore possible that this solitary central pronunciation of *goal* could constitute a momentary slip, which is backed up by the fact that it was pronounced with the back variant during the text task, meaning that the speaker was not consistent across the two tasks. The fact that the central variant was produced during more careful and focused speech could indicate the speaker's perception of [əʊ] to be the more correct or accurate pronunciation of this diphthong, although there is insufficient evidence at this point to support this assumption. This topic will be revisited later.

With only a couple of exceptions, it can clearly be seen that /əʊ/ tends to be pronounced in a more centralised position in monosyllabic words without post-vocalic dark [ɫ], while it tends to be more back in monosyllabic words with post-vocalic dark [ɫ]. While the data presented so far is based solely on auditory perception, it can be confirmed by the analysis of the formant values of the diphthongs in each case. The graphs shown below present the formant frequencies in Hz of both elements of each diphthong, i.e. the first and the second vowel sounds which together form the diphthong. Each instance of a first element is represented by a blue dot, and the second elements are represented by orange dots. The mean values of these elements are represented by larger dots. The x-axis represents the F2, which roughly correlates with vowel frontness, and the y-axis represents the F1, which roughly correlates with vowel closeness. In order that the graphs loosely resemble the vowel quadrangle, both axes have been inverted. In each graph, the left side is intended to represent the front of the mouth. This is to more clearly visualise elements which are more fronted (i.e. can be seen more to the left), more back (i.e. to the right), and those which are lower and higher. As discussed earlier, the position of each dot on the graph is only an approximate indication of the tongue position at the time of articulation, and therefore may not accurately reflect the exact actual position of the tongue.

The distribution of the formants for the words without post-vocalic dark [ɫ] can be seen in Figures 9 (texts) and 10 (word list) below:

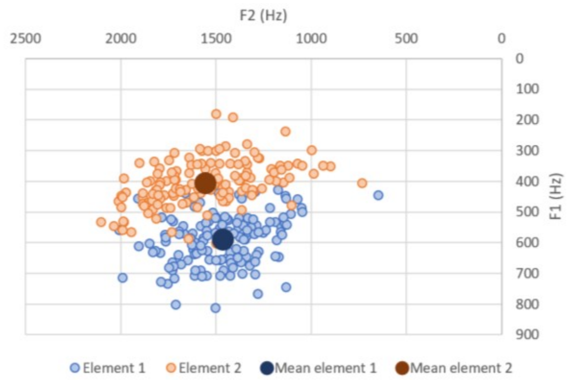

Figure 9. Formant frequencies of /əʊ/ in monosyllabic words without dark [ɫ] (text task)

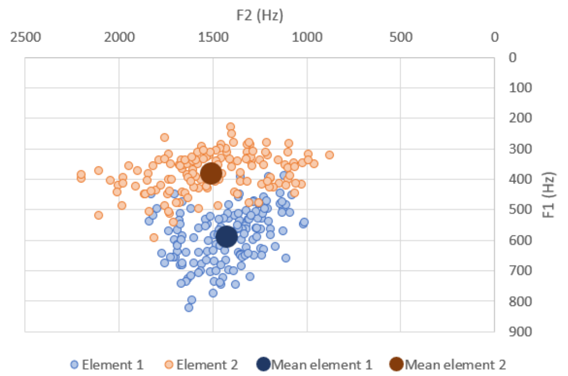

Figure 10. Formant frequencies of /əʊ/ in monosyllabic words without dark [ɫ] (word list task)

Upon an initial visual impression, it can be seen that there is a clear upwards movement from the first elements to the second, which confirms that the sounds in question are indeed closing diphthongs. This can also be verified by directly consulting the actual formant frequencies, whereby in every case, the F1 is higher in the first element than in the second, indicating an upward movement of the tongue. Further to this, a slight forward movement from the first to the second elements can also be observed, although this tendency is not as strong and is only evident in 71.4% of all cases in the texts, and 65.7% in the word list. The mean formant values of monosyllabic words without post-vocalic dark [ɫ] can be seen in Table 9 below:

Table 9. Mean formant frequencies of /əʊ/ in monosyllabic words without dark [ɫ] (Hz)

	Texts		**Word list**	
	Element 1	Element 2	Element 1	Element 2
F1	587.90	404.75	586.43	378.86
F2	1465.27	1556.40	1428.25	1511.24

As shown in Table 9, in both the texts and the word list, the F1 decreases from the first diphthong element to the second, signifying a closing diphthong, while an increase in the F2 can be observed from the first to the second element, indicating a forward movement. This can be seen visually in Figures 9 and 10 above.

The formant values of /əʊ/ in the monosyllabic words with post-vocalic dark [ɫ] also confirm the initial auditory analysis. The distribution of these formants can be seen in Figures 11 (texts) and 12 (word list) below:

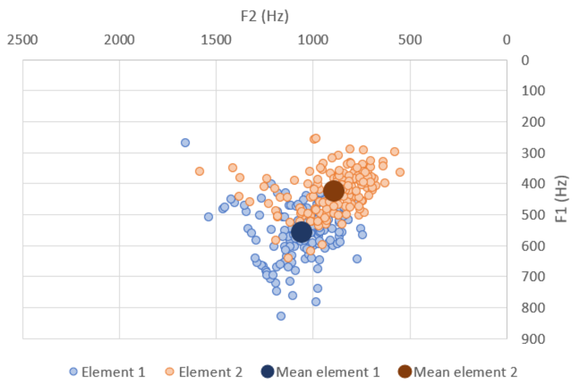

Figure 11. Formant frequencies of /əʊ/ in monosyllabic words with dark [ɫ] (text task)

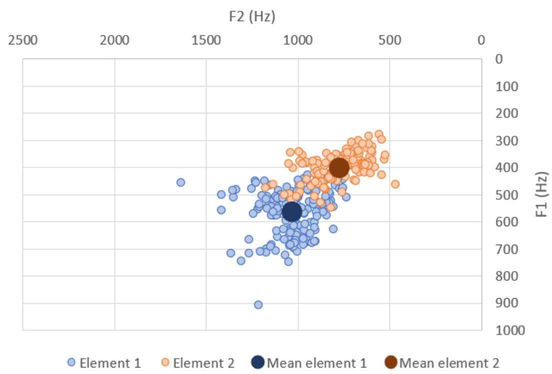

Figure 12. Formant frequencies of /əʊ/ in monosyllabic words with dark [ɫ] (word list task)

A clear distinction is immediately noticeable between the frequency distributions shown in Figures 9 and 10 and those shown in Figures 11 and 12. Here, while there is also an upward movement from the first to the second element, there is also a marked backward movement.

Furthermore, the F2 values themselves, regardless of the changes between elements, are generally lower here than in the words without a dark [ɫ]. The mean formant values of the monosyllabic words with /l/ in the coda are given in Table 10 below:

Table 10. Mean formant frequencies of /əʊ/ in monosyllabic words with dark [ɫ] (Hz)

	Texts		**Word list**	
	Element 1	Element 2	Element 1	Element 2
F1	557.42	425.27	565.32	403.08
F2	1055.34	892.88	1030.15	774.30

While there appears to be little difference in the mean F1 values between words with and without the dark [ɫ], the mean F2 values are notably lower in the words with dark [ɫ], as can be seen in Table 10 above. Furthermore, the second element has a lower mean F2 than the first, which suggests a backwards tongue movement. This data supports the auditory findings that /əʊ/ is pronounced as variant 2 [ɒʊ] when followed by dark [ɫ] in the coda of a monosyllabic word.

In both sets of words, there is little difference between the texts and the word list in terms of the mean F2 values of the first element. In the words without a dark [ɫ], the mean F2 of the first element is 1465.27Hz in the texts and 1428.25Hz in the word lists, with a negligible difference of 37.02Hz. Similarly, in the words with a dark [ɫ], the difference between the mean F2 of the first element in the texts (1055.34Hz) and the word list (1030.15Hz) is also very small, at just 25.19Hz. This indicates that, while the first element in words from the word list tends to be slightly more back than those from the texts, the type of task does not appear to make a significant difference to the starting point of the diphthong. However, this difference is greater when considering the second element. In the words without a dark [ɫ], the difference between the mean F2 of the second element in words from the texts (1556.40Hz) and from the word list (1511.24Hz) is 45.16Hz. In the words with a dark [ɫ], this difference between the mean F2 of the second element in words from the texts (892.88Hz) and from the word list (774.30Hz) is even greater at 118.58Hz. This data shows that, however small the difference may be, the mean F2 of both elements of the diphthong is consistently lower when the respective word is pronounced as part of a word list, i.e. when the speaker is concentrating more on the words in isolation as they utter them. This difference is more noticeable in the second element, especially in the words with a dark [ɫ]. In other words, when the diphthong /əʊ/ is followed by dark [ɫ], it is generally pronounced as the back variant [ɒʊ], and when uttered as part of the word list, it is produced even further back when compared to the text task.

In addition to monosyllabic words, where the presence of /l/ after the diphthong automatically means that it is in the coda and therefore constitutes a dark [ɫ], this study also includes disyllabic words with an intervocalic [l]. In each of these words, the first syllable is stressed. Furthermore, the second syllable of each word constitutes a suffix attached to a base which, on its own, contains a dark [ɫ] in the coda. These base words are also included in this study for the purpose of comparison. The morphological structure of these disyllabic words is shown in Table 11 below:

Table 11. Morphological structure of tested disyllabic words

Tested word	Base (also tested)	Suffix
bowling	*bowl*	*-ing*
goalie	*goal*	*-ie*
holey	*hole*	*-y*
wholly	*whole*	*-ly*
roller	*roll*	*-er*
tolling	*toll*	*-ing*

The pronunciation of these disyllabic words among the 14 participants can be seen in Figure 13 below:

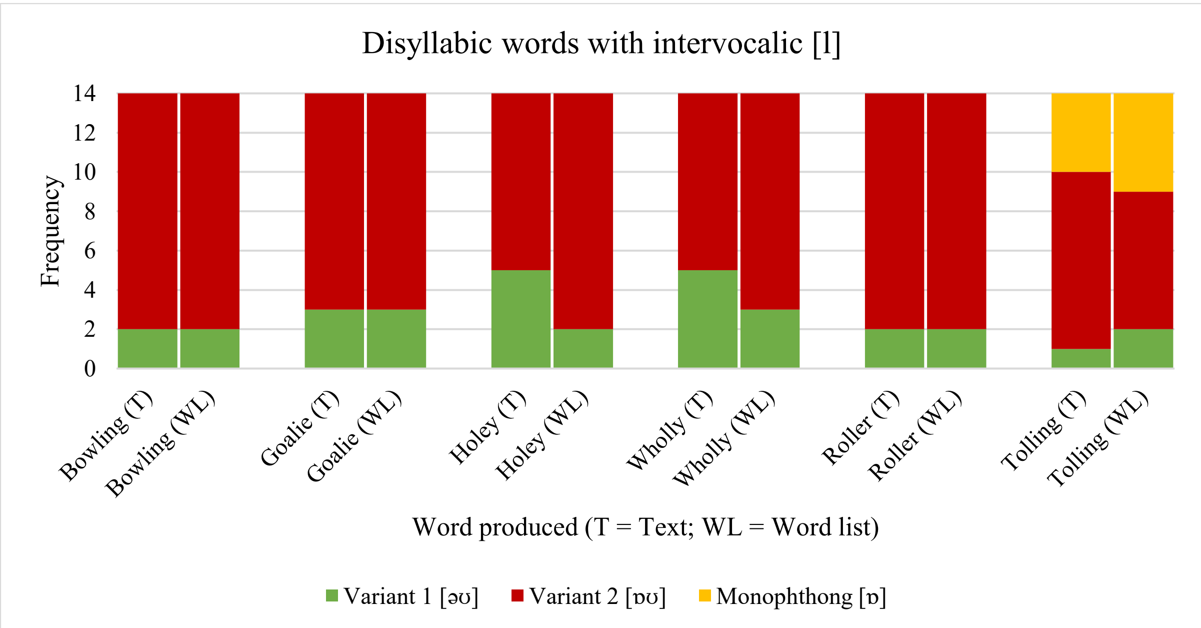

Figure 13. Pronunciation of /əʊ/ in disyllabic words with intervocalic [l]

In Figure 13 above it can be seen that there is a tendency towards variant 2 [ɒʊ]. On the one hand, since there is a clear [l] in each of these words, the diphthong /əʊ/ would normally be expected to be pronounced as variant 1 [əʊ] since there is no dark [ɫ] to retain its backness. However, this is evidently not the case. The pronunciation of the respective base words on their own may thus have a significant bearing on the pronunciation of their derived or inflected forms. For instance, since *bowl* is pronounced exclusively using variant 2 [ɒʊ], it stands to reason that *bowling* is largely pronounced using the same variant, despite containing a clear [l]. This could hint towards the possible phonemic autonomy of [ɒʊ] and its independence from the dark [ɫ] in specific contexts, and is in line with Wells' (2009) argument that the pronunciation of the base morpheme is often retained in derivative forms, regardless of whether the /l/ is dark or clear.

While there is a clear preference of variant 2 [ɒʊ] here, variant 1 [əʊ] is notably more represented in the disyllabic words than in the monosyllabic words with dark [ɫ]. This may speak for the possibility that while some speakers more readily transfer the pronunciation of the base words to the complex words, others may reanalyse these complex words and disregard their bases. For instance, *goalie* is pronounced with variant 1 [əʊ] in 6 out of 28 utterances, suggesting that while the transfer of [ɒʊ] from *goal* is predominant, the central pronunciation cannot realistically be attributed to a slip of the tongue; rather it is likely that *goalie* has been interpreted as a simplex word in its own right.

Similar to the word *toll*, the word *tolling* is pronounced with the short monophthong [ɒ] as opposed to a diphthong a total of 9 times out of 28 utterances. Again, this may be attributed to its similarity to the German word *toll*, to its relative infrequency in English, and to its orthography, with double consonants often indicating a short preceding vowel. These deviations aside, *tolling* still exhibits the same tendency towards the back variant [ɒʊ] in spite of the clear [l].

The frequency of central and back pronunciations of /əʊ/ in these disyllabic words remains relatively consistent across both tasks, with the exception of *holey* and *wholly*. In these cases, there is an increase in the pronunciation of the diphthong as [ɒʊ] in the word list task, meaning that speakers tended towards the back variant during more concentrated speech. These two words will be compared to *holy* as part of the next group.

5.3.2. Group 2: *wholly*, *holey*, *holy*

The words *wholly*, *holey* and *holy* are supposed homophones, with the diphthong in all three words being widely transcribed phonemically as /əʊ/ in British English in online dictionaries, or as /əw/ in *CUBE*. The analysis above showed that the diphthongs in *holey* and *wholly* tend to be pronounced as variant 2 [ɒʊ] more readily than as variant 1 [əʊ], likely due to their derivation from *hole* and *whole* respectively, which were found to be pronounced exclusively with variant 2 [ɒʊ]. Since *holy* appears to be a homophone of *holey* and *wholly*, it would be expected that it also be pronounced with variant 2 [ɒʊ]. However, during the auditory analysis, the diphthong was perceived to be pronounced as variant 1 [əʊ] in 78.6% of all utterances, with no difference recorded between the texts and the word list. Figure 14 below compares the perceived pronunciations of *holy*, *holey* and *wholly*:

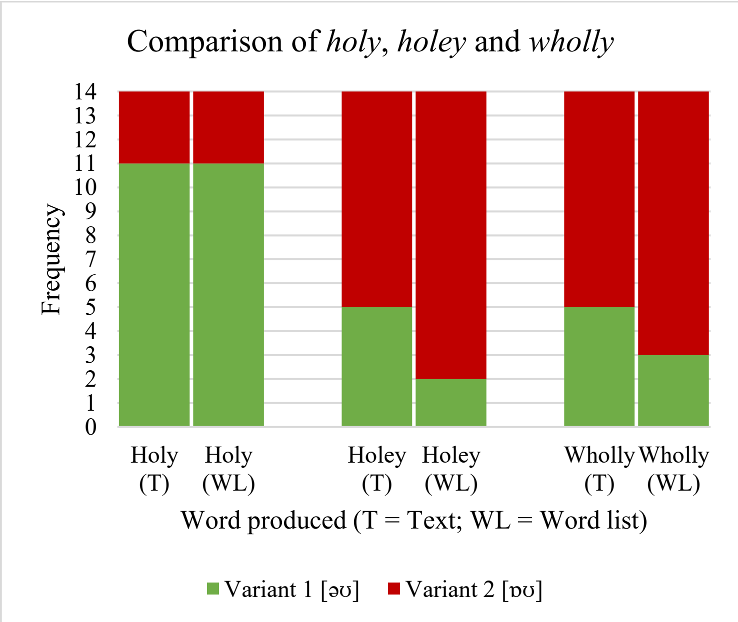

Figure 14. Pronunciation of *holy*, *holey* and *wholly* (auditory analysis)

Figure 14 shows a clear preference towards the central variant in *holy* as opposed to the back variant in *holey* and *wholly*. This difference is even more prominent in the words from the word list, with *holey* and *wholly* exhibiting a more frequent back pronunciation in the latter task.

When the formants are taken into account, the tendency that *holy* is more centralised than *wholly* and *holey* is confirmed. Figures 15, 16 and 17 show the formant values of the diphthongs in *holy*, *holey* and *wholly* respectively, plotted on scatter graphs. On these graphs, the blue nodes represent the first elements, the orange nodes represent the second elements, the green lines represent diphthongs perceived to be variant 1 [əʊ] and the red lines represent diphthongs perceived to be variant 2 [ɒʊ]:

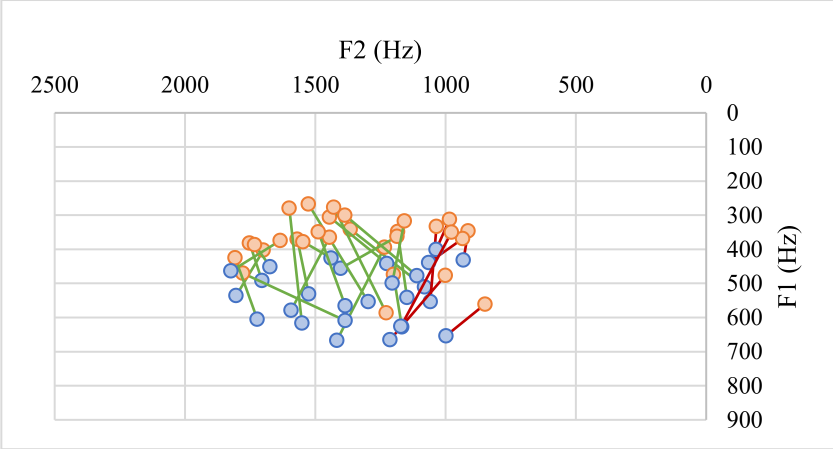

Figure 15. Formant frequencies of /əʊ/ in *holy*

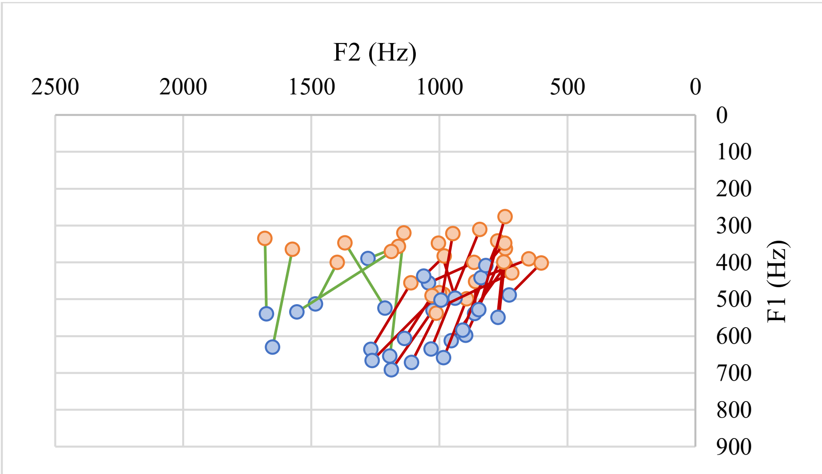

Figure 16. Formant frequencies of /əʊ/ in *holey*

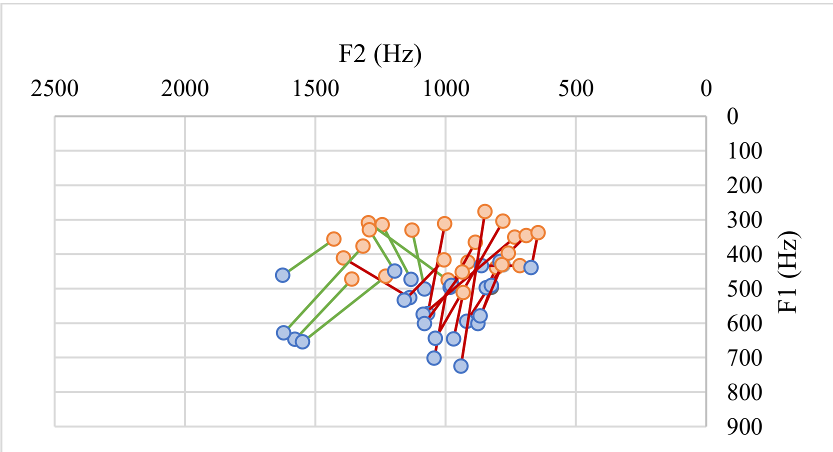

Figure 17. Formant frequencies of /əʊ/ in *wholly*

While the three scatter graphs in Figures 15, 16 and 17 do confirm the results of the auditory analysis, they also highlight the fact that there is no clear defining boundary between sounds classified as centralised and those classified as back. In order to compare frontness, a boundary may be set, for instance an F2 of 1100Hz, with which each diphthong may be compared. This would show that the majority of formant values of diphthongs in *holy* are left of this boundary, i.e. are higher than 1100Hz, whereas most formant values of diphthongs in *holey* and *wholly* are right of this boundary. This also appears to be the approximate point at which diphthongs are split between variant 1 and variant 2. However, this boundary is completely arbitrary, and there is rather a gradual continuum from the most back variants to the most centralised or fronted variants.

Surprisingly, in the case of *wholly*, there is one diphthong which was perceived in the auditory analysis to be variant 2 [ɒʊ], but which demonstrates a clear forward movement among other instances perceived to be variant 1 [əʊ], as seen in Figure 17. Its F2 values are even those typical of other diphthongs which have been classified as variant 1 [əʊ], with the F2 of the first element being 1136.90Hz and that of the second element being as high as 1391.27Hz. There are a number of possible reasons for this. Firstly, since this particular utterance of *wholly* occurred during the text reading task and therefore as part of a string of words, the word was pronounced fairly quickly. The diphthong here was especially short, lasting only approximately 0.05s from beginning to end, which makes the auditory analysis and subsequent classification rather difficult. The brevity of the diphthong in this word is illustrated in Figure 18 below:

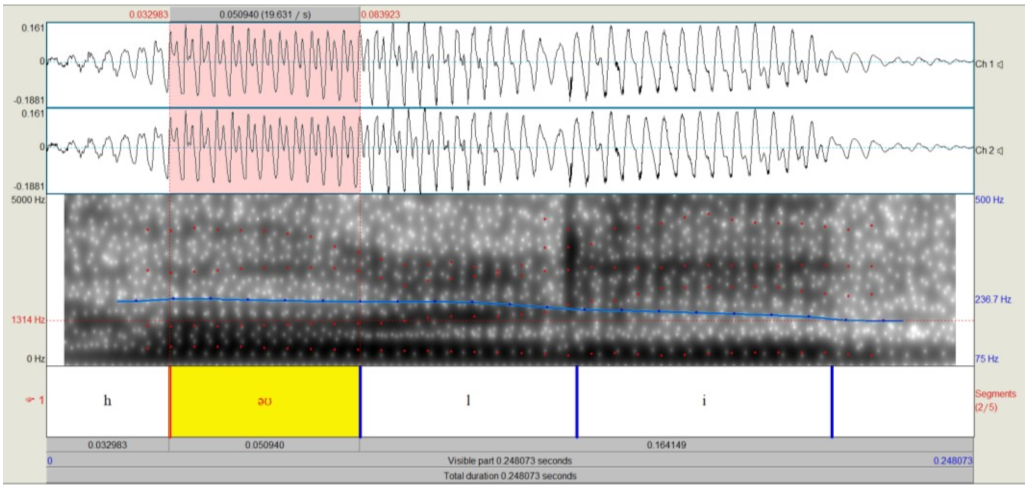

Figure 18. SoundEditor view of the word *wholly* (text task, P01) in *Praat*

Secondly, the F2 of both elements in *wholly* were not remarkably high for this participant (P01) when taking into account all other words pronounced by this person. When considering that some words from the text task showed a second-element F2 in excess of 2000Hz (e.g. *toe* [2012.74Hz], *coaster* [2082.67Hz] and *Polish* [2030.84Hz]), it stands to reason that an F2 of 1391.27Hz would be perceived as comparatively low, and this diphthong therefore as comparatively back, when considering this speaker's individual range.

Earlier it was stated that *holy*, *holey* and *wholly* are all commonly transcribed with the same phonemic symbols for their diphthongs; however, their transcription as a whole is not identical. While not directly related to the main research questions of this thesis, it is nonetheless interesting to note that the word *wholly* seems to be frequently transcribed with a doubled consonant /l/, for instance /ˈhəʊllɪ/ (*Collins*) or /hə́wl + lɪj/ (*CUBE*), as opposed to with a singleton /l/ like with *holey* and *holy*, for instance /ˈhəʊlɪ/ (*Collins*) or /hə́wlɪj/ (*CUBE*). In some dictionaries, both variants are given for *wholly*, for example /ˈhəʊlli/ and /ˈhəʊli/ (*Lexico*). This suggests that the medial liquid [l] can be repeated or geminated in *wholly*, but not in *holey* or *holy*. The possibility of repetition can be excluded on the basis of the data collected here, since no cases were recorded of the medial [l] being repeated. The *Lexico* online dictionary provides separate audio examples for each transcription variant. These samples differ noticeably in terms of the length of the medial [l], with the liquid in /ˈhəʊlli/ being approximately 0.126s long, and the one in /ˈhəʊli/ just 0.068s long. In the data collected in the present study, there is little difference in the length of the medial [l] in *holy*, *holey* and *wholly*, as can be seen in Table 12 below:

Table 12. Mean length of [l] in *holy*, *holey* and *wholly* across both tasks

	Text task			**Word list task**		
	holy	*holey*	*wholly*	*holy*	*holey*	*wholly*
Mean length of [l] (total)	**0.050s**	**0.076s**	**0.058s**	**0.089s**	**0.084s**	**0.098s**
Mean length of [l] (variant 1)	0.053s	0.052s	0.058s	0.087s	0.092s	0.109s
Mean length of [l] (variant 2)	0.038s	0.088s	0.058s	0.095s	0.083s	0.094s

Table 12 shows the mean lengths of [l] in all utterances of *holy*, *holey* and *wholly*, given in seconds to the nearest third decimal. Unsurprisingly, the mean length of the medial [l] is greater for the words in the word list task, since the speakers pronounce each word more slowly and carefully from a list than as part of a text. In the word list task, the medial [l] is longer in *wholly* than both *holy* and *holey*, but there is only approximately 0.09s between the mean lengths of [l] in *wholly* and the next longest, *holy*. In the text task, *wholly* does not even have the greatest mean length of [l]. Furthermore, there does not appear to be a correlation between the mean length of [l] and the frontness of the preceding diphthong. For instance, with *holy*, the mean length of [l] in all words where /əʊ/ is realised as the centralised variant [əʊ] (0.053s) is greater than with the back variant [ɒʊ] (0.038s) in the text task. However, the opposite is true in the word list task, where instances of *holy* with variant 2 feature a longer [l] than instances with variant 1. It may therefore be tentatively concluded that the length of medial [l] does not affect, or is not affected by, the choice of variant of /əʊ/.

5.3.3. Group 3: *pole*, *polar*, *Poland*, *Polish*

The words *polar*, *Poland* and *Polish* all constitute at least historical complex words with *pole* as their root morphemes. This is somewhat more transparent in *polar*, which is an adjective used to signify a relation to poles, most commonly of the earth. While *Poland* is originally derived from {pole} and {land} (Harper 2019, 'Poland'), it is not typically used in direct connection or relation to poles. As a further derivative of *Poland*, the morphological relation to *pole* in *Polish* is even more opaque. Figure 19 below compares the perceived pronunciation of *pole*, *Poland*, *Polish* and *polar*:

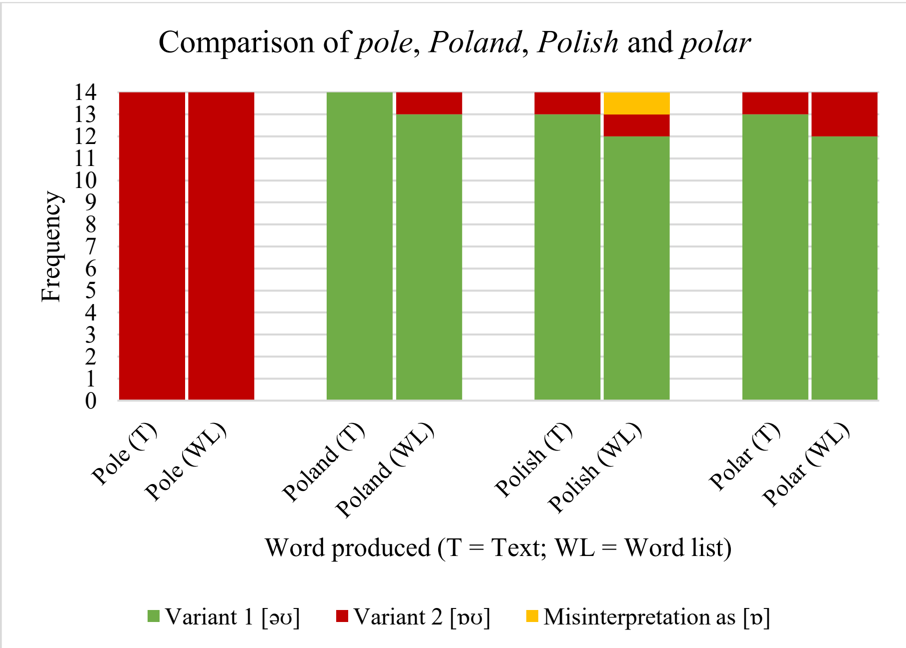

Figure 19. Pronunciation of *pole*, *Poland*, *Polish* and *polar* (auditory analysis)

It is quite clear that *Poland*, *Polish* and – perhaps surprisingly – *polar* are not considered derivatives of *pole* in practice, at least not enough for the back pronunciation of the diphthong in *pole* to be transferred. As has been demonstrated with word pairings such as *bowl* and *bowling*, and *goal* and *goalie*, the back pronunciation of the diphthong /əʊ/ as variant 2 [ɒʊ] in the simplex, monosyllabic words is largely retained in the complex words. Since *polar* clearly derives from *pole*, it was to be expected that the pronunciation of /əʊ/ as variant 2 [ɒʊ] in *pole* be transferred to *polar*, too. However, in all 28 utterances of *polar*, only 3 contained variant 2 [ɒʊ], constituting only 10.7% of all utterances, with the rest all containing variant 1 [əʊ]. This may indicate a possible disassociation of *polar* from *pole*, which could occur for multiple reasons. For instance, *-ar* is not as common a suffix as *-ing*, *-y* or *-ie* such as in the previous disyllabic words, and certainly not as common as the homophonic *-er* (Farlex 2020), which may potentially lead to the reanalysis of *polar* as a simplex word. This being said, the fact that *polar* is pronounced with variant 2 [ɒʊ] three times at all, more than *Poland* and *Polish*, does suggest that the interpretation of the word as a base *pole* with the suffix *-ar* is possible. As regards *Poland* and *Polish*, the pronunciation of the diphthong differs even more starkly from that of the historical root *pole*. Both words are almost exclusively pronounced with variant 1 [əʊ], indicating that their morphological structure is no longer perceived by speakers. The potential reanalysis of {pole}+{land} to {po}+{land} is supported by the fact that the entirety of the word *land* is retained in *Poland*, which is not the case with *pole*. Furthermore, the tendency for some countries to consist of a supposed compound with {land}, for example *Greenland*, *Iceland* and *Thailand*, could lead to the (re)interpretation of {po} as a prefix to {land}. This would account for the divergence in pronunciation between *pole* and *Poland*. The pronunciation of *Polish* is likely transferred directly from *Poland* due to its clear morphological relation.

In one instance, *Polish* was misinterpreted during the word list for the homograph *polish*, pronounced [ˈpɒlɪʃ] and referring to the cleaning substance as opposed to the nationality and language. During the text task, this was not a problem since the participants could rely on the co-text to disambiguate the word, which was also written with a capital letter. However, in the word list, the co-text provides little guidance beyond the inclusion of the word *Poland*, and therefore cannot help with discerning the meaning of the word. Furthermore, since all words were capitalised in the list, there would have been no way of determining whether the cleaning substance *polish* /ˈpɒlɪʃ/ or the nationality *Polish* /ˈpəʊlɪʃ/ was meant. This issue was foreseen in the case of *bow*, which can take the form of /bəʊ/ or /baʊ/ depending on the lexeme, by including it in the phrase *bow tie*. Some participants also noted that the word *row*, which can also take both the form /rəʊ/ and /raʊ/ depending on the lexeme, is also ambiguous. Fortunately, the latter word was not misinterpreted during the word list, and so this ambiguity did not affect the results.

5.3.4. Group 4: Two-word phrases

To test the possible effects of vowel-to-vowel assimilation on the pronunciation of /əʊ/, the phrases *chrome rollers*, *roller coaster* and *roly poly* were analysed. It was found earlier that the diphthong in the word *roller* is primarily pronounced as variant 2 [ɒʊ], with 85.71% of utterances of this word outside of these two-word phrases containing the back variant. It is therefore expected that the majority of utterances of *roller(s)* within the two-word phrases would also contain the back variant. Since every instance of /əʊ/ not followed by [l] or [ɫ] that has been tested so far contains the centralised variant [əʊ], it is to be expected that *chrome* and *coaster* also contain variant 1 [əʊ] since there is no dark [ɫ] to retract the tongue. In the case of *roly poly*, it is not as clear; as *roly* is a derivative of *roll*, it is likely to retain the back variant. However, it is not obvious to the lay speaker whether or not *poly* is a complex or simplex word, or even simply the result of "a varied reduplication of *roll*" (Harper 2019, 'roly-poly'). The latter case suggests that the very presence of *poly* in this compound is to function as a rhyme for *roly*, in which case its diphthong must be the same. These considerations, coupled with the orthographic similarity to *holy*, makes it difficult to predict which variant of /əʊ/ will be more prevalent.

Table 13 below shows the results of the auditory analysis of *chrome rollers*. The results for *roller* as a standalone word are given as a basis for comparison:

Table 13. Pronunciation of *chrome rollers* compared with *roller* (auditory analysis)

	P01		P02		P03		P04		P05		P06		P07		P08		P09		P13		P15		P17		P18		P19	
roller	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1	2
chrome	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
rollers	2	2	2	2	2	2	1	2	2	2	1	1	2	2	1	2	2	2	2	2	2	2	1	1	2	2	2	2

1 Variant 1 [əʊ]   2 Variant 2 [ɒʊ]

As expected, *chrome* is pronounced exclusively with variant 1 [əʊ]. Also unsurprisingly, *rollers* is mainly, but not exclusively, pronounced with variant 2 [ɒʊ]. However, there is a slight increase in the number of instances of variant 1 [əʊ] in *rollers* following *chrome*, with 6 centralised diphthongs as part of the phrase as opposed to just 4 as a singleton word. Nevertheless, this only constitutes 21.43% of utterances of *chrome rollers* where the diphthong in *rollers* is pronounced similarly to *chrome*. Whether this slight increase in central diphthongs in *rollers* could be considered assimilation to the diphthong in *chrome* (assimilator) is debatable.

Table 14 below shows the perceived pronunciation of *roller coaster*. Again, the results for *roller* as a singleton word are provided for the purpose of comparison:

Table 14. Pronunciation of *roller coaster* compared with *roller* (auditory analysis)

	P01		P02		P03		P04		P05		P06		P07		P08		P09		P13		P15		P17		P18		P19	
roller	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1	2
roller	2	2	2	2	2	2	2	1	2	2	2	1	2	2	2	2	2	2	2	2	1	1	1	1	2	2	2	2
coaster	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	2

1 Variant 1 [əʊ]   2 Variant 2 [ɒʊ]

In the case of *roller coaster*, the word expected to be pronounced with variant 1 [əʊ], *coaster*, follows *roller* rather than preceding it. Similarly to *chrome rollers*, there is a minimal increase in the number of centralised diphthongs in *roller* as part of the phrase *roller coaster*, again with 6 instances of variant 1 [əʊ] as opposed to 4 in the lone word. However, *coaster* is not consistent across all utterances as *chrome* is. In three instances, the diphthong in *coaster* is pronounced as variant 2 [ɒʊ], despite the absence of a dark [ɫ] in its base *coast*. This back pronunciation could be caused by vowel-to-vowel assimilation to the diphthong in *roller*, possibly constituting a slip of the tongue. It has been reported that of the five main vowel dimensions (quantity, height, frontness, rounding and nasality), the dimension most prone to mistakes is that of frontness, at least in English (Berg 1998: 198). This observation, along with the fact that the three speakers who produced [ɒʊ] in *coaster* did so in only one of the tasks and not both, is an indication that these were slips rather than a reflection of their general speech behaviour.

In both *chrome rollers* and *roller coaster*, it was the word *roller(s)* that was less consistent, with more deviant variants than *chrome* and *coaster*. This may be caused by the ambiguity of the position of /l/ with respect to the syllables, as explained earlier. However, in both cases, *roller(s)* is more stressed than its counterpart. It has been frequently observed that speech errors within words occur more frequently in stressed syllables than in unstressed syllables (Boom & Laver 1968; Poulisse 1999: 15, among others). This could apply not only to word stress, but also stress on the phrase or sentence level, which would explain why *roller(s)* is more prone to being 'mispronounced' here, although this is mere speculation and would require detailed research. The data presented here also offers little evidence to suggest that the marginal increase in central variants in *roller(s)* is anything more than circumstantial.

Interestingly, there is one instance (P15, word list) where the expected variants are switched in *roller coaster*, namely *roller* contains the centralised variant [əʊ] and *coaster* contains the back variant [ɒʊ]. This supports the possibility that the variation in pronunciation may in part be considered mispronunciation. The two words are not pronounced individually as expected, nor is one diphthong assimilated to the other, rather the diphthongs appear to undergo what is known as a “movement error”, which includes exchanges (Poulisse 1999: 12-13). Exchanges occur most frequently between phonetically similar segments (Poulisse 1999: 16), which is the case here. It appears as though the diphthongs have exchanged the feature of frontness, giving the impression of a complete exchange of segment since frontness is the critical differentiating dimension here. That only one pair of diphthongs has been completely exchanged across all 56 pairs (in *roller coaster* and *chrome rollers*) supports Poulisse’s (1999: 12) observation that exchanges in general are a relatively rare type of mistake. What might speak against this being purely a mistake is that the supposed exchange occurred during the word list task as opposed to the text task, which means it happened when the speaker was concentrating more on each word and speaking more slowly and carefully. What is more, the speaker did not correct their pronunciation or give any verbal or visual indication that they considered their pronunciation erroneous in that instance. While it is possible for slips of the tongue to go unnoticed by speakers, it would be surprising if speakers did not recognise them during such a task. It can therefore only tentatively be assumed that this instance constitutes a segment exchange and hence a mistake.

The results of the auditory analysis of the final two-word phrase, *roly poly*, are shown in Table 15 below, again with the results for *roller* as a single word:

Table 15. Pronunciation of *roly poly* compared with *roller* (auditory analysis)

	P01		P02		P03		P04		P05		P06		P07		P08		P09		P13		P15		P17		P18		P19	
roller	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	1	2	2	1	2
roly	2	2	2	2	2	2	1	1	2	2	2	1	2	2	2	2	2	2	2	2	2	2	1	1	2	1	2	2
poly	2	2	2	2	2	2	1	1	2	2	1	1	1	2	2	2	2	2	1	1	2	1	1	1	2	2	2	2

1 Variant 1 [əʊ]   2 Variant 2 [ɒʊ]

As an independent word or prefix, *poly* is usually pronounced as /ˈpɒli/ and carries its own meaning. However, as part of the compound phrase *roly poly*, *poly* appears to consistute a mere "varied reduplication" of *roly* (Harper 2019, 'roly-poly'). Since *poly* is not discernibly a complex word, it has no reason to be pronounced with the back variant [ɒʊ] any more than *holy*. As *roly* is clearly derived from *roll*, also evident in the semantic relation between *roll* and *roly*, *roly* would be expected to adopt the back pronunciation of *roll*, as is largely the case with *roller*. Table 15 shows a continuation of the pattern that the derivative of *roll*, *roly*, is pronounced with variant 1 [əʊ] six times in total, showing a slight increase from *roller* as a singleton word. *Poly*, on the other hand, is pronounced with variant 2 [ɒʊ] more frequently than expected. In 22 out of 28 cases, *poly* appears to mimic the pronunciation of *roly*, which is in line with the hypothesis that this phrase constitutes a reduplication. The similarity in orthography between *roly* and *poly* supports this assumption. Of the six instances where the pronunciation of *roly* and *poly* differ, *roly* is pronounced with the back [ɒʊ] and *poly* with the central [əʊ], indicating that when the effects of rhyme do not override those of morphological structure, *poly* is interpreted as a simplex word, and *roly* as a complex word. The single instance of *roly* being pronounced with [əʊ] and *poly* with [ɒʊ] may be considered a slip, perhaps even an exchange, due to its infrequency. Again, this apparent mistake was made during the word list task, where speakers were expected to be more focused, so this lack of concord between the two diphthongs and the divergence from the expected pronunciations of both *roly* and *poly* independently is surprising. As regards potential vowel-to-vowel assimilation, it is difficult to ascertain which of the two diphthongs would constitute the assimilator and which the assimilee, since *poly* does not exist as a standalone word with a comparable meaning, and so does not have a standardised pronunciation.[26]

5.3.5. Group 5: *tombola*

The perceived pronunciation of *tombola* is presented in Table 16 below:

Table 16. Perceived pronunciation of *tombola* (texts and word list)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P13	P15	P17	P18	P19
Texts	1	2	2	1	1	1	2	1	1	1	2	1	1	2
List	2	2	2	1	2	1	1	1	1	1	2	1	1	2

1 Variant 1 [əʊ]   2 Variant 2 [ɒʊ]

[26] The results of the auditory analysis in this group are corroborated by the acoustic analysis. For the purposes of space, the graphs showing the formant frequencies are not shown here. All formant frequencies of all recorded words are given in the appendix.

As can be seen in Table 16, there is a slight general preference towards the central variant as opposed to the back variant. This is to be expected, since the segment /l/ is intervocalic and is therefore pronounced as a clear [l]. This being said, 39.3% of all utterances of *tombola* contain variant 2 [ɒʊ], suggesting an alternative perceived morphological structure. Furthermore, while the majority of speakers remain consistent with their pronunciation of *tombola* across the two tasks, two participants produce variant 1 [əʊ] in the text task and variant 2 [ɒʊ] in the word list, and one participant the other way around. This implies that while personal preference may play a role in the pronunciation of the diphthong here, the pronunciation of this word can be considered relatively flexible due to the inconsistency in some participants' pronunciation. There is also no evident connection between the task type and the pronunciation of the diphthong.

Figures 20 and 21 show the formant values of /əʊ/ in *tombola* in the text task and the word list task respectively:

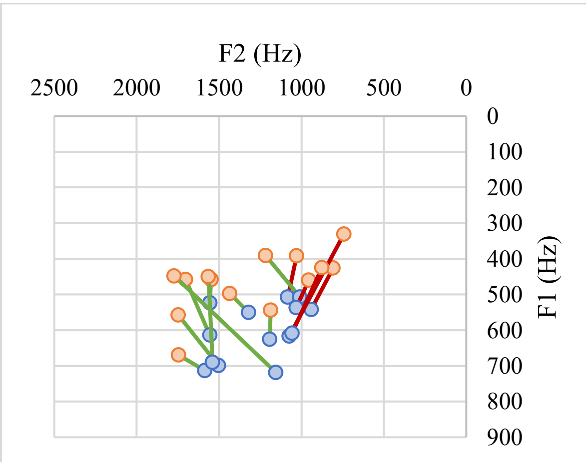

Figure 20. Formant frequencies of /əʊ/ in *tombola* (text task)

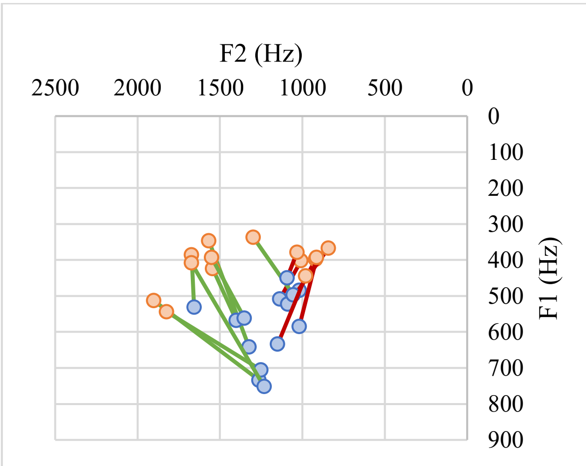

Figure 21. Formant frequencies of /əʊ/ in *tombola* (word list task)

As can be seen in Figures 20 and 21 above, there are no noticeable differences between the two tasks in terms of the general distribution of formant values of the diphthong, especially with regards to the F2. In the word list task, however, it can be seen that there are more diphthongs which exhibit greater distance between the frequencies of their two elements. This can be attributed to the speed at which the participants read the words. In the text task, the word *tombola* forms part of a coherent text and is therefore likely to have been pronounced more quickly, meaning that there is less time for the diphthong to move from one position to another. In the word list task, the words were read in isolation and were generally pronounced more slowly, which means that the tongue has more time to change positions. While this is an interesting observation, it does not give any indication as to why the diphthong is central in some cases and back in others. There appears to be no correlation between the choice of variant and the participants ages, nor their gender, place of birth, or parents' accents.

The variation in the pronunciation of /əʊ/ in the word *tombola* seems to be a reflection of a wider tendency towards incongruity. While it is often transcribed as /tɒmˈbəʊlə/ in dictionaries which only provide phonemic transcriptions (e.g. *Collins*), there are a number of other variants that have been recorded. Aside from the expected difference in the diphthong in General American, namely /tɑmˈboʊlə/, the diphthong is sometimes reduced to an unstressed monophthong, as in /ˈtɑmbələ/, although again this is more typical for American varieties (*Collins*).[27] Furthermore, variants of the diphthong /əʊ/ have been recorded in southern British varieties, such as the triphthong [ʌoʊ], which was uttered by a speaker whose London accent and dialect was "nicely balanced between the extremes of Standard English and Cockney" (Blunt 1980: 46). This word appears to be particularly prone to variation and inconsistency, both on an inter-speaker and an intra-speaker level, as was addressed in the introduction to this thesis with the example of Jamie Morton, Alice Levine and James Cooper.

In today's world, the influence of American pronunciation on British varieties cannot be underestimated, and so the back variant [ɒʊ] in *tombola* could be said to be the result of interference in this respect. However, this does not hold water since the pronunciation of *tombola* with variant 2 [ɒʊ] in this study does not correlate with the pronunciation of other words where /əʊ/ is followed by /l/ and an unstressed syllable, for instance *bowling* or *roller*. Furthermore, *tombola* is far less prevalent in the American lexicon than in British English (Brysbaert et al. 2019: 469), which makes the adoption of a more American pronunciation rather unlikely. This suggests that this pronunciation phenomenon is idiosyncratic for *tombola*, and is rather caused by the individual interpretation of word-internal factors.

As seen in earlier results in this study, the back variant [ɒʊ] is commonly produced in syllables where there is a dark [ɫ] in the coda, especially in monosyllabic words (e.g. *bowl*) and polysyllabic words whereby the diphthong /əʊ/ forms the nucleus of a base morpheme which would contain a dark [ɫ] in the coda when standing as a free morpheme (e.g. *bowling*). In the latter case, a clear tendency towards variant 2 [ɒʊ] can be observed, yet the introduction of a

[27] Interestingly, a hybrid of the commonly British /tɒmˈbəʊlə/ and the more American variant /ˈtɑmbələ/ was uttered by one of the participants who was removed from the current study on the basis of their not being born and raised in England. This speaker pronounced *tombola* as /ˈtɒmbələ/ in both tasks, retaining the British /ɒ/ but adopting the American stress pattern and reduction of the diphthong to the unstressed monophthong /ə/. This mixed form is actually given as a legitimate British English variant in the *Longman Pronunciation Dictionary* (Wells 2008: 829). While the participant spoke with an exclusively British variety, the possible American interference is interesting to note.

second syllable seems to increase the frequency of utterances with variant 1 [əʊ]. Nonetheless, the morphological relation between the complex word and its base is reflected in the adoption of the pronunciation of the diphthong /əʊ/ in most cases, with the diphthong in *bowling* being commonly pronounced in the same way as that in *bowl*. In the *Longman Pronunciation Dictionary*, the liquid /l/ in *tombola* is consistently ascribed to the middle syllable, with the principle transcription being /tɒm.ˈbəʊl.ə/ (Wells 2008: 829).[28] This would imply that the pronunciation of the nucleus of the central syllable /bəʊl/ would constitute variant 2 [ɒʊ] due to what would be a dark [ɫ] in the coda, if this syllable structure were to be based on morphological structure. Historically this appears to be the case, with the etymological source of the word *tombola* being the Italian *tombolare*, 'to turn a somersault' or 'to tumble' (Hoad 2003). Here, the second syllable is followed by the infinitive suffix *-are*, leaving the liquid /l/ as part of the base. While this may account for the analogous syllabification of *tombola*, it is unlikely to be recognised by the layperson, which may account for both variants of /əʊ/. Furthermore, Wells (1990: 80) employs a system of syllabification in which intervocalic consonants are ascribed to the coda of a preceding stressed syllable as opposed to the onset of a following unstressed syllable. This view would account for his analysis of the syllable structure of *tombola* above, but stands in opposition to the perhaps more intuitive maximal onset principle. However, regardless of the precise syllable structure of *tombola*, and even if the etymology of *tombola* is not common knowledge among speakers, the sound structure of *tombola* is similar to that of words with the suffix *-er* in English, namely there is a stressed syllable followed by an unstressed schwa [ə]. Where the base contains a liquid /l/ in the coda, such as *roll*, the pronunciation of the diphthong is often retained when the suffix *-er*, and hence the schwa [ə], is added. This has been confirmed by the findings in this study. It therefore stands to reason that the final syllable in *tombola* may be interpreted by speakers as consisting of a sole schwa, in parallel to many other complex words in English, which would entail that the liquid /l/ belongs to the coda of the central syllable. This may explain the possibility for the diphthong to be pronounced as both [əʊ] and [ɒʊ] by speakers. That this word is so ambiguous in this regard may be the reason as to why there is also some intra-speaker inconsistency in the pronunciation of *tombola*, namely due to conflicting interpretations of morphological and syllabic boundaries, but also due to the repeated exposure to multiple, equally viable variants of the same word.

[28] In the original transcription, syllable boundaries are marked by a space as opposed to a dot.

5.3.6. Group 6: *oh* and *woah*

The final group of words to be analysed consists of the interjections *oh* and *woah*. Their perceived pronunciations can be seen in Figure 22 below:

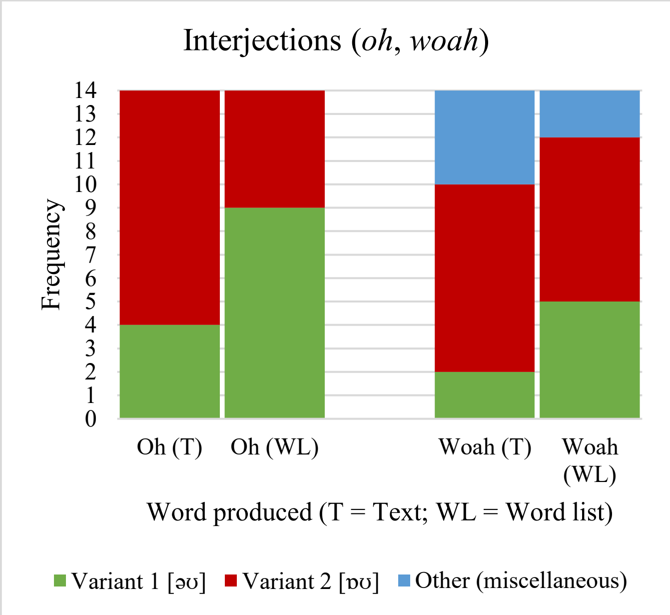

Figure 22. Pronunciation of *oh* and *woah* (auditory analysis)

As Figure 22 shows, the back variant [ɒʊ] appears to be pronounced slightly more frequently than [əʊ] across both interjections. From a purely phonological perspective, this is surprising since there is no post-vocalic dark [ɫ] to trigger a back variant in either word. This corroborates Stange's (2009: 64) claim that interjections do not always adhere to the phonological rules of a given language, and that they may therefore be considered para-linguistic. Furthermore, there is no clear preference for either variant, at least not to a comparable extent as with the lexical words analysed. This is to be expected due to the relative instability of interjections with respect to their pronunciation, as discussed in section 3.3.2. The six instances of 'miscellaneous' pronunciations in *woah* are further indicators of this volatility. For example, pronunciations such as [ˈwɒwɐ] (P15, word list) and [wɒʌa] (P09, text), which cannot be categorised into the two variants [əʊ] and [ɒʊ], are largely unique among the samples in this study, and sometimes even constitute a centring or opening diphthong as opposed to a closing diphthong. In any case, the number of 'miscellaneous' pronunciations decreases in the word list task where the interjections are not presented as such in context, but rather as part of a list among lexical words. This fact may cause speakers to regulate their pronunciation more, although this is purely speculative.

Interestingly, there is a visible increase in variant 1 [əʊ] in the word list task when compared to the text task, across both interjections. This could indicate that [əʊ] is considered the more 'correct' or 'careful' variant of the two, since speakers are generally more focused on their pronunciation during the more formal word list task. The variability of the pronunciation of interjections is likely to be more prominent in an informal context, where interjections are probably more frequent due to their tendency towards being more spontaneous. In a more formal context, it may be the case that speakers exhibit increased adherence to the expected phonological rules of the language, which would account for the more frequent pronunciation of [əʊ].

In spite of these remarks, the sheer variability must remain in the foreground of consideration. As with all the results presented here, a much larger sample size is needed in order to draw solid conclusions and identify significant trends. Furthermore, this analysis of interjections must be used as an indicator for tendencies, and nothing more. This is because interjections are chiefly spontaneous utterances, and so their being read aloud from a text or word list means they are removed from the context in which they are predominantly produced, setting them apart from the rest of the lexical words analysed. Nonetheless, the results of this study are still useful as an initial gauge upon which to build, and can be used as a starting point to draw conclusions on the current state of play in southern British standard usage. In the following section, the results of this study will be discussed with respect to their potential implications for the phonology of /əʊ/.

5.4. Discussion

The results of this empirical study show that while there are clear tendencies with regards to the frontness of /əʊ/, there are very few exclusivities, especially where there is an intervocalic [l] following the diphthong. For this reason, any conclusions that are drawn must be considered with the caveat that there are exceptions. These exceptions may result from the respective speaker's personal preference, although the majority of breaks from the expected or predominant pronunciation were not consistent across both tasks. The low intra-speaker consistency with regards to deviations from general tendencies indicates that these instances rather constitute momentary phenomena, such as mistakes. While it was not asked whether or not the participants felt they had made a mistake in these instances – this would make for an interesting area of further research – there are some indicators that these deviations were indeed mere slips. More significantly, these indicators also suggest that the participants *perceived* these to be mistakes.

It was observed during the recordings that two speakers pronounce a word using one variant, before immediately repeating the same word with the other variant, seemingly correcting what they may perceive to have been a mistake. This can be observed with P08, who during the reading of the word list initially pronounces *chrome* using variant 2 [ɒʊ] ([F1: 614.59Hz, F2: 1072.70Hz] → [F1: 405.72Hz, F2: 851.19Hz]) before breaking off the following word and repeating *chrome* with variant 1 [əʊ] ([F1: 602.38Hz, F2: 1476.55Hz] → [F1: 464.18Hz, F2: 1753.87Hz]). While the F1 frequencies of both repetitions remain similar, the F2 frequencies of the second repetition are much higher and exhibit a clear forward movement from the first element to the second. This can also be seen with P15 during the reading of the texts, where the participant first pronounces the word *toad* using variant 2 [ɒʊ] ([F1: 578.13Hz, F2: 995.33Hz] → [F1: 388.28Hz, F2: 784.96Hz]) before apparently correcting himself and producing variant 1 [əʊ] ([F1: 519.72Hz, F2: 1444.24Hz] → [F1: 277.14Hz, F2: 1547.51Hz]). The difference between the F2 frequencies in both repetitions can also be seen clearly here. Figures 23 and 24 below illustrate these differences, compared with the average for each word:

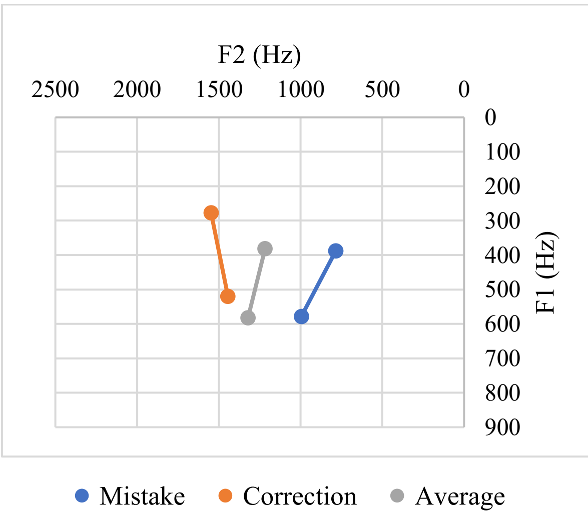

Figure 23. Formant frequencies of /əʊ/ in *toad* (mistake, correction and average)

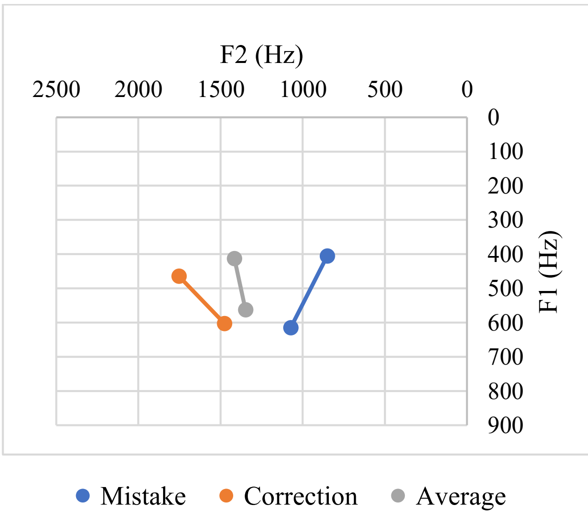

Figure 24. Formant frequencies of /əʊ/ in *chrome* (mistake, correction and average)

Here, the average was derived from all utterances of the words *toad* and *chrome* respectively in this project, excluding the two 'mistakes'. As can be seen above, in both instances the initial utterance of the word shows marked divergence from the average, whereas the second, corrected versions are closer to the average with regards to frontness. These self-corrections may imply that the speakers perceive both variants to be distinct from each other and to have acceptable and unacceptable phonetic environments in which they may occur. In fact, these corrections even overshoot the average, which might suggest that the speakers overcompensate for their perceived mistake by pronouncing the diphthong even more fronted than usual. This awareness of the frontness of this diphthong and the perception of deviation as a mistake may also support the notion that a phonemic split between the back and central variants has occurred.

Apparent correction of 'mistakes' in this regard can also be frequently observed outside of the data presented in this thesis. It was mentioned in section 3.3.2. that Theresa May appears to amend an incorrect pronunciation of the word *oldest* during her speech after the 2017 terrorist attack outside the Palace of Westminster. Here, she pronounces the syllable *old-* with a fronted diphthong approaching variant 1 [əʊ] ([F1: 586.00Hz, F2: 1614.89Hz] ➝ [F1: 444.91Hz, F2: 1147.19Hz]). This is untypical before a dark [ɫ], but is potentially caused by the effect of vowel-to-vowel assimilation with variant 1 [əʊ] in *home*, uttered just a couple of words before. She then produces variant 2 [ɒʊ] in her correction ([F1: 643.31Hz, F2: 1156.16Hz] ➝ [F1: 415.71Hz, F2: 880.07Hz]). Figure 25 below shows the differences between the two utterances:

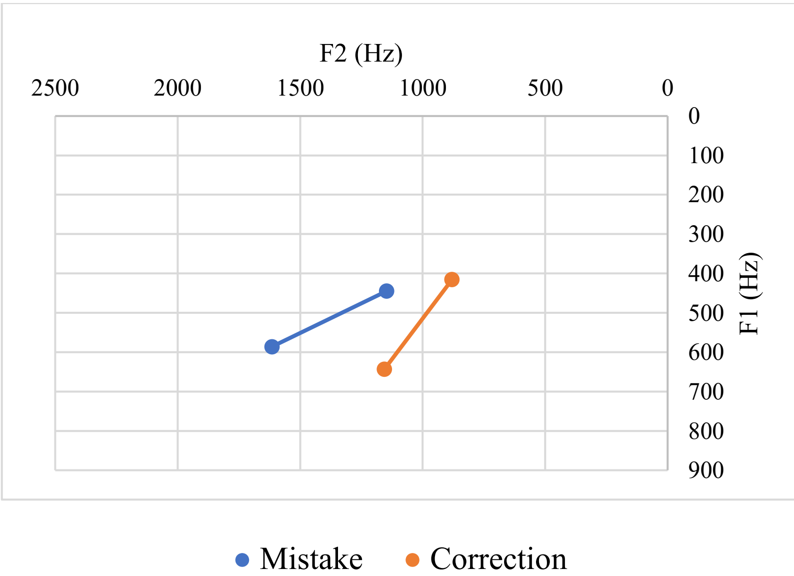

Figure 25. Formant frequencies of /əʊ/ in *old(est)* (mistake and correction, Theresa May)

It can be seen in Figure 25 that May's first utterance of *old* exhibits a stark backwards movement where she initiates the diphthong in a central position, before moving towards a back position in anticipation of the dark [ɫ]. May then restarts the word and begins the diphthong from a more back position. This example, along with the examples taken from the data in this thesis, shows that speakers may associate the two variants strongly enough with either their respective phonetic environment or the respective word as a whole to then perceive deviation as a mistake. This supports the idea that the two variants constitute distinct segments, if not phonemically, then at least cognitively.

With regards to the general tendencies shown in the results of this study, the following can be observed:

- The diphthong /əʊ/ in monosyllabic lexical words with no post-vocalic dark [ɫ] is pronounced as central [əʊ].
- The diphthong /əʊ/ in monosyllabic lexical words with post-vocalic dark [ɫ] is generally pronounced as back [ɒʊ].
- The back pronunciation of /əʊ/ as [ɒʊ] is generally retained in derivative and inflected forms, even though intervocalic /l/ is produced as a clear [l] and not a dark [ɫ]. This retention of the back variant generally depends on the transparency of the morphological structure of the word: if the word clearly consists of a base (with [ɒʊ]) and a suffix, the pronunciation of /əʊ/ as [ɒʊ] tends to be retained. If this structure is rather opaque or no longer applicable, /əʊ/ tends to be more readily realised as central [əʊ].
- The effects of inter-word vowel-to-vowel assimilation across two-word phrases are minimal, although attested in each of the three tested phrases.
- Interjections appear to be exempt from these tendencies, likely due to their supposed status as para-linguistic units.
- The approximate F2 threshold for perceived centrality/backness of /əʊ/ is 1100-1200Hz. Where the F2 is higher than this threshold, the diphthong is generally perceived as central [əʊ]; where it is lower, the diphthong tends to be perceived as back [ɒʊ] (with individual exceptions, see *wholly*, for instance).

The question now remains as to whether or not there is evidence to suggest that [əʊ] and [ɒʊ] belong to distinct phonemic categories. On the one hand, the predominant pronunciation of /əʊ/ in *holy* as central [əʊ], but in *holey* and *wholly* as back [ɒʊ], indicates the emergence of a minimal pair. Even when *wholly* is discounted due to its being potentially distinct from *holy* and *holey* on the count of its geminated /l/ (which was only corroborated in this study in the word list task), *holy* and *holey* would still constitute a minimal pair: /ˈhəʊli/ and /ˈhɒʊli/ respectively. The fact that both *holy* and *holey* belong to the same word class means that they are a high-quality minimal pair, since minimal pairs across word classes are often considered "pseudo minimal pair[s]" (Anyanwu 2008: 148). Despite the apparent current absence of any other minimal pairs involving [əʊ] and [ɒʊ] at this time, this one example should be sufficient to conclude that [əʊ] and [ɒʊ] are separate phonemes. As Anyanwu (2008: 146) asserts, "[a] minimal pair provides concrete evidence of a phonemic contrast".

What may speak against the proposition that [əʊ] and [ɒʊ] belong to separate phonemes is their apparent interchangeability. In many instances recorded in this study, words were not pronounced exclusively with one variant, but rather exhibited variation. Despite the production of what may potentially be a distinct phoneme, no difference in meaning occurred as a result. For instance, the pronunciation of *roller* with [əʊ] as opposed to [ɒʊ] does not create a new lexeme, but rather constitutes a mere variation of pronunciation. The observation that there appears to be no clear preferred pronunciation of /əʊ/ in *tombola*, both on an inter-speaker and an intra-speaker level, also suggests that [əʊ] and [ɒʊ] can be considered allophones which undergo free variation, at least in specific contexts. This argument, however, is not satisfactory as a rebuttal to the claim that [əʊ] and [ɒʊ] belong to separate categories. It is possible for two segments to function as allophones, but simultaneously belong to distinct phonemes, as seen with the voices and voiceless alveolar fricatives [s] and [z] in German. On the one hand, they may undergo free variation in multiple positions, such as word initially. For example, *Sitz* 'seat' may be pronounced as [zɪts] or [sɪts] with no difference in meaning. At the same time, the words *reisen* 'travel' and *reißen* 'rip' differ only in this one segment: /ˈraɪzn̩/ and /ˈraɪsn̩/ respectively. This means that while two segments may be used interchangeably in certain contexts, they may form minimal pairs and therefore constitute a phonemic contrast in other contexts. In English, something similar can be observed with the vocalisation of /l/. As discussed in section 3, post-vocalic /l/ can be realised as a dark [ɫ] or be vocalised to [ʊ], with no change in meaning arising as a result. Since both [ɫ] and [ʊ] are similar from an articulatory perspective, they can be considered allophones of /l/ in this regard. Still, nobody will dispute that /l/ and /ʊ/ are well-established distinct phonemes. This may be the case with [əʊ] and [ɒʊ].

Interestingly, one participant (P18, word list) pronounces *holey* with [ɒʊ] before immediately 'correcting' this to [əʊ], possibly indicating that this speaker perceives the back variant to be a mistake. What makes this particularly notable is that *holey* is otherwise largely recorded as containing the back variant [ɒʊ], especially in the word list task. Furthermore, it constitutes one half of the minimal pair *holy*-*holey*, which forms the main crux of the argument that [əʊ] and [ɒʊ] belong to different phonemes. This one speaker appears to consider this back pronunciation to be a mistake, or at the very least, seems unsure about the correct pronunciation and doubts their initial attempt. This could suggest that while a phonemic split may have occurred, or be in the process of occurring, it is perhaps not yet at the stage of widespread acknowledgement and acceptance among laypeople.

The assumption that [əʊ] and [ɒʊ] are mere allophones, on the other hand, would require a phonetic basis justifying the conditions under which they are produced. On the assumption that the central [əʊ] is the underlying form of /əʊ/, the following rule may be conceived on the basis of the theoretical considerations discussed in the earlier sections of this thesis:

/əʊ/ → [ɒʊ] / _[ɫ]

However, it has been shown that [ɒʊ] can occur independently of dark [ɫ]. Firstly, this rule appears to be overridden by morphological conditions. For instance, if the base morpheme contains a post-vocalic dark [ɫ] and /əʊ/ is hence pronounced as [ɒʊ], this enables /əʊ/ to be pronounced as [ɒʊ] in this base's derivative forms, even when no dark [ɫ] is present. Secondly, as shown in *tombola*, there need not be a dark [ɫ] or an easily discernible base morpheme for the back variant [ɒʊ] to be possible. Furthermore, if *holy*-*holey* is to be taken as a minimal pair, it shows that the above rule cannot be applied universally. It is clear that the pronunciation of /əʊ/ is not dependent on the assimilation to a dark [ɫ], and therefore it may be tentatively concluded that /əʊ/ and /ɒʊ/ are separate phonemes. It is expected that, over time, more minimal pairs will develop as /əʊ/ and /ɒʊ/ become more distinct.

With regards to the methodology employed in this study, the combined approach of auditory and acoustic analysis has proven to be highly beneficial. On the one hand, auditory analysis is perhaps more relevant in terms of practical use; for instance, a diphthong that is central from an acoustic perspective, but *perceived* as a back diphthong, might as well be a back diphthong in practice. On the other hand, formant analysis has shown a number of advantages. Firstly, it has allowed for the visualisation of the trajectory of individual diphthongs for the purpose of comparison, and also in order to show the extent of overlap between what is perceived to be two distinct categories. The formant analysis has demonstrated that there is no neat and clear division between [əʊ] and [ɒʊ] from an acoustic perspective. Secondly, the acoustic analysis has informed decisions in cases of doubt. For example, the word *toll*, as spoken by P05, initially sounded as though it contained a monophthong during the text task. However, by studying the spectrogram and consulting the formant frequencies, it could be seen that it clearly contained a diphthong, but that this diphthong was difficult to perceive due to the speed at which the speaker had pronounced it and hence the reduced length of the diphthong. Thirdly, by taking the formants into account, the results of the auditory analysis could be supported by more objective data, with consideration given to the drawbacks of conducting formant analysis.

It must be kept in mind when using the data presented here to draw conclusions that there are a number of additional factors which may have affected the pronunciation of /əʊ/. For instance, during the text task, the diphthong could have been influenced by sounds in neighbouring words not specifically selected for this study, which may especially be the case in the monosyllabic words with an empty coda. To give one example, the word *toe* was followed by *into* in the text task, which in many cases caused the participants to insert a linking [w] between the words due to the adjacent vowels. Furthermore, where word-final /l/ would be pronounced as a dark [ɫ] in isolated words in the word list, it may be realised as a clear [l] in connected speech when followed by a vowel in the next word. For example, the word *bowl* was directly followed by *in the process* in the text task, meaning that the /l/ was intervocalic and therefore clear during continuous speech. This latter example did not cause *bowl* to be pronounced with a central [əʊ] in this study, rather the back variant [ɒʊ] was retained nonetheless, which further speaks for the independence of the frontness of /əʊ/ from the presence or absence of a dark [ɫ]. In any case, it is important to acknowledge that differences between the text task and the word list task are in all likelihood attributable to more than a mere change in the formality of the context and the speakers' level of concentration. In future research, it would be beneficial to regulate the phonetic environment of the tested words even more, taking into account the co-text beyond the word itself. Such studies are likely to be purely phonetic in nature, and it is not expected that questions concerning phonology of /əʊ/ and /ɒʊ/ will be affected in any significant way by such undertakings.

6. Conclusion

The aim of this thesis was to contribute to the growing amount of research into the GOAT-GOAL distinction in SSBE, with the particular view to providing data to support or refute the notion that this split is phonemic. Before this was possible, it was necessary to determine the speech community to whom any conclusions drawn here would apply. In this context, the concept of 'standard' was discussed and various views regarding the standard(s) for British English were considered. It was concluded that the much-used term *Received Pronunciation* (RP) was no longer appropriate since it denotes a variety that nowadays is losing prevalence and becoming increasingly influenced by regional accents and dialects, particularly those from the south-eastern regions of English, such as London. The term *Standard Southern British English* (SSBE) is considered a suitable replacement since it acknowledges that the British standard cannot truly be applicable across the entirety of the language area for which it stands. It was furthermore discussed that there is a distinction between a codified standard and standard usage, the latter of which applies to oral communication and can differ from norms established in codices. Especially in the study of pronunciation, it is certainly more beneficial and realistic to analyse the standard usage of a variety when considering the current state of play.

In a next step, the diphthong /əʊ/ was investigated with regards to its diachronic centralisation and the factors involved in its articulation as a central or back diphthong. It was found that it shares many similarities with the monophthong /u:/, including its general movement from a back to a central vowel over the course of the 20th century, as well as the role of the post-vocalic dark [ɫ] in its pronunciation as a back vowel. It was also shown that there is significant variation as regards both the starting point and the endpoint of the diphthong, brought about by a multitude of factors such as geography and class. From a phonetic perspective, vowel assimilation was discussed and determined to be a key aspect involved in the pronunciation of /əʊ/ as central or back. In this context, the dark [ɫ] was investigated as a major assimilator, even in spite of – or perhaps at times due to – its frequent vocalisation. Other factors such as vowel-to-vowel assimilation, slips of the tongue, special cases and personal preference were also addressed and considered when analysing the results of the empirical study.

Before the study itself was presented, a review of the main conventions regarding phonemic and phonetic transcription was undertaken, with particular focus on the vowel and diphthong inventory, and of the diphthong /əʊ/. It was found that most codices for British English use /əʊ/ as the phonemic symbol for the GOAT sound, with some exceptions due to independent systems. The principles for selecting symbols for phonemic notation proposed by Gimson (1994 [1962]: 48), Windsor Lewis (2003: 145) and the IPA itself (1999; see section 4.1 of this paper) were considered, before /əʊ/ and /ɒʊ/ were selected to denote the GOAT and GOAL phonemes respectively, should it be found that the split is indeed phonemic. This symbol selection is also in line with Wells' (1982a: 147; 1982b: 213; 2008) use of this notation. Methods of vowel analysis, particularly acoustic analysis, were then introduced and critiqued in this section. Here it was decided that formant analysis is a useful tool to ascertain the approximate tongue position at the point of articulation of vowels. It was also acknowledged, however, that this methodology has significant drawbacks concerning its reliability and validity, and should be used first and foremost as a guide and in cases of comparison. It is for this reason that simply plotting the F1 of a vowel against its F2 is sufficient for the purposes of this study. The conclusion of this discussion was that a combined approach of auditory and acoustic analysis would provide the most reliable results.

In the empirical study, it was found that monosyllabic words tend to exhibit a more stable and consistent pronunciation of /əʊ/ as either back or central where a post-vocalic dark [ɫ] is present or absent respectively. The data also showed that the back variant was possible where no dark [ɫ] was produced, mainly in cases of morphologically complex words where the base morpheme contains a dark [ɫ]. In these instances, the base morphemes as simplex words are pronounced with the back variant [ɒʊ], as shown in the first part of the study. This back pronunciation then appears to be retained when suffixes are attached and the liquid /l/ becomes intervocalic. This was only the case where the morphological structure was relatively transparent; where it was not as clear that the words are derived forms, the central variant was produced more frequently, as seen with *polar*, *Poland* and *Polish*. Furthermore, it was found that interjections do not show the same tendencies as lexical words, nor is there any clear preference for the back or central variants. It was noted, however, that in the absence of a significantly predominant variant, the central [əʊ] was produced more frequently during more careful and focused speech than during the text task. This possibly implies that [əʊ] is considered generally more ‘correct’ than [ɒʊ], although more evidence is needed to back up this claim. Vowel-to-vowel assimilation was shown not to have a particularly notable effect on the pronunciation of /əʊ/, although there was a very slight increase in deviation from expected pronunciation when words were pronounced as part of two-word phrases. The pronunciation of *tombola* was shown to be especially irregular, and possibly owing to the opaque morphological structure of the word, it was pronounced with both [əʊ] and [ɒʊ], with some instances of intra-speaker inconsistency across the two tasks. On the basis of these findings, the four hypotheses set out in section 5.2. (see page 54) can be accepted, albeit in the case of hypothesis 4 perhaps with reservation since vowel-to-vowel assimilation, while it did occur, was minimal.

It has been proposed that /əʊ/ and /ɒʊ/ now constitute separate phonemic categories, this being for multiple reasons. Firstly, as shown in this study, a minimal pair differing in only these diphthongs has emerged: *holy* and *holey*. Since only a single minimal pair is sufficient for distinct phonemic categories to be established, and since this pair even constitutes a high-quality minimal pair in line with Anyanwu (2008: 148), it can be concluded that two categories now exist. Secondly, this conclusion is supported by the fact that speakers have been observed correcting their pronunciation of /əʊ/ and /ɒʊ/ where they perceive their initial utterances to be inaccurate. This behaviour suggests that /əʊ/ and /ɒʊ/ are now being stored as separate categories where mispronunciation leads to self-correction. However, the fact that the pronunciation of *holey* with [ɒʊ] was 'corrected' to [əʊ], thus neutralising the minimal pair *holy*-*holey*, suggests that the phonemic split may not yet be entirely cemented and acknowledged by all speakers. Instead, it could still be in the process of becoming established, which suggests that the introduction of a new phonemic symbol may at this point be somewhat premature. It is therefore recommended that this topic be observed carefully over the coming years and decades, and further studies such as these conducted on a wider scale. Additionally, such further research could be complemented by studies on the perception of [əʊ] and [ɒʊ] and their categorisation by listeners as allophones or distinct phonemes, or as well-formed or ill-formed.

Due to the limited scope of this thesis, there are a number of areas which could not be investigated but may prove to be relevant to the present discussion. For instance, it was not possible to test any potential effects of prevocalic consonants of the pronunciation of /əʊ/, nor could it be investigated whether the diphthong is pronounced differently when the coda is filled by a velar consonant as opposed to a bilabial or alveolar consonant. The precise effects of /l/-vocalisation could not be explored, and so future studies could investigate possible differences in the articulation of /əʊ/ depending on whether or not post-vocalic /l/ is pronounced as a dark [ɫ] or vocalised to [ʊ]. Further dimensions such as openness could also be studied in future projects, since frontness is certainly not the only aspect that exhibits variation with regard to this diphthong. Such areas could be examined in detail and with a greater sample size in future research, with a view to achieving a more comprehensive understanding of the factors involved in the pronunciation of /əʊ/. The increased volume and range of data would allow for more solid conclusions to be drawn, and by this time, it is predicted that the distinction between /əʊ/ and /ɒʊ/ will be more prominent.

The question may be asked as to the purpose of introducing a new phonemic symbol, and if such a symbol should be used outside of specialist fields. Such a significant change in the phoneme inventory must be justified as being crucial, and by no means superficial or superfluous. There are plenty of arguments against the general adoption of a new category, the most prominent being the upholding of convention. As Windsor Lewis (2003: 145) insists, "any changes of notation that can be seen as not essential positive improvements must surely be considered highly undesirable in that they damage an existing very beneficial consensus".

He goes on to argue that "[i]n the interests of the overwhelming majority of dictionary users the helpful consensus we have after so many years fortunately achieved is best preserved by all" (Windsor Lewis 2003: 150). While it is certainly true that an agreed convention ought to be adhered to for the sake of widespread understanding, it cannot be denied that language is constantly changing. Windsor Lewis' arguments pertain mainly to the adoption of new symbols for existing sounds and categories as opposed to the splitting of phonemes and the introduction of new symbols for these phonemes. It has been acknowledged for decades that the GOAT-GOAL distinction may be phonemic, and there is evidence presented in this thesis that supports this idea. It may take more time before /əʊ/ and /ɒʊ/ are truly contrastive, not just in terms of minimal pairs, but also in the minds of the majority of speakers. It would be highly beneficial to continue the debate and the study of this split, and it is hoped that one day the IPA council will hold a vote as to the adoption of /ɒʊ/ as an official phonemic symbol in the (British) English phoneme inventory. Admittedly, language-specific phonemes are not specified on the IPA chart of symbols; yet the IPA is still considered an authority concerning transcription, with the phoneme inventories for many languages being listed in their handbook, including the diphthongs of English (IPA 1999: 42-43). Even though additions to the IPA bank of symbols have been rejected in the past, such attempts to introduce new symbols have largely been unsuccessful due to the lack of need for different notation.[29] This is not the case with /əʊ/ and /ɒʊ/; should these two categories continue to become more contrastive, it would be negligent to ignore the need for revision. The introduction of /ɒʊ/ would not be a mere cosmetic change, but a necessary reflection of the contemporary developments in the British English phoneme inventory.

[29] For an example of the rejection of a new symbol by the IPA, see Keating (2012). The IPA council ultimately voted 17 to 12 (1 abstention) against the adoption of [ᴀ] as a symbol for a central open vowel.

7. References

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8. Appendix

8.1. Auditory analysis results of all words (texts)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P13	P15	P17	P18	P19
boat	1	1	1	1	1	1	1	1	1	1	1	1	1	1
bold	2	2	2	2	2	2	2	2	2	2	2	2	2	2
bow	1	1	1	1	1	1	1	1	1	1	1	1	1	1
bowl	2	2	2	2	2	2	2	2	2	2	2	2	2	2
bowling	2	2	2	2	2	1	2	2	2	2	2	1	2	2
chrome (1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
rollers (2)	2	2	2	1	2	1	2	1	2	2	2	1	2	2
go	1	1	1	1	1	1	1	1	1	1	1	1	1	1
goal	2	2	2	2	2	2	2	2	2	2	2	2	2	2
goalie	2	2	2	1	2	1	2	2	2	2	2	1	2	2
goat	1	1	1	1	1	1	1	1	1	1	1	1	1	1
gold	2	2	2	2	2	2	2	2	2	2	2	2	2	2
hoe	1	1	1	1	1	1	1	1	1	1	1	1	1	1
hold	2	2	2	2	2	2	2	2	2	2	2	2	2	2
hole	2	2	2	2	2	2	2	2	2	2	2	2	2	2
holey	2	2	2	1	1	1	2	2	2	1	2	1	2	2
holy	1	1	1	1	1	1	1	2	2	1	1	1	1	2
hope	1	1	1	1	1	1	1	1	1	1	1	1	1	1
oh	2	2	2	1	1	1	2	2	2	2	1	2	2	2
Poland	1	1	1	1	1	1	1	1	1	1	1	1	1	1
polar	1	1	1	1	1	1	1	2	1	1	1	1	1	1
pole	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Polish	1	1	1	1	1	1	1	2	1	1	1	1	1	1
roll	2	2	2	2	2	2	2	2	2	2	2	2	2	2
rolled	2	2	2	2	2	2	2	2	2	2	2	2	2	2
roller	2	2	2	2	2	1	2	2	2	2	2	2	2	1
roller (1)	2	2	2	2	2	2	2	2	2	2	1	1	2	2
coaster (2)	1	1	2	1	1	1	1	1	1	1	1	1	1	1
roly (1)	2	2	2	1	2	2	2	2	2	2	2	1	2	2
poly (2)	2	2	2	1	2	1	1	2	2	1	2	1	2	2
row	1	1	1	1	1	1	1	1	1	1	1	1	1	1
toad	1	1	1	1	1	1	1	1	1	1	1	1	1	1
toe	1	1	1	1	1	1	1	1	1	1	1	1	1	1
told	2	2	2	2	2	2	2	2	2	2	2	2	2	2
toll	2	2	3	2	2	2	2	2	2	2	2	2	3	2
tolling	3	2	2	2	3	1	2	3	2	2	2	2	3	2
tombola	1	2	2	1	1	1	2	1	1	1	2	1	1	2
whole	2	2	2	2	2	2	2	2	2	2	2	2	2	2
wholly	2	1	2	1	1	1	2	2	2	2	2	1	2	2
woah	2	2	2	2	4	1	2	4	4	1	2	2	2	4
wrote	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Key: 1 Variant 1 [əʊ] 2 Variant 2 [ɒʊ] 3 Pronunciation as [ɒ] 4 Misc. pronunciation

8.2. Auditory analysis results of all words (word list)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P13	P15	P17	P18	P19
boat	1	1	1	1	1	1	1	1	1	1	1	1	1	1
bold	2	2	2	2	2	2	2	2	2	2	2	2	2	2
bow	1	1	1	1	1	1	1	1	1	1	1	1	1	1
bowl	2	2	2	2	2	2	2	2	2	2	2	2	2	2
bowling	2	2	2	2	2	1	2	2	2	2	2	1	2	2
chrome (1)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
rollers (2)	2	2	2	2	2	1	2	2	2	2	2	1	2	2
go	1	1	1	1	1	1	1	1	1	1	1	1	1	1
goal	2	2	2	2	2	1	2	2	2	2	2	2	2	2
goalie	2	2	2	1	2	1	2	2	2	2	2	1	2	2
goat	1	1	1	1	1	1	1	1	1	1	1	1	1	1
gold	2	2	2	2	2	2	2	2	2	2	2	2	2	2
hoe	1	1	1	1	1	1	1	1	1	1	1	1	1	1
hold	2	2	2	2	2	2	2	2	2	2	2	2	2	2
hole	2	2	2	2	2	2	2	2	2	2	2	2	2	2
holey	2	2	2	2	2	1	2	2	2	2	2	1	2	2
holy	1	2	1	1	1	1	1	2	1	1	1	1	1	2
hope	1	1	1	1	1	1	1	1	1	1	1	1	1	1
oh	1	2	1	1	1	1	2	1	2	2	1	1	2	1
Poland	1	1	1	1	1	1	1	1	1	2	1	1	1	1
polar	1	2	1	1	1	1	1	1	1	2	1	1	1	1
pole	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Polish	1	2	1	1	1	1	1	3	1	1	1	1	1	1
roll	2	2	2	2	2	2	2	2	2	2	2	2	2	2
rolled	2	2	2	2	2	2	2	2	2	2	2	2	2	2
roller	2	2	2	2	2	1	2	2	2	2	2	1	2	2
roller (1)	2	2	2	1	2	1	2	2	2	2	1	1	2	2
coaster (2)	1	1	1	1	1	1	1	1	1	1	2	1	1	2
roly (1)	2	2	2	1	2	1	2	2	2	2	2	1	1	2
poly (2)	2	2	2	1	2	1	2	2	2	1	1	1	2	2
row	1	1	1	1	1	1	1	1	1	1	1	1	1	1
toad	1	1	1	1	1	1	1	1	1	1	1	1	1	1
toe	1	1	1	1	1	1	1	1	1	1	1	1	1	1
told	2	2	2	2	2	2	2	2	2	2	2	2	2	2
toll	2	2	3	2	3	2	2	2	2	2	2	2	2	2
tolling	3	2	3	2	3	1	2	3	2	2	2	1	3	2
tombola	2	2	2	1	2	1	1	1	1	1	2	1	1	2
whole	2	2	2	2	2	2	2	2	2	2	2	2	2	2
wholly	2	2	2	1	2	1	2	2	2	2	2	1	2	2
woah	2	1	2	1	1	1	2	4	2	1	4	2	2	2
wrote	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Key: 1 Variant 1 [əʊ] 2 Variant 2 [ɒʊ] 3 Pronunciation as [ɒ] 4 Misc. pronunciation

8.3. Formant values of all tested words (texts)

			P01		P02		P03		P04		P05	
			Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2
	boat	F1	554.36	388.65	542.46	371.93	549.77	410.82	457.99	357.78	563.40	396.20
		F2	1481.88	1985.43	1286.90	1505.23	1317.75	1525.28	1071.82	1345.34	1162.30	1320.61
	bold	F1	583.55	412.16	501.12	367.75	527.41	329.04	482.78	346.61	424.55	377.77
		F2	1053.33	719.63	975.64	744.67	990.02	636.11	924.91	708.55	896.49	698.05
	bow	F1	582.70	444.82	531.52	180.58	587.52	356.98	498.08	357.91	504.51	395.78
		F2	1374.56	1773.28	1218.83	1499.17	1348.95	1795.91	1049.69	1279.61	1107.48	1145.58
	bowl	F1	569.77	377.53	501.51	432.52	533.51	405.80	477.56	366.20	591.97	412.55
		F2	1054.35	882.87	966.78	873.92	1038.48	697.28	861.89	715.13	920.69	692.80
	bowling	F1	583.43	442.16	492.30	398.93	557.93	440.91	494.57	390.78	592.19	399.80
		F2	1054.93	1263.32	987.00	827.48	1116.43	817.17	919.11	705.24	924.13	752.68
phrase	chrome (1)	F1	529.96	369.91	610.91	467.16	546.16	372.03	447.52	394.09	491.57	397.68
		F2	1509.63	1555.50	1305.82	1370.24	1331.49	1564.61	1096.14	1221.43	1070.93	1119.69
	rollers (2)	F1	528.06	403.69	550.19	415.98	533.62	378.27	421.78	351.12	436.32	428.53
		F2	957.60	1279.47	1042.80	992.45	1154.83	620.21	1128.42	1223.34	1054.08	918.43
	go	F1	516.69	429.10	438.44	190.07	438.10	381.11	432.68	344.09	454.86	303.20
		F2	1784.70	1819.53	1485.59	1413.58	1662.23	1717.58	1295.21	1400.14	1365.23	1432.10
	goal	F1	482.77	465.72	497.50	254.88	469.84	407.35	452.35	376.56	529.60	386.36
		F2	1465.31	1228.76	1184.39	982.56	1115.20	675.21	1048.30	768.17	928.46	765.14
	goalie	F1	482.32	432.53	464.41	353.23	498.46	419.83	401.19	360.07	474.20	365.83
		F2	1639.23	797.64	1202.20	964.55	1130.38	770.28	1360.25	1218.55	951.24	733.13
	goat	F1	544.53	489.11	500.06	342.42	557.64	399.05	441.12	370.75	529.58	348.57
		F2	1672.26	1830.77	1519.42	1483.56	2009.95	1760.15	1379.65	1348.30	1453.43	1425.20
	gold	F1	545.21	482.26	431.71	309.69	571.45	421.64	462.93	384.96	479.65	382.27
		F2	1336.66	987.54	1140.57	868.94	1112.26	692.60	908.26	683.05	1028.88	873.44
	hoe	F1	700.07	409.60	532.54	235.98	705.52	345.65	486.39	322.98	744.26	399.18
		F2	1362.00	1510.24	1189.37	1134.84	1548.90	1631.26	1050.57	1123.66	1132.76	1071.61
	hold	F1	501.84	381.51	468.80	366.80	441.46	379.90	464.58	404.53	562.19	438.98
		F2	1001.68	1376.74	977.71	912.03	803.05	829.33	771.80	747.11	977.94	811.33
	hole	F1	605.04	448.61	600.14	318.87	644.52	365.01	497.09	399.68	473.57	383.50
		F2	1145.53	797.45	999.74	900.72	772.89	549.33	858.77	724.95	929.42	785.11
	holey	F1	691.99	486.83	635.05	310.96	612.98	408.48	523.99	347.60	654.15	320.55
		F2	1187.23	982.43	1032.07	841.98	953.00	741.14	1211.38	1367.80	1192.57	1138.09
	holy	F1	536.20	402.77	510.22	341.39	666.68	394.21	442.03	305.65	541.37	347.80
		F2	1803.85	1698.96	1080.97	1365.52	1416.83	1234.25	1225.30	1444.92	1148.15	1184.18
	hope	F1	573.18	393.41	519.05	430.84	765.57	464.45	548.48	347.41	590.26	342.21
		F2	1766.96	1711.55	1335.03	1367.27	1281.30	1446.95	1156.19	1275.33	1183.92	1187.39
	oh	F1	607.02	337.14	660.67	197.91	571.29	440.61	464.41	315.17	705.06	484.21
		F2	1174.68	1045.81	1129.58	940.79	1129.45	766.33	1246.45	1695.64	1168.51	1210.93
	Poland	F1	711.51	419.45	565.73	412.69	783.04	425.52	565.41	344.87	620.25	334.11
		F2	1638.05	1841.79	1188.47	1227.07	1284.07	1418.82	1078.13	1303.66	1111.36	1112.20
	polar	F1	484.73	385.62	473.67	311.15	599.31	415.44	503.99	375.66	555.83	371.67
		F2	1532.31	1636.71	1162.35	1272.68	1479.50	1611.86	1192.38	1284.72	1266.45	1194.01
	pole	F1	619.37	516.34	531.74	419.37	571.58	426.21	478.90	384.58	571.71	418.90
		F2	1137.17	901.90	1042.87	883.29	932.45	646.96	942.14	680.53	887.18	733.85
	Polish	F1	603.84	460.83	557.66	322.65	652.62	377.26	470.18	359.33	650.93	460.01
		F2	1848.82	2030.84	1180.97	1370.32	1373.06	1565.16	1177.14	1287.44	1221.88	1242.85
	roll	F1	463.04	411.13	558.70	470.43	489.76	351.52	429.48	367.65	424.06	339.00
		F2	1402.21	1250.81	1082.06	919.67	1180.06	781.85	865.76	789.80	885.22	741.89
	rolled	F1	402.57	443.61	507.40	256.19	583.73	445.15	453.92	387.05	415.19	402.56
		F2	1216.97	1169.63	1156.70	991.24	1119.10	1010.01	938.92	814.61	987.60	861.25
	roller	F1	424.21	415.41	512.86	451.48	518.88	437.25	453.44	430.20	557.09	424.68
		F2	1195.85	1135.16	1119.98	1012.69	1128.66	890.82	927.91	787.08	1045.50	822.71
phrase	roller (1)	F1	434.89	432.50	445.05	331.33	580.76	444.84	442.22	382.67	418.38	392.15
		F2	1115.93	1076.47	1082.36	942.98	1209.71	1032.53	891.91	754.82	960.06	791.61
	coaster (2)	F1	491.67	363.55	455.57	312.50	527.47	457.70	388.04	309.78	476.55	369.66
		F2	1824.25	2082.67	1393.44	1595.46	1248.21	1186.79	1257.53	1416.52	1222.41	1482.08
phrase	roly (1)	F1	386.29	348.71	528.55	420.78	530.44	417.61	426.48	332.60	443.20	421.27
		F2	1141.30	1363.67	1121.59	971.37	1078.37	847.58	1135.19	1390.85	1069.14	836.74
	poly (2)	F1	555.21	430.68	490.58	430.38	510.75	463.40	487.89	384.31	433.71	369.74
		F2	1153.13	1379.53	1065.46	1007.35	999.67	937.41	1190.69	1327.47	950.47	741.57
	row	F1	513.01	438.50	484.80	384.85	583.43	369.37	454.79	333.57	536.19	342.06
		F2	1504.38	1581.75	1218.83	1329.78	1442.45	1338.03	1133.59	1194.80	1138.30	1165.00
	toad	F1	689.45	364.69	525.55	322.46	562.29	338.61	437.35	321.52	649.34	402.68
		F2	1730.89	1710.08	1308.42	1640.99	1695.96	1529.98	1352.63	1556.34	1442.62	1380.74
	toe	F1	569.23	464.50	549.63	387.96	596.58	425.82	426.23	420.45	579.20	386.80
		F2	1671.51	2012.74	1384.40	1363.70	1614.47	1657.48	1176.31	1209.05	1377.63	1371.93
	told	F1	449.22	360.36	470.88	424.12	584.36	365.71	508.65	385.89	646.87	425.89
		F2	1266.07	1582.77	1123.75	924.38	1292.03	839.78	1146.37	789.33	1133.18	832.03
	toll	F1	665.70	508.35	544.42	416.39	572.99	518.25	440.12	409.56	549.14	496.68
		F2	1258.19	1183.25	1001.50	827.92	864.37	953.98	1032.25	800.05	1041.64	960.16
	tolling	F1	569.95	562.55	531.72	383.09	521.77	445.78	478.09	405.58	720.62	570.10
		F2	1199.03	1197.59	1220.01	908.11	1096.61	762.21	1102.59	832.47	1035.96	937.17
	tombola	F1	523.43	458.00	507.72	391.46	542.11	425.95	506.91	391.11	625.37	543.71
		F2	1556.20	1548.36	1082.94	1029.37	940.90	808.02	1009.22	1216.92	1192.89	1186.63
	whole	F1	558.40	417.42	483.31	367.01	526.08	384.06	547.23	344.40	557.19	347.04
		F2	1075.73	1196.49	897.18	862.86	864.23	891.01	752.82	638.72	850.75	700.57
	wholly	F1	526.49	411.42	473.87	314.86	595.11	431.71	483.17	308.74	501.19	330.61
		F2	1136.90	1391.27	1131.52	1242.78	918.82	779.51	977.67	1295.55	1080.23	1128.45
	woah	F1	608.21	459.48	441.98	359.34	543.88	408.70	480.62	376.01	409.01	281.52
		F2	1084.31	842.36	892.43	815.85	935.23	565.31	1011.28	901.48	963.74	878.53
	wrote	F1	530.07	450.44	518.21	405.47	443.87	403.83	445.70	306.37	539.98	434.10
		F2	1539.88	1886.52	1378.39	1587.68	649.65	734.32	1136.99	1336.40	1129.28	1298.10

			P06		P07		P08		P09		P13	
			Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2
	boat	F1	528.69	409.35	652.56	421.26	688.22	586.98	654.72	503.52	810.67	434.58
		F2	1726.56	1886.35	1427.78	1690.32	1579.96	1884.56	1471.21	1991.73	1503.21	1797.60
	bold	F1	430.43	331.15	604.05	361.80	656.42	460.26	642.24	501.58	782.56	391.47
		F2	1183.09	809.22	1094.14	738.22	1147.75	964.52	1005.29	761.17	984.91	844.91
	bow	F1	621.87	446.40	655.26	411.68	655.71	531.21	679.26	528.71	701.37	563.82
		F2	1621.42	1806.81	1399.86	1575.93	1480.03	1878.50	1411.92	1792.47	1293.62	1528.40
	bowl	F1	561.49	349.98	634.91	441.04	655.38	506.33	603.34	538.00	828.25	387.35
		F2	1317.86	1415.15	1112.07	864.19	1106.70	1011.79	1014.78	969.52	1164.50	973.57
	bowling	F1	487.91	386.34	619.43	502.74	715.14	515.46	641.90	590.22	688.31	430.70
		F2	1380.00	1304.54	1085.63	971.90	1234.70	1075.00	1030.87	980.14	1070.72	948.93
phrase	*chrome (1)*	F1	486.13	327.07	631.76	326.27	738.83	476.88	643.31	582.37	612.70	516.30
		F2	1826.79	1377.00	1499.97	1555.19	1487.40	1102.82	1308.73	1792.47	1391.58	1499.32
	rollers (2)	F1	502.21	366.94	578.19	379.35	631.20	503.03	627.38	580.72	682.96	514.64
		F2	1449.35	1304.01	1150.21	918.70	1592.25	1598.40	1186.87	1077.23	1046.99	1012.64
	go	F1	454.15	398.17	653.78	334.03	669.23	565.24	639.22	451.19	606.14	455.28
		F2	1908.97	1747.83	1536.18	1711.30	1683.95	2038.16	1697.02	1982.88	1626.26	1806.05
	goal	F1	507.90	506.73	636.63	531.20	706.66	478.77	696.27	460.61	749.00	462.92
		F2	1539.49	1183.40	1136.34	931.11	1219.99	1067.07	1237.12	931.59	1185.97	947.18
	goalie	F1	397.79	355.01	586.64	318.71	702.89	512.25	674.05	554.10	654.17	451.80
		F2	1813.49	1031.99	1301.96	860.00	1387.09	1105.78	1236.24	915.53	1466.16	1060.38
	goat	F1	624.58	402.89	663.21	292.71	705.63	601.94	676.47	485.00	708.11	491.28
		F2	1819.74	1724.84	1729.46	1865.09	1611.67	1834.28	1722.89	1972.44	1574.73	1675.13
	gold	F1	477.26	445.54	656.78	334.71	688.61	583.05	694.68	483.05	660.87	460.73
		F2	1455.81	1130.88	1288.14	802.75	1236.03	1190.72	1207.67	928.76	1167.91	939.67
	hoe	F1	522.58	305.95	645.71	342.36	656.79	484.44	626.06	445.38	518.40	299.92
		F2	1736.59	1465.20	1340.43	1343.32	1646.89	1654.62	1354.53	1433.84	1502.92	1104.80
	hold	F1	475.18	395.13	644.78	375.26	631.62	441.84	647.51	511.84	457.42	419.07
		F2	1084.89	879.44	1039.28	813.52	1107.72	1379.43	966.60	939.10	969.86	991.07
	hole	F1	664.15	418.08	680.44	498.59	714.87	617.10	761.87	503.63	676.80	485.59
		F2	1263.97	965.95	1091.94	928.75	1118.05	1011.27	1103.17	866.09	976.70	985.66
	holey	F1	539.91	334.94	598.03	362.75	636.36	455.66	658.81	499.26	389.78	356.72
		F2	1675.17	1680.82	896.26	741.54	1267.31	1110.22	982.69	892.86	1278.37	1159.71
	holy	F1	492.04	382.04	585.72	275.87	553.50	333.50	653.74	561.03	609.24	470.01
		F2	1704.57	1751.95	1228.46	1429.63	1058.89	1034.95	998.60	848.81	1384.70	1778.58
	hope	F1	595.62	416.88	545.51	380.61	707.37	468.58	636.43	453.33	663.10	476.29
		F2	1764.80	1719.56	1581.07	1577.70	1425.28	1999.90	1614.94	1998.53	1370.84	1541.78
	oh	F1	847.48	357.70	627.79	403.00	701.03	510.98	696.47	528.60	732.77	332.57
		F2	1680.82	1643.11	1095.81	926.42	1235.91	1020.82	997.09	869.50	1233.38	897.29
	Poland	F1	457.64	390.10	652.41	339.43	669.30	512.48	744.56	493.03	634.40	434.86
		F2	1699.50	1534.29	1332.36	1540.35	1762.08	2104.42	1242.26	1770.16	1202.22	1622.80
	polar	F1	565.00	433.64	599.18	373.36	658.18	480.84	667.37	568.01	691.41	329.69
		F2	1697.15	1694.99	1335.80	1562.87	1067.21	1135.38	1361.74	1694.86	1266.26	1688.44
	pole	F1	573.15	452.79	615.03	398.85	598.52	465.19	684.30	485.75	577.84	430.67
		F2	1249.65	1016.76	1081.76	768.17	1139.06	1032.54	968.30	827.71	982.25	1005.35
	Polish	F1	488.19	374.08	654.13	375.21	676.84	554.03	712.97	525.00	719.32	529.83
		F2	1599.30	1563.68	1379.28	1607.36	1395.05	1298.02	1246.94	1724.27	1288.44	1758.76
	roll	F1	470.04	362.07	586.58	327.19	642.09	460.08	553.75	521.99	607.67	455.81
		F2	1354.99	1017.68	1036.91	702.93	1297.92	1327.13	1029.00	1064.89	1042.66	880.84
	rolled	F1	450.62	384.33	582.71	355.23	682.81	526.60	604.23	522.31	615.73	491.17
		F2	1422.44	1239.36	1065.36	951.67	1242.87	1118.86	1118.96	1007.99	1142.56	1057.68
	roller	F1	421.75	372.23	553.03	330.17	695.97	500.09	675.46	540.67	622.03	529.00
		F2	1443.44	1545.88	982.45	808.37	1507.04	1250.18	1141.49	955.54	1070.34	1030.49
phrase	*roller (1)*	F1	511.69	420.80	497.51	339.07	635.39	522.37	668.12	495.77	707.57	581.58
		F2	1382.40	1386.68	981.81	815.07	1241.39	1079.22	1076.32	1142.78	1220.14	1104.07
	coaster (2)	F1	516.60	361.97	558.32	299.43	537.51	404.82	659.57	467.02	601.66	511.88
		F2	1769.61	1786.80	1515.66	1896.68	1645.19	1756.90	1377.54	2157.70	1689.63	1777.98
phrase	*roly (1)*	F1	481.59	425.09	601.17	377.56	626.28	508.10	649.20	551.15	634.31	536.76
		F2	1323.60	1238.76	1170.81	902.06	1290.05	1196.93	1144.83	1027.70	1232.51	1216.42
	poly (2)	F1	623.14	350.49	656.08	495.24	622.34	458.08	681.43	563.90	715.23	485.29
		F2	1677.88	1699.29	1335.71	1337.39	1241.07	1079.29	1189.53	1115.86	1413.12	1304.08
	row	F1	584.78	437.99	630.42	470.84	664.95	460.86	672.97	435.33	575.28	472.62
		F2	1632.92	1864.59	1426.68	1584.71	1421.01	1499.13	1323.79	1762.99	1337.63	1366.46
	toad	F1	632.57	374.44	581.15	298.92	610.35	478.67	713.18	401.79	689.59	425.89
		F2	1792.12	1722.31	1765.67	1585.30	1905.74	2104.19	1991.45	1987.86	1461.48	1734.89
	toe	F1	461.03	436.93	625.65	424.35	800.88	473.36	725.98	558.70	648.10	411.70
		F2	1623.04	1583.01	1546.37	1595.90	1713.61	1643.49	1789.70	1856.14	1386.99	1305.67
	told	F1	267.87	389.53	547.88	401.68	546.37	441.18	669.85	523.29	501.96	495.92
		F2	1657.60	1096.33	1215.23	973.56	1108.92	997.76	1127.93	1012.42	1276.82	1060.17
	toll	F1	490.79	401.77	591.37	596.78	668.83	642.40	629.39	520.50	495.76	411.80
		F2	1345.43	1024.52	1034.68	952.09	1184.83	1126.79	1020.93	929.16	901.70	907.87
	tolling	F1	602.06	435.00	625.50	441.77	673.71	657.48	652.49	523.28	564.31	337.11
		F2	1652.73	1458.41	1294.57	1035.49	1270.50	1314.46	1144.48	1042.60	994.84	895.24
	tombola	F1	613.70	457.71	616.57	330.60	713.32	669.72	699.51	557.81	718.77	447.81
		F2	1556.66	1702.66	1073.97	742.52	1585.55	1745.13	1502.71	1747.11	1154.77	1772.16
	whole	F1	720.96	488.22	551.30	339.34	572.14	506.98	609.88	461.21	594.68	403.26
		F2	1193.85	1192.40	939.90	820.68	1129.20	1052.18	935.31	801.94	968.65	842.88
	wholly	F1	647.37	472.52	572.59	312.28	702.30	474.90	601.60	495.85	496.20	423.15
		F2	1577.36	1358.93	1068.34	1002.85	1043.25	989.10	875.70	824.77	983.06	913.98
	woah	F1	719.79	337.06	734.63	395.29	621.72	628.45	675.43	805.71	733.34	474.31
		F2	1478.42	1364.57	1062.33	905.54	1060.57	1441.70	1091.23	1391.04	1262.87	1235.53
	wrote	F1	569.34	330.52	626.86	423.18	731.80	545.41	655.58	530.56	706.55	474.87
		F2	1625.48	1846.22	1278.15	1825.88	1753.59	1945.31	1501.03	1989.89	1479.84	1791.93

			P15		P17		P18		P19	
			Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2
	boat	**F1**	557.27	284.09	634.38	444.61	565.08	443.77	642.84	349.50
		F2	1238.93	1463.57	1601.24	1813.88	1277.90	1616.68	1190.36	1158.90
	bold	**F1**	564.93	299.28	558.58	420.77	543.15	468.63	431.53	292.96
		F2	745.62	575.82	966.60	813.39	963.99	869.78	960.06	736.98
	bow	**F1**	566.39	509.09	592.21	339.51	539.55	485.74	661.13	389.38
		F2	1252.78	1336.12	1566.09	1640.90	1468.40	1597.54	1294.94	1153.23
	bowl	**F1**	558.16	393.04	555.37	502.64	530.12	459.66	611.03	288.62
		F2	861.80	752.89	959.00	868.74	1004.15	823.06	1028.76	806.97
	bowling	**F1**	586.91	482.35	588.72	410.89	528.85	502.14	632.37	395.09
		F2	954.60	757.32	1534.04	1835.41	920.87	837.99	932.14	817.78
phrase	***chrome (1)***	**F1**	537.90	389.96	636.31	513.72	502.83	390.24	537.98	446.16
		F2	1115.45	1303.24	1597.38	1805.38	1397.84	1513.43	1122.18	895.91
	rollers (2)	**F1**	587.30	457.74	618.70	426.50	497.05	465.96	546.66	349.02
		F2	907.99	847.85	1571.16	1566.91	1042.05	870.18	1066.54	940.35
	go	**F1**	525.66	299.60	600.73	427.69	467.67	401.11	607.63	293.26
		F2	1436.78	1402.84	1851.08	1732.35	1585.90	1688.39	1582.28	1450.36
	goal	**F1**	599.47	399.44	603.86	445.39	567.33	475.02	582.25	406.12
		F2	894.33	629.59	1201.67	762.80	1098.56	830.75	1042.46	818.80
	goalie	**F1**	485.01	418.04	600.21	390.89	471.81	403.53	595.89	350.24
		F2	957.89	756.00	1694.36	1785.55	1100.52	817.29	975.53	801.39
	goat	**F1**	562.65	422.71	569.88	396.31	559.71	436.25	575.21	373.56
		F2	1433.65	1384.11	1694.79	1720.40	1547.98	1626.71	1545.31	1115.56
	gold	**F1**	547.16	482.25	563.76	396.47	527.46	422.80	573.49	375.04
		F2	898.82	756.39	1078.43	700.67	1037.97	832.33	1061.64	861.81
	hoe	**F1**	543.37	393.98	689.94	440.14	556.89	483.65	516.50	298.49
		F2	1359.82	1049.19	1610.14	1308.35	1337.46	1479.29	1145.34	940.14
	hold	**F1**	518.36	364.09	511.72	457.26	504.58	443.39	482.95	348.40
		F2	818.50	727.84	833.08	746.09	840.81	842.48	830.85	773.29
	hole	**F1**	596.05	493.83	738.47	532.06	521.28	500.20	586.68	474.32
		F2	874.91	735.38	976.56	851.28	865.35	826.09	964.59	760.12
	holey	**F1**	539.52	452.74	630.33	364.81	497.54	348.37	584.59	342.31
		F2	861.49	857.85	1651.16	1573.80	937.91	1002.80	908.36	771.07
	holy	**F1**	456.02	362.19	604.81	425.34	531.24	370.16	431.89	346.08
		F2	1402.47	1185.70	1722.59	1807.57	1525.11	1568.98	931.47	912.86
	hope	**F1**	588.55	348.99	679.20	425.99	567.01	447.23	645.33	348.27
		F2	1356.24	1220.02	1748.20	1830.77	1502.57	1599.03	1171.61	1000.15
	oh	**F1**	612.97	431.65	647.80	317.25	594.45	493.46	658.44	390.14
		F2	1306.08	1259.65	1302.64	1119.43	1037.85	951.78	1102.45	805.77
	Poland	**F1**	505.62	400.83	604.13	422.74	647.58	446.46	552.91	382.81
		F2	1255.81	1207.46	1718.38	1620.33	1427.72	1444.12	1115.34	938.68
	polar	**F1**	533.29	376.95	661.91	414.17	462.69	366.62	456.28	381.01
		F2	1239.92	1080.10	1738.00	1656.95	1360.35	1599.39	968.26	1056.71
	pole	**F1**	612.26	438.89	552.69	390.12	607.52	524.97	525.11	454.14
		F2	921.64	768.89	1035.86	736.92	928.56	878.70	947.80	710.87
	Polish	**F1**	543.41	460.76	695.84	441.24	554.98	424.02	689.09	362.87
		F2	1402.90	1356.10	1646.55	1756.08	1427.82	1512.13	1258.45	1176.87
	roll	**F1**	530.96	455.46	570.55	523.22	469.35	460.12	483.59	357.19
		F2	945.75	743.36	1153.98	976.62	1075.14	912.41	1052.20	862.77
	rolled	**F1**	502.30	404.26	568.15	380.68	519.34	475.07	578.20	418.61
		F2	1015.62	848.28	971.52	755.20	1074.51	892.92	1088.40	843.30
	roller	**F1**	473.26	433.48	618.71	484.79	478.54	393.19	525.79	432.04
		F2	863.84	700.02	1353.83	1269.91	1004.63	1015.42	1092.61	1134.12
phrase	***roller (1)***	**F1**	492.88	322.10	605.60	473.04	517.26	444.16	640.36	360.32
		F2	1275.79	1494.96	1549.79	1661.59	918.45	1004.45	1147.77	1279.15
	coaster (2)	**F1**	479.49	395.98	655.74	398.44	411.45	380.53	512.16	293.09
		F2	1368.19	1621.77	1832.19	1800.25	1523.44	1757.16	1125.63	1587.28
phrase	***roly (1)***	**F1**	475.35	401.20	557.44	411.13	496.77	433.13	425.47	255.75
		F2	1030.58	776.43	1393.76	1403.67	1069.78	972.70	1066.53	995.66
	poly (2)	**F1**	563.17	418.84	635.73	411.79	549.17	463.96	523.13	394.08
		F2	1045.95	904.01	1570.51	1615.98	1003.42	894.10	1232.32	997.78
	row	**F1**	522.13	343.70	623.34	394.08	534.12	407.80	572.74	388.26
		F2	1307.36	1261.30	1575.56	1550.11	1390.92	1463.25	1155.69	989.03
	toad	**F1**	519.72	277.14	631.02	370.95	481.61	343.88	569.55	357.68
		F2	1444.24	1547.51	1831.18	1904.62	1613.08	1741.02	1406.90	1488.21
	toe	**F1**	564.62	464.56	715.12	520.18	533.14	451.52	638.92	360.84
		F2	1334.01	1451.98	1720.51	1804.77	1552.44	1311.58	1289.49	900.91
	told	**F1**	586.66	467.38	552.83	475.25	536.50	477.09	591.07	392.94
		F2	1064.41	796.64	1143.57	817.80	1002.81	807.39	1000.88	810.91
	toll	**F1**	584.68	439.59	561.10	495.50	516.45	497.26	517.34	396.27
		F2	911.63	709.50	1009.21	889.96	978.17	1026.67	917.67	738.70
	tolling	**F1**	552.02	419.28	542.42	452.61	676.95	646.76	636.82	344.18
		F2	956.21	799.99	991.74	915.85	1048.04	1046.60	1085.43	828.81
	tombola	**F1**	536.98	459.81	689.86	450.15	550.56	497.22	608.37	424.55
		F2	1032.00	955.09	1539.06	1564.06	1321.09	1434.23	1057.10	875.43
	whole	**F1**	588.66	377.89	522.90	335.35	516.67	425.64	475.56	350.90
		F2	859.89	717.84	847.46	948.79	815.97	773.96	838.93	958.71
	wholly	**F1**	490.86	428.44	654.72	464.38	497.84	439.14	433.65	433.24
		F2	790.51	772.23	1548.25	1229.42	843.03	803.65	861.37	714.18
	woah	**F1**	676.22	583.34	697.98	532.54	519.54	460.21	617.37	456.38
		F2	1041.98	973.43	1344.37	949.74	961.52	968.87	1074.53	829.09
	wrote	**F1**	570.87	380.79	583.18	369.33	514.12	433.16	618.07	408.50
		F2	1297.15	1501.20	1568.83	1812.07	1454.30	1578.51	1394.09	1483.28

*All values in Hz

8.4. Formant values of all tested words (word list)

			P01		P02		P03		P04		P05	
			Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2
	boat	F1	556.63	380.61	494.88	398.81	550.10	385.29	445.49	310.83	473.87	363.37
		F2	1459.95	1846.52	1211.72	1470.71	1324.93	1498.49	1141.85	1317.83	1134.54	1101.84
	bold	F1	540.39	415.25	510.64	418.75	552.72	369.47	460.45	360.87	424.35	315.17
		F2	1155.93	755.52	997.53	810.20	983.48	527.59	884.82	609.96	833.01	681.50
	bow	F1	558.90	372.25	469.94	292.04	511.29	332.54	482.17	298.49	452.59	413.14
		F2	1578.69	1902.92	1280.65	1562.74	1419.88	1756.22	1113.16	1463.09	1083.40	1145.98
	bowl	F1	577.67	383.40	467.21	389.21	611.72	345.43	507.60	360.90	418.59	327.91
		F2	1131.26	748.98	932.65	703.53	997.30	685.85	996.21	671.43	811.00	622.25
	bowling	F1	539.26	416.24	486.31	382.99	551.87	366.26	491.25	366.21	415.06	357.16
		F2	1258.06	998.42	1022.29	848.07	886.16	801.25	926.60	687.31	933.11	644.62
phrase	*chrome (1)*	F1	478.75	456.36	522.17	420.58	571.47	361.15	473.89	355.54	472.52	371.55
		F2	1498.81	1607.24	1206.47	1227.22	1510.74	1432.08	1090.72	1112.76	1128.12	1171.46
	rollers (2)	F1	524.50	471.08	442.68	403.91	527.37	375.89	468.47	347.90	448.11	396.32
		F2	1090.21	848.78	1018.60	760.37	1005.29	682.60	967.49	744.99	1025.13	791.89
	go	F1	636.83	385.73	518.06	330.61	585.03	263.89	474.23	310.15	471.60	352.10
		F2	1533.05	1637.78	1386.79	1459.77	1662.52	1759.73	1287.42	1221.06	1217.27	1118.29
	goal	F1	544.60	400.67	449.62	418.10	504.04	370.35	473.92	370.28	440.36	365.05
		F2	1162.45	764.61	1179.91	761.69	1196.41	672.22	1059.07	766.42	966.36	729.06
	goalie	F1	536.99	390.74	447.03	370.92	510.95	438.40	419.58	372.88	424.08	330.12
		F2	1195.07	983.75	1211.19	945.01	1263.63	701.20	1251.87	1331.57	1039.52	771.57
	goat	F1	545.38	448.26	457.91	390.22	511.75	350.60	390.03	285.38	448.84	279.06
		F2	1531.45	1863.96	1366.77	1591.98	1677.64	1639.51	1356.25	1317.06	1359.36	1307.61
	gold	F1	554.24	448.30	465.84	376.82	545.67	346.64	450.53	386.42	446.26	351.81
		F2	1217.18	893.67	1151.54	745.69	1208.13	595.00	977.38	621.85	998.17	791.80
	hoe	F1	613.28	317.29	458.68	341.38	795.52	320.39	547.94	329.56	620.15	398.43
		F2	1485.59	1738.12	1230.47	1300.63	1614.51	1212.03	1019.24	1317.77	1168.28	1193.99
	hold	F1	569.47	480.63	501.08	379.82	571.31	353.48	443.08	285.11	480.28	296.45
		F2	1114.08	847.70	995.46	718.99	967.49	781.92	753.52	615.50	773.74	544.21
	hole	F1	656.02	433.06	553.72	398.09	550.78	326.24	531.13	385.15	578.72	338.49
		F2	1113.45	741.04	1040.54	601.60	887.29	689.34	882.74	644.65	845.11	598.82
	holey	F1	455.63	400.52	437.64	383.06	530.67	428.63	441.73	391.16	409.24	348.02
		F2	1041.90	863.70	1060.94	980.54	1024.27	715.99	836.37	649.74	818.33	743.94
	holy	F1	450.90	386.52	439.29	368.92	616.08	279.17	477.53	300.12	400.34	312.65
		F2	1673.34	1732.50	1064.67	934.65	1551.48	1599.73	1109.79	1385.94	1036.01	984.97
	hope	F1	596.55	447.38	527.01	405.46	600.19	299.63	495.64	281.96	386.24	317.46
		F2	1708.68	1863.91	1242.15	1353.63	1523.48	1433.10	1128.21	1097.21	1124.04	992.30
	oh	F1	574.80	400.46	523.97	275.33	641.52	364.58	497.33	323.80	624.71	374.59
		F2	1507.63	1748.19	1152.25	887.54	1332.85	1312.23	1096.21	1221.25	1259.39	1043.59
	Poland	F1	439.16	398.20	465.82	392.59	592.33	391.55	490.74	327.12	514.33	299.78
		F2	1744.89	1515.48	1175.13	1129.51	1528.65	1228.00	1046.42	1245.87	1161.27	1177.59
	polar	F1	616.62	427.22	467.56	387.47	661.87	340.25	496.90	345.28	401.75	346.45
		F2	1586.74	1541.80	1076.45	917.22	1438.27	1443.29	1049.88	1088.02	1042.00	962.28
	pole	F1	561.67	411.98	484.44	366.73	592.06	342.64	488.57	363.65	441.12	340.56
		F2	1064.46	725.74	996.44	642.70	1480.16	585.27	882.15	590.24	783.31	576.79
	Polish	F1	476.32	394.80	403.85	390.02	589.41	433.13	580.79	330.54	395.12	347.26
		F2	1729.22	1703.07	1063.13	935.24	1433.24	1381.88	1093.25	1502.93	1123.88	1186.69
	roll	F1	522.12	448.91	506.31	362.11	518.19	376.78	482.99	388.20	432.75	349.10
		F2	1146.98	851.27	1120.30	812.62	1108.15	732.67	945.95	693.54	894.53	666.28
	rolled	F1	484.28	394.77	499.58	393.47	515.24	373.56	467.97	375.52	427.49	354.43
		F2	1106.17	781.60	1092.97	700.94	1110.18	596.52	991.69	716.16	948.79	724.13
	roller	F1	526.89	441.38	489.52	379.84	541.78	418.88	486.29	394.49	444.95	379.31
		F2	1267.17	1078.89	1095.36	763.50	1072.01	759.81	953.34	756.19	942.04	797.39
phrase	*roller (1)*	F1	481.15	458.83	499.30	430.41	564.07	490.83	431.43	294.36	446.68	377.54
		F2	1386.55	1141.27	1135.60	1040.09	1103.79	584.45	1157.20	1347.57	903.96	691.75
	coaster (2)	F1	507.37	461.41	479.33	431.94	558.04	381.31	435.92	322.21	471.61	340.10
		F2	1681.18	2089.52	1407.51	1554.58	1501.08	1501.39	1337.24	1439.08	1290.98	1404.49
phrase	*roly (1)*	F1	435.71	420.93	469.03	374.62	470.79	366.45	434.52	345.88	456.56	405.97
		F2	1322.39	1128.38	1100.64	1051.82	1172.76	694.57	1158.55	1126.89	897.02	604.42
	poly (2)	F1	524.94	516.72	457.11	340.63	525.81	362.20	441.76	342.89	503.03	373.52
		F2	1201.08	1063.91	1091.47	886.71	1040.34	837.55	1268.87	1266.87	933.25	735.88
	row	F1	561.49	401.45	528.72	228.35	618.08	321.61	508.74	310.79	568.88	400.31
		F2	1369.00	1565.57	1261.91	1406.43	1461.38	1518.74	1094.11	1102.16	1128.37	1100.43
	toad	F1	564.70	370.46	535.08	364.22	654.41	286.60	480.97	250.89	512.08	279.10
		F2	1689.55	2111.60	1361.24	1665.16	1703.30	1459.11	1258.75	1399.73	1237.52	1218.03
	toe	F1	638.97	335.32	500.73	312.22	679.65	350.84	479.82	376.69	562.39	344.71
		F2	1575.69	1789.13	1321.73	1427.97	1673.37	1658.67	1142.82	1354.38	1196.04	1070.15
	told	F1	506.74	445.92	503.85	377.78	595.46	418.86	536.14	387.72	441.74	348.52
		F2	1168.76	695.43	1090.43	652.19	1062.36	667.13	1063.64	665.61	839.11	709.81
	toll	F1	544.16	469.07	489.86	375.33	659.31	435.55	484.60	324.22	630.51	528.97
		F2	1111.72	925.92	1038.31	695.09	1035.61	818.54	941.60	596.66	903.24	878.42
	tolling	F1	567.48	555.38	491.88	379.65	568.48	504.69	493.89	379.69	627.56	531.23
		F2	1155.72	1184.79	1028.33	745.71	940.14	950.51	969.76	654.73	989.40	986.57
	tombola	F1	508.14	402.09	484.82	397.93	523.01	367.00	496.83	336.68	449.97	378.59
		F2	1136.31	1008.31	1019.04	919.84	1087.89	841.69	1054.52	1298.29	1092.86	1032.19
	whole	F1	633.46	417.11	509.20	356.87	722.45	348.49	464.84	278.96	444.21	374.47
		F2	1116.04	811.18	1006.94	729.35	1070.96	739.93	794.41	556.66	783.64	594.48
	wholly	F1	534.00	416.65	490.88	365.51	574.62	351.28	449.60	329.85	421.06	345.88
		F2	1157.66	1005.98	976.81	885.70	1085.16	734.30	1194.40	1292.02	790.75	689.81
	woah	F1	515.98	386.67	446.13	353.71	484.25	342.40	425.13	285.90	421.49	311.88
		F2	1033.13	791.55	1046.67	776.43	931.17	544.06	974.25	900.05	918.17	782.10
	wrote	F1	527.96	434.68	479.90	379.53	483.31	327.84	391.74	284.09	494.73	335.55
		F2	1415.23	1804.78	1255.43	1454.40	1418.88	1537.17	1204.26	1302.52	1227.69	1253.24

		P06		P07		P08		P09		P13	
		Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2
boat	F1	534.04	400.32	644.96	339.41	704.88	517.53	663.61	411.69	718.33	496.82
	F2	1682.05	1734.99	1349.90	1485.46	1577.18	2111.56	1534.98	1979.08	1305.42	1578.15
bold	F1	456.47	373.38	700.76	385.97	709.57	499.06	688.02	460.26	709.43	448.92
	F2	1227.62	894.42	1174.39	1052.01	1207.27	1047.09	1047.60	871.33	1002.38	807.84
bow	F1	494.20	418.57	664.48	327.66	637.41	485.15	682.16	384.27	745.90	404.90
	F2	1620.80	1776.33	1430.04	1298.53	1689.37	1757.21	1662.50	2201.10	1382.10	1489.77
bowl	F1	536.40	403.17	637.26	337.88	692.07	560.18	664.81	479.79	685.54	423.40
	F2	1210.22	907.06	1000.40	667.92	1146.64	1015.61	1075.63	858.77	1039.01	802.04
bowling	F1	584.79	339.65	534.54	276.59	689.44	426.87	700.33	524.84	645.14	487.20
	F2	1622.13	1678.15	975.32	743.36	1086.56	891.60	1141.52	1126.01	1070.63	1013.27
phrase ***chrome (1)***	F1	580.47	389.64	612.37	399.59	602.38	464.18	620.50	480.92	654.13	425.14
	F2	1608.40	1810.96	1360.13	1370.49	1476.55	1753.87	1339.02	1824.19	1266.72	1146.03
rollers (2)	F1	490.48	407.78	566.44	413.70	670.10	527.33	651.57	470.61	659.61	508.09
	F2	1400.89	1144.09	981.15	854.23	1199.87	1108.70	1162.45	1091.46	1116.42	978.63
go	F1	517.65	352.59	640.02	442.75	735.94	476.50	740.66	510.20	738.20	486.00
	F2	1818.58	1680.30	1364.50	1387.39	1646.58	1698.00	1670.69	1734.55	1465.07	1475.46
goal	F1	456.11	476.65	623.38	411.34	708.32	500.96	631.13	550.00	680.47	377.53
	F2	1637.13	1178.96	1039.45	750.54	1119.88	1073.43	1034.56	904.17	1015.65	793.37
goalie	F1	489.73	400.36	553.93	288.63	708.47	480.50	705.31	472.75	726.40	583.53
	F2	1415.44	1127.16	1081.66	695.01	1241.19	992.37	1135.49	994.08	1225.71	1082.66
goat	F1	449.39	369.33	566.18	305.07	674.68	418.27	638.07	441.64	699.18	427.38
	F2	1828.24	1606.25	1469.81	1484.19	1601.58	2005.44	1644.07	2009.49	1482.13	1579.19
gold	F1	449.53	354.47	570.61	312.58	664.79	567.28	628.37	444.32	715.98	386.06
	F2	1234.84	975.62	1086.66	646.48	1266.39	1034.65	1078.07	863.53	1365.60	993.37
hoe	F1	697.63	393.97	625.93	354.38	772.37	475.47	722.86	444.09	657.82	592.86
	F2	1419.23	1631.91	1248.97	1294.63	1497.92	1681.84	1447.78	1647.33	1114.27	1816.99
hold	F1	499.46	345.96	602.70	332.70	684.61	490.90	686.82	445.40	560.38	350.03
	F2	1416.26	1041.28	910.62	737.28	1143.82	991.08	970.38	786.62	874.83	765.31
hole	F1	479.45	376.90	556.55	409.54	718.62	507.85	662.67	451.02	678.77	422.31
	F2	1252.87	987.85	946.41	681.85	1264.52	911.02	955.86	820.90	921.95	844.04
holey	F1	513.09	400.14	528.75	275.97	666.54	482.52	606.59	490.76	671.82	538.27
	F2	1483.21	1397.75	845.60	742.95	1262.15	999.67	1135.22	1028.36	1108.32	1011.33
holy	F1	463.93	374.16	554.02	267.14	664.84	476.39	627.28	473.88	425.69	377.86
	F2	1823.31	1634.08	1296.95	1526.80	1212.63	1000.54	1167.84	1200.08	1438.92	1546.76
hope	F1	448.79	349.86	563.64	308.96	700.52	393.48	643.69	439.02	647.44	476.47
	F2	1708.11	1584.09	1247.97	1290.21	1569.26	1981.59	1774.90	1832.50	1354.84	1309.68
oh	F1	568.66	366.14	676.32	353.15	852.75	618.78	741.48	535.76	583.10	414.80
	F2	1722.83	1491.71	1394.84	742.44	1507.00	1609.77	1294.03	1028.37	1066.78	774.98
Poland	F1	603.20	402.72	597.10	262.89	728.32	511.17	651.07	494.38	513.85	387.10
	F2	1864.90	1695.91	1355.52	1387.63	1392.64	1803.10	1529.26	1743.65	979.17	1136.94
polar	F1	533.42	467.52	622.24	290.09	729.60	475.66	618.67	452.91	344.62	298.93
	F2	1663.22	1559.15	1266.51	1331.03	1620.99	1680.16	1459.90	1708.80	1087.40	986.04
pole	F1	497.66	379.03	605.90	279.20	719.52	472.99	689.89	471.37	649.19	564.66
	F2	1201.27	923.78	1003.97	759.23	1048.44	941.85	1021.07	836.03	923.34	836.38
Polish	F1	614.46	385.28	586.91	269.89	726.68	727.61	661.53	499.93	716.88	463.88
	F2	1679.34	1619.08	1338.34	1420.28	1196.55	1200.86	1673.38	2036.36	1278.93	1670.51
roll	F1	484.12	375.23	620.10	313.59	744.47	508.74	650.73	453.79	692.44	342.66
	F2	1354.61	823.72	978.00	614.89	1309.42	1007.68	1008.33	810.61	1023.69	975.06
rolled	F1	482.59	379.61	628.74	396.66	713.67	465.68	583.80	453.37	576.07	408.09
	F2	1336.72	957.83	808.02	731.19	1173.57	982.94	1008.58	821.23	1145.88	918.47
roller	F1	487.97	343.43	588.18	303.94	646.84	514.16	639.58	486.86	759.45	543.82
	F2	1542.89	1671.41	1015.62	667.44	1308.86	1072.45	1123.54	958.50	1215.22	857.19
phrase ***roller (1)***	F1	498.23	471.66	560.38	374.81	672.71	503.62	618.26	520.14	659.86	462.17
	F2	1509.08	1596.03	1015.23	826.76	1587.02	1396.00	1063.47	844.86	1069.98	968.25
coaster (2)	F1	513.33	440.46	567.97	294.45	652.54	419.00	598.49	400.93	656.98	435.85
	F2	1802.44	1833.51	1656.73	1725.90	1782.26	2030.66	1831.02	1918.72	1584.73	1770.05
phrase ***roly (1)***	F1	501.05	372.97	549.90	357.84	547.29	521.62	672.41	508.13	537.88	469.79
	F2	1647.05	1754.35	1057.24	910.91	1322.62	1390.52	1182.21	1004.34	1138.51	1015.63
poly (2)	F1	511.84	370.76	594.52	391.76	672.14	466.53	670.98	522.61	711.31	534.87
	F2	1646.16	1753.72	1198.99	934.29	1399.27	1212.40	1078.05	1013.37	1225.64	1228.65
row	F1	725.09	381.15	648.46	448.29	736.28	541.29	700.20	505.84	684.03	407.31
	F2	1633.56	1608.10	1281.54	1371.86	1493.91	1713.50	1389.60	1734.86	1348.71	1318.66
toad	F1	497.32	349.34	561.82	279.44	715.25	397.75	703.94	402.66	562.27	401.17
	F2	1798.54	1725.55	1325.46	1389.96	1620.06	2200.32	1517.48	2049.67	1343.89	1722.67
toe	F1	538.39	448.51	646.92	357.59	820.32	442.64	743.25	506.64	680.99	424.71
	F2	1839.75	1740.39	1356.64	1402.74	1628.34	1667.55	1458.75	1839.30	1458.16	1179.26
told	F1	559.15	384.08	655.71	374.29	748.14	420.21	670.90	476.40	673.90	370.16
	F2	1416.73	948.04	1050.02	696.35	1050.03	908.94	1010.41	853.78	905.79	884.59
toll	F1	509.54	402.88	614.06	301.82	908.94	520.08	639.85	452.69	629.79	393.94
	F2	1349.22	1028.62	984.90	669.01	1215.34	1034.47	1039.83	891.70	967.91	685.65
tolling	F1	570.66	456.66	697.08	307.44	709.55	703.30	623.85	567.39	572.44	412.34
	F2	1744.86	1500.90	1014.34	730.97	1288.85	1296.26	1104.04	1027.91	1014.10	842.59
tombola	F1	530.99	385.46	641.56	346.79	733.92	512.71	705.72	543.91	751.94	408.51
	F2	1657.07	1672.18	1323.77	1567.31	1262.64	1902.28	1250.53	1823.48	1232.10	1673.09
whole	F1	572.04	388.16	602.90	392.14	697.34	462.92	679.05	492.80	620.63	413.87
	F2	1242.53	890.40	927.87	642.04	1023.63	1135.71	959.62	758.59	911.53	895.48
wholly	F1	461.16	356.94	644.43	304.92	646.19	511.96	602.04	451.87	724.76	276.89
	F2	1624.60	1427.98	1038.43	780.07	969.31	932.15	1080.87	936.01	940.99	848.59
woah	F1	641.36	477.85	674.55	487.99	723.74	522.05	607.85	569.78	649.94	494.92
	F2	1449.01	1486.76	1335.43	1046.94	1381.50	1020.14	1146.02	1060.67	1180.10	1187.82
wrote	F1	472.06	402.33	624.28	311.23	677.09	421.39	666.92	486.35	596.51	422.14
	F2	1663.08	1853.04	1322.55	1517.00	1561.56	1911.99	1495.12	1984.98	1348.14	1536.98

			P15		P17		P18		P19	
			Element 1	Element 2	Element 1	Element 2	Element 1	Element 2	Element 1	Element 2
	boat	F1	536.00	426.97	615.09	335.25	517.96	353.87	559.30	347.59
		F2	1204.16	1200.81	1692.69	1668.45	1298.81	1673.22	1267.76	961.61
	bold	F1	529.57	353.26	558.78	384.16	536.21	407.81	518.98	412.03
		F2	830.41	468.60	1120.58	819.44	865.28	763.19	912.13	647.35
	bow	F1	559.56	333.86	590.76	437.61	511.02	352.26	580.69	333.28
		F2	1274.63	1324.10	1604.16	1733.85	1364.66	1472.04	1195.72	1413.25
	bowl	F1	546.88	426.54	551.21	403.67	526.08	420.19	550.09	409.72
		F2	828.26	631.73	1111.42	857.10	936.10	789.16	980.62	743.58
	bowling	F1	511.64	389.99	584.58	389.25	554.01	396.84	566.41	435.14
		F2	794.18	647.39	1612.94	1409.41	915.86	751.36	1038.09	771.34
phrase	chrome (1)	F1	528.21	253.29	639.72	472.22	464.70	347.89	574.25	403.75
		F2	1046.43	1094.00	1600.11	1793.69	1379.06	1483.41	1178.69	1128.39
	rollers (2)	F1	566.24	345.62	566.06	474.90	492.55	425.14	505.11	385.13
		F2	971.84	834.29	1582.99	1564.58	1045.65	883.55	1046.65	900.35
	go	F1	583.04	475.58	656.59	427.74	530.24	424.74	642.43	445.07
		F2	1496.65	1259.33	1725.47	1532.22	1541.56	1602.33	1315.60	1065.38
	goal	F1	565.82	418.73	552.34	436.13	501.83	409.31	584.15	435.02
		F2	863.83	613.58	1166.96	826.46	1045.73	822.28	1031.97	746.61
	goalie	F1	492.62	418.57	537.75	398.34	459.40	377.77	546.18	364.92
		F2	916.75	666.19	1595.71	1264.17	1148.17	798.03	1025.91	718.81
	goat	F1	532.06	407.34	568.89	337.50	520.95	332.59	577.51	415.73
		F2	1309.23	1208.73	1735.01	1595.18	1516.91	1553.80	1335.42	1029.02
	gold	F1	488.51	307.45	546.57	394.18	498.37	430.77	528.17	423.67
		F2	898.60	604.56	1141.97	953.35	1046.92	731.36	1020.96	689.81
	hoe	F1	597.01	345.62	599.29	339.48	656.44	407.62	650.25	412.46
		F2	1286.07	1026.71	1672.36	1369.62	1344.85	1617.10	1239.18	1062.12
	hold	F1	475.10	386.77	529.89	363.14	492.44	398.83	663.51	420.47
		F2	751.92	618.29	843.94	729.87	830.22	710.16	969.70	670.74
	hole	F1	522.93	384.64	672.92	346.68	565.53	432.00	607.49	355.86
		F2	819.51	635.67	909.31	818.48	899.65	811.81	961.87	686.42
	holey	F1	488.68	401.69	534.54	371.27	549.54	399.26	502.98	322.53
		F2	726.04	601.70	1555.76	1186.79	770.16	747.47	992.26	947.10
	holy	F1	498.81	317.45	579.30	365.03	565.59	349.06	626.13	350.02
		F2	1205.01	1157.85	1593.13	1445.38	1385.08	1488.25	1171.65	977.09
	hope	F1	540.70	358.75	675.41	340.26	581.70	310.58	508.65	319.58
		F2	1016.61	1066.43	1666.04	1609.27	1474.66	1583.82	1132.57	881.40
	oh	F1	559.88	377.18	633.66	360.92	585.00	401.56	632.56	437.39
		F2	1366.20	1045.77	1519.31	1237.56	1071.65	922.08	1257.69	952.31
	Poland	F1	543.10	360.96	696.27	390.29	562.27	367.29	566.42	371.19
		F2	1416.63	1123.02	1678.48	1513.81	1366.47	1470.74	1134.40	1099.05
	polar	F1	504.16	442.25	734.80	412.40	541.57	391.60	590.83	361.28
		F2	1041.98	1208.74	1594.01	1311.82	1270.84	1420.35	985.55	906.94
	pole	F1	535.81	427.42	523.38	392.53	555.23	375.16	586.93	396.69
		F2	829.85	636.53	949.86	784.83	902.85	782.05	938.28	777.84
	Polish	F1	512.82	354.10	659.00	395.59	581.57	383.04	462.73	379.83
		F2	1144.68	1141.37	1709.45	1555.94	1306.91	1506.56	1022.82	883.82
	roll	F1	524.88	422.39	516.91	442.66	563.88	427.62	488.64	429.70
		F2	849.01	705.09	1172.66	851.16	1134.39	822.39	1004.69	678.09
	rolled	F1	497.68	394.15	514.19	432.18	537.65	452.36	502.37	396.61
		F2	825.96	639.08	1080.89	829.62	1001.16	819.59	997.38	680.77
	roller	F1	517.76	432.06	642.17	391.20	507.91	444.12	606.12	440.25
		F2	913.35	738.98	1523.13	1440.79	986.74	807.56	1049.06	889.23
phrase	roller (1)	F1	458.63	444.03	621.79	430.85	515.50	344.19	527.16	420.06
		F2	811.93	809.32	1674.27	1668.29	1017.68	914.16	1143.12	1065.90
	coaster (2)	F1	510.61	385.77	560.01	376.88	477.48	416.14	589.86	364.99
		F2	1312.20	1337.45	1820.79	1889.07	1522.47	1594.94	1237.37	1426.93
phrase	roly (1)	F1	518.01	452.91	590.30	449.17	493.27	390.51	507.60	342.25
		F2	1108.81	1176.05	1553.51	1705.40	1243.26	1080.60	1098.31	880.40
	poly (2)	F1	535.88	438.23	606.49	379.01	557.76	402.79	460.89	361.95
		F2	1198.98	1135.22	1681.99	1594.04	1143.76	953.31	979.88	865.00
	row	F1	560.16	416.97	617.24	380.40	551.31	422.48	629.40	337.83
		F2	1364.92	1239.64	1689.57	1515.53	1371.52	1538.38	1233.11	991.17
	toad	F1	527.48	337.77	675.59	354.27	553.69	335.99	634.43	325.73
		F2	1442.28	1152.67	1757.73	1949.70	1541.96	1647.75	1435.56	1611.21
	toe	F1	529.90	395.18	654.65	358.29	631.40	459.15	648.57	418.07
		F2	1311.16	1194.20	1713.16	1491.91	1501.95	1633.55	1331.50	1110.59
	told	F1	510.07	388.89	567.42	414.69	537.36	399.04	505.96	395.21
		F2	733.10	545.06	1111.53	796.85	914.24	733.45	849.39	685.17
	toll	F1	545.46	463.55	561.07	442.95	569.19	409.72	615.88	459.19
		F2	808.05	524.96	1105.20	847.69	964.84	820.59	1022.93	769.88
	tolling	F1	571.12	383.52	616.74	397.28	661.49	630.51	593.48	400.33
		F2	907.87	737.20	1618.65	1265.93	933.98	944.91	960.71	861.94
	tombola	F1	584.73	393.00	568.34	424.25	561.59	393.16	634.23	444.82
		F2	1018.92	913.01	1400.06	1543.83	1351.59	1550.90	1149.82	979.65
	whole	F1	480.80	400.37	577.61	413.50	581.46	413.48	644.50	383.83
		F2	757.68	578.66	1115.76	804.75	897.05	792.91	934.66	700.43
	wholly	F1	438.84	338.25	628.45	377.34	490.90	397.14	579.20	430.54
		F2	671.25	644.92	1620.91	1316.64	823.40	758.18	866.53	782.77
	woah	F1	475.12	522.95	606.66	427.65	471.07	375.54	513.62	421.62
		F2	829.34	892.92	1145.95	887.15	1010.31	875.03	938.61	861.95
	wrote	F1	505.45	351.97	547.48	354.87	532.17	303.47	589.28	386.13
		F2	1272.80	1232.04	1677.45	1818.06	1469.62	1548.88	1267.70	1092.15

*All values in Hz

8.5. Formant values of apparent slips of the tongue

<table>
<tr><th colspan="2">Word</th><th>Task</th><th>Participant</th><th>F1/F2</th><th>Element 1</th><th>Element 2</th></tr>
<tr><td colspan="2" rowspan="2">toad</td><td rowspan="2">texts</td><td rowspan="2">P15</td><td>F1</td><td>578.13</td><td>388.28</td></tr>
<tr><td>F2</td><td>995.33</td><td>784.96</td></tr>
<tr><td rowspan="4">phrase</td><td rowspan="2">chrome</td><td rowspan="2">word list</td><td rowspan="2">P08</td><td>F1</td><td>614.59</td><td>405.72</td></tr>
<tr><td>F2</td><td>1072.70</td><td>851.19</td></tr>
<tr><td rowspan="2">rollers</td><td rowspan="2">word list</td><td rowspan="2">P08</td><td>F1</td><td>679.09</td><td>Word interrupted</td></tr>
<tr><td>F2</td><td>1335.51</td><td>Word interrupted</td></tr>
<tr><td colspan="2" rowspan="2">holey</td><td rowspan="2">word list</td><td rowspan="2">P18</td><td>F1</td><td>530.87</td><td>362.60</td></tr>
<tr><td>F2</td><td>1437.69</td><td>1511.18</td></tr>
</table>

8.6. Texts

Text 1: Martin

Martin loves it when it's his birthday. He loves the attention, the presents, the cake… the whole day is his to enjoy. He loves big parties and a lot of fuss. Last year was a quiet one, though – a bit of a let-down, to be honest. He had a picnic, went bowling with some friends, and then went out for some drinks, before heading back and going to bed. Nothing special. And his presents were a bit disappointing, too. Some deodorant (does he smell or something?), some cheap novelty socks (which are now either unravelling or holey), some chocolate (he's lactose intolerant)… It was a disaster.

This year, however, is going to be different. For his birthday, Martin's girlfriend is taking him on holiday: a three-week trip around Europe! He'll visit Spain, Denmark, Germany… He's especially looking forward to Poland. This is where his grandfather is from, and it's shocking that Martin has never been there before, considering he himself is a quarter Polish. And the south of France is going to be just incredible. Oh, just the thought of it makes Martin want to jump on a plane and go there right now!

Words analysed: *whole, bowling, holey, Poland, Polish, oh, go*

Text 2: Vanessa

Vanessa had a vivid imagination and an adventurous spirit. She often dreamt of exploring rainforests, traversing deserts, climbing mountains and travelling to the Arctic. In fact, ever since she saw the big white fluffy polar bears and the cute penguins at the zoo she has longed to travel to the North and South Pole and see some in the wild one day. One of her biggest dreams was to swim with sharks, and it was her goal to make this happen as soon as possible. She could only hope she could somehow get the money together to go on her first big adventure next year. Who knows, maybe she'd even sail around the world one day. She had visions of herself in her little wooden boat with her little compass and map, and she would take the oars and row from one country to the next. But she never told anyone about these dreams – they were her secret ambitions.

Words analysed: *polar, pole, goal, hope, boat, row, told*

Text 3: Felix

Felix had just turned four, but he was a clever young boy. He could already count to fifty, write short sentences and draw quite elaborate pictures. He was also a master at tying his shoelaces. He loved making a tight knot and tying the laces in a neat bow. He could ride a bike – well, a tricycle – and his dad didn't even have to hold him steady. While all the other kids in his nursery class seemed to be wholly dependent on their parents, he could actually get on with things pretty well on his own. He could play hopscotch, he could run extremely fast for a four-year-old, and there was nothing he loved more than a good roly poly. In fact, one time he rolled so far down a hill, he made himself dizzy and couldn't stand up again!

As well as being very talented, he was also very well-behaved. His nursery teacher always told his parents that he was a little angel. "What a good little boy!", they said. "As good as gold!", they often wrote. His parents were very proud, and couldn't wait to see what the future held for their son.

Words analysed: *bow, hold, wholly, roly poly, rolled, gold, wrote*

Text 4: Melissa

It was the summer holidays, and Melissa was so bored. She lived in the middle of the countryside, and there's not much to do. Her sister had tried and tried to entertain her: she had taken her to the local farm, where she stroked a cow, made friends with a goat, and watched the sheep snooze in the shade. Thrilling. She had taken her to the lake, where Melissa was so unimpressed, she didn't so much as dip her little toe into the water. Boring! Melissa's sister had to think of something…

One day, as Melissa was eating her cereal, her sister bounded into the kitchen. She squealed: We're going to a theme park! Melissa jumped up in delight, knocking over her bowl in the process. She'd never been to a theme park before! She'd been to the village fair a few times – they had a tombola and sack races and a competition for the best homemade jam… Not quite the thrilling fairground rides she'd dreamt of. The closest she'd ever come to a fairground ride was speeding up and down her street on her roller blades. Imagine what a real-life roller coaster would be like! She wondered, is it safe? Do you have to wear a helmet? Could she fall out of the rides? Maybe she should bring her goalie gloves for extra grip… She had no idea what was in store for her, and she loved the suspense. This summer would definitely be the best yet!

Words analysed: *goat, toe, bowl, tombola, roller, roller coaster, goalie*

Text 5: Darren

Darren went through to the back room and took off his robe. He felt a pang of sadness. His church services are nowhere near as well-attended as they used to be. Unless it's a wedding or a funeral, the place is pretty much desolate. Just three people in the so-called choir tonight, and one lonely bell-ringer, for a congregation of four. He slumped in his chair and listen to the bell toll outside. How could he get more people through the doors? He would have to do something bold, something unexpected and radical. He would obviously keep all the holy days as they are, but the regular services needed a complete rethink. He let his head sink back into the chair and listened as the bell continued tolling, resonating hauntingly through the church hall. Such a beautiful sound, and such a shame there was only one bell-ringer… His eyes flashed open. He smiled – he had the answer.

Words analysed: *toll, bold, holy, tolling*

Text 6: Sally

Being seventy doesn't mean you can't be young at heart, and Sally was the perfect example of this. She was the epitome of eccentricity. In fact, she was one of the strangest people you could meet. She lived in a repurposed abattoir, painted people's feet for fun, had a pet toad called Prudence, and refused to speak to anyone who had the letter T in their name. She loved her swivel chair above all things. To be fair, it was a thing of beauty. It had red leather padding, sparkling chrome rollers, and it made the most glorious squeaking sound when you roll along in it. She liked to take it into the garden and race Prudence to the pond. She would use whatever instrument she could find to push herself along – a rake, a hoe, a broom – and propel herself towards the other end of the lawn. One time she didn't look where she was pushing herself, and suddenly – woah! – one of the wheels dropped into a hole, and she sunk down into the mud! That was the only time Prudence ever won a race against her!

Words analysed: *toad, chrome rollers, roll, hoe, woah, hole*

8.7. Word list

Part 1: Single words

Birthday	Swim	Hoot	Pretty
Hole	Possible	Fact	Shoot
Germany	Take	Mute	Short
Socks	Dream	World	Poland
Grandfather	Money	Zoo	Bike
Fuss	Bowl	Plate	Six
Honest	Wooden	Roll	Mate
Three	Day	Big	Shoelaces
Unravelling	Tombola	First	Toad
Chocolate	Fluffy	Scoot	Knot
Go	Deserts	Compass	Seem
Different	Shark	Four	Teacher
Attention	One	Sharks	Run
Consider	Often	Wake	Oh
South	Hold	Tolling	Flute
Incredible	Rake	Hopscotch	Great
Cake	Long	Hill	Playground
Toe	Explore	Newt	Wrote
Bake	Adventurous	Tricycle	Create
Cheap	Goal	Two	Sentences
Bed	Against	Actually	Elaborate
Enjoy	Put	Whole	Turned
Row	Five	Nursery	Bowling
Europe	Holy	Rate	Had
Party	Cute	Hoe	Broom
Flake	Bell	Speeding	Far
Vivid	Rainforest	Summer	Hope
Spirit	Have	Wait	Bored
Boat	Toll	People	Sister
Arctic	Penguin	Goat	Suspense

Eight
Theme
Bounded
Tried
Spain
Bold
Dizzy
Middle
Cow
Water
Park
Jumped
Gold
Delight
Ten
Snooze
Cereal
Goalie
Village
Sack
Thrilling
Friends
Broken
Holey
Unimpressed
Something
Taken
Quite
Hate
Lived
Told
Lake
Competition
Blades

Fairground
She
Nine
Rolled
Eating
Future
North
Did
Holidays
Pole
Sheep
Before
Maybe
Store
Woah
Wait
Congregation
Sadness
Denmark
Chair
Much
Back
Desolate
Roller
Funeral
Pang
Took
Seven
Shook
Choir
Polar
Beautiful
Answer
Door

Service
Ringer
Nowhere
Through
Wholly
Felt
Eccentric
Something
Book
Name
Regular
Attended
Days
Sound
Polish
Young
Swivel
Example
Instrument
Propel
Strange
Eleven
Sparkling
Prudence

Part 2: Phrases and compounds

Big adventure	Nothing special	Roly poly
Short sentences	Novelty socks	Very talented
Secret ambitions	Lactose intolerant	Little angel
Cute penguins	Three weeks	Summer holidays
Beautiful sound	Looking forward	Fairground ride
Right now	Swivel chair	Village fair
Vivid imagination	Back room	Theme park
Adventurous spirit	Perfect example	Homemade jam
Traversing deserts	Chrome rollers	Bow tie
Biggest dreams	Tight knot	Church services
One day	Nursery teacher	Bell-ringer
Little compass	Play hopscotch	Squeaking sound
Roller coaster	Extremely fast	One time
Let down	Well-behaved	At last

8.8. Questionnaire (blank)

QUESTIONNAIRE

- **Project ID of participant:** ______________
- **Name:** ____

This will not be published.

- **Email address:** ____

This will only be used for important correspondance and will not be published.

SOCIODEMOGRAPHIC DATA ***(important for the analysis – this will be anonymised)***

- **Age** (years): __________
- **Gender** (please tick one option): ☐ male ☐ female ☐ other
- **Highest qualification** (please tick one option):

  ☐ university degree (please specify): ______________________________________

  ☐ A-Levels ☐ GSCE ☐ none
- **Nationality:** ____
- **Place of birth (town, county, country):** ____________________________________
- **Please list all places of residence (town & country) and period of residence:**

  1. (Current residence) ____

     since ______________________ (year)
  2. **Place:** ____

     from ______________________ **until** ______________________ (year)
  3. **Place:** ____

     from ______________________ **until** ______________________ (year)
  4. **Place:** ____

     from ______________________ **until** ______________________ (year)
  5. **Place:** ____

     from ______________________ **until** ______________________ (year)
  6. **Place:** ____

     from ______________________ **until** ______________________ (year)

TEACHING ENGLISH

■ **Are you currently teaching English?** (Please tick one option): ☐ Yes ☐ No

► If yes, **who do you teach?** Please tick one option:

☐ exclusively non-native speakers

☐ mainly non-native speakers

☐ both native and non-native speakers (roughly equal proportion)

☐ mainly native speakers

☐ exclusively native speakers

► **Where do you teach regularly?** Please tick all that apply:

☐ Austria

☐ England

☐ Other parts of the UK (please specify): ______________________________

☐ Other European countries (please specify): ___________________________

☐ Countries outside of Europe (please specify): _________________________

► **In what capacity do you teach?** Please tick all that apply:

☐ secondary school teacher (Austria: AHS, BHS, ...)

☐ secondary school language assistant (Austria: AHS, BHS, ...)

☐ primary school teacher

☐ primary school language assistant

☐ project-based teaching (e.g. English in Action)

☐ university / college (with focus on language competence)

☐ private tuition

☐ other (please specify): ____

► **What role does pronunciation play in your classes?**

Please tick all that apply:

☐ It's important that my students acquire a native-like accent

☐ If I can understand my students, it doesn't matter what accent they have

☐ I try to be a good pronunciation model for my students

☐ My own pronunciation doesn't matter much

☐ I make a conscious effort to speak extra clearly in my classes

☐ I make a conscious effort to speak naturally in my classes

☐ I don't tend to pay attention to my own pronunciation in my classes

► **How often do you explicitly focus on pronunciation as a topic in your classes (e.g. drilling, pronunciation practice, transcription, corrections, etc.)?**

Please tick one option:

☐ Every class

☐ Regularly

☐ Every now and then

☐ Rarely

☐ Never

LANGUAGES

- **Is English your first language?** (please tick one option): ☐ Yes ☐ No

- **Do you have any other first languages?** (please tick one option): ☐ Yes ☐ No

  ► If yes, please specify: ____

- **Do you speak any other languages?** (please tick one option): ☐ Yes ☐ No

  ► If yes, please specify (please give an approximate level, e.g. fluent, A-Level, GSCE, B2, basic knowledge, etc.):

  ____

  ____

  ____

  ____

- **Did your parent(s)/guardian(s) speak with an accent other than a southern British variety when you were growing up?** (please tick one option):

  ☐ Yes ☐ No

  ► If yes, please specify: ____

With my signature I expressly confirm that I have provided my personal data voluntarily for academic and scientific purposes. I can request access to this questionnaire at any time.

______________________________ ______________________________

Place, date Signature of participant

8.9. Abstract (English)

The so-called GOAT-GOAL distinction is a well-known feature of Standard Southern British English (SSBE) and has been widely documented since the general centralisation of the diphthong /əʊ/ started to become standard in the 20th century (Wells 1982a: 237). This split concerns the more contemporary central pronunciation of /əʊ/ and the markedly more back variant approaching [ɒʊ]. It has thus far been assumed that the frontness of /əʊ/ is mainly dependent on the presence or absence of a following dark [ɫ] respectively. This thesis aims to investigate whether this is truly the case, or whether there are more factors involved in the realization of /əʊ/. Furthermore, it has occasionally been remarked that this split may be phonemic and not simply phonetic in nature, with the central and back variants now potentially constituting distinct phonemes (Wells 1982b: 312). In spite of such claims, the symbol /əʊ/ prevails as the solitary phonemic notation for both variants in SSBE, and the question still persists as to whether two phonemes now exist. This thesis contributes to the debate by providing empirical data and exploring arguments for and against the establishment of a new phonemic category. To this end, 14 L1 speakers of SSBE were recorded producing the diphthong /əʊ/ in a range of phonetic environments as part of coherent texts and a word list. The data was analysed both auditorily and acoustically using *Praat* (Boersma & Weenink 1992). The results indicate that the dark [ɫ] is a primary factor involved in the frontness of /əʊ/, but also that morphology and speaker-specific aspects such as personal preference play a role. It is concluded that /əʊ/ and /ɒʊ/ can be considered distinct phonemes, but that it may take more time before these categories are recognised and internalised by the majority of the language community.

8.10. Abstract (German)

Die sogenannte ‚GOAT-GOAL‘-Teilung stellt eine bekannte Eigenschaft des südbritischen Standards, *Standard Southern British English* (SSBE), dar und wurde weitgehend dokumentiert, seitdem die allgemeine Zentralisierung des Diphthongs /əʊ/ im 20. Jahrhundert zur Standardaussprache wurde (Wells 1982a: 237). Bei dieser Spaltung handelt es sich um die neuzeitliche zentrale Aussprache von /əʊ/ und die deutlich zurückgezogene Variante [ɒʊ]. Bisher wurde angenommen, dass die horizontale Zungenlage bei der Artikulation von /əʊ/ hauptsächlich vom Vorhandensein bzw. Nichtvorhandensein eines folgenden dunklen [ɫ] abhängig sei. Ziel dieser Arbeit ist es, zu untersuchen, ob dies tatsächlich der Fall ist, oder ob mehrere Faktoren an der Realisierung von /əʊ/ beteiligt sind. Des Weiteren wurde im Schriftgut angemerkt, dass diese Teilung nicht nur phonetischer, sondern phonemischer Natur ist, und dass die zentrale Variante und die hintere Variante nun zwei verschiedene Phoneme darstellen (Wells 1982b: 312). Trotz solcher Behauptungen bleibt /əʊ/ das vorwiegende Lautzeichen für beide Varianten in SSBE, und die Frage, ob nun zwei Phoneme entstanden sind, bleibt offen und bedarf einer endgültigen Klärung. Diese Arbeit zielt darauf ab, zu dieser Debatte durch neue empirische Daten und eine Diskussion von Argumenten für und gegen die Einführung einer neuen phonemischen Kategorie beizutragen. Hierzu wurden 14 L1-SprecherInnen von SSBE aufgenommen, während sie den Diphthong /əʊ/ in verschiedenen phonetischen Kontexten und als Teil von kohärenten Texten und einer Wortliste produzierten. Die Daten wurden sowohl auditiv als auch akustisch mittels *Praat* (Boersma & Weenink 1992) analysiert. Die Ergebnisse zeigen, dass das dunkle [ɫ] ein Hauptfaktor bezüglich der Zungenlage bei der Aussprache von /əʊ/ ist, aber auch dass die Morphologie und personenspezifische Aspekte wie etwa individuelle Präferenz eine Rolle spielen. Es wird geschlossen, dass /əʊ/ und /ɒʊ/ als getrennte Phoneme betrachtet werden können, es jedoch länger dauern kann, bis diese Kategorien von der Mehrheit der Sprachgemeinschaft anerkannt und verinnerlicht werden.