

**A Study of Current Pronunciation Issues of
Japanese English Learners**

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Abstract

This study investigates pronunciation challenges faced by Japanese undergraduate students majoring in English, focusing on both segmental (consonants and vowels) and suprasegmental (stress, intonation) features that impact intelligibility in spoken English. In an increasingly globalised world, English serves as a vital communication tool worldwide, particularly among non-native speakers. However, Japanese learners often struggle with English pronunciation due to the fundamental differences between Japanese and English phonological systems. These challenges can significantly reduce intelligibility, affecting learners' confidence and communication effectiveness. To address these issues, this study explores common pronunciation difficulties and proposes ways to improve the teaching of pronunciation.

The research involved collecting questionnaire data and speech recordings under three conditions: 1) a diagnostic word list, 2) reading passages aloud, and 3) spontaneous speech. Analysis of these data revealed prevalent pronunciation issues among participants, such as difficulties with specific consonants (/l/, /r/, /θ/, /ð/) and vowels (/æ/, /ɔ:/, /əʊ/), as well as suprasegmental challenges, particularly with word stress. Findings also highlighted a gap between learners' self-perceived difficulties and their actual performance, emphasising the need for learner-centred pronunciation instruction.

The study offers theoretical insights into the role of both segmental and suprasegmental features in intelligibility, emphasising that effective pronunciation instruction should integrate both aspects in a balanced manner. Practically, this study proposes a structured approach to pronunciation instruction, focusing on consonants, vowels, and suprasegmental features, and allowing educators to tailor their teaching methods to meet the specific needs of learners. Additionally, integrating technology such as speech recognition apps into pronunciation practice is proposed as an effective tool for autonomous learning, providing immediate feedback and fostering continuous improvement.

Despite limitations in sample size and reliance on qualitative assessments, it is hoped this research contributes valuable insights for pronunciation instruction, particularly for Japanese learners. Future research should expand sample diversity, develop objective assessment tools, and examine broader suprasegmental features, such as sentence stress, intonation, and rhythm. Overall, this study not only enhances our understanding of Japanese learners' pronunciation difficulties but also contributes to the field of second language acquisition, offering theoretical and practical implications to support the development of communicative competence in English.

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Chapter 1 Introduction

1.1. Background of the Study

According to Statista (2024), approximately 1.5 billion out of the world's 7.8 billion people speak English as either a first or second language, with the majority being non-native speakers. Around 360 million people speak English as their first language, meaning native speakers account for less than a quarter of all English speakers worldwide. Today, it is no exaggeration to say that native speakers are in the minority among global English speakers. As a result of globalisation driven by political, economic, technological, and social developments, English has become the most frequently used language across various contexts. The global prevalence of English is undeniable.

In the famous paper by Kachru (1985), the three-circle model of English: *inner circle*, *outer circle*, and *expanding circle* are introduced. The inner circle includes countries like the UK, the US, Canada, and Australia, where English is the dominant language and serves as the *norm-providing* model. The outer circle comprises former colonies such as India, Singapore, and Nigeria, where English is an official or second language and is *norm-developing*. Finally, the expanding circle includes countries such as Japan, Korea, and Indonesia, where English is taught as a foreign language and is *norm-dependent*. Crystal (2003), for example, estimated that there were 750 million speakers of English in the expanding circle and 750 million in the inner and outer circles combined. Jenkins (2009) also reported an increasing number of English speakers. According to her calculations, while there were 350 million speakers each in the inner and the outer circles, around one billion would fall into the category of non-native speakers, who would satisfy the criterion of having reasonably understandable English.

Nowadays, English has several names, including World Englishes (Kachru, 1985), English as a Global Language (Crystal, 2003), English as an International Language (EIL; Smith, 1976), English as a Lingua Franca (ELF; Jenkins, 2007; Seidlhofer, 2004), and it serves as a crucial

communication tool among non-native speakers, even in the absence of native speakers. In the 21st century, English serves as a lingua franca not only for native speakers but also for those who do not speak it as their first language. In other words, English has become the dominant language in global communication and an essential skill for individuals seeking to engage in international business, academia, and cultural exchange. Svartvik, Leech & Crystal (2016: 1) state that, 'What gives English its special status is its unrivalled position as a means of international communication. Most other languages are primarily communicative channels within, rather than across, national borders. Today, English is big business and the most commonly taught foreign language all over the world.'

The Japanese Ministry of Education, Culture, Sports, Science, and Technology (MEXT) has increasingly emphasised the development of English communication skills. However, despite years of instruction, many Japanese learners struggle with pronunciation, significantly affecting their intelligibility and confidence in speaking. One of the main challenges they face is the difference between the phonological systems of Japanese and English. English has a much more complex phonetic system, both in terms of segmental features and suprasegmental features. In contrast, Japanese lacks certain phonemes found in English, and while Japanese rhythm is syllable-timed, English rhythm is stress-timed. These fundamental differences often lead to pronunciation errors, such as difficulties with /l/ and /r/, as well as /æ/ and /əʊ/, along with common mistakes in stress and intonation.

There is a growing need to explore both segmental and suprasegmental features of English in greater depth to better understand the pronunciation challenges faced by Japanese learners of English. This study aims to investigate the segmental and some suprasegmental difficulties encountered by Japanese undergraduate students majoring in English, examining how these issues impact their pronunciation intelligibility. Focusing on this group provides valuable insights for more targeted pronunciation instruction to improve the communicative effectiveness of Japanese learners of English.

Furthermore, with the increasing availability of digital tools and applications in language learning, there is a growing potential for integrating technology into pronunciation instruction. Given the accessibility of speech recognition software and mobile apps, this study also considers the potential of these technologies to support autonomous pronunciation learning strategies.

1.2.Motivation of the study

My interest in pronunciation research was initially inspired by Kenji Kitao's 1973 study done in the US, *Difficulty in English Pronunciation for Japanese People*. I encountered this work while studying at the University of Warwick in 2006, and it became a central focus of my master's dissertation in 2007 (Kimura, 2022). Building on Kitao's research, I hypothesised that Japanese learners' pronunciation would have improved over the 30 years since his study. My findings showed that while some consonant phonemes (/v, ð, θ, l/), the allophone /ŋ/, and /z, g/ in word-ending remained challenging, the overall number of difficult phonemes had decreased. Additionally, some learners had difficulty with word-ending /k/ and /d/, but phonemes like /b, h, j, m, n, p, s, t, w, dʒ, ʒ/ were found to be relatively easy. It should be noted that Kitao's study focused on North American pronunciation, whereas my analysis used British English as I was conducting the study in the U.K. then.

After completing my master's degree in the UK and working in Ireland and Singapore for over a decade, I decided to pursue a Ph.D. to deepen my knowledge and become a more proficient researcher. In starting to prepare this doctoral thesis, I read *English as a Lingua Franca: Attitude and Identity* (Jenkins, 2007) and was immensely curious about the findings of her research. In her book, Jenkins conducted a study on the intelligibility of English spoken by both native and non-native speakers. Questionnaires were sent to 12 countries, including Japan, Canada, Taiwan, and Germany, asking respondents to rate the correctness, acceptability, pleasantness, and familiarity of English accents. The results revealed that Japanese EFL learners ranked the lowest in all categories except familiarity. This suggests that English spoken

by Japanese learners is not comfortably recognised or understood by either native or non-native English speakers. Reading this book reminded me of a key experience while working in Singapore.

I lived and worked in the Republic of Singapore for seven and a half years, from September 2011 to March 2019. The first three years between 2011 and 2014 were spent as a Japanese instructor at the National University of Singapore. At the time, the Centre for Language Studies at the National University of Singapore (NUS) was a language teaching and research centre that used to handle a total of 12 languages, including Japanese, Chinese, Korean, Thai, Indonesian, Malay, Vietnamese, Hindi, Tamil, Arabic, 10 Asian languages, as well as European languages such as French and German. (Currently 13 languages with the addition of Spanish). The Japanese language programme I used to belong to was large, having 12 full-time and more than 10 part-time lecturers. It was a workplace full of Japanese people who had lived abroad for a long time and had unique and special personalities. This workplace occasionally held centre-wide seminars and conferences. One day, a professor from a Japanese university came and gave a talk. Many of my colleagues from the language centre attended and listened. My regular lunch companions, a French and an Indian colleague, were also present. The professor from a Japanese university started well and was presenting in relatively intelligible English. However, after a minute or so, he began speaking in English with a strong Japanese accent. His speech started off well, but suddenly his Japanese accent became so thick that even I, a Japanese person, could not understand what he was saying, and I ended up not understanding it very well. The colleagues who were there did not seem to understand the content very well either, and during the question time, they asked a few bland questions and managed to save face for the presenter. Somewhat tired, I left that venue with the lunch companions, a French and an Indian colleague. The following is a conversation we had then:

Me: Well... let's go for lunch, guys!

Indian colleague: Sure, Masami...by the way, what did the Japanese guy say in the talk?

Did you get it?

Me: Not really... I did at the beginning, though.

French colleague: Well, I didn't understand what *your friend* was saying. (grin)

Me: ... (bitter smile)

I still remember my French colleague saying, 'I didn't understand what *your friend* was saying'. It seems that he referred to your friend, the Japanese professor who had just given the talk, to discreetly avoid drawing attention to the situation. On that same day, similar comments were made by Korean and Singaporean colleagues. The Singaporean colleague even mentioned, 'That Japanese professor started speaking with a typical Japanese accent halfway through, and I couldn't understand the content at all.' In short, the English spoken by *my friend* was not comfortably understood or recognised by non-native English speakers.

This led me to consider the optimal target for English pronunciation among Japanese English learners and how the concept of English as a Lingua Franca (ELF) should be understood and interpreted by Japanese English learners. In ELF, even if a pronunciation has an accent or peculiar expression, if it is widely used according to certain rules, it is a legitimate variety of English (Jenkins 2000). However, some Japanese learners of English, even teachers and professors may conveniently interpret this as 'Having a slightly strong Japanese accent is OK!'. Is this interpretation right?

Based on the above, in this doctoral thesis, I would like to visit the area of pronunciation problems of Japanese undergraduate students whose major is English. Since the participants in my master's dissertation each majored in a different subject, this time I would like to explore problems that are unique to participants majoring in English. I will investigate not only segmental features but also some suprasegmental features.

1.3.Purpose of the Study

The purpose of this study is to investigate the pronunciation difficulties faced by Japanese undergraduate students majoring in English, with a particular focus on both segmental (consonants and vowels) and suprasegmental (stress, intonation) features. The study aims to identify the specific pronunciation challenges that interfere with communicating in English and to examine how these difficulties impact the intelligibility of their speech. By analysing these pronunciation issues, the research seeks to provide insights into common error patterns made by Japanese learners and uncover the factors contributing to these errors.

Another key objective of this study is to contribute to the field of pronunciation instruction in English language education. The findings of this research will offer practical recommendations to English teachers, particularly in Japan, on how to address specific pronunciation challenges more effectively. Furthermore, this study will explore the potential role of digital tools, such as speech recognition software, in facilitating learners' autonomous improvement of pronunciation. By integrating technology into pronunciation practice, this study aims to propose innovative methods for enhancing pronunciation instruction and supporting learners in developing intelligible and more natural speech patterns.

In short, the goal of this study is to provide a comprehensive understanding of the pronunciation difficulties faced by Japanese learners of English, to offer pedagogical insights for improving pronunciation instruction, and to explore the role of technology in supporting learners' pronunciation development. Through these objectives, the study aims to contribute to the broader field of second language acquisition and to improve the communicative competence of Japanese learners of English.

1.4. Outline of the Dissertation

This dissertation is divided into six chapters, each of which contributes to the investigation of pronunciation difficulties faced by Japanese learners of English, with a particular focus on segmental and some suprasegmental features.

The first chapter introduces the background, motivation, and purpose of the study. It discusses the global importance of English as a lingua franca, particularly for non-native speakers, and highlights the specific challenges that Japanese learners encounter in acquiring clear and intelligible pronunciation, drawing on the author's personal experiences abroad.

In Chapter 2, the relevant literature on pronunciation instruction and learning is reviewed, focusing on both segmental features and some suprasegmental aspects. The chapter discusses previous studies on the phonological differences between English and Japanese, as well as common pronunciation errors made by Japanese learners. Additionally, theoretical frameworks related to second language acquisition and pronunciation pedagogy are explored.

Chapter 3 outlines the research design and methodology used in the study. This includes detailed descriptions of the participants, the data collection process, and tools used to measure pronunciation accuracy, such as questionnaires and recorded speech samples. The chapter explains the analytical methods employed to assess both segmental and suprasegmental pronunciation features, including phoneme accuracy, word stress, and intonation patterns, along with the rationale for selecting these methods.

Chapter 4 presents the findings of the study, focusing on the analysis of segmental and some suprasegmental pronunciation features. It provides detailed qualitative data on specific phonemes and some of the suprasegmental aspects that pose the greatest challenges for Japanese learners. The chapter also examines how these pronunciation difficulties impact learners' intelligibility.

Chapter 5 interprets the research findings and the theoretical frameworks discussed in the literature review. It discusses both the segmental and some of the suprasegmental challenges

faced by Japanese learners and explores the implications for pronunciation teaching and learning. The chapter also compares the results with prior studies, highlighting similarities and differences. Moreover, the role of speech recognition software and other technological tools in supporting pronunciation practice is considered, along with how these tools might address the issues identified in the study.

The final chapter provides a concise summary of the research findings and their theoretical and practical implications for pronunciation instruction in English language education. It highlights the main contributions of the study to the field of second language pronunciation teaching and offers practical recommendations for teachers and learners. The chapter also identifies the limitations of the study and suggests directions for future research, particularly regarding the use of technology in pronunciation teaching and the need for further exploration of suprasegmental features in Japanese learners' English pronunciation.

Chapter 2 Literature Review

2.1. Overview

While significant progress has been made in the field of SLA over the last two decades, the field of L2 phonology has often been overlooked (Derwing & Munro, 2005: 379) in alignment with Communicative Language Teaching (CLT) trend (Pennington, 2021). During the late 20th century, Major (1998: 131) noted that *‘of the nearly 200 articles published in studies in SLA, only about a dozen focused on phonetics and phonology’*. However, one of the most important aspects of language learning is pronunciation as it has been noted to be a primary focus for language teaching (Pennington & Richards, 1986). For seamless interactions, it is important to pronounce words in a way that is intelligible for listeners to understand. It goes without saying that smooth interactions will of course boost the confidence of L2 learners if their utterance is intelligible. The importance of pronunciation has been re-emphasised in recent decades, both domestically and internationally, by authors such as Pennington (2021), Saito and Plonsky (2019) and Ministry of Education, Culture, Sports, Science and Technology (MEXT) in Japan. In Japan, for example, the full implementation of English language education in elementary schools began in April 2011 under the current curriculum for fifth and sixth graders. The emphasis was on activities to develop the fundamentals of speaking skills through English, familiarisation with English sounds and rhythms, and promoting an understanding of the differences between English and Japanese (MEXT, 2008). After the implementation of English education for fifth and sixth graders in April 2011, the programme was expanded in April 2020 to also include third and fourth graders. Again, emphasis is placed on activities to develop the spoken competency, familiarisation with English sounds, and awareness of the differences and characteristics between Japanese and English sounds (MEXT, 2017). Internationally, Pennington (2021) notes that the widespread use of English for communication among multilingual speakers has led to discussions about the goals and priorities of pronunciation curricula. These discussions focus on preparing learners to

communicate in English as a Lingua Franca (ELF; Cruttenden, 2014; Jenkins, 2000, 2002; Seidlhofer, 2011) or in English as an International Language (EIL), where native English speakers are involved. The focus on pronunciation has shifted from native speaker models to recognition of L2 speaker diversity, emphasising intelligibility (Levis, 2018) and communicative effectiveness (Pennington & Rogerson-Revell, 2019). In other words, the goal is moving towards intelligibility and successful communication rather than correctness or accuracy.

2.2. Contrasting Japanese and English Phonology

Japanese and English have their own roots. While Japanese is considered to belong to the Japonic or Japanese-Ryukyuan language family (Kindaichi, 1988), English belongs to the Germanic language group, which is a branch of the Indo-European language family (Robbeets, 2017). This means that there are many differences in syntax, vocabulary, or phonology between Japanese and English. For instance, spelling and pronunciation do not always match in English, whereas Japanese is spelled and pronounced the same way it is written in Roman characters. Therefore, in general, Japanese speakers often find it difficult to learn English in the first place. Thus, it is important to introduce the differences between Japanese and English sounds.

In English, among forty-four sounds, there are twelve pure vowels (monophthongs), eight diphthongs, and twenty-four consonants (Richards, Platt & Platt, 1992, Hewings, 2007: 192). There are twelve International Phonetic Alphabet (herein referred to as IPA) for English pure vowels: /ɪ, e, æ, ʌ, ɒ (ɑ), ʊ, ə, i:, ɑ:, ɔ:, u:, ɜ:/ and eight IPA symbols for English diphthongs: /eɪ, əʊ (oo), aʊ, ɪə, eə, ɔɪ, aɪ, ʊə/. The twenty-four consonants contain the semi-vowels /j/ and /w/, which are articulated like vowels but function as consonants, and therefore these are included in consonants (Richards, Platt & Platt, 1992: 330). Japanese, on the other hand, has much fewer sounds than English. There are twenty-four sounds in Japanese: five vowels, sixteen consonants (semi-vowels /j/ and /w/ are included like English for the same reason), and three special phonemes (Kindaichi, 1988: 96). The five vowel phonemes are /a, e, i, o, and u/, and consonant

phonemes are /p, b, t, d, k, g, ɲ, c, s, z, h, m, n, r, w, j/. The special phonemes are /N/ (ㇰ plosives), /T/ (ㇱ plosives) and /R/ (long vowels). It should be noted that even similar sounds are, strictly speaking, phonologically different although there are some phonemes in common between English and Japanese. Details and examples will be provided in the Vowels section (2.3.1) and in the Consonants section (2.3.2).

This chapter first looks at important segmental features (vowels and consonants) primarily and some suprasegmental features such as stress and intonation, which will be introduced by comparing the two languages. It is important to note that much of the research conducted in this field have used received pronunciation (RP) as its frame of reference, which will also be mobilised in this study. However, as the participants in this study are assumed to be influenced by American English as well as British English (BE), or even other varieties of English, a bias towards either RP or GA (General American) seems too narrow. This paper therefore considers it would be fair to take a broader view when conducting an analysis of segmental features.

2.3. Segmental research

2.3.1. Vowels

As introduced earlier, English has more vowels than Japanese: twenty vowels out of forty-four sounds. In contrast, Japanese has only five vowels, which is common to many other languages around the world (Kenworthy, 1987). In Japanese, each vowel is either one syllable or one syllable in combination with a consonant. Furthermore, Japanese does not have diphthongs like English /eɪ, əʊ (ou), aʊ, ɪə, eə, ɔɪ, aɪ, ʊə/. Moreover, the length of the vowel is involved in the dissemination of meaning, such as in uncle (*ojiisan*) - or grandfather (*ojiisan*). Vowels can be aligned with other vowels such as grandfather (*ojiisan*), or grandmother (*obaasan*). It is often

pointed out that one of the hardest features of English for Japanese to pronounce are consonants, but this researcher believes that not only consonants but also vowels can be a reason. For example, the vowel *a* as in /æ/ is used in the word *apple*, but it is not easy to determine how exactly it is pronounced by Japanese speakers with this single vowel, /æ/. Most Japanese would probably pronounce the *a* in *apple* with a sound closer to either /ɒ (a)/ or /ʌ/ rather than /æ/ although /ʌ/ does not exist in Japanese. In English, there are four different phonetic symbols for the letter *a* alone as follows: /ə/, /ɒ (a)/, /æ/ and /ʌ/ as short vowels.

In the 1990s, Kitao (1995a) investigated the relationship between English diphthongs and similar vowel combinations in Japanese with a spectrograph. Three English diphthongs /aɪ/, /aʊ/ and /ɔɪ/ were compared with similar sounds in Japanese /a//i/, /a//ʊ/ and /ɔ//i/ focusing on such as length and loudness when pronounced by native speakers of English and Japanese. Examples of the words including the diphthongs are coin – コイン, cow – 買う, pie – パイ, etc. He concluded that even relatively similar sounds differ between Japanese and English. For instance, the longest and loudest part in English was the first vowel, but the first vowel part in Japanese was shortest and loudest, and the second vowel was shorter in the study. In the end, the importance of pronunciation instruction was re-emphasised, and using katakana (Japanese script) to pronounce English spellings was outlined as problematic. This is because it may give learners the impression that the sounds are the equivalent of the same sound, even though they are in fact different.

In the 2000s, tracing the roots of contrastive analysis and interference theory, Bada (2001) conducted a phonological analysis of Japanese speakers learning English as a foreign language in English phonology. A non-comprehensive sound system comparison between English and Japanese was undertaken to diagnose what was referred to as problematic phonemes supported by empirical data. The data was collected in the UK and Japan with a total of 18 participants. They read a set of 38 sentences which included all potentially problematic sounds into a tape

recorder. The data was analysed statistically focusing on word-initial, medial, and final to observe the significance of the sound replacements. The results show that there were 23 desired sounds in total, but 47 replacements were recorded among 10 vowels and 13 consonants. Some phonemes are difficult to pronounce to some extent due to L1 interference, while others are less difficult as they are already present or similarly pronounced in the L1. In terms of vowels, this report states that there is a tendency for Japanese speakers to shorten long vowels such as /ɔ:/ and /u:/ which are not present in the Japanese phonological system. In addition, it is reported that the pronunciation of /æ/, /e/, /əʊ (oo)/, /ɒ (a)/, /ʌ/ and /ɔ:/ were replaced by similar Japanese vowel sounds such as /a/, /e/, /e:/, /o/, /o:/ and /ɑ:/ mostly because of L1 interference. Ohata (2004) showed that the key differences between Japanese and English vowel systems are the number of vowels, the tense, and the lax distinction. Ohata (2004: 5) clarified that the difference between tense and lax distinction can cause considerable problems for Japanese learners of English and suggested that 'It should be noted that although long vowels of Japanese are sometimes analysed as having the same quality as English tense vowels, this claim is difficult to support because those vowels of Japanese are not always contrastive in nature as the English tense/lax vowel pairs.' In Yamane (2006 in Yamane, 2015), 52 problematic words were extracted from the speech of 80 Japanese EFL learners and presented to 48 native English speakers. The study found that even when individual words lacked intelligibility, native speakers could guess the correct word when it was presented within the context of a sentence, thus improving accuracy. He classified pronunciation errors of Japanese learners into two types: prosodic errors, such as incorrect word stress, and segmental errors, including vowel addition, vowel substitution, consonant substitution, and consonant deletion. The study revealed that vowel addition had a lesser impact on intelligibility, with a 72.6% accuracy rate when presented in sentences, suggesting that vowel addition did not significantly hinder native speakers' comprehension. Additionally, vowel errors had less of a negative effect on intelligibility compared to consonant errors. Kavanagh (2007) defined and described Japanese and English phonemes and discussed how contrastive analysis may or may

not benefit the EFL classroom, using vowels and consonants as examples. Although Kavanagh (2007: 291) questioned whether the contrastive analysis could be a practical aid, he concluded that 'In its diagnostic function it can certainly aid teachers, in terms of anticipating errors, and creating awareness of problems ... the nucleus of the method can be a benefit to teachers and students.' Roach (2009: 20) made an insightful comment in his *Notes for Teachers*, stating that one of the most common pronunciation features that leads to learners being identified as having a foreign accent is the substitution of pure vowels for diphthongs (e.g., /e/ for /ei/ or /o/ for /əʊ/).

In the 2010s, Smith (2012) explored the types of pronunciation patterns and issues that Japanese speakers encountered when attempting to speak English. The data was collected by recording two Japanese male students performing a scripted English dialogue which was analysed for segmental and suprasegmental features. As for segmental features, the learners' vowel and consonant segments with General American (GA) pronunciation were contrasted and their pronunciations were compared with word and sentence stress in English and Japanese as suprasegmental features. As a result of the overall study, pronunciation issues are mainly due to very different tongue placement because of the interference of L1 and due to the absence of certain sound production features in L1 that are required in L2. It was also similar to findings from Ohata's 2004 study, showing that similar issues have not been properly addressed. As for vowels, he found that there was a tendency for the learners to use /u:/ instead of /ʊ/ and /oo/ rather than /ə/ and /ɑ:/. This is because due to the interference from the Japanese pronunciation of vowels, the learners preferred the use of high back and rounded vowels over more central and lower to mid vowels.

In the 2020s, Higurashi (2020) highlighted the key vowel and consonant sound problems and discussed what attributed to the pronunciation problems, along with the characteristics of the phonetic differences between Japanese and English. Higurashi emphasised that it is important to acquire accurate English pronunciation not to end up with misleading and unfortunate consequences. The study states that 'a' is the most difficult series of sounds to learn

of English vowels (See Figure 1) because Japanese has only one sound, /a/ corresponding to *a* while English has /æ/, /ʌ/, /ə/, and /ɒ (ɑ)/. Among these, /æ/ is one of the most challenging sounds to learn because it requires a prominent movement of the mouth (Nishikiori, 2007). Pronouncing the Japanese vowel, /a/ requires less movement of the jaw and tongue, whereas in English /æ/ there is a need to move the tongue more forward (Saito & Lyster, 2012) and spread your lips to keep tension and jaw down (Celce-Murcia, Brinton, & Goodwin, 1996). She also suggested effective teaching approaches for Japanese learners and practitioners, with specific examples and diagrams below (Figure 1).

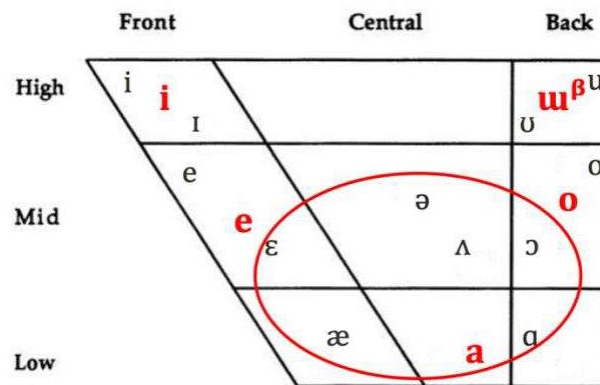


Figure 1: English vowels in black vs Japanese vowels in red (Higurashi 2020: 4)

Moreover, Tanaka & Uchida (2022) investigated which English phonemes are difficult for Japanese learners of English to learn through a pronunciation experiment on English words including minimal pairs. Unlike traditional approaches, speech recognition on a smartphone was used as a verification method in this study. The experiment explored which phonological features of vowels and consonants were more difficult to pronounce. They also investigated pronunciations of *katakana* English words, such as *coffee*, which are foreign words. The result showed that Japanese learners of English could most accurately pronounce foreign English words across

vowels, consonants, and foreign words. At the same time, it was found that it was more difficult to pronounce vowels correctly than to pronounce consonants when comparing vowels and consonants.

2.3.2. Consonants

As mentioned earlier in section 1.1, among forty-four sounds, there are twenty-four consonants in English (Richards, Platt & Platt, 1992, Hewings, 2007: 192) and sixteen consonants and three special phonemes out of twenty-four sounds in Japanese (Kindaichi, 1988: 96). The pronunciation of English that Japanese find difficult is not only the previously mentioned vowels, but also the consonants. As Yamane (2015: 136) claims, correct pronunciation of consonants is crucial for maintaining intelligibility. Similarly, O'Connor (1980: 24) states that consonants serve as the *skeleton* of a word, while vowels add the *flesh*. Without properly pronouncing consonants, speech becomes less intelligible. One significant difference between Japanese and English pronunciation is that English has words ending in both consonants and vowels. However, Japanese pronunciation is entirely vowel-ended apart from /N/, regardless of whether it is a noun or a verb, while English has many words that end in consonants such as *t* for *cat* and *d* for *kind*. According to Thompson (1991), the syllable structure of Japanese is quite simple, and consonant clusters are nearly non-existent.

To give a classic example, there are certain sounds that Japanese people find difficult to pronounce, such as /l/ and /r/ (Goto, 1971). These are known as the English and Japanese liquids. Some words containing these sounds are not easy to pronounce, thus many Japanese speakers may end up reading them in *katakana* (Japanese script) way. This is because the English /r/ is pronounced with the tongue retracted, whereas the Japanese /r/ is pronounced with little or no retraction, making it sound like something between the English /l/ and /r/, which is the postalveolar consonant ɾ , /ɾ/ (Matsusaka, 1994: 59). Besides, as in Okada (1999: 5), 'ɾ /, which corresponds to *r* in Romanization, is postalveolar in place rather than retroflex and mainly occurs

medially' in Japanese IPA. Lambacher (1999: 142) expressed /l/ and /r/ as 'infamously difficult to pronounce'. According to Riney, Takada and Ota (2000), many international teachers and textbook authors outside Japan consider English liquids to be a problem for Japanese speakers. For instance, Kenworthy (1987) claims that there are only four English segments that need to be assigned to Japanese speakers and /l/ and /r/ are two of them as high priority. In addition, Pennington (2014) produced only one unit to teach English /l/ and /r/ but dedicated to 'Japanese, Chinese, and Koreans'. Moreover, Celce-Murcia, Brinton, and Goodwin (1996: 52) also stressed the importance of this need for 'speakers of Asian languages, especially Japanese'.

In the mid-90s, Kitao (1995b) studied English consonants, which phonemes are difficult for Japanese speakers to comprehend in listening and to pronounce in speaking, under four hypotheses. These hypotheses explored: 1) consonant phonemes that do not have allophones and are absent in Japanese such as /l, f, v, θ, ð/, 2) closed syllables which are consonant clusters and those occur before a pause as Japanese do not have them, 3) a correlation between the ability to comprehend and pronounce English phonemes and 4) a high correlation between general English language proficiency and the ability to pronounce English phonemes. Eight Japanese undergraduates at the University of Kansas participated in the study. He reported on the problems caused by the differences between English and Japanese and the correlation between the results of English pronunciation tests, which were designed by Kitao for this study, and the results of the Michigan Test of English Language Proficiency administered in 1973. All consonant phonemes except /w, j, h/ were tested through ten different tests administered by Kitao, which were categorised into three: listening, pronunciation and combination. In the end, four consonant phonemes, which are absent in Japanese, /ð, v, θ, l/ and two allophones /ɜ, ɨ/ were found to be difficult. Indeed, the voiceless /θ/ and the voiced /ð/ are universally difficult and known as *exotic* sounds (Jenkins, 2000: 134) as dental fricatives. According to Maddieson (1984: 46), 'the sounds are very rare in the world's languages and are thus extra difficult.' In addition, Kitao (1995b) also

reported that /z, r/ were also found to be rather challenging for speakers of Japanese when speaking English, although these sounds are present in Japanese.

From the very end of the 90s to the 2000s, Wells (1999) claims that there are phonemes that are pronounced differently by some Japanese speakers, and there are a number of marked allophones resulting from compromise. Wells also claims that learners can inappropriately adapt the phonological rules from their L1 into their L2 as outlined by Ohata (2004). For example, /s/ can be pronounced as /ʃ/ when Japanese try to address ‘seat’, but it sounds like ‘sheet’. This is because /s/ does not precede /i/ in Japanese. In a sample of spelling tests conducted by Kavanagh (2007), there were 90% of such errors out of 80 participants although he states that such errors may be extreme cases made by a limited number of novice learners. According to the paper, *Native Language Influence on the Production of English Sounds by Japanese Learners* by Bada (2001: 5) which was introduced in section 2.3.1, he argues that consonants may be the biggest problem stating that ‘... distinct place and manners of articulation of sounds is another phenomenon to have a certain impact on learners’ language performance.’ This report states that fricatives such as /θ/ and /ð/ are found to be major production difficulties. The former was pronounced with /t/, /s/, and /z/, and the latter was produced mainly with /d/ in word-initial and with /z/ in word-medial position as replacements. This reflects the influence of speakers’ L1 in their L2 utterances. In addition, /l/ was substituted with /r/ and /r/ is pronounced by replacing /l/, conversely. Bada interprets that this is related to ‘a direct native language transfer’. Other minor issues were /v, ŋ/ as in Kitao (1995b), but /ŋ/ was not seen as a big difficulty. Besides, /ʃ, b/ were also found to be minor issues, but /b/ was well produced except in the word-final position. Jenkins (2002) argues that some English sounds like /θ/ and /ð/ cause so much trouble for English language learners that it is unsuitable to include them in the pronunciation targets for English as a lingua franca (ELF). On the other hand, Saito (2014: 268) emphasises the importance of teaching the interdental fricatives /θ/ and /ð/ thoroughly in order to avoid accent-related discrimination, as these sounds frequently appear as initial consonants. As illustrated earlier in section 2.3.1.

Vowels, the difference between tense and lax distinction can cause considerable problems for Japanese learners of English. Ohata (2004) also points out that there is no affricate in Japanese, but a series of fricatives and affricates exist in English. Affricates in English are /tʃ/ and /dʒ/, and absent fricatives in Japanese are /f, v, θ, ð, ʃ/ and /ʒ/, whereas there are common fricatives such as /s, z/ and /h/ in English and Japanese. Kimura (2022) revisited the area of Kitao's study done in the 1970s, which was introduced earlier, and investigated which consonant phonemes are difficult for Japanese undergraduates. These participants had different majors from different universities in Japan and attended a junior year abroad programme at the University of Warwick, U.K. in 2007. Hypothesising that in about three decades, Japanese university students' English pronunciation would be better than it was in the 1970s, Kimura administered three pronunciation tests to eight Japanese undergraduate students. From the findings, the four absent phonemes, /ð, v, θ, l/ and an allophone, /ŋ/ as well as a voiced alveolar fricative, /z/, were still found to be difficult, as in Kitao's study. However, /g, r/ were not a problem, but the consonant stop, /k, d/ caused difficulties for a few participants in her study, which were different from Kitao's results. The results also showed that the phonemes which are relatively easy to pronounce were /b, h, j, w, dʒ, ʃ, ʒ/, and she finally concluded that the pronunciation of Japanese undergraduates has improved to some extent compared to the results of the 1970s study.

In the 2010s, as discussed in section 1.2, Smith (2012) explored the types of pronunciation patterns and issues that Japanese speakers encounter when attempting to speak English. As for consonants, plosives /d/, /t/ and /k/ in word-ending position as well as liquids /l/ and /r/ were highlighted. Particularly, the striking fact was that the use of plosives at the end of the word was rather different from a native speaker's perspective. For example, one of the participants pronounced *bad* /bæd/ as *bat* /bæt/ and dropped word-ending *t* in *just* as /dʒəs/. As for liquids /l/ and /r/, the participant substituted /l/ for /r/ and pronounced /r/ with /l/ like in Bada (2001) such as /du:reɪ/ for *delay* and /keter/ for *kettle*. Smith states that these are from L1 interference and 'The very different places of articulation in the oral cavity for the /l/ and /r/ sounds create a great

deal of difficulty for Japanese speakers both in producing and distinguishing between the sounds.’ (Smith, 2012: 202) According to *An Introduction to Japanese Linguistics*, Tsujimura (2014) explains the differences among English alveolar retroflex liquid, /r/ and alveolar lateral liquid, /l/, and Japanese alveolar liquids (approximants), /r/ with examples such as *roku* (six) and *ringo* (apple). Tsujimura argues that this /r/ sound closely resembles the sound of /d/ in Amerindian English. The pronunciation of these words, *roku* (six) and *ringo* (apple), differs beyond the imagination from those of English, and conversely, even for many English-speaking learners of Japanese, it is difficult to distinguish between the Japanese /r/ and /d/ sounds.

In the 2020s, Higurashi (2020) as in section 1.2, highlighted the key vowel and consonant sound problems and discussed what attributed to the pronunciation problems, along with the characteristics of the phonetic differences between Japanese and English. In terms of consonants, she focused on three areas: 1) liquid /r/ vs /l/, 2) voiceless stop consonants /p/ vs /b/ and 3) fricatives. As for liquid /r/ vs /l/, she describes that the sounds corresponding to the English /r/ and /l/ are not present in Japanese, and Japanese /r/ is represented by the IPA symbol /ɾ/, which is also known as a post-alveolar ridge or alveolar flap. The Japanese /r/ is pronounced similarly to /d/ and /t/ sounds in American English because the tip of the tongue touches the alveolar ridge. Similarly, Tsujimura (2014) describes Japanese /r/ as similar in articulation to /d/ in American English.

2.4. Suprasegmental research

According to Pennington (2021), since the CLT trend, there has been a revival of attention to pronunciation, as well as to contextual aspects of pronunciation, such as suprasegmental phonology. Language teaching has been enhanced by the growth of technology and maintaining a well-established focus on segmental phonology. Suprasegmental features, sometimes referred to as *prosody*, generally refer to four key aspects: stress, intonation (pitch/tones), rhythm, and duration/variation in length. Wells (2006: 3) specifies that ‘the prosodic (or suprasegmental) characteristics of speech are those of pitch, loudness, and speed (or tempo, or speech rate; its

inverse is the duration of the constituent segments). These combine to make up the rhythm of speech and are combined in turn with stretches of silence (pause) to break up the flow of speech.’ To this end, the following two sections will explain the areas of word stress and intonation (pitch), which are particularly challenging for Japanese speakers (Anderson-Hsieh, 1996), as well as the related issues.

2.4.1. Stress (word stress)

Despite the similarities between English and Japanese in terms of word stress, the two languages differentiate themselves in terms of how word stress plays a role in producing the distinctive stress patterns of their respective languages (Ohata, 2004). As Roach (2000: 45) states, the contrasts between many essential sounds are simply not the outcome of differences between phonemes. He describes stress as one of the most important prosodic features in the section on suprasegmental phonology as follows: ‘when the word *import* is pronounced with the first syllable sounding stronger than the second, English speakers hear it as a noun, whereas when the second syllable is stronger the word is heard as a verb.’ Wells (2006: 3) describes ‘stress is realised by a combination of loudness, pitch, and duration.’ He states that some languages use stress placement lexically, citing Greek as an example, and introduces word pairs where differences in meaning depend entirely on stress placement and not on consonant or vowel sound differences. In standard (Tokyo) Japanese, *hashi* (端: edge, 橋: bridge, 箸: chopsticks) can be an example of this (Wells, 2006: 5). For instance, it means *end*, *edge* with no accent, *bridge* with an accent on the second syllable, and *chopsticks* when the second syllable is much lower pitched than the first one. On the contrary, the meanings are different when pronounced in Kansai (Osaka) Japanese dialect. However, it is known as a pitch accent (Wells, 2006: 4). Wells (2006) also illustrates some languages have no lexical use of stress, such as French.

When word stress is misplaced by L2 learners of English, it is said that it can result in significant problems in intelligibility (Celce-Murcia et al., 2010: 212; Roach, 2009: 79). In the 90s,

Benrabah (1997) stated that misplaced word stresses can cause listening errors. For example, *nórmally* is mistakenly pronounced as *normállly* with the stress on the second syllable, which can be misunderstood as *no money*, and *wríttén* can be misunderstood as *retain* when it is said as *writtén*. In the 2000s, Yamane (2006 in Yamane, 2015) examined the intelligibility of English pronunciation of Japanese learners by providing audio samples to Americans. The results showed that 47.5% of the respondents were able to hear words correctly with misplaced stresses, which was the second lowest percentage after *consonant deletion*. He reported that, for example, *cómmerce* was difficult to understand when it was mistakenly pronounced as *commérce* with the stress on the second syllable. However, it was also found that even when pronounced with an extra vowel inserted, the pronunciation was still relatively understandable. Zielinski (2008) examined the intelligibility of English pronunciation by providing recordings of L2 learners who spoke either Vietnamese, Korean or Chinese as their L1, and asked native speakers to identify what words they were saying. The results showed that 1) the correct positioning of word accents and 2) the correct pronunciation of vowels and consonants in strong syllables lead to better intelligibility. It was suggested that strong syllable segments played a major role in word recognition. These empirical data suggest that misplaced word stresses can hinder intelligibility and communication. Learning the correct word stress is important for achieving a highly intelligible English pronunciation.

2.4.2. Intonation (pitch)

One characteristic of Japanese learners of English is that they tend to speak with a monotone intonation from the beginning to the end of a sentence. Native English speakers generally use falling tones for simple sentences and wh-questions, and rising tones for yes-no questions, listing, and choice sentences. In addition, rising tones also act to convey reassuring emotions (Tsukuma, 2005). Roach (2000: 45) explains ‘*Intonation* is also important: if the word *right* is said with the pitch of the voice rising, it is likely to be heard as a question or as an

invitation to a speaker to continue, while falling pitch is more likely to be heard as confirmation or agreement.' The English intonation system constitutes the most important and complex part of English prosody, therefore many non-native speakers could fail to understand some or entire messages of native speakers, depending on intonation type (Wells, 2006). As Jenkins (2000) notes, English is no longer exclusively the language of native speakers of English (NSE) but is more often used as a Lingua Franca between speakers of a foreign language. Therefore, it is no longer necessary to refer to 'native English pronunciation', and it is sufficient to learn phonemes by minimising the number of consonants and vowels needed to be understood. However, Jenkins (2000) insists that intonation rules should be taught, especially when regarding where nuclear stress should be placed, as it is the most important clue to conveying the speaker's intended meaning. Similarly, Lodge (2009) states that misplaced nuclear stress and incorrectly articulated pronunciations are immediately corrected by the listener cognitively. Wells (2006) states that native speakers of English know that many learners struggle with vowels and consonants. Therefore, when speaking to non-native English speakers, they are more tolerant towards segmental errors. However, they do not take intonation errors into consideration. Wells also argues that this would be because native speakers are not aware that English language learners can also make mistakes in intonation. Even for those who have acquired a sophisticated command of English, it is intonation which remains the most difficult to master until the very end of their language acquisition journey (Jenkins, 2000). Learners who can pronounce segmental phonemes correctly may still have difficulties acquiring intonation without continuous training, and regular opportunities to communicate with native English speakers (Roach, 2009: 121).

In the 90s, Derwing, Munro, and Wiebe (1998) examined the learning effects of three different approaches to pronunciation instruction over 12 weeks with three groups of English language learners, respectively: 1) segmental accuracy-focused instruction; 2) general pronunciation instruction with no particular emphasis; and 3) prosody-focused instruction. They

measured the effects of different pronunciation instruction methods on foreign accent, comprehensibility, and fluency by native English speakers as raters and found that spontaneous speech pronunciation improved the most in the prosody-focused group. In the 2000s, Yabuuchi and Sato (2001) had native English speakers listen to English read aloud by Japanese learners of English and rated its *naturalness*. The result reports that the greater the pitch change, the more English-like the native speakers deemed the utterance to be. In the 2010s, Saito & Saito (2017) investigated the effects of suprasegmental-based instruction on the comprehensibility, word stress, rhythm, and intonation of 10 Japanese EFL learners. Over six weeks, the experimental group was given a total of three hours of instruction, while a controlled group of students received meaning-focused instruction which did not include suprasegmentals at all. Speech samples were rated by native speakers and acoustic analysis was conducted. The result showed that the experimental group achieved better overall results in terms of comprehension, word stress, rhythm, and intonation. In particular, with intonation, they were able to use appropriate intonation in yes/no questions and wh-questions. These empirical data suggest that intonation (pitch) can also affect intelligibility and communication.

2.5. Summary of the chapter

From the above, we can ascertain that there are difficulties with vowels and consonants for Japanese learners of English, as well as stress and intonation (pitch) because of speech styles. This study is thus timely and important because it explores where problems lie mainly in segmental (vowels and consonants) and some suprasegmental features in the pronunciation of English by Japanese undergraduate students, majoring in English, and seeks to recommend suitable learning approaches for their level of English proficiency. Problems for Japanese learners of English include mispronunciations of vowels rather than consonants, causing more communication problems (e.g. Bada, 2001; Kitao, 1995a; Ohata, 2004). Consonants are the *skeleton* of a word (O'Connor, 1980), however, mainly the clichés such as /θ/, /ð/, /l/, /r/ etc. (e.g.

Kimura, 2022; Kitao, 1995b; Ohata, 2004), are also considered problematic. It is suggested that prosody is also important for the acquisition of near-native pronunciation (Derwing et al., 1998; Saito & Saito, 2017; Yabuuchi & Sato, 2001). Knowing this background information, a theoretical understanding of these issues is crucial. It is important to explore why these mistakes are present among Japanese learners and how we can address these pronunciation issues. To this end, an outline of this project's purpose and approaches will be presented in the next methodology chapter.

Chapter 3 Research Methodology

3.1. Overview

The main aim of this study is to explore where segmental and suprasegmental problems lie in the pronunciation of English among Japanese undergraduate students majoring in English. Needless to say, both segmental and suprasegmental pronunciation play a crucial role. Stress is crucial, as emphasised by Ohata (2004), Roach (2000), and Wells (2006), because it significantly affects intelligibility (Benrabah, 1997; Celce-Murcia et al., 2010; Roach, 2009; Yamane, 2015; Zielinski, 2008). Intonation is also considered to affect intelligibility (Jenkins, 2000; Roach, 2000; Saito & Saito, 2017; Wells, 2006). In particular, as word stress and intonation (pitch) are considered challenging for Japanese learners of English (see Chapter 2, Section 4), this study focuses on these two suprasegmental features. The essential tools for data collection in this study were questionnaires and spoken voice recordings. Firstly, the questionnaire was created to elicit responses from participants to better understand their English learning background and their opinions about English pronunciation. Secondly, in order to check and clarify participants' pronunciation, 3 recording conditions were created: 1) a diagnostic word list, 2) reading passages aloud, and 3) spontaneous speech. Further details about both the questionnaire and the recordings will be provided in section 3.5. and 3.6.

3.2. Research questions

The results of previous studies suggest that the correct pronunciation of segments is more important in conversations among non-native speakers of English rather than appropriate prosody (Arimoto, 2002; Jenkins, 2000; Sugito, 1996; Yamane, 1999). On the contrary, correct stress and intonation, with incorrect segmental pronunciation of English is better understood by native English speakers than correct segmental pronunciation, with incorrect stress and intonation (Wells, 2006: 2; Anderson-Hsieh, Johnson & Koehler, 1992). This is because it is the

most important cue in conveying the speaker's intended meaning (Lodge, 2009; Wells, 2006). Moreover, Cenoz & Lecumberri (1999: 4) claim that 'Errors in intonation may be more serious since they can produce misunderstandings at the pragmatic level when the specific context may not help to ratify the intended meaning.' Then, as a result, questioning which is more important for Japanese learners of English to focus on, segmental or suprasegmental features, is an important consideration. These factors make it difficult for learners and teachers to set learning objectives on what elements of pronunciation they need to learn (Arimoto & Kochiyama, 2006). As Yamane (2015) states, many EFL teachers are non-native English speakers. In addition, in fact, it is reported that approximately 80% of English language teachers worldwide are non-native speakers (Celce-Murcia, et al., 2010). In such an environment, it would be unrealistic to expect non-native-speaking teachers of English to provide perfect pronunciation as a model for learners. However, it is also true that many learners want to improve their pronunciation and acquire native-like pronunciation (Derwing, 2003; Scales, Wennerstrom, Richard & Wu, 2006). Many L2 speech researchers have emphasised repeatedly that, even with detectable accents, learners should be encouraged to seek more achievable and practical goals, such as mastering intelligible and comprehensible pronunciation (Levis, 2005; Munro & Derwing, 1995). Hence, pronunciation teaching should be designed to ensure the most efficient and effective learning of what is essential for real-life use of L2 in the future (Saito & Plonsky, 2019).

Considering the issues that Japanese EFL learners face when learning English pronunciation, the following research questions were created to be explored within this dissertation:

- 1) Which phonemes do Japanese learners of English find difficult to produce in an intelligible manner?
- 2) Do the phonemes which are difficult for the learners affect their intelligibility?

Furthermore, three sub questions were also explored:

- A. Are there any differences in pronunciation of these phonemes by participants depending on the task being undertaken (such as a diagnostic word list, reading passages aloud, or spontaneous speech);
- B. Are the participants conscious of where their difficulties lie; and
- C. Which has more of an impact on learners' intelligibility, stress or intonation?

3.3.Participant overview

A total of 49 participants (n=49), who were first, second and third-year undergraduate students majoring in English, were recruited to take part in this study. There were 11 first-year students, 21 second-year students and 17 third-year students. With reference to Dörnyei & Taguchi's instructions (2010: 19) in 3.5.1., an invitation letter explaining the purpose of the questionnaire was prepared, but to make sure that the participants understood the purpose of the questionnaire, a brief explanation in English and Japanese was given at the beginning of the questionnaire as found in the appendix. Additionally, the purpose of the study was explained verbally to all the participants. They were provided with a consent form, which included information about the project at the beginning of the questionnaire. By completing and submitting the questionnaire, they agreed to participate in this study.

All the participants were Japanese female students between 18 and 22 years old, and they were educated in a monolingual school environment before entering university. The reason for choosing this age group was that general pronunciation difficulties of Japanese learners of English (e.g., junior and senior high school students and undergraduate students not majoring in English) have been studied extensively, thus this research focused specifically on undergraduate students majoring in English. Currently, English language education in Japanese primary schools has been officially implemented since 2020 (MEXT, 2017), and all primary schools started to offer a minimum of one English lesson a week, 35 sessions per year, from the third grade in 2020. The participants in this study were born between 2001 and 2004 so they officially started

learning English from junior high school. This means that they started learning English at the age of 12/13 and received a typical grammar-based, written language-centred English education with little attention to pronunciation for six years before entering the university (Baba, 2021; Saito, 2007; Tsukuma, 2005). These participants are highly motivated to learn English as well as interested in the target culture.

The institution they belong to is Mukogawa Women's University (Hereafter referred to as MWU), which is a private university located in Nishinomiya, Hyogo, Japan, founded in 1939. MWU has a student body of around 7,700 students. At MWU, there is a mainstream course and an advanced course in English (ACE) in the Department of English (now known as the Department of English and Global Studies). According to the homepage of MWU, ACE stands for Advanced Course in English, a specialist English course. It is designed for students who have an English language proficiency of around 600 points on TOEIC® at the time of enrolment to improve their English language skills and intercultural competence. Class sizes are small and, in principle, conducted in English, and students can join the ACE from the mainstream programme in their second or third year if they meet the minimum entry requirements. From the third year, mainstream students can choose one of the three different streams of study 1) Culture and Literature, 2) Language and Linguistics, or 3) Business and Communication. ACE students, on the other hand, belong to International Liberal Arts stream in addition to the three above-mentioned fields. The school encourages ACE students to participate in exchange programmes, intending to nurture students who will be capable of working in a wide range of international fields after graduation.

Students of the Department of English go to the U.S. at the end of the first year and study there for 4 months at Mukogawa U.S. Campus in Spokane, Washington. They can also join a further extension programme there if they wish. All the 49 participants in this present study major in English, and 32 of them belong to ACE, with the remaining 17 students belonging to the mainstream course.

3.4. Recruitment of participants

Since this study is a qualitative one, it was assumed that there would be approximately 40 participants for the questionnaire and 10-12 for the recording data needed. In order to recruit participants, two sampling strategies were mobilised in this study, which were introduced as purposeful sampling by Leavy (2022). Participants were recruited using *convenience sampling*, which created a snowball effect. *Convenience sampling* is ‘a sampling strategy in which the researcher identifies participants based on their accessibility’ (Leavy, 2022: 280). *Snowball sampling* is one of the most frequently used purposeful sampling strategies, also known as *chain sampling* (Patton, 2015) in which participants are recruited by word of mouth from other participants or supporters of the research project.

There were two stages of participant recruitment that took place in this project. In stage 1, in order to conduct a questionnaire, convenience sampling (Leavy, 2022) was mobilised by asking students in a listening class taught by this researcher to take part in the questionnaire. However, there were only 21 students in the above-mentioned listening class who could be approached to take part in the study. Further participants needed to be found, as 21 participants were not enough to conduct the questionnaire and attain enough results to properly analyse trends and justify the findings. Therefore, snowball sampling (Leavy, 2022) was mobilised by asking my thesis supervisor, a colleague, and a part-time lecturer to recruit their students to take part in the study. Consequently, convenient sampling was employed by reaching out to other lecturers who shared the questionnaire with students in their classes. As a result, 49 participants completed the questionnaire. In stage 2, in order to get voice recording data, all participants were invited to take part in the recording stage after completing and submitting the questionnaire. 14 participants volunteered to continue to take part in this study and 35 participants decided to finish taking part in this study after the questionnaire. All recordings took place one by one with the researcher and participant. The recordings were conducted between the 10th and 17th of January 2023, on four separate days, with 12 of the 14 recordings taking place face-to-face in a

postgraduate student room at the university, and the remaining two recordings taking place via Zoom at the participants' requests. This was how the 14 students eventually participated in the recordings.

3.5. Questionnaire

A total of 49 participants (n=49) completed the questionnaire. This questionnaire was one of the most important data collection instruments incorporated in this study. The purpose of this questionnaire was to find out the participants' English background. During the questionnaire, participants were asked about their language study background, their experience of using English both in Japan and abroad, their connection to their learning environment, and their opinions on their English pronunciation.

3.5.1. Questionnaire design

This questionnaire was created and distributed using Google Forms. This questionnaire was composed of two parts: Part 1 contained 20 questions on participants' English language qualifications, English language educational background and travel history, while Part 2 contained 13 questions on participants' opinions about their English pronunciation, for a total of 33 questions. In this questionnaire, the following types of questions were incorporated in the data collection stages: multiple choice questions, fill-in-the-gaps, Yes/No questions, and open-ended questions.

When designing the questionnaire, Dörnyei & Taguchi's instructions (2010:19) were referred to and covered the following points:

- What the study is about and why it is important or socially useful.
- The organisation responsible for conducting the study.
- Emphasising that there are no right or wrong answers, requesting honest answers and trying to elicit integrity in general.

- Promising confidentiality.
- Saying ‘thank you.’

3.5.2. Procedure

The questionnaire was open from 15th December 2022 to 13th January 2023 in the autumn semester. The responses were obtained by sharing a link to the Google Form or asking participants to scan a QR code provided to them using their mobile phones. The link to the questionnaire was further shared with some of the participants via Google Classroom.

As mentioned in 3.4, 21 participants from this researcher’s class were not enough to obtain sufficient results for a proper analysis of trends and responses, and therefore further participants were recruited. My thesis supervisor and a fellow part-time lecturer were approached to assist in recruiting students to participate in this study, and both were kind enough to let me join them either before or at the beginning of their lectures to explain the project to participants. There, I introduced myself, described the current study, and invited them to complete the questionnaire. As a result, by employing convenience sampling, using connections with lecturers who shared my questionnaire with their students, 49 participants eventually responded to the questionnaire on the following dates:

- Thursday, 15th December 2022: 11 participants from the first year
- Thursday, 22nd December 2022: 9 participants from the third year
- Friday, 23rd December 2022: 21 participants from the second year
- Friday, 13th January 2023: 8 participants from the third year

Now, an in-depth explanation of each section of the questionnaire will be provided in section 3.5.3. and 3.5.4. The questionnaire in its entirety can be found in Appendix 4.

3.5.3. Part 1: Participants' background

In Part 1 of the questionnaire, there were 20 questions in total. I firstly asked participants general questions, such as their year level, gender, age, nationality, department/major and language qualifications, from questions 1 to 7 by using multiple choice questions and fill-in-the-gap style questions. Next, questions 8 to 11 asked participants to answer questions about their English language learning background prior to entering tertiary education by employing multiple-choice questions and open-ended questions. In this way, the participants' basic information was obtained.

3.5.4. Part 2: Opinions about English pronunciation

In order to find out which of the vowel and consonant phonemes were perceived to be difficult to pronounce, Part 2 of the questionnaire was developed with 13 questions in total. In Part 2, participants' opinions about their English pronunciation were gathered by using multiple-choice questions and open-ended questions to let them explain how they felt about their pronunciation and English proficiency. Part 2 was divided into two main parts, including seven questions on vowels, five questions on consonants, and an additional question about other words or phonemes which participants felt were difficult to pronounce.

In order to properly analyse trends and responses, vowels were categorised into short, long and diphthongs. As such, in the survey, two questions were created to differentiate between short and long vowels that used the same phoneme but with different vocabulary. Similarly, three questions were created for diphthongs, asking the same phoneme but with different vocabulary at the beginning, middle and end of the word. As for consonants, vocabulary containing phonemes at the beginning, middle, and end of words was asked as one question respectively. In addition, considering the results of my M.A. thesis, vocabulary containing /g, k, d/ was also asked as a separate question to see whether similar difficulties were present during this project. It is important to note that all the 20 vowels were included, but four phonemes, /b, h, j, m/, were

excluded in the questions on consonants because they have been deemed to not be difficult for Japanese speakers to pronounce (Kimura, 2022; Kitao, 1995b). Detailed questions and results on vowels and consonants will be provided in Chapter 4, the Results chapter of this dissertation.

3.6. Recording and procedure

As introduced in section 3.1, spoken voice recordings were crucial for drawing reliable conclusions regarding both segmental and suprasegmental issues in the pronunciation of word lists and passages, as well as in participants' natural language use. The recording materials were prepared under three conditions: 1) a diagnostic word list, 2) reading passages aloud, and 3) spontaneous speech. These three types of recording materials were timed in advance by the researcher, and it was assumed that it would take around 15 minutes to complete all the recordings. A total of 14 participants signed up for a Google Docs timeslot provided by the researcher according to their availability. The recordings took place between the 10th and 17th of January 2023, on four separate days. For the voice recordings, both a voice recorder in my PC (Surface, Microsoft) and SONY IC recorder were used in order to make sure that none of the responses from participants were incomplete based on technological difficulties.

To ensure successful recordings, 14 recordings were conducted in two locations. One was carried out face-to-face in a postgraduate student room at the university, and the other was made via Zoom at the request of the participants. Firstly, twelve recordings of the participants were made in a quiet postgraduate student room at the university, where one participant and the researcher were alone to avoid background noise and external influences. In addition, a waiting room was provided in a neighbouring room so that the next participant could enter the recording room as soon as the previous participant finished. Two of the 12 participants requested to wear masks during the recordings. Secondly, the remaining two recordings were carried out via Zoom. Just in case, in addition to a voice recorder in my PC (Surface, Microsoft) and SONY IC recorder, Zoom sessions were also recorded using the record function built-in to the Zoom software.

As anticipated, each recording session lasted for 10 to 15 minutes, including audio checks. The recordings were conducted one by one with the researcher and participants. The recording quality was first checked and adjusted for each speaker so that their voices would be recorded at a suitable volume for analysis. The materials, printed on one side of A4 paper, were distributed to each participant just before the recording commenced, and they had an opportunity to look them through right before the record button was pressed. No instruction was given by the researcher in terms of phonetic and phonological features in the materials. When recording, the SONY recorder was operated by the researcher, and the PC recorder by the participants themselves. This was to ease the nervousness of the participants so that they could start recording at their own pace. However, this was not the case for recordings performed on Zoom. During the recording, the researcher made sure to create a relaxed and comfortable ambiance so that participants did not feel too nervous in both settings. As a result, 14 participants eventually participated in recording on the following dates:

- Tuesday, 10th January 2023: 3 participants from the first year and 2 participants from the second year
- Friday, 13th January 2023: 1 participant from the second year
- Monday, 16th January 2023: 2 participants from the second year (on Zoom)
- Tuesday, 17th January 2023: 5 participants from the first year and 1 participant from the third year

3.6.1. Materials for Recording

When preparing for recordings, materials were carefully selected, which were considered to be phonetically balanced by the researcher, with a focus on phonemes which are particularly difficult for Japanese learners of English as stated by Kimura (2022) and Kitao (1995b). As introduced in section 3.1, three recording conditions: 1) a diagnostic word list, 2) reading passages aloud, and 3) spontaneous speech, were covered. These three conditions partly followed Labov's

five stylistic levels: [1] Casual speech, [2] Careful speech, [3] Reading, [4] Word lists, and [5] Minimal pairs (Labov, 1970:184).

For this study, [4] Word lists and [5] Minimal pairs were combined as 1), a diagnostic word list. These three recording conditions had mainly two types of tasks: 1) and 2) controlled production tasks, and 3) a spontaneous production task. The former involved reading materials provided, such as a word list and short passages. Following a word list allowed the researcher to elicit pre-determined, clearly specified speech material from the speaker (Munro, 2008: 202). The latter was a less controlled task in the form of a spontaneous speech. While a more natural speech output may cover the weaknesses of the controlled tasks, the output may not contain the pre-determined features of the target language of the researcher's interest, making it harder to differentiate between two speakers or groups (Richter, 2019: 66). The two types of speech recording tasks were deemed as sensible to employ in order to draw credible conclusions about segmental and suprasegmental problems in both the pronunciation of dictated word lists, and through attaining records of participants natural usage of the language. Hence, these three recording conditions were prepared. Now, a description of each recording type will be provided.

3.6.1.1. Reading a diagnostic word list

The diagnostic word list consisted of two categories: vowels and consonants with minimal pairs in each category. In the list of vowels, 14 minimal pairs, 18 short and 10 long vowels, and 16 diphthongs were listed respectively. The consonant list also had 10 minimal pairs and 47 consonants. Notably, unlike the consonants in Part 2 of the questionnaire, all 24 consonant phonemes were included here. As the word list was relatively long, some participants read it by dividing the list into two parts (i.e., vowels and consonants) and others read it all at once, depending on their individual preferences. The word lists in Hewings' *English Pronunciation in Use: Advanced Self-study and Classroom Use* (2007: 129, 192) provided good and valid samples of word lists which are well organised, therefore they were mobilised as a reference when

preparing the word list that was used in this project. The minimal pairs were selected by considering typical words that were considered to be confusing to Japanese speakers. This word list was used to check whether participants could distinguish words and pronounce them in an intelligible manner in comparison to RP and GA. The whole diagnostic word list can also be found in the appendix.

3.6.1.2. Reading short passages aloud

There were four types of passages: 1) spoken, 2) narrative, 3) diary-style, and 4) children's book. Firstly, 1) and 3) were adapted from *English Pronunciation in Use: Advanced Self-study and Classroom Use* (Hewings, 2007: 144). Secondly, this study employed one of the most well-known phonetically balanced passages: *The North Wind and the Sun*, one of Aesop's Fables, adopted by the International Phonetic Association (1999) as 2). Gass and Varonis (1994) also used this text in their study on the role of conversational interactions in the development of non-native speech like other researchers such as Horgues & Scheuer (2014) and Meng, Harrison & Wang (2009) did. Lastly, Shel Silverstein's *The Giving Tree* (1964) was included as 4). The number of words in these four passages was relatively similar in length at 87, 113, 90 and 78 words respectively. Since there were four passages, participants read the passages with brief breaks or in one go, according to their individual preferences, similarly to the vocabulary list. These four passages were intended to check how participants pronounce the words in the passages compared to reading the words in a diagnostic word list one by one. Besides, it was of interest to find out if there were differences across the four different text types. Again, these passages were compared with RP and GA.

3.6.1.3. Spontaneous speech

There were eight topics provided for participants to freely talk about: *my experience of study abroad online, my best meal, my favourite place, my best trip, my best friend, my hometown,*

my hobby, and *my family*. The participants were asked to choose one of these eight topics and talk about it for about one minute. The reason why they were provided with these simple topics was that the researcher anticipated that they would be comfortable with talking about themselves on these types of topics, and therefore they would speak smoothly. In terms of the length of the speech, as it was highly expected that some participants might not know how long they had been speaking, all participants were instructed to check the timer of the PC voice recorder in case they wanted to know how long they spoke before they started. In this regard, two participants were allowed to change the topic and re-record it after they had started speaking, but not on the same topic. The reasons for changing the topics were as follows: one participant said, 'I thought I was too familiar with the topic and it was boring', while the other participant said, 'I went off the topic'. In analysing this spontaneous speech, a transcription application called CLOVA Note (LINE Corporation, 2022) was used to automatically transcribe the speech to some extent, and then it was transcribed and redrafted by the researcher by listening to it again. CLOVA Note is an AI technology-based speech transcript management service.

3.7.Measurement

Although appropriate tasks were selected for this study, there was one challenge. That was finding appropriate measurement tools. Despite the progress of research that investigates pronunciation, there is no standardised measurement of the extent of foreign accents (FA) specifically (Richter, 2019). Although there are variations in the types of ratings, most studies regarding the perceived degree of FA classified speakers on a scale from native speech to strongest FA, based on the listener's instincts (Thompson, 1991). While some studies ask listeners to rate the degree of FA on a specific scale (Flege, MacKay and Piske, 2002), some rate it on a *native* and *non-native* scale (e.g. Moyer, 1999), while others rate it on a *very good* and *very poor* pronunciation (Yeni-Komshian, Flege & Liu, 2000) or even some more ambiguously, expressed in relative terms such as *close to native English* and *less close to native English* respectively (Magen,

1998). Due to this lack of standardised measurement tools and scales, four original rating scales were developed: 1) perfectly intelligible, 2) fairly intelligible, 3) relatively intelligible, and 4) unintelligible for intelligibility assessment. The ratings were categorised based on the raters' intuition, as in Thompson's (1991) study. The recording data was analysed by human raters for both segmental and suprasegmental features, with the prominent suprasegmental features being assessed using the software called Praat (Boersma & Weenink, 2024).

3.7.1. Raters for qualitative research

Data analysis and evaluations of the participants' results were conducted by two human raters for this qualitative research. One Australian associate professor was recruited as a native speaker of English and cooperated in rating the recordings and pronunciation (Hereafter, Rater 2). The other rater was the primary researcher of this project, a Japanese EFL speaker (Hereafter, Rater 1). Since Rater 2 has been teaching English at Japanese universities for more than a decade and has worked internationally, it was assumed that he would be used to Japanese speakers' English. Nevertheless, the rater's experience of exposure to the English of Japanese learners does not necessarily reflect on the leniency or severity of the rater's judgments. Suenobu, Kanzaki and Yamane (1992) studied the relationships between judges' scores and other parameters such as age, education, and experience with Japanese English, and found no significant correlations between them. Rater 1, who had completed a master's degree in England, worked in the Republic of Ireland and Singapore for 10 years and taught English and Japanese at Japanese universities for 4 years at the time of this experiment. Firstly, Rater 1 checked whether vowels and consonants were pronounced correctly, and then Rater 2 checked the pronunciation to confirm the findings. The results of the analysis were listed respectively by phonetic symbols. The complete list is provided in Appendices 5 and 6.

3.7.2. Speech analysis software

As outlined in section 3.7, the prominent suprasegmental data was acoustically analysed using Praat (Boersma & Weenink, 2024), a speech analysis software, to provide objective ratings alongside human raters. Praat is a software developed by Paul Boersma and David Weenink at the University of Amsterdam, designed for speech analysis, transformation, and synthesis. The advantages of Praat include its easy accessibility and being free of charge. For linguistic speech analysis, Praat is highly suitable due to its ability to visualise speech. Each prominent data obtained was manually annotated and analysed, specifically looking at word stress (intensity) and intonation (pitch) gathered in the recordings. The results of this analysis will be provided in Chapter 4, the Results section of this thesis.

Chapter 4 Results

4.1. Analysis of the questionnaire

First, this section reports on the results obtained in the questionnaire. It was divided into two parts. Part 1 asked for background information, while Part 2 asked for participants' opinions on English pronunciation (vowels and consonants). Seven questions on vowels and five questions on consonants were asked, and all responses to Part 1 and 2 were compiled.

4.1.1. Part 1

In Part 1, participants' English background was mainly examined and was divided into four parts: 1) Characteristics of the participants, 2) English learning background, 3) History of travel and residency abroad, 4) Pronunciation of English consisting of 20 questions. The following are the results of the analysis for each of these four sections.

4.1.1.1. Characteristics of the participants

In this section, participants' basic information, such as year level, class, gender, age, nationality, department/ major and language qualifications were asked from questions 1 to 7 by using multiple choice questions and short sentence questions in which participants wrote out their answers. In terms of language qualifications, in question 7 they were asked about their results in TOEIC and other English language qualification tests such as EIKEN, TOEFL, and IELTS, which were widely accepted measures in order to get an idea of the English language proficiencies of the participants. Table 1 below shows the total TOEIC Reading & Listening scores and the number of participants.

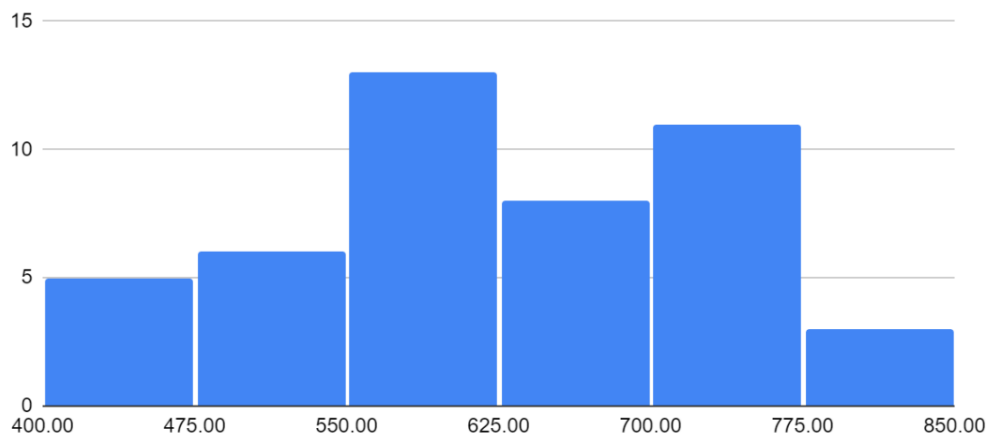


Table 1: Total Score of TOEIC Reading & Listening

As for their level of English, the result of TOEIC scores was referred because currently this is the test all students are strongly encouraged to take at MWU. 46 out of 49 participants in total reported their TOEIC score. 3 participants did not remember their scores. As shown in Table 1, the overall score range was quite wide, from 400 to 850, with an average score of 618.3, and the average score of mainstream was 600.4 and ACE was 627.9, respectively. The score range with the largest number of participants was 550-625, followed by 700-775. This shows that the English language levels of the target group were varied. According to the TOEIC® Program DATA & ANALYSIS 2023, the average TOEIC score among Japanese university students was 588. Within this category, the average of humanities majors was 601. It indicates that the target group of this study belongs to just around the range of the national average of Japanese university students and humanities majors.

In addition, 37 out of 49 participants answered that they have obtained EIKEN (英検), with 29 obtaining Grade 2, the largest number, followed by 6 obtaining Grade Pre-2. Judging from the TOEIC scores and the status of EIKEN (英検), it can be assumed that the English language levels of the participants approximately correspond to between participants being at the pre-intermediate and intermediate level, which is between B2 and A2 for the Common

European Framework of Reference (CEFR; Council of Europe, 2001), with the majority of the participants clustered around B1 of the CEFR.

4.1.1.2. English learning background

In this section, there were mainly two parts: history of English learning and current English learning status. Firstly, questions 8 to 11 asked participants to answer questions about their English language learning background prior to entering tertiary level through multiple choice questions and short response questions. In terms of question 8, the researcher wanted to know when they had started studying English.

8. How old were you when you started learning English? いつごろから英語を習い始めましたか。

49 responses

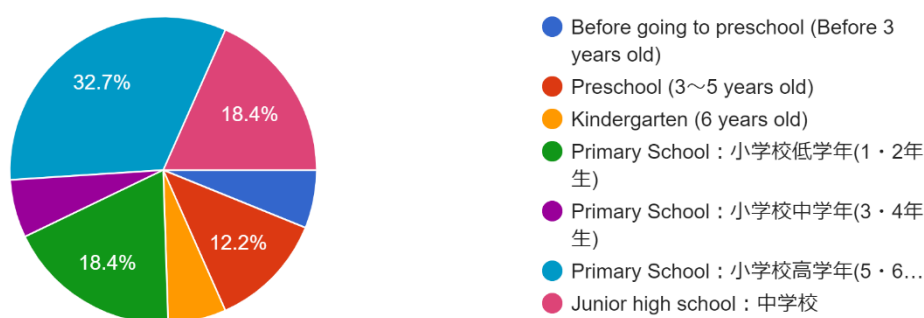


Table 2: Timing of the Start of English Language Learning

As Table 2 above shows, seven options have been given as follows: before the age of 3, 3-5 years old, 6 years old, Primary 1-2, Primary 3-4, Primary 5-6, and junior high school. Firstly, upper primary school (grades 5 and 6) was the most common timing for starting to learn English (32.7%), followed by junior high school (18.4%), and these two groups represented 51.1% of the total. Secondly, as in junior high school, 18.4% of the participants were in the lower primary school (grades 1 and 2), and 6.1% were in the middle primary school (grades 3 and 4), accounting for 24.5% of the total. Finally, preschool (3-5 years old) accounted for 12.2% and before going to

preschool (before 3 years old) and kindergarten (6 years old) for 6.1% respectively, accounting for 24.4% of the total. This suggests that 24.4% of the participants started to learn English before starting compulsory education at primary school. As mentioned in section 3.3, Chapter 3, it is known that all Japanese university students have studied English since junior high school at the age of 12/ 13 as a compulsory subject in Japan, for those born between 2001 and 2004. In fact, 57.2% of the participants started learning English from primary school before junior high school according to the results mentioned above.

In questions 9-11, the researcher specifically asked about the individual's English language learning circumstances prior to entering the university and the reasons behind them.

9. What did you do to study English apart from school before entering the university? You can answer more than one. 大学入学前、学校以外で英語の勉強をしたことは何ですか。(複数回答可)

49 responses

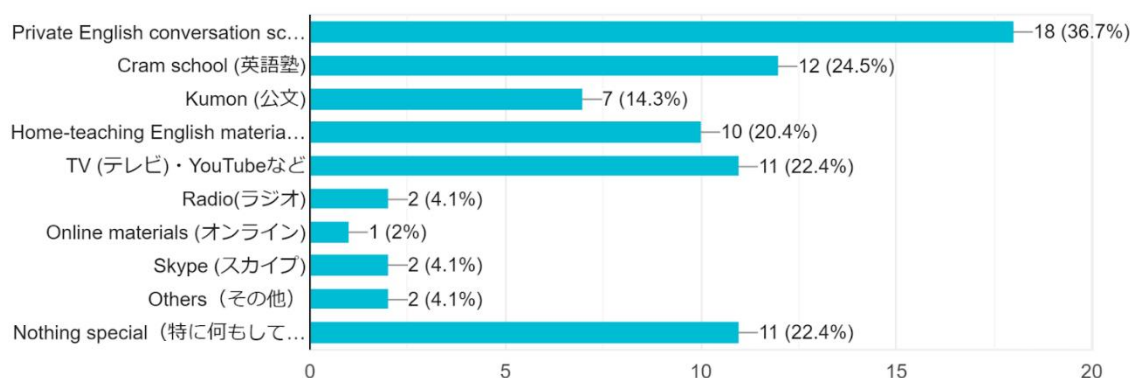


Table 3: English Language Learning Outside School (before entering university)

In question 9, ten options were given as follows: private English conversation school, cram school, Kumon, home-teaching English materials, TV & YouTube etc., radio, online materials, Skype, nothing special and others. If chosen *others*, details had to be given in question 10. Question 11 asked for reasons behind the answers to question 9 in fill in the gap format. As shown in Table 3, *private English conversation school* was dominant (36.7%), followed by *cram school* (24.5%) and *TV/YouTube etc.* (22.4%). Alongside this, the number of participants who

chose *nothing special* was relatively high at 22.4%. Next, 20.4% of participants answered *Home-teaching English materials*, followed by *Kumon* at 14.3%. Moreover, *radio*, *Skype* and *others* accounted for 4.1% each, and the least was *online materials* at 2%. Details about *others* were found in question 10: homestay, private tutoring, and BE-GO. Searching for BE-GO, it was found to be a home-teaching English material employing a CD-ROM containing a pronunciation assessment system by Benesse Corporation. This home-teaching English material, BE-GO can be categorised in Computer-Assisted Language Learning, known as CALL.

Overall, 79.6% of the participants' English learning situation outside of school prior to university enrolment was via face-to-face learning style and 48.9% was independent. The face-to-face category included Skype. This is because Skype involves a virtual but live conversation with an English speaker rather than studying on their own. Moreover, looking at these learning styles, 32.6% are media-based, such as TV, YouTube, radio and online materials, which shows that even among the digital native generation, face-to-face styles seem to be preferred. It should be noted, by the way, that this figure exceeds 100 when added all together, which is 155, as multiple answers were allowed to be selected at the time of the survey, which shows that a number of participants used multiple methods simultaneously.

The next point worth noting was the answer to question 11, which was the reason given in response to question 9. Responses fell into four categories: 1) influence of family and surroundings, 2) compulsory at school/exam preparation, 3) own interest/motivation, and 4) whether they viewed their classes as sufficient in school. Category 1) was the most common reason, at 38.7%, with participants stating that it was because of their parents' influence or because their parents wanted them to study English. On the other hand, 10.2% of participants in 2), with the main reason reported being in order to study for entrance examinations. In the two above-mentioned categories, 48.9% of the participants tended to be passive when it came to learning English. In contrast, 26.5% of participants in 3) said it was out of interest or motivation, reasoning such as 'I wanted to be able to speak English', 'I wanted to hear native speakers

speaking’. Besides, 10.1% of the participants in 4) who answered that they did nothing in particular in question 9 answered that their English lessons at school were sufficient. Moreover, one participant gave a reason for attending English conversation classes in Question 9: ‘In high school, it was all about grammar and my speaking skills didn't improve’. For these reasons, although 48.9% did not learn English spontaneously, it is clear that the majority were highly interested in improving speaking skills, even though they were passive in their approaches to doing so.

Secondly, question 17 asked participants to answer an open-ended question: ‘How did you use English in your daily life apart from university?’.

Receptive skills (Listening & Reading)	Watch films, TV dramas, video clips, SNS in English (55.1%)
	Listen to music, radio programme in English (22.4%)
	Read articles, books in English (8.1%)
Productive skills (Speaking & Writing)	Talk with foreigners at part-time job, foreign teachers, friends (22.4%)
	Write letters, emails, journals (4%)
	Speak to myself in English (6.1%)
	Go to English conversation classes (4%)
Others	Nothing in particular, no response (8.1%)

Table 4: Current English Language Learning Status (apart from university)

Table 4 shows their current English language learning strategies apart from university. Again, it should be noted that this figure exceeds 100 when added all together, which is 130.2, as multiple answers were allowed similarly to question 9. When asked about their current English language learning status in question 17, the responses were divided into two main categories, receptive skills (listening and reading) and productive skills (speaking and writing), as shown in Table 4. (excluding ‘none/no’ response). What should be noted is that 85.6% of participants clustered on the former. Among these, *watch films, TV dramas, video clips, SNS in English* were the most popular answers at 55.1%, suggesting that the enjoyable exposure to English may be a

motivating factor. In addition, 18.3% (n=9) answered that they did not simply watch films, TV programmes and YouTube channels in English, but also utilised subtitles, which shows that they were trying to understand the content in their way. Among the latter productive skills, *talk with foreigners* was the most common (22.4%), especially among respondents who spoke English at their part-time jobs. Other unique answers, such as *speak to myself in English*, give a glimpse of their personalities and preferences. Overall, the former responses were mainly on listening, while the latter were on speaking in question 17.

4.1.1.3. History of travel and residency abroad

In questions 12-16, participants were asked about travel history, countries visited, and history of living abroad. The type of the question for questions 12 was a Yes/ No question: ‘Have you ever been to an English-speaking country?’.

12. Have you ever been to an English speaking country? 英語圏の国に行ったことはありますか。
49 responses

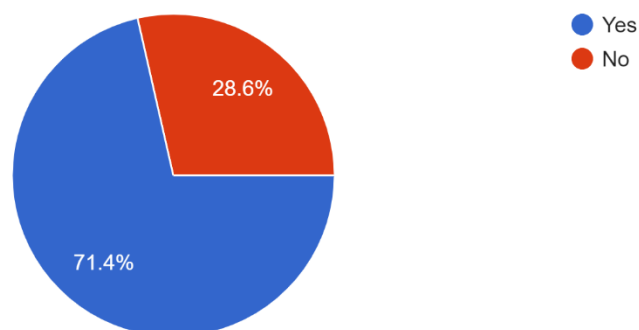


Table 5: Travel History to English-Speaking Countries

Table 5 above shows their travel history to English-speaking countries. 35 participants (71.4%) have been to an English-speaking country and 14 of them (28.6%) have not. Looking at the number of participants by grade for each answer, there was a variation regardless of grade: 8

first year, 16 second year, 11 third year participants answered yes, and 3, 5, 6 in each year level answered no.

If answered *Yes* in question 12, participants were asked to select an option that referred to their experiences associated through mobilising multiple choice questions in question 13. Question 13 asked about the timing of travel in response to question 12.

13. If yes, when did you go there? Yesの場合、いつ頃行きましたか？

49 responses

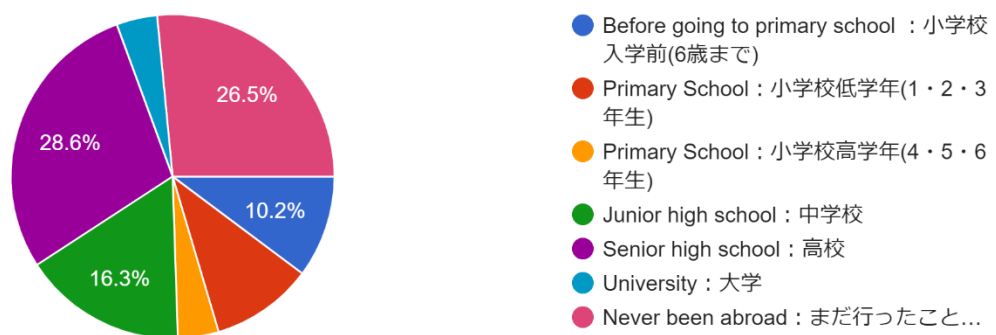


Table 6: Timing of travel

Table 6 above shows the timing of travel. The most common time of travel was during senior high school, followed by junior high school, with 69.4% having travelled to an English-speaking country in some way by the time of entering university.

In the fill in the gap question on question 14, participants were asked to answer the countries they had visited, including non-English speaking countries.

Area	Country	n=39
North America	US*	24
	Canada*	6
Europe	UK*	6
	Republic of Ireland*	1
	France	2
	Germany	1
	Malta*	1
Oceania	Australia*	6
	New Zealand*	4
	New Caledonia	1
East Asia	China	2
	Taiwan	6
	Korea	4
Southeast Asia	Singapore*	5
	Malaysia	1
	Indonesia	2
	Thailand	1
	Vietnam	3
	Philippines*	1

Table 7: Travel History

Table 7 above shows the countries which they have visited. An asterisk after the country name indicates nations where English is an official language. In question 14, 39 participants answered a total of 19 countries they have visited, including non-English speaking countries. As in questions 9 and 17, multiple answers were allowed here. Thus, note that all these numbers add up to 77, which exceeds the number of 39 participants who have been abroad. As shown in Table 7, each English-speaking country is marked with an asterisk, and as 39 of the 49 participants had been abroad, the table shows n=39. The areas they visited ranged from North

America, Europe, Oceania, East Asia, and South-East Asia, with North America being the predominant area. It shows that 70.1% travelled to 9 English-speaking countries out of 19 different countries, with 24 participants travelling to the USA (including Guam and Hawaii). This was followed by Canada, Australia and the United Kingdom with 6 participants respectively, and in Asia, Singapore was the most popular English-speaking country chosen by 5 participants. Within the minority, they have also travelled to the Republic of Ireland, the Republic of Malta and the Philippines. Overall, there is an impression that travel history was somewhat low, possibly due to the coronavirus pandemic between 2020 and 2022.

Next, the type of the question for question 15 was a Yes/ No question: 'Did you live abroad before entering university?'. 49 responses

15. Did you live abroad before entering university? 大学入学前に海外に住んでいたことがありますか？

49 responses

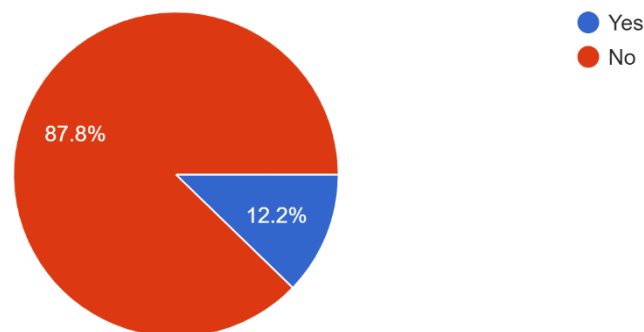


Table 8: History of Residency Abroad

As shown in Table 8, 6 out of 49 (12.2%) participants answered *Yes* and 43 out of 49 (87.8%) participants answered *No* when asked about their history of living abroad in question 15. If participants answered *Yes* in question 15, they were asked to select an option that referred to their experiences associated, which was the length of their residency abroad, through mobilising multiple choice question in question 16.

16. If yes, how long for? Yesの場合、どれくらいの期間ですか。

7 responses

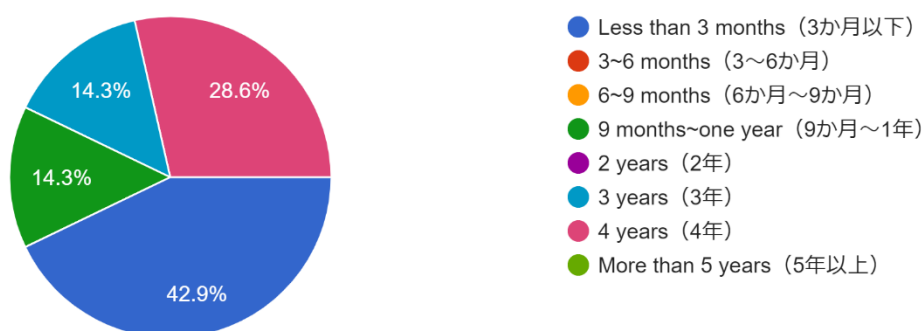


Table 9: Length of Residency Abroad

In question 16, eight options were given as follows: less than 3 months, 3-6 months, 6-9 months, 9 months-1 year, 2 years, 3 years, 4 years and more than 5 years. As Table 9 shows, 2 out of 6 participants stayed for 4 years (US & Australia: 28.6%), 1 for 3 years (US: 14.3%), 1 for 9 months to 1 year (Canada: 14.3%), and 3 for less than 3 months (US, Ireland, New Zealand: 42.9%), with the most common duration of stay being less than 3 months.

4.1.1.4. Pronunciation of English

Lastly, questions 18-20 asked about speaking and pronunciation. Question 18 was a Yes/No question: 'Have you ever tried anything to improve your speaking skill?'

18. Have you ever tried anything to improve your speaking skill? スピーキング力を向上させるために何か試したことがありますか。

49 responses

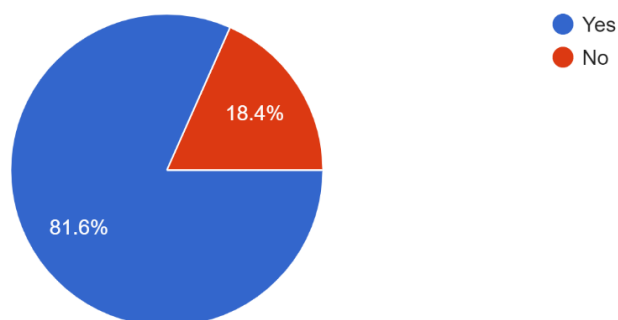


Table 10: Yes/ No question for speaking skill

As shown in Table 10, those who have tried to improve their speaking skills were 81.6%, indicating that the desire to become fluent is significantly strong. Question 19 was also a Yes/No question: ‘In terms of the question above, have you made an effort to acquire near native English pronunciation?’.

19. In terms of question above, have you made an effort to acquire near native English pronunciation? 前の質問に関して、ネイティブに近い英語の発音を身につけようとしたことがありますか。
49 responses

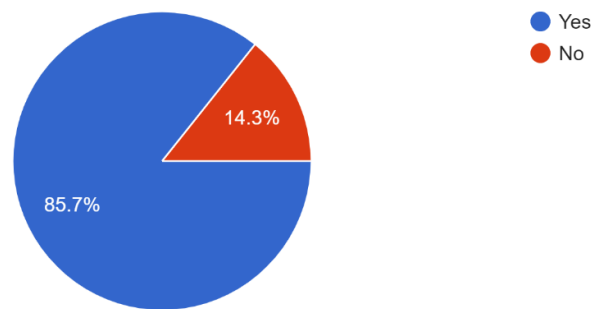


Table 11: Yes/ No question for near native English

As shown in Table 11, 85.7% of participants responded that they have tried to acquire near-native pronunciation. This indicates that participants who chose *Yes* have a rather strong wish to acquire native-like pronunciation as well as the above-mentioned improvement of speaking skills in Table 10.

Participants were then asked to provide specific responses as to what strategies and methods they found effective in learning English pronunciation as follows in an open-ended question: ‘In your own experience, what kind of strategies did you find effective to learn English pronunciation?’ in question 20.

Passive Approaches	Learning pronunciation symbols and phonemes specifically (12.2%)
	Just listening (16.3%)
Active Approaches	Practising aloud repeatedly (67.3%)
Others	No response, not answered (4.2%)

Table 12: Effective Strategies to Learn English Pronunciation

As shown in Table 12, the responses of 47 out of 49 participants fell into three main categories. Firstly, 12.2% of the participants answered that learning pronunciation symbols and phonemes specifically as knowledge of phonetics was the most effective way to learn pronunciation. Secondly, 16.3% of the participants answered, 'just listening', which specifically included listening to native speakers' pronunciation, listening to music in English, watching films and dictation. The above two response groups can be described as passive approaches. On the other hand, 67.3% stated that practising aloud repeatedly was preferred, which involved more active approaches such as mimicking native speakers, shadowing and reading aloud. The remaining 4.2% gave no response or did not answer the question. An interesting finding here is that 36.7% of the participants preferred native speakers as their model of pronunciation. In this way, the participants' English background information was obtained specifically.

4.1.2. Part 2

As introduced in section 2.1, Chapter 2, there were forty-four sounds in English (Richards, Platt & Platt, 1992, Hewings, 2007: 192) whereas Japanese has only twenty-four sounds (Kindaichi, 1988). Thus, the number of phonemes differs significantly between English and Japanese. The researcher wanted to find out initially which of the vowel and consonant phonemes were perceived to be difficult for the participants when it came to pronunciation. In Part 2, participants' opinions about English pronunciation were mainly explored by using multiple-choice questions and short-answer questions to let them explain why they responded to each question the way they did. Part 2 is divided into two main parts and consists of 13 questions, including seven questions on vowels, five questions on consonants and an additional question set to ask whether any other words or phonemes were difficult to pronounce. In this section, the IPA symbols adapted from Hewings (2007: 192) are used as reference.

4.1.2.1. Opinion on English vowels

Firstly, questions 1-7 elicited opinions on short vowels, long vowels, and diphthongs respectively. The parts of the questionnaire that participants were asked to focus on were underlined in bold to facilitate answering the questions. In addition, some words containing the same phoneme were repeatedly included as options for selection. This is because the same phoneme may elicit a different response in different words. The next two Tables 13 and 14 show the results on short vowels: /ɪ, e, æ, ʌ, ɒ, ʊ, ə, i, u/.

[1～7：母音について] 1. Which vowels are difficult for you to pronounce?

あなたにとって発音しにくい母音はどれですか。You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に回答してください。

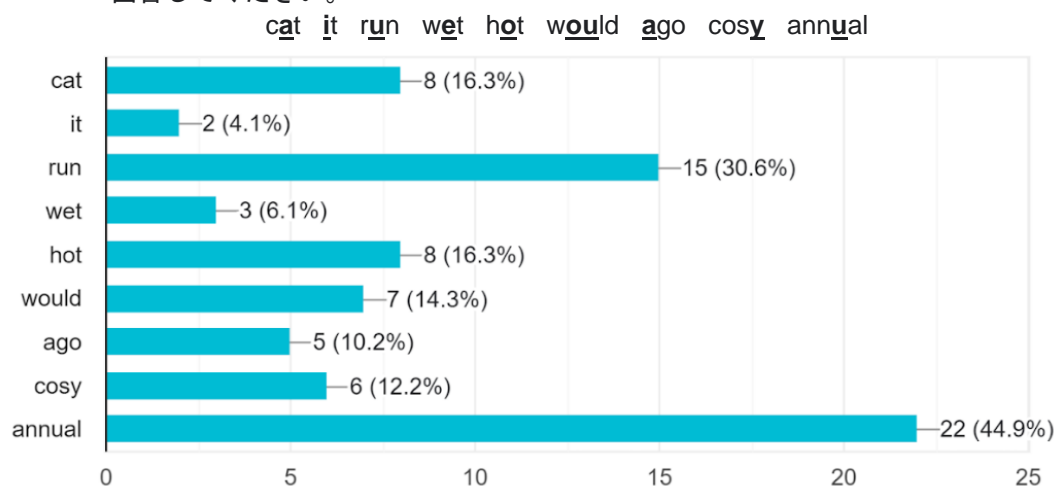


Table 13 Short vowels 1

In question 1, nine choices were given as follows: **cat**, **it**, **run**, **wet**, **hot**, **would**, **ago**, **cosy** and **annual**. As Table 13 shows, 44.9% of the participants reported that /u/ in *annual* was difficult to pronounce most frequently. This was followed by /ʌ/ in *run* with 30.6% of the participants. In contrast, /ɪ/ in *it* and /e/ in *wet* were the least common at 4.1% and 6.1% respectively.

2. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか。You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に回答してください。

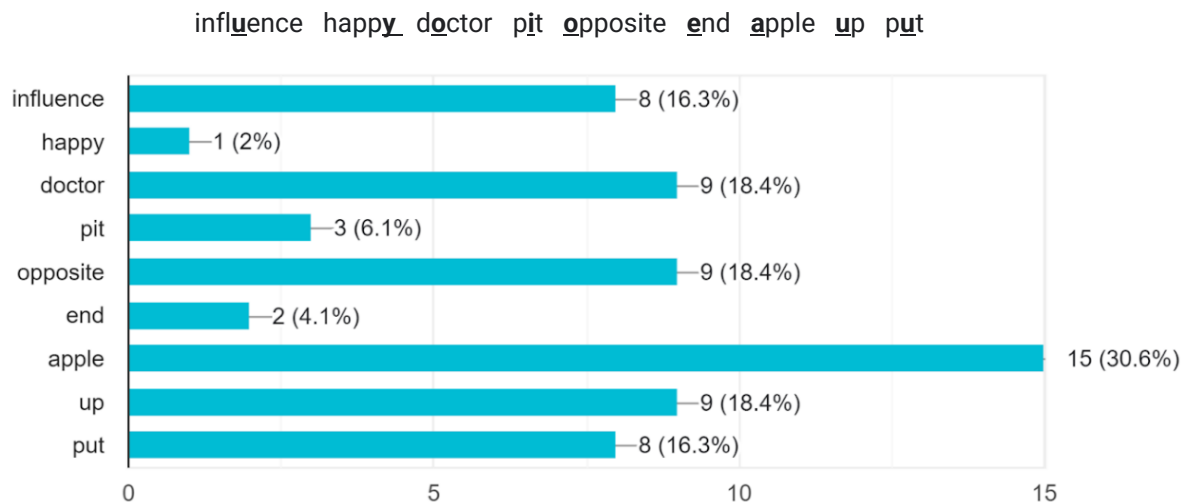


Table 14 Short vowels 2

Similarly, in question 2, nine choices were given as follows: influence, happy happy, doctor, pit, opposite, end, apple, up and put. As shown in Table 14, 30.6% of the participants reported that /æ/ in *apple* the most frequently the hardest to pronounce. This was followed by /ɒ/ in *doctor*, /ɒ/ in *opposite* and /ʌ/ in *up* with 18.4% of the participants respectively. In contrast, /i/ in *happy* was the least common at 2%.

Overall, the results above indicate that more than 30% of the participants tended to find /u/, /æ/ and /ʌ/ difficult among short vowels. The next two tables, Tables 15 and 16, are the results on long vowels: /i:/, a:, ɔ:, u:, ɜ:/.

3. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか。You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に回答してください。

eat arm saw oo early

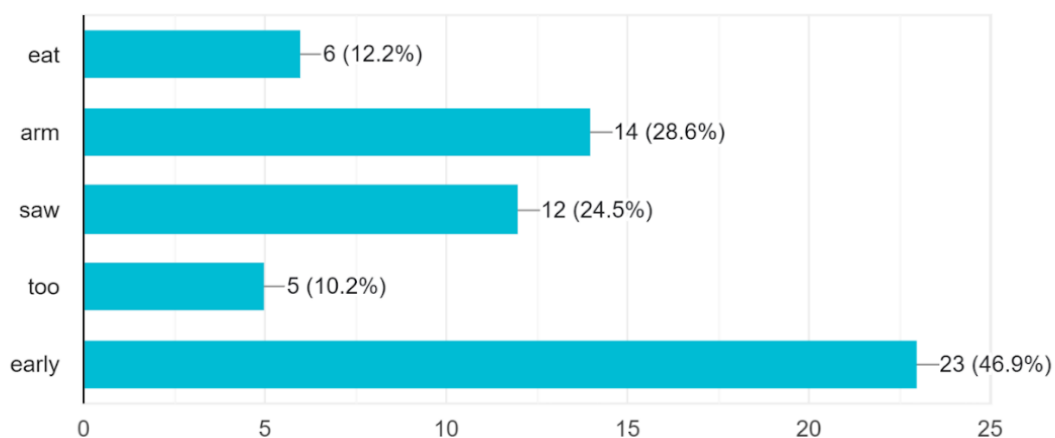


Table 15 Long vowels 1

In question 3, five choices were given as follows: eat, arm, saw, too and early. As Table 15 shows, 46.9% of participants chose /ɜ:/ in *early* most frequently. The second most frequently selected sound was /ɑ:/ in *arm* at 28.6% followed by /ɔ:/ in *saw* with 24.5% of the participants. In contrast, /u:/ in *too* and /i:/ in *eat* were the least common sounds at 10.2% and 12.2% respectively.

4. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか。
。 You can answer more than one. (複数回答可)

49 responses

回答してくれた人。

her you see always part

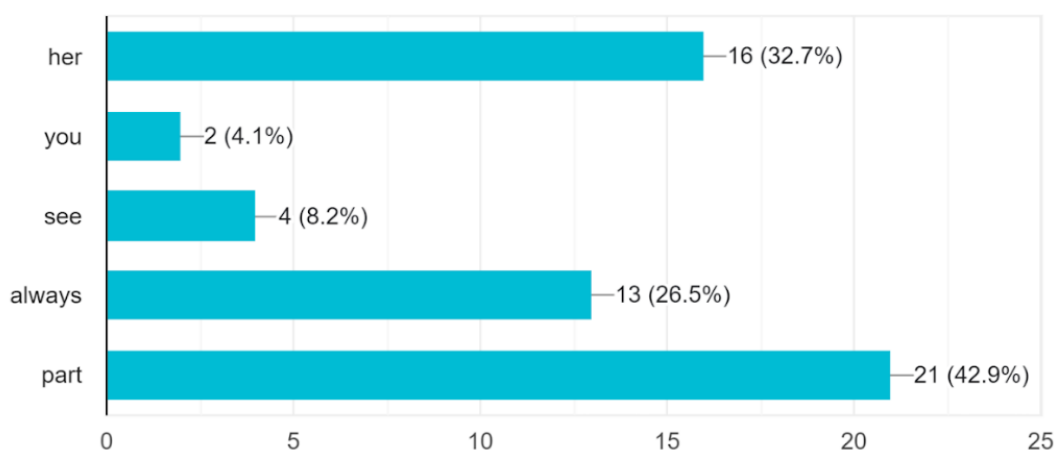


Table 16 Long vowels 2

Similarly, in question 4, five choices were given as follows: her, you, see, always and part. As shown in Table 16, 42.9% of the participants reported that /ɑ:/ in *part* most frequently. The second most frequently selected sound was /ɜ:/ in *her* at 32.7% followed by /ɔ:/ in *always* with 26.5% of the participants. In contrast, /u:/ in *you* was the least common at 4.1%.

These results above suggest that more than 40% of the participants tended to find /ɜ:/ and /ɑ:/ particularly difficult among long vowels. Next three tables show the results for diphthongs: /eɪ, aɪ, ɔɪ, əʊ, aʊ, ɪə, eə, ʊə/.

5. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか。 You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に回答してください。

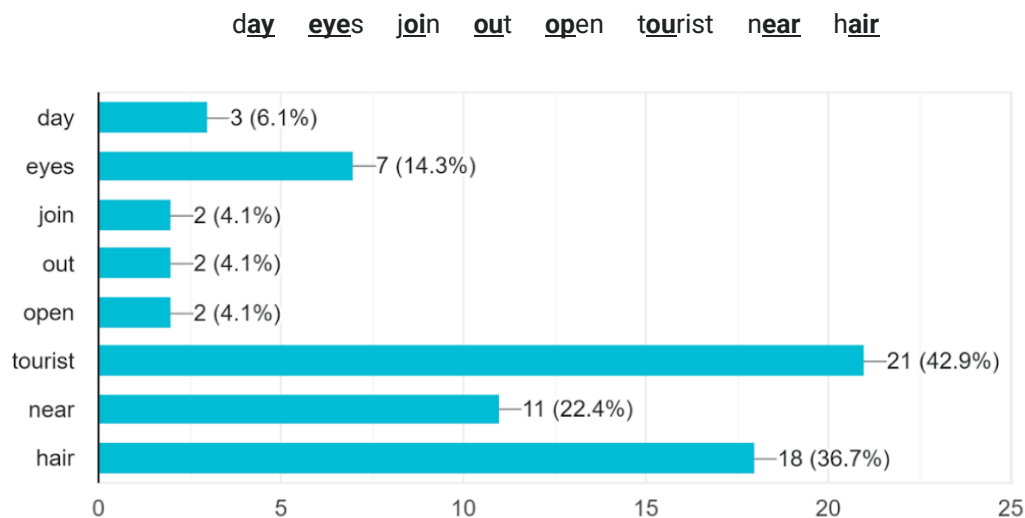


Table 17 Diphthongs 1

In question 5, eight choices were given as follows: day, eyes, join, out, open, tourist, near and hair. As Table 17 shows, 42.9% of participants chose /ʊə/ in *tourist* most frequently. The second most frequently selected sound was /eə/ in *hair* at 36.7% followed by /ɪə/ in *near* with 22.4% of the participants. In contrast, /ɔɪ/ in *join*, /aʊ/ in *out* and /əʊ/ in *open* were the least common at 4.1%

respectively. This shows that participants found /ʊə/ was the most difficult to pronounce among eight diphthongs followed by /eə/ in question 5.

6. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか。
。 You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に回答してください。

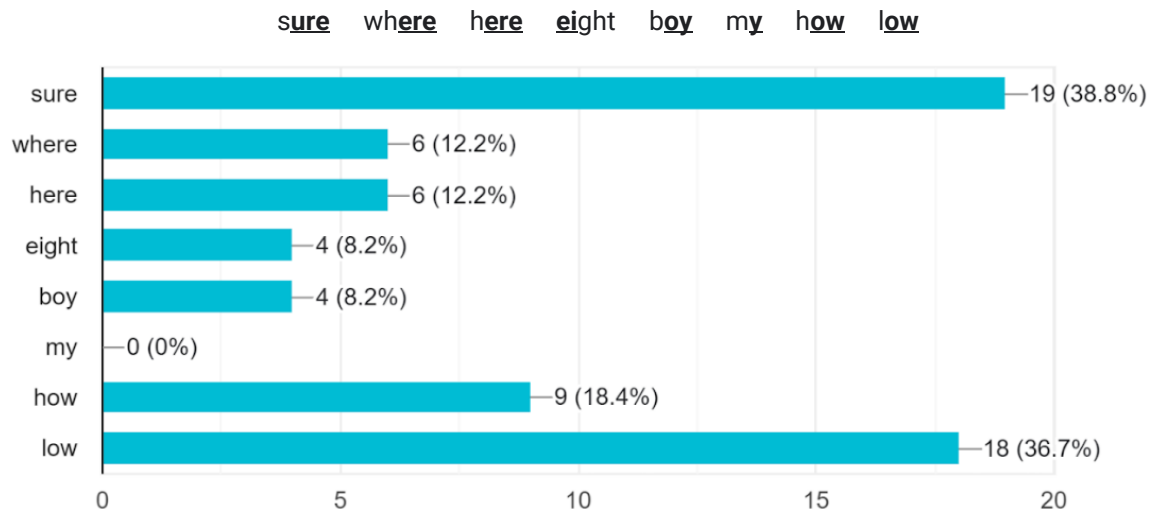


Table 18 Diphthongs 2

In question 6, eight choices were given as follows: **sure**, **where**, **here**, **eight**, **boy**, **my**, **how** and **low**. As shown in Table 18, /ʊə/ in *sure* was selected most frequently at 38.8% followed by /əʊ/ in *low* with 36.7% of the participants. In contrast, no one chose /aɪ/ in *my*, and /eɪ/ in *eight* and /ɔɪ/ in *boy* were the second least common at 8.2% respectively. Similarly to question 5, this indicates that participants found /ʊə/ the most difficult diphthong to pronounce, followed by /eə/. However, the percentages were close, with /ʊə/ at 38.8% and /eə/ at 36.7%.

7. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか。
。 You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に回答してください。

shoulder **fear** **toy** **care** pine gown pray **poor**

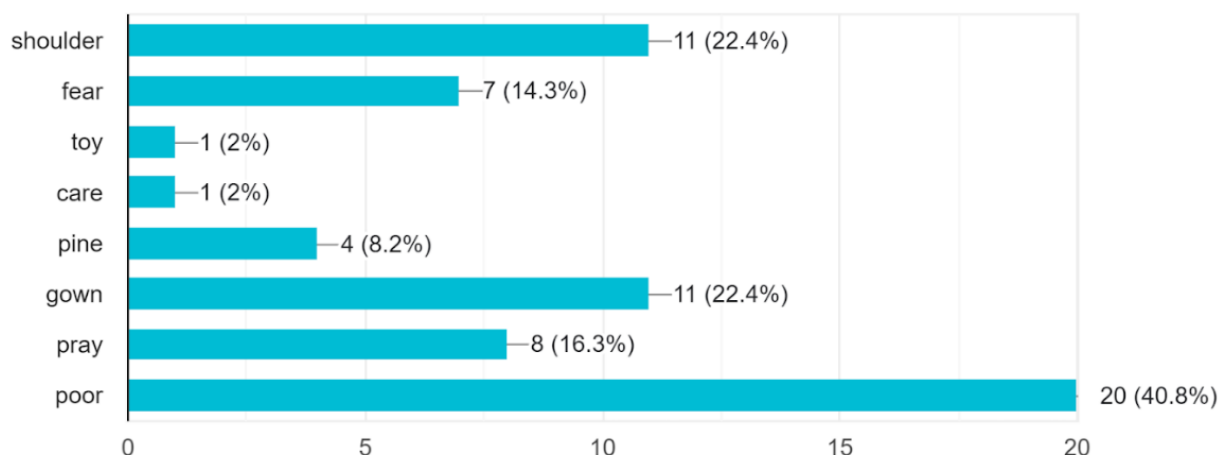


Table 19 Diphthongs 3

Similarly, in question 7, eight choices were given as follows: shoulder, fear, toy, care, pine, gown, pray and poor. As shown in Table 19, 40.8% of the participants reported that /ʊə/ in *poor* most frequently. The second most frequently selected sounds were /əʊ/ in *shoulder* and /aʊ/ in *gown* with 22.4% of the participants respectively. In contrast, /ɔɪ/ in *toy* and /eə/ in *care* were the least common at 2% each.

One common feature found across questions 5 to 7 was that more than 38% of participants chose words containing /ʊə/ as the most difficult sound. Specifically, *tourist* (/tʊərɪst/) was selected by 42.9%, *sure* (/ʃʊə(r)/) by 38.8%, and *poor* (/pʊə(r)/) by 40.8% being the most frequently chosen. This was followed by /eə/ in *hair* and /əʊ/ in *low*, both chosen by the same proportion of participants at 36.7%. Therefore, the data shows that participants find /ʊə/ as well as /eə/ and /əʊ/ especially difficult to pronounce in diphthongs.

4.1.2.2. Opinion on English consonants

Secondly, pronunciation of English, which is considered to be difficult for Japanese learners, is not only related to the above-mentioned vowels, but is also found with consonants. As mentioned in section 2.3, Chapter 2, the significant difference between Japanese and English

pronunciation is that English ends in consonants, while Japanese ends in all vowels, regardless of whether they are nouns or verbs. Question 8 asked for opinions on consonants in word-initial.

[8～12：子音について] 8. Which consonants are difficult for you to pronounce?
 あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可)
 49 responses

The following Table 20 shows the result on question 8.

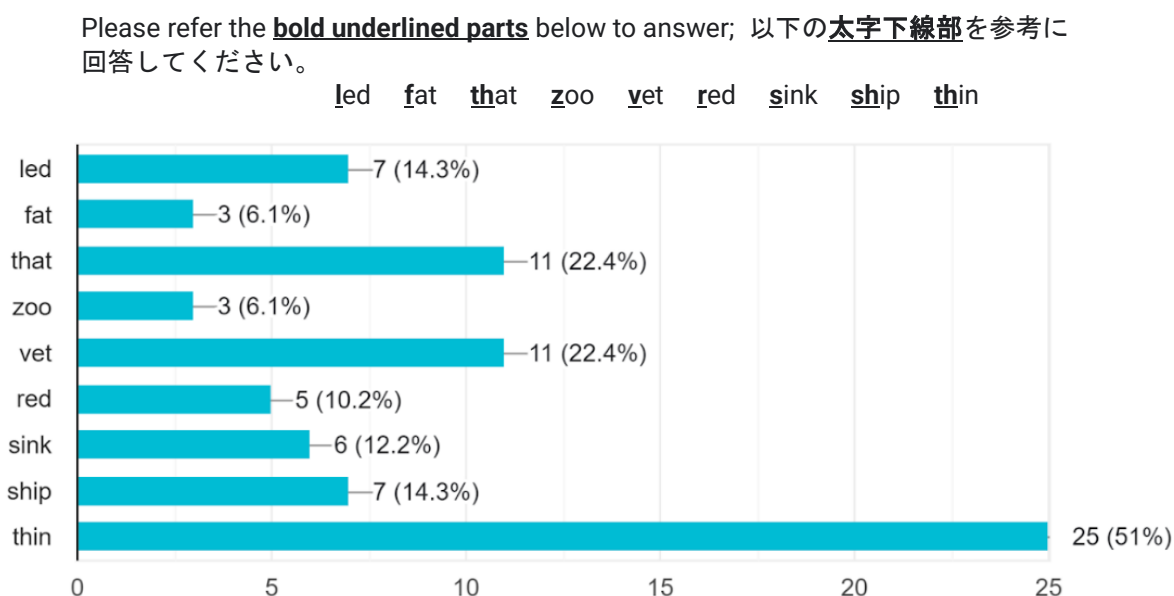


Table 20 Word- initial

In question 8, eight choices at word-initial were given as follows: led, fat, that, zoo, vet, red, sink, ship and thin. As Table 20 shows, 51% of participants chose /θ/ in *thin* at word-initial as difficult to pronounce most frequently. This was followed by /ð/ in *that* and /v/ in *vet* with 22.4% of participants respectively. In contrast, /f/ in *fat* and /z/ in *zoo* were the least common at 6.1%. Next, questions 9 asked for opinions on consonants in word-medial. The following Table 21 shows the result on question 9.

9. Which consonants are difficult for you to pronounce?

あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に

回答してください。

live **swim** **other** **allow** **around** **safe** **author**

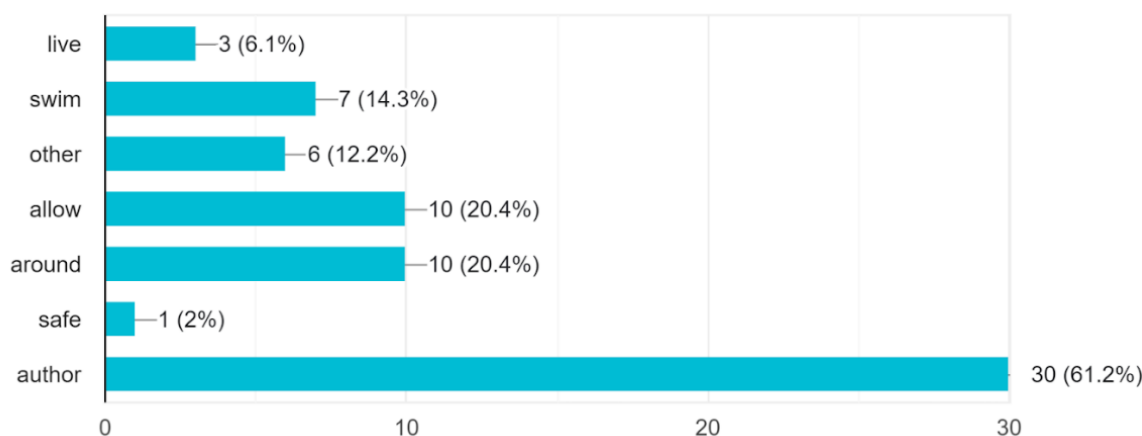


Table 21 Word-medial

In question 9, seven choices at word-medial were given as follows: **live**, **swim**, **other**, **allow**, **around**, **safe** and **author**. As Table 21 shows, 61.2% of participants chose /θ/ in *author* at word-medial most frequently as difficult to pronounce. This was followed by /l/ in *allow* and /r/ in *around* with 20.4% of participants respectively. Meanwhile, /f/ in *safe* was the least common at 2%. Then, question 10 asked for opinions on consonants in word endings. The following Table 22 shows the result on question 10.

10. Which consonants are difficult for you to pronounce?

あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に回答してください。

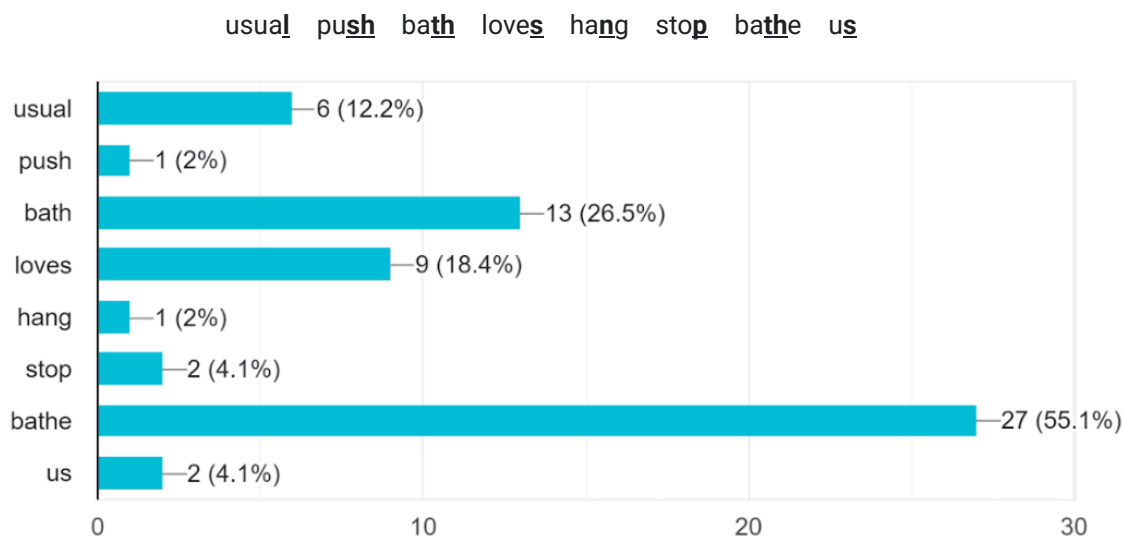


Table 22 Word-ending

In question 10, eight choices at word-ending were given as follows: usuall, pushh, bathh, lovess, hangg, stopp, batheh and uss. As Table 22 shows, 55.1% of participants chose /ð/ in *bathe* at word-ending most frequently as difficult to pronounce. This was followed by /θ/ in *bath* with 26.5% of participants. Whereas /ʃ/ in *push* and /ŋ/ in *hang* were the least common at 2%, and /p/ in *stop* and /s/ in *us* followed at 4.1% respectively.

One common feature found across questions 8 to 10 was that more than 50% of participants chose words containing *th*, no matter whether this appeared at the word-initial, medial or ending. Specifically, /θ/ in *thin* (51%) and *author* (61.2%) at word-initial and medial respectively, and /ð/ in 'bathe' (55.1%) at ending, which corresponds to voiced and voiceless sounds of *th*. Questions 8 and 9 include voiced /ð/ *that* and *other* as options, however, it can be interpreted as a general perception that the voiceless /θ/ is more difficult to pronounce rather than the voiced /ð/. The following two Tables 23 and 24 show the results on questions 11 and 12. The responses were subsequently elicited for randomly mixed pronunciations at word-initial, medial, and ending.

11. Which consonants are difficult for you to pronounce?

あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に

回答してください。

big **around** **general** **side** **key** **go** **age** **week**

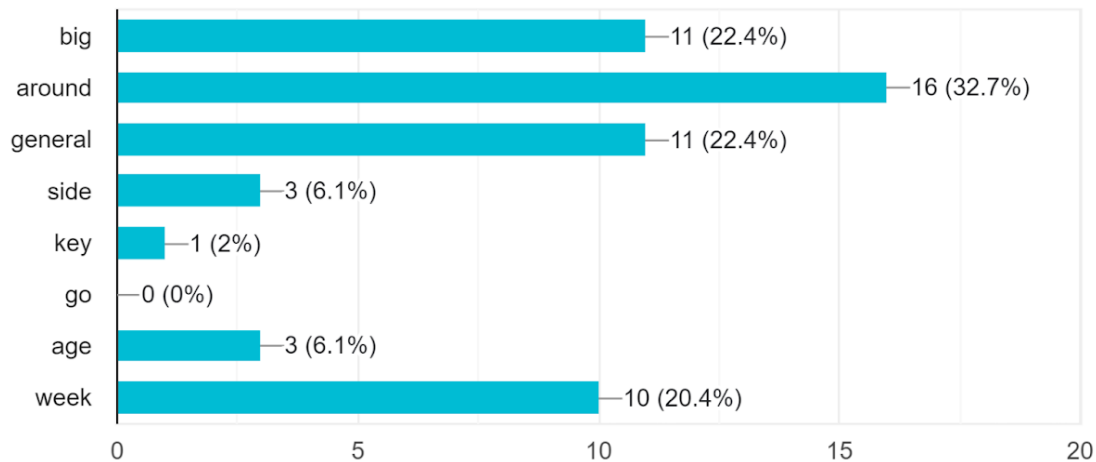


Table 23: Result on question 11

In question 11, eight choices were given as follows: **big**, **around**, **general**, **side**, **key**, **go**, **age**, **week**. As shown in Table 23, 32.7% of participants chose /d/ in *around* at word-ending most frequently as difficult to pronounce. This was followed by /g/ in *big* at word-ending and /ʒ/ in *general* at word-initial with 22.4% of participants respectively. In contrast, no one chose /g/ in *go* at word-initial, and /k/ in *key* at word-initial was the second least common at 2%. However, /k/ in *week* at word-ending was the third most common at 20.4%, interestingly. According to participants' responses, the main reasons for this were as follows: 'Because it needs to be pronounced without putting *u* in /k/.', 'I'm not good at voiceless sounds.', 'I don't know exactly how much to open the mouth.' and 'I don't know how loud to pronounce it at the end of a word'. From the above, it can be seen that the word-ending /k/ is more difficult to pronounce than word-initial /k/. Unlike Japanese, which ends entirely in vowels, English pronunciation, which ends in consonants, can be perceived by these participants to be highly uncertain.

12. Which consonants are difficult for you to pronounce?

あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可)

49 responses

Please refer the **bold underlined parts** below to answer; 以下の**太字下線部**を参考に

回答してください。

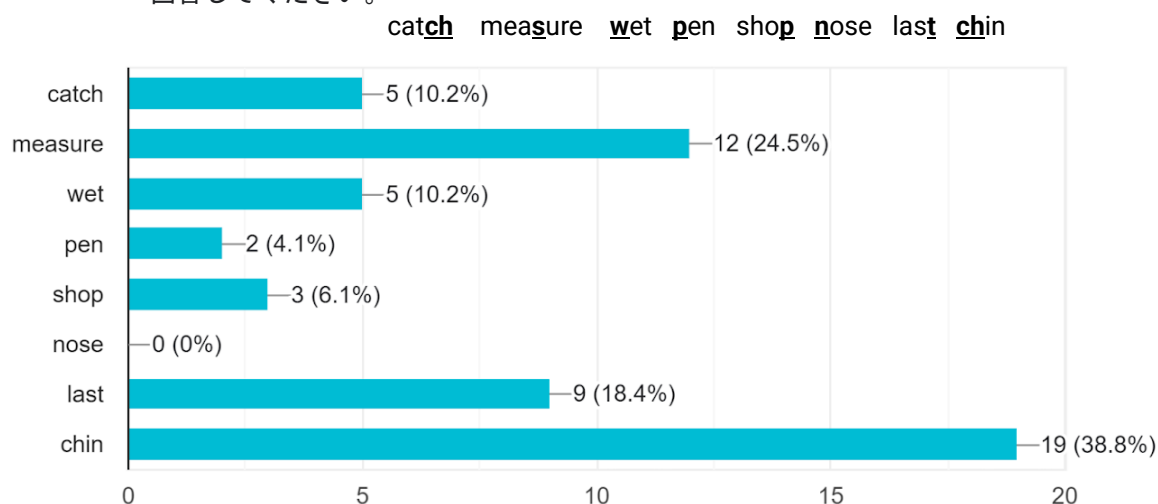


Table 24: Result on question 12

Similarly, in question 12, eight choices were given as follows: **catch**, **mesure**, **wet**, **pen**, **shop**, **nose**, lastt and **chin**. As shown in Table 24, 38.8% of participants chose /tʃ/ in *chin* at word-initial most frequently as difficult to pronounce. This was followed by /ʒ/ in *measure* at word-medial with 24.5% of participants. In contrast, no one chose /n/ in *nose* at word-initial, and /p/ in *pen* at word-initial was the second least common at 4.1%.

Although there were variations in responses to questions 11 and 12, 32.7% of the responses were clustered around /d/ in *around* at word-ending as shown in Table 23, and /tʃ/ in *chin* at word-initial at 38.8% in Table 24 respectively. According to participants' responses, the main reasons for selecting these two sounds were as follows: '/d/ is difficult to pronounce softly at the end of a word. If read as it stands, I would pronounce it as *do* (ド) in *katakana* way.' and '/tʃ/ can be difficult to form the lips and to place the tongue when pronouncing'. One common feature found across questions 11 to 12 was that more than 22% of participants chose words containing

/ʒ/. Specifically, /ʒ/ in *general* at word-initial at 22.4% and *measure* at word-medial with 24.5% respectively. The main reasons for selecting this sound were as follows: ‘It is difficult to pronounce *s* as a voiced sound /ʒ/.’, ‘The pronunciation of /ʒ/ is unfamiliar to me.’ and ‘Because of the complex movements in the mouth’.

The final question 13 asked whether there were any other words or phonemes which were difficult for the participants to pronounce as a Yes/ No question. If *Yes* was selected, they were asked to answer in detail. In this way, opinions about English pronunciation were collected.

4.2.Summary

The questionnaire revealed that Japanese undergraduate students majoring in English found eight vowel phonemes challenging, including /u/, /æ/, /ʌ/, /ɜ:/, /ɑ:/, /ʊə/, /eə/, and /əʊ/. Consonant difficulties included /θ/ in word-initial and word-medial positions, /ð/ in word-final positions, and /tʃ/ in word-initial positions. Voiceless /θ/ was reported as harder to pronounce than voiced /ð/, consistent with Maddieson’s (1984) observation of their rarity in world languages. Even shared phonemes like /tʃ/ posed challenges, reflecting subtle phonological differences between English and Japanese. Despite being English majors with average TOEIC scores for Japanese undergraduate students, participants’ responses highlighted typical pronunciation difficulties for Japanese speakers. These findings emphasise the need to address both perceived and actual difficulties in instruction. Further analysis of recorded speech samples will examine segmental and suprasegmental issues to validate and expand upon these results.

4.3.Analysis of the recording of speech samples

When analysing the speech samples, it was found that both segmental and suprasegmental features were shown to be problematic for participants’ pronunciation with regards to word stress and intonation, and these topics will be addressed in this section.

This section reports on the results obtained from recorded speech samples compiled in Appendix XXX. The recording materials contained 3 sections: 1) a diagnostic word list, 2) short passages, and 3) spontaneous speech. The analysis was divided into two main parts: segmental and suprasegmental features, focusing on important segmental features (vowels and consonants) and suprasegmental features (word stress and intonation). Both parts were checked by two human raters: one Australian associate professor and the primary researcher of this project. Besides, the computer software for speech analysis introduced in Chapter 3-7.2, Praat (Boersma & Weenink, 2024) analysed the prominent part of the suprasegmental features as well as the two human raters rated on intelligibility. The following tables show how the participants pronounced each word, which was transcribed according to IPA, with the phonetic symbols for each word listed in received pronunciation (RP) and General American (GA) following Hewings (2007: 192) and Oxford Learner's Dictionaries (Oxford University Press, 2024).

In terms of the results of segmental features displayed for the diagnostic word list, phonetic symbols in bold show that participants' pronunciations differed from RP/GA. As the focus here was on the target vowels and consonants, only words that differed from the RP and GA pronunciations in the focused sounds were changed to bold. Regarding the words to the left side of the tables, focused parts were indicated in red.

As for the results of suprasegmental features, figures drawn by Praat were displayed for each item. The following sections will explore the characteristics of each part of the three recording conditions and discuss the prominent aspects and trends of the participants' difficulties.

4.3.1. Diagnostic word list: vowels

This section will introduce the minimal pairs, short and long vowels, and diphthongs. This section will focus on aspects which particularly stood out from the analysis.

4.3.1.1.Minimal pairs

There were 14 minimal pairs to read such as *sport* and *spot*. By listening to the recording, 3 minimal pairs were found to be particularly difficult for 11 participants to pronounce. They are the following:

Minimal Pairs	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
heard hard	/hɜ:d/ /hɑ:d/	/hɜ:rd/ /hɑ:rd/	/hɜ:t/ /hɑ:rd/	/hɜ:rd/ /hɑ:rd/	/hɜ:t/ /hɑ:t/	/hɪrt/ /hɑ:t/	/hɑ:rd/ /hɑ:rd/	/hɑ:rd/ /hɑ:rd/	/hɜ:rd/ /hɑ:d/	/hɜ:rd/ /hɑ:rd/	/hɜ:rd/ /hɑ:rd/	/hɪr/ /hɑ:d/	/hɜ:rd/ /hɑ:rd/	/hɪrd/ /hɑ:d/	/hɜ:rd/ /hɑ:rd/	/hɜ:rt/ /hɜ:r/
heart hat	/hɑ:t/ /hæt/	/hɑ:rt/ /hæt/	/hɜ:rt/ /hæt/	/hɜ:rt/ /hæt/	/hɜ:rt/ /hæt/	/hɜ:rt/ /hat/	/hɑ:rt/ /hæt/	/hɑ:rt/ /hæt/	/hɑ:t/ /hat/	/hɑ:rt/ /hæt/	/hɑ:rt/ /hæt/	/hɑ:t/ /hat/	/hɑ:rt/ /hæt/	/hɜ:rt/ /hæt/	/hɑ:rt/ /hat/	/hɜ:rt/ /hɑ:t/
man men	/mæn/ /men/	/mæn/ /men/	/mæn/ /men/	/men/ /men/	/mʌn/ /mʌn/	/mʌn/ /mʌn/	/men/ /mæn/	/mæn/ /men/	/man/ /men/	/mæn/ /men/	/mæn/ /men/	/mʌn/ /mæn/	/mæn/ /men/	/man/ /men/	/man/ /men/	/mæn/ /men/

Table 25: Result of vowels (minimal pairs)

According to the results, two issues were prevalent. Firstly, looking at the first two pairs, *heard/hard* and *heart/hat*, it was observed that in *heard/hard*, it was difficult for 6 of 14 participants to differentiate between /ɜ:/ and /ɑ:/. More specifically, the vowel part /ɜ:/ in *heard* was replaced by /ɑ:/ or /ɪr/. Also, in the vowel part /ɑ:/ in *hard*, one participant pronounced it as /ɜ:/. Next, in *heart/hat*, 6 out of 14 participants pronounced /ɑ:/ as /ɜ:/ for *heart*, and like the minimal pair discussed above, there were also problems here in differentiating between /ɜ:/ and /ɑ:/. Secondly, looking at the third pair in Table 1, *man/men*, it was observed that 9 out of 14 participants had difficulty with differentiating between the sounds of the singular form *man* and the plural form *men*. To elaborate, /æ/ in *man* (/mæn/) was pronounced with /e/, /ʌ/ or /ɒ (ɑ)/, and /e/ in *men* (/men/) was pronounced with /ʌ/ or /æ/. In particular, participants (C, D, E and J) were unable to differentiate this minimal pair. Among them, participants C and D pronounced both *man/men* as /men/. In summary, the result shows that the short vowels /æ/ and /e/, and the long vowels /ɜ:/ and /ɑ:/ were more likely to cause difficulties in distinguishing among the vowel minimal pairs.

4.3.1.2. Word list

As can be seen in appendix 1, there were 44 words to read in total: 18 words for short vowels, 10 words for long vowels and 16 words for diphthongs. The next three sections present the results for short vowels, long vowels, and diphthongs respectively.

4.3.1.2.1. Short vowels

There were 18 words including 9 short vowels analysed. By listening to the recording, 3 phonemes were found to be particularly difficult for 6 participants to pronounce. They are the followings:

Short Vowels	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
a pple	/æp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/	/ʼæp/
u p	/ʌp/	/ʌp/	/æp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/
infl u ence	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnfl əns/	/ʼɪnfə ns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnfu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/	/ʼɪnflu əns/

Table 26: Result of short vowels

Based on this result, two issues were discovered. Firstly, looking at the first two words, *apple* and *up*, it was observed that it was difficult for 4 out of 14 participants to differentiate between /æ/ and /ʌ/. More specifically, while the vowel part /æ/ in *apple* was replaced by /ʌ/, /ʌ/ in *up* was pronounced as /æ/ by 1 participant. In particular, participants (A, H, J and N) were unable to differentiate between these two words. Among them, participant A pronounced both *apple* and *up* as /æ/, while participants (H, J and N) pronounced them as /ʌ/. During the analysis it seemed that the participants were uncertain about the sound of these /æ/ and /ʌ/ and pronounced the words incorrectly. As was outlined in Chapter 2, it is not easy for Japanese speakers to determine precisely how these short vowels are pronounced. This is because there is only one 'a' sound in Japanese, whereas there are four 'a' sounds in English. Secondly, looking at the third word, *influence*, in Table 2, it was observed that 3 out of 14 participants had difficulty with pronouncing

the target short vowel, /u/. To elaborate, participant B dropped /u/ and pronounced /'ɪnfləns/, participant C skipped /u/ and pronounced /'ɪnfəns/, and participant J pronounced /'ɪnfuəns/. In summary, the result shows that the short vowels /æ/, /ʌ/ and /u/ were most likely to cause difficulties.

4.3.1.2.2. Long vowels

There were 10 words which included 5 long vowels that were analysed. By listening to the recording, 2 phonemes were found to be particularly difficult for 11 participants to pronounce. They are the following:

Long Vowels	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
saw	/sɔ:/	/sɔ:/	/sɑ:ʊ/	/səʊ/	/sɔ:/	/sɔ:/	/sɔ:ʊ/	/səʊ/	/sɔ:ʊ/	/səʊ/	/səʊ/	/səʊ/	/sɔ:/	/səʊ/	/səʊ/	/səʊ/
her	/hɜ:/	/hɜ:r/	/hɑ:/	/hɜ:r/	/hɜ:/	/hɜ:/	/hɜ:/	/hɜ:r/	/hɜ:/	/hɜ:r/	/hɜ:r/	/hɑ:r/	/hɜ:r/	/hɜ:r/	/hɜ:r/	/hɜ:/
early	/'ɜ:li/	/'ɜ:rlɪ/	/ɑ:li/	/'ɜ:li/	/'ɜ:li/	/'ɜ:li/	/'ɜ:rlɪ/	/'ɜ:rlɪ/	/'ɜ:li/	/'ɜ:rlɪ/	/ɑ:li/	/ɑ:li/	/'ɜ:rlɪ/	/'ɜ:rlɪ/	/'ɜ:rlɪ/	/'ɜ:li/

Table 27: Result of long vowels

According to the result, the mispronunciation of *saw*, the first word in Table 27, was particularly prevalent. It was observed that *saw* (/sɔ:/) was pronounced rather differently by 11 out of 14 participants compared to RP and GA. Specifically, 8 participants pronounced the vowel part /ɔ:/ in *saw*, which was replaced by /əʊ/ just like as spelt. Similarly, participant A pronounced it as /sɑ:ʊ/, which was heard just like as spelt, but as an extra-long vowel. Moreover, participants E and G pronounced it as /sɔ:ʊ/, which was quite close to RP and GA, but added /ʊ/ at the end of the word. Next, looking at the second and the third words, *her* and *early*, it was observed that 3 out of 14 participants had difficulty with pronouncing the target long vowel, /ɜ:/ as in the result of minimal pairs. To elaborate, participants (A, I and J) pronounced *early* (/ʔɜ:li/) as /ɑ:li/ as in stretching the 'a' sound in Japanese. In particular, participants A and J pronounced both *her* and *early* as /hɑ:(r)/ and /ɑ:li/. In summary, the result shows that there was a tendency to pronounce

word-ending with /ʊ/ for *saw*, and /ɔ:/ and /ɜ:/ were more likely to cause difficulties among long vowels.

4.3.1.2.3. Diphthongs

There were 16 words including 8 RP and 5 GA diphthongs analysed. By listening to the recording, 2 phonemes were found to be particularly difficult for 7 participants to pronounce.

They are the following:

Diphthongs	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
open	/əʊpən/	/əʊpən/	/ɔ:ʊpən/	/ɔ:peɪn/	/əʊpən/	/ɔ:pən/	/əʊpən/	/əʊpən/	/əʊpən/	/əʊpən/	/ɔ:pən/	/ɔ:pən/	/ɔ:pən/	/əʊpən/	/əʊpən/	/ɔ:pən/
tourist	/ˈtʊərɪst/ /ˈtɔ:rist/ t/	/ˈtʊrɪst/ t/	/ˈtu:rist/ st/	/ˈtu:rist/ st/	/ˈtɔ:rist/ st/	/ˈtʊrɪst/ st/	/ˈtʊrɪst/ t/	/ˈtʊrɪst/ t/	/ˈtɔ:rist/ st/	/ˈtʊrɪst/ t/	/ˈtʊrɪst/ st/	/ˈtʊrɪst/ st/	/ˈtʊrɪst/ st/	/ˈtʊrɪst/ t/	/ˈtʊrɪst/ st/	/ˈtʊrɪst/ st/

Table 28: Result of diphthongs

Based on this result, two issues were discovered. Firstly, for the word *open*, 6 out of 14 participants pronounced it as /ɔ:pən/, while participant A pronounced it as /ɔ:ʊpən/ instead of the correct /əʊpən/. Specifically, among the 6 participants, the vowel 'o' was pronounced as a long vowel /ɔ:/, similar to the elongated 'o' sound in Japanese, while participant A added /ʊ/ after the long vowel /ɔ:/. Secondly, looking at the second word, *tourist*, 10 out of 14 participants pronounced the target diphthong /ʊə/ in GA way, /ʊ/ as a short vowel, and 2 participants pronounced it as /ɔ:/ as a long vowel. However, the rest of the 2 participants pronounced as /ˈtu:rist/ just like katakana English reading of Japanese. In detail, this is most likely because *tourist* exists as a loanword in the Japanese language (Bada, 2001). In summary, the result shows that a diphthong /əʊ/ was difficult to pronounce and /ʊə/ tended to be pronounced with a short vowel /ʊ/ or a long vowel /ɔ:/. This is because these two words already exist as katakana words in Japanese, which may suggest L1 interference.

4.3.2. Diagnostic word list: consonants

In this section, there are 2 parts: minimal pairs and a word list of consonants. This section will focus on aspects which were particularly striking from the analysis.

4.3.2.1. Minimal pairs

There were 10 minimal pairs to read. As in appendix 1, minimal pairs 1-8 (*play-pray*, *fly-fry*, *grass-glass*, *clown-crown*, *praise-plays*, *blue-brew*, *flame-frame*, *fresh-flesh*) primarily focused on /l/ and /r/ distinctions known as the English and Japanese liquids (Chapter 2), while the remaining two pairs, *berry-very* and *sink-think* dealt in particular with distinctions of /b/ and /v/, and /s/ and /θ/ respectively. By listening to the recording, 6 minimal pairs were found to be particularly difficult for 9 participants to pronounce. According to the focused phonemes, 4 pairs in Table 29 and the remaining 2 pairs were summarised in Table 30.

Minimal Pairs	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
p lay r ay	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/preɪ/ /pleɪ/	/pleɪ/ /pleɪ/	/pleɪ/ /pleɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/	/preɪ/ /pleɪ/	/pleɪ/ /preɪ/	/pleɪ/ /preɪ/
p raise p lays	/preɪz/ /pleɪz/	/preɪz/ /pleɪz/	/praɪz/ /pleɪz/	/preɪz/ /pleɪz/	/praɪz/ /pleɪz/	/pleɪz/ /pleɪz/	/pleɪz/ /pleɪz/	/preɪz/ /pleɪz/	/pleɪz/ /pleɪz/	/plaɪz/ /pleɪz/	/praɪz/ /pleɪz/	/praɪz/ /pleɪz/	/preɪz/ /pleɪz/	/preɪz/ /pleɪz/	/preɪz/ /pleɪz/	/praɪz/ /pleɪz/
f lame f rame	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/fleɪm/ /feɪm/	/fleɪm/ /freɪm/	/fleɪ/ /freɪ/	/fleɪm/ /fleɪm/	/fleɪm/ /fleɪm/	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/fleɪm/ /freɪm/	/freɪ/ /freɪ/
b lue b rew	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bləʊ/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bluː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/	/bluː/ /bruː/

Table 29: Result of consonants - minimal pairs 1

According to the result, two issues emerged here. Firstly, looking at the 4 pairs in Table 29, it was observed that it was difficult for 8 of 14 participants to differentiate between /l/ and /r/. In particular, participants D and E pronounced all the /r/ sounds as /l/ among the first 3 pairs. Secondly, the pronunciation of *brew* in the fourth minimal pair was noticeably unique. It was uttered in roman characters as *buryu*, ‘ブリ ュー’ in katakana script and 7 participants (C, E, I, J, L, M and N) pronounced the word in this way as indicated in blue. It is interesting to note that

these 7 were able to pronounce /r/ but pronounced the word as a whole as if it were katakana English reading of Japanese.

Minimal Pairs	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
berry	/ˈberi/	/ˈberi/	/ˈberi/	/ˈberi/	/ˈberi/	/ˈbeli/	/ˈbewi:/	/ˈberi/	/ˈbeli/	/ˈberi/	/ˈberi/	/ˈberi/	/ˈberi/	/ˈbeli/	/ˈberi/	/ˈveri/
very	/ˈveri/	/ˈveri/	/ˈveri/	/ˈveri/	/ˈveri/	/ˈbeli/	/ˈbewi:/	/ˈberi/	/ˈveri/	/ˈveri/	/ˈveri/	/ˈveri/	/ˈveri/	/ˈveli/	/ˈveri/	/ˈveli/
sink	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/θɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/
think	/θɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/	/sɪŋk/	/sɪŋk/	/sɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/	/θɪŋk/

Table 30: Result of consonants - minimal pairs 2

This paragraph continues with a report on the use of /b/ and /v/, and /s/ and /θ/ including /l/ and /r/. Based on the result, 4 of 14 participants had difficulty in distinguishing between plosive /b/ and fricative /v/ sounds. In particular, participants (D, E and F) pronounced /b/ at the beginning of both words, *berry-very*, and conversely, participant N pronounced /v/ at the beginning of both words. As reported by Kitao (1995b), it seemed to be more difficult for the above participants to pronounce /v/ than /b/ because /v/ is an absent phoneme in Japanese (Ohata, 2004). Furthermore, 5 participants, including participants (D, E and N), also encountered difficulties in distinguishing between the use of /l/ and /r/ in addition to the use of /b/ and /v/. Moreover, participant E even pronounced /r/ as /w/. Next, 4 out of 14 participants had difficulty in distinguishing between /s/ and /θ/. To elaborate, participants (D, E and F) pronounced both words, *sink-think* as /sɪŋk/, whereas participant G pronounced them as /θɪŋk/.

In summary, the result further affirms that literature on Japanese ESL learners difficulties with pronouncing /l/ and /r/ were more likely to cause difficulties (Celce-Murcia, et al., 1996; Goto, 1971; Kenworthy, 1987; Lambacher, 1999; Matsusaka, 1991; Okada, 1999; Pennington, 2014; Riney, et al., 2000), and fricatives /v/ and /θ/ were also likely to cause difficulties (Kimura, 2022; Kitao, 1995b) to distinguish among the consonant minimal pairs, thus showing that similar problems are still present with Japanese learners of English in 2024, and that further work needs to be done to address these pronunciation mistakes in the future.

4.3.2.2. Word list

Appendix shows that there were 47 words including 24 consonants analysed. By listening to the recording, 10 words including the following 7 consonant phonemes: /l, r, θ, ð, d, m, ʃ/ were found to be particularly difficult for 10 participants to pronounce. According to the focused phonemes, the following Tables 31 to 33 provide a summary of the results:

	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
red	/red/	/red/	/rɛd/	/red/	/led/	/led/	/led/	/red/	/red/	/red/	/red/	/red/	/red/	/led/	/red/	/red/
around	/ə'raʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'raʊnd/
general	/ˈdʒenrəl/	/ˈdʒenrəl/	/ˈdʒenləl/	/ˈdʒenrəl/	/ˈdʒenləl/	/ˈdʒenrəl/	/ˈdʒenrəl/	/ˈdʒenrəl/	/ˈdʒenləl/	/ˈdʒenrəl/	/ˈdʒenrəl/	/ˈdʒenləl/	/ˈdʒenrəl/	/ˈdʒenləl/	/ˈdʒenləl/	/ˈdʒenrəl/

Table 31: Result of consonants 1

As illustrated in the previous section, the English and Japanese liquids, /l/ and /r/ issues would also be addressed briefly here. According to the result, it was observed that 8 out of 14 participants pronounced /r/ as /l/, sounding like something between the English /l/ and /r/, which is the postalveolar consonant /ɭ/ (Matsusaka, 1994:59), among the words in Table 31: *red*, *around* and *general*. In particular, participants (A, C and L) pronounced all the /r/ sounds as /l/ among these three words. Thus, it indicates that these 3 participants have difficulties, particularly in pronouncing the liquids /l/ and /r/ which sounds obviously like typical Japanese pronunciation.

	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
thin	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/sɪn/	/sɪn/	/θɪn/	/θɪn/	/sɪn/	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/tɪn/
bath	/bɑːθ/	/bæθ/	/bæθ/	/bæθ/	/bæ/	/beɪs/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæ/
that	/ðæt/	/ðæt/	/ðæt/	/ðæt/	/zæt/	/zæt/	/dæts/	/ðæt/	/ðæt/	/ðæt/	/ðæt/	/zæt/	/ðæt/	/ðæt/	/ðæt/	/ðæt/
other	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/	/ˈʌðər/

Table 32: Result of consonants 2

This paragraph continues with reports on dental fricatives, voiceless /θ/ and voiced /ð/, which are known as universally difficult phonemes (Maddieson, 1984 in Chapter 2). Based on the results, 7 out of 14 participants had difficulty in pronouncing /θ/ and/or /ð/ sounds among the first 3 words in Table 8: *thin*, *bath* and *that*. First, to elaborate the voiceless /θ/, participants (C, D and G) pronounced *thin* as /sm/, and participant N did as /tɪn/. Also, as for *bath*, participants D and F pronounced at the end of the word in /s/, and participants C and N dropped the sound at word-ending and pronounced as /bæ/. Second, in terms of the voiced /ð/, participants (C, D and J) pronounced *that* as /zæt/, and participant E did as /dæts/. However, looking at the fourth word, *other* in Table 32, it was observed that there was no issue for all the participants to pronounce /ð/ in the middle of the word compared to *that* in the word-initial of /ð/.

	RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
side	/saɪd/	/saɪd/	/saɪz/	/saɪd/	/saɪd/	/saɪd/	/saɪ/	/saɪd/	/saɪd/	/saɪz/	/saɪd/	/saɪd/	/saɪd/	/saɪd/	/saɪd/	/saɪd/
swim	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪ/	/swɪn/	/swɪn/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪn/
ship	/ʃɪp/	/ʃɪp/	/ʃɪp/	/ʃɪp/	/sɪp/	/sɪp/	/sɪp/	/ʃɪp/	/sɪp/	/ʃɪp/	/ʃɪp/	/ʃɪp/	/ʃɪp/	/sɪp/	/ʃɪp/	/sɪp/

Table 33: Result of consonants 3

Moreover, this paragraph continues with a report on the word-ending /d/ and /m/, and the use of /ʃ/ at word-initial. Based on the result, 6 out of 14 participants had difficulty in pronouncing /d/ and/or /m/ sounds at word-ending between the first two words in Table 33: *side* and *swim*. To elaborate, participants A and H pronounced *side* as /saɪz/ sounding like *size*, and participant E did as /saɪ/ like *sigh*. As for *swim*, participants (D, E and N) pronounced at the end of the word in /n/, and participant C dropped the sound at word-ending and pronounced as /swɪ/. In particular, it was observed that it was difficult for participant E to pronounce these two word-endings. In terms of the use of /ʃ/ at word-initial, 6 out of 14 participants pronounced *ship* as /sɪp/ sounding like *sip*. It is believed that this is because some phonemes can be pronounced differently by some

Japanese speakers and as a result of compromise there are many marked allophones (Ohata, 2004; Wells, 1999) as in Chapter 2.

In summary, as was evident with the minimal pairs, the wordlist also identified issues with /l/ and /r/, as well as a tendency to replace /θ/ with /s/. In addition, /ð/ was substituted with /z/, and the word-endings /d/ and /m/, as well as the word-initial /ʃ/, were not pronounced correctly, resulting in words that sounded different from the intended words. Therefore, the eight consonant phonemes: /l, r, θ, ð, d, m, ʃ, v/ have been highlighted in the wordlist, along with their problems in this section. It should be noted that although Chapter 3.5.4. mentioned that the four phonemes /b, h, j and m/ were excluded from the questions in the questionnaire because they were deemed not to be difficult for Japanese speakers to pronounce (Kimura, 2022; Kitao, 1995b), the issue of /m/ at the word-ending appeared in this study. The following section will explore the issues of each passage and discuss the prominent aspects and trends of the participants' difficulties.

4.3.3. Short passages

In this section, four types of passages were analysed: 1) spoken, 2) narrative, 3) diary-style, and 4) children's book. This analysis was based on the results of the questionnaire and the word list as the focus of the analysis. Appendix XXX shows that there were 74 words including 10 vowels and 9 consonants analysed; short vowels were /u, æ, ʌ, e/, long vowels were /ɜ:, ɑ:, ɔ:/, diphthongs were /ʊə, eə, əʊ/, and consonants were /l, r, θ, ð, d, m, ʃ, tʃ, v/. This section will focus on aspects which were particularly striking from the analysis.

4.3.3.1. Passage 1 My favourite thing to do

There were 19 words to be focused on and analysed in this passage. By listening to the recording, 4 consonant phonemes: /θ, r, ð, v/ were found to be particularly difficult for 10

participants to pronounce, and /m/ was found to be a minor one. The following Table 34 provides a summary of the results:

	Focused Words	RP	GA	Phonetic Symbols	Positions	No. Ss	Findings
1	th ings	/θɪŋz/		θ	word-initial	7	pronounced in /s/ or /t/
2	r ods	/rɒdz/	/rɑːdz/	r	word-initial	6	pronounced in /l/
3	togeth er	/təˈgeðə(r)/	/təˈgeðər/	ð	word-medial	5	pronounced in /z/ or /d/
3	r olls	/rəʊlz/		r	word-initial	5	pronounced in /l/
5	fav ourite	/'feɪvərɪt/		v	word-medial	5	pronounced in /b/
6	th e	/ðə/		ð	word-initial	4	pronounced in /z/ or /d/
7	Th ere's	/ðeəz/	/ðerz/	ð	word-initial	3	pronounced in /z/ or /d/
7	th ere	/ðeə(r)/	/ðer/	ð	word-initial	3	pronounced in /z/ or /d/
9	b read	/bred/		r	word-medial	2	pronounced in /l/
10	bre am	/bri:m/		m	word-ending	1	dropped /m/
10	h am	/hæm/		m	word-ending	1	added /u/ after /m/

Table 34: Result of Passage 1

First, the table above showed that 7 out of 14 participants pronounced /θ/ at word-initial either as /s/ or /t/ in *things* in Table 34. In particular, 5 participants (C, D, E, H and L) pronounced /θ/ as /s/ among these 7 participants. The other 2 participants, G and J, pronounced /θ/ as /t/.

Second, 6 out of 14 participants had difficulty in pronouncing /r/ at word-initial in *rods*. To elaborate, all the 6 participants (A, D, G, I, L and N) pronounced /r/ as /l/, sounding like *loads*. This was also the case with 3) *rolls* and 9) *bread*, at word-initial or word-medial as shown in Table 34. Moreover, this issue at word-initial was found more frequently than word-medial, with 4 participants (A, G, I and L) commonly pronouncing /r/ as /l/ for both *rods* and *rolls*.

Third, 5 out of 14 participants pronounced /ð/ at word-medial in *together* either as /d/ or /z/. In particular, 3 of them (D, E and J) pronounced /ð/ in /d/, and the remaining participants (C and G) did in /z/. This was also the case with *the*, *There's* and *there*, at word-initial as shown in

Table 10. It was observed that there were three participants (C, D and E) who had difficulty with all of the four words containing this phoneme /ð/.

Fourth, 5 of 14 participants had difficulty in pronouncing /v/ at word-medial in *favourite*. To elaborate, all the 5 participants (C, D, E, L and N) similarly pronounced /v/ as /b/.

Finally, regarding /m/ as a minor one, participant C pronounced *bream* as /bri:/, dropping the /m/ sound at the end of the word, sounding like a type of cheese. Besides, participant D pronounced *ham* as /hæmu/, adding /u/ sound at the end of the word and pronounced it as Katakana English word ‘ハム’ (*hamu*).

In summary, four major problematic phonemes /θ, r, ð, v/ and word-ending minor phoneme /m/ respectively have been discussed along with related issues. The results showed that a fricative /θ/ was/ the most common problem in Passage 1, and it tended to be pronounced either as /s/ or /t/. In this section, the issues were solely about consonants rather than vowels.

4.3.3.2. Passage 2 The North Wind and the Sun

There were 19 words to be focused and analysed in this passage. By listening to the recording, 6 phonemes (2 vowels: /əʊ, ɔ:/ and 4 consonants: /θ, ð, v, r/) were found to be particularly difficult for 14 participants to pronounce. The following Table 35 provides a summary of the results:

	Focused Words	RP	GA	Phonetic Symbols	Positions	No. Ss	Findings
1	f old	/fəʊld/		əʊ	word-medial	10	pronounced in /ɔ:/ or /ə/
1	w arm	/wɔ:m/	/wɔ:rm/	ɔ:	word-medial	10	pronounced in /ɑ:/
3	cl oak	/kləʊk/		əʊ	word-medial	9	pronounced in /ə/, /ɔ:/ or /oɑ/
4	N orth	/nɔ:θ/	/nɔ:rθ/	θ	word-ending	8	pronounced in /s/
5	T hey	/ðeɪ/		ð	word-initial	6	pronounced in /z/ or /d/
6	trav e ller	/ˈtrævələ(r)/	/ˈtrævələr/	v	word-medial	5	pronounced in /b/
7	w r apped	/ræpt/		r	word-medial	3	pronounced in /l/

Table 35: Result of passage 2

As shown in Table 35, the top 3 issues were related to vowels, either a diphthong /əʊ/ or a long vowel /ɔ:/. First, 10 out of 14 participants pronounced /əʊ/ at word-medial either as /ɔ:/ or /ə/ in *fold*. Specifically, 7 participants (A, B, C, G, J, L and M) pronounced /əʊ/ as a long vowel /ɔ:/ among these particular 10 participants. The rest of the 3 participants (D, I and K) pronounced /əʊ/ as a short vowel /ə/. Similarly, 9 out of 14 participants pronounced /əʊ/ at word-medial either as /ɔ:/, /ə/ or /oʌ/ in *cloak*. In particular, 7 participants (B, C, F, H, I, J and L) pronounced /əʊ/ as a short vowel /ə/ among these 9 participants. The other 2 participants (A and N) pronounced it as /oʌ/ and a long vowel /ɔ:/ respectively. It should be noted that the word *cloak* did not seem to be very familiar to these participants. This was because, according to the researcher's recall, many participants were reading it in a clumsy manner during the recording. Second, 10 out of 14 participants had difficulty in pronouncing /ɔ:/ at word-medial in *warm*. To elaborate, all the 10 participants (A, C, D, F, H, I, J, L, M and N) pronounced /ɔ:/ as /ɑ:/, which is a typical mispronunciation by some Japanese learners of English to read words in roman characters as spelt. These were the results for the top three vowels.

Next, this section continues with fricatives /θ, ð, v/ as well as alveolar fricative /r/. First, 8 out of 14 participants pronounced the dental fricative /θ/ at word-ending in *North* as /s/. In particular, participants (A, C, D, E, G, J, L and N) pronounced it in such a way, sounding like *Norse*, the Norwegian language in the Scandinavian language group. Similarly, another dental fricative /ð/ at word-initial in *They* was pronounced either in /z/ or /d/ by 6 participants. To elaborate, 4 participants (C, D, F and N) pronounced it in /z/, and the rest of the 2 participants (E and J) pronounced it in /d/, sounding like *day*.

Second, 5 out of 14 participants had difficulty in pronouncing /v/ at word-medial in *traveller*. Again, all the 5 participants (A, C, D, E and L) similarly pronounced /v/ as /b/ as shown *favourite* in the previous section, passage 1. Finally, regarding the alveolar fricative /r/ at word-medial in *wrapped*, it was pronounced in /l/, sounding like *lapped*.

In summary, based on the above results, it indicates that some participants were unsure of the differences among long vowels /ɔ:/, /ɑ:/ and a diphthong /əʊ/ depending on the spellings. Moreover, the fricatives /θ, ð, v, r/ were challenging phonemes which had also been covered in passage 1.

4.3.3.3. Passage 3 Short diary

There were 18 words to be focused and analysed in this passage. By listening to the recording, 8 phonemes (3 vowels: /əʊ/, /ʌ/, /æ/ and 5 consonants: /v/, /r/, /θ/, /ʃ/, /l/) were found to be particularly difficult for 14 participants to pronounce. The following Table 36 provides a summary of the results:

	Focused Words	RP	GA	Phonetic Symbols	Positions	No. Ss	Findings
1	old	/əʊld/		əʊ	word-initial	14	pronounced in /ɔ:/
2	social	/ˈseʊʃl/		əʊ	word-medial	12	pronounced in /ɔ:/
3	won	/wʌn/		ʌ	word-medial	11	pronounced in /ɔ/
4	active	/ˈæktɪv/		v	word-ending	6	pronounced in /b/ or /m/
5	advantages	/ədˈvɑːntɪdʒɪz/	/ədˈvæntɪdʒɪz/	v	word-medial	5	pronounced in /b/ or /m/
5	husband	/ˈhʌzbənd/		ʌ	word-medial	5	pronounced in /æ/
5	hadn't	/ˈhædnt/		æ	word-medial	5	pronounced in /ɒ (ɑ)/
8	carry	/ˈkæri/		r	word-medial	4	pronounced in /l/
8	thinks	/θɪŋks/		θ	word-initial	4	pronounced in /s/ or /ʃ/
10	championship	/ˈtʃæmpiənʃɪp/		ʃ	word-medial	3	pronounced in /s/
10	playing	/ˈpleɪɪŋ/		l	word-medial	3	pronounced in /r/

Table 36: Result of passage 3

The above results showed that the top 5 issues were mainly related to vowels, which were a diphthong /əʊ/ and short vowels /ʌ, æ/. First, all the 14 participants pronounced /əʊ/ at word-initial as /ɔ:/ in *old* in Table 36. Similarly, 12 out of 14 participants, except A and K, pronounced /əʊ/ at word-medial as /ɔ:/ in *social*.

Second, 11 out of 14 participants had difficulty in pronouncing /ʌ/ at word-medial in *won*. To elaborate, all the 11 participants (A, B, C, D, E, F, I, J, L, M and N) pronounced /ʌ/ as /ɔ/, which was also a typical mispronunciation by some Japanese learners of English to read words in roman characters as spelt such as *warm* in the previous section, passage 2. Similarly, 5 out of 14 participants (A, H, I, L and M) pronounced /ʌ/ at word-medial as /æ/ in *husband*.

Third, 5 of 14 participants (A, C, G, J and N) pronounced /æ/ at word-medial in *hadn't* as /ɒ (ɑ)/. For these two short vowels /ʌ, æ/, it can be assumed that the six participants (A, C, I, J, L and M) did not recognise these phonemes respectively. Especially for participant A, who all mispronounced *won*, *husband* and *hadn't*, it might not be too much to say that she might not be able to distinguish the four phonemes /æ, ʌ, ə, ɒ (ɑ)/, which are peculiar to English language (Chapter 2-3.1. Vowels).

Next, this section continues with 5 consonants: fricatives /θ, v, ʃ/ as well as liquids /r, l/. First, 6 out of the 14 participants at the word-ending in *active*, and 5 of the 14 participants at the word-medial in *advantages* had difficulty in pronouncing /v/. To elaborate, 5 of the 6 participants (C, D, E, J and L), and 4 of 5 participants (C, D, E and J) pronounced /v/ as /b/ in *active* and *advantages* respectively as shown in the previous sections, passage 1 (*favourite*) and 2 (*traveller*). Additionally, participants N and I pronounced /v/ in *active* and *advantages* as /m/, respectively.

Second, regarding liquids /r, l/, 4 of the 14 participants (A, E, G and N) pronounced the alveolar fricative /r/ at word-medial as /l/ in *carry* as indicated in the previous sections, passage 1 (*bread*) and 2 (*wrapped*). Conversely, 3 of the 14 participants, I, J and L pronounced /l/ at the word-medial as /r/ in *playing*, sounding like *praying*.

Third, the dental fricative /θ/ at the word-initial in *thinks* was pronounced either as /s/ or /ʃ/ by 4 participants. Specifically, participants C and N pronounced it as /s/, sounding like *sinks*, and participants D and E pronounced it as /ʃ/.

Finally, regarding the fricative /ʃ/, 3 of the 14 participants (C, D and L) pronounced it at the word-medial as /s/ in *championship*, which was an interesting finding. As Ohata (2004) and

Wells (1999) in Chapter 2 claims, some words which include these consonants can be marked allophones by adapting the phonological rules from their L1 into their L2. This can be described as a similar problem to that of *ship* in Table 33.

In summary, based on the above results, it indicates that some participants were unsure of the differences among short vowels /ʌ, æ/ and a diphthong /əʊ/ depending on the spelling of the word. Besides, the fricatives /θ, v, ʃ/ and the liquids /l/ and /r/ were also challenging in passage 3.

4.3.3.4. Passage 4 The Giving Tree

13 words that were focused on and analysed in this passage. By listening to the recording, 6 phonemes (1 vowel: /æ/ and 5 consonants: /v, ð, d, tʃ, r/) were found to be particularly difficult for 13 participants to pronounce. Table 37 provides a summary of the results:

	Focused Words	RP	GA	Phonetic Symbols	Positions	No. Ss	Findings
1	apples	/'æplz/		æ	word-initial	11	pronounced in /ɒ (ɑ)/
2	very	/'veri/		v	word-initial	7	pronounced in /b/
3	gather	/'gæðə(r)/	/'gæðər/	ð	word-medial	6	pronounced in /z/ or /d/
3	happy	/'hæpi/		æ	word-medial	6	pronounced in /ɒ (ɑ)/
5	tired	/'taɪəd/	/'taɪərd/	d	word-ending	4	dropped /d/
6	loved	/lʌvd/		d	word-ending	3	dropped /d/
6	leaves	/li:vz/		v	word-medial	3	pronounced in /b/
6	branches	/brɑ:ntʃi:z/	/bræntʃi:z/	tʃ	word-medial	3	pronounced in /tsu/ or /tsui/
9	branches	/brɑ:ntʃi:z/	/bræntʃi:z/	r	word-medial	2	pronounced in /l/

Table 37: Result of passage 4

First, the above results showed that 11 of 14 participants, meaning except F, H and K, pronounced /æ/ at the word-initial as /ɒ (ɑ)/ in *apple* as a most frequent issue in Table 37. Similarly, 6 of 14 participants (C, E, G, H, M and N) pronounced /æ/ at word-medial as /ɒ (ɑ)/ in

happy. This issue was briefly introduced in Chapter 2 (3.1. Vowels) as /æ/ is one of the most challenging sounds among /æ/, /ʌ/, /ə/, and /ɒ (ɑ)/ (Higurashi, 2020).

Second, 7 of 14 participants (C, D, E, G, J, L and N) had difficulty in pronouncing /v/, which was the same issue as shown in the previous sections, passage 1 (*favourite*), 2 (*traveller*) and 3 (*active, advantages*). They pronounced /v/ at the word-initial as /b/ in *very*, sounding like *berry*. This was also the case with *leaves* at the word-medial as shown in Table 37. Specifically, 3 of 14 participants (C, D and E) pronounced /v/ as /b/ in both of these words, *very* and *leaves*.

Third, a dental fricative /ð/ at word-medial in *gather* was pronounced either in /z/ or /d/ by 6 participants/, which was the same issue as shown in the previous sections, passage 1 (*together, the, There's, there*) and 2 (*They*) although there was no issue on *other* in Table 32 (4.3.2. Diagnostic word list: consonants). To elaborate, only a participant C pronounced it in /z/, and the rest of the 5 participants (D, E, G, J and L) pronounced it in /d/ in this passage.

Fourth, regarding the word-ending /d/, 4 of 14 participants pronounced *tired* as /'taɪə(r)/, dropping the /d/ sound at the end of the word, sounding like *tire*. Similarly, 3 of 14 participants dropped /d/ at the end of the word and pronounced *loved* as /lʌv/, sounding like *love*. Finally, it is about phonemes /tʃ/ and /r/ in *branches*. 3 of 14 participants (C, D and N) uniquely pronounced the voiceless postalveolar affricate /tʃ/ at word-medial as /tsu/ (ツ) or /tsui/ (ツイ) in *branches*. The aforementioned questionnaire results highlighted the opinions of participants that 38.8% found /tʃ/ difficult to pronounce at word-initial, but it was found that some participants were having difficulty pronouncing it in the word-medial because there was no problem pronouncing /tʃ/ at word-initial in *cheese* (passage 1) and *championship* (passage 3). Besides, 2 of 14 participants (G and J) pronounced the liquid /r/ at word-medial as /l/ in *branches* as indicated in the previous sections, passage 1 (*bread*), 2 (*wrapped*) and 3 (*carry*).

Based on the above, it was the case here again, /æ/ in *apples* was the most challenging phoneme in this passage, and it was claimed as one of the most challenging sounds among /æ/, /ʌ/,

/ə/, and /ɒ (ɑ)/ (Higurashi, 2020). So was /v/ as the second most problematic phoneme here, which was a common problem with all three other passages as well as the liquid /r/ especially at word-initial. A dental fricative /ð/ tended to be pronounced by being replaced by /z/ or /d/, regardless of whether it appeared at the beginning or in the middle of the word.

To sum up, the analysis shows the four vowels: /ʌ, æ, ɔ:, əʊ/ and nine consonant phonemes: /l, r, θ, ð, d, m, v, tʃ, ʃ/ have been highlighted in the four short passages, along with the tendencies and problems in this section. Next, issues of spontaneous speech and a discussion of the prominent aspects and trends of the participants' responses will be addressed.

4.3.4. Spontaneous speech

In this section, 14 spontaneous speech recordings were analysed. There were eight topics provided for all 14 participants to choose from. Participants were asked to choose one topic and freely talk about as introduced in Chapter 3. From the passages provided, 'my hobby' was the most popular, and was chosen by 9 participants, 'my hometown' was chosen by 2, and 'my best trip', 'my best friend' and 'my family' were chosen by 1 participant respectively. Although all participants were guided to talk about their topic for approximately one minute, the time range varied between 54 seconds and 2 minutes and 35 seconds, with the average response time being 1 minute and 25 seconds. This was because some participants were aware of the amount of time they had spoken by checking the timer on the PC voice recorder, but others did not. Therefore, some participants kept talking for more than one minute and others paused for more than 10 seconds in the middle of the speech. This indicates that it might have been challenging for some participants to speak spontaneously in English and that this may have made some of the participants nervous. Some might have been concentrating on what they would say rather than pronouncing each word clearly. As mentioned in Chapter 3, in analysing this spontaneous speech, the transcription application CLOVA Note (LINE Corporation, 2022) was used for initial

automatic transcription. Subsequently, the researcher reviewed and redrafted the transcription by listening to the recordings again.

Again, the questionnaire and the wordlist results were the focus of the analysis here. Appendix XXX shows that there were 69 words including 5 vowels and 6 consonants focused and analysed among 14 participants here; short vowel was /æ/, long vowels were /ɜ:/, ɑ:/, ɔ:/, diphthong was /əʊ/, and consonants were /l, r, θ, ð, d, v/. In this section, as the last part of the analysis of the segmental features, it continues to focus on aspects which were particularly striking from the analysis.

4.3.4.1. Vowels

There were 14 words to be focused and analysed among 14 participants. By listening to the recording, 5 phonemes (1 short vowel /æ/, 3 long vowels /ɜ:/, ɑ:/, ɔ:/ and 1 diphthong /əʊ/) were found to be particularly difficult for 10 participants to pronounce. Table 38 provides a summary of the results:

Vowels						
	Phonetic Symbols	Focused Words	No. Ss	Participants	Positions	Findings
1	əʊ	old, stones, hometown, show	5	C, D, E, I, L	word-initial, medial, ending	pronounced in /ɔ:/
2	ɑ:	started, father	3	B, C, L	word-medial	pronounced in /ɒ (ɑ)/
2	ɔ:	drawing, bought, abroad	3	A, F, H	word-medial	pronounced in /ɔ/ or /əʊ/
4	æ	balance, ballet	2	C, L	word-medial	pronounced in /ɒ (ɑ)/
4	ɜ:	first, works, world	2	C, J	word-medial	pronounced in /ɑ:/ or /ɔ:/

Table 38: Result of spontaneous speech – vowels

The table above provides a list of the phonemes which were problematic from the analysis. They are listed from highest to lowest in order of number of participants as well as Table 39 in the next section. First, the most problematic phoneme was a diphthong /əʊ/, which was

pronounced in a long vowel /ɔ:/ by 5 participants. This issue happened in any position of the words. Specifically, 2 participants (C and L) pronounced it at word-initial as /ɔ:/ in *old* as shown *open* in Table 28 and *old* in Table 36. In addition, participants (D and E) pronounced it at word-medial as /ɔ:/ in *stones* and *hometown* respectively. Similarly, participant I pronounced it at word-ending as /ɔ:/ in *show*.

Second, the second most problematic phonemes were 2 long vowels /ɑ:/, ɔ:/, which were pronounced in one of the short vowels /ɒ (ɑ), ɔ/, or a diphthong /əʊ/ by 3 participants respectively. These issues occurred at the word-medial among all of the 5 different words as shown in the above Table 38. Specifically, as for one of the long vowels /ɑ:/, participants (B and L) pronounced it as /ɒ (ɑ)/ in *started*, and participant C did the same way in *father*. On the other hand, regarding the other long vowels /ɔ:/, participant A pronounced it as /ɔ/ in *drawing*, and participants (F and H) pronounced it as /əʊ/ in *bought* and *abroad* respectively.

Lastly, the third most problematic phonemes were a short vowel /æ/ and a long vowel /ɜ:/, which were pronounced in a short vowel /ɒ (ɑ)/ or one of the long vowels /ɑ:/, ɔ:/ by 2 participants respectively. Again, these issues happened at word-medial among all of the 5 different words as in Table 38. To elaborate, participants (C and L) had difficulty in pronouncing /æ/ in *balance* and *ballet*, and they pronounced it in a short vowel /ɒ (ɑ)/ respectively. Regarding the long vowel /ɜ:/, participants (C and J) pronounced it as a long vowel /ɑ:/ in *first* and *world* respectively sounding like katakana English. Moreover, participant C pronounced it as /ɔ:/ in *works*, which was also a typical mispronunciation by some Japanese learners of English to read words in roman characters as spelt such as *warm* and *won* in the previous sections, passage 2 and 3.

4.3.4.2. Consonants

There were 42 words to be focused and analysed among 14 participants. By listening to the recording, 6 consonant phonemes, /r, l, ð, θ, v, d/, were found to be particularly difficult for 11 participants to pronounce. Table 39 provides a summary of the results:

Consonants						
	Phonetic Symbols	Focused Words	No. Ss	Participants	Positions	Findings
1	R	wrote, very, surrounded, river, practice, group, January, raise, children, problems	9	A, C, D, E, G, I, J, L, N	word-initial, medial, ending	pronounced in /l/
2	ð	brother, together, father, their, this, there, that's, then	7	C, D, E, F, G, L, N	word-initial, medial	pronounced in /z/ or /d/
2	V	love, have, lives, very, everywhere, favourite, I've	7	A, C, D, E, I, J, L	word-initial, medial, ending	pronounced in /b/
4	L	playing, will, healthy, culture, world, fluently, children	6	B, C, I, J, L, N	word-medial, ending	pronounced in /r/ or /lʊ/
5	θ	think(s), healthy, thank, thousand, 29th	5	C, E, F, J, N	word-initial, medial, ending	pronounced in /s/ or /ʃ/
6	d	old, hard, started, designed, bed	4	C, J, L, N	word-ending	pronounced in /do/ or /t/, dropped /d/

Table 39: Result of spontaneous speech – consonants

The table above provides a list of the phonemes which were problematic from the analysis. In contrast to this previous section on vowels, in order to present more explicit comparison and analysis, this section reports on the results in the following three groups: /r/ and /l/, /ð/ and /θ/, and /v/ and /d/.

First, in terms of liquids /r/ and /l/, the most problematic phoneme among the 6 phonemes was /r/, which was pronounced as /l/, by 9 participants. This problem occurred regardless of where it appeared in the words: word-initial, medial and ending among 10 words, as shown in the column of focused words in Table 39. As for another liquid /l/, 6 participants pronounced it either in /r/ or /lʊ/ among 7 words such as *playing*, which happened in word-medial or ending. Interestingly, according to data collected and analysed in this project, some participants were likely to pronounce /r/ in /l/ and vice-versa. This could be interpreted that the participants were aware of the pronunciation differences between /l/ and /r/ but were unable to differentiate between the two in their actual speech.

Second, as for the dental fricatives /ð/ and /θ/ which are known as universally difficult phonemes (Maddieson, 1984 in Chapter 2), the second most problematic phoneme here was the

voiced /ð/. It was pronounced either in short vowels /z/ or /d/ by 7 participants. These issues occurred at the word-initial and medial positions among 8 different words, such as *brother* and *there*, as shown in Table 39. Specifically, participants (C, D, F and L) pronounced it as /z/ in *brother*, *their*, *that's*, and *there* respectively, and participants (C, E, F, G and L) did as /d/ in *father*, *there*, *together*, *this* and *then* respectively. It should be noted that the pronunciations of /ð/ for participants (C, F and L) were mixed in /z/ and /d/, while participants (D, E and G) were consistently pronounced it as /z/ or /d/. On the other hand, regarding the other dental fricative, voiceless /θ/, 5 participants pronounced it either in /s/ or /ʃ/ among 5 words such as *thank*, which happened in any positions of the words: word-initial, medial and ending. In particular, the voiceless /θ/ in *think(s)*, *thank*, *thousand* and *29th* were pronounced all in /s/ by these 5 participants, sounding like different vocabulary like *sink* and *sunk*, especially in *think(s)*, *thank*. Besides, the only participant who pronounced /θ/ in /ʃ/ in *healthy* was participant C, sounding like katakana English.

Finally, regarding /v/ and /d/, the second most problematic issue here, alongside the voiced /ð/, was /v/. It was pronounced in /b/ among 7 focused words by 7 participants, which occurred in word-initial and medial, as shown in Table 39. Hence, some words such as *love*, *have* and *very* among the 7 focused words sounded like different vocabulary like *lab*, *hub* and *berry*, or even *belly*. Concerning /d/, 4 participants (C, J, L and N) either dropped or pronounced it in /do/ or /t/, which occurred all at word-endings. Specifically, participants (C and L) dropped it in *old* and participants (J and L) did the same in *started*. Moreover, participant C pronounced it as /t/ in *hard*, sounding like *heart*. Furthermore, participant N pronounced it as /do/ in *designed* and *bed*, adding a vowel /o/ after /d/, which was also a typical mispronunciation by some Japanese learners of English.

In summary, the analysis shows the five vowels: /æ, ɑ:, ɜ:, ɔ:, əʊ/ and six consonant phonemes: /l, r, θ, ð, d, v/ have been highlighted in the spontaneous speech, along with the tendencies and problems in this section.

Now that an analysis of the segmental features has been provided, the following section will show the results of the analysis of suprasegmental features (stress and intonation) by Praat and human assessments on intelligibility.

4.3.5. Stress

As previously noted in 4.3., the analysis of the above speech samples revealed two words with prominent issues related to suprasegmental elements (particularly word stress and intonation). These issues were identified by the primary researcher of this project and confirmed by the Australian associate professor. This section first presents the results of the analysis of word stress, which is one of the suprasegmental features. The following report will focus on aspects which particularly stood out from the analysis.

As can be seen in appendix 1, there were 24 minimal pairs, and 91 words analysed in total: 18 words for short vowels, 10 words for long vowels, 16 words for diphthongs and 47 words including 24 consonants. By listening to the recording, 2 words, *influence* and *annual* in the list of short vowels, were found to be particularly difficult for 4 and 2 participants respectively to pronounce with the appropriate stresses. Hence, these two words were analysed acoustically by using a voice recognition software called Praat (Boersma & Weenink, 2023) as an objective rating instrument as well as human raters. The following figures show a summary of the results obtained from analysis by Praat among native speakers and relevant participants. The ‘native speakers’ here refer to the voices of female speakers in Oxford Learner's Dictionaries.

4.3.5.1. Word Stress of *influence*

Figure 2 shows the result of the analysis conducted by using Praat on *influence* from a female voice of Oxford learner's dictionaries. The waveform, spectrogram, segment and tone were marked from the top. The spectrogram part also shows an intensity in blue.

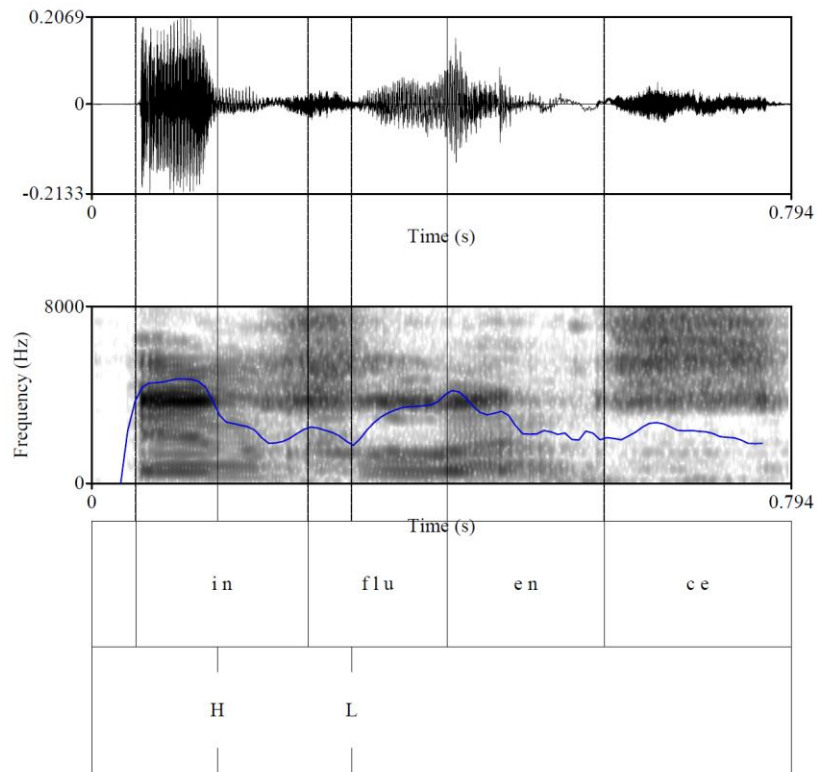


Figure 2: *influence* produced by a female native speaker in Oxford Learner's Dictionaries

In the figure above, the intensity shown in blue indicates the intensity of the stress, which goes up and down like the waveform. It was therefore found that this female native speaker pronounced the first syllable of *influence* most strongly. After the first syllable, the intensity went down at the second syllable and slightly went up at the third syllable. In the end, the intensity went down at the end of the word.

Next, two Praat analysis results will be presented for two participants (E and F) who misplaced the stress position of this target word. Then, the results were compared with those of the native speaker presented earlier and participant A, one of the participants, who correctly placed the stress.

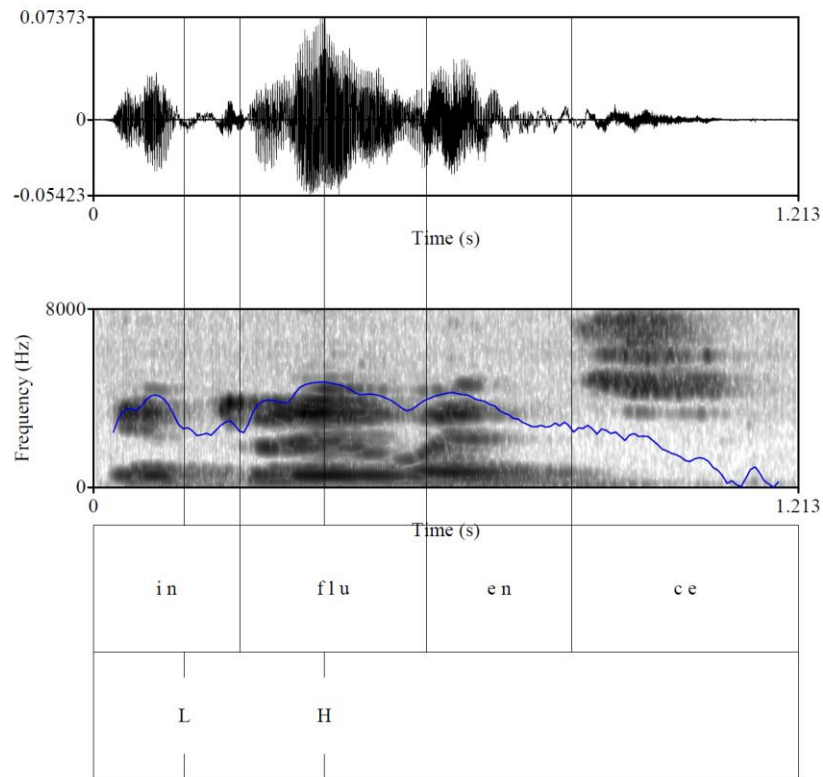


Figure 3: *influence* produced by participant F

Figure 3 shows the result of the analysis conducted by using Praat on *influence* from participant F. Looking at this figure and comparing with figure 1, it was found that participant F pronounced the second syllable of *influence* most strongly as can be seen with the waveform. At the end of the first syllable, the intensity went down and went up the most at the second syllable. Then, the intensity gradually went down at the end of the word. This is a clear example of misplacement of the word stress.

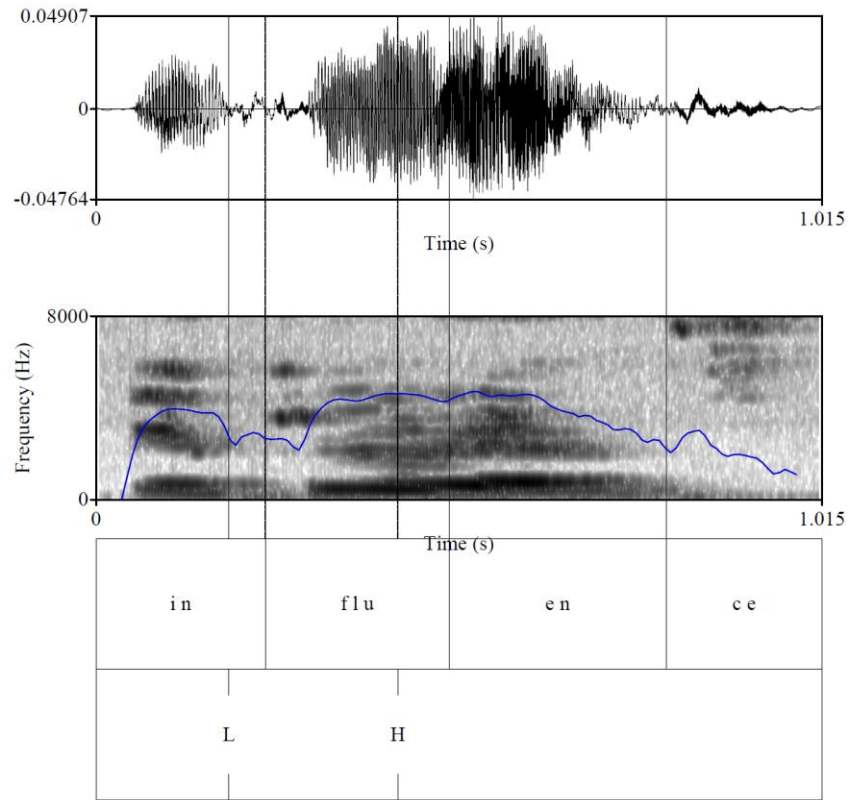


Figure 4: *influence* produced by participant E

Figure 4 shows the result of the analysis conducted by using Praat on *influence* from participant E. Looking at this figure and comparing it with participant F in figure 3, it was found that participant E also pronounced the second syllable of *influence* most strongly, however the strong intensity continued until the third syllable as can be seen in the waveform. At the end of the first syllable, the intensity went down and up at the second syllable, and kept the intensity longer than participant F. Then, the intensity gradually went down at the end of the third syllable and slightly went up and down at the end of the word. This is an ambiguous example of misplacement of the word stress as this participant pronounced the target word uniquely. It was uttered in Roman characters as *infryuence*, ‘インフ リ ュ エ ンス’ in *katakana* way like *blue-brew* as *buryu*, ‘ブ リ ュ ー’ which was introduced earlier in 4.3.2.1. Minimal Pair. This could be one possible explanation.

Now, another Praat analysis result is presented for participant A who correctly placed the stress position of this target word. Then, the result was compared with the native speaker.

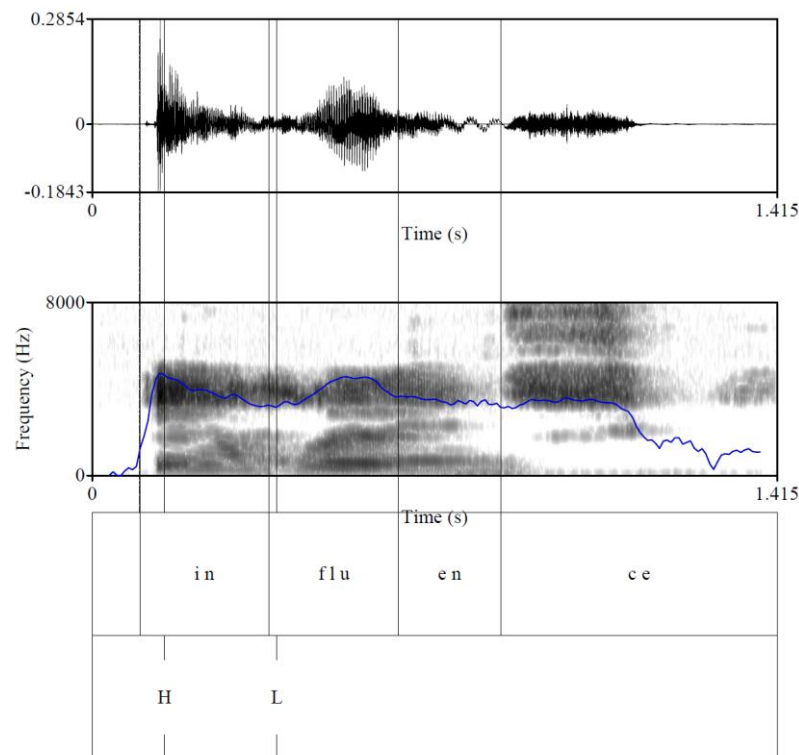


Figure 5: *influence* produced by participant A

Figure 5 shows the result of the analysis conducted by using Praat on *influence* from participant A. Looking at this figure and comparing it with the native speaker in figure 2, it was found that this participant similarly placed the word stress at the first syllable of the word most strongly. At the first syllable, the intensity sharply went up like the native speaker but gradually went down at the end of the first syllable towards the second syllable. Compared to the native speaker in Figure 1, this indicates that intensity did not clearly go up and down but was gently ramped up and down. In the end, the intensity gradually went down towards the end of the word, like the native speaker and other participants. When comparing the waveforms and intensities of participants E and F who misplaced the stress with those of participant A, a significant difference was observed, particularly in the waveforms, with participant A being more similar to

the waveforms of a native speaker. Although participant A's waveform and intensity did not perfectly match those of the native speaker shown in Figure 2, her pronunciation can be considered sufficiently intelligible.

4.3.5.2. Word Stress of *annual*

This section continues with reporting on *annual*. Figure 6 shows the result of the analysis conducted by using Praat on *annual* from the female voice of Oxford learner's dictionaries.

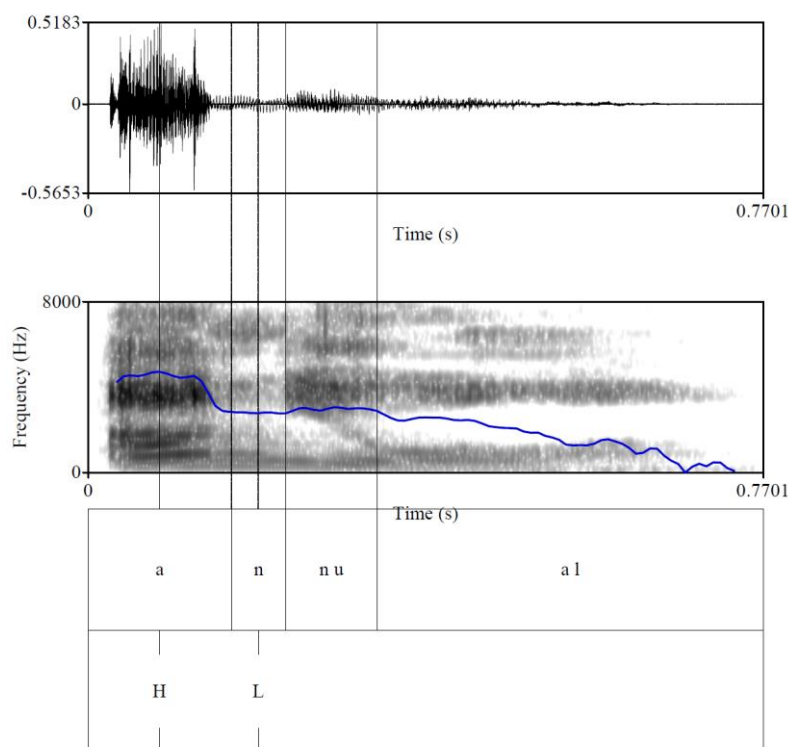


Figure 6: *annual* produced by a female native speaker in Oxford Learner's Dictionaries

As shown in Figure 6, it was observed that this female native speaker pronounced the first syllable of *annual* most strongly. At the end of the first syllable, the intensity dramatically dropped towards the second syllable. Gradually, the intensity decreased from the second syllable towards the end of the word.

As with *influence* earlier, two Praat analysis results are presented for two participants (H & M) who misplaced the stress position/s of this target word. Then, the results are to be compared with those of the native speaker presented earlier and with participant K, one of the participants, who correctly placed the stress.

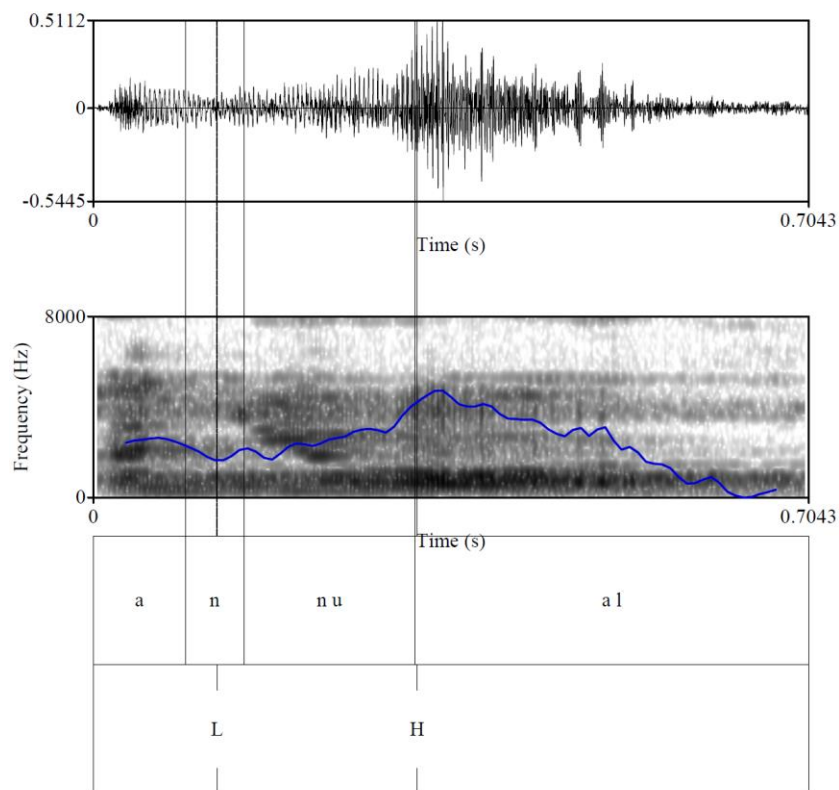


Figure 7: *annual* produced by participant M

Figure 7 above shows the result of the analysis conducted by using Praat on *annual* from participant M. Looking at this figure and comparing with Figure 6, it was found that participant M pronounced the second syllable of *annual* most strongly as can be seen with the waveform. At the end of the first syllable, the intensity slightly went down and up dramatically at the end of the second syllable. Then, the intensity gradually went down towards the end of the word. This is a clear example of misplacement of the word stress as well as Figure 4.

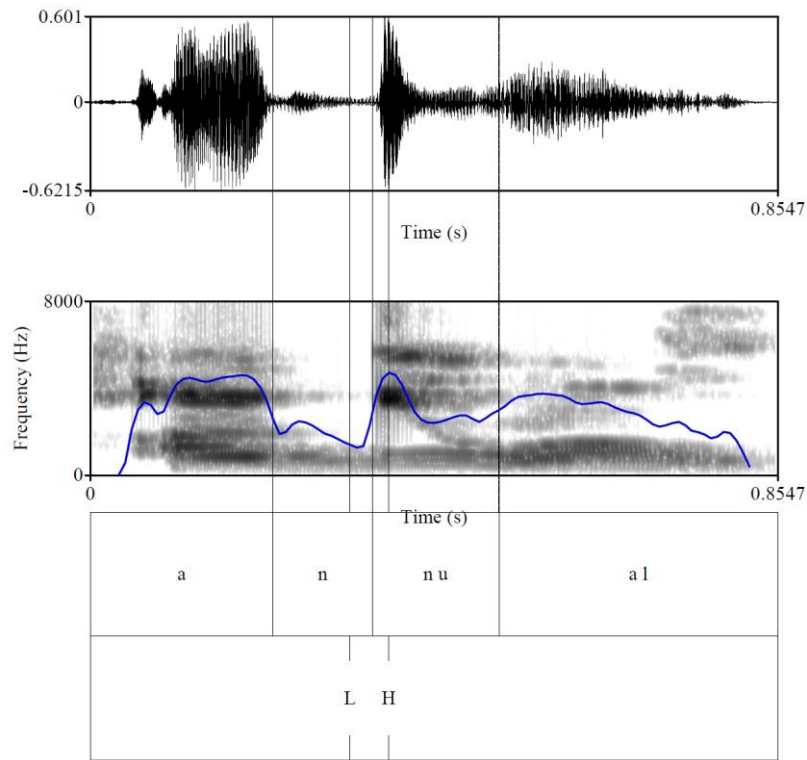


Figure 8: *annual* produced by participant H

Figure 8 shows the result of the analysis conducted by using Praat on *annual* from participant H. Looking at the figure and comparing with participant M in Figure 7, it was observed that participant H also pronounced the second syllable of *annual* most strongly, however the strong intensity started from the beginning of the first syllable as can be seen with the waveform and dramatically dropped at the latter part of the first syllable. This part was the second strongest part of the intensity. Besides, participant H also placed the third strongest stress in the third syllable after the strongest stress in the second syllable. Ultimately, in the case of participant H, the speech was uttered with a messed-up intensity, but each phoneme was pronounced clearly, so it did not turn out to be unintelligible.

Now, another Praat analysis result will be presented for participant K who correctly placed the stress position of this target word. Then, the results are to be compared with the native speaker, and the participants H and M presented earlier.

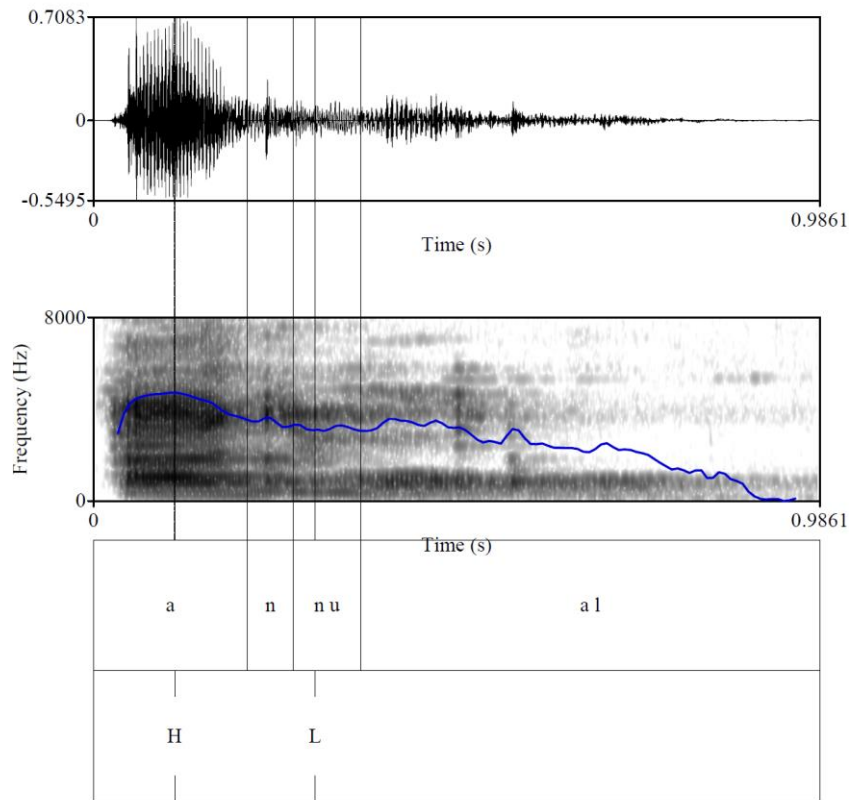


Figure 9: *annual* produced by participant K

Figure 9 shows the result of the analysis by Praat on *annual* from participant K. Looking at this figure and comparing with the native speaker in Figure 6, it was observed that participant K similarly placed the word stress at the first syllable of the word most strongly. At the first syllable, the intensity sharply increased and gradually decreased from the latter part of the first syllable towards the end of the word like the native speaker did. When comparing the waveform and intensity of participants H and M who misplaced the stress with those of participant K, a clear difference was observed with participant K being more like the waveforms and intensity of the native speaker. Therefore, it can be suggested that participant K's pronunciation is intelligible.

4.3.6. Intonation

This section continues to present the results of the analysis of intonation (pitch), which is another kind of the suprasegmental features. The following report will focus on aspects which particularly stood out from the analysis.

4.3.6.1. Pitch Movement of *influence*

Figure 10 below shows the result of the analysis conducted by using Praat on *influence* from the female voice of Oxford learner's dictionaries. As shown earlier, the waveform, spectrogram, segment and tone were marked from the top. The spectrogram part also shows pitch movement in red in addition to intensity in blue.

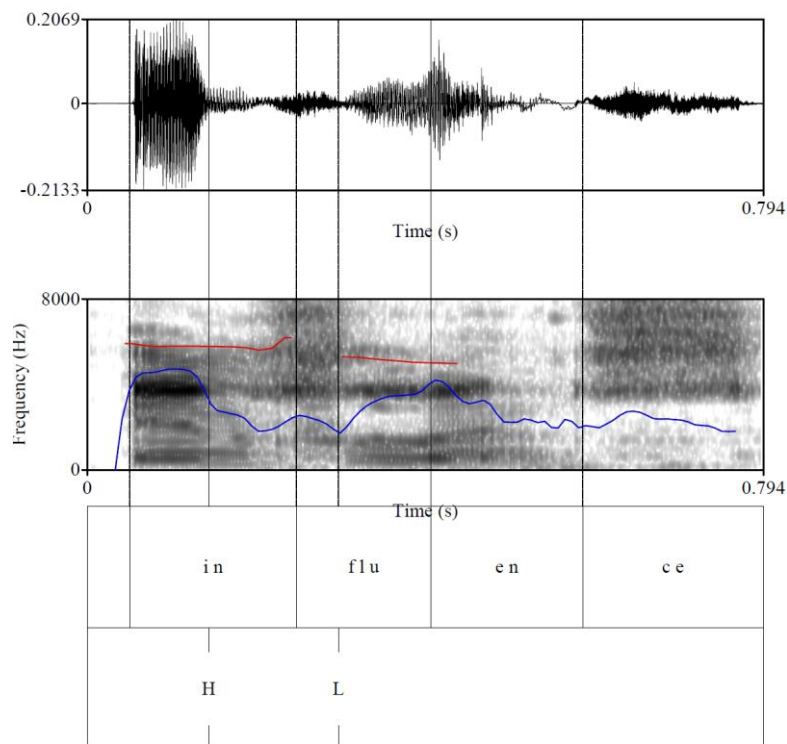


Figure 10: *influence* produced by a female native speaker in Oxford Learner's Dictionaries

Figure 10 shows the result of the analysis conducted by using Praat on *influence* from a female native speaker in Oxford Learner's Dictionaries. Looking at the pitch movement, it was

found that this female native speaker's pitch dramatically went up at the latter part of the first syllable of *influence*. After that, the pitch gradually went down at the second syllable.

Next, two Praat analysis results will be presented for two of the four participants (E, F, K and N) who mispronounced the target word. Then, the results will be compared with those of the native speaker presented earlier. Lastly, participant A, one of the participants, who correctly pronounced the target word will also be examined.

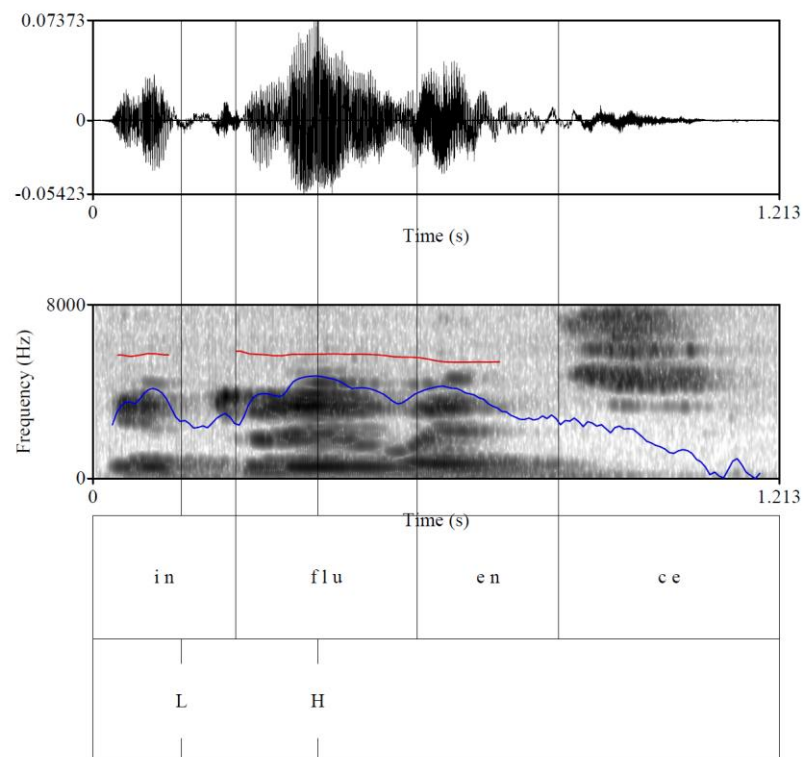


Figure 11: *influence* produced by participant F

Figure 11 shows the result of the analysis conducted by using Praat on *influence* from participant F. Looking at this figure and comparing with figure 10, it was found that participant F's pitch was relatively flat all the way.

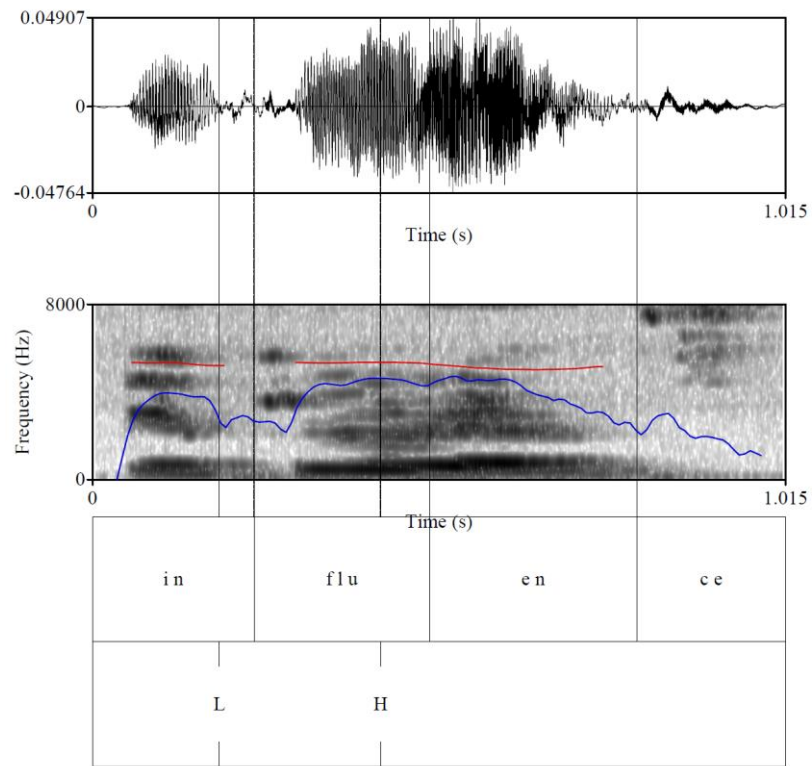


Figure 12: *influence* produced by participant E

Figure 12 shows the result of the analysis conducted by using Praat on *influence* from participant E. Looking at this figure and comparing with participant F in figure 11, it was found that participant E's pitch was completely monotonous all the way through the word. Participant E, like participant F, also appeared to have placed stress on the second syllable. This is another example of mispronunciation of the target word.

Now, another Praat analysis result will be presented for participant A, who correctly pronounced the target word. Then, the results will be compared with the native speaker, along with the responses provided by participants E and F presented earlier.

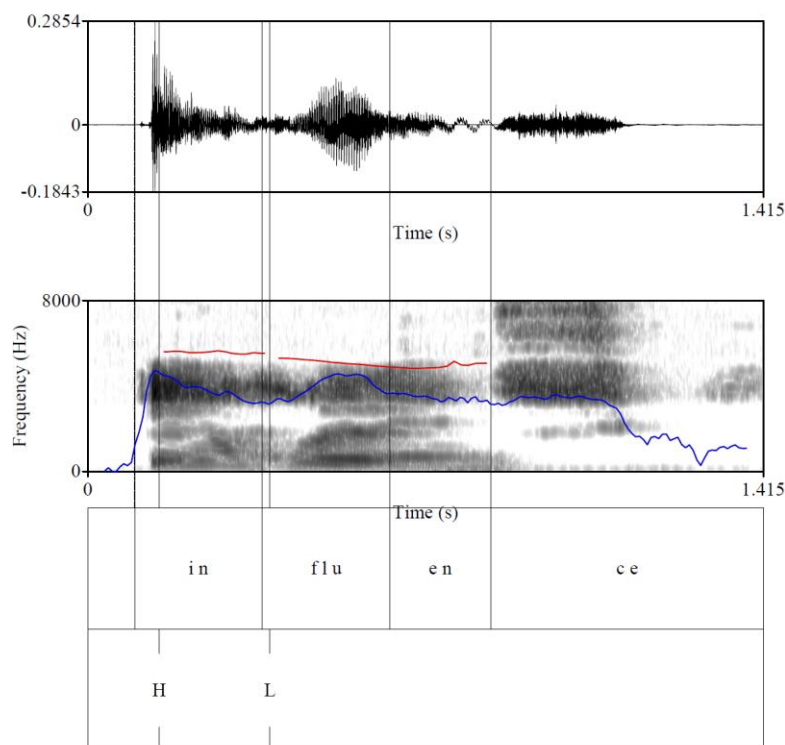


Figure 13: *influence* produced by participant A

Figure 13 shows the result of the analysis conducted by using Praat on *influence* from participant A. Looking at this figure and comparing with the native speaker in figure 10, it was found that the pitch of participant A was slightly up at the first syllable and went down at the second syllable. It was found to be relatively flat overall, although this participant similarly placed the word stress at the first syllable of the word as the native speaker did. In particular, there was a significant difference in the waveform compared to participants E and F who pronounced the target word incorrectly. However, significant differences were not observed in terms of pitch, among these three participants (A, E and F) showing similar pitch movements, interestingly.

4.3.6.2. Pitch Movement of *annual*

Figure 14 below shows the result of the analysis conducted by using Praat on *annual* from the female voice of Oxford learner's dictionaries.

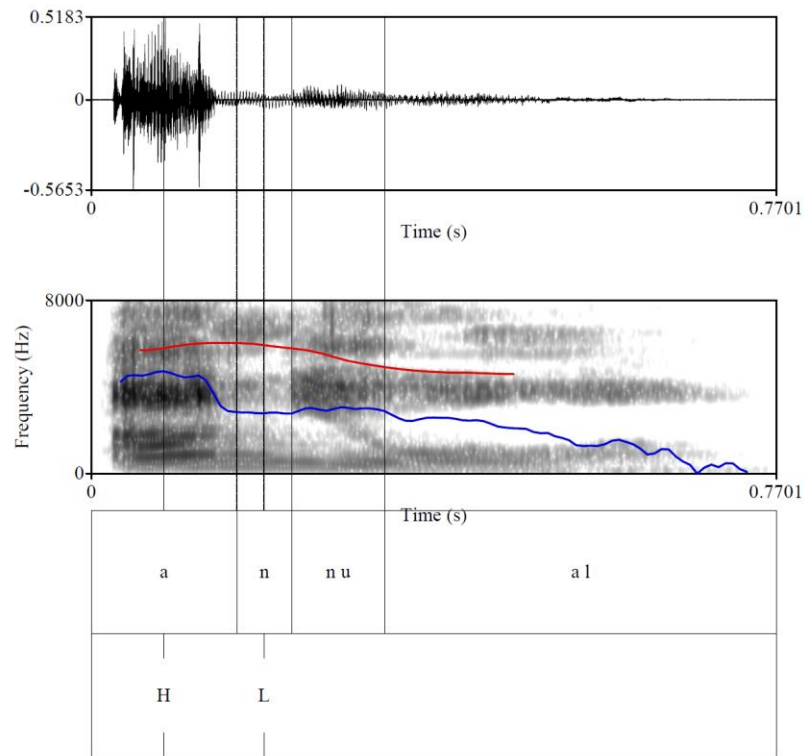


Figure 14: *annual* produced by a female native speaker in Oxford Learner's Dictionaries

Looking at the pitch movement in Figure 14, it was found that this female native speaker's pitch went up the most at the first syllable of *annual*. The pitch then gradually dropped with the intensity from the second to the third syllable.

As with *influence* earlier, two Praat analysis results will be presented for two participants H and M, who mispronounced the target word, compared with those of the native speaker presented in Figure 14. Furthermore, the responses from participant K, who correctly pronounced the target word, *annual*, will also be provided.

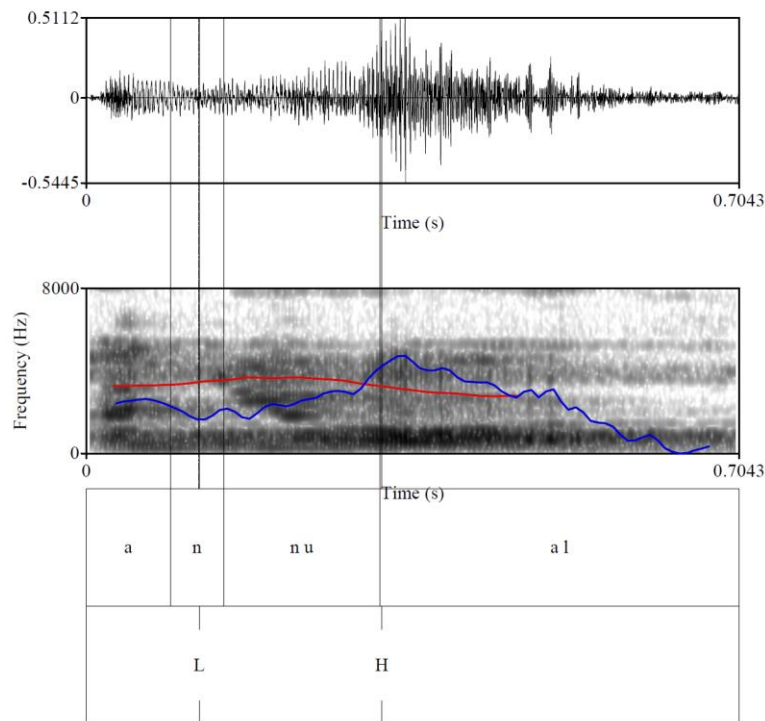


Figure 15: *annual* produced by participant M

Figure 15 shows the result of the analysis conducted by using Praat on *annual* from participant M. Looking at this figure and comparing with Figure 14, it was found that participant M's pitch went up slightly at the second syllable. This was most probably because this participant misplaced the stress at the second syllable. In any case, the overall pitch was relatively flat.

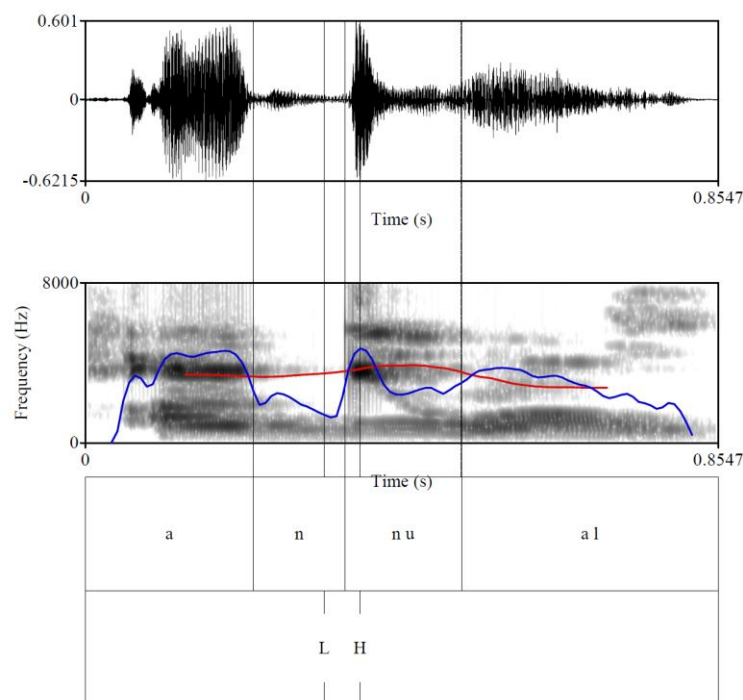


Figure 16: *annual* produced by participant H

Figure 16 shows the result of the analysis by Praat on *annual* from participant H. Looking at the figure, it was found that the pitch of participant H was more clearly arced like that of a native speaker than that of participant M. However, the highest hump of the pitch and the strongest intensity was observed at the same syllable as this participant misplaced the stress at the second syllable like participant M also did.

Now, another Praat analysis result will be presented for participant K, who correctly pronounced the target word. Then, the results will be compared with the native speaker, along with the responses from participants H and M presented earlier.

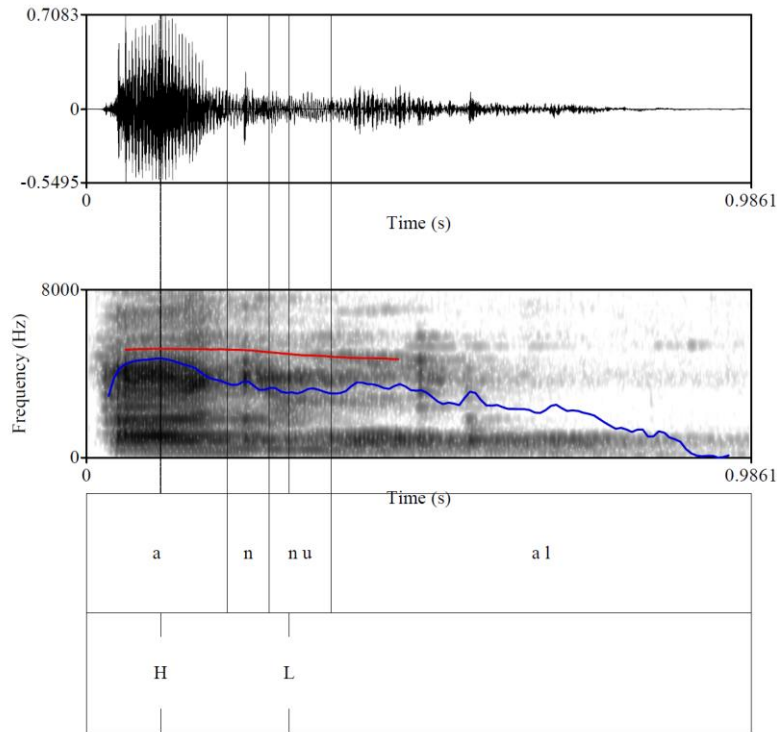


Figure 17: *annual* produced by participant K

Figure 17 shows the result of the analysis conducted by using Praat on *annual* from participant K. Looking at this figure and comparing with the native speaker in Figure 14, it was observed that the pitch of this participant was completely monotonous from the first to the third syllable even though this participant similarly placed the word stress at the first syllable of the word most strongly as the native speaker did as well as the frequency was high between 5,000 and 7,000 Hz. When comparing the pitch movement and the frequency of participants H and M, who mispronounced the target word, with those of participant K, similarities were observed, which was the pitch movement being mostly flat. However, the frequency of participant K was higher than that of participants H and M.

4.3.7. Assessment by human raters

In order to report the above acoustic evaluations alongside human assessments, the intelligibility ratings provided by the two human raters were summarised in the table below. The

assessment criteria were as follows: *perfectly intelligible*, *fairly intelligible*, *relatively intelligible*, and *unintelligible*, as introduced in Chapter 3-7. Rater 1 refers to the Japanese primary researcher of this study, while rater 2 refers to the Australian associate professor.

Participant	Stress Placement	Rater 1: (Japanese)	Rater 2: (Australian)
E	Misplaced	Relatively intelligible	Fairly intelligible
F	Misplaced	Fairly intelligible	Fairly intelligible
A	Appropriately placed	Perfectly intelligible	Perfectly intelligible

Table 40: Assessment Results on Intelligibility: *influence*

Table 40 shows the assessment results on intelligibility of the word, *influence*. As can be seen, participant E, who misplaced the stress, was rated as *relatively intelligible* by rater 1 and *fairly intelligible* by rater 2. Participant F received a *fairly intelligible* rating from both raters. In contrast, participant A, who correctly placed the stress, was rated as *perfectly intelligible* by both raters. Even though the pitches of these participants (A, E, F) were flat, participant A's pronunciation was perfectly intelligible according to both of the human raters. Despite some differences between the raters, the results were generally consistent.

Participant	Stress Placement	Rater 1: (Japanese)	Rater 2: (Australian)
H	Misplaced	Fairly intelligible	Fairly intelligible
M	Misplaced	Fairly intelligible	Fairly intelligible
K	Appropriately placed	Perfectly intelligible	Perfectly intelligible

Table 41: Assessment Results on Intelligibility: *annual*

Table 41 shows the assessment results on intelligibility of the word, *annual*. As shown, participants H and M, who misplaced the stress, were rated as *fairly intelligible* by both raters. In contrast, participant K, who placed the stress correctly, was rated as *perfectly intelligible* by both raters although her pitch movement was mostly flat like participants H and M. Both raters'

assessments were all consistent for this result. Notably, rater 2 described participant K's pronunciation as near native, which was also agreed by rater 1.

4.3.8. Tendencies of participants' mispronunciations

The analysis of the 14 participants' pronunciation revealed an interesting trend. The participants were divided into two main groups: one with prominent issues in both consonants and vowels, and another with significantly fewer consonant issues but noticeable vowel difficulties. In short, these groups can be categorised as those with prominent consonant issues and those without.

	Participants	Vowels	Consonants	No. of Mistakes	TOEIC score
1	K	4	1	5	555
2	B	7	0	7	700
3	F	3	3	6	620
4	M	8	2	10	715
5	H	4	6	10	not reported
6	I	8	3	11	450
7	J	11	5	16	485
8	G	6	13	19	602
9	A	11	9	20	665
10	L	8	16	24	495
11	N	14	11	25	400
12	E	9	18	27	665
13	D	10	23	33	480
14	C	10	19	29	500

Table 42: Summary of pronunciation mistakes (diagnostic word list)

Table 42 shows the summary of pronunciation mistakes of the diagnostic word list. Participants with fewer to more problems are listed from the top. As shown, the group with

prominent consonant issues (Group A), represented in grayscale, includes seven participants (G, A, L, N, E, D, C). On the other hand, the rest of the seven participants (K, B, F, M, H, I, J) belong to Group B, where consonant issues are less prominent. Comparing these two groups with a focus on consonants, which are considered the *skeleton* of words (O'Connor's, 1980), it is evident that participants of Group A exhibit more consonant errors. Notably, participants N, E, D, and C, who were frequently mentioned as they made pronunciation errors in this chapter, were categorised in Group A. In contrast, participant K, who was referred to as near-native in the previous section, has the fewest errors belonging to Group B. The average TOEIC scores for the two groups were 543.8 for Group A and 587.5 for Group B. Although there was a 43.7-point difference, TOEIC scores did not appear to correlate with pronunciation accuracy.

4.4. Summary of the chapter

The results obtained from the recorded speech samples provided in Appendices 5 and 6. The analysis was presented focusing on important aspects of segmental features (vowels and consonants) and suprasegmental features (stress and intonation), with examples of some of the most striking results. Regarding the diagnostic word list, short passages, and spontaneous speech data, human raters initially identified issues with vowels and consonants at the segmental level. At the same time, analysis with Praat software detected suprasegmental problems.

Through the analysis of segmental features, difficulties in vowels and consonants were revealed. In terms of vowels, nine phonemes turned out to be difficult to pronounce: /u, æ, ʌ, e/ in short vowels, /ɜ:, ɑ:, ɔ:/ in long vowels, and /ʊə, əʊ/ in diphthongs. Concerning consonants, the results showed that nine phonemes turned out to be problematic: /l, r, θ, ð, d, m, ʃ, v, tʃ/. Specifically, in the word list performance, nine vowels: /æ, ʌ, u, e, ɜ:, ɑ:, ɔ:, ʊə, əʊ/ and eight consonants: /l, r, θ, ð, d, m, ʃ, v/ were found to be difficult as major issues. Then, the analysis of the four short passages revealed that there were also significant problems with four vowels /ʌ, æ, ɜ:, əʊ/ and eight consonant phonemes /l, r, θ, ð, d, v, tʃ, ʃ/, as well as with /m/ as a minor problem.

In particular, it was an interesting finding about /ʃ/ in the word-medial. In addition, the analysis of spontaneous speech revealed that five vowels /æ, ɑ:, ɜ:, ɔ:, əʊ/ and six consonants /l, r, θ, ð, d, v/ were problematic, along with trends and issues.

With regard to the suprasegmental features, two target words, *influence* and *annual* were acoustically analysed by Praat (Boersma & Weenink, 2023) and the results were illustrated in figures including waveforms, spectrograms, segments and tones. Examples were given of four participants (E, F, M & H) who mispronounced the target words, two participants (A & K) who pronounced the words properly, and native speakers, whose analyses were reported with figures. What became clear about stress was that not only waveforms and intensities of participants (E, F, M & H) who mispronounced the target words, but that these responses were much different to those that were gathered from participants A & K who pronounced the words properly. Also, participants A & K were very similar to those of the native speaker. Accordingly, it can be said that the pronunciations of participants A and K were well intelligible. This was the case for both target words, *influence* and *annual*. Meanwhile, in terms of intonation, it became apparent that the pitch movements of participants E, F and A did not differ significantly in the target word *influence*, and that the pitch movement of participant A was remarkably similar and relatively flat compared to participants E and F. Comparing the pitch movement and frequency of participants H and M, who mispronounced the target word *annual*, and participant K who pronounced it correctly, revealed a commonality in pitch movement among the three participants, although there were slight variations observed. However, participant K's frequency was higher than participants H and M, like the native speaker. It was found that even though intonation was relatively monotonal, it was still sufficiently intelligible as long as stresses were placed appropriately. These findings were similarly confirmed by both human raters.

Finally, the summary of pronunciation mistakes in the diagnostic word list revealed two groups: those with prominent consonant issues and those without. Practical implications for these groups will be discussed in the next chapter.

Chapter 5 Discussion

This chapter will discuss the relevance of the results obtained in this study and will address and answer the research questions set out in the methodology chapter. The theoretical and practical implications of the research findings will then be explored and specific applications in educational settings and in pronunciation instruction proposed. The limitations of this study will be identified, and future research directions and potential applications discussed.

5.1. Findings and interpretations

First, a discussion of the significance of the research findings will be presented, through elaboration of the key findings in regard to vowels and consonants at the segmental level. Suprasegmental features which became apparent when analysing the segmental features will also be addressed.

5.1.1. Participants' background

The participants were surprisingly passive in their motivation for learning English. Results showed that the most common reason for participants to study English was *the environment and influence of family members* (38.7%). The analysis also revealed that, although their backgrounds varied, many of the participants wanted in some degree to improve their speaking skills and to acquire near-native pronunciation in order to speak well.

5.1.1.1. Participants' opinions about English pronunciation

The questionnaire elicited participants' subjective opinions on phonemes which they found particularly difficult in short vowels, long vowels, diphthongs and consonants. Tables 43 and 44 summarise the results for vowels and consonants which were selected by more than 30% of the participants in order to illustrate the main issues.

5.1.1.1.1. Vowels

	Difficult Phonemes	Words in Questionnaire	Percentage (%)	Reasons
Short vowels	/æ/	apple	44.9%	This sound doesn't exist in Japanese. Difficult to place the tongue. Differences among the sounds of 'a' in English are difficult to distinguish & unfamiliar.
	/ʌ/	run	30.6%	This sound doesn't exist in Japanese. Pronunciation of initial /r/ is difficult, followed by an unfamiliar pronunciation of /ʌ/.
	/ʊ/	annual	30.6%	Difficult to pronounce after double 'n'.
Long vowels	/ɜ:/	early, her	46.9%, 32.7%	Difficult to place the tongue. Difficult to pronounce due to /r/ after /ɜ:/.
	/ɑ:/	part	42.9%	Difficult to place the tongue. Difficult to pronounce due to /r/ after /ɑ:/.
Diphthongs	/ʊə/	tourist, sure, poor	42.9%, 38.8%, 40.8%	Difficult to pronounce due to /r/ after /ʊə/. This sound doesn't exist in Japanese. Difficult to move the lips. Diphthongs are difficult to pronounce and unfamiliar.
	/eə/	hair	36.7%	Difficult to pronounce due to /r/ after /eə/. This sound doesn't exist in Japanese. Unfamiliar sound.
	/əʊ/	low	36.7%	Difficult to move the lips. Unfamiliar sound.

Table 43: Result of questionnaire - opinions on vowels

As shown above, trends in difficulties in 8 vowels were revealed. More than 30% of the participants perceived /ʊ/, /æ/ and /ʌ/ as being difficult in short vowels, more than 40% of the participants found /ɜ:/ and /ɑ:/ particularly difficult among long vowels, and more than 36% of participants considered /ʊə/, /eə/ and /əʊ/ challenging in diphthongs.

The main reason for the short vowels here being listed as difficult was that there is more than one variation of 'a' in English, which do not exist in Japanese to begin with, which makes it challenging to distinguish among them (Nishikiori, 2007; Higurashi, 2020 in Chapter 2.3.1 Vowels). Therefore, it is difficult to know how to move the tongue and the lips (Celce-Murcia, Brinton, & Goodwin, 1996; Nishikiori, 2007). We can summarise the situation by saying that participants were aware that in English the letter 'a' alone had four different short vowel phonemes but found it quite challenging to differentiate among them in actual use. One interesting finding here was that especially with /ʌ/ in *run*, due to 'r' which is one of the English and Japanese liquids (Chapter 2.3.2 Consonants), the pronunciation of the following vowel was

also perceived as difficult. Similar reasons were cited for long vowels and diphthongs. This suggests that the participants were not confident in pronouncing the above vowels themselves and felt additional difficulty when ‘r’ came before or after each vowel. /u/ in annual, where a double ‘n’ makes the following /u/ hard to pronounce. This is similar to findings by Bada (2001), Higurashi (2020) and Ohata (2004), showing that even today, the same issues are present with Japanese learners of English.

5.1.1.1.2. Consonants

Difficult Phonemes	Words in Questionnaire	Positions	Percentage (%)	Reasons
/θ/	thin, author	word-initial, word-medial	51%, 61.2%	Difficult to place the tongue. This sound doesn't exist in Japanese.
/ð/	bath	word-ending	55.1%	Difficult to place the tongue. Unfamiliar sound.
/d/	around	word-ending	32.7%	Difficult to place the tongue. Difficult to pronounce softly at the end. Pronounce it as 'do' (ド) in <i>katakana</i> way.
/tʃ/	chin	word-initial	38.8%	Difficult to place the tongue and form the lips.

Table 44: Result of questionnaire - opinions on consonants

As shown in Table 44, trends in difficulties perceived in 4 consonants were revealed. It was found that word-initial (51%) and word-medial /θ/ (61.2%), word-ending /ð/ (55.1%) and /d/ (32.7%), and word-initial /tʃ/ (38.8%) were considered difficult for participants to pronounce in this study.

In all questions on consonants, more than 51% of participants reported that words containing /θ/ were difficult. As Maddieson (1984 in Chapter 2.3.2 Consonants) points out, the voiceless /θ/ and voiced /ð/, known as dental fricatives, are universally regarded as difficult and exotic (Jenkins, 2000). Based on the responses to the questionnaire in this study, it was found that pronunciation of /θ/ was more difficult than /ð/. This is likely because, while neither sound exists in Japanese, the voicing of /ð/ makes it somewhat easier for Japanese speakers to produce compared to the voiceless /θ/. Besides, /ð/ can be considered similar to the sounds /z/ and /d/,

making it relatively easier to substitute. In contrast, /θ/ may be more challenging due to the difference in tongue position. In addition, more than 32% of participants answered that words containing word-ending /d/ and word-initial /tʃ/ were difficult. Regarding the issue of the word-ending /d/ (Smith, 2012), this is a major difference between Japanese and English pronunciations, as English has words which end in both consonants and vowels, and the findings of this study further support the claims made by Smith. Conversely, all Japanese words end in vowels except those which end in /N/ (Chapter 2.3.2 Consonants). Thus, the word-ending /d/ in particular tends to be pronounced by Japanese speakers as 'do' (ド) with a vowel as in *katakana* due to L1 interference. One unexpected finding was that word-initial /tʃ/ was considered difficult. A possible reason for this is that, as Table 44 shows, it has to be pronounced as /tʃ/ with the lips sticking out, which makes it difficult for Japanese speakers to pronounce, although a similar sound to /tʃ/ exists in Japanese. Besides, no phoneme in Japanese is pronounced with a significant lip motion. Perhaps the only phoneme that uses the lips more than other Japanese phonemes would be 'u'.

Overall, one common reason for the difficulty with the above consonants for the participants in this study was that they were uncertain about the position that the tongue should be placed in. Hence, it would be fair to say that participants do not know how to pronounce them with the result that they are unable to produce comprehensible speech. At the same time, compared to the consonants listed above, /l/ and /r/ each accounted for only 20.4%. However, they should not be overlooked in identifying pronunciation difficulties, particularly /r/, which also appeared among the vowels in Table 43.

The participants in this study were English majors, with an average English proficiency for Japanese university students according to TOEIC scores, but many of the English phonemes they considered difficult in this questionnaire were typical for Japanese speakers generally. The above findings will be compared with the results of the recorded speech data analysis in the next section.

5.1.2. Result of the recording of speech samples

As noted in Chapter 4, the analysis of segmental features highlighted significant suprasegmental elements, such as stress and intonation. These aspects substantially influenced this study and showed that suprasegmental factors also had a significant influence on the intelligibility of the participants in this study. This section first presents a detailed discussion of the key findings on vowels and consonants in the recorded speech samples, together with interpretations mainly at the segmental level. This will be followed by a discussion on features at the suprasegmental level: word stress and intonation.

5.1.2.1. Segmental features

By analysing the abovementioned speech samples, human raters identified problematic vowels and consonants within the segmental features. Tables 45 and 46 summarise the results for vowels and consonants in order to illustrate the actual problems in speech.

5.1.2.1.1. Vowels

Recording Conditions	Short vowels	Long vowels	Diphthongs
Diagnostic word list	/æ/, /ʌ/, /ʊ/, /e/	/ɔ:/, /ɜ:/, /ɑ:/	/əʊ/, /ʊə/
Short passages	/æ, ʌ/	/ɔ:/	/əʊ/
Spontaneous speech	/æ/	/ɔ:/, /ɜ:/, /ɑ:/	/əʊ/

Table 45 Problematic vowels in actual speech

Table 45 highlights the vowels that posed difficulties in actual speech, categorised into short vowels, long vowels, and diphthongs, as observed under three recording conditions. Within the diagnostic word list, four short vowels (/æ/, /ʌ/, /ʊ/, /e/), three long vowels (/ɜ:/, /ɑ:/, /ɔ:/), and two diphthongs (/ʊə/, /əʊ/) were identified as challenging to the participants. In short passages, two short vowels (/æ/, /ʌ/), two long vowels (/ɑ:/, /ɔ:/), and one diphthong (/əʊ/) were problematic.

In spontaneous speech, one short vowel (/æ/), three long vowels (/ɜ:/, /ɑ:/, /ɔ:/), and one diphthong (/əʊ/) were found to be particularly difficult.

Among the short vowels, an interesting commonality was observed: /æ/ was identified as difficult to the participants in this study across all three recording conditions. For example, one of the minimal pairs in the diagnostic word list was *man/men*. Other examples include *apple* and *happy* in short passages, as well as *balance* in spontaneous speech. To elaborate, the /æ/ in *man* (/mæn/) was pronounced as /e/, /ʌ/, or /ɒ (ɑ)/, and the /e/ in *men* (/men/) tended to be pronounced as /ʌ/ or /æ/ according to the results of this study. This phenomenon can be attributed to the fact that the four short vowels /æ/, /ʌ/, /ɐ/, and /ɒ (ɑ)/ in English are considered the most challenging series of sounds for Japanese learners of English (Nishikiori, 2007; Higurashi, 2020), whereas Japanese has only one 'a' sound. Higurashi (2020: 4) also says that /æ/ is one of the most complex sounds to learn because it requires significant mouth movement and notes that 'Japanese speakers are not aware of how they should move their mouths, lips, and jaws when they speak English'. While the pronunciation of the Japanese vowel /a/ requires minimal jaw and tongue movement and does not need significant facial expression or movement (Nishikiori, 2007), the English /æ/ demands the tongue to be more forward (Saito & Lyster, 2012) and the lips to be wider to reduce tension and jaw movement (Celce-Murcia, Brinton, & Goodwin, 1996). Consequently, /æ/ tends to be substituted with /e/, /ʌ/, or /ɒ (ɑ)/ (Nishikiori, 2007). This also seems to be the case with the participants in this study, which shows that /æ/, among these four short vowels, is particularly confusing and problematic for Japanese learners of English, as noted in the literature (See Chapter 2-3.1) supported by the findings of this study.

In terms of long vowels, one common feature was also identified under the same recording conditions: the /ɔ:/ sound (see Table 45). For instance, difficulties were observed from participants with the pronunciation of the word *saw* in the diagnostic word list, *warm* in short passages, and *drawing*, *bought*, and *abroad* in spontaneous speech. Specifically, the /ɔ:/ in *saw* (/sɔ:/) was mainly pronounced as /əʊ/ by 8 of 14 participants, the /ɔ:/ in *warm* (/wɔ:m/) was often replaced with /ɑ:/,

and the /ɔ:/ in *drawing* (/drɔ:ɪŋ/) was pronounced as /ɔ/ or /əʊ/. These results suggest that L1 influence (Bada, 2001) played a role and that participants commonly misread *saw* and *warm* based on their Romanised spellings. Moreover, difficulties with /ɜ:/ and /ɑ:/ were noticeable in both the diagnostic word list and in spontaneous speech. For example, the /ɜ:/ in *heard* was replaced by /ɑ:/ or /ɪr/, and the /ɑ:/ in *hard* and *heart* was pronounced as /ɜ:/. This suggests that /ɜ:/ and /ɑ:/ were complicated and indistinguishable for the participants, in a similar way to the issues observed with short vowels above. Additionally, in spontaneous speech, the /ɑ:/ in words like *started* and *father* was pronounced as a short vowel /ʌ (a)/. The results of this study confirm previous research findings from Bada (2001), which show that Japanese speakers tend to shorten long vowels that do not exist in the Japanese phonological system.

Furthermore, regarding diphthongs, one common feature among participants was also identified under the same recording conditions: the /əʊ/ sound (see Table 45). Difficulties were observed, for example, in the pronunciation of seven words: *open* in the diagnostic word list; *fold*, *old* and *social* in the short passages; and *old*, *stones*, *hometown* and *show* in spontaneous speech. In these words, the majority of the participants who mispronounced the /əʊ/ substituted /ɔ:/ for it. Interestingly, all seven of these words are Japanese katakana words, which was an unexpected outcome that emerged from summarising and overviewing the vowel issues. For example, *fold* is used in poker to quit games, and *social* is used as part of a word for *social networking*. As suggested by Kitao (1995a), this diphthong issue likely arises from the katakana pronunciation of English words. The results of this study further support this standpoint and show that issues in teaching pronunciation still need to be addressed in English education in Japan.

5.1.2.1.2. Consonants

	Phonetic symbols
Diagnostic word list	/l, r, θ, ð, d, v, ʃ, m/
Short passages	/l, r, θ, ð, d, v, ʃ, m, tʃ/
Spontaneous speech	/l, r, θ, ð, d, v/

Table 46 Problematic consonants in actual speech

Table 46 shows the consonants that posed difficulties for participants in actual speech under three recording conditions. Specifically, the diagnostic word list revealed eight challenging consonants: /l/, /r/, /θ/, /ð/, /d/, /ʃ/, /v/, and /m/. In the context of short passages, nine consonants were identified as problematic: /l/, /r/, /θ/, /ð/, /d/, /v/, /ʃ/, /m/, and /tʃ/. Meanwhile, spontaneous speech exhibited significant difficulties with six consonants: /l/, /r/, /θ/, /ð/, /d/, and /v/. By summarising and providing an overview of the consonant issues, it was found that six consonants (/l/, /r/, /θ/, /ð/, /d/, /v/) were problematic elements common to all three recording conditions.

First, the most common problems that participants encountered were with the English liquids /l/ and /r/, which accounted for only 20.4% of the results of the questionnaire. For instance, four of the minimal pairs in the diagnostic word list—play/pray, praise/plays, flame/frame, and blue/brew—illustrate these difficulties, as shown in Table 29 in Chapter 4. Additional examples include words such as *general* and *rolls* in short passages, as well as *children* and *January* in spontaneous speech. The challenge of distinguishing between minimal pairs with /l/ and /r/ was evident in 8 out of 14 participants, supporting the findings of various studies (Bada, 2001; Celce-Murcia, Brinton & Goodwin, 1996; Goto, 1971; Kenworthy, 1987; Lambacher, 1999; Pennington, 2014; Riney, Takada & Ota, 2000; Smith, 2012) that this is a common issue for Japanese speakers. In this study, the mispronunciation characteristics of /l/ included either being pronounced as /r/ or as /lu/ with an additional vowel added after /l/. This issue was frequent in both word-medial and word-ending positions. Conversely, /r/ was often mispronounced as /l/ across all word positions. More precisely, participants frequently substituted a sound between /l/ and /r/,

specifically /ɹ/, rather than the English /l/, as noted by Matsusaka (1994:59) and Okada (1999:5) in Chapter 2. A detailed analysis of the results revealed that mispronunciations of /r/ were more frequent than those of /l/ in this study. However, previous studies by Kimura (2022) and Kitao (1995b) reported that /l/ is more challenging than /r/. Additionally, Kitao (1995b) noted that although /r/ exists in Japanese, it remains a significantly challenging phoneme for Japanese learners of English and is by no means an easy sound to master.

Second, the second most common problems evident with participants in this study were fricatives, /θ/ and /ð/, which are considered exotic and universally difficult phonemes (Jenkins, 2000; Maddieson, 1984) and present major production challenges (Bada, 2001). These phonemes were perceived as challenging by over 51% of the participants, representing the highest percentage in the results of the questionnaire. Specifically, /θ/ was frequently mispronounced in all positions within words although the questionnaire results indicated that word-initial and word-medial were considered especially difficult. Examples include *thin*, *healthy*, and *bath*, where /θ/ was pronounced as /s/ or /t/ at word-initial, as /s/ or /ʃ/ in word-medial, and with /s/ or no sound at word-ending position. As for /ð/, it was frequently mispronounced by replacing it with /z/ or /d/ at word-initial and word-medial positions such as *that* and *together*. The above two fricative alternatives were mentioned by Bada (2001) in Chapter 2, and the results of this study support this conclusion. In the present study, /θ/ was mispronounced more frequently than /ð/, indicating that /θ/ is more challenging. This aligns with the questionnaire results, confirming that participants' perceptions corresponded with their actual performance outcomes.

Third, this paragraph continues with a discussion on the word-ending /d/ and /m/. The word-final plosive /d/ was deemed difficult by 32.7% of the participants in the questionnaire but was also a problem in actual performance. Examples of word-ending /d/ include *side*, *tired*, and *hard* being pronounced as /do/ or /t/, or omitted, as discussed by Smith (2012) in Chapter 2. In this regard, the results of this study also agreed with the findings of Kimura (2022). On the other hand, the analysis of the recorded data revealed that the voiced bilabial nasal /m/ presented minor

issues although the phonemes /b, h, j, m/ are generally considered easy for Japanese speakers to pronounce (Kimura, 2022; Kitao, 1995b) and were therefore excluded from the questionnaire on consonants. It was mispronounced by replacing /n/, /mu/ or dropping the sound, for example in *swim*, *ham* and *breem*. The mispronunciation of these two phonemes shares a common feature: the addition of a vowel at the end of the word, as in *hard* pronounced as /hɑ:do/ and *ham* as /hæmu/, reflecting L1 interference and a katakana English adaptation in the participants' speech. Yamane (2006 in Yamane, 2015) has indicated that the addition of vowels such as /o/ or /u/ to word-endings does not pose a significant barrier for native speakers in understanding the pronunciation of Japanese learners. This finding is consistent with the questionnaire results, confirming that participants' perceptions on /d/ were aligned with their actual performance outcomes.

Fourth, /v/ emerged as a common problem element in all three recording conditions, as /v/ is a fricative phoneme absent in Japanese (Kimura, 2022; Kitao, 1995b; Ohata, 2004). Specifically, /v/ was often mispronounced as /b/ (Higurashi, 2020; Kavanagh, 2007) in all positions, as seen in words such as *very*, *leaves* and *love*. Although Bada (2001) considered it a minor issue, other studies (Higurashi, 2020; Kavanagh, 2007; Kimura, 2022; Kitao, 1995b) have identified /v/ as a significant challenge. Therefore, the finding on /v/ in this study was consistent with the findings of previous studies.

Lastly, this paragraph discusses the fricative /ʃ/ and the affricate /tʃ/. Interestingly, the fricative /ʃ/, known as a fricative phoneme, absent in Japanese (Ohata, 2004), was unexpectedly identified as a challenging phoneme in word-initial and as a minor issue in word-medial positions to the participants in this study, although it was selected as a minor challenging phoneme by only 14.3% of participants in the questionnaire for word-initial position. Specifically, in the diagnostic word list, /ʃ/ in *ship* was frequently mispronounced as /s/ in the word-initial position, and similarly in the word-medial position of *championship* in passage 3. This revealed a gap between the participants' perception and their actual performance. By contrast, a study by Ohata (2004)

indicated a tendency to pronounce /s/ as /ʃ/. Additionally, Kavanagh (2007) remarked that such errors were limited to a small number of beginners. A closer examination revealed that participants C, D, and L consistently mispronounced both words, indicating that this was a recurring issue for these individuals. These three in particular had a high frequency of mispronunciations throughout the entire recorded data analysis results, which can be interpreted as a problem among a limited number of learners. While Bada (2001) regarded /ʃ/ as a minor problem, Kimura (2022) claimed that /ʃ/ was a relatively straightforward phoneme. However, in this study, the results showed that when regarding the affricate /tʃ/, 38.8% of participants identified it as difficult in word-initial positions. This difficulty was also confirmed in actual performance, but it was more frequently observed in word-medial rather than word-initial positions. Specifically, the affricate /tʃ/ in *branches* from passage 4 was mispronounced as /tsu/ (ツ) or /tsui/ (ツイ) in the word-medial position. This mispronunciation can be attributed to the difficulty of producing /tʃ/ with protruded lips, as highlighted in Table 37. Although a similar sound exists in Japanese, the articulatory requirement makes it challenging. Additionally, the plural form *branches* may have further complicated pronunciation compared to the singular form *branch*.

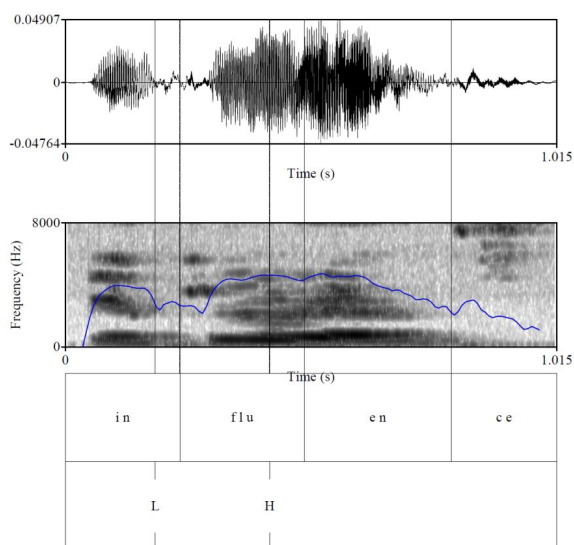
In summary, the mispronunciations of vowels and consonants by the participants in this study can be primarily attributed to L1 interference, and the lack of certain phonetic features required in L2 that do not exist in L1, leading to significant differences in tongue placement (Nishikiori, 2001; Ohata, 2004; Smith, 2012). Specifically, issues related to the phonological distinction between /l/ and /r/ (Higurashi, 2020) and the inappropriate application of L1 phonological rules to L2 (Ohata, 2004; Wells, 1999) are notable. Bada (2001) describes this phenomenon as ‘direct native language transfer’. A means to address this issue will be discussed in section 5.3.2 Practical implications.

5.1.2.2. Suprasegmental features

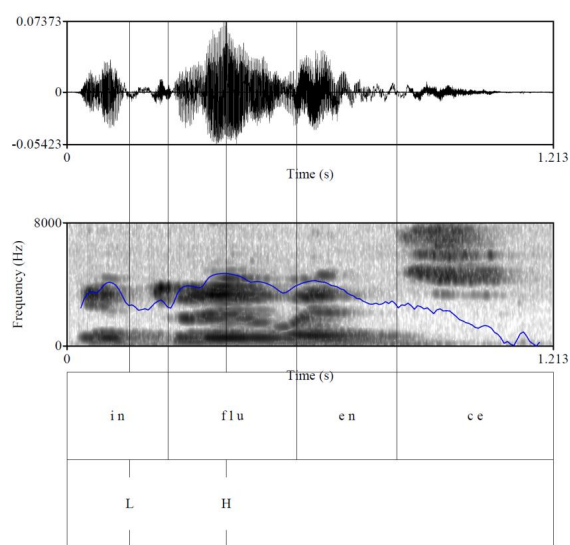
Significant suprasegmental issues, particularly in word stress and intonation (pitch) for the words *influence* and *annual*, were identified. These issues were discovered by the primary researcher, confirmed for intelligibility with an Australian associate professor, and further validated using Praat (Boersma & Weenink, 2023). As noted by Roach (2000: 45), many essential sound contrasts are not simply due to differences between phonemes. This section will briefly address suprasegmental issues, specifically focusing on word stress and intonation (pitch) along with the intelligibility assessments of two human raters.

5.1.2.2.1. Stress (word stress)

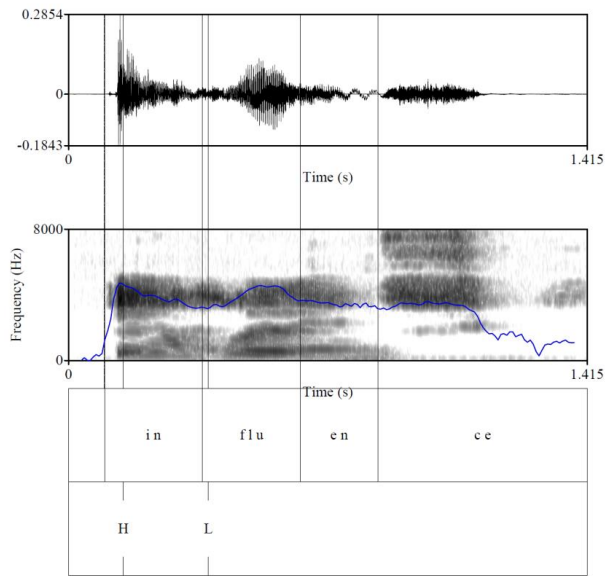
The analysis of word stress focused on comparing participants who incorrectly stressed the words with those who used stress correctly as well as with female native speakers in Oxford Learner's Dictionaries, using Praat-generated visualisations. The waveform, spectrogram, segment and tone were marked from the top. The analysis focused on the waveform and intensity (indicated in blue). The figures below illustrate the stress patterns of participants E and F, who misplaced the stress in the word *influence*, compared to participant A and a native speaker, who placed the correct word stress.



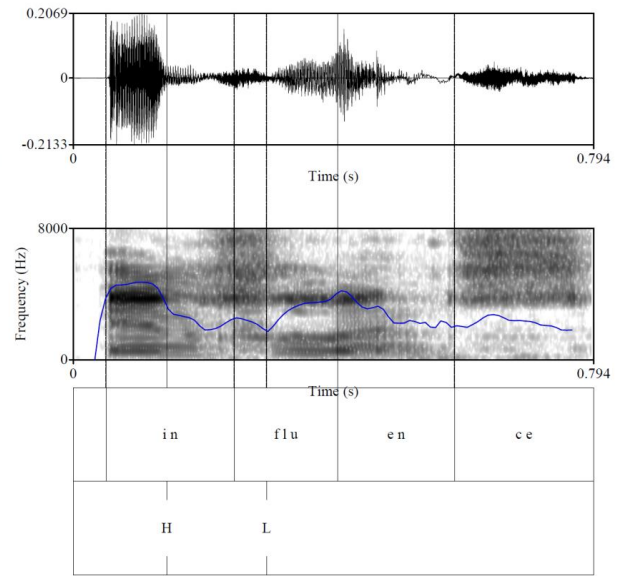
Participant E (Figure 3)



Participant F (Figure 4)



Participant A (Figure 5)



Female native speaker (Figure 2)

Comparison of the waveforms and intensity patterns of participants E and F, who misplaced the stress, with those of participant A and the native speaker revealed distinct differences. Participant A's waveform was closer to that of the native speaker, while E and F's waveforms differed significantly. Regarding intensity, E and F showed the highest peak in the second syllable due to misplaced stress, whereas A and the native speaker exhibited the highest intensity in the first syllable, reflecting correct stress placement. Thus, although participant A's waveform and intensity patterns did not fully match those of the native speaker acoustically, it can be said that her pronunciation was still sufficiently intelligible because of the correct placement of the word stress. In contrast, it can be inferred that the pronunciation of participants E and F may be somewhat less intelligible.

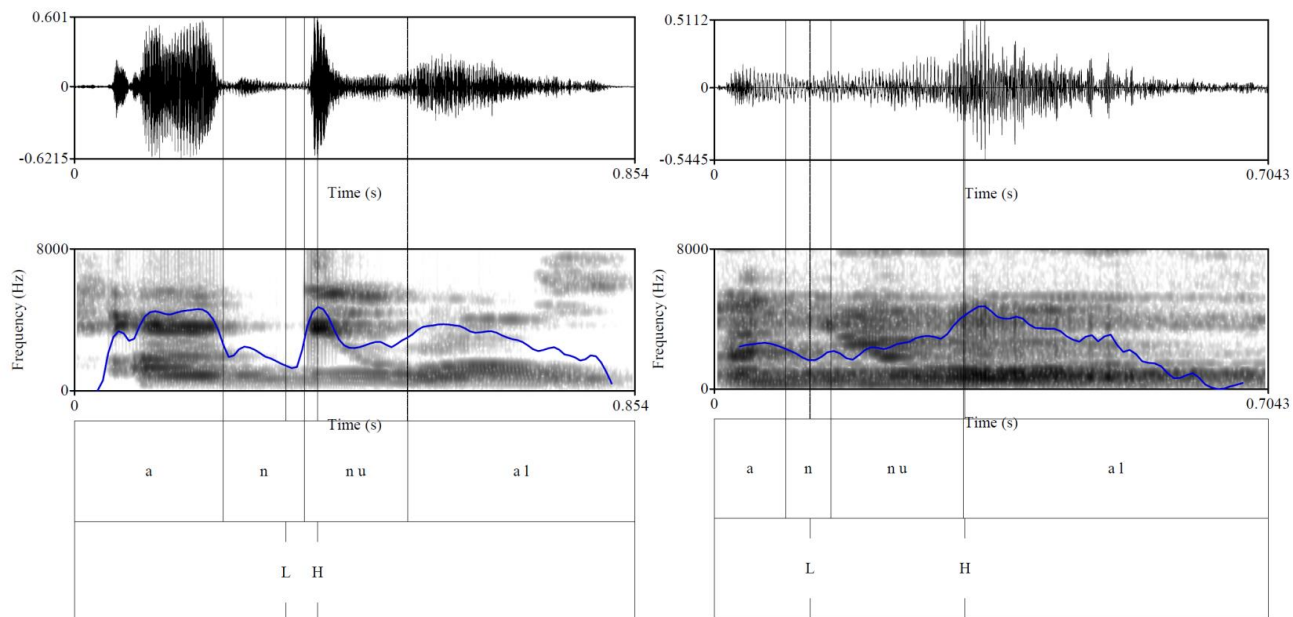
To compare the acoustic evaluations with human assessments, the intelligibility ratings from both raters are summarised in the table below, as presented in Chapter 4. The rating scale, introduced in Section 3-7, includes four levels: *perfectly intelligible*, *fairly intelligible*, *relatively intelligible*, and *unintelligible*. Rater 1 is the primary Japanese researcher of this study, while Rater 2 is an Australian associate professor.

Participant	Stress Placement	Rater 1: (Japanese)	Rater 2: (Australian)
E	Misplaced	Relatively intelligible	Fairly intelligible
F	Misplaced	Fairly intelligible	Fairly intelligible
A	Appropriately placed	Perfectly intelligible	Perfectly intelligible

Table 40: Assessment Results on Intelligibility: *influence*

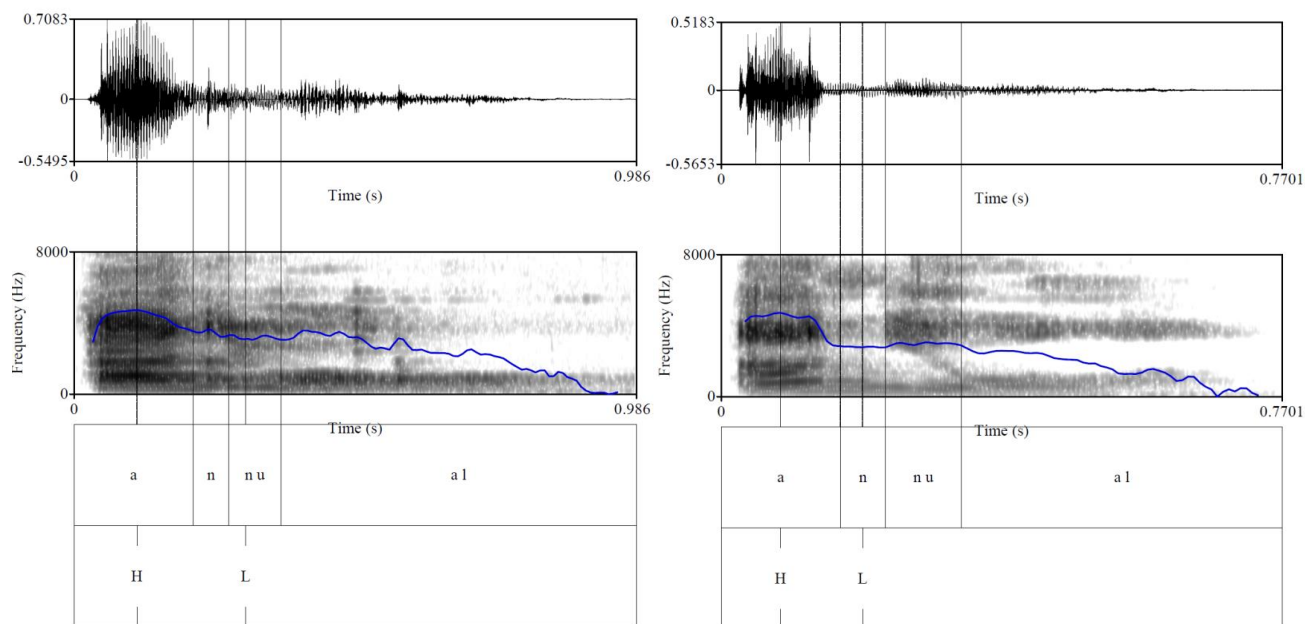
As illustrated in Table 16, participant E, who placed the stress incorrectly, was rated as *relatively intelligible* by rater 1 and *fairly intelligible* by rater 2. Participant F was consistently rated as *fairly intelligible* by both raters. In contrast, participant A, who correctly placed the stress, received a *perfectly intelligible* rating from both raters. Although minor discrepancies were observed between the raters, the overall results were largely consistent. In Chapter 3, it was mentioned that in the speech of non-native English speakers, correct pronunciation of segments is considered more important than proper prosody (Jenkins, 2000; Yamane, 1999). Conversely, it is suggested that native English speakers are more likely to understand speech when the segments are incorrect, but the stress and intonation are accurate (Wells, 2006: 2; Anderson-Hsieh, Johnson & Koehler, 1992). However, in this study, the opposite phenomenon occurred among the two raters involved. Rater 1, the Japanese primary researcher, found the speech less intelligible despite clear segmental pronunciation due to incorrect stress placement within the word. On the other hand, rater 2, the Australian native speaker, found the speech fairly intelligible due to the clear segmental pronunciation, despite the misplaced stress. Therefore, this minor discrepancy in evaluation can likely be attributed to this phenomenon.

The discussion continues with the word *annual*. The figures below illustrate the stress patterns of participants H and M, who misplaced the stress, compared to participant K and another native speaker, who used the correct word stress.



Participant H (Figure 7)

Participant M (Figure 8)



Participant K (Figure 9)

Female native speaker (Figure 6)

Comparison of the waveform and intensity between participants H and M, and participant K, revealed that participant K's waveform and intensity closely resembled those of the native speaker. As for intensity, participants H and especially M showed the highest peak in the second syllable due to misplaced stress, whereas both participant K and the native speaker displayed the

highest intensity in the first syllable, indicating correct stress placement. Thus, as illustrated in the above figures, it can be inferred that the pronunciation of participants H and M, with misplaced stress on the second syllable, may be less intelligible. In contrast, participant K's pronunciation closely mirrored the waveform and intensity patterns of the native speaker, suggesting a high degree of intelligibility. Next, the discussion addresses human assessments in addition to acoustic evaluations.

Participant	Stress Placement	Rater 1: (Japanese)	Rater 2: (Australian)
H	Misplaced	Fairly intelligible	Fairly intelligible
M	Misplaced	Fairly intelligible	Fairly intelligible
K	Appropriately placed	Perfectly intelligible	Perfectly intelligible

Table 41: Assessment Results on Intelligibility: *annual*

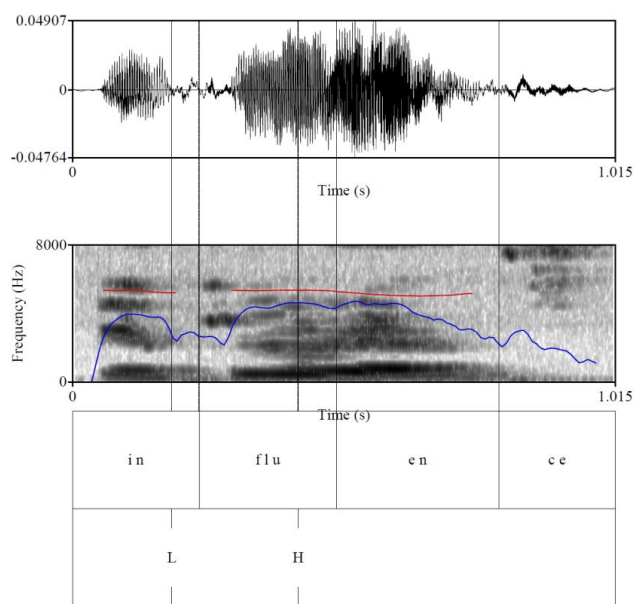
Table 41 shows that participants H and M, who incorrectly placed the stress, were rated as *Fairly intelligible* by both raters. In contrast, participant K, who correctly placed the stress, received a rating of *Perfectly intelligible* from both raters. The assessments were consistent across both raters. Notably, rater 2 described participant K's pronunciation as 'near-native', which was also agreed by rater 1.

Both acoustic analyses and human assessments indicate that proper word stress enhances intelligibility. Despite misplacing word stress, participants E, F, H, and M pronounced each phoneme clear enough for their language to remain above a level that would cause misunderstanding.

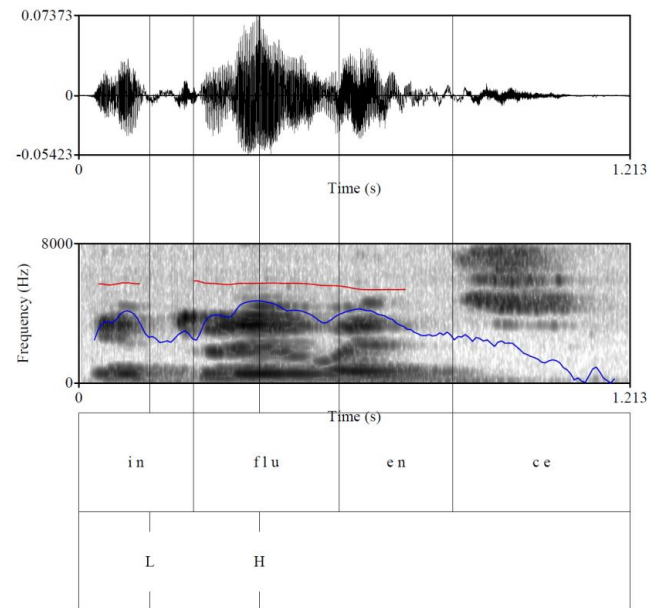
5.1.2.2.2. Intonation (pitch)

The analysis of intonation also focused on comparing participants who misplaced the stress with those who correctly placed it, as well as with female native speakers in Oxford Learner's Dictionaries, using Praat-generated visualizations. As shown earlier, the waveform,

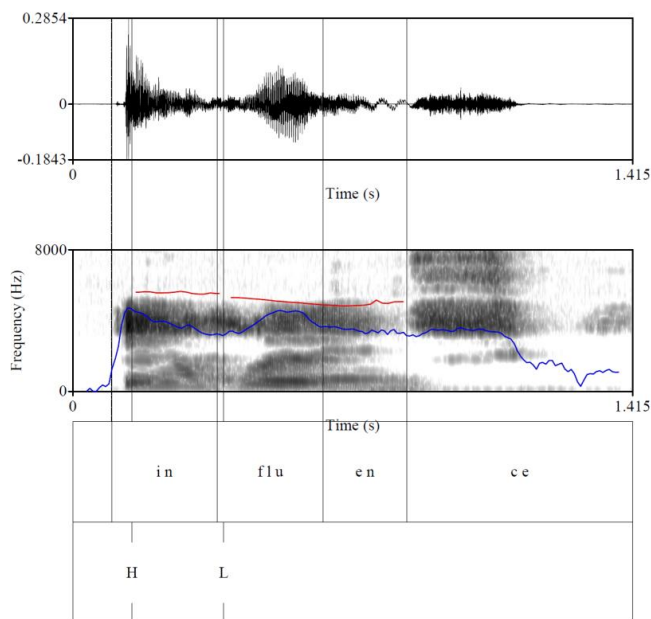
spectrogram, segment and tone were marked from the top. The spectrogram part also shows pitch movement in red in addition to intensity in blue. The analysis mainly focused on the pitch movement. The figures below illustrate the pitch movements of participants E and F, who mispronounced the word *influence*, compared to participant A and a native speaker, who pronounced the target word correctly.



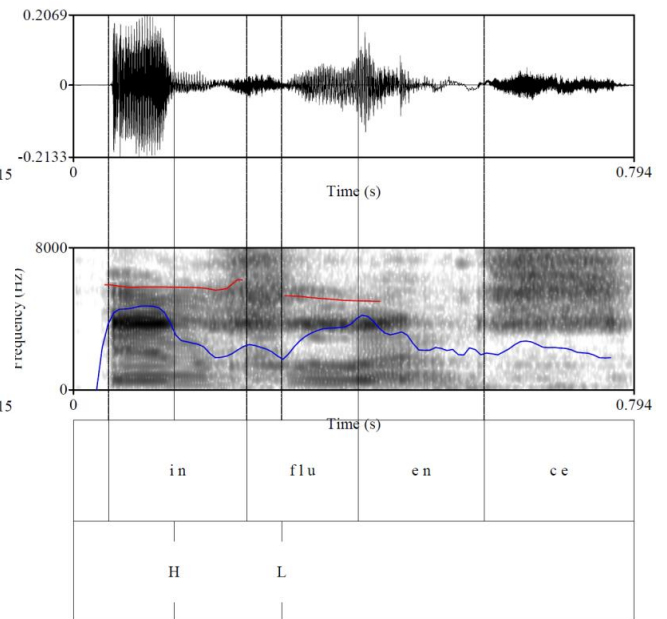
Participant E (Figure 12)



Participant F (Figure 11)

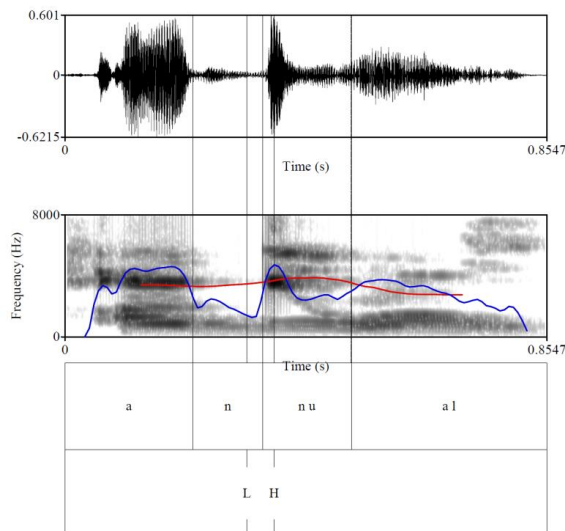


Participant A (Figure 13)

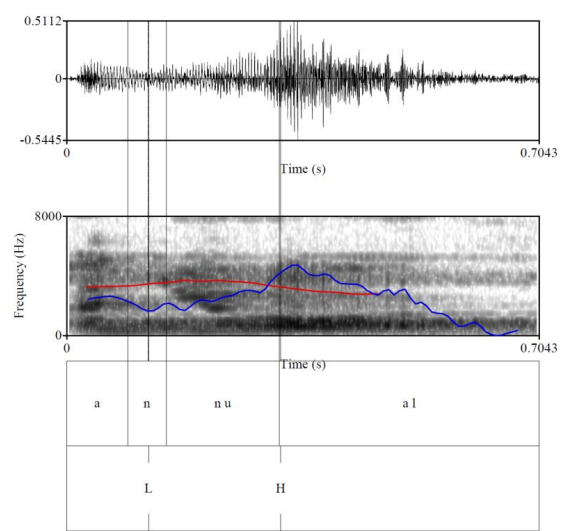


Female native speaker (Figure 10)

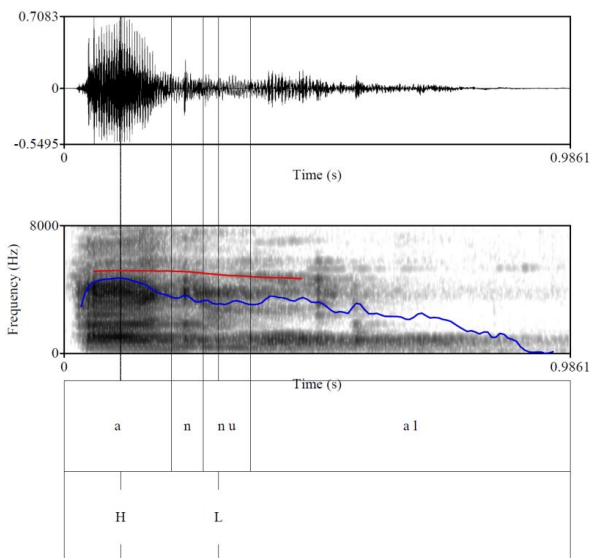
When comparing the pitch movements of participants E and F, who misplaced the stress, with participant A, who placed the stress correctly, only minor differences were observed. Specifically, participant A's pitch slightly rose on the first syllable and then dropped on the second, remaining relatively flat overall. Besides, participant F and especially participant E exhibited consistently monotonous pitch patterns. On the other hand, the native speaker's pitch sharply rose at the end of the first syllable and gradually declined on the second. Interestingly, regardless of whether stress was correctly placed, as in the case of participant A, or misplaced, as with participants E and F, it was found that the pitch patterns for all three were generally flat. Thus, although participant A's pitch did not align with that of the native speaker and was similarly flat to that of participants E and F, who misplaced the stress, participant A's pronunciation was still deemed sufficiently intelligible based on both acoustic analysis of stress and human rater assessments, as in Table 16. In contrast, despite the similarity in pitch to that of participant A, the pronunciations of participants E and F remained less intelligible because of the misplacement of the stress.



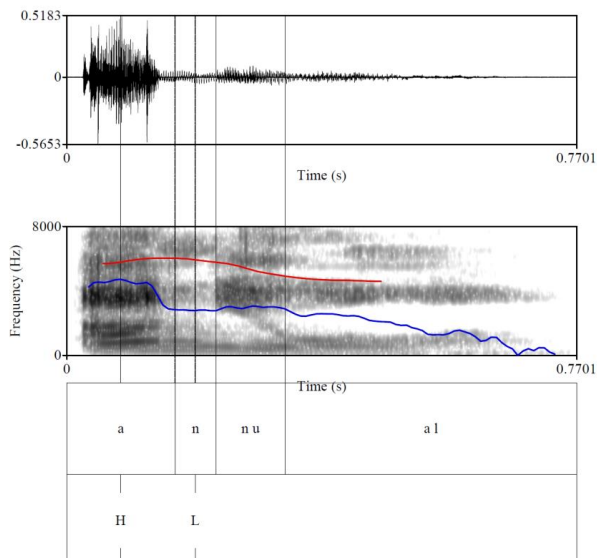
Participant H (Figure 16)



Participant M (Figure 15)



Participant K (Figure 17)



Female native speaker (Figure 14)

A comparison of the pitch movements between participants H and M, who misplaced the stress, and participant K, who correctly placed it, showed that all three had generally similar pitch patterns. Both H and M exhibited slight pitch variations across syllables, while participant K displayed a relatively flat pitch despite correct stress placement. In contrast, the native speaker's pitch peaked at the first syllable and gradually declined in intensity through the subsequent syllables. These findings echoed the results observed for the word *influence*. Despite participant K's pitch being as flat as that of participants H and M, who misplaced the stress, K's pronunciation was still considered highly intelligible based on both acoustic analysis on stress and human rater assessments. While participant K's pronunciation was rated as perfectly intelligible by both raters as in Table 41, additional intonation training could improve the naturalness and clarity of her speech more, as greater pitch variation is often associated with more natural-sounding English (Yabuuchi & Sato, 2001). In spite of having similar pitch patterns to participant K, the pronunciations of participants H and M were less intelligible due to incorrect stress placement, similar to participants E and F.

Although the suprasegmental analysis and discussion in this study focused on the word level rather than the sentence level, findings related to word stress and intonation (pitch) were observed. Based on the results above, it has been demonstrated through both acoustic analysis and human rater assessments that misplacement of word stress by L2 English learners affects intelligibility, as discussed by Celce-Murcia et al. (2010: 212), Roach (2009: 79), and Yamane (2015). This also likely impacts listening errors (e.g. misunderstanding the meaning of a word), as noted by Benrabah (1997) and Yamane (2006 in Yamane, 2015). However, when asked why participants E and H were rated as *Fairly Intelligible* despite the significantly misplaced stress, rater 2 explained that the phonemes were clearly articulated, making the pronunciation intelligible even with the incorrect stress placement. As Zielinski (2008) suggested, the key to improving the intelligibility of English pronunciation is a combination of the correct placement of word stresses and the correct pronunciation of vowels and consonants in strong syllables. On the other hand, the English intonation system is considered one of the most important and complex aspects of English prosody (Roach, 2000; Wells, 2006). As mentioned earlier, this study focused solely on the word level rather than the sentence level, leading to interesting observations primarily related to pitch movements. Specifically, regardless of stress placement, the pitch movements of participants A, E, F, H, K, and M were generally flat. It is likely related to the tendency of Japanese English learners to maintain monotonous intonation throughout sentences, as discussed in Chapter 2-4.2. However, this did not correlate with the intelligibility assessments. As Jenkins (2000) notes, intonation is the most challenging aspect of language acquisition to master until the very end of the language acquisition journey, even for near-native speakers like participant K, suggesting that it may represent the final hurdle in achieving complete proficiency.

5.2. Addressing Research Questions

5.2.1. Research Question 1

The first research question was which phonemes Japanese learners of English found difficult to produce in an intelligible manner. In order to address this research question, the results of Part 2 of the questionnaire were summarised in Table 47, divided into vowels and consonants. The table organises the phonemes perceived as difficult, the words asked in the questionnaire, and the corresponding percentages. As previously mentioned, the threshold for ‘difficult’ was set at responses above 30%. Additionally, the positions of consonant phonemes are indicated in brackets.

		Difficult Phonemes	Words in Questionnaire	Percentages (%)
Vowels	Short vowels	/æ/	a pple	44.90%
		/ʌ/	ru n	30.60%
		/ʊ/	ann u al	30.60%
	Long vowels	/ɜ:/	ea rry, he r	46.9%, 32.7%
		/ɑ:/	pa rt	42.90%
	Diphthongs	/ʊə/	to urist, su re, po or	42.9%, 38.8%, 40.8%
		/eə/	ha ir	36.70%
		/əʊ/	lo w	36.70%
	Consonants	/θ/	th in, au thor	51%, 61.2% (word-initial & medial)
		/ð/	ba th	55.10% (word-ending)
		/d/	ar ou nd	32.70% (word-ending)
		/tʃ/	ch in	38.80% (word-initial)

Table 47: Summary of opinions on vowels and consonants

Table 47 above clearly shows which phonemes were perceived as difficult, providing an answer to the first research question. These include eight vowels—specifically three short vowels (/æ/, /ʌ/, /ʊ/), two long vowels (/ɜ:/, /ɑ:/), and three diphthongs (/ʊə/, /eə/, /əʊ/)—as well as four consonants (/θ/, /ð/, /d/, /tʃ/). Surprisingly, consonant phonemes, /l/ and /r/ were not included in

this list, with responses instead focusing on /θ/ and /ð/. However, it is important to note that /l/ and /r/ should not be discounted, as the survey results indicated that 20.4% of respondents considered these phonemes difficult. Additionally, as discussed in this chapter 5.1.1.2.1, some participants noted that the presence of *r* before or after a vowel made pronunciation even more difficult (see Table 43).

The significance of these findings lies in revealing that specific vowels and consonants were perceived by Japanese English learners as challenging, particularly highlighting the unexpected recognition that /θ/ and /ð/ are far more difficult than /l/ and /r/, as well as the influence of the presence of ‘r’ on vowel pronunciation. Furthermore, it is also evident that vowels are generally perceived as more difficult to pronounce than consonants, which can inform targeted pronunciation instruction. The suggestions to address these issues will be proposed in section 5.3.2 Practical Implications.

5.2.2. Research Question 2

The second research question aimed to identify difficult phonemes in learners' actual performance and examine their impact on intelligibility. In order to address this research question, the results of the recorded data analysis were summarised in Table 48, categorised into vowels and consonants. This table organises the three recording conditions (diagnostic word list, short passages, spontaneous speech), short vowels, long vowels, diphthongs and consonants.

Recording Conditions	Short vowels	Long vowels	Diphthongs	Consonants
Diagnostic word list	/æ/, /ʌ/, /u/, /e/	/ɔ:/, /ɜ:/, /ɑ:/	/əʊ/, /ʊə/	/l, r, θ, ð, d, v, ʃ, m/
Short passages	/æ, ʌ/	/ɔ:/	/əʊ/	/l, r, θ, ð, d, v, ʃ, m, tʃ/
Spontaneous speech	/æ/	/ɔ:/, /ɜ:/, /ɑ:/	/əʊ/	/l, r, θ, ð, d, v/

Table 48: Summary of problematic vowels and consonants in actual speech

Table 48 clearly identifies the phonemes that were challenging in actual performance, answering the second research question. These challenging phonemes include nine vowels across the three recording conditions—four short vowels (/æ/, /ʌ/, /ʊ/, /e/), three long vowels (/ɔ:/, /ɜ:/, /ɑ:/), and two diphthongs (/əʊ/, /ʊə/)—along with nine consonants (/l/, /r/, /θ/, /ð/, /d/, /v/, /ʃ/, /m/, /tʃ/). As for impacts on intelligibility, in minimal pairs such as the vowels in *heard* and *hard* or the consonants in *flame* and *frame* from the diagnostic word list are not accurately distinguished—particularly the long vowels /ɜ:/ and /ɑ:/, or the consonants /l/ and /r/—it can be difficult for the listener to understand. However, in short passages and spontaneous speech, the context and flow of the conversation can make the utterance *relatively intelligible* or even *fairly intelligible*, even if the sound distinctions are not accurate. However, mispronunciation as well as misplaced word stress can greatly increase the possibility of *unintelligible* utterances.

These findings are significant because they highlight the specific phonemes that affect intelligibility in real speech situations, especially when minimal pairs involving long vowels (/ɜ:/, /ɑ:/) and consonants (/l/, /r/) are not properly distinguished. While context can aid intelligibility in spontaneous speech, mispronunciations and misplaced word stress notably increase the likelihood of communication breakdowns. Suggestions to address these issues will also be presented in section 5.3.2 Practical Implications.

5.2.3. Sub question A

Furthermore, three sub questions were also explored. Sub-question A asked whether participants' pronunciation of these phonemes differed across word list performance, reading passages aloud, and spontaneous speech. In order to address this, the recorded data analysis was summarised by the three recording conditions, as shown in Table 48. Table 48 clearly identifies which phonemes were challenging under each condition, thus addressing sub-question A. In short, different phonemes presented difficulties depending on the condition. Specifically, the diagnostic word list identified the greatest number of problematic phonemes, 17 in total: nine vowels—four

short vowels (/æ/, /ʌ/, /ʊ/, /e/), three long vowels (/ɔ:/, /ɜ:/, /ɑ:/), and two diphthongs (/əʊ/, /ʊə/)—as well as eight consonants (/l/, /r/, /θ/, /ð/, /d/, /v/, /ʃ/, /m/). In the short passages, a total of 13 phonemes were identified as challenging: four vowels—two short vowels (/æ/, /ʌ/), one long vowel (/ɔ:/), and one diphthong (/əʊ/)—along with nine consonants (/l/, /r/, /θ/, /ð/, /d/, /v/, /ʃ/, /m/, /tʃ/). In spontaneous speech, the fewest phonemes were identified as difficult, with a total of 11 challenging sounds: five vowels—one short vowel (/æ/), three long vowels (/ɔ:/, /ɜ:/, /ɑ:/), and one diphthong (/əʊ/)—and six consonants (/l/, /r/, /θ/, /ð/, /d/, /v/). The reason for the smaller number of problematic phonemes in spontaneous speech is likely due to participants choosing words that are easier for them to articulate and pronounce.

The significance of these findings is that they demonstrate how phoneme difficulty varies across different speaking conditions, with the most challenges identified in controlled tasks like a diagnostic word list, and fewer difficulties in spontaneous speech where participants may naturally avoid problematic phonemes. This insight is valuable for understanding the influence of task type on pronunciation accuracy.

5.2.4. Sub question B

Sub-question B asked whether the participants were aware of where their difficulties lay. To address this, Table 49 was compiled, summarising the results from Part 2 of the questionnaire alongside the recorded data analysis, divided into vowels and consonants. The table categorises the phonemes that participants perceived as difficult and those that were challenging in their performance.

		Perceived Difficult	Actually Difficult
Vowels	short vowels	/æ/, /ʊ/, /ʌ/	/æ/, /ʊ/, /ʌ/, /e/
	long vowels	/ɜ:/, /ɑ:/	/ɜ:/, /ɑ:/, /ɔ:/
	diphthongs	/ʊə/, /əʊ/, /eə/	/ʊə/, /əʊ/

Consonants			/l/ (word-initial, medial & ending)
			/r/ (word-initial, medial & ending)
		/θ/ (word-initial & medial)	/θ/ (word-initial, medial & ending)
		/ð/ (word-ending)	/ð/ (word-initial)
		/d/ (word-ending)	/d/, /m/ (word-ending)
		/tʃ/ (word-initial)	/tʃ/ (word-medial)
			/f/ (word-initial & medial)
			/v/ (word-initial, medial & ending)

Table 49: Summary of problematic phonemes (perception and reality)

Table 49 above clearly shows which phonemes were perceived as difficult (left) and challenging in actual performance (right), providing an answer to the sub-question B. In addition, phonemes that were challenging but not consciously recognised by the participants are indicated in red, while those perceived as difficult but not actually problematic are in blue. As shown in the table, noticeable highlights in red and blue in each column vividly indicate that there is a significant gap between the degree of perceived difficulty and the actual degree of difficulty.

The significance of these findings lies in the way in which they reveal the discrepancy between participants' perceptions of phoneme difficulty and their actual performance and highlight areas where learners may misjudge their pronunciation challenges. This gap underscores the need for targeted instructional strategies that address both perceived and actual difficulties in phoneme articulation to improve overall pronunciation skills.

5.2.5. Sub question C

The final sub-question C asks whether stress or intonation had the greater impact on learners' intelligibility. In the present study, stress was found to have a greater impact on intelligibility (Celce-Murcia et al., 2010: 212; Roach, 2009: 79; Yamane, 2015). As shown in 5-1.2.2. of this chapter, participants (A, K) who placed stress correctly were more intelligible, even

with flat intonation (pitch), compared to those with incorrect stress (E, F, H, M). This was supported by the raters' assessments (Tables 16 & 17). Although this sub question was the only one related to suprasegmental features, it was able to draw a clear answer for the participants in this study.

These findings underscore the critical role of stress in enhancing intelligibility among learners, indicating that correct stress placement can significantly improve communication effectiveness, even in the presence of flat intonation. This highlights the importance of focusing on stress in pronunciation instruction for English language learners. Recommendations for addressing these issues will be outlined in section 5.3.2 Practical Implications (Group B).

5.3.Implications

The final aim of this study is to offer advice on theoretical and practical implications for learning and teaching English pronunciation in Japan. This relates primarily to the first and second research questions, as well as sub-questions B and C. As detailed in Chapters 3, 4, and 5, the study identified which phonemes Japanese learners of English found challenging to pronounce, the phonemes that were difficult in actual performance, their impact on intelligibility, ~~the~~ learners' awareness of these difficulties, and whether stress or intonation had a greater impact on learners' intelligibility. In the following sections, the theoretical implications will first be considered by aligning the findings with existing phonological theories and exploring potential contributions, including new insights in order to enhance our understanding of English pronunciation. Secondly, the practical implications will focus on identifying potential learning goals for Japanese English learners in educational and practical settings, supported by the findings of this study.

5.3.1. Theoretical Implications

The theoretical implications of this study underscore the significance of vowel articulation challenges for Japanese learners of English, particularly with vowels like /æ/, /ɔ:/, and /əʊ/, which were consistently identified as the most difficult across short, long vowels, and diphthongs, respectively, in all recording conditions. These findings align with prior research (Higurashi, 2020; Ohata, 2004) that highlights the limited vowel system in Japanese, specifically the presence of only one /a/ sound. This study supports the idea that Japanese learners encounter difficulties with English vowels that require more complex articulatory movements, such as /æ/, /ʌ/, /ə/, and /ɒ(a)/. The contrast between the minimal articulatory effort needed for the Japanese vowel /a/ (Nishikiori, 2007) and the more intricate movements involved in producing English vowels (Celcer-Murcia, Brinton, & Goodwin, 1996; Saito & Lyster, 2012) reinforces the need to address these challenges in pronunciation teaching for Japanese learners. Besides, the findings of this study emphasise the significant role of L1 phonological interference, particularly from Japanese phonological structures and *katakana* pronunciation, in the misarticulation of English long vowels and diphthongs by Japanese learners. Although the long vowel /ɔ:/ was not perceived as particularly challenging in the questionnaire, the actual substitutions of /ɔ/, /əʊ/, and /ɑ:/ observed in words like *saw*, *drawing*, and *warm* align with previous research (Bada, 2001), which suggests that Japanese learners' phonological system lacks a direct equivalent for these sounds, often leading to shortened vowel production. The substitution of /əʊ/ by /ɔ:/ in commonly mispronounced words with *katakana* equivalents, such as *open*, *old*, and *show*, further illustrates the strong influence of *katakana* on English diphthong production (Kitao, 1995a). These findings substantiate the claim that L1 phonological interference, especially through *katakana*, plays a critical role in shaping pronunciation errors among Japanese learners, highlighting the need to address this interference in pronunciation pedagogy.

Moreover, the findings of this study reinforce the persistent challenges Japanese learners face with specific consonant phonemes, particularly /l/, /r/, /θ/, /ð/, /d/, and /v/, which are shaped

by L1 phonological interference and the absence of certain sounds in Japanese. Although /l/ and /r/ were identified as problematic by only 20.4% of participants in the questionnaire, the significant number of mispronunciations in minimal pairs like *play/pray* highlights the difficulty learners have in distinguishing these sounds, consistent with earlier studies (e.g., Celce-Murcia, et al., 1996; Goto, 1971; Kenworthy, 1987; Pennington, 2014; Riney, Takada & Ota, 2000). Contrary to some previous research (Kimura, 2022; Kitao, 1995b), which suggested that /l/ was more challenging, this study found that /r/ presented more frequent errors, underscoring ongoing difficulties with this phoneme (Bada, 2001; Matsusaka, 1994; Okada, 1999). Similarly, the study confirmed the well-documented challenges with fricatives /θ/ and /ð/ (Jenkins, 2000; Maddieson, 1984), particularly with /θ/, which was often substituted as /s/, /t/, or /ʃ/, especially in word-initial and word-medial positions (e.g., *thin, healthy, bath*) in this study. These findings align with Maddieson's (1984) view of /θ/ as a difficult phoneme for speakers of many languages, especially non-native speakers of English. The findings of this study also support the view that /θ/ is more challenging than /ð/, confirming the participants' perceptions and actual performance outcomes. Additionally, challenges with the plosive /d/ in word-final positions, frequently realised as a vowelised or omitted sound, reflect *katakana* influences in learners' speech, reinforcing the notion that L1 phonological structures significantly shape consonant mispronunciations (Kimura, 2022; Smith, 2012). Furthermore, the difficulties with /v/, often replaced with /b/ in words like *very* and *love*, align with earlier research on the absence of this phoneme in Japanese (Higurashi, 2020; Kavanagh, 2007; Kimura, 2022; Kitao, 1995b). Collectively, these findings substantiate previous research while deepening our understanding of how L1 interference affects the articulation of consonants among Japanese learners of English, contributing to the theoretical framework surrounding second language phonology.

These results, which find certain phonemes to be consistently difficult for Japanese English learners, are consistent with previous research, but the present study also identified phonemes where this was not the case. First, the fricative /ʃ/, typically absent in Japanese (Ohata,

2004), was unexpectedly challenging for some participants in both word-initial and word-medial positions in this study. For example, /ʃ/ in *ship* was often mispronounced as /s/, and the same issue occurred with *championship*. In contrast to Ohata's (2004) observation that /s/ is often pronounced as /ʃ/ and Kavanagh's (2007) claim that such errors are common among beginners, this study found the opposite: participants C, D, and L mispronounced /ʃ/ as /s/. Although Bada (2001) viewed this as a minor issue and Kimura (2022) argued that /ʃ/ was relatively easy, this mispronunciation pattern was notably present in these participants in this study. Second, in the questionnaire used for this study, 38.8% of participants perceived /tʃ/ as difficult in word-initial positions, but mispronunciations were more frequent in word-medial positions, particularly in words like *branches*, where it was pronounced as /tsu/ or /tsui/ as the plural form. This difficulty likely arose from the articulatory challenge of producing /tʃ/ with protruded lips.

These results reinforce the importance of addressing these articulatory challenges in pronunciation instruction for Japanese learners of English.

5.3.2. Practical Implications

As stated in Chapter 3, previous studies indicate that accurate segmental pronunciation is more important than appropriate prosody in conversations among non-native English speakers (Jenkins, 2000; Yamane, 1999). On the other hand, native English speakers find utterance with correct stress and intonation but inaccurate segmental pronunciation easier to understand (Anderson-Hsieh, Johnson & Koehler, 1992; Wells, 2006: 2). Therefore, this study examined both segmental and suprasegmental features.

In light of the above, this study has also considered whether segmental or prosodic features should be more important for Japanese learners of English. According to Kachru's (1985) three-circle model, Japan falls within the 'expanding circle', where English is taught as a foreign language. Given this context, what objectives should be set for Japanese undergraduate students with a certain level of English proficiency, such as the participants in this study? The following

paragraph will outline the key aspects of English pronunciation that should be prioritised, focusing mainly on segmental features while also addressing certain suprasegmental aspects, as pedagogical goals for this particular group of learners.

As reported in Chapter 4, the pronunciation analysis of the 14 participants revealed two main groups: those with prominent consonant issues and those without (Table 42). Considering O'Connor's (1980: 24) assertion that consonants form the *skeleton* of a word, and Yamane's (2015) emphasis on the importance of correct consonant pronunciation for maintaining intelligibility, this section will propose trends and potential pedagogical goals for these groups.

	Participants	Vowels	Consonants	No. of Mistakes	TOEIC score
1	K	4	1	5	555
2	B	7	0	7	700
3	F	3	3	6	620
4	M	8	2	10	715
5	H	4	6	10	not reported
6	I	8	3	11	450
7	J	11	5	16	485
8	G	6	13	19	602
9	A	11	9	20	665
10	L	8	16	24	495
11	N	14	11	25	400
12	E	9	18	27	665
13	D	10	23	33	480
14	C	10	19	29	500

Table 42: Summary of pronunciation mistakes (diagnostic word list)

As shown in Table 42, the group with prominent consonant issues (Group A), represented in grayscale, includes seven participants (G, A, L, N, E, D, C). The other seven participants (K,

B, F, M, H, I, J) belong to Group B, where consonant issues are less prominent. Comparing these two groups with a focus on consonants, which are the *skeleton* of words (O'Connor's, 1980), it is evident that participants of Group A exhibit more consonant errors. Notably, participants N, E, D, and C, who were frequently mentioned as they made pronunciation errors in Chapter 4, were categorised in Group A. In contrast, participant K, who was referred to as near-native in Chapter 4.4., has the fewest errors belonging to Group B. Below, potential applications suitable for each group will be presented.

Group A exhibited a noticeable prevalence of consonant ~~issues~~ as well as vowel problems. For this group, it is essential to first identify which consonant phonemes should be prioritised in instruction. Subsequently, specific methods and resources for learners to autonomously improve their pronunciation will be proposed.

	Perceived Difficult	Actually Difficult
Consonants		/r/ (word-initial, medial & ending)
		/l/ (word-initial, medial & ending)
	/θ/ (word-initial & medial)	/θ/ (word-initial, medial & ending)
	/ð/ (word-ending)	/ð/ (word-initial)
	/d/ (word-ending)	/d/, /m/ (word-ending)
	/tʃ/ (word-initial)	/tʃ/ (word-medial)
		/ʃ/ (word-initial & medial)
		/v/ (word-initial, medial & ending)

Table 50: Summary of problematic consonants (perception and reality)

Table 50 shows a list of challenging consonants identified through the recording data analysis in this study. It is a simplified version of Table 49. As can be seen, phonemes that were difficult but not consciously identified by the participants are marked in red, while those perceived as difficult but not actually problematic are marked in blue.

Initially, it is crucial to present the learners with the consonants they perceived to be difficult and compare these with the actually difficult sounds, helping them recognise their pronunciation challenges. As a strategy for addressing the most frequently mispronounced consonants, practice should focus on reinforcing the correct pronunciation of specific consonants. For instance, in teaching Japanese learners to distinguish between /r/ and /l/, effective methods include pronunciation exercises that emphasize mouth shape and tongue position, as well as repeated minimal pair drills (e.g., *light* and *right*). The next step involves listening comprehension training, as accurate listening is essential for better pronunciation. Incorporating phoneme identification exercises and activities targeting commonly mispronounced sounds can be effective. For instance, listening exercises that focus on distinguishing between similar sounds can help learners accurately identify them. These are commonly recommended strategies for classroom pronunciation instruction. For both classroom use and individual practice, *Tree or Three?: An elementary pronunciation course* (2nd edition) by Ann Baker (2006) is highly recommended. The book comprises 47 units, each focusing on a specific target phoneme, and provides a variety of listening exercises tailored to the sound in question. Additionally, the text includes illustrations that drawn tongue positions and airflow for pronunciation. In certain cases, learners are also encouraged to place their fingers on their throat to feel the vocal vibrations when producing specific sounds. This resource is rich in information about each target phoneme, making it a valuable textbook for pronunciation practice. Next, utilising speech recognition software can be beneficial both in the classroom and for self-study. Learners can effectively use speech recognition apps to monitor their pronunciation. For example, ELSA Speak is well-known. It tests pronunciation in sentences at each level from basic to advanced. The results of the pronunciation check are detailed and suggestions for practice are made accordingly. ELSA Speak offers three features: AI pronunciation correction, AI speech analysis, and AI conversation practice, allowing learners to practice anytime, anywhere, and as often as needed. Additionally, *Hatsuon Zukan* (illustrated encyclopaedia of pronunciation) uses 3D computer graphics to

demonstrate the tongue positioning and airflow in English pronunciation. These tools provide immediate feedback, helping learners identify and correct their pronunciation errors. For learners, particularly those from the digital native generation, such applications can provide a highly valuable learning experience.

The consonant phonemes that should be given particular priority for practice and learning would depend on the pronunciation that Group A learners are targeting. It depends on whether the learner is aiming for an intelligible pronunciation for communication, or whether they are seeking for a near-native pronunciation. In the former case, this would include English as Lingua Franca (ELF), for example, where English is used for communication among people whose mother tongues are different from one another. In the case of English as a Foreign Language (EFL), learning is typically based on native-speaker models, making it a representative example of this category. Keeping in mind the Lingua Franca Core (LFC; hereafter, LFC) proposed by Jenkins (2000), the phonemes in Table 46 will be given as examples.

Firstly, /l/ and /r/ should be practised, with particular emphasis on /r/, as discussed in Chapter 4. This is because, as Jenkins (2002) also states, communication can break down due to the mispronunciation of /r/ as /l/. Examples given by Jenkins (2002) include pronouncing *red* as /let/ and *grey* as /gleɪ/. Secondly, regarding /θ/ and /ð/, the LFC states that all consonants except /θ/ and /ð/ are important and should be taught. In other words, /θ/ and /ð/ can be replaced by sounds that are easier for learners to pronounce (e.g. /s/, /d/ or /z/ for Japanese learners) (Jenkins, 2000). These phonemes do not need to be practised if the goal is to achieve a level of pronunciation that does not interfere significantly in communication. In contrast, those who aim for more near-native pronunciation (e.g. interpreters, English teachers and other so-called English professionals) should learn and master the interdental fricatives /θ/ and /ð/ as Saito (2014: 268) points out that they are important because of the high frequency of interdental fricatives as word-initial consonants. Therefore, they should be thoroughly learned and honed at the classroom level. Thirdly, as for word-endings /d/ and /m/, previous research has shown that

adding vowels such as /o/ and /u/ to word-endings does not create a significant problem for native speakers in understanding the pronunciation of Japanese learners, as stated by Yamane (2006 in Yamane, 2015). As mentioned above, this also depends on the target English pronunciation. Finally, as discussed in section 5.1.2.1.2. Consonants in this chapter, participants C, D and L in Group A had unique problems, mispronouncing /ʃ/ as /s/ in the word-initial and medial positions. Thus, because of the different pronunciation issues within the same group, learners need to recognise their difficulties and provide themselves with appropriate and tailored practice in order to improve their overall pronunciation skills. Promoting this self-analysis of language is something that language teachers and fellow students can assist with in classes that are communicatively focused.

It can be expected that Group A learners will eventually become much more intelligible, especially if they become better with /l/ and /r/ as well as /θ/ and /ð/, as mentioned above. Group A learners will then be able to move on to the next stage, where following Group B should focus on vowel issues.

Group B had significantly fewer consonant issues compared to Group A, but relatively more vowel-related problems. As Tanaka and Uchida (2022) point out, it can be said that pronouncing vowels correctly is more challenging than consonants. As with Group A, it is crucial to first identify which vowel phonemes should be prioritised in instruction. Subsequently, specific methods and materials to help learners independently improve their pronunciation will be proposed.

		Perceived Difficult	Actually Difficult
Vowels	short vowels	/æ/, /ʊ/, /ʌ/	/æ/, /ʊ/, /ʌ/, /e/
	long vowels	/ɜ:/, /ɑ:/	/ɜ:/, /ɑ:/, /ɔ:/
	diphthongs	/ʊə/, /əʊ/, /eə/	/ʊə/, /əʊ/

Table 51: Summary of problematic vowels (perception and reality)

Table 51 shows a list of challenging vowels identified through the recording data analysis in this study. It is also a simplified version of Table 49. As can be seen, phonemes that were difficult but not consciously identified by the participants are marked in red, while those perceived as difficult but not actually problematic are marked in blue, which is the same as Table 49 and 50.

As with Group A, it is important to present vowels that learners perceive as difficult and compare them with actual difficult sounds, so that learners can recognise their own pronunciation challenges. Again, as a strategy to address the most frequently mispronounced vowels, practice should focus on reinforcing the correct pronunciation of specific vowels.

For vowel pronunciation instruction, as with Group A, first, it is essential to begin with minimal pair exercises. By practicing words with similar sounds, learners can identify subtle differences and improve their pronunciation. This method also focuses especially on vowel length, helping learners distinguish between long and short vowels. For example, pairs like *ship* and *sheep* or *bit* and *beat* can be used to emphasise differences in vowel length. The second method involves listening and mimicking practice. Learners listen to native speakers' pronunciation and then attempt to mimic it. This practice is particularly effective when learners repeatedly listen to and pronounce words or phrases containing the target vowels. Of course, dictation can also be beneficial in mastering these sounds. For both classroom and individual practice, *Ship or Sheep?*: *An intermediate pronunciation course* (3rd edition) by Ann Baker (2006) is highly recommended. The book consists of 50 units and, like *Tree or Three?*, provides a variety of listening exercises that focus on specific target phonemes, accompanied by illustrations showing tongue positioning and airflow during pronunciation. In addition to the target phonemes, the text also includes exercises on minimal pairs and suprasegmental features such as word stress and intonation. This resource is rich in information on each target phoneme, making it a comprehensive textbook for pronunciation practice. Additionally, using apps like ELSA Speak, which tests pronunciation

with sentences ranging from basic to advanced levels and provides tailored practice methods and schedules based on the results, can be beneficial. A third method involves pair work and group activities. Learners practice vowel pronunciation with peers and provide mutual feedback, enabling them to compare and adjust their pronunciation. A fourth method focuses on raising awareness of mouth shape and tongue position during pronunciation. Learners can visually check their pronunciation using a mirror or receive feedback through speech recognition apps. For instance, as mentioned in the Group A section, *Hatsuon Zukan* (illustrated encyclopaedia of pronunciation) app uses 3D computer graphics to show tongue position and airflow in English pronunciation, helping learners to become more conscious of their articulatory movements. The app categorises vowels and consonants into eight groups, allowing learners to study pronunciation at the phoneme level. Through these exercises and activities, learners can enhance the accuracy of their vowel pronunciation and improve overall intelligibility in their speech.

Regarding the vowel phonemes to prioritise for practice and learning, again, it depends on the pronunciation goals of Group B learners. As illustrated in Table 51, for short vowels such as /æ/, as noted in the study results, the four short vowels in English (/æ/, /ʌ/, /ə/, /ʊ (ə)/) are considered the most challenging sounds for Japanese learners of English (Nishikiori, 2007; Higurashi, 2020). Therefore, unless aiming for near-native pronunciation, intensive training may not be necessary. For long vowels like /ɑ:/, minimal pair exercises should emphasise vowel length contrasts. Chapter 4 demonstrated that /ɑ:/ was often pronounced as /ʊ (ə)/, indicating a tendency among Japanese speakers to shorten long vowels absent from their native phonological system (Bada, 2001). This long-short vowel contrast is also highlighted in the LFC (Jenkins, 2000) under vowel quantity. Next, concerning diphthongs, the LFC does not particularly emphasise them. Many participants in this study tended to replace /əʊ/ with the short vowel /ɔ/ or the long vowel /ɔ:/ (Bada, 2001). Unexpectedly, most participants who mispronounced /əʊ/ substituted it with the long vowel /ɔ:/. As Yamane (2015) suggests, vowels are generally more tolerable cognitively for native speakers compared to consonants. Thus, unless aiming for near-native pronunciation,

intensive practice of diphthongs, like short vowels, may not be necessary. However, diphthongs are known to exhibit foreign accents more easily (Roach, 2009: 20). For instance, if the diphthong in *open* /əʊpən/ is pronounced as /ɔ:pən/ in a *katakana* way, it may be understood in context, but it will be perceived as being in a foreign accent. Seven of the words in this study containing the mispronounced /əʊ/ were *katakana* loanwords. Therefore, learners aiming for more near-native pronunciation should also focus on practising short vowels and diphthongs as well as long vowels. Finally, for learners aiming for further naturalness and intelligibility, it is beneficial to practice pronunciation with a focus on prosody. Software like Praat can be used to visualise learner's such as stress and intonation (pitch), which helps learners to recognise their problems and refine their English pronunciation. For learners like participant K, who can produce correct word stress but have flat intonation, this could be an effective approach as well. As Sugito (1996) points out, while accurate pronunciation of segmental sounds is important, improving suprasegmental features can make speech sound more natural and native-like.

Even advanced learners struggle the most with mastering intonation, which often contributes to a perceivable foreign accent (Jenkins, 2000). Roach (2009: 121) suggests that even learners with correct segmental pronunciation need ongoing exposure to native English speakers in order to acquire intonation.

Defining appropriate pronunciation learning goals is inherently challenging, as the answer to the question of which accent English learners should aim for largely depends on their learning objectives and thus varies among individuals (Nelson, 2011; Walker, 2010). While the term *lingua franca* is now commonly heard, there is still a need to raise awareness of the concept of English as a Lingua Franca (ELF). Some learners may not fully understand the idea of ELF and might mistakenly believe that native speaker accents are the only acceptable goal (Shimizu, 2011; Walker, 2010), with GA and RP still being highly admired accents. As Jenkins (2000) suggests, it is reasonable for learners to choose an accent they wish to acquire. At the same time,

it is essential for educators to support learners in selecting realistic, achievable goals and to guide them through the learning process, continuously evolving alongside them.

5.4.Limitations

This study aims to contribute to the pronunciation learning of Japanese undergraduate students majoring in English, who already have a certain level of English proficiency. The primary objective was to identify segmental pronunciation issues among these learners. Additionally, suprasegmental aspects were limited to word stress and intonation (pitch). However, some limitations were encountered, which will be discussed as four limitations below, along with suggestions for future research directions in this field.

One of the main limitations of this study lies in the qualitative approach used for pronunciation analysis. While qualitative methods allow for in-depth insights into individual learners' issues, they are fundamentally subjective and may introduce researcher bias. In this study, two human raters, the primary researcher and the Australian associate professor, were involved in the assessments. Although it was noted in Chapter 3 that the evaluators' prior experience with Japanese learners of English does not necessarily affect the leniency or strictness of their judgments (Suenobu, Kanzaki & Yamane, 1992), the assessment of participants' pronunciation accuracy was based on auditory perception and may be influenced by the listeners' linguistic background, and familiarity with the sounds of the language. Even their consistency of pronunciation ratings can be problematic, as they may vary depending on a variety of factors. As an objective rating instrument, Praat (Boersma & Weenink, 2023) was employed in the acoustic data analysis in addition to human raters. However, Praat was only used to analyse suprasegmental features, word stress and intonation (pitch) of two prominent words, *influence* and *annual*. A second limitation is the sample size in this study (49 respondents for the questionnaire, 14 for the sample recordings) which limits the generalisability of the results. The experiences and challenges of this particular group of participants may not fully represent those

of a larger and more diverse population of English learners. While this allows for detailed insights into specific cases, it constrains the ability to apply the findings more broadly. A third limitation lies in the materials used for recording data. The diagnostic word list and passages were specifically designed to elicit certain phonemes and speech patterns. However, such controlled materials may not fully reflect participants' natural speech patterns in spontaneous, real-life situations (Munro, 2008: 202). While about one minute of spontaneous speech data collection was also conducted, some participants repeated the same words or fell silent due to nervousness, limiting the variety of data. As a result, the collected data may not provide a complete picture of learners' pronunciation abilities in authentic communicative contexts. A final limitation lies in its focus primarily on segmental features, while suprasegmental features, such as word stress and intonation (pitch), were only addressed at the word level. As mentioned, although the initial aim was to concentrate on segmental pronunciation issues, the suprasegmental data emerged as significant during the data analysis stage. As a result, it was deemed valuable to include word-level stress and intonation (pitch) in the analysis. However, a more comprehensive study that also incorporated sentence-level stress and intonation could have provided a more balanced and thorough understanding of the learners' pronunciation issues.

In summary, this study offers valuable insights into the pronunciation challenges faced by Japanese undergraduate students majoring in English. However, it is crucial to acknowledge its limitations, as doing so allows for more careful interpretation of the findings. The subjectivity of qualitative evaluations, the sample size, reliance on controlled materials for data collection, and the focus on word-level analysis of suprasegmental features all contribute to potential biases and limit the generalisability of the results. Future research should address these limitations by incorporating objective evaluations alongside diverse human raters, expanding the sample size to include a more varied group of learners, utilising more natural speech samples, and broadening the analysis of suprasegmental features.

5.5.Future Research

Given these limitations, future research should focus on developing more objective methods for assessing pronunciation to reduce the inherent subjectivity of qualitative evaluations. Advanced tools such as speech recognition technologies and acoustic analysis software like Praat can provide more accurate, data-driven assessments of learners' pronunciation. These tools offer consistent measurements, minimising rater bias and improving the accuracy of pronunciation evaluations. Such an approach would lead to more reliable assessments of learners' progress and specific areas of difficulty. However, since communication primarily involves interactions among humans, it is equally important to include human raters, not only native speakers from the inner circle (Kachru, 1985) but also speakers from the outer and expanding circles, to ensure more comprehensive assessments.

To address the limitation of sample size, future research should aim to include a larger and more diverse group of participants. Involving learners from different age groups, proficiency levels, and learning backgrounds would allow researchers to gain a broader understanding of the pronunciation challenges faced by English learners in various contexts. This approach would enable the generalisation of findings to a wider range of learners, providing more comprehensive insights into the factors that influence pronunciation learning and acquisition across different populations.

To overcome the limitations of relying on controlled materials, future research should explore and refine methods for collecting natural speech data. This could include spontaneous speech in free conversations, interactive tasks, or real-life communication scenarios where participants speak freely when they are less nervous. Such data would better reflect how learners handle pronunciation in actual communication, allowing for more accurate assessments of their speaking abilities. Additionally, studying pronunciation in diverse contexts would provide insight into the social and environmental factors that influence pronunciation as well as draw attention

to pragmatic aspects such as differences in impression and misunderstandings due to varieties of speech.

Further research on suprasegmental features such as word and sentence stress, intonation, and rhythm is essential for improving overall speech intelligibility in learners. While segmental issues like vowel and consonant pronunciation have been widely recognised, suprasegmental elements play a crucial role in achieving intelligible or near-native pronunciation. Future research should include not only the analysis of recorded data but also a balanced investigation through tools such as questionnaires. It is necessary to explore how learners can master suprasegmental features to speak more fluently and intelligibly, and to investigate potential methods for more effective pronunciation instruction.

5.6. Summary of the chapter

The main findings of this study highlight key areas of segmental and suprasegmental pronunciation difficulties faced by Japanese undergraduate students majoring in English. Through analysis of questionnaire and recorded speech data, significant patterns emerged in vowel and consonant issues. Consistent challenges were observed in the articulation of segmental features, particularly for sounds absent in learners' L1 (Japanese). For vowels, /æ/, /ɔ:/, and /əʊ/ were consistently identified as the most difficult among short and long vowels, and diphthongs, while for consonants, six sounds (/l/, /r/, /θ/, /ð/, /d/, /v/) were consistently identified as the most challenging. These findings align with previous research, but this study also identified unexpected difficulties with the fricatives /ʃ/ and /tʃ/. The study also revealed gaps between learners' perceived difficulty of certain phonemes and their actual performance. Moreover, suprasegmental features, particularly word stress and intonation, were found to affect intelligibility, with stress having a greater impact. These results offer valuable insights into the specific pronunciation challenges learners face and address the research questions of this study.

The significance of this study extends to both theoretical and practical aspects. Theoretically, the findings contribute to a deeper understanding of the segmental pronunciation difficulties faced by Japanese English learners, reinforcing previous research on the importance of addressing specific phonological challenges in second language acquisition. Practically, the study outlines key aspects of English pronunciation that should be prioritised for this particular group of learners, dividing them into two groups: Group A, which struggles more with consonants, and Group B, which has more difficulties with vowels. Group A focuses on consonants, while Group B focuses on vowels but also addresses aspects of some suprasegmental aspects. These goals are based on whether learners aim for intelligible pronunciation for communication or a more near-native pronunciation. These insights can be applied to develop more effective teaching methods and autonomous learning strategies suited to the needs of learners, particularly those of the digital-native generation.

To enhance future research, several areas could be improved. First, the use of more objective evaluation methods, such as automated pronunciation assessment tools or acoustic analysis, could help reduce potential subjectivity influenced by the linguistic background and biases of raters. Additionally, expanding the sample size would provide a broader basis for more generalisable results. While this study employed both controlled materials and spontaneous speech data, incorporating more natural communication contexts could offer deeper insights into participants' authentic speech patterns. Finally, expanding the analysis of suprasegmental features beyond word-level stress and intonation to include sentence-level patterns would provide a more comprehensive understanding of pronunciation challenges.

The goal of future research should aim to address these drawbacks and explore new directions. The development of more objective evaluation tools, such as voice recognition apps and acoustic analysis software, may help reduce subjectivity in pronunciation assessment. Additionally, increasing the sample size and including a more diverse group of participants could improve the generalisability of the findings. Using more authentic speech data, such as

spontaneous conversation, could provide a clearer understanding of learners' pronunciation abilities in real-life contexts. Finally, further research into suprasegmental features, like sentence stress, intonation and rhythm, could deepen our understanding of the pronunciation challenges faced by Japanese learners of English.

In conclusion, this study provided valuable insights into the pronunciation challenges faced by Japanese undergraduate students majoring in English, focusing primarily on segmental features and some of the main suprasegmental aspects. It highlighted the importance of adjusting learning goals according to the learner's target pronunciation. While the study has limitations, it offers significant potential for future research aimed at further developing effective pronunciation learning strategies. Overall, this study contributes to ongoing efforts to bridge the gap between learners' perceptions and actual performance, improving English pronunciation instruction for Japanese undergraduates.

Chapter 6 Conclusion

6.1. Research Objectives and Key Findings

The primary objective of this study was to identify the segmental and suprasegmental pronunciation difficulties faced by Japanese undergraduate students majoring in English. To achieve this, a combination of questionnaire data and speech recordings was employed. The questionnaire aimed to gather insights into participants' backgrounds and their perceptions of English pronunciation. Pronunciation recording data were collected under the three recording conditions: reading a diagnostic word list, reading short passages, and spontaneous speech on specified topics. The questionnaire and speech analysis revealed key patterns in vowel and consonant difficulties, with specific segmental features such as /æ/, /ɔ:/, /əʊ/ for vowels and /l/, /r/, /θ/, /ð/, /d/, /v/ for consonants being particularly problematic. Unexpected challenges with /ʃ/ and /tʃ/ were also uncovered. Moreover, gaps between learners' perceived difficulties and their actual performance were also highlighted. Furthermore, this study delved into suprasegmental features such as word stress and intonation (pitch), confirming that word stress, in particular, has a significant impact on speech intelligibility. By analysing these data, the study sought to provide a clearer understanding of the specific areas of pronunciation that require targeted instruction and practice for this group of learners.

6.2. Implications

The implications of this study for teaching and learning are both theoretical and practical. Theoretically, the findings of this study offer significant insights into the pronunciation challenges faced by Japanese learners of English, particularly about segmental and suprasegmental features. This research confirms and expands on existing

theories regarding second language phonology, emphasising the role of both segmental and suprasegmental elements in intelligibility and overall communication. The study emphasises the importance of addressing these two aspects simultaneously in pronunciation instruction, as suprasegmental elements such as word stress may exert an even greater influence on intelligibility than previously assumed.

Moreover, the research highlights the gap between learners' perceived difficulty with certain phonemes and their actual pronunciation performance, suggesting the need for an understanding of learners' perceptions in phonological studies. This aligns with the broader theoretical framework that prioritises learner-centred approaches, where learners' self-assessments and their specific difficulties are critical to developing effective teaching strategies. These theoretical insights can inform pronunciation teaching practice, especially in tailoring instruction to the specific needs of learners with different L1 backgrounds.

From a practical point of view, the findings of this study have several implications for English pronunciation teaching and learning. First, the study highlights the need to prioritise segmental features such as consonants and vowels, tailoring instruction to learners' specific challenges. For instance, learners in Group A, who struggle with consonants such as /l/, /r/, /θ/, and /ð/, should engage in targeted practice that focuses on these problematic sounds. Group B, which faces difficulties with vowels like /æ/, /ɔ:/, and /əʊ/ rather than consonants, should focus on vowel distinctions, but also receive training in suprasegmental features such as word stress and intonation, as these elements significantly affect intelligibility.

The findings also emphasise the importance of setting pronunciation goals according to learners' needs, whether they are aiming for intelligible pronunciation for effective communication (as in English as a Lingua Franca) or native-like pronunciation (as in English as a foreign language). Teachers can use these insights to create a more personalised and

targeted pronunciation curriculum that addresses both segmental and suprasegmental issues.

For learners, especially those from the digital-native generation, integrating speech recognition technology and pronunciation apps (e.g., ELSA Speak and Hatsuon Zukan) could foster autonomous learning. These tools provide immediate feedback on learners' pronunciation, enabling them to practice more frequently and effectively. Overall, the findings from this study can guide educators in developing teaching strategies that accommodate individual learner differences and promote a balanced approach to pronunciation instructions.

6.3. Limitations

This study, while providing useful insights, has some limitations. A primary limitation is the reliance on qualitative evaluation methods, which can introduce subjectivity due to the linguistic backgrounds and biases of the raters. Additionally, the relatively small sample size may restrict the generalisability of the findings. Although the pronunciation recordings primarily relied on controlled materials, spontaneous speech data was also collected. However, the recordings may not fully reflect participants' natural speech patterns in real-world communication contexts. Finally, the analysis of suprasegmental features was confined to word-level stress and word-level intonation (pitch), which may have overlooked broader pronunciation challenges that learners encounter, including sentence-level intonation.

6.4. Further studies

To address the limitations identified here, future research should prioritise overcoming them and exploring new areas of inquiry. Developing more objective evaluation

tools, such as voice recognition software and acoustic analysis programs, may reduce the subjectivity often associated with pronunciation assessment. Expanding the sample size and incorporating a more diverse group of participants could improve the applicability of the results. Furthermore, collecting authentic speech data through spontaneous conversations may provide deeper insights into learners' pronunciation abilities in real-world situations. Finally, a greater focus on suprasegmental features, such as sentence-level stress, intonation, and rhythm, could enhance our understanding of the specific pronunciation difficulties encountered by Japanese learners of English.

This research provided valuable insights into the pronunciation challenges faced by Japanese undergraduate students majoring in English, addressing both segmental and some suprasegmental aspects. It particularly emphasised the importance of aligning learning objectives with the pronunciation goals of the learners themselves. While this study has limitations, such as the somewhat subjective nature of qualitative evaluation and limited sample size, it enhances our understanding of effective pronunciation learning strategies and opens up numerous possibilities for future research. Overall, this research also aims to bridge the gap between learners' perceptions and actual performance, contributing to ongoing efforts to improve English pronunciation instruction for Japanese undergraduates. Moreover, the suprasegmental data obtained from this study provides a foundational framework for my future research endeavours. Ultimately, educators must assist learners in setting realistic and attainable goals, providing guidance throughout the learning journey and adapting alongside them.

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Appendix 1: Word List for Recordings

Vowels

Minimal pairs

sport – spot
cut – cot
tea – tow
fat – fit
hut – hurt
hit – heat
books – box
heard – hard
man – men
wrist – rest
bird – bored
pull – pool
look – luck
heart – hat

Short vowels

pit
it
wet
end
cat
apple
run
up
hot
opposite
put
would
ago
doctor
happy
cosy
influence
annual

Long vowels

see
eat
part
arm

saw
always
too
you
her
early

Diphthongs

day
eight
my
eyes
boy
join
low
open
how
out
near
here
hair
where
tourist
sure

Consonants

Minimal pairs

play – pray
fly – fry
grass – glass
clown – crown
praise – plays
blue – brew
flame – frame
fresh – flesh
berry – very
sink – think

about
do
side
fat
safe

go
big
hat
behind
yet
you
key
week
led
allow
map
lamp
nose
any
pen
stop
red
around
soon
us
ten
last
vet
live
wet
swim
zoo
loves
general
age
hang
hoping
that
other
thin
bath
ship
push
measure
usual
chin
catch

Adopted from English Pronunciation in Use Advanced (2007)

Appendix 2: Passages for Recordings

1. One of my favourite things to do when I've got a bit of spare time is to go fishing with my friends. We get a bit of tackle together, the fishing rods, pile it all into the back of a four-by-four and we head up into the mountains. There's some wonderful streams up there, well stocked with trout, carp and bream. We normally take a bit of a picnic up, you know, some bread rolls, and some ham and cheese, and it's just a nice day out. (87 words)

Adopted from English Pronunciation in Use Advanced (2007: 144)

2. The North Wind and the Sun were disputing which was the stronger, when a traveller came along wrapped in a warm cloak. They agreed that the one who first succeeded in making the traveller take his cloak off should be considered stronger than the other. Then the North Wind blew as hard as he could, but the more he blew the more closely did the traveller fold his cloak around him; and at last, the North Wind gave up the attempt. Then the Sun shone out warmly, and immediately the traveller took off his cloak. And so the North Wind was obliged to confess that the Sun was the stronger of the two. (113 words)

Adopted from The North Wind and the Sun (1964)

3. When I started playing badminton, I was sixty and I hadn't done any strenuous exercise for almost twenty years. But after just a few months I'd won the over-fifties national championship and an international competition. My husband thinks that I'm crazy and that I'll injure myself. But I've found a number of advantages in taking up a sport. I feel much healthier, and it's important to be active at my age. And meeting new people has improved my social life. So I'll carry on playing until I get too old. (90 words)

Adopted from English Pronunciation in Use Advanced (2007)

4. Once there was a tree... and she loved a little boy. And everyday the boy would come and he would gather her leaves and make them into crowns and play king of the forest. He would climb up her trunk and swing from her branches and eat apples. And they would play hide-and-go-seek. And when he was tired, he would sleep in her shade. And the boy loved the tree... very much. And the tree was happy. (78 words)

Adopted from The Giving Tree (1964)

Appendix 3: Spontaneous Speech

Choose one of the following topics and talk about it for approximately one minute.

1. My experience of study abroad online
2. My best meal
3. My favourite place
4. My best trip
5. My best friend
6. My hometown
7. My hobby
8. My family

Appendix 4: Questionnaire



Mukogawa Women's University

15th December 2022

Dear students,

Hello, my name is Masami Okazaki. I am a postgraduate student at Mukogawa Women's University.

I am currently in the process of researching my Ph.D. dissertation topic, which is about 'Japanese University Students' Pronunciation Difficulties with Pronouncing Consonants and Vowels in English'. I would like to request your participation in answering questions I created on Google Form. The survey is being conducted by me to better understand your English language study background and to ask what your pronunciation difficulties are. This is not a test so there are no 'right' or 'wrong' answers. Your data will be written up in my Graduation thesis and all names, personal information and identifying information will not be included in the thesis to protect the anonymity of all participants who take part. Thank you very much for your help.

The survey will take approximately 15 minutes to complete. Thank you very much again in advance for your time and cooperation.

Masami Okazaki (Kimura)

Ph.D candidate in Language and Education

Department of English

Mukogawa Women's University

6-46 Ikebiraki, Nishinomiya, Hyogo

663-8558 Japan

E-mail: 2031710@mwu.jp

Questionnaire for Students

By completing and submitting this survey, you agree to be a participant in this study. All private and identifiable information will be kept anonymous. The results of this questionnaire will not be used for any purpose other than research. The survey will take approximately 10-15 minutes to complete. Thank you very much again in advance for your time and cooperation. このアンケートに回答し送信することであなたはこの研究の参加者となることに同意したとみなします。個人情報および個人を特定できる情報は、すべて匿名に保たれます。尚、このアンケート結果は研究以外の目的に使用されることはありません。アンケートの回答には10～15分程かかります。ご協力ありがとうございます。

Part 1

This part of the questionnaire concerns background information about yourself. I need this to interpret your answers properly. Completing this questionnaire will replace the consent form.

ここではあなた自身の答えを正しく解釈するために必要な背景情報をお聞きします。

* Indicates required question

1. Email *

2. 1. Year level: 学年 *

Mark only one oval.

- ☐ 1st year: 1 回生
- ☐ 2nd year: 2 回生
- ☐ 3rd year: 3 回生
- ☐ 4th year: 4回生

3. 2. Class: クラス *

Mark only one oval.

- ☐ A
- ☐ B
- ☐ C
- ☐ D
- ☐ S

4. 3. Gender

Mark only one oval.

- ☐ Male
- ☐ Female
- ☐ Prefer not to say

5. 4. Age *

6. 5. Nationality

7. 6. Department/major (学科・専攻)

8. 7. Language qualification: TOEIC score (highest score) *

9. Language qualification: EIKEN (英検)

10. Language qualification: TOEFL

11. Language qualification: IELTS

12. Language qualification: Others (if any)

13. 8. How old were you when you started learning English? *

いつごろから英語を習い始めましたか。

Mark only one oval.

- ☐ Before going to preschool (Before 3 years old)
- ☐ Preschool (3~5 years old)
- ☐ Kindergarten (6 years old)
- ☐ Primary School : 小学校低学年(1・2年生)
- ☐ Primary School : 小学校中学年(3・4年生)
- ☐ Primary School : 小学校高学年(5・6年生)
- ☐ Junior high school : 中学校

14. 9. What did you do to study English apart from school before entering the university? You can answer more than one. *

大学入学前、学校以外で英語の勉強をしたことは何ですか。(複数回答可)

Tick all that apply.

- ☐ Private English conversation school (英会話教室)
- ☐ Cram school (英語塾)
- ☐ Kumon (公文)
- ☐ Home-teaching English materials (家でできる英語教材)
- ☐ TV (テレビ)・YouTubeなど
- ☐ Radio(ラジオ)
- ☐ Online materials (オンライン)
- ☐ Skype (スカイプ)
- ☐ Others (その他)
- ☐ Nothing special (特に何もしていない)

15. 10. If you chose 'Others', give details.

その他を選択した場合、その内容を教えてください

You can answer in Japanese if you prefer.

日本語でお答えいただいても結構です。

16. 11. In terms of your answer in 9, why did you choose it/them? *

9の回答に関して、なぜそれを/それらを選んだのですか。

You can answer in Japanese if you prefer.

日本語でお答えいただいても結構です。

17. 12. Have you ever been to an English speaking country? *
- 英語圏の国に行ったことはありますか。

Mark only one oval.

- ☐ Yes
- ☐ No

18. 13. If yes, when did you go there? *
- Yesの場合、いつ頃行きましたか？

Mark only one oval.

- ☐ Before going to primary school : 小学校入学前(6歳まで)
- ☐ Primary School : 小学校低学年(1・2・3年生)
- ☐ Primary School : 小学校高学年(4・5・6年生)
- ☐ Junior high school : 中学校
- ☐ Senior high school : 高校
- ☐ University : 大学
- ☐ Never been abroad : まだ行ったことがない

19. 14. What country have you been so far? *
- これまで行ったことのある国はどこですか。
- You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。
-

20. 15. Did you live abroad before entering university? *
- 大学入学前に海外に住んでいたことがありますか？

Mark only one oval.

- ☐ Yes
- ☐ No

21. 16. If yes, how long for?
Yesの場合、どれくらいの期間ですか。

Mark only one oval.

- ☐ Less than 3 months (3か月以下)
☐ 3~6 months (3~6か月)
☐ 6~9 months (6か月~9か月)
☐ 9 months~one year (9か月~1年)
☐ 2 years (2年)
☐ 3 years (3年)
☐ 4 years (4年)
☐ More than 5 years (5年以上)

22. 17. How did you use English in your daily life apart from university? eg. Watching TV in English *
大学以外の日常生活では、どのように英語を使っていましたか。例：英語でテレビを観る
You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

23. 18. Have you ever tried anything to improve your speaking skill? *
スピーキング力を向上させるために何か試したことがありますか。

Mark only one oval.

- ☐ Yes
☐ No

24. 19. In terms of question above, have you made an effort to acquire near native English pronunciation? *
前の質問に関して、ネイティブに近い英語の発音を身につけようとしたことがありますか。

Mark only one oval.

- ☐ Yes
☐ No

25. 20. In your own experience, what kind of strategies did you find effective to learn English pronunciation? *
- ご自身の経験の中で、英語の発音を学習する際にどのようなストラテジーや方法が効果的だと感じましたか。
- You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

Part 2

This part of the questionnaire concerns your opinions about English pronunciation.
ここでは英語の発音 [母音と子音] に関するあなた自身の意見お聞きます。

26. [1～7 : 母音について] *
1. Which **vowels** are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか。
。 You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

cat **it** **run** **wet** **hot** **would** **ago** cosy annual

Tick all that apply.

- ☐ cat
☐ it
☐ run
☐ wet
☐ hot
☐ would
☐ ago
☐ cosy
☐ annual

27. Why? なぜですか *
- You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

28. 2. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか *
。You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

influence happy doctor pit opposite end apple up ut

Tick all that apply.

- ☐ influence
- ☐ happy
- ☐ doctor
- ☐ pit
- ☐ opposite
- ☐ end
- ☐ apple
- ☐ up
- ☐ put

29. Why? ^{*}なぜですか

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

30. 3. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか *
。You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

eat **a**rm **s**aw **t**oo **e**arly

Tick all that apply.

- ☐ eat
- ☐ arm
- ☐ saw
- ☐ too
- ☐ early

31. Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

32. 4. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか *
。 You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

her **you** **see** **a**lways **part**

Tick all that apply.

- ☐ her
- ☐ you
- ☐ see
- ☐ always
- ☐ part

33. Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

34. 5. Which **vowels** are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか *
。 You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

day, **eyes** join **out** **open** **tourist** **near** **hair**

Tick all that apply.

- ☐ day
- ☐ eyes
- ☐ join
- ☐ out
- ☐ open
- ☐ tourist
- ☐ near
- ☐ hair

35. Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

36. 6. Which **vowels** are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか *
。 You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

sure **where** **here** **eight** **boy** **my** **how** **low**

Tick all that apply.

- ☐ sure
- ☐ where
- ☐ here
- ☐ eight
- ☐ boy
- ☐ my
- ☐ how
- ☐ low

37.

Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

38. 7. Which vowels are difficult for you to pronounce? あなたにとって発音しにくい母音はどれですか *
。 You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

shoulder fear toy care pine gown pray poor

Tick all that apply.

- ☐ shoulder
- ☐ fear
- ☐ toy
- ☐ care
- ☐ pine
- ☐ gown
- ☐ pray
- ☐ poor

39.

Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

40. [8~12 : 子音について] *

8. Which consonants are difficult for you to pronounce? あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可)

Please refer the bold underlined parts below to answer;
以下の太字下線部を参考に回答してください。

led fat that zoo vet red sink ship thin

Tick all that apply.

- ☐ led
- ☐ fat
- ☐ that
- ☐ zoo
- ☐ vet
- ☐ red
- ☐ sink
- ☐ ship
- ☐ thin

41. Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

42. 9. Which consonants are difficult for you to pronounce? あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可) *

Please refer the bold underlined parts below to answer;
以下の太字下線部を参考に回答してください。

live swim other allow around safe author

Tick all that apply.

- ☐ live
- ☐ swim
- ☐ other
- ☐ allow
- ☐ around
- ☐ safe
- ☐ author

43. Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

44. 10. Which **consonants** are difficult for you to pronounce? あなたにとって発音しにくい子音はどれですか。You can answer more than one. (複数回答可) *

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

Tick all that apply.

- ☐ usual
- ☐ push
- ☐ bath
- ☐ loves
- ☐ hang
- ☐ stop
- ☐ bathe
- ☐ us

45. Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

46. 11. Which **consonants** are difficult for you to pronounce? あなたにとって発音しにくい子音はどれで *
すか。You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

big around **general** side **key** go age week

Tick all that apply.

- ☐ big
- ☐ around
- ☐ general
- ☐ side
- ☐ key
- ☐ go
- ☐ age
- ☐ week

47. Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

48. 12. Which **consonants** are difficult for you to pronounce? あなたにとって発音しにくい子音はどれで *
すか。You can answer more than one. (複数回答可)

Please refer the **bold underlined parts** below to answer;
以下の**太字下線部**を参考に回答してください。

catch measure **wet** **pen** shop **nose** last **chin**

Tick all that apply.

- ☐ catch
- ☐ measure
- ☐ wet
- ☐ pen
- ☐ shop
- ☐ nose
- ☐ last
- ☐ chin

49.

Why? なぜですか *

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

50. 13. Are there any other words or phonemes which are difficult for you to pronounce? *

他に発音が難しい単語や音素はありますか。

Mark only one oval.

☐ Yes

☐ No

51. If **yes**, give details. Yesの場合、詳細を教えてください。

You can answer in Japanese if you prefer.
日本語でお答えいただいても結構です。

52. Comment if any.

何かコメントがあればお願いします。

Thank you very much for your time and cooperation.
ご協力ありがとうございました。

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Appendix 5: Transcription of recordings – Vowels

Minimal pairs

		RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	sport spot	/spɔ:t/ /spot/	/spɔ:rt/ /spɔ:t/	/spɔ:rt/ /spot/	/spɔ:rt/ /spot/	/spɔ:t/ /spot/	/spɔ:rt/ /spot/	/spɔ:rt/ /spot/	/spɔ:rt/ /spot/	/spɔ:t/ /spot/	/spɔ:rt/ /spot/	/spɔ:rt/ /spot/	/spɔ:t/ /spot/	/spɔ:rt/ /spot/	/spɔ:rt/ /spot/	/spɔ:rt/ /spot/	/spɔ:ts/ /spot/
2	cut cot	/kʌt/ /kot/	/kʌt/ /kɑ:t/	/kɒt/ /kɒt/	/kʌt/ /kot/	/kʌt/ /kot/	/kʌt/ /kot/	/kʌt/ /kæt/	/kʌt/ /kot/	/kʌt/ /kot/	/kʌt/ /kot/	/kʌt/ /kɑ:t/	/kʌt/ /kot/	/kʌt/ /kot/	/kʌt/ /kot/	/kʌt/ /kot/	/kʌt/ /kæt/
3	tea tow	/ti:/ /təʊ/	/ti:/ /toʊ/	/ti:/ /təʊ/	/ti:/ /təʊ/	/ti:/ /təʊ/	/ti:/ /toʊ/	/ti:/ /təʊ/	/ti:/ /təʊ/	/ti:/ /təʊ/	/ti:/ /təʊ/	/ti:/ /təʊ/	/ti:/ /toʊ/	/ti:/ /təʊ/	/ti:/ /təʊ/	/ti:/ /tɔ:/	/ti:/ /tɑ:/
4	fat fit	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fɒt/ /fɒt/	/fæt/ /fit/	/fɒt/ /fɒt/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/	/fæt/ /fit/
5	hut hurt	/hʌt/ /hɜ:t/	/hʌt/ /hɜ:rt/	/hɒt/ /hɜ:rt/	/hʌt/ /hɜ:rt/	/hʌt/ /hɜ:rt/	/hʌt/ /hɜ:rt/	/hʌt/ /hɑ:rt/	/hʌt/ /hɜ:rt/	/hʌt/ /hɑ:t/	/hʌt/ /hɜ:rt/	/hʌt/ /hɜ:rt/	/hɒt/ /hɑ:rt/	/hʌt/ /hɜ:rt/	/hɒt/ /hɑ:rt/	/hʌt/ /hɜ:rt/	/hʌt/ /hɜ:rt/
6	hit heat	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/	/hɪt/ /hi:t/
7	books box	/bʊks/ /bɒks/	/bʊks/ /bɑ:ks/	/bʊks/ /bɑ:ks/	/bʊks/ /bɑ:ks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/	/bʊks/ /bɒks/
8	heard hard	/hɜ:d/ /hɑ:d/	/hɜ:rd/ /hɑ:rd/	/hɒ:t/ /hɑ:rd/	/hɜ:rd/ /hɑ:rd/	/hɒ:t/ /hɑ:t/	/hɪrt/ /hɑ:t/	/hɑ:rd/ /hɑ:rd/	/hɜ:rd/ /hɑ:d/	/hɜ:rd/ /hɑ:rd/	/hɜ:rd/ /hɑ:rd/	/hɪr/ /hɑ:rd/	/hɜ:rd/ /hɑ:rd/	/hɪrd/ /hɑ:rd/	/hɜ:rd/ /hɑ:rd/	/hɜ:rd/ /hɜ:rt/	/hɜ:rt/ /hɜ:rt/
9	man men	/mæn/ /men/	/mæn/ /men/	/mæn/ /men/	/men/ /mæn/	/mʌn/ /mʌn/	/mʌn/ /mæn/	/mæn/ /men/	/man/ /men/	/mæn/ /men/	/mæn/ /men/	/mæn/ /men/	/man/ /mæn/	/mæn/ /men/	/man/ /man/	/mæn/ /men/	/mæn/ /men/
10	wrist rest	/rɪst/ /rest/	/rɪst/ /rest/	/rɪst/ /rest/	/rɪst/ /rest/	/rɪst/ /rest/	/ɪst/ /lest/	/rɪst/ /rest/	/rɪst/ /rest/	/rɪst/ /rest/	/rɪst/ /rest/	/raɪst/ /lest/	/rɪst/ /rest/	/rɪst/ /rest/	/rɪst/ /lest/	/rɪst/ /rest/	/wɪst/ /rest/
11	bird bored	/bɜ:d/ /bɔ:d/	/bɜ:rd/ /bɔ:rd/	/bɜ:rd/ /bɔ:rd/	/bɜ:rd/ /bɔ:rd/	/bɑ:d/ /bɔ:d/	/bɜ:d/ /bɔ:rd/	/bɜ:rd/ /bɔ:rd/	/bɑ:rd/ /bɔ:rd/	/bɑ:d/ /bɔ:d/	/bɜ:rd/ /bɔ:rd/	/bɜ:rd/ /bɔ:rd/	/bɜ:rd/ /bɔ:rd/	/bɑ:rd/ /bɔ:rd/	/bɜ:rd/ /bɔ:rd/	/bɜ:rd/ /bɔ:rd/	/bɜ:rd/ /bɜ:rd/
12	pull pool	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/	/pʊl/ /pu:l/
13	look luck	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/	/lʊk/ /lʌk/
14	heart hat	/hɑ:t/ /hæt/	/hɑ:rt/ /hæt/	/hɑ:rt/ /hæt/	/hɜ:rt/ /hæt/	/hɜ:rt/ /hæt/	/hɜ:rt/ /hat/	/hɑ:rt/ /hæt/	/hɑ:rt/ /hæt/	/hɑ:t/ /hat/	/hɑ:rt/ /hæt/	/hɑ:rt/ /hæt/	/hɑ:t/ /hat/	/hɑ:rt/ /hæt/	/hɜ:rt/ /hæt/	/hɑ:rt/ /hɒt/	/hɜ:rt/ /hɑ:t/

Short vowels

		RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	pit	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pʊt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/	/pɪt/
2	it	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/	/ɪt/
3	wet	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/
4	end	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/	/end/
5	cat	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/	/kæt/
6	apple	/æpl/	/ˈæpl/	/ˈæpl/	/ˈæpl/	/ˈæpl/	/ˈæpl/	/ˈæpl/	/ˈæpl/	/ˈæpl/	/ʌpl/	/ˈæpl/	/ʌpl/	/ˈæpl/	/ˈæpl/	/ˈæpl/	/ʌpl/
7	run	/rʌn/	/rʌn/	/rʌn/	/rʌn/	/rʌn/	/lʌn/	/rʌn/	/rʌn/	/lʌn/	/rʌn/	/lɜ:rn/	/rʌn/	/rʌn/	/lʌn/	/rʌn/	/rʌn/
8	up	/ʌp/	/ʌp/	/æp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/	/ʌp/
9	hot	/hɒt/	/hɑ:t/	/hɑ:t/	/hɒt/	/hɒt/	/hɒt/	/hɒt/	/hɑ:t/	/hɒt/	/hɑ:t/	/hɒt/	/hɒt/	/hɒt/	/hɑ:t/	/hɑ:t/	/hɑ:t/
10	opposite	/ˈɒpəzɪt/	/ˈɑ:pəzɪt/	/ˈɑ:pzɪ/	/ˈɒpəzɪt/	/ˈɒpəsɑrt/	/ˈɒpəzɪt/	/ˈɒpəzɪ/	/ˈɒpəzɪt/	/ˈɒpəzɪt/	/ˈɑ:pəzɪt/	/ˈɒpəzɪt/	/ˈɒpəzɪt/	/ˈɒpəsɑrt/	/ˈɒpəsɑrt/	/ˈɒpəsɑrt/	/ˈɑ:pəzɪt/
11	put	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊ/	/pʊt/	/pʊt/	/pʊt/	/pʊt/	/pʊt/
12	would	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊ/	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊd/	/wʊd/
13	ago	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/	/əˈgəʊ/
14	doctor	/ˈdɒktə/	/ˈdɑ:k tər/	/ˈdɑ:k tər/	/ˈdɒktər/	/ˈdɒktər/	/ˈdɒktər/	/ˈdɒktər/	/ˈdɒktər/	/ˈdɒktər/	/ˈdɑ:k tər/	/ˈdɒktər/	/ˈdɒktər/	/ˈdɒktər/	/ˈdɑ:k tər/	/ˈdɑ:k tər/	/ˈdɑ:ktər/
15	happy	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/	/ˈhæpi/
16	cosy	/ˈkəʊzi/	/ˈkəʊzi/	/ˈkəʊzi/	/ˈkɔ:zi/	/ˈkəzi/	/ˈkəzi/	/ˈkəʊzi/	/ˈkəʊzi/	/ˈkəʊzi/	/ˈkəʊzi/	/ˈkəʊzi/	/ˈkəʊzi/	/ˈkəʊs/	/ˈkəzi/	/ˈkəʊzi/	/ˈkəʊzi/
17	influence	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/	/ˈɪnfluəns/
18	annual	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/	/ˈænjʊəl/

Long vowels

		RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	see	/si:/	/si:/	/si:/	/si:/	/si:/	/si:/	/si:/	/si:/	/si:/	/ji:/	/si:/	/si:/	/si:/	/si:/	/si:/	/si:/
2	eat	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:t/	/i:/
3	part	/pa:t/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:t/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:rt/	/pa:/
4	arm	/a:m/	/a:rm/	/a:rm/	/a:rm/	/a:rm/	/a:rm/	/a:m/	/a:rm/	/a:rm/	/a:rm/	/a:rm/	/a:rm/	/a:rm/	/a:rm/	/a:m/	/a:m/
5	saw	/sɔ:/	/sɔ:/	/sɑ:ʊ/	/səʊ/	/sɔ:/	/sɔ:/	/sɔ:ʊ/	/səʊ/	/sɔ:ʊ/	/səʊ/	/səʊ/	/səʊ/	/səʊ/	/sɔ:/	/səʊ/	/səʊ/
6	always	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lɔw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/	/ˈɔ:lw eɪz/
7	too	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/	/tu:/
8	you	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/
9	her	/hɜ:/	/hɜ:r/	/hɑ:/	/hɜ:r/	/hɜ:/	/hɜ:/	/hɜ:/	/hɜ:r/	/hɜ:/	/hɜ:r/	/hɜ:r/	/hɑ:r/	/hɜ:r/	/hɜ:r/	/hɜ:r/	/hɜ:/
10	early	/ˈɜ:li/	/ˈɜ:rli/	/ɑ:li/	/ˈɜ:li/	/ˈɜ:li/	/ˈɜ:li/	/ˈɜ:rli/	/ˈɜ:rli/	/ˈɜ:li/	/ˈɜ:rli/	/ɑ:li/	/ɑ:li/	/ˈɜ:rli/	/ˈɜ:rli/	/ˈɜ:rli/	/ˈɜ:li/

Diphthongs

		RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	day	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/	/deɪ/
2	eight	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/	/eɪt/
3	my	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/	/maɪ/
4	eyes	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/	/aɪz/
5	boy	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/	/bɔɪ/
6	join	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/	/dʒɔɪn/
7	low	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/	/ləʊ/
8	open	/ˈəʊpən/	/ˈəʊpən/	/ˈɔːpən/	/ˈɔːpən/	/ˈəʊpən/	/ˈɔːpən/	/ˈəʊpən/	/ˈəʊpən/	/ˈəʊpən/	/ˈəʊpən/	/ˈəʊpən/	/ˈɔːpən/	/ˈɔːpən/	/ˈɔːpən/	/ˈəʊpən/	/ˈɔːpən/
9	how	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/	/haʊ/
10	out	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/	/aʊt/
11	near	/nɪə/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/	/nɪr/
12	here	/hɪə/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/	/hɪr/
13	hair	/heə/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/	/her/
14	where	/weə/	/wer/	/wer/	/wer/	/wer/	/wer/	/wer/	/wer/	/wer/	/wer/	/wer/	/wer/	/weə/	/wer/	/wer/	/wer/
15	tourist	/ˈtʊərɪst/	/ˈtɔːrɪst/	/ˈtuːrɪst/	/ˈtuːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/	/ˈtɔːrɪst/
16	sure	/ʃʊə/	/ʃʊr/	/ʃʊə/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/	/ʃʊr/

Consonants

		RP	GA	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	about	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/	/ə'baʊt/
2	do	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/	/du:/
3	side	/saɪd/	/saɪd/	/saɪz/	/saɪd/	/saɪd/	/saɪd/	/saɪ/	/saɪd/	/saɪd/	/saɪz/	/saɪd/	/saɪd/	/saɪd/	/saɪd/	/saɪd/	/saɪd/
4	fat	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fæt/	/fɛt/
5	safe	/seɪf/	/seɪf/	/seɪf/	/seɪf/	/seɪf/	/seɪf/	/seɪ/	/seɪf/	/seɪ/	/seɪf/	/seɪf/	/seɪf/	/seɪf/	/seɪf/	/seɪf/	/seɪf/
6	go	/gəʊ/	/gəʊ/	/gəʊ/	/gəʊ/	/gɔ:/	/gɔ:/	/gɔ:/	/gəʊ/	/gɔ:/	/gəʊ/	/gəʊ/	/gəʊ/	/gəʊ/	/gɔ:/	/gəʊ/	/gəʊ/
7	big	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪ/	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪg/	/bɪg/
8	hat	/hæt/	/hæt/	/hæt/	/hæt/	/hæt/	/hæt/	/fæt/	/hæt/	/hæt/	/hæt/	/hæt/	/hæt/	/hæt/	/hæt/	/hæt/	/hɒt/
9	behind	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br:haɪn/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/	/br'haɪnd/
10	yet	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/	/jet/
11	you	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/	/ju:/
12	key	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/	/ki:/
13	week	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/	/wi:k/
14	led	/led/	/led/	/led/	/led/	/led/	/led/	/led/	/led/	/led/	/le/	/led/	/le/	/led/	/led/	/led/	/led/
15	allow	/ə'laʊ/	/ə'laʊ/	/ə'laʊ/	/ə'laʊ/	/ə'laʊ/	/ə'ləʊ/	/ə'laʊ/	/ə'laʊ/	/ə'ləʊ/	/ə'laʊ/	/ə'ləʊ/	/ə'laʊ/	/ə'ləʊ/	/ə'ləʊ/	/ə'ləʊ/	/ə'laʊ/
16	map	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/	/mæp/
17	lamp	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/	/læmp/
18	nose	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nɔ:z/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/	/nəʊz/
19	any	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/	/'eni/

20	pen	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/	/pen/
21	stop	/stop/	/sta:p/	/stop/	/sta:p/	/sto/	/stop/	/stop/	/sta:p/	/sta:p/	/sta:p/	/sta:p/	/stop/	/stop/	/sta:p/	/sta:p/	/sta:p/
22	red	/red/	/red/	/led/	/red/	/led/	/led/	/led/	/red/	/red/	/red/	/red/	/red/	/red/	/led/	/red/	/red/
23	around	/ə'raʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'raʊnd/	/ə'laʊnd/	/ə'raʊnd/	/ə'raʊnd/
24	soon	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/	/su:n/
25	us	/əs/	/əs/	/ʌs/	/ʌs/	/ʌs/	/əs/	/ʌs/	/əs/	/ʌs/	/əs/	/ʌs/	/ʌs/	/ʌs/	/əs/	/ʌs/	/ʒs/
26	ten	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/	/ten/
27	last	/lɑ:st/	/læst/	/læst/	/læst/	/læst/	/læst/	/ræst/	/læst/	/læst/	/læst/	/læst/	/læst/	/læst/	/læs/	/læst/	/læst/
28	vet	/vet/	/vet/	/vet/	/vet/	/vet/	/vet/	/bet/	/vet/	/vet/	/vet/	/vet/	/vet/	/vet/	/vet/	/vet/	/vet/
29	live	/lɪv/	/lɪv/	/laɪv/	/lɪv/	/lɪv/	/li:v/	/lɪv/	/lɪv/	/lɪv/	/laɪv/	/lɪv/	/lɪv/	/lɪv/	/lɪv/	/lɪv/	/lɪv/
30	wet	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/	/wet/
31	swim	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪ/	/swɪn/	/swɪn/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪm/	/swɪn/
32	zoo	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/	/zu:/
33	loves	/lʌvz/	/lʌvz/	/lʌbs/	/lʌvz/	/lʌvz/	/lʌvəz/	/lʌvz/	/lʌvz/	/lʌvz/	/lʌvz/	/lʌvz/	/lʌvz/	/lʌvz/	/lʌvz/	/lʌvz/	/lʌvz/
34	general	/dʒenrəl/	/dʒenrəl/	/dʒenləl/	/dʒenrəl/	/dʒenləl/	/dʒenrəl/	/dʒenrəl/	/dʒenrəl/	/dʒenləl/	/dʒenrəl/	/dʒenrəl/	/dʒenləl/	/dʒenrəl/	/dʒenləl/	/dʒenləl/	/dʒenrəl/
35	age	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/	/edʒ/	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/	/edʒ/	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/	/eɪdʒ/
36	hang	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/	/hæŋ/
37	hoping	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/	/həʊpɪŋ/
38	that	/ðæt/	/ðæt/	/ðæt/	/ðæt/	/zæt/	/zæt/	/dæts/	/ðæt/	/ðæt/	/ðæt/	/ðæt/	/zæt/	/ðæt/	/ðæt/	/ðæt/	/ðæt/
39	other	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/	/lʌðə/

40	thin	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/sɪn/	/sɪn/	/θɪn/	/θɪn/	/sɪn/	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/θɪn/	/tɪn/
41	bath	/bɑːθ/	/bæθ/	/bæθ/	/bæθ/	/bæ/	/bers/	/bæθ/	/bæs/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæθ/	/bæ/
42	ship	/ʃɪp/	/ʃɪp/	/ʃɪp/	/ʃɪp/	/sɪp/	/sɪp/	/sɪp/	/ʃɪp/	/sɪp/	/ʃɪp/	/ʃɪp/	/ʃɪp/	/ʃɪp/	/sɪp/	/ʃɪp/	/sɪp/
43	push	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/	/pʊʃ/
44	measure	/ˈmeɪz ə/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə ər/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/	/ˈmeɪzə r/
45	usual	/ˈjuːʒu əl/ /ˈjuːʒəl / /	/ˈjuːʒu əl/ /ˈjuːʒəl / /	/ˈjuːʒəl / /	/ˈjuːʒu əl/ /	/ˈjuːʒəl / /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒu əl/ /	/ˈjuːʒuəl / /
46	chin	/tʃɪn/	/tʃɪn/	/tʃɪn/	/tʃɪn/	/tɪn/	/tɪn/	/tʃɪn/	/tʃɪn/	/tɪn/	/tʃɪn/	/ʃɪn/	/tʃɪn/	/tʃɪn/	/tɪn/	/tʃɪn/	/tʃɪn/
47	catch	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/	/kætʃ/