

UNIVERSITY OF AMSTERDAM

Second Language Phonology:

The Perception and Production of Diphthongs by

Turkish L2 English Speakers and the Role of Motivation

in L2 learning

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BA Thesis English Language and Culture

28 June 2018

## **Acknowledgements**

I would like to thank my supervisor Dr. Hamann for her help and valuable feedback during the whole process. I would also like to thank Philippa Jackson for not only taking part as a participant but also for helping me set up one of the experiments. I am also grateful to every participant who took the time to take part in this study.

I have read the UvA guidelines on plagiarism and confirm that this thesis does not contain plagiarised material.

## Table of Contents

<b>Acknowledgements.....</b>	
<b>Table of Contents.....</b>	
<b>Abstract.....</b>	<b>1</b>
<b>1. Introduction.....</b>	<b>2</b>
<b>2. Theoretical Framework.....</b>	<b>5</b>
2.1. Perception and Production.....	5
2.2. Motivation in L2-Learning.....	7
2.3. Diphthongs in English.....	9
<b>3. Methodology.....</b>	<b>12</b>
3.1. Participants.....	12
3.2. Materials.....	12
3.2.1. Motivation: Interview.....	12
3.2.2. Production: Interview and Reading Task.....	13
3.2.3. Perception: AX Discrimination Task.....	13
3.3. Method.....	14
3.4. Analysis.....	15
<b>4. Results.....</b>	<b>18</b>
4.1. Motivation: Interview.....	18
4.2. Production Task and Interview.....	19
4.3. Perception.....	22
4.4. Combined Results.....	25
4.4.1. Production and Perception.....	25

4.4.2. Production and Motivation.....	26
4.4.3. Perception and Motivation.....	27
<b>5. Discussion.....</b>	<b>28</b>
5.1. Implications.....	28
5.1.1. Implications Perception and Production.....	28
5.1.2. Implications Production, Perception and Motivation.....	29
5.1.3. Limitations.....	31
<b>6. Conclusion.....</b>	<b>34</b>
<b>7. References.....</b>	<b>35</b>
<b>Appendices.....</b>	<b>41</b>

## **Abstract**

This study looked at the perception and production of two English diphthongs, [aɪ] and [aʊ], by Turkish L2 speakers who moved to England post-puberty. In addition to finding out whether perception and production were linked, it also looked at whether the motivation to learn an L2 would influence either the perception or production of the diphthongs. This was tested through three experiments: a reading task, an AX Discrimination Task, and an interview asking about participants' motivation in moving to England and their future plans. The results showed that participants did not show a relation between perception and production for the diphthongs.

Though a better perception of the [aɪ] diphthong lead to a better production of the F2 of the [aɪ] diphthong, this was just a small difference. A better perception of the [aʊ] diphthong did not lead to a better production, either. Motivation seemed to have an influence on perception but not production. Participants who were planning on staying perceived the diphthongs slightly better. This was not the case for production. In fact, participants who planned on returning had better production than participants who were planning on staying.

## 1. Introduction

Whereas most people will not have any difficulty acquiring their first language (L1), a second language (L2) as an adult is seldom acquired in a native-like fashion. This is especially true when it comes to mastering the phonology of an L2 (Young-Scholten, 1993; Major, 2001). Most adult speakers, however advanced, still do not show the same proficiency as children when it comes to phonology (Fathman, 1975; Singleton, 2001; Sang, 2017).

There are different theories that explain this phenomenon. The Critical Period Hypothesis (CPH: Lenneberg, 1967) argues that it is difficult for speakers to obtain a native-like acquisition in an L2 after a certain age, particularly in phonology, due to "neurological changes in an individual's brain" (Jedynak, 2009, p. 40). Other studies, however, have argued that the critical period is not the only determiner (Flege et al, 1995; Flege, Yeni-Komshian, & Liu, 1999; Tsukada et al., 2005). An example is Flege's Speech Learning Model (SLM) which proposes that the acquisition of an L2 is not restricted by a critical period and that speakers can access "the language-specific properties of their L1" throughout their lifetime (Flege, 2007, p. 366). Furthermore, the SLM holds that speakers will be able to perceive and produce sounds that have a greater perceived phonetic dissimilarity between an L2 speech sound and the closest L1 sound while sound pairs with a "minimal differences" are difficult to notice which therefore may result in the speaker not acquiring them (Major, 2004, p. 72).

Another aspect that may have an influence on L2 speakers' "willingness to sound just like members of the L2-speaking culture" and how attached they feel to their L1 speaking community is the age during which a speaker moves to another country (Flege, 1987, p. 171). Some speakers "might wish to retain some features of the L1 in their L2-accent to mark membership of a certain L1-group" where, even when a particular sound could be pronounced in

a native-like fashion, this is not done (Beinhoff, 2013, p. 65). Studies that have looked at the acquisition of phonology in relation to other factors such as a speaker's identity (Lybeck, 2002; Myriantopoulous, 2016), have shown that indeed multiple factors play a role in the acquisition of an L2 and that age is not the only factor affecting a speaker's accent. Therefore, this study will look at language acquisition in relation to speakers' desire to learn the language since "research that focuses on age at immigration, but neglects the links between age at immigration and life-course considerations, may overestimate the importance of age at immigration as a maturational marker" (Stevens, 1999, p. 556).

The present study will look at the acquisition of two English diphthongs by Turkish L2 English speakers living in the UK. Since diphthongs do not exist in the Turkish language (Yavuz, Balci, & Turan, 2000; Rogerson-Levell, 2011), it will look at both the perception and production of the diphthongs in order to see whether perception has an influence on production and whether a better perception leads to better production. In addition, as all participants are international students and have different plans regarding their future in the UK, the present study will also aim to look at differences between speakers by focusing on their motivation of moving to the UK. It will also look at their future plans to see whether this has an influence on their perception and production of the two English diphthongs, expecting that speakers with clear plans of moving back will have less accurate perception and production skills than those who want to stay in the UK.

While a lot of research on language acquisition has looked at the perception and production of vowels (Flege, MacKay, & Meador, 1999; Jia, Strange, Wu, Collado, & Guan, 2006; Ying Lin, 2013), most of them have focused on differences between age of arrival (AOA) and/or length of residence (LOR). The current study will look at both the perception and

production in relation to speakers' motivation, while keeping other variables, such as AOA and LOR, relatively constant.

The methodology for this study will consist of three parts: an interview, a reading task, and an AX Discrimination Task. The three tasks together will look at participants' production and perception of two diphthongs and ask about participants' motives in moving to the UK, what they think of life in the UK, and their future plans in terms of living in the UK. In this way, the results of the interview will serve two purposes. First of all, it is hoped that the interview elicit the relevant diphthongs. Though it is difficult to predict how many words containing a diphthong the participants will use during the interview, all the words containing the relevant diphthongs will be extracted from the responses and will be analysed. Secondly, the answers will be used in order to decide whether participants' future plans with regard to staying or leaving the UK have an influence on the perception and production of the diphthongs. The second task is a reading task and is intended to elicit the diphthongs. Both tasks will be recorded. The last task will look at the participants' perception of diphthongs using an AX Discrimination Task.

To sum up, this study will aim to answer the following questions: (1) Does better speech perception lead to better speech production? And (2) Do speakers who wish to stay in the UK have better perception and production skills than participants who wish to move back to Turkey? By doing this, this study will look at the acquisition of an L2 from a sociolinguistics perspective, hoping to shed more light on the factors that play a role during this complex process.



## **2. Theoretical Framework**

As mentioned before, L2 learners of a language may have difficulty in the pronunciation of the L2 target sounds. The Critical Period cannot be the only factor as it “assumes a biological link to accent which should operate more or less equally across learners” (Moyer, 2004, p. 18). Indeed multiple studies have shown that second language acquisition is not just a biological issue and that there are exceptional learners who do attain native-like competence in their L2, including accent (Ioup, Boustagui, El Tigi, & Moselle, 1994; Bongaerts, Mennen, & van der Slik, 2002). This chapter will discuss two other possible factors that may affect the acquisition of an L2 phonology more in-depth: the link between perception and production of new sounds in an L2 and an individual’s motivation in wanting to sound like a native speaker.

### **2.1 Perception and Production**

Flege (1998, p. 17) argues that speakers starting to learn an L2 “process L2 phonetic segments through the grid of their L1 phonology” as speakers who acquired their L1 “are language-specific” perceivers. The SLM argues that a variety of factors, such as an individual’s age of L2 learning and the perceived dissimilarity of an L2 sound from the closest L1 sound, determines whether a speaker will be able to correctly produce the L2 sounds. Sounds that are not perceived correctly will therefore not be produced correctly. This also means that as perception improves, production should improve, too (Munro & Bohn, 2007, p. 9).

One of the studies that looked at the production and perception of English vowels was conducted by Flege, Mackay and Meador (1999). This study looked at native Italian speakers who moved to Canada and had different AOAs. During the first experiment, the speakers’ production of 11 Canadian English vowels (/i ɪ e ε æ u ʊ o ʌ ɒ/) was assessed. It was expected

that the native Italian subjects' intelligibility scores would decrease as AOA increased. Also, it was expected that the early bilinguals who used Italian more often would produce English vowels more accurately than the speakers who used Italian less frequently. While the first hypothesis seemed to be correct, there was no correlation found for the second one. The second experiment looked at the speakers' perception using a categorial discrimination test. Participants had to listen to English – English (/u/ - /ʊ/, /æ/ - /ʌ/, and /ɒ/ - /ʌ/), English – Italian (/æ/ - /a/, /ʌ/ - /a/, /ʊ/ - /o/, /e/ - /e/), and Italian – Italian (/u/ - /o/, /e/ - /a/, /u/ - /i/) contrasts. It seemed that the later the native Italian subjects arrived in Canada, the less accurately they perceived English vowels. The late group, but not the early group, also obtained lower scores for the Italian – Italian contrasts. One explanation could be due to the fact that the late speakers did not form a category for specific English vowels and instead their L1 category changed due to assimilation.

A more recent study looking at both the production and perception of vowels is Rojczyk (2010). This study looked at the forming of new vowel categories in Polish learners of English. More specifically, it looked at the acquisition of the /i/ and /e/ vowels “[u]sing the metric of the Speech Learning Model” (Rojczyk, p. 93). Since English /i/ is different from both Polish /i/ and /i/, Rojczyk (2010) hypothesized that as speakers improved their English, they would start perceiving English /i/ as a distinct sound. As for the sound /e/, it was expected that a new category will not be formed and that instead this sound would be “wholly assimilated by Polish /ɛ/.” This is because the use of /ɛ/, instead of the English /e/, “will not seriously impair the communication” and therefore speakers would not find it necessary to form a new category for this particular sound (p. 88). The speakers for this study were learning English in their own country as a Foreign Language (FL) and were recorded pronouncing vowels after attending college and shortly before graduating. The results showed that English /e/ has indeed been

completely assimilated by the Polish sound /ɛ/ while a new category had been formed for the English /ɪ/, as was hypothesized.

Lastly, a study by Evans and Alshangiti (2018) looked at the link between perception and production of English vowels and consonants by Arabic learners of English. The speakers were divided into low proficiency (LP) and high proficiency (HP) groups. While the consonants were identified quite accurately overall, this was not the case for the vowels as even the HP group struggled with the recognition of vowels. An explanation for this is the fact that the speakers "were mapping the larger English vowel inventory to their smaller Arabic vowel system" (p. 29). The LP group, furthermore, had difficulty with the /e/ - /i/ distinction while the HP group was better at this distinction, suggesting the forming of a new category. The study also provided a link between production and perception as speakers who produced vowels better, perceived them better as well.

The results of these studies, then, suggest that a relationship between perception and production may exist and that age and proficiency may have an influence on both as well. The next section will look at another factor that might influence the perception and production of speakers, namely the motivation to learn a second language.

## **2.2 Motivation in L2-Learning**

Motivation is defined by Ellis (2008, p. 972) as "the effort that learners put into learning an L2 as a result of their need or desire to learn it." Gardner's Socio-Educational Model (1985) makes a further distinction between integrative and instrumental motivation in the acquisition of a foreign/second language. Instrumental motivation refers to the motivation arising from the desire

of reaching a particular goal while integrative motivation refers to a speaker's wish to identify with the L2-speaking community.

Another important aspect, therefore, is the feeling of "identity" of the speaker. Whereas an accent can be seen as something one should try to improve, it can also help identify someone "with a particular social group which may be an integral part of a person's identity" (Archibald, 1998, p. 33). According to Beinhoff (2013, p. 65), a speaker will be more motivated to "learn an L2 when she or he has some sense of identification with the L2-group."

A study that looked at language acquisition and this notion of moving back or staying in the L2 country is Drummond (2012). This study looked at Polish migrants who lived in Manchester, UK, and the acquisition of the local *-ing* variation. One of the questions this study asked was whether the pattern in the *-ing* variation between non-native speakers and native speakers would be similar or different. Therefore, it looked at three groups of Polish speakers in Manchester (speakers who wanted to stay in the UK, speakers who wished the return to Poland and speakers who had no plans regarding their future plans yet). The [ɪn] variant in this study has been reported to be the most L2 influenced *-ing* variant and the [ɪŋk] the most L1 influenced *-ing* variant. There indeed seemed to be a difference between the *ing* uses of the three groups as the results showed that speakers who intended to return exhibited "no [ɪn] tokens yet more [ɪŋk] tokens than the other two groups" while speakers who wished to stay in Poland exhibited all four *-ing* variants "to slightly different degrees" (p. 128).

Another study on Polish speakers was conducted in France by Regan (2013). The study aimed to look at whether language was linked to integration. It looked at the *ne*-deletion among speakers since deletion and retention of *ne* are a stable variable in spoken French and "is deleted variably to a great or lesser extent by all members of French-speaking communities throughout

the world” (Regan, 2013, p. 35). There were different features that influenced the deletion of *ne* such as LOR, age, gender and linguistic constraints. There were, however, individual differences as well. An example are two speakers, Mariusz and Anna, who showed interesting results. Anna oriented towards France and aimed to integrate into the local community. Furthermore, her whole family’s future was in France. She had the lowest *ne*-rate despite having the shortest LOR. Mariusz oriented more towards Poland: he had a Polish bookstore in France and "present[ed] himself as the embodiment of Polishness" (p. 43). He also had clear plans about returning to Poland. Despite his longest LOR, Mariusz had the highest *ne*-rate.

The final study that will be discussed here, looking at pronunciation, was conducted by Jiang, Green, Henley and Masten (2009). This study looked at acculturation in relation to pronunciation and oral speaking proficiency. The participants were 49 Chinese students studying at a university in Texas. Their language proficiency was assessed through two different methods: a reading task and a L2 proficiency interview. The Stephenson Multigroup Acculturation Scale was used in order to measure participants’ acculturation progress towards the ethnic society and the dominant society. The results of both the reading task and the interview showed that “the degree of immersion in American Society contributed to participants’ speaking proficiency but not pronunciation” (p. 488-9).

These findings, then, show that speaker’s motivation may influence the acquisition of an L2, though the results about pronunciation seem mixed.

### 2.3 Diphthongs in English

Whereas the quality of a vowel in a monophthong stays “more or less constant throughout the production” (Becker & Bieswanger, 2017, p. 57), a diphthong is a sound in which “there is an obvious change in the tongue or lip shape” (Collins & Mees, 2009, p.65). Furthermore, the first part of a diphthong in English is always longer and stronger than the second part (Roach, 2009, p. 17).

Whereas some argue that Received Pronunciation (RP) has nine diphthongs (McMahon, 2002; Lorenz, 2005), most seem to agree on eight diphthongs (Jones, 2006; Sethi & Dhamija, 2006; Roach, 2009; Hughes, Trudgill, & Watt, 2013). Of these eight diphthongs, three are categorised as centring and five as closing diphthongs. The centring diphthongs end in the central vowel [ə] as a result of [ɪ]-loss and therefore only occur in non-rhotic accents. The closing diphthongs end in the closing vowels [ɪ] or [ʊ]. Closing vowels “raise to a rather close position towards the end of their articulation” (p. 57). Figure 1 shows the diphthongs in RP according to Roach (2009, p.18).

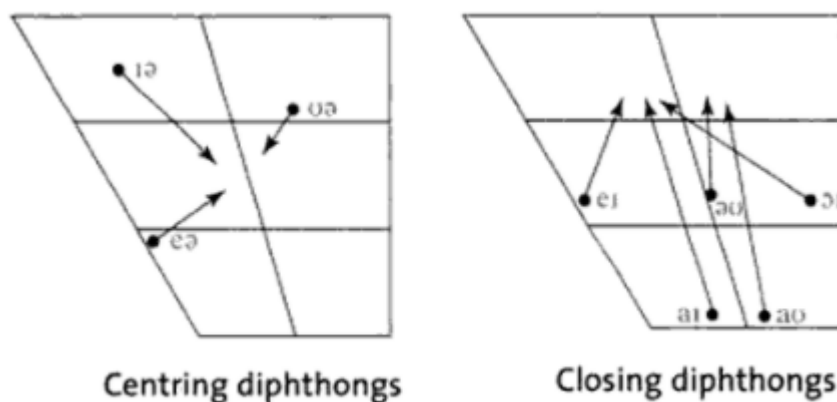


Figure 1 Diphthongs in RP by Roach (2009, p. 18)

In contrast, Turkish only has monophthongs, namely eight short vowels which tend to be shorter than the English vowels (Rogerson-Revell, 2010, p. 289). In order to look at the production and perception of the diphthongs by Turkish speakers, this study will look at two of the eight diphthongs for different reasons that will be outlined next.

First of all, all closing diphthongs were excluded from the study. Since the diphthong [ʊə] is “extremely rare” and many speakers pronounce it as [ɔ:] (Roach, 2009, p. 18), this diphthong was not be suitable for this study. Furthermore, in their analysis of the remaining centring diphthongs, Hughes et al (2013, p. 51-2) note that with the diphthongs [ɪə] and [eə] the tendency to monophthongise the vowel is "much more frequent" than the actual realisation of the diphthong. Therefore, these diphthongs were not suitable for the current study, either.

Two other diphthongs that were excluded from this study were [eɪ] and [əʊ]. Even though Rogerson-Revell (2011, p. 289) lists pronunciation difficulties for these two diphthongs for Turkish speakers and notes that Turkish speakers may confuse [eɪ] with [e], this is not a fit diphthong to look at in Newcastle upon Tyne (Newcastle hereafter) where the participants are living. Watt (1999) notes that monophthongal [e:] rather than the diphthong [eɪ] is the norm in Tyneside English. The same applies to the closing diphthong [əʊ] which is mainly pronounced as [ɔ:] in Tyneside English.

This leaves three diphthongs and this study only focused on [aʊ] and [aɪ] as the first part of these diphthongs have the same vowel quality and therefore [ɔɪ] will be the last diphthong to be excluded from this study.

### **3. Methodology**

#### **3.1 Participants**

Seven participants from Turkey living in Newcastle participated in this study. Since Newcastle does not have a big Turkish community, it was not possible to include many more participants.

Though not all participants moved to Newcastle at the same age, they all moved to Newcastle after puberty. Five of the participants moved to Newcastle immediately after graduating from high school whereas two moved to Newcastle 10 ten years after graduating from high school. These two participants had finished their bachelor's degree and came to Newcastle in order to do a Master's degree followed by a PhD degree. All participants spoke English as a second language and had Turkish as their native language. Participants reported not to speak any other language on a (near-) native level and none of them had a background in English (linguistics). They were students either at Newcastle University or Northumbria University and were collected through convenience sampling.

In addition to this, there was one native speaker from Newcastle who read the reading passage as her formant values served as a reference point.

#### **3.2 Materials**

##### **3.2.1 Motivation: Interview**

The questions for the interview asked about participants' reason(s) in moving to the UK and their future plans regarding to where they would want to continue their lives. The questions first of all covered basic facts about the participants such as their age and degree they study. After this, the



questions moved on to their language skills and their lives in the UK. It concluded with asking about participant's future plans in terms of staying or leaving the UK. A list of the interview questions can be found in Appendix 1.

### **3.3.2 Production: Interview and Reading Task**

The interview mentioned above was also used to extract and analyse words containing the relevant diphthongs.

In addition, there was also a reading task in order to elicit more diphthongs. The reading task consisted of eight sentences. There were twenty-two words containing the relevant diphthongs, both the [aɪ] and the [aʊ] diphthong occurred eleven times. The words were tried to keep monosyllabic in order to minimise the effect of the number of syllables on the pronunciation, though this was not always possible. Eighteen of the words containing the diphthongs were monosyllabic and four were disyllabic. The reading passage has been copied from the Speech Bank Archive and has been adjusted in order to elicit the right diphthongs for the task. The whole text can be found in Appendix 2.

### **3.2.3 Perception: AX Discrimination Task**

The AX Discrimination Task consisted of ten minimal pairs of each diphthong and fifteen similar pairs. The similar pairs consisted of five words of each diphthong and five words containing the long vowel [ɑ:]. All similar pairs were copied from Higgins (n.d.).

The words for this task were recorded by a native female speaker of Newcastle using a TASCAM DR-05 recorder. The word pairs used for this experiment can be found in Appendix 3.

### 3.3 Method

The experiment started with the interview in order to have a simple start in which the participants only had to answer a few questions about themselves. Furthermore, as this is the most informal speech elicitation task, it was hoped that it would not give away any clues of what sounds this study was looking at, as this could have been more obvious with the more formal reading passage or the AX Discrimination Task.

For the interview, it was expected that the questions would elicit answers about participants' reason in moving to the UK and their future plans regarding to where they would want to continue their lives. The interviews were held in a quiet room at the library that was booked in advance in order to eliminate background noise as much as possible. Before participants were interviewed, they were asked to sign a consent form. This form can be found in Appendix 4.

After the interview, the reading task followed. Even though the reading passage was set up in the style of a shopping list, the sentences were presented to the readers as separate, numbered sentences as to secure some pause between them and make sure none of the participants would read too fast. Participants were also told to take their time when reading the sentences and make sure not to read too fast.

The last experiment was the AX Discrimination Task which the participants took on a different day than the interview and the reading task. This task contained ten minimal pairs of each diphthong and fifteen similar pairs. The different pairs were presented to the speakers in both possible ways, A – B and B – A, and this led to a total of 55 different stimuli. Participants heard each pair three times. In total, this resulted in 165 stimuli. During the experiment, the

participants were in a silent room in order to minimize the background noises that could possibly distract them. The participants were told that they would hear two sounds and that they had to indicate whether it was the same or not by clicking the respective button with their mouse. They were also told that they could hear the sounds only one time. After participants indicated they understood the whole procedure, the real experiment started. There were no example trials. The experiment was conducted with Praat (Boersma & Weenink, 2018). Participants finished the experiment in around 15-20 minutes.

### **3.4 Analysis**

As mentioned before, the answers for the interview questions were analysed in two ways. First, the interview was analysed for the motivational aspect of the participants' answers. Participants were categorised according to two groups: (1) Participants who plan a future in the UK and (2) Participants who want to move back to Turkey. The main questions that were of particular interest for this section were "*What are you hoping to do when you graduate?*" and "*Where do you think you might live in the future?*" since these questions are oriented towards the participants' future and will tell more about what their plans are. Secondly, the sentences that contained the relevant diphthong(s) were analysed the same way the reading task has been analysed, as described below.

The reading task and the interview were analysed for the relevant diphthongs using Praat (Boersma & Weenink, 2018) and DARLA (Rosenfelder et al., 2014). First, the sound files have been uploaded on Praat in order to annotate each sound file in a TextGrid with only one tier called "sentence". Every clause or sentence has been annotated separately, with a maximum of two sentences per boundary as this is required by DARLA. When analysing the interview,

boundaries were only put before and after the interviewee's answer. By doing this, the interviewer's answers were omitted and were not analysed as these were not relevant. Sentences that did not contain any of the diphthongs were left out for analysis as well. These were most of the time not complete sentences as almost all of the sentences contained the word "I". Sentences left out were mainly a few repetitive phrases such as "... you know" and "so, yeah". In addition to this, some of the words of the interviewee had to be left out from analysis as well as the interviewer's answer merged with it (i.e. saying "okay" and "I see" while the interviewee was still talking). Furthermore, there were two instances where two different participants were mimicking someone and these have been omitted as well as they changed their voice and accent a little.

After this, the TextGrid and sound file together were uploaded in DARLA. Though this study will not make a distinction between the differences of males and females, the settings in DARLA were set for the right sex in order to have more accurate results. Furthermore, even though there was an option to omit stop words (words such as "ah", "and", "um", and a few abbreviations that are commonly used, such as "we'll" and "we're"), this was not done. The list of stop words included "I'm" as well and these tokens were necessary for the analysis as they included the [aɪ] diphthong.

This provided a document with the vowel formants of the respective sound files. This study looked at the F1 and F2 formants values at both 20 and 80 percent. The F1 indicates the vowel height while the F2 indicates the backness of a vowel (Greenberg, Ainsworth, Popper, & Fay, 2004, p. 117). In order to see whether the two diphthongs were realised as monophthongs or as diphthongs it was necessary to look whether there was any movement in the vowel formants. Therefore, the average of the participants' vowel formants in Hz per diphthong per formant was

calculated first. The vowel formants in Hz were then converted into ERB (Moore & Glasberg, 1983). After this, the differences between the F1 and F2 at 20 and 80 percent were calculated in order to see the movement in the vowel formants and “[t]he bigger the difference the easier it will be to hear the offglide” (Wright & Nichols, 2015, p. 2). These values were compared to the native speaker’s formant values. The native speaker’s values were namely considered as 100% diphthongisation and participants who have a formant value that is least 75% of the native speaker were categorised as “native” and participants with a formant value below 75% were categorised as “non-native”.

The results for the AX Discrimination Task have been analysed individually for each participant and word pair. The results also looked at each diphthong combined. The “same” words that did not contain any diphthong and only the long vowel were left out of analysis as this was of no interest for the current study. The results of the AX Discrimination Task were extracted into tables using Praat after each participant was done. These were converted into graphs using Excel. Participants were categorised as native if they perceived 75% of the minimal pairs as correct.

Both the perception and production tasks were also analysed by looking at the two different groups: the ones that are staying and the ones that are planning on leaving.

## **4. Results**

### **4.1 Motivation: Interview**

The participants for this task were categorised according to two groups (1) Participants who plan a future in the UK and (2) Participants who want to move back to Turkey.

One of the participants who said that she had to go back to Turkey even though she would have thought about staying in the UK if she had had the chance, was placed in the first group. This was done because she knew she had to go back since the first day she came to the UK as the scholarship she received from Turkey's government required her to go back to Turkey and work there. Therefore, she simply has been analysed as someone who is moving back to Turkey. In addition, a few participants indicated that, at some point, maybe they would move back. When asked further about what exactly they wanted to do, however, they seemed to have a clear plan in one of the two countries. They have been placed accordingly in either group 1 or 2, regardless of the fact that maybe they could change their mind again later.

The participants who wanted to stay gave several reasons: one indicated he liked studying here and the fact that he could travel so much now he had moved to England. Another participant stated that she liked her life in England now and that she did not want to leave her life in England behind, even though her family would like for her to go back at some point. The last participant wanted to stay in England as he had plans of starting his own business here. He did not think of moving back to Turkey yet due to the economic situation, though he did not rule out going back at some point.

Two of the four participants who indicated they would move back to Turkey said that they had to move back to Turkey due to a scholarship that was granted to them by Turkey's

government. Still, one of these participants made it very clear that he would have moved back to Turkey anyway. The other participant would have thought about staying in England would this have been possible. The last participant in this group also indicated a similar reason indicating that she identified and felt more Turkish than British.

The total gives three participants who want to or will stay in England and a total of four participants who have clear plans of moving back. Table 10 gives an overview of how long each participant has been in England already and a short summary of why every participant wants to stay or move back. Interview transcripts for each participant can be found in Appendix 5.

Participant	LOR in months	Future Plan	Reason
1	12	Stay in the UK	He likes life better in the UK
2	12	Move back to Turkey	She is used to her own (Turkish) culture and traditions
3	36	Stay in the UK	She likes life better in the UK
4	14.5	Move back to Turkey	Scholarship from Turkey that requires him to go back. Also wants to go home himself.
5	15	Move back to Turkey	Scholarship from Turkey that requires her to go back
6	36	Stay in the UK	Has plans of starting his own business in the UK
7	24	Move back to Turkey	Still feels "Turkish" and feels more home in Turkey

*Table 1 Overview of participants' LOR and future plans*

#### **4.2 Production: Reading Task and Interview**

The participants eventually did not use a lot of words eliciting the diphthongs during the interview. When they did use words containing the two relevant diphthongs, the words were very often the same (e.g. *I, high, life, about*). Particularly the [aʊ] diphthong was difficult to elicit, with much less tokens than the [aɪ] diphthong. Nevertheless, these were extracted and analysed together with the relevant words from the reading passage.

Table 2 shows the native speaker's vowel formants in Hz. It shows the average values for the F1 and F2 at both 20 and 80 percent. Table 3 shows the difference in formant values in ERB for the native speaker. The differences of the ERB values between the F1 and F2 of the native speaker served as a reference point and were considered as 100% diphthongization when calculating the values for the participants.

Diphthong	Mean F1 at 20%	Mean F1 at 80%	Mean F2 at 20%	Mean F2 at 80%
[aɪ]	647	370.7	1329.1	1508.6
[aʊ]	855.4	573.9	1610.5	1227.7

*Table 2* Formants in Hz Native Speaker

Diphthong	Mean F1	Percentage	Mean F2	Percentage
[aɪ]	3.6	100%	1.04	100%
[aʊ]	2.88	100%	2.21	100%

*Table 3* Differences (in ERB) in formant values for the Native Speaker

The differences (in ERB) in formant values of the native speaker for the F1 is much bigger than the F2 for the [aɪ] diphthong. This means that the movement is larger in the F1 than the F2. As for the [aʊ] diphthong, the F1 is again larger than the F2, but smaller than the difference for the [aɪ] diphthong.

Table 4 shows the average vowel formants in Hz for the participants for both tasks combined for the [aɪ] diphthong. Table 5 shows the ERB values and the percentage of diphthongization and whether the participants are categorised as native or non-native like.

Participant	Mean F1 at 20%	Mean F1 at 80%	Mean F2 at 20%	Mean F2 at 80%
1	679.8	570.4	1625.5	1850
2	594.5	539.5	1434.7	1716.9
3	640.4	548.1	1430.3	1805.9
4	638.4	573.3	1437	1620.9
5	567.3	522.7	1289.1	1622



6	518.3	444	1394.6	1523.1
7	638.9	497.9	1423.4	1673.7

*Table 4* Formants in Hz Participants Combined for [aɪ] Diphthong

Participant	Difference F1	% Diphthongization	Category	Difference F2	% Diphthongization	Category
1	1.23	34.2	NN	1.07	102.9	N
2	0.66	18.3	NN	1.48	142.3	N
3	1.07	29.7	NN	1.92	184.6	N
4	0.74	20.6	NN	0.99	95.2	N
5	0.55	15.3	NN	1.88	180.8	N
6	0.99	27.5	NN	0.72	69.2	NN
7	1.69	46.9	NN	1.33	127.9	N

*Table 5* Differences (in ERB) in formants values and Percentage Diphthongisation Participants for [aɪ] Diphthong

Table 4 shows that none of the participants pronounced the F1 of the [aɪ] diphthong in a native-like fashion as they all have a diphthongization level of less than 75%. Participant 7 has the highest rate, 46.9%, which still does not come close to the native-speaker's values. The realisation of the F2 of the diphthong, however, was realised native-like by six participants, and only participant 6 was classified as non-native. Five participants even had a higher value than the native speaker for the F2.

Table 6 and 7 show the same information for the [aʊ] diphthong.

Participant	Mean F1 at 20%	Mean F1 at 80%	Mean F2 at 20%	Mean F2 at 80%
1	704.5	644	1523.7	1358.4
2	658.2	617.5	1872	1784.6
3	704.6	626	1629.9	1367.7
4	741.4	516.3	1354.1	1235.2
5	594.9	536.2	1268.4	1340.2
6	556.3	571.8	1216.1	1355.5
7	656.7	534.9	1549.4	1248.4

*Table 6* Formants in Hz Participants Combined for [aʊ] Diphthong

Participant	Difference	%	Difference	%
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	F1	Diphthongization	Category	F2	Diphthongization	Category
1	0.64	22.2	NN	0.94	42.5	NN
2	0.45	15.6	NN	0.4	18.1	NN
3	0.85	29.5	NN	1.44	65.2	NN
4	2.52	87.5	N	0.74	33.5	NN
5	0.4	13.9	NN	0.45	20.4	NN
6	0.19	6.6	NN	0.88	39.8	NN
7	1.41	49	NN	1.76	79.6	N

*Table 7* Differences (in ERB) in formants values and Percentage Diphthongisation Participants for [aɪ] Diphthong

Table 7 shows that for the [aʊ] diphthong the F1 was pronounced native like by only one (participant 4) out of seven participants. Unlike the [aɪ] diphthong, the F2 was also pronounced native like by only one out of seven participants (participant 7).

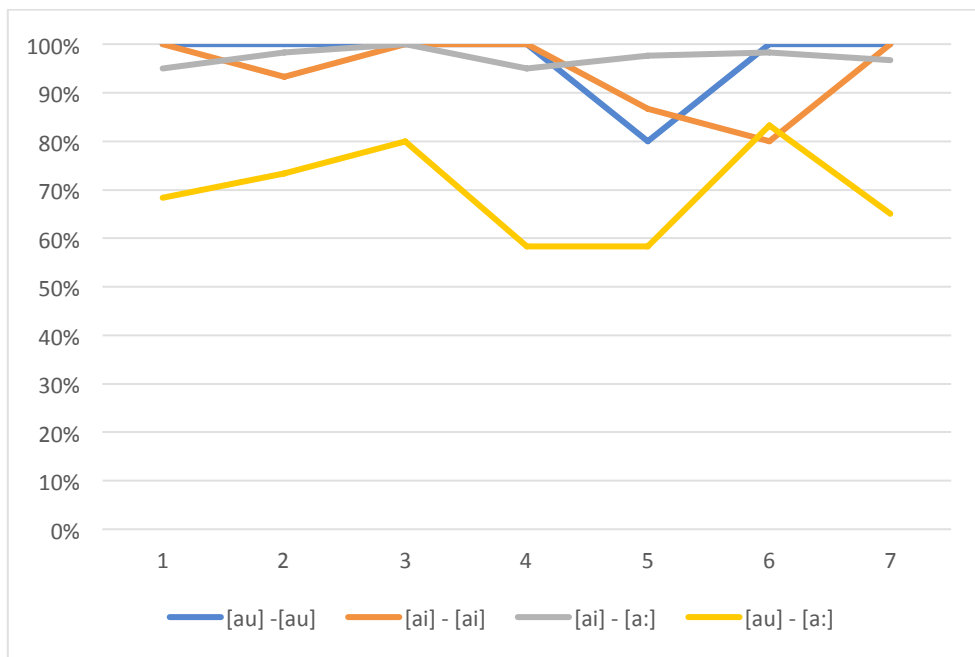
### 4.3 Perception

The results of the AX Discrimination Task have been analysed in three different ways.

Table 8 and Graph 1 show the correct answers in percentage for each participant for each word pair containing a diphthong. It shows that most of the correct answers were given for the [aʊ] – [aʊ] word pairs while the most incorrect answers were given for the [aɪ] - [a:] minimal pairs.

Participants	[aʊ] - [aʊ]	In %	[aɪ] - [aɪ]	In %	[aɪ] - [a:]	In %	[aʊ] - [a:]	In %
1	15/15	100	15/15	100	57/60	95	41/60	68.3
2	15/15	100	14/15	93.3	59/60	98.3	44/60	73.3
3	15/15	100	15/15	100	60/60	100	48/60	80
4	15/15	100	15/15	100	57/60	95	35/60	58.3
5	12/15	80	13/15	86.7	58/60	96.7	35/60	58.3
6	15/15	100	12/15	80	59/60	98.3	50/60	83.3
7	15/15	100	15/15	100	58/60	96.7	39/60	65

*Table 8* Correct Answers for each Word Pair Containing a Diphthong

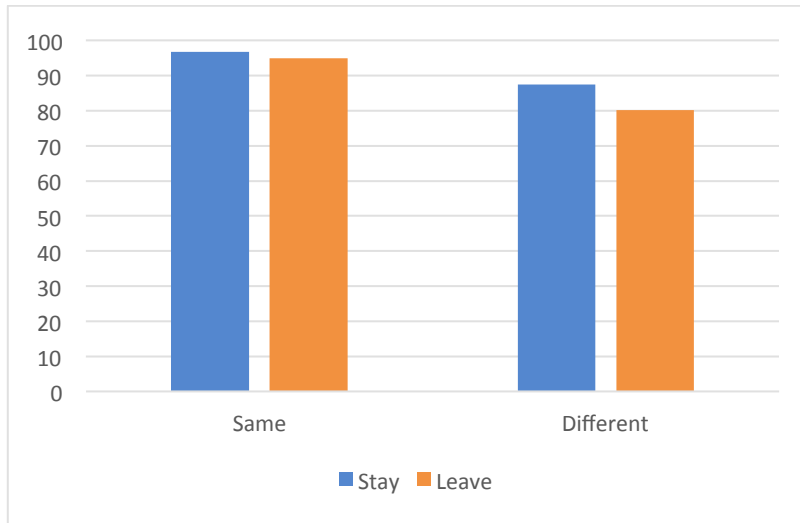


*Graph 1* Correct Answers for each Word Pair Containing a Diphthong per Participant

Furthermore, table 9 and graph 2 show the correct answers in total according to the two groups the participants were categorised as: staying in the UK or moving back to Turkey.

Group	Same	Same in %	Different	Different in %
Stay	87/90	96.7	315/360	87.5
Leave	114/120	95	385/480	80.2

*Table 9* Correct Answers for each Group



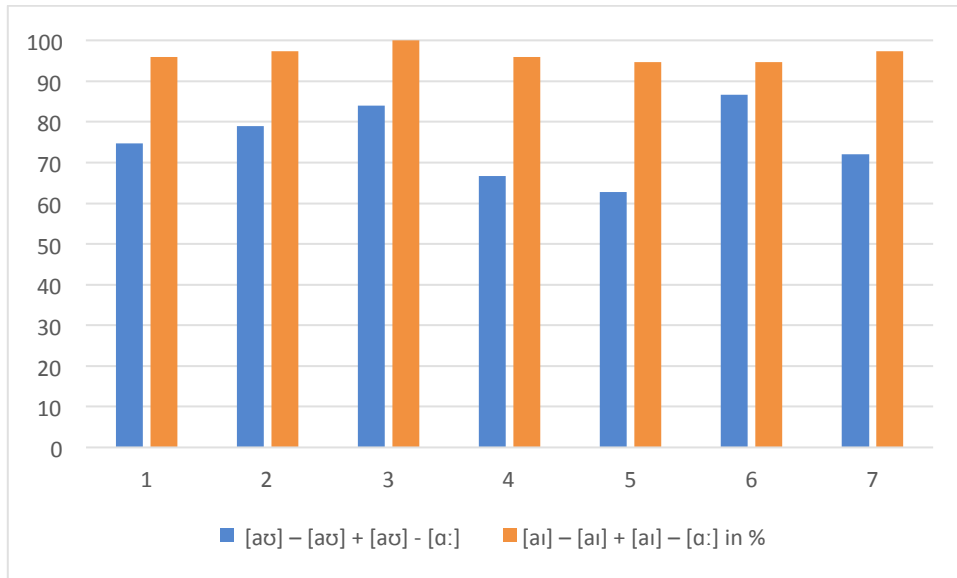
Graph 2 Correct Answers for each Group in Percentages

The group of three participants who will stay in the UK has slightly more correct answers for the *same* category (1.7%), though it is a very small difference. The difference in the *different* category is slightly bigger (2.3%), where the group that will stay in the UK again has a greater amount of correct answers.

Table 10 and graph 3 show the correct answers for which the minimal pairs containing either diphthong were combined. Table 10, in addition, shows whether the participant is categorised as native or non-native like according to the percentage correct answers.

Participant	[aʊ] – [aʊ]	[aʊ] – [aʊ]	Category	[aɪ] – [aɪ]	[aɪ] – [aɪ]	Category
	+ [aʊ] - [a:]	+ [aʊ] - [a:] in %		+ [aɪ] - [a:]	+ [aɪ] - [a:] in %	
1	56/75	74.7	NN	72/75	96.0	N
2	59/75	78.9	N	73/75	97.3	N
3	63/75	84.0	N	75/75	100.0	N
4	50/75	66.7	NN	72/75	96.0	N
5	47/75	62.7	NN	71/75	94.7	N
6	65/75	86.7	N	71/75	94.7	N
7	54/75	72.0	NN	73/75	97.3	N

Table 9 Correct Answers per Diphthong



Graph 3 Correct Answers per Category in Diphthong

All answers including the reaction time for each participant for the AX Discrimination Task can be found in Appendix 6.

## 4.4 Combined Results

### 4.4.1 Production and Perception

Table 11 shows each participant and whether the F1 and F2 of each diphthong was realised native like or non-native like. Next to it is shown whether the perception of each diphthong was native like or non-native like to see if there is a relation between production and perception.

Participants	[aʊ] F1	[aʊ] F2	Perception [aʊ]	[aɪ] F1	[aɪ] F2	Perception [aɪ]
1	NN	NN	NN	NN	N	N
2	NN	NN	N	NN	N	N
3	NN	NN	N	NN	N	N
4	N	NN	NN	NN	N	N
5	NN	NN	NN	NN	N	N
6	NN	NN	N	NN	NN	N
7	NN	N	NN	NN	N	N

Table 11 Production and Perception for Both Diphthongs Combined

Three of the participants scored native like on the perception of [aʊ], but non-native like on the production of both the F1 and the F2. Two participants who scored non-native like on the perception, scored a native like on either the F1 or the F2. Another two participants scored non-native like on both tasks.

As for the [aɪ] diphthong, all seven participants scored native like on the perception but six produced only the F2 in a native-like manner. The F1 is realised as non-native by all participants.

The results given above seem to suggest that better perception for the [aʊ] does not necessarily lead to a better production of the diphthong while a good perception of the [aɪ] diphthong does seem to lead to a better production of only the F2 of the diphthong.

#### 4.4.2 Production and Motivation

Table 12 shows the relation between the production of both diphthongs and participants' motivation. The “leave” group produced either the F1 or the F2 native like in five of the 16 cases (31.3%). The “stay” group produced either the F1 or F2 native like in two out of 12 cases (16.7%). This means that participants who wish to stay in the UK did not produce the diphthongs in a more native like fashion than the group who will leave. In fact, the “stay” group produced the either formant of the diphthongs in a native-like manner almost twice as much.

Participants	[aʊ] F1	[aʊ] F2	[aɪ] F1	[aɪ] F2	Motivation
1	NN	NN	NN	N	Stay
2	NN	NN	NN	N	Leave
3	NN	NN	NN	N	Stay
4	N	NN	NN	N	Leave
5	NN	NN	NN	N	Leave

6	NN	NN	NN	NN	Stay
7	NN	N	NN	N	Leave

*Table 12* Production and Motivation Combined

#### 4.4.3 Perception and Motivation

Table 13 shows the relation between the perception of both diphthongs and participants' motivation. Participants from the “stay” group all perceived both the diphthongs native like (100%). All participants from the “leave” groups except one perceived both the diphthongs native like (87.5%). These results suggest that motivation may influence perception of vowels, though there is just a slight difference (12.5%) between the two groups when we look at the average performance of all participants.

Participants	[aʊ] in %	Category	[aɪ] in %	Category	Motivation
1	74.7	N	96	N	Stay
2	78.9	N	97.3	N	Leave
3	84	N	100	N	Stay
4	66.7	N	96	N	Leave
5	62.7	N	94.7	N	Leave
6	86.7	N	94.7	N	Stay
7	72	NN	97.3	N	Leave

*Table 13* Perception and Motivation Combined

## **5. Discussion**

### **5.1 Implications**

#### **5.1.1 Implications Perception and Production**

Though the perception for [aʊ] was native like in three of the six cases (42.9%), the production of either the F1 or F2 was native like in only two (14.3%) of the cases. And whereas the perception of [aɪ] was native like in all cases (100%), the production of either the F1 or F2 was native like in only six out of the 12 cases (42.9%). The results for the perception and production tasks were surprising as it was expected that participants would produce both [aʊ] and [aɪ] better if they perceived them better as well, though the results indicate this is not the case in the current study.

Though the production of [aɪ] was higher than the production of [aʊ], an even higher native-like production of [aɪ] would have been expected given the fact that the perception was native like in all cases (where the lowest individual percentage of perception was 89.2%). The [aʊ] diphthong especially had a very low production (14.3%) with a perception of 42.9%. the perception for this diphthong, however, would have been lower if this task had an 85% criteria for the native-like category rather than a 75%. In that case, the production and perception of the [aʊ] diphthong both would have been 14.3%. An 85% criteria, however, would not have made any difference for the [aɪ] diphthong as they all had a high perception.

The results are in contrast with some of the earlier research, such as Bohn & Flege (1992) who found out that, with experience, German speakers were able to pronounce English /æ/, for which there is no German equivalent, “close enough to the English acoustic norm” (p. 156). This was however only true for the experienced and not the inexperienced group. The inexperienced



group had stayed in an English speaking environment for about 0.6 years and the experienced for about 7.5 years. The participants of the current study were more experienced than the inexperienced group of Bohn & Flege's (1992) study yet not as experienced as the experienced group, either. It could be that maybe after a few years the participants in the current study will also further improve their perception and thus production.

Another reason could be that Turkish does not have either diphthong, or any diphthong, in its sound system. It also lacks a big vowel inventory. Though this could be seen as an advantage for Turkish speakers when acquiring English diphthongs, as learning a distinct L2 vowel would be easier, previous studies have shown that a smaller vowel inventory could also be a disadvantage when learning an L2. An example is a study by Iverson & Evans (2009) on German and Spanish speakers. It showed that German speakers, who have a bigger vowel inventory than the Spanish speakers, improved more after a "high-variability auditory training for English vowels" than the Spanish speakers (p. 866). The results showed that the German rather than the Spanish speakers improved more on learning the English vowels.

Furthermore, the studies mentioned in the literature review all had more participants. This could have influenced the outcome as well. As for the question whether perception and production are linked, the results given above suggest that there was no link between perception and production per se and that the differences seem to be diphthong specific.

### **5.1.2 Implications Production, Perception and Motivation**

As mentioned before, participants from the "stay" group all perceived both diphthongs native like (100%). The "leave" group all participants except one perceived both diphthongs native like

(87.5%). This means that there is a small difference in favour of the *stay* group (12.5%), though it is a small difference. This therefore suggests that participants' motivation seems to affect their perception of the diphthongs in favour of the *stay* group, as hypothesized. The studies discussed earlier all looked at production and this study additionally wanted to look at the effects of motivation on perception.

As for the production of the diphthongs, the group of participants that were thinking of a returning to Turkey had a bigger percentage of native like pronunciations than the group who wanted to stay. This results seem to be the opposite of what was hypothesized. It was namely expected that motivation and the feeling of wanting to stay would lead to more awareness of language. This then could lead to wanting to sound as a native speaker as opposed to people who would care less about this as they imagined a future in another country where English would not have to be spoken.

Another aspect, however, was identity and it was said that speakers who do not wish to sound particularly like a native speaker will not and will rather retain their L1 features. This also seemed to be the case with two of the three participants in the *stay* category. One of them (participant 6) explicitly mentioned that he would go back to Turkey, but that he simply did not want to do this yet because he did not find the economy stable enough and had experienced his parent's bankruptcy just a few years ago. Participant 3 indicated she wanted to stay, though also mentioned that she felt pressure from her parents to go back and felt insecure about her future. The last participant in this category, participant 1, was the only participant who said that he would like to stay in the UK without really mentioning wanting to return back under certain circumstances. It could be then that even though the participants wanted to stay in England, they

still identified as Turkish and simply did not feel the need to strongly improve their accents (Beinhoff, 2015).

As of the participants who wanted to leave, only one (participant 2) indicated that although she had not learned a lot during her English lessons at high school, she liked the English language and listened and sang a lot in English. She also mentioned she liked English music and movies better than Turkish ones. The other 3 (participants 4, 5, and 7), however, indicated that they wanted to go back to Turkey because they had to, wanted to or because they still felt strongly Turkish. So, even though most of this group too seemed to identify as Turkish clearly, their production of the diphthongs was better than the previous group.

Therefore, it seems that there is no evidence that wanting to stay in a certain country automatically lead to pronunciation of the L2 sounds. Further could look at more aspects of “motivation” to see what factors play a role, if they do, in the acquisition of an L2.

## **5.2 Limitations**

One of the limitations of the current study was that only seven participants could take place. Although this was eventually going to be more, participants cancelled last minute and replacement could not be found. Furthermore, of these seven participants, five were eager to participate and were open to the idea of an interview and reading task when told. Two of the participants, however, were a bit reluctant when they heard the interview was in English. Thought they made it clear they still wanted to participate, they kept asking a lot of questions about the procedure. They were not told what the experiments would be about, other than the fact that the interview would ask a few questions about themselves. One of the participants still asked

whether Turkish was not an option for the interview and he was told that this was not possible. In addition, I made sure to tell him that English was not my native language either and that there was no need to worry.

Though these two participants still took part, being nervous might have influenced their pronunciations. This is because some of the participants seemed very eager to give elaborate answers. A few participants, including these two, however, started with very short and some one-word answers. When this happened, it was tried to have more follow-up questions, though this did not always help.

Another limitation was the fact that the [aʊ] diphthong was not used very often during the interview. Whereas the [aɪ] diphthong had 336 tokens in total among the speakers, the [aʊ] diphthong had 26 tokens in total. In addition to this, one participant barely used the word “I” and this was immediately visible in his tokens of diphthongs as he only had 14 [aɪ] tokens. This participant indicated that he was very nervous and that the audio recorder reminded him of his oral exams he used to be so nervous for. As an interviewer I tried to comfort him by saying that beyond me no one would listen to the recording and that I was not there to grade him and merely wanted to know him better. The same method of asking him follow-up questions was used though these were sometimes answered with a nod.

A limitation with the reading task was that, even though participants were asked to read slowly, most speed up after the first sentence anyway. This could be because they were nervous or because they thought the task would look at how quickly they could read an English passage. A way to avoid this in further research could be by not presenting the participants with a sentence until they have completely read the first one. A way to do this would be by presenting the sentences to them as timed slides.

As for the AX Discrimination Task, most participants gave an incorrect answer for the [au] – [a:] contrasts. Though this could be due to the fact that participants simply had more difficulties with his pair, it could, however, also mean that the [ai] – [a:] pairs were maybe poorly chosen and that therefore these were easier.

Another problem with the AX Discrimination Task occurred during the writing of the Praat Script. Due to the mistake the experiment would not run. Though this was eventually solved, it could have influenced participants' answers. Because this took a while I decided participants would be interviewed and asked to read the passage first and that there would be a second meeting in order to do the AX Discrimination Task. As mentioned before, most were nervous for the first bit, but no one expressed such feelings during the AX Discrimination Task. This could be a good thing but could also mean that maybe participants cared less about this and automatically tried their best less than during the other two tasks. Some of the participants also noted that they sometimes clicked on the wrong answer. Though they were told that each sound was only played once and that they could not go back, some participants made the mistake. As this was not really possible to avoid, the unintentionally answered trials also counted in the analysis. There were four participants in the [au] category that were classified as non-native and two of them just barely (72% and 74.7%). This could have been different if the participants had made no mistakes.

## 6. Conclusion

This study aimed to answer two questions about the acquisition of an L2 phonology. The questions were (1) Does better perception lead to better production? And (2) Does motivation influence perception and production? Three experiments were conducted in order to answer these two questions: an AX Discrimination Task to test participants' perception, a reading task and an interview to test production and specific interview questions asking about participants' motivation in moving to England and their future plans.

Though, based on the SLM and previous studies, it was expected that participants with a better perception would have a better production of the respective diphthongs, the current study could not support this claim. A better perception, even when all participants scored 100% for the [aʊ] diphthong, did not lead to better production. This means that participants were able to distinguish the diphthongs better than they could produce them. Though this could mean that there is no link between perception and production, it is also important to note that this study had a very small sample.

As for the second question, there seemed to be a relation between motivation and perception, but not production. Participants who wished to stay in England, had slightly better perception percentages than the participants who were thinking of moving back, as expected. As for production, participants who wanted to leave seemed to have a slightly better production than the ones who wanted to stay in England. This was the opposite of what was expected. Asking about participants' future plans might not have been enough and future research could look at multiple aspects of motivation during the acquisition of an L2.

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## **Appendices**

### **Appendix 1 Interview Questions**

1. How old are you?
2. What are you studying?
3. Where were you born?
4. When did you move to England and why?
5. How long have you been studying in England?
6. How are you finding life in England? Did you have any difficulties with the language?
7. When did you start learning English?
8. Do you speak any other languages?
9. What are you hoping to do when you graduate?
10. Where do you think you might live in the future?

## Appendix 2 Reading Passage

Please read the following passage.

1. Please call Stella.
2. Ask her to buy a few things at the store for the dinner tonight.
3. It is quite a lot so she might want to write it down.
4. One pound of Brussels sprouts, two pounds of ground beef, and three bottles of wine.
5. We also need paper towels, and some brown and powdered sugar for the apple pie.
6. And maybe some of the sour candy the kids like while she is there, though they can manage without it.
7. She can scoop these things into three white bags.
8. We will pick her up in about an hour from town and give her a ride home.

### Appendix 3 Word Pairs AX Discrimination Task

#### Minimal pairs [aʊ] and [aɪ]

1. Art – Out
2. Bar – Bough
3. Car – Cow
4. Dart – Doubt
5. Grass – Grouse
6. Lard – Loud
7. Spars – Spouse
8. Start – Stout
9. Trance – Trounce
10. Vase – Vows
11. Bark – Bike
12. Cart – Kite
13. Dark – Dike
14. Fart – Fight
15. Guard – Guide
16. Halve – Hive
17. Lark – Like
18. Park – Pike
19. Scar – Sky
20. Tardy – Tidy

#### Same pairs [a:], [aʊ] and [aɪ]

1. Charm – Charm
2. Harm – Harm
3. Heart – Heart
4. Laugh – Laugh
5. Smart – Smart
6. Browse – Browse
7. Cloud – Cloud
8. Mouse – Mouse
9. Pouch – Pouch
10. South – South
11. Blind – Blind
12. Hype – Hype
13. Mind – Mind
14. Life – Life
15. Rise – Rise

## Appendix 4 Consent Form

### CONSENT FORM



English Language and Culture,  
P.C. Hoofthuis  
Spuistraat 134,  
1012 VB,  
The Netherlands

The interview is for a small-scale study for my thesis on second language acquisition. The interview will collect information from you relating to your exposure to your second language, but your full name will not be recorded or written anywhere; instead initials or a pseudonym will be used. The interview will be recorded. The recording will be transcribed by me, but neither the recording, the transcription nor your details will be used for any purpose beyond a thesis that will be submitted to the University of Amsterdam. My supervisor for this project is Dr. S. R. Hamann (S.R.Hamann@uva.nl).

Thank you very much for your participation.

Şule Çavdar

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#### AGREEMENT

I agree to participate and allow the recording of my interview and accompanying material to be used for the purpose of this thesis. I understand that my participation is voluntary and that I have the option of declining to cooperate further at any time during the interview.

Signature of Interviewer: \_\_\_\_\_

Signature of Interviewee: \_\_\_\_\_

Date of Interview: \_\_\_\_\_



## Appendix 5 Interview Transcripts

### Interview Participant 1

**I: Hi, thank you again for being here. How are you?**

P1: Good, good.

**I: So let's start, then. How old are you and where were you born?**

P1: I am twenty years old. I was born in Turkey.

**I: Okay, good. And what are you studying?**

P1: Economics and Finance.

**I: And what is your native language?**

P1: My native language is Turkish.

**I: Any other languages you speak? Besides English.**

P1: I had a little bit of German but I wouldn't say I speak it.

**I: So Turkish and English only, okay.**

P1: Yes.

**I: And of course you speak English, too. When did you start learning it?**

P1: Yes. I started when I was 10.

**I: Oh okay, that's quite young! So that was the first time? At school?**

P1: Yes, that was the first time I was taught English at school. Just the basis. Learning how to say your name and ask how to go to the bathroom. I think I learned more by doing my own thing.

**I: And how did you do that?**

P1: Due to games.

**I: Games!**

P1: Yes, when you're gaming with players all over the world you have to learn the language everyone understands. That really helped.

**I: Right, that's good. And would you say it made learning English easier for you?**

P1: Yes, I mean when gaming I didn't really think about grammar and all the things we used to focus on during class. What I said had to be clear and that's that.

**I: Okay, and this was around the same age as starting your English classes?**

P1: A bit later.

**I: And how long have you been in England now, in total?**

P1: Approximately a year.

**I: Had you been to England before?**

P1: Not lived. I went to London and Manchester before and... Newcastle but not for a long period.

**I: Okay, and when you first move here, did you have any problems with the language? You said you learned quite a lot by yourself but how was it when you really moved to an English speaking country? Was the transition difficult for you?**

I: Not really at university. I am reading what is assigned and just prepare and that works and you just get used to the jargon. It would be more heavy if it was a complete other language. But it's still not the same as Turkish.

**I: Understandably. And how are you finding life in England now?**

P1: I enjoy living here. I have travelled a lot since I came here. I was in Amsterdam actually a few months ago. I really like travelling.

**I: Ah, I hope you liked Amsterdam.**

P1: It was... quite busy. More like London, Newcastle is much smaller...

**I: That's true. And what are you hoping to do when you graduate?**

P1: ...

**I: Or... not really thought about it yet?**

P1: I mean how far in the future are we talking about...? I am still a first year and haven't really thought much about what to do afterwards to be honest.

**I: I get it. And where do you think you might want to live in the future?**

P1: I have had my ups and downs since I came here. I do miss Turkey but on most days I can't imagine that a year ago I wasn't living here. I also can't think of moving back yet, so... I'm guessing I'll stay here.

**I: Okay, that was all. Thank you.**

Interview Participant 2

**I: Hello, thank you for being here. How are you?**

P2: Good, thank you.

**I: Good. What are you studying?**

P2: Psychology.

**I: Oh, I studied that for a year. And how old are you?**

P2: Twenty.

**I: And where are you from?**

P2: Istanbul.

**I: When did you move to England?**

P2: A year ago.

**I: That's nice. And when did you start speaking English?**

P2: When I was at the primary school.

**I: Okay, so how old were you?**

P2: I think I was eleven.

**I: And when you first starting learning English, did you have any difficulties with it?**

P2: Yes, it was so hard for me because I had never learned English before and it was really the first time for me and that was very hard.

**I: And do you speak any other languages?**

P2: Turkish... and little Dutch you taught me, of course.

**I: Haha. Okay, so you told me that you had trouble learning English when you first started learning it. Did you have any difficulties with the language when you first moved here?**

P2: No... I mean not very. I improved since I came here, but that is normal. I was alone when I first came here and did everything on my own and... my flat mates weren't Turkish so I had to speak English.

**I: Okay, that's good. Was it all because of the classes you had at high school or did you do something to improve your English?**

P2: No... The classes weren't really helping. And improving... Like only when I was singing.

**I: Oh, you sing!**

P2: I mean... not professionally. And when I watched movies or shows in English. At first I realised that it really improved my reading and listening... speaking not so.

**I: That's really interesting. And I think a great way to improve your English, because it doesn't really feel like you're studying or something, is that right?**

P2: Yes, I watched movies because I wanted to watch a fun movie or because I wanted to listen to English music rather than Turkish music.

**I: Okay. And how are you finding life in England now?**

P2: Same as when I first moved here. I like it, but I miss Turkey. I love my course but I do miss home.

**I: Is there a specific reason as to why you miss home or is it just...?**

P2: Yes. My whole family is there so of course I miss them and just miss being with them. And the culture difference, of course.

**I: What is the biggest difference for you? Between the two countries, I mean?**

P2: Turkish people are so... we are together a lot and spend time together a lot. And just... we do things different. Not better or so... just different.

**I: And do you go back to Turkey regularly?**

P2: I try to but it not always possible. I could not during the Christmas break because I had so much to do. I did go back during the Easter Holiday but...

**I: And what are you hoping to do when you graduate?**

P2: I want to work as a psychologist and... that's a few years more of studying.

**I: And where do you think you might do that?**

P2: What country?

**I: Yes.**

P2: Turkey. I definitely want to move back to Istanbul. I think it was better for me to study here, but I want to go back and hopefully find a good job and... yeah.

**I: Okay, thank you.**

Interview Participant 3

**I: Hello. How are you?**

P3: Fine, a little exhausted.

**I: How come?**

P3: Revising... mainly.

**I: Ah, glad you could still make it.**

P3: Yeah, no problem.

**I: Let's start then. How old are you and what are you studying?**

P3: I'm 22 years old and I am studying architecture.

**I: Okay, and where were you born?**

P3: I was born in Turkey.

**I: Right, and when did you move to England?**

P3: I moved to England after I finished high-school so that is three years ago now.

**I: And when did you start learning English?**

P3: Officially?

**I: Doesn't matter, just the first time you started learning English.**

P3: I started learning English at the age of... eleven. I would not say I could really speak it. I was mostly learning grammar rules and stuff. I wasn't really using English other than during the lessons... so I would not really practice.

**I: Okay, and was that enough of a basis for you, would you say?**

P3: I could have done more during the lessons but then... yeah I didn't really care back then.

**I: When did you had the feeling you could actually speak it? Before you moved or did you have difficulties with the language when you first moved here?**

P3: Not difficulties really... I mean I needed adjusting to because I had to use the English words for certain things I had never thought about before... But you know, you kind of have to. Because you have no choice and you know people are not going to understand you and if you can't express yourself it's going to be hard and...

**I: But in general you could easily express yourself?**

P3: Yes, I never felt like I was learning a new language or stuff just had to improve what I'd got. When I first came here I bought a notebook on my first day and you know... every word or phrase I had not heard before and did not know what it meant... I wrote it in the notebook. I

really did try hard but not because I felt like I couldn't express myself but because I wanted to be able to speak it as fluently as possible.

**I: That's so amazing. What a dedication, too. How long did you do that for?**

P3: I think almost a year... couldn't really bother after a while.

**I: I understand, even a year is long. And do you speak any other languages?**

P3: No, tried to learn a few languages but gave up rather quickly every time.

**I: Ah, so you tried to master a language yourself?**

P3: Yeah, but it was kind of hard to keep up with it because I was trying to learn it for fun and you don't really have any reason to keep up with it and I was not that motivated.

**I: I get that. And how are you finding life in England now?**

P3: I really like it. In the beginning I missed home. But rather than just family I mean the place I grew up and got so used to. But now I got used to life here so it is fine as this is the place I do call home now and it is like I have two homes now.

**I: That's so nice. So what are you hoping to do when you graduate?**

P3: I do not know. I am kind of done with studying so... I want to start working but at the same time the thought of doing something so serious scares me... sometimes I can't wait till I am done and have this freedom but that can be scary too and... I don't really want to think about it.

**I: I'm sorry. A bit more general then, have you thought of where you might live in the future?**

P3: I get so nervous when I think of that, too. I mean I would like to stay here. My parents are kind of oh you're almost done can't wait until you're back but... you know... I got a life here now and I don't even want to think about leaving it behind... but I will have to see... once I'm done.

**I: I can understand. This is my second semester here and I am still in denial that I will be leaving soon.**

P3: Yeah, exactly.

Interview Participant 4

**I: Thank you again for being here. So, how old are you?**

P4: Twenty-eight years old.

**I: And what are you studying here in Newcastle?**

P4: Sustainable chemical engineering.

**I: Oh, interesting. And where were you born?**

P4: In the capital city of Turkey, in Ankara.

**I: And when did you move to England and what was your main reason back then?**

P4: I moved here one year ago. And I moved here because I need to do my master degree in the UK.

**I: And when did you start learning English?**

P4: I start learning English in... I think in primary school.

**I: Okay, and how old were you then?**

P4: Maybe 10.

**I: And when you first moved here, did you have any difficulties with the language? How was that for you?**

P4: Yes, it was quite hard for me because in Turkey I graduated from chemistry department and my bachelor degree was in my own language. And yeah, we have English lectures, we have English modules, but we don't speak English, really. So it's quite hard for me to get used to living here and speak English every day.

**I: I get that. And do you feel like you improved since you came here?**

P4: Yes, I improved my English. But not enough, I think.

**I: Do you speak any other languages besides English?**

P4: No.

**I: And how are you finding life in England now?**

P4: I like living here. I am in Newcastle now but was in London before. And London... it is so crowded. And a lot of international people. So it's quite easy living in London compared to Newcastle, because the international people, we can speak slowly together, that's why. And in Newcastle English people speak Geordie accent and it's quite hard for me to understand and speak.

**I: How long did you stay in London, then?**

P4: 10 weeks.

**I: I see, and what are you hoping to do when you graduate?**

P4: I need to do my PhD here as well because I have a scholarship from my government. So that's why I have to do my PhD as well in the UK.

**I: So you're here for another four years, at least?**

P4: At least 3, maybe 4 years.

**I: And after your PhD, what do you want to do?**

P4: As I said before, I have a scholarship, that's why I need to go back. That's why I won't stay here.

**I: Ah, right, I get it. And if you could've stayed here...?**

P4: I don't know... I would've thought about staying here maybe.

**I: All right, thank you so much.**



Interview Participant 5

**I: Thank you for being here again. How old are you?**

P5: I'm twenty-eight.

**I: And what are you currently studying?**

P5: I am doing a PhD on mechatronics.

**I: Oh wow, and that is...**

P5: Which is about robotics.

**I: And where were you born?**

P5: In Erzurum, in Turkey... Which is a very small city, you probably don't know it.

**I: I do. And you grew up there?**

P5: Yes.

**I: And when did you move to England and why?**

P5: My reason was about education. Further education, actually. I have a scholarship of Turkey government and in the frame of this scholarship I have to do a master and a PhD. But I remember, I think I said PhD for your first question, but I am doing a master now.

**I: Oh, okay. So you're doing your master's degree now, and after that you'll do your PhD?**

P5: Yes.

**I: Okay. And how long have you been here now?**

P5: One year. But before moving here, I lived in Cambridge.

**I: How long was that for?**

P5: I stayed there for three months.

**I: And why were you there?**

P5: It was about language education.

**I: Oh, so that was before you came here?**

P5: Yes.

**I: When did you start learning English?**

P5: In primary school but the education of foreign language is very bad in Turkey. If you don't hate English, or other languages you learn, it is enough for you. I mean, you can't learn anything from your school. The public schools, maybe private schools are different. I myself used to hate English until uni.

**I: How old exactly when you started learning English?**

P4: Ten.

**I: And do you think that if maybe the teachers put a little more effort in teaching you would've enjoyed learning English more?**

P4: I think this is about the philosophy of the education in Turkey and the way they are teaching. My English teacher, I had more than two, they were quite good teachers, I think. But the way the government ordered them to teach us is terrible.

**I: How many hours of English did you have? Weekly?**

P4: I don't remember... I think more than five hours.

**I: Oh, that's quite a lot. But simply because it wasn't taught right you didn't feel like it was helpful?**

P4: For example, if you want to pass your lecture or your exams, you don't have to study, actually. Somehow you can pass the exam. So that's why I didn't have to study for English. First I wanted to learn English, but I hated the way they teach and I said if I can pass without studying, why study.

**I: Yeah, I get that. Do you speak any other languages?**

P4: No, not really.

**I: And did you have difficulties with English when you first moved here?**

P4: Of course. Before going to Cambridge, I had an exam about academic English in Turkey. And in Turkey. I got first level. But this academic English and the English spoken is quite different. And even if you know every single word in a sentence, sometimes you can't understand what they mean. When I first realised this, I was surprised. Because I thought I would be speaking like "It can be said that...", but this is just academic English which is different from regular English.

**I: Spoken English is indeed different. How are you finding life in England in general?**

P4: I like England and I like life in England as well. But the culture is quite different, as you know. I think it's okay, I like England.

**I: And I wanted to ask you, what do you want to do after you graduate, but you said you came here with a scholarship. So you have to go back to Turkey, correct?**

P4: Yes, I have to go back. But if I could have a chance, still I'd go back.

**I: And why is that?**

P4: I don't know how to say the exact reason... but I love my country and I love my culture. And that's why.

Interview Participant 6

**I: So, how are you?**

P6: Good. You?

**I: Me, too. Thank you. So, how old are you?**

P6: Twenty-one.

**I: And what are you studying?**

P6: Computer science.

**I: What year are you in now?**

P6: Starting to second year.

**I: Okay, so next year is going to be your second year?**

P6: Yes.

**I: And how long have you been living in England now?**

P6: Three years.

**I: Oh okay. Did you study something else before or why did you move to England back then?**

P6: I moved here with parents. They had a business in Turkey and then it got bankrupt. We had families in London so they had some connection of England and they decided to move to Newcastle and start a new life.

**I: Wow, that's so interesting. And how was moving to England to you?**

P6: First of all it was hard, didn't have any friends. No cousins, especially. It was hard. It took me a year to get used to it. Same with food, culture... everything was different so it took me a while to get used to it.

**I: Understandably. And did you have any difficulties with the English language? Because how old were you when you started learning English?**

P6: Eleven. And yes it was hard and I took English lessons. But then it was okay.

**I: Do you speak any other languages?**

P6: Learned Spanish. I think it's easier for a Turkish person to learn Spanish than English. But I forgot all the words and everything.

**I: Would you ever want to pick it up again?**

P6: No. But if I start again I might learn Spanish faster than I learned English.

**I: What are you hoping to do when you graduate?**

P6: Start working at a big company. Doesn't matter if it's for free. Just for experience. And then open my own office, a web development office.

**I: And because you were born in Turkey, do you think you might want to move back in the future?**

P6: No... Depends. In the future, if things will change, economy and everything. So for now I'm planning to stay in Newcastle. But if things change in turkey then I might go back and plan a future there.

**I: Ah, I see. But for now you would want to stay here, and in Newcastle specifically?**

P6: Yes, yes.

Interview Participant 7

**I: Hello. How old are you and what are you studying?**

P7: I am twenty-one years old and I'm studying architecture.

**I: And where were you born?**

P7: I was born in Turkey.

**I: Okay and when did you move here and why?**

P7: I moved here two years ago. I got accepted into Newcastle University and that was why I moved here.

**I: And when did you start learning English?**

P7: Started learning when I was ten.

**I: And did you have any difficulties with the language when you moved here?**

P7: I did not have any problems understanding the language. But speaking and expressing everything wasn't really very easy. In the beginning, I mean. I still don't speak it as well as Turkish. I was just thinking... I wish this interview was in Turkish. That's my native language and it is different than speaking English... even though I live here now.

**I: You said expressing yourself wasn't always easy. Did you do something to change that?**

P7: I live in Durham with my and aunt and I just made sure that I would speak English with her most of the time that helped but Turkish is both our native language so... didn't always happen.

**I: Oh, she's from there? And do you still live with her?**

P7: She works there but moved from Turkey as well. I still live with her.

**I: Nice. And how are you finding life in England? In general?**

P7: In general... It is not as if my life has been improved since I came here and I don't mean that in a bad way. It's just the same... in another country. It's nice and even though I had to get used to a few things when I first moved here they were like... just temporary. After a while things stopped feeling new, though. But when I first came here I used to think of myself as you know... as if everyone just knew I moved here recently and sometimes I was scared they would treat me differently because of it.

**I: Oh, and did they?**

P7: No, no, I don't think so. There are a lot of international students here and eventually I stopped thinking about myself as "different", though. But I still just think of myself as Turkish rather than British.

**I: And what do you hope after you graduate?**

P7: From my bachelor's degree? I want to do a postgraduate study which is another two years.

**I: And do you think you'll stay here or?**

P7: You're not the first one to ask this and I think I ask myself this question the most. For now I will probably move back to Turkey as I said it's just... I love being here I really do it's just not really... my country. I do feel like I'm... Turkish and I don't see myself living here, or somewhere else, for much longer.

## Appendix 6 Participants' Answers AX Discrimination Task<sup>1</sup>

Subject	Stimulus	Response	Reaction Time
1	south,south	d	5.398820248
1	dark,dike	s	3.518995844
1	stout,start	s	8.187457559
1	cloud,cloud	d	5.639951627
1	dart,doubt	d	4.428966551
1	mind,mind	d	3.539226931
1	bike,bark	s	2.873587072
1	kite,car	s	4.922801541
1	pike,park	s	9.032163971
1	heart,heart	d	3.922282484
1	guard,guide	s	3.490893771
1	rise,rise	d	5.324975823
1	hive,halve	s	9.768229898
1	life,life	d	3.706113871
1	car,kite	d	3.456716612
1	vows,vase	d	5.190637186
1	bough,bar	s	5.501591094
1	bar,bough	s	3.625671463
1	hype,hype	d	3.402168202
1	lark,like	d	4.568443282
1	like,lark	d	12.13934009
1	vase,vows	s	3.922202481
1	blind,blind	d	3.276177368
1	pouch,pouch	d	3.321220176
1	grouse,grass	d	4.157889196
1	art,out	s	3.359790444
1	spouse,spars	d	3.876241242
1	out,art	s	2.619074119
1	smart,smart	d	2.870834339
1	bark,bike	s	3.864025148
1	browse,browse	d	2.766382796
1	laugh,laugh	d	2.971247345
1	lard,loud	d	3.677232892
1	guide,guard	s	4.561108633
1	cow,car	s	3.579664782

<sup>1</sup> Due to a mistake in the Praat script, “different” answers have been noted as “s” and “same” answers have been noted as “d”.

1	trance,trounce	d	3.285041029
1	scar,sky	s	2.951999332
1	dike,dark	s	3.39357271
1	park,pike	s	5.385342031
1	halve,hive	s	3.678555177
1	loud,lard	s	3.600430287
1	fight,fart	s	2.960809231
1	trounce,trance	d	3.189076173
1	fart,fight	s	3.628188668
1	harm,harm	d	3.698356808
1	grass,grouse	d	3.149487631
1	car,cow	s	2.970553561
1	sky,scar	s	2.739627328
1	spars,spouse	s	2.713319236
1	tardy,tidy	s	2.517007297
1	charm,charm	d	3.720461878
1	doubt,dart	d	2.759665768
1	start,stout	s	4.91067313
1	mouse,mouse	d	2.854848516
1	tidy,tardy	s	2.843637896
1	pouch,pouch	d	3.145600779
1	hive,halve	s	2.885871009
1	grass,grouse	s	4.119676699
1	smart,smart	d	3.031495788
1	trance,trounce	d	3.725576292
1	art,out	s	2.442090196
1	grouse,grass	s	3.314364263
1	mouse,mouse	d	2.476635367
1	south,south	d	2.888038122
1	halve,hive	s	2.805615486
1	fight,fart	s	2.724264247
1	spouse,spars	s	68.40969998
1	cloud,cloud	d	3.18071813
1	dike,dark	s	2.203755711
1	bark,bike	s	3.870718495
1	charm,charm	d	2.598843673
1	tardy,tidy	s	1.705542332
1	vows,vase	s	5.365758006
1	rise,rise	d	2.93336638
1	fart,fight	s	1.295154012
1	dark,dike	s	1.411171387



1	bar,bough	s	2.2971624
1	heart,heart	d	3.021113996
1	mind,mind	d	1.990230389
1	trounce,trance	d	2.440316696
1	scar,sky	s	1.763486057
1	bike,bark	s	2.273340152
1	lard,loud	s	2.052859073
1	lark,like	s	2.883274441
1	car,cow	s	2.718438129
1	cart,kite	s	2.32958718
1	pike,park	s	2.451088261
1	tidy,tardy	s	2.752526966
1	browse,browse	d	2.182434668
1	park,pike	s	1.378209629
1	hype,hype	d	5.84139526
1	harm,harm	d	3.279073466
1	loud,lard	s	3.884969858
1	laugh,laugh	d	3.560569735
1	dart,doubt	s	2.344510566
1	doubt,dart	s	2.05217361
1	out,art	s	2.806270229
1	spars,spouse	s	2.446405862
1	kite,art	s	1.994324607
1	vase,vows	s	3.117940961
1	blind,blind	d	2.320932166
1	sky,scar	s	2.780115742
1	cow,car	s	2.098027325
1	like,lark	s	2.438629598
1	life,life	d	6.732629331
1	bough,bar	s	2.92835117
1	stout,start	s	6.341495424
1	guide,guard	s	2.285153032
1	guard,guide	s	2.076840686
1	start,stout	s	5.162506952
1	mind,mind	d	3.197913593
1	cow,car	s	2.436958502
1	guide,guard	s	1.641554242
1	vows,vase	s	3.198611217
1	spouse,spars	s	1.951992292
1	dart,doubt	d	3.439039212
1	blind,blind	d	2.439311861

1	charm,charm	d	1.878019862
1	hype,hype	d	2.958895566
1	mouse,mouse	d	37.86573721
1	out,art	s	3.0495156
1	start,stout	s	1.966461902
1	south,south	d	1.837045673
1	vase,vows	d	2.127383201
1	lark,like	s	2.39358103
1	dark,dike	s	2.3514196
1	doubt,dart	d	3.41775081
1	pike,park	s	2.202780958
1	art,out	s	1.33285001
1	loud,lard	d	2.859633319
1	hive,halve	s	2.332399435
1	guard,guide	s	1.666949663
1	trance,trounce	d	2.189380824
1	halve,hive	s	2.761542952
1	trounce,trance	d	3.268134855
1	smart,smart	d	3.071433143
1	bough,bar	s	3.249051968
1	sky,scar	s	2.637713471
1	pouch,pouch	d	2.946530346
1	life,life	d	2.51384943
1	bark,bike	s	2.142740522
1	car,cow	s	1.576970931
1	rise,rise	d	1.751209161
1	scar,sky	s	1.534761499
1	heart,heart	d	2.657305176
1	lard,loud	s	2.544050774
1	grass,grouse	d	2.904752289
1	park,pike	s	1.189003851
1	tardy,tidy	s	2.174096465
1	like,lark	s	4.17776635
1	tidy,tardy	s	2.494304447
1	fart,fight	s	2.635838208
1	laugh,laugh	d	3.099703542
1	grouse,grass	d	1.934468497
1	harm,harm	d	2.753380115
1	browse,browse	d	2.361103129
1	fight,fart	s	2.016270312
1	cloud,cloud	d	3.047675537

1	stout,start	s	4.738907304
1	bike,bark	s	1.427582184
1	dike,dark	s	3.241392188
1	cart,kite	s	31.13990907
1	bar,bough	s	2.473102448
1	spars,spouse	s	2.005554428
1	kite,cart	s	1.973407418
2	harm,harm	d	3.453403219
2	stout,start	d	4.666352523
2	vows,vase	s	3.247138943
2	hive,halve	s	4.525241176
2	pouch,pouch	d	3.939981004
2	life,life	d	4.175926287
2	charm,charm	d	3.300647318
2	blind,blind	d	2.947881432
2	start,stout	s	3.174335193
2	mind,mind	d	2.554752577
2	smart,smart	d	3.105689025
2	rise,rise	d	2.550797883
2	lard,loud	s	3.543595079
2	grouse,grass	d	3.076498275
2	cow,car	s	3.308461983
2	tardy,tidy	s	3.528670412
2	doubt,dart	s	2.992902479
2	dart,doubt	s	2.404026825
2	guide,guard	s	3.318829695
2	dike,dark	s	2.393701354
2	hype,hype	d	4.156153457
2	loud,lard	s	2.62293793
2	fart,fight	s	2.662701199
2	heart,heart	d	3.051943202
2	spouse,spars	d	3.493867312
2	trounce,trance	d	2.732807257
2	scar,sky	s	2.966825435
2	lark,like	d	5.34493554
2	bike,bark	s	2.702904162
2	trance,trounce	d	2.915288967
2	vase,vows	s	2.873877002
2	park,pike	s	2.67983906
2	fight,fart	s	2.716523184
2	laugh,laugh	d	3.988274482

2	mouse,mouse	d	2.574997104
2	pike,park	s	2.702288462
2	bark,bike	s	2.823231444
2	tidy,tardy	s	2.682944445
2	bough,bar	s	3.802123528
2	bar,bough	s	2.579441415
2	like,lark	s	3.297252643
2	guard,guide	s	3.314782197
2	cart,kite	s	2.391339034
2	halve,hive	s	2.846733041
2	grass,grouse	d	2.56986029
2	spars,spouse	s	5.024209141
2	browse,browse	d	2.894206011
2	sky,scar	s	9.010761005
2	car,cow	s	2.206422682
2	cloud,cloud	d	3.052423218
2	south,south	d	2.679759057
2	dark,dike	s	2.363309283
2	art,out	s	2.43248347
2	out,art	s	4.003008422
2	kite,art	s	5.124394939
2	out,art	s	3.875017521
2	bike,bark	s	3.476219353
2	dart,doubt	s	2.266353035
2	hive,halve	s	4.319004421
2	sky,scar	s	3.439069293
2	pouch,pouch	d	2.539894473
2	art,out	s	3.514093278
2	cloud,cloud	d	3.32165091
2	grass,grouse	d	3.29568907
2	scar,sky	s	3.139720899
2	halve,hive	s	2.694361153
2	spars,spouse	s	2.586620538
2	bark,bike	s	2.604177614
2	vows,vase	d	4.80659088
2	mouse,mouse	d	2.598953116
2	stout,start	s	3.804661854
2	like,lark	s	3.061082072
2	laugh,laugh	d	3.666135555
2	cart,kite	s	3.421168526
2	cow,car	s	3.404640605

2	fight,fart	s	3.153347602
2	harm,harm	d	9.398753046
2	kite,cart	s	6.188172463
2	vase,vows	s	4.277022197
2	dike,dark	s	5.207472957
2	fart,fight	s	3.920494263
2	car,cow	s	4.855059724
2	charm,charm	d	4.093200281
2	mind,mind	d	4.894410178
2	south,south	d	2.931167265
2	tardy,tidy	s	2.642274906
2	trounce,trance	d	5.083598676
2	smart,smart	d	3.44133753
2	lark,like	s	3.213777171
2	spouse,spars	s	3.445635916
2	start,stout	s	3.652390449
2	guard,guide	s	3.08638341
2	pike,park	s	2.568195593
2	doubt,dart	s	2.388986314
2	rise,rise	d	2.978091737
2	tidy,tardy	s	2.382355049
2	blind,blind	d	4.65594193
2	bar,bough	s	2.810925747
2	dark,dike	s	3.66157028
2	lard,loud	s	2.53359602
2	trance,trounce	d	2.860393025
2	bough,bar	s	3.870110474
2	life,life	d	3.416401644
2	guide,guard	s	4.167723129
2	hype,hype	s	5.191790506
2	loud,lard	s	2.434637143
2	park,pike	s	5.291824619
2	browse,browse	d	3.519639066
2	heart,heart	d	3.039296373
2	grouse,grass	d	4.650530546
2	fart,fight	s	3.638688224
2	dark,dike	s	3.943146552
2	laugh,laugh	d	6.696196095
2	like,lark	s	3.502122952
2	park,pike	s	5.958016176
2	scar,sky	s	3.018783677

2	cow,car	s	3.158827467
2	car,cow	s	2.740147026
2	halve,hive	s	2.78803345
2	cart,kite	s	2.429266081
2	cloud,cloud	d	3.097983804
2	mind,mind	d	2.263540139
2	guard,guide	s	2.625786667
2	grouse,grass	d	3.215420747
2	doubt,dart	s	2.704460695
2	heart,heart	d	2.791939503
2	life,life	d	3.198677139
2	stout,start	s	2.793145303
2	smart,smart	d	42.5796603
2	start,stout	s	2.784330284
2	lark,like	s	2.879545034
2	grass,grouse	d	2.177800271
2	pike,park	s	2.902516693
2	vows,vase	d	4.067978946
2	pouch,pouch	d	3.200526802
2	art,out	s	2.882784824
2	rise,rise	d	2.727657002
2	dart,doubt	s	3.095396196
2	harm,harm	d	2.632490254
2	bike,bark	s	3.496741009
2	kite,art	s	2.598295174
2	south,south	d	3.511122297
2	blind,blind	d	2.567201639
2	loud,lard	s	3.098020925
2	fight,fart	s	2.683398861
2	hive,halve	s	2.271085995
2	trance,trounce	d	4.130633231
2	guide,guard	s	8.536292431
2	bough,bar	s	3.270414612
2	vase,vows	s	4.38353589
2	charm,charm	d	3.242487265
2	out,art	s	3.067642934
2	bar,bough	s	3.372685601
2	browse,browse	d	2.612395492
2	tidy,tardy	s	2.779983897
2	spouse,spars	s	2.757839786
2	lard,loud	s	3.014870584

2	tardy, tidy	s	2.311598089
2	hype, hype	d	3.220791169
2	sky, scar	s	2.796430535
2	mouse, mouse	d	2.875953232
2	spars, spouse	s	2.09904368
2	bark, bike	s	2.482094753
2	trounce, trance	d	2.770662621
2	dike, dark	s	2.383974944
3	harm, harm	d	3.149931166
3	charm, charm	d	3.104760353
3	dark, dike	s	2.93072757
3	cart, kite	s	5.417482641
3	dart, doubt	s	3.967905791
3	trance, trounce	d	3.075124148
3	hype, hype	d	3.818178473
3	rise, rise	d	2.775762954
3	cloud, cloud	d	2.882860987
3	laugh, laugh	d	2.960579463
3	lard, loud	d	3.757394331
3	hive, halve	s	3.459039891
3	blind, blind	d	4.513178047
3	life, life	d	3.666922142
3	spouse, spars	s	5.805379318
3	loud, lard	s	4.547704658
3	bough, bar	s	3.875726025
3	out, art	s	4.525426782
3	park, pike	s	4.769582264
3	doubt, dart	s	3.248354984
3	vase, vows	d	5.126205561
3	guide, guard	s	4.793602919
3	pike, park	s	5.273514878
3	trounce, trance	d	2.853046215
3	mind, mind	d	2.420323697
3	cow, car	s	3.030517195
3	heart, heart	d	3.529266273
3	dike, dark	s	2.460881233
3	tardy, tidy	s	2.675206583
3	start, stout	s	3.319085703
3	vows, vase	d	8.107342841
3	grouse, grass	s	8.974608099
3	halve, hive	s	2.981111999

3	sky,scar	s	4.894271934
3	pouch,pouch	d	8.435074278
3	scar,sky	s	3.325145429
3	bike,bark	s	2.579096443
3	kite,cart	s	4.052457139
3	smart,smart	d	3.559614822
3	south,south	d	2.486305456
3	fight,fart	s	2.151812829
3	like,lark	s	2.865936253
3	fart,fight	s	2.045583306
3	car,cow	d	5.244024597
3	art,out	s	2.917641686
3	bark,bike	s	3.479382981
3	stout,start	s	5.15063519
3	tidy,tardy	s	2.798440203
3	mouse,mouse	d	7.408202966
3	bar,bough	s	10.96828788
3	guard,guide	s	3.487719903
3	grass,grouse	s	6.811652811
3	browse,browse	d	3.431107423
3	spars,spouse	s	3.072096846
3	lark,like	s	2.653760736
3	dark,dike	s	3.627990261
3	dike,dark	s	2.904224911
3	kite,cart	s	1.944336992
3	mind,mind	d	5.454082282
3	grass,grouse	s	4.073323767
3	south,south	d	2.420060008
3	tidy,tardy	s	5.776322333
3	mouse,mouse	d	3.837766337
3	spouse,spars	d	8.146695856
3	rise,rise	d	2.657318616
3	bike,bark	s	3.183636629
3	cow,car	s	2.915220484
3	loud,lard	s	2.550359468
3	browse,browse	d	3.987100042
3	scar,sky	s	4.800489553
3	pouch,pouch	d	10.63128381
3	start,stout	s	4.662909846
3	stout,start	s	2.998631314
3	pike,park	s	2.076728683



3	smart,smart	d	3.19134441
3	charm,charm	d	2.999366698
3	grouse,grass	s	3.49676853
3	cart,kite	s	2.277865745
3	fart,fight	s	1.788046891
3	guide,guard	s	4.018706235
3	vows,vase	d	3.980763828
3	hype,hype	d	2.98467628
3	fight,fart	s	1.944979574
3	harm,harm	d	2.799590962
3	trounce,trance	d	4.774918765
3	bark,bike	s	2.960326654
3	lark,like	s	6.988242481
3	laugh,laugh	d	5.817964705
3	vase,vows	s	2.952692475
3	hive,halve	s	2.688741122
3	bough,bar	s	4.18869152
3	dart,doubt	s	2.393175256
3	park,pike	s	2.471521594
3	out,art	s	3.135862848
3	spars,spouse	s	2.569312431
3	blind,blind	d	2.955232721
3	sky,scar	s	2.563517675
3	doubt,dart	s	3.659253402
3	like,lark	s	3.3720539
3	halve,hive	s	4.697399336
3	guard,guide	s	4.096769042
3	heart,heart	s	5.21905671
3	bar,bough	s	5.086321328
3	life,life	d	6.784079396
3	tardy,tidy	s	4.300352268
3	art,out	s	5.665131361
3	lard,loud	s	3.050810363
3	cloud,cloud	d	3.24292248
3	trance,trounce	d	3.10611976
3	car,cow	s	4.523432475
3	start,stout	s	3.61378498
3	spouse,spars	s	3.454441975
3	blind,blind	d	4.244285086
3	hive,halve	s	2.986033126
3	doubt,dart	s	3.584633911

3	grass,grouse	s	3.224850827
3	mouse,mouse	d	3.933981441
3	bough,bar	s	5.775708552
3	loud,lard	s	3.388348213
3	mind,mind	d	3.261058775
3	guide,guard	s	4.988998987
3	grouse,grass	s	2.661882611
3	kite,cart	s	2.854135532
3	scar,sky	s	2.83194278
3	pike,park	s	2.318645369
3	halve,hive	s	3.159163479
3	art,out	s	3.09876015
3	trounce,trance	d	2.554883782
3	smart,smart	d	2.690428219
3	bike,bark	s	2.491718759
3	harm,harm	d	2.808344539
3	bark,bike	s	3.291011151
3	heart,heart	s	3.849972191
3	south,south	d	3.163386982
3	life,life	d	3.496145149
3	pouch,pouch	d	3.045767632
3	fart,fight	s	2.798687251
3	tardy,tidy	s	2.744052438
3	vase,vows	s	4.038194256
3	sky,scar	s	3.700941216
3	bar,bough	s	3.215462989
3	charm,charm	d	4.34140454
3	laugh,laugh	d	2.423762534
3	park,pike	s	3.30159519
3	like,lark	s	2.586019558
3	rise,rise	d	2.546731825
3	browse,browse	d	3.239319158
3	dart,doubt	s	4.167564404
3	cloud,cloud	d	2.782088928
3	lark,like	s	2.906520029
3	tidy,tardy	s	2.390901259
3	hype,hype	d	3.445297344
3	cart,kite	s	2.004150861
3	lard,loud	s	2.446284898
3	vows,vase	s	3.014690738
3	dike,dark	s	2.100598932

3	car,cow	s	2.464293829
3	dark,dike	s	1.968885665
3	fight,fart	s	2.936114633
3	out,art	s	3.571657471
3	cow,car	s	3.865918972
3	guard,guide	s	2.332706005
3	trance,trounce	d	2.44515974
3	spars,spouse	s	2.385256268
3	stout,start	s	3.492907279
5	life,life	d	3.200304074
5	south,south	d	2.504348947
5	bike,bark	s	3.197957755
5	pouch,pouch	d	3.476768492
5	guide,guard	s	3.2034197
5	mind,mind	d	5.103516791
5	laugh,laugh	d	2.477169786
5	sky,scar	s	2.74174836
5	bar,bough	s	3.112256288
5	tidy,tardy	s	3.257316568
5	doubt,dart	d	3.369793983
5	charm,charm	d	3.120249519
5	lard,loud	d	2.64091742
5	stout,start	d	5.975882382
5	cart,kite	s	2.645059
5	grouse,grass	d	3.273263989
5	car,cow	s	2.44045622
5	bough,bar	s	5.653458005
5	vase,vows	s	4.222964043
5	lark,like	s	3.360072694
5	hive,halve	s	6.547307205
5	tardy,tidy	s	4.625144085
5	fart,fight	s	2.998621713
5	spars,spouse	s	4.852352432
5	like,lark	s	3.324403004
5	trounce,trance	d	3.366491471
5	bark,bike	s	4.331388841
5	loud,lard	s	2.81309158
5	guard,guide	s	8.058308858
5	rise,rise	d	3.21343732
5	dike,dark	s	2.862456455
5	park,pike	s	4.635061861

5	blind,blind	d	8.821873958
5	cloud,cloud	d	3.890195635
5	halve,hive	s	2.989242835
5	pike,park	s	5.630643791
5	browse,browse	d	2.549697686
5	harm,harm	d	3.407315256
5	mouse,mouse	d	2.578102489
5	dark,dike	s	4.743281212
5	trance,trounce	d	4.37912614
5	hype,hype	d	7.946578348
5	smart,smart	d	3.97316997
5	fight,fart	s	5.771894663
5	scar,sky	s	6.213984538
5	out,art	s	3.380877239
5	vows,vase	d	3.381271493
5	kite,art	s	3.056388153
5	heart,heart	d	2.393682794
5	art,out	s	3.778637931
5	cow,car	s	3.107331961
5	start,stout	s	6.274654116
5	dart,doubt	d	2.890410683
5	spouse,spars	s	2.365359273
5	grass,grouse	d	3.495554409
5	lard,loud	d	2.981627217
5	mouse,mouse	d	3.525765354
5	art,kite	s	7.487543257
5	bar,bough	s	2.758818379
5	charm,charm	d	2.89888457
5	grass,grouse	d	7.589748324
5	spouse,spars	d	3.696505865
5	hive,halve	s	7.378613483
5	fart,fight	s	2.376616615
5	life,life	d	2.846793843
5	trance,trounce	d	2.976179352
5	vase,vows	d	2.507516415
5	scar,sky	s	3.100335243
5	spars,spouse	s	4.874484383
5	like,lark	s	8.241200822
5	sky,scar	s	1.64506156
5	smart,smart	d	2.686502326
5	dark,dike	s	3.486617146

5	fight,fart	s	2.065869434
5	cloud,cloud	d	2.963417959
5	vows,vase	d	3.078515623
5	tidy,tardy	s	2.709769035
5	car,cow	s	3.567000033
5	cow,car	s	2.196307139
5	doubt,dart	d	2.286468917
5	tardy,tidy	s	2.330960666
5	heart,heart	d	2.823642978
5	stout,start	d	3.565107488
5	loud,lard	d	3.760156025
5	kite,cart	s	2.264242883
5	trounce,trance	d	2.445990488
5	pouch,pouch	d	2.916659893
5	dart,doubt	d	3.323337368
5	start,stout	s	3.527543334
5	out,art	s	3.937607164
5	grouse,grass	s	3.402466452
5	rise,rise	d	2.435821823
5	mind,mind	d	2.39827751
5	blind,blind	d	2.255973803
5	guide,guard	s	2.398838809
5	guard,guide	s	2.708282265
5	halve,hive	s	2.784867263
5	harm,harm	d	3.227357792
5	south,south	d	2.535221035
5	art,out	s	2.908681382
5	pike,park	s	2.195522472
5	browse,browse	d	2.545552265
5	bark,bike	s	2.41685414
5	lark,like	s	3.676947442
5	park,pike	s	3.14976156
5	bike,bark	s	2.477249788
5	hype,hype	d	2.98584048
5	laugh,laugh	d	2.781708116
5	dike,dark	s	4.755698913
5	bough,bar	s	3.593144279
5	spars,spouse	s	2.480605422
5	mind,mind	d	3.478294304
5	lard,loud	s	4.472350422
5	cloud,cloud	d	3.698338888

5	mouse,mouse	d	2.8856182
5	kite,cart	s	7.026743627
5	park,pike	s	2.532238534
5	vows,vase	s	3.289747748
5	art,out	s	3.866718359
5	harm,harm	d	3.851873696
5	car,cow	s	4.17747514
5	pike,park	s	2.936765535
5	rise,rise	d	4.977084983
5	dark,dike	s	2.22848295
5	blind,blind	d	2.515421963
5	loud,lard	d	2.852849729
5	grass,grouse	s	2.172127119
5	dike,dark	s	2.144246493
5	out,art	s	3.054154477
5	guard,guide	s	4.018057252
5	fight,fart	s	2.200357196
5	bike,bark	s	2.077072374
5	vase,vows	s	3.328355138
5	cart,kite	s	2.240648483
5	guide,guard	s	2.58814571
5	dart,doubt	s	2.457229909
5	spouse,spars	s	2.737968392
5	trounce,trance	d	2.457202388
5	hive,halve	s	2.536716125
5	bark,bike	s	2.029333795
5	tardy,tidy	s	2.338774051
5	scar,sky	s	2.450445679
5	charm,charm	d	2.311885459
5	halve,hive	s	2.887270736
5	life,life	s	3.538967722
5	grouse,grass	d	2.862763665
5	tidy,tardy	d	4.147351238
5	laugh,laugh	s	2.481377928
5	bar,bough	d	3.099485935
5	hype,hype	s	3.796481097
5	bough,bar	d	2.854856837
5	browse,browse	s	2.677105527
5	like,lark	d	2.842015441
5	heart,heart	s	2.651975715
5	cow,car	s	2.772677409

5	south,south	s	2.697322533
5	doubt,dart	s	2.600733017
5	trance,trounce	s	2.946305699
5	sky,scar	s	2.579083003
5	pouch,pouch	s	2.488898183
5	stout,start	s	2.969202475
5	lark,like	s	1.657230293
5	fart,fight	s	2.016091106
5	smart,smart	s	2.184439856
5	start,stout	s	1.971651198
6	trounce,trance	d	3.83402093
6	doubt,dart	s	4.935863104
6	vows,vase	s	4.266973216
6	lark,like	s	5.467700024
6	start,stout	s	6.537573115
6	bough,bar	s	3.225098515
6	life,life	d	3.537631996
6	out,art	s	4.095896693
6	grass,grouse	s	4.714462955
6	mind,mind	d	5.778493286
6	cloud,cloud	d	5.010837808
6	browse,browse	d	3.827050454
6	mouse,mouse	d	3.939725635
6	pike,park	s	8.383580051
6	laugh,laugh	d	2.785934179
6	lard,loud	s	5.545353218
6	spars,spouse	s	4.610938803
6	trance,trounce	d	3.649700438
6	blind,blind	d	4.565566384
6	bike,bark	s	4.272636128
6	like,lark	s	2.238010953
6	kite,cart	s	2.38708289
6	art,out	s	1.398325511
6	stout,start	d	3.994597257
6	loud,lard	s	4.655846566
6	fight,fart	s	2.363338724
6	south,south	d	3.151885792
6	guide,guard	s	3.744537575
6	cow,car	s	3.937118827
6	rise,rise	d	3.326313469
6	guard,guide	s	8.188297267

6	heart,heart	d	3.626017715
6	cart,kite	s	4.56868073
6	spouse,spars	s	3.45342114
6	vase,vows	s	3.321709152
6	scar,sky	s	3.100072834
6	halve,hive	s	2.190602625
6	hive,halve	s	2.249050048
6	bar,bough	s	3.523092623
6	sky,scar	s	3.087589211
6	tardy,tidy	s	3.330844822
6	pouch,pouch	d	2.469389042
6	hype,hype	d	5.683003968
6	bark,bike	s	8.226899536
6	dart,doubt	d	2.672803942
6	park,pike	s	3.82488974
6	charm,charm	d	4.488935945
6	car,cow	s	5.246595565
6	dike,dark	s	2.962230079
6	fart,fight	s	6.242393822
6	harm,harm	d	4.384310316
6	grouse,grass	d	4.951798365
6	dark,dike	s	1.82930013
6	smart,smart	d	2.457816169
6	tidy,tardy	d	3.374024527
6	fart,fight	s	1.759118549
6	doubt,dart	d	4.237214766
6	life,life	d	6.810373408
6	trance,trounce	s	3.45372003
6	tidy,tardy	s	2.459060371
6	trounce,trance	s	2.233420718
6	dark,dike	s	2.02357936
6	pike,park	s	2.318877056
6	kite,cart	s	2.439080814
6	hype,hype	s	2.735804478
6	lard,loud	d	3.756269813
6	grouse,grass	s	2.939815879
6	like,lark	s	2.434590421
6	bike,bark	s	2.282499502
6	fight,fart	s	2.064732116
6	south,south	d	3.911407875
6	tardy,tidy	s	2.690931276



6	lark,like	s	2.025980081
6	harm,harm	s	2.939897161
6	vase,vows	s	7.790745222
6	charm,charm	d	4.405534076
6	browse,browse	d	3.444763566
6	scar,sky	s	1.90625698
6	rise,rise	d	6.87380852
6	park,pike	s	2.561075992
6	spouse,spars	s	4.413097212
6	vows,vase	s	2.53184236
6	grass,grouse	s	1.5418747
6	pouch,pouch	d	2.849335369
6	spars,spouse	d	7.637426101
6	cloud,cloud	d	2.883122115
6	hive,halve	s	2.949501967
6	mouse,mouse	d	5.610820399
6	cow,car	s	3.113588173
6	stout,start	s	3.180325797
6	start,stout	s	4.436206476
6	heart,heart	d	2.942113556
6	bough,bar	s	4.479219775
6	art,out	s	3.054796419
6	loud,lard	s	2.711613578
6	guide,guard	s	2.585268812
6	halve,hive	s	3.80336517
6	out,art	s	1.689438106
6	blind,blind	d	2.45460838
6	bar,bough	s	3.327382945
6	dike,dark	s	4.051189256
6	mind,mind	s	5.353706398
6	smart,smart	d	2.125563619
6	cart,kite	s	3.562524361
6	bark,bike	s	3.613736978
6	laugh,laugh	d	5.102430034
6	car,cow	s	2.440576544
6	dart,doubt	s	2.641156788
6	sky,scar	s	3.15301159
6	guard,guide	s	2.525248216
6	life,life	d	2.731673778
6	bike,bark	s	2.281042173
6	rise,rise	d	2.614862776

6	tidy,tardy	s	3.735030692
6	doubt,dart	s	3.180696369
6	park,pike	s	4.582705525
6	south,south	d	4.391679526
6	car,cow	s	4.771096556
6	grouse,grass	d	3.254267505
6	vase,vows	s	3.017762842
6	scar,sky	s	1.878072984
6	dark,dike	s	2.005949322
6	kite,cart	s	2.527596456
6	halve,hive	s	2.941713543
6	pouch,pouch	d	2.192746058
6	lard,loud	d	2.940660067
6	lark,like	s	3.076457953
6	bark,bike	s	2.557319704
6	spouse,spars	s	2.180850614
6	out,art	s	2.673230836
6	laugh,laugh	d	2.592790347
6	stout,start	s	2.980877751
6	tardy,tidy	s	2.298620369
6	grass,grouse	s	2.61616586
6	heart,heart	d	2.46580684
6	cart,kite	s	1.953362578
6	blind,blind	d	2.568055428
6	art,out	s	2.474599458
6	like,lark	s	5.256044845
6	start,stout	s	3.990776967
6	guide,guard	s	3.054409846
6	loud,lard	s	3.832698005
6	mind,mind	d	2.925878766
6	charm,charm	d	2.907956238
6	fight,fart	s	3.365618482
6	hive,halve	s	2.53006822
6	sky,scar	s	2.979790354
6	trance,trounce	s	4.934204808
6	spars,spouse	s	3.003123626
6	guard,guide	s	3.052675387
6	browse,browse	d	2.910316638
6	fart,fight	s	2.080569453
6	cloud,cloud	d	2.884520563
6	bar,bough	s	4.474490655

6	pike,park	s	3.791830699
6	trounce,trance	s	3.616287465
6	harm,harm	d	2.573500733
6	dike,dark	s	2.29745425
6	hype,hype	s	2.698436171
6	smart,smart	d	2.414818871
6	mouse,mouse	d	2.104394261
6	cow,car	s	2.377412802
6	bough,bar	s	2.72259251
6	vows,vase	s	3.278770096
6	dart,doubt	s	2.138841509
7	blind,blind	d	3.650773658
7	laugh,laugh	d	2.982199088
7	life,life	d	2.523304456
7	vase,vows	s	5.362906158
7	mind,mind	d	2.727567893
7	charm,charm	d	3.74999232
7	fart,fight	s	2.264892016
7	kite,car	s	3.062533921
7	bike,bark	s	1.958427416
7	bark,bike	s	2.329789535
7	grass,grouse	s	5.052033092
7	halve,hive	s	4.510678115
7	scar,sky	s	2.653888641
7	cow,car	s	2.920159263
7	tardy,tidy	d	3.227398928
7	guard,guide	s	2.806446679
7	bough,bar	d	4.890505796
7	trounce,trance	d	3.455776448
7	dike,dark	s	4.125192006
7	pike,park	s	5.107997834
7	smart,smart	d	3.267779152
7	south,south	d	4.241058902
7	fight,fart	s	7.725119812
7	tidy,tardy	d	2.376111077
7	spars,spouse	s	2.600171014
7	out,art	s	5.742910484
7	hype,hype	d	3.917135802
7	cloud,cloud	d	3.799680373
7	park,pike	s	2.291145049
7	loud,lard	s	2.593792561

7	stout,start	s	9.102340046
7	harm,harm	d	3.514049748
7	heart,heart	s	6.693464999
7	lard,loud	d	4.62620388
7	grouse,grass	s	2.664263387
7	hive,halve	s	0.281496088
7	browse,browse	d	4.221791701
7	mouse,mouse	d	8.572566895
7	art,out	s	3.741145945
7	spouse,spars	s	2.966841776
7	lark,like	s	5.210118993
7	car,cow	s	4.737851756
7	vows,vase	d	3.32752834
7	trance,trounce	d	2.622706804
7	rise,rise	d	2.656398805
7	start,stout	s	3.2283628
7	cart,kite	s	8.702681945
7	dark,dike	s	8.191087959
7	like,lark	s	3.660132689
7	pouch,pouch	d	3.527681561
7	sky,scar	s	4.284067694
7	dart,doubt	s	4.114359006
7	doubt,dart	s	2.267238334
7	guide,guard	s	5.513291962
7	bar,bough	s	2.308947882
7	browse,browse	d	3.52011779
7	fight,fart	s	2.83624287
7	tidy,tardy	s	2.73767127
7	art,out	s	3.215472131
7	cloud,cloud	d	5.576971522
7	pike,park	s	4.637236567
7	loud,lard	d	4.008614687
7	fart,fight	s	2.203835904
7	guide,guard	s	3.182912327
7	dart,doubt	s	3.293413285
7	stout,start	d	3.472984061
7	halve,hive	s	3.101608502
7	laugh,laugh	d	3.713092532
7	grouse,grass	s	2.463495745
7	harm,harm	d	4.311109234
7	mind,mind	d	2.592004982

7	life,life	d	2.775095875
7	cart,kite	s	2.139451681
7	heart,heart	d	4.607979914
7	out,art	s	8.949784569
7	hype,hype	d	3.674133155
7	hive,halve	s	5.849010015
7	scar,sky	s	5.229009861
7	smart,smart	d	4.420470313
7	mouse,mouse	d	5.791245533
7	kite,cart	s	2.482383414
7	south,south	d	5.612929838
7	bough,bar	s	6.174438445
7	pouch,pouch	d	5.209648577
7	doubt,dart	s	5.218039896
7	tardy,tidy	s	5.395104349
7	blind,blind	d	5.514172632
7	rise,rise	d	3.78243948
7	like,lark	s	4.361931405
7	bar,bough	s	6.173283207
7	dike,dark	s	4.580381555
7	park,pike	s	2.917811025
7	spars,spouse	s	3.433101134
7	dark,dike	s	1.957551227
7	vase,vows	d	3.055437365
7	grass,grouse	s	2.593413029
7	lark,like	s	6.878211627
7	sky,scar	s	3.692289919
7	cow,car	s	4.474513712
7	vows,vase	d	7.727489171
7	trounce,trance	d	6.784743556
7	start,stout	s	7.936737735
7	guard,guide	s	7.537768297
7	bike,bark	s	2.193303713
7	trance,trounce	d	1.753680122
7	lard,loud	s	5.375233608
7	car,cow	s	2.981649949
7	spouse,spars	s	2.097495085
7	bark,bike	s	3.411008878
7	charm,charm	d	2.718061017
7	dark,dike	s	4.174302121
7	fight,fart	s	1.805690813

7	grouse,grass	s	1.895512043
7	doubt,dart	d	2.780129643
7	kite,cart	s	4.290654153
7	bark,bike	s	1.981854116
7	like,lark	s	2.21905049
7	bike,bark	s	2.338160374
7	harm,harm	d	2.361597314
7	mouse,mouse	d	2.648248774
7	smart,smart	d	2.662838059
7	cloud,cloud	d	3.341510885
7	laugh,laugh	d	2.939068052
7	hype,hype	d	0.542768783
7	park,pike	s	3.820038811
7	tidy,tardy	s	3.381129484
7	guide,guard	s	6.901766331
7	mind,mind	d	2.329834337
7	car,cow	s	2.101130406
7	bar,bough	s	1.785704228
7	lark,like	s	2.577598742
7	browse,browse	d	2.119036282
7	scar,sky	s	2.678967236
7	trounce,trance	d	1.449872892
7	fart,fight	s	1.145408359
7	out,art	s	1.845654383
7	life,life	d	2.302644952
7	halve,hive	s	5.87019152
7	start,stout	s	6.820773555
7	south,south	d	2.377060869
7	bough,bar	s	3.084624256
7	spouse,spars	d	3.290000691
7	grass,grouse	s	2.47415594
7	charm,charm	d	2.761102449
7	dike,dark	s	2.048749142
7	sky,scar	s	2.323899419
7	cart,kite	s	1.938374909
7	stout,start	d	3.582108333
7	heart,heart	d	2.372856569
7	dart,doubt	d	3.507952905
7	cow,car	s	2.563247545
7	blind,blind	d	2.636339257
7	vase,vows	d	2.204113033

7	art,out	s	3.001174439
7	vows,vase	d	3.720939193
7	spars,spouse	s	2.915108855
7	hive,halve	s	2.876129638
7	tardy,tidy	s	2.529469141
7	rise,rise	d	2.907797892
7	pouch,pouch	d	3.048009278
7	pike,park	s	3.699678325
7	loud,lard	d	3.358045196
7	trance,trounce	d	3.327539221
7	lard,loud	d	2.25872669
7	guard,guide	s	2.060619617

## Appendix 7 Participants' Results Diphthongs Interview

name	sex	vowel	word	F1@20%	F1@80%	F2@20%	F2@80%
P1	M	AY	I	671.5	707.5	1517.6	881.3
P1	M	AY	I	1060.2	677.6	1729.8	1346.7
P1	M	AY	MY	443.3	571.5	1317.8	1528.5
P1	M	AY	I	784.6	659.7	2169.1	1782.7
P1	M	AY	I	689.6	556.1	1540.9	1747
P1	M	AY	I	818.2	598.1	1778	1914.2
P1	M	AY	I	622.3	453.2	1562.4	2578.2
P1	M	AY	I	544.9	514.2	1827.9	1947.9
P1	M	AY	TIME	561.1	622.6	1528.9	1832
P1	M	AY	I	766.5	498.5	1588.5	1478.4
P1	M	AY	BY	648.2	481.6	2011	1782.8
P1	M	AY	I	838.6	497.1	1734.2	2033.3
P1	M	AY	I	966.6	462.1	3013.2	1479.9
P1	M	AY	BY	684.5	596.3	1855	1806.1
P1	M	AY	MY	429.2	506.6	1193.4	1773.4
P1	M	AY	MY	411.5	438.1	1559.2	1886.5
P1	M	AY	I	1074.5	584.3	2495.7	1675.8
P1	M	AY	I'M	907.4	535.1	2062.8	1771.1
P1	M	AY	ASSIGNED	541.4	554	1569.7	1904.7
P1	M	AY	I	674.6	507.8	1365.8	2022.4
P1	M	AY	I	1085.2	674	3203	1763.8
P1	M	AY	I	515.5	442.7	1634.1	2034.5
P1	M	AY	I	1049	582.6	1776.3	1491.8
P1	M	AY	I	755.3	493.8	1528.6	1445.7
P1	M	AY	LIKE	544.3	520.8	1639.5	2241.1
P1	M	AY	QUITE	567.7	472.8	1267.8	1377.4
P1	M	AY	LIKE	535.1	511.4	1421.7	1775.8
P1	M	AY	LIKE	487.8	517.6	1398.6	1978.1
P1	M	AY	I	602.6	604.5	1437.2	1779.7
P1	M	AY	I'M	1458	464.8	2451.5	1699.2
P1	M	AY	I	671	445.5	1489.8	2272.4
P1	M	AY	MY	477.3	588.5	1376.3	1647.4
P1	M	AY	I	714.9	645.5	1641.6	1853.9
P1	M	AY	MY	560.6	494.7	1510.3	2072.9
P1	M	AY	I	545	451.3	1690.6	2029.5
P1	M	AY	I	1034.1	556.3	1659.8	1726.6
P1	M	AY	I	562.2	916.4	1616.5	2186.9
P1	M	AY	I	507.2	497.8	1241	1472.7



P1	M	AY	I	718.7	547	1501.8	1115.2
P1	M	AY	I'M	782.5	579.5	1389.8	1438.8
P1	M	AW	HOW	629.5	495.7	1352.1	1313.2
P1	M	AW	HOW	557.6	467.5	1567	1508.8
P1	M	AW	HOW	747.7	684	1342	1137.1
P1	M	AW	ABOUT	560	541	1472	1537.7
P1	M	AW	ABOUT	596.8	547.5	1318.6	1476.5
P1	M	AW	DOWNS	598.4	609.7	1611.8	1406.6
P1	M	AW	NOW	650.6	589.8	1508.8	1077.4
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P2	F	AY	PRIMARY	675	653.7	1059	1948.7
P2	F	AY	I	686.5	664.9	1479.5	1861.8
P2	F	AY	I	611.1	631.6	1540.7	1823.6
P2	F	AY	I	476.8	284.6	1463.7	855.5
P2	F	AY	TIME	619.6	568.3	1443.6	2022.5
P2	F	AY	I	1041.8	717.4	1932.6	1715.2
P2	F	AY	I	900.5	466.6	1650.9	1814.9
P2	F	AY	I	453.6	467.3	1715.1	2200.5
P2	F	AY	I	905.3	662.5	1506.6	1415
P2	F	AY	I	452.9	381	1845.5	1819.4
P2	F	AY	MY	535.9	605.2	1267.8	1893.3
P2	F	AY	MY	422.6	670.3	1377.5	1828.6
P2	F	AY	I	666.2	764	1326.1	1754.5
P2	F	AY	LIKE	691.7	439	1405.4	2169
P2	F	AY	I	332.3	682.8	1534.5	1493.4
P2	F	AY	I	877.2	734.4	1398.3	1678.3
P2	F	AY	I	390.3	646.5	1221.9	1563
P2	F	AY	I	592.7	598	1600.5	1823.1
P2	F	AY	MY	232.7	568.6	1269.6	1908.7
P2	F	AY	I	905.2	722.7	1727.8	1457.2
P2	F	AY	I	435.5	626.4	1552.4	1551.7
P2	F	AY	I	500.8	467.2	1528.1	1569.8
P2	F	AY	I	1070.5	474.8	2608.5	1435.8
P2	F	AY	LIKE	376.3	479.9	1283.5	2178.4
P2	F	AY	I	715.2	339.7	1588.7	1219.1
P2	F	AY	I	861.7	516.1	1629.5	1563.5
P2	F	AY	MY	355.1	272.5	1090.2	1139.1
P2	F	AY	I	497.4	529.4	1880	1946.1
P2	F	AY	MY	426.6	626.9	1313	1778.9
P2	F	AY	I	687.7	448.2	1641.3	1328.9
P2	F	AY	TIME	733.1	643.5	1609.6	1942.6

P2	F	AY	I	1023.9	523.4	2026.4	2106
P2	F	AY	TRY	619.6	388.9	1369.9	2199.2
P2	F	AY	I	362.8	685.7	1410.1	1860.9
P2	F	AY	I	837.9	605.6	1483.4	1469
P2	F	AY	I	717.7	580.8	1309.7	1294
P2	F	AY	PSYCHOLOGIST	687.2	553.4	1698.8	1944.9
P2	F	AY	I	991.3	386.6	1882.8	823.3
P2	F	AY	I	891.8	731.5	1910.8	1833.7
P2	F	AY	I	649	708.4	1643.8	1414.6
P2	F	AY	FIND	792.5	243	1576.8	806.7
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P3	F	AY	FINE	582.5	442.4	924.8	1417.8
P3	F	AY	REVISING	641	459.9	1267.2	2142.4
P3	F	AY	I	1112.1	633.3	2406.2	1728.4
P3	F	AY	I	560.2	673.4	1645.1	1864.4
P3	F	AY	I	836.3	688.6	2042.8	1576.2
P3	F	AY	I	1221.2	507.4	2526.9	2144.5
P3	F	AY	I	596.2	567	1729.7	1866.1
P3	F	AY	HIGH	893	429.3	1705.2	1871.9
P3	F	AY	I	801.7	302.6	1463.1	663.9
P3	F	AY	I	581.1	570.2	2018.8	1999
P3	F	AY	I	997.2	668.6	1604.6	811.8
P3	F	AY	I	625.8	635.3	1287.4	1401.4
P3	F	AY	OUTSIDE	565.5	604.5	1524	1913.6
P3	F	AY	I	926.7	395.1	2736.8	2092.7
P3	F	AY	I	929	942.1	1727.5	1835.2
P3	F	AY	I	534.7	634.8	1600.1	1906.1
P3	F	AY	I	608.8	502.1	1721.4	1516
P3	F	AY	I	1006.2	480.8	1594.9	2354.3
P3	F	AY	LIKE	614.4	542.9	1280.1	2185.6
P3	F	AY	I	1055.4	668.7	2092.3	1521.7
P3	F	AY	I	408.3	311.6	1401	1832.8
P3	F	AY	I	1039.4	463.3	1656.2	1928.8
P3	F	AY	MY	287.1	389.1	1144.1	1703.8
P3	F	AY	I	1034.4	894	1785.4	1744.6
P3	F	AY	I	754.4	591.7	1379.6	1281.4
P3	F	AY	MY	353.1	666.8	1188.8	1952.8
P3	F	AY	I	473.4	458.9	1729.3	1861.3
P3	F	AY	TRY	615.5	555.3	1591	1774.3
P3	F	AY	I	463.1	433.2	1591.4	1517.2
P3	F	AY	I	547.2	481.2	1775.4	2078.6

P3	F	AY	MYSELF	287.6	533.8	1226.8	1953.2
P3	F	AY	LIKE	477.8	467.7	1601.2	2045
P3	F	AY	MY	355	553.6	1116	1049.1
P3	F	AY	I	609.7	381.8	1601.1	2355.7
P3	F	AY	WHILE	566.4	687.9	1013.4	1224.6
P3	F	AY	I	1094.4	560.3	2557.6	1311.9
P3	F	AY	LIKE	445.8	494	1347.1	1820.8
P3	F	AY	I	1011.5	606.8	1360.4	1179.5
P3	F	AY	I	684.6	392.5	1589.7	1882.9
P3	F	AY	LIKE	399.2	304.4	996.2	2240.2
P3	F	AY	MY	363.3	476.1	1241.5	2115.2
P3	F	AY	I	908.4	488.4	1584.1	1710.3
P3	F	AY	I	456.3	362	1770.4	2133
P3	F	AY	I	713.8	489.1	1762.5	1364.5
P3	F	AY	MY	307.4	431.3	1213.5	1969
P3	F	AY	I	573.7	580.3	1702.9	1582.4
P3	F	AY	I	608.3	454.3	1197.4	2231.9
P3	F	AY	LIFE	611.1	476.4	1255.8	1969
P3	F	AY	FINE	735.1	394.9	1559.5	2112.1
P3	F	AY	I	447.1	461.1	1572.4	2009.9
P3	F	AY	LIKE	667.2	481.1	1647.4	2053.6
P3	F	AY	I	982.3	520.8	1756.7	1981.4
P3	F	AY	I	507.8	647.2	938.8	1737.2
P3	F	AY	KIND	814.7	495.6	1853.8	1033.8
P3	F	AY	I	840.7	599	1187	1346.3
P3	F	AY	TIME	670.1	646.3	1777.7	1884.6
P3	F	AY	I	408.2	476.8	2053.4	2207.9
P3	F	AY	I	449.7	459.7	1642.2	1468
P3	F	AY	I	572.3	481.8	1909	2067.8
P3	F	AY	I	446.7	489.3	1667.6	1836.1
P3	F	AY	I	604.2	497.5	1138	1767.7
P3	F	AY	I	706.3	612.6	1552.4	1076.4
P3	F	AY	LIKE	385.2	494	1341.2	2093.2
P3	F	AY	MY	471.1	550.8	1148.1	1476.6
P3	F	AY	KIND	954.5	571.4	1858.8	1967
P3	F	AY	I	1098.8	311.4	1499.4	1092.3
P3	F	AY	LIFE	744.5	390.3	1495	2195.9
P3	F	AY	I	530.2	570.3	1530.7	2024
P3	F	AY	BEHIND	552.2	274.5	1414.1	704.4
P3	F	AY	TIME	761	624	1590.7	1953.5
P3	F	AY	I	347.9	487.1	1251.6	1769.2

P3	F	AW	NOW	628.3	782.3	1612	1186.8
P3	F	AW	OUTSIDE	759.4	635.9	1600.6	1563
P3	F	AW	ABOUT	693	619.1	1420.8	1222.3
P3	F	AW	DOWN	707.3	624.3	1747.5	1306.1
P3	F	AW	SURROUNDINGS	709.1	716.2	1570	1524.8
P3	F	AW	NOW	750.1	608.5	1626.1	1197.4
P3	F	AW	NOW	716.6	349.6	1659.3	1035.5
P3	F	AW	ABOUT	685.7	576.3	2259.2	2092.4
P3	F	AW	NOW	628.7	574.4	1755.7	1128.3
P3	F	AW	ABOUT	637	634.9	1320.3	1265.2
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P4	F	AY	I	581.4	565.3	1860.4	1499.4
P4	F	AY	I	673.5	843.9	1698.5	1921.8
P4	F	AY	I	678.6	482.8	1672	1074.2
P4	F	AY	I	1696.5	782.4	2685.8	1747.3
P4	F	AY	MY	467.9	755.9	1101	1720.5
P4	F	AY	I	863.7	364.7	1287.7	1881.4
P4	F	AY	I	1568.9	633.4	2609.7	2004.3
P4	F	AY	PRIMARY	712.4	752.8	1707.8	1793
P4	F	AY	QUITE	689.4	437	1319.9	902.8
P4	F	AY	I	679.6	401.2	1944.9	2314.2
P4	F	AY	MY	823.8	458.3	1432.9	2335.2
P4	F	AY	MY	763.3	332.1	1178	1353.5
P4	F	AY	QUITE	648.9	605.3	1339.2	2021.2
P4	F	AY	I	817.1	580.5	1692.4	2321.6
P4	F	AY	MY	432.7	608	1081.4	1896.8
P4	F	AY	I	600.3	618.5	949.3	1650.4
P4	F	AY	I	369.9	682.7	1807.6	1707.9
P4	F	AY	LIKE	643.3	563.5	1429.2	1254.4
P4	F	AY	I	1297.7	518.1	2805.4	1861.4
P4	F	AY	I	613.7	765.8	1373.7	1796.9
P4	F	AY	QUITE	632.2	652.7	1331.7	1921.8
P4	F	AY	WHY	684.1	630.3	1235.5	1922.4
P4	F	AY	QUITE	669.3	463.7	1193.9	841.5
P4	F	AY	I	612.5	521.1	1713.1	2014.5
P4	F	AY	MY	362.1	557.2	867	1734.7
P4	F	AY	I	522	629.5	1575.7	2091.6
P4	F	AY	MY	341.4	342.4	1029.2	1418.9
P4	F	AY	WHY	721.2	605.3	1675.1	1876.1
P4	F	AY	I	591	615.2	1811	2023.4
P4	F	AY	MY	287.7	392.8	781.4	1152.1

P4	F	AY	I	454.4	683.1	1831.4	1938.6
P4	F	AY	I	727.8	790.7	1309.7	1566.9
P4	F	AY	WHY	655.2	778.1	2262.4	1820.6
P4	F	AY	I	768.3	590.6	1735.6	1961.7
P4	F	AY	MY	426.3	397.9	939.3	737
P4	F	AY	MY	549	498.6	1513.7	1341.8
P4	F	AY	WHY	616.5	707.1	1318.6	1703.2
P4	F	AY	I	769.6	478.2	1570.6	973
P4	F	AY	I	638.3	840.6	1840.3	1764.6
P4	F	AY	I	1354.5	579.1	2100.5	2042
P4	F	AW	NOW	864.2	498.1	1494.9	1379.2
P4	F	AW	CROWDED	679.1	574.4	1163.8	1196.2
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P5	M	AY	I'M	1516.6	613	2631.3	1498.7
P5	M	AY	I	1181	590.7	1969.2	1382.8
P5	M	AY	MY	608	560.8	1186.3	1652.7
P5	M	AY	I	1058.8	690.5	2395.9	1555.4
P5	M	AY	I	612.7	564.4	1184.5	1413.2
P5	M	AY	I	715.8	525.4	1354.8	1060
P5	M	AY	I	580.1	486.1	1261.7	1847.6
P5	M	AY	I'M	546.6	629.2	1370.2	1521.2
P5	M	AY	I	681.6	560.7	1409	1056.9
P5	M	AY	I	745.2	549.5	1768.7	1293
P5	M	AY	I	258.9	536.2	1528.8	1435.6
P5	M	AY	I	1282.9	444.7	2425.8	1742.7
P5	M	AY	LIKE	549.8	506.8	1159.8	1936.4
P5	M	AY	PRIMARY	555.6	586.5	1092.6	1421.6
P5	M	AY	I	461.1	506.5	1924.6	1701
P5	M	AY	PRIVATE	605.9	503.7	1119.2	1506.9
P5	M	AY	I	623.7	384.6	1514.1	2091.8
P5	M	AY	MYSELF	638.9	632.3	1070.8	1895.2
P5	M	AY	I	777.6	598.5	1886	1346.5
P5	M	AY	MY	534.5	589.8	1091.6	1885.1
P5	M	AY	I	423.1	629.4	1158.3	1457.2
P5	M	AY	I	672	551.7	1913.6	1740.3
P5	M	AY	QUITE	562.6	495.2	1083	1618.5
P5	M	AY	I	768	433.6	1265.9	1774.7
P5	M	AY	FIVE	615.1	579.3	1153.3	1512.6
P5	M	AY	WHY	567.7	639.4	1184.1	1506.6
P5	M	AY	I	725.6	344.2	1341.6	2161.6
P5	M	AY	I	579	473.8	1295.1	1616.8

P5	M	AY	I	553.6	584.7	1613.2	1355.3
P5	M	AY	I	607.1	557.1	1114.4	1660.5
P5	M	AY	I	437.5	498.3	1411.5	1948.6
P5	M	AY	I	572.3	476	1384.3	1796.6
P5	M	AY	WHY	635.1	397.7	1283	2139.6
P5	M	AY	I	809.2	602.7	1426.6	1179.8
P5	M	AY	I	529.1	577.4	1701.4	1449.9
P5	M	AY	I	745.5	665.2	1618.5	1421.6
P5	M	AY	MY	694.7	478.9	1139	1698.4
P5	M	AY	MY	631.4	522.1	1074.5	1775.3
P5	M	AY	I	588.4	504.7	1193.2	2065.1
P5	M	AY	I	174.8	543.9	1320.4	1827.3
P5	M	AY	QUITE	566.6	506.7	1032.9	1861.9
P5	M	AY	I	615.6	404	1528.8	2037
P5	M	AY	REALISED	569.3	524.1	1228.8	1944.9
P5	M	AY	I	993.2	544	2276.3	1304.8
P5	M	AY	SURPRISED	526.8	547.1	1149.2	1638.8
P5	M	AY	I	473.5	471.4	1321.3	1292
P5	M	AY	LIKE	580.8	489	1135.7	1861
P5	M	AY	I'M	662	528.4	1577.9	1044.2
P5	M	AY	LIKE	581.7	442	1235.7	1872.7
P5	M	AY	QUITE	611.1	512.2	1226.2	1840.8
P5	M	AY	I	1222.1	636.7	2197	1775.4
P5	M	AY	I	921.7	498.7	1929.6	1753.4
P5	M	AY	LIKE	537.6	598.6	1676.2	1897
P5	M	AY	I	322.4	568.2	1720	1757.8
P5	M	AY	LIKE	544.2	559.5	1633.5	1679.2
P5	M	AY	I	516.9	587.5	1952.2	1660.2
P5	M	AY	I	700.2	494.9	1585.3	1688.1
P5	M	AY	LIKE	520.7	489.3	1564.5	1588.3
P5	M	AY	LIFE	626.4	521	1365.2	1720
P5	M	AY	QUITE	564.9	583.3	1166.1	1624.3
P5	M	AY	I	1074.6	617.4	1920.9	1400.7
P5	M	AY	I	506.4	484.1	1475.6	1781
P5	M	AY	I	667	481	1434.2	1977.7
P5	M	AY	I	360.9	477.6	1919.1	1920.9
P5	M	AY	I	772.1	559.4	1486.8	1551.1
P5	M	AY	I	1004.7	550.8	2251	1644.4
P5	M	AY	MY	558.7	538.5	1051.4	1677.2
P5	M	AY	I	602	581.3	1527	1288.8
P5	M	AY	MY	583.4	485.5	1105.1	1606.5

P5	M	AY	WHY	538.1	616.6	1044.1	1621.4
P5	M	AW	ABOUT	491.9	464.6	1001.9	1091.8
P5	M	AW	ABOUT	461.8	518.2	1028.1	1232.2
P5	M	AW	ABOUT	485.1	487.4	958.6	1149
P5	M	AW	ABOUT	435.8	493	950.9	1122
P5	M	AW	SOMEHOW	691.2	464.6	1086.3	1116
P5	M	AW	WITHOUT	575.8	494.3	1557.9	1152.1
P5	M	AW	ABOUT	452.3	503.7	914.3	1143.1
P5	M	AW	HOW	665.7	567.8	1182.5	1095.3
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P6	M	AY	DECIDED	464.3	430.1	1655.2	1802.8
P6	M	AY	LIFE	734.9	327.5	1559.8	1097
P6	M	AY	I	1070.1	522.5	2253	1701.7
P6	M	AY	WHILE	531.4	499.5	1044.7	1010.1
P6	M	AY	I	587.7	488.1	1383.8	1312.8
P6	M	AY	I	535.9	601.2	1425.7	895.9
P6	M	AY	I	890.5	395.4	1805.5	1761.3
P6	M	AY	I	354.9	517.2	1557	1645.1
P6	M	AY	MIGHT	318.5	505.7	1161.3	1716.7
P6	M	AY	I	583.4	452.2	1435.1	1564.4
P6	M	AY	MY	413.4	468.5	1205.8	1767.2
P6	M	AY	I'M	936.9	545.8	1684.7	1150.1
P6	M	AY	I	500.7	544.4	1480.8	1540.3
P6	M	AY	MIGHT	280.7	389.2	1133.9	1343.4
P6	M	AW	NOW	579.3	729.5	1273.6	1652.8
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P7	M	AY	I	938.2	698.7	1612.1	1696.5
P7	M	AY	I'M	497.8	648.3	1558.8	1824
P7	M	AY	I	1021.4	617.9	1539.3	1657.2
P7	M	AY	I	820.2	263.1	1454.2	632
P7	M	AY	I	939	624.5	1622.9	2055.7
P7	M	AY	WHY	608.1	536.6	1224.7	1898.3
P7	M	AY	I	518.3	409.7	1726.7	1835.4
P7	M	AY	I	679.9	684.9	1633.5	1854.6
P7	M	AY	I	660.8	625.2	1986.7	1983.8
P7	M	AY	I	1172.9	616.9	2136.2	1940.4
P7	M	AY	I	1018.4	601.8	1674.6	1628.5
P7	M	AY	MY	286.9	634.5	1292.5	1932.3
P7	M	AY	I	639.6	433.7	1387.9	1255.8
P7	M	AY	LIVE	378.3	460	1490.8	1644.4
P7	M	AY	I	1248.8	608.4	1649.4	1826.6

P7	M	AY	LIVE	374.3	493.2	1602.7	1871.2
P7	M	AY	MY	345	732.1	1395.6	1680.1
P7	M	AY	I	379	336.7	1328	1769.1
P7	M	AY	I	670.1	363.7	1653.1	1886.8
P7	M	AY	TIME	501.6	576.5	1617.3	1920
P7	M	AY	I	1224.8	616.9	1701.1	1843.5
P7	M	AY	I	975.2	353.5	1698.3	1324.2
P7	M	AY	I	1237.7	372.5	2776.7	1938.3
P7	M	AY	FIND	693.7	619.3	1638.2	1624
P7	M	AY	MY	363.4	418.3	1271.9	1199.6
P7	M	AY	LIFE	663.2	486.3	1466.7	1882.8
P7	M	AY	I	483.2	407.2	1732.1	2097
P7	M	AY	I	618.4	586.1	1757.4	1932.5
P7	M	AY	LIFE	523.6	452.2	1323.2	1971.1
P7	M	AY	NICE	718.8	381.7	1613.8	2022.4
P7	M	AY	I	1021.5	505.5	2313.8	1659.1
P7	M	AY	I	529.9	618.7	1759.2	1880.9
P7	M	AY	LIKE	580.4	394.1	1550.6	2080.3
P7	M	AY	WHILE	642.9	643.8	1216.3	1197.4
P7	M	AY	I	592.4	663.5	1776.7	1885.9
P7	M	AY	I	656.2	562.3	1767	2034.2
P7	M	AY	MYSELF	264.3	395.5	1182.1	1708.8
P7	M	AY	I	623.4	565.5	1354.6	1659.4
P7	M	AY	SOMETIMES	430.3	641.3	1607.9	1816.3
P7	M	AY	I	870.8	660.5	1647.8	1444.4
P7	M	AY	I	615.1	541.2	1234.3	1203.9
P7	M	AY	I	625.6	402.7	1768.3	1459.7
P7	M	AY	MYSELF	273.3	372.4	1299	1676.5
P7	M	AY	I	694.5	346.8	1796.8	1945.2
P7	M	AY	MYSELF	357.1	442.9	1186.1	1600
P7	M	AY	MY	447.4	640.8	1259.4	1906.9
P7	M	AY	I	961.6	533.4	1614.6	1116
P7	M	AY	I	659.4	330	1497.8	1968.5
P7	M	AY	I	1398.5	307.4	3024.6	2170.1
P7	M	AY	I	623.6	505.4	1705.3	1875.7
P7	M	AY	MYSELF	249.7	262.4	1124.5	999.7
P7	M	AY	I	323.2	422.5	992.9	1168.1
P7	M	AY	I	502.3	485.5	1595.6	1840.1
P7	M	AY	I	971.5	626.5	1863.9	1512.6
P7	M	AY	I	564.7	514.3	1680.5	1718.7
P7	M	AY	MY	333.8	372.6	1240.8	1618.6



P7	M	AY	I	1037.8	583.5	1835.3	1899.5
P7	M	AY	LIKE	363.6	462	1241.3	2078.6
P7	M	AY	I	755.4	443.8	1709.5	2221.6
P7	M	AY	MYSELF	258.4	316.1	1096.9	1482.2
P7	M	AW	NOW	694.5	682.2	1629.9	1459.3
P7	M	AW	ABOUT	685.7	666	1512.8	1383.5
P7	M	AW	NOW	766.2	300.4	1698.5	978.9

### Appendix 8 Participants' Results Diphthongs Reading Task

<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P1	F	AY	BUY	669.2	581.4	1188.5	1353.8
P1	F	AY	TONIGHT	647.1	686.5	1747.2	1921.7
P1	F	AY	QUITE	880.9	651.6	1774.6	2107.5
P1	F	AY	MIGHT	567.3	507.1	1360.9	1764.9
P1	F	AY	WRITE	612.7	529	1314.8	1987.8
P1	F	AY	WINE	713.9	635.4	1406.1	1850
P1	F	AY	PIE	789.4	591.7	1634.5	1956.9
P1	F	AY	LIKE	689.5	501.7	1715	2127.9
P1	F	AY	WHILE	537.7	859.5	1528.9	1678.5
P1	F	AY	WHITE	453.8	428.9	1619.1	2112.1
P1	F	AY	RIDE	607.1	519.5	1689.4	2429.2
P1	F	AW	DOWN	770.4	900.2	1829	1146.9
P1	F	AW	POUND	789.9	791.2	1149.3	1115.5
P1	F	AW	SPROUTS	806.1	614.3	1688	1192.2
P1	F	AW	POUNDS	664	773.8	1072.4	1112.2
P1	F	AW	GROUND	710.4	743.9	1744	1433.5
P1	F	AW	TOWELS	1031.4	581.6	1637.9	1016.5
P1	F	AW	BROWN	819.7	785.4	1670.7	1897.2
P1	F	AW	POWDERED	834.2	622.9	1528.5	1346.6
P1	F	AW	WITHOUT	729.9	717.1	1869.1	1664.8
P1	F	AW	ABOUT	709.7	674.6	1610.7	1624.1
P1	F	AW	TOWN	804.7	778.2	1736.1	1474.1
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P2	M	AY	BUY	532	500.1	1258.4	1719.8
P2	M	AY	TONIGHT	354.8	579.3	1482.3	1768.5
P2	M	AY	QUITE	529.9	481.7	1271.9	1696.9
P2	M	AY	MIGHT	525	471	1216.1	1716.5
P2	M	AY	WRITE	503.5	460.6	1152.4	1719.7
P2	M	AY	WINE	533.2	645.9	1322.8	1956.9
P2	M	AY	PIE	595.3	671.3	1369.5	1825
P2	M	AY	LIKE	659.9	492.3	1402.7	1963.2
P2	M	AY	WHILE	615.5	599.1	1482.9	1484.1
P2	M	AY	WHITE	500.2	433.5	1240.9	1880
P2	M	AY	RIDE	565.4	427	1245	1675.6
P2	M	AW	DOWN	571	743.5	1503.2	1066.2
P2	M	AW	POUND	704.5	776.3	2148.6	3735.5
P2	M	AW	SPROUTS	695.1	635.4	1982.1	1869.3
P2	M	AW	POUNDS	631.9	665.8	1960.4	2206
P2	M	AW	GROUND	656.8	834.1	2036.2	2503.9

P2	M	AW	TOWELS	648.2	448.6	1349	871
P2	M	AW	BROWN	684.1	598.3	2034.3	1321.2
P2	M	AW	POWDERED	683.4	581.5	2054.4	2413.2
P2	M	AW	WITHOUT	648.6	400.4	1461.3	1071.5
P2	M	AW	ABOUT	592.4	515	1865.8	1507.5
P2	M	AW	TOWN	724.4	594	2196.7	2158.7
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P3	F	AY	BUY	704.7	413.5	1381.9	2210.9
P3	F	AY	TONIGHT	505.1	633.4	1559.7	1732
P3	F	AY	QUITE	600.8	578.8	1254.7	1882.4
P3	F	AY	MIGHT	348	629.3	1285	1934.3
P3	F	AY	WRITE	623.7	508.9	1150.1	2020.7
P3	F	AW	DOWN	703.6	762.1	1672.8	1380.6
P3	F	AW	POUND	782.6	745.7	1445.6	1436
P3	F	AW	SPROUTS	713.3	557.8	1589.1	1245.7
P3	F	AW	POUNDS	689.4	626.9	1694.5	1544.3
P3	F	AW	GROUND	642.8	611	1565.5	1522.2
P3	F	AY	WINE	684.3	475.8	1181.6	2126.3
P3	F	AW	TOWELS	735.1	635.5	1529.3	1064.5
P3	F	AW	BROWN	695.5	529.9	1610.4	960.8
P3	F	AW	POWDERED	823.9	618.8	1540.5	1515.4
P3	F	AY	PIE	727.9	859	1549.4	2337
P3	F	AY	LIKE	732.6	624.6	1455.1	1978
P3	F	AY	WHILE	561.1	680.9	1000.6	1144.7
P3	F	AW	WITHOUT	635.4	647.3	1707.8	1528
P3	F	AY	WHITE	665.4	441.7	941.3	2139.7
P3	F	AW	ABOUT	687.4	643.5	1583.6	1527.9
P3	F	AW	TOWN	786.2	658	1688.1	1489.8
P3	F	AY	RIDE	677.4	500.3	1407.6	936.6
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P4	F	AY	BUY	606.4	580.9	1054.9	1249.5
P4	F	AY	TONIGHT	352.9	307.4	1292.3	1016.6
P4	F	AY	QUITE	670.7	448.8	1381.8	939.3
P4	F	AY	MIGHT	484.3	534.1	1296.1	2036.7
P4	F	AY	WRITE	564.4	532.9	1901.8	2081.6
P4	F	AY	WINE	642.3	700.9	1077.1	2278.6
P4	F	AY	PIE	714	849.1	1251	2120.9
P4	F	AY	LIKE	488.8	570.5	1527.4	1902.8
P4	F	AY	WHILE	642.8	587.1	1215.7	874.8
P4	F	AY	WHITE	523.4	514.4	838.2	1871
P4	F	AY	RIDE	652.6	521.2	1558.2	612.8

P4	F	AW	DOWN	823.5	333.2	1525.4	1123.9
P4	F	AW	POUND	599.2	947.4	1409.6	1606.7
P4	F	AW	SPROUTS	559.8	419.1	1168.7	1016.3
P4	F	AW	POUNDS	915.9	560.8	1397.5	1107.2
P4	F	AW	GROUND	813.7	354.5	1418.7	1078.4
P4	F	AW	BROWN	693.8	370.1	1274.7	1050.7
P4	F	AW	POWDERED	677.6	404.4	1964.5	1336.9
P4	F	AW	WITHOU	655.8	348	1427.5	986.1
P4	F	AW	ABOUT	729.2	567.7	1202.9	1199.4
P4	F	AW	TOWN	857	706	1183.1	1410.6
P4	F	AH	TOWELS	496.1	448.1	1194.7	1093
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P5	M	AY	BUY	556.2	513.1	1099.2	1850
P5	M	AY	TONIGHT	462.9	595.4	1285.6	1733.9
P5	M	AY	QUITE	444.5	459.3	1155.3	1408.3
P5	M	AY	MIGHT	459.1	434.2	1149.9	1773.3
P5	M	AY	WRITE	391.4	452.3	1085.2	1426.7
P5	M	AY	WINE	531.7	538	1025.9	1628.9
P5	M	AY	PIE	696.2	794.3	1216	1993.5
P5	M	AY	LIKE	496.6	420.1	1295.3	1697.9
P5	M	AY	WHILE	507.7	525.5	1045.2	1574.4
P5	M	AY	WHITE	486.9	521.6	981.7	1694
P5	M	AY	RIDE	517	422.9	1330.1	1337.2
P5	M	AW	DOWN	612.6	690.8	1340.8	1154.7
P5	M	AW	POUND	960.9	613.6	1167.4	1114
P5	M	AW	SPROUT	466.6	414.4	946.4	1038.7
P5	M	AW	POUNDS	640.6	677.4	1068.8	1139.6
P5	M	AW	GROUND	445.8	508.2	955.2	1039.3
P5	M	AW	BROWN	421.6	480	973.1	1049.6
P5	M	AW	POWDERED	494.2	434.5	950.1	1074.5
P5	M	AW	WITHOUT	537	423.7	1545.7	1283.5
P5	M	AW	ABOUT	452.4	504.8	919.4	1180.1
P5	M	AW	ABOUT	394.9	515	951.9	1204.8
P5	M	AW	TOWN	667.7	515	1181.6	1147.3
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P6	M	AY	BUY	491.3	406.4	1089	1892.9
P6	M	AY	TONIGHT	340.7	459	1390.3	1924.4
P6	M	AY	QUITE	484.3	402.6	1204.7	1713.8
P6	M	AY	MIGHT	334.7	386.8	1164.4	1200.2
P6	M	AY	WRITE	440.9	364	1204.4	1419.4
P6	M	AW	DOWN	611.5	405	1411.5	1181.5

P6	M	AW	POUND	580.7	506.1	1119.9	1112.7
P6	M	AW	SPROUTS	404.9	312.6	1048.7	999.3
P6	M	AW	POUNDS	513.6	447.6	1127.2	1188.8
P6	M	AW	GROUND	545.2	402.7	1223	1088.5
P6	M	AY	WINE	501.3	397.7	971.7	1552.6
P6	M	AW	TOWELS	533.1	405.8	1233.4	987.1
P6	M	AW	BROWN	489.2	435.2	1108.1	927.7
P6	M	AW	POWDERED	612.6	398	1074.3	956.9
P6	M	AY	PIE	693.9	642.5	1320.9	1470.3
P6	M	AY	LIKE	371	354.8	1418.3	2018.3
P6	M	AY	WHILE	473.3	359.2	1103.9	1073.8
P6	M	AW	WITHOUT	564.9	460.2	1114.7	1037.2
P6	M	AY	WHITE	406.9	360.6	1016.1	1339.5
P6	M	AW	ABOUT	488.6	399.8	1051	1062.1
P6	M	AW	TOWN	522.2	381.3	1231.6	1098.6
P6	M	AY	RIDE	418.3	378.4	1247.2	1945.5
<b>name</b>	<b>sex</b>	<b>vowel</b>	<b>word</b>	<b>F1@20%</b>	<b>F1@80%</b>	<b>F2@20%</b>	<b>F2@80%</b>
P7	F	AY	BUY	723.4	434.9	1401.6	2014.1
P7	F	AY	TONIGHT	501.7	370.2	869.8	1003.9
P7	F	AY	QUITE	658.3	489.7	1257.3	1908.6
P7	F	AY	MIGHT	441.6	486.9	1178.1	1921.3
P7	F	AY	WRITE	575.1	465.2	1057.7	1032.2
P7	F	AY	WINE	694.5	512.8	1181.7	1654.3
P7	F	AY	PIE	734.6	768.6	1433.8	2302.7
P7	F	AY	LIKE	658.8	341.5	1311.7	2089.2
P7	F	AY	WHILE	595.2	676.8	1368	1337.2
P7	F	AY	WHITE	609.3	428.2	1272.4	1639.4
P7	F	AY	RIDE	632.5	437.9	1473.3	951.4
P7	F	AW	DOWN	712.9	430.4	1553.7	1159.5
P7	F	AW	POUND	643.2	634.2	1410.5	951.4
P7	F	AW	SPROUTS	367.4	411.3	1551.1	1409.1
P7	F	AW	POUNDS	389	432.4	1159.2	1111.8
P7	F	AW	GROUND	633.5	578.9	1450.2	1213.1
P7	F	AW	TOWELS	674.9	591.9	1456.7	1076
P7	F	AW	BROWN	521.6	654.4	1671.9	1272.2
P7	F	AW	POWDERED	648.5	448.2	1315.8	1091.7
P7	F	AW	WITHOUT	677.2	410.2	1551.1	1284
P7	F	AW	ABOUT	701	491.3	1625	1416.6
P7	F	AW	TOWN	602.1	638.5	1590.1	1465.3