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The purpose of this study is to determine whether or not pronunciation training results in a decreased use of the following consonant cluster simplification strategies--articulatory feature change, consonant cluster reduction and substitution--when pronouncing words containing final three-segment consonant clusters. This case study involves three Arabic speaking siblings living in Kuwait who received six weeks of pronunciation training. The instructional method incorporated native English speaker modeling, choral repetition, and self-correction using the subjects' audio taped recordings of them reading the target words in word lists, sentences, and passages. The subjects' pre- and post-assessments, as well as their weekly pre- and post-training audio recordings, were analyzed. The results from this study show that pronunciation training yields more target-like pronunciation of final three-segment consonant clusters.

PRONOUNCING THREE-SEGMENT FINAL CONSONANT CLUSTERS:

A CASE STUDY WITH ARABIC SPEAKERS LEARNING ENGLISH

By

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CHAPTER ONE: INTRODUCTION

In 2005, I was working at the American School of Kuwait (ASK) teaching middle school English as a foreign language (EFL) to students from a variety of countries whose parents' employers had transferred them to Kuwait. Part of my job involved designing and piloting a middle school EFL program. I gathered information from administrators and teachers at ASK, as well as from those working at the following private schools in Kuwait: The British School of Kuwait, Universal American School, American International School, A'Takamul International School, and Kuwait English School. Everyone I spoke to emphasized the same point: the goal of EFL programs in Kuwait, particularly middle school EFL programs, is to prepare students for high school, where they will be in mainstream classes without any EFL program to support them. Once they enter high school, EFL students will be expected to learn at the same pace and level of difficulty as their peers. In order to be considered amongst the best in Kuwait, and to attract students with wealthy parents, the private schools mentioned above want three things: 1) an international student population, 2) native English speaking teachers, particularly those from South Africa, Australia, Canada, the United Kingdom and the United States, and 3) a reputation as having a rigorous academic program in English that prepares students for university programs abroad. According to administrators that I spoke to, schools are afraid that this reputation would be compromised if they offered EFL programs in high school, regardless of the fact that many students could benefit

from them. Thus, taking the needs and goals of ASK into consideration, I designed and implemented an EFL program that prepared students with the skills they would need for high school such as answering both lower and higher level Bloom's Taxonomy questions about a text, summarizing the main idea of a text, figuring out the meaning of vocabulary words in context, developing pre-writing organizational skills, writing with description and examples, and writing an academic research paper according to the 6+1 writing traits model with accurate citations and paraphrasing. It was months later, during Hamline's Phonetics and Phonology course, when I realized that I had completely neglected to include the teaching and acquisition of accurate English pronunciation in my EFL program.

While taking Phonetics and Phonology I became fascinated with how English language learners acquire and develop better, that is, more understandable English pronunciation. As a result of my coursework, I was developing an increased awareness of my students' pronunciation and my own teaching practices, which encouraged me to ask basic questions: How were my students learning to pronounce words in English? How was I fostering pronunciation accuracy and fluency? What difficulties were my students having with English and how was I addressing such difficulties? Was I correcting their pronunciation mistakes? How was I doing so and in what way? When was it necessary to correct my students' mistakes? How could I more effectively and creatively teach pronunciation?

I didn't want awareness about the importance of teaching pronunciation to end with me. I felt it was my responsibility to pass on this knowledge to my school administrators and other teachers. One of the first steps I took towards encouraging

others to consider the importance of the role of pronunciation in the education of EFL learners was to share my new knowledge with ASK's elementary EFL teachers. I had been meeting weekly with this group of teachers since I had begun teaching at ASK. We discussed the burgeoning middle school EFL program and concerns about both the middle school and the elementary EFL students in order to better meet their needs and prepare them for the time in their education when they would no longer be a part of an EFL program.

Summer was fast-approaching, and we were in the process of putting together the annual spring EFL parents' meeting. This end-of-the-year meeting is designed to help parents foster their children's English skills during the three-month summer break. The usual advice to parents at this meeting had always been to encourage their children to read as much as possible in English so that they would do well in their mainstream classes the following fall and to keep a daily journal to maintain and practice English vocabulary and grammar skills. However, due to the discussions I had been initiating with my colleagues about pronunciation, we decided to also include suggestions to parents on how to encourage and help their children maintain and improve their English pronunciation skills. We advised parents to engage their children in English conversation, choose specific periods of time to correct their children's pronunciation rather than correcting every utterance, have their children keep a log of difficult words to pronounce and revisit the list each week, and read aloud with their children and make a list of pronunciation errors to review at the end of the reading session.

When the children returned to school that following fall, they seemed to have maintained almost the same level of English pronunciation that they had left with at the

beginning of the summer holiday. This judgment, however, was based on my memory rather than the results of pre- and post-holiday pronunciation assessments. Thus, I wasn't able to actually determine whether or not the suggestions we offered to the parents were effective. I realized later through further reading that my own oversight was part of a larger gap: while much research has been done on identifying and explaining English language learners' difficulties with English, far fewer studies have been done on how to apply this knowledge to the practice of teaching in order to determine whether or not pronunciation training is effective and which methods are the most effective. Realizing the existence of this gap and the need for further contributions in the area, I tucked away the idea of doing my capstone within the field of pronunciation practice.

In the summer of 2007, I began working at the Kuwait Ministry of Defense (MOD) Language School. The students go there to take a set number of two-week long English courses, determined by the commander of their military unit, for the purpose of improving their English, so that they can participate in overseas military programs in the United States and in the United Kingdom. Similar to the teaching situation at ASK, pronunciation is not a part of the curriculum because it is not assessed. The exams that take place at the end of every two-week course assess only the following skills: vocabulary, grammar, and listening. Based on my teaching experiences at the MOD, and listening to other teachers' testimonies regarding their own classes, the students at the MOD want opportunities to practice their speaking skills in class and to receive feedback about their pronunciation.

As a result of the requests from my military students, I began to devote the last lesson of the day to conversation and pronunciation practice. I would elicit topics from

the men, or select a topic myself or use a colleague's suggestion, and facilitate a discussion or friendly debate. My goals were to help the men become more fluent English speakers and to help them pronounce words more accurately. I would keep a list of mispronounced words on the board. Each day I would begin the pronunciation lesson by having the students read the list of words as a group and individually, correcting them only after they had attempted to identify their own errors. Then I would call on individual students to make a sentence with each word. I noticed two types of pronunciation errors amongst my students. The first type of errors I noticed were phonemic errors—errors demonstrated by a student's difficulty pronouncing a single English phoneme. My students' substitution of /b/ for /p/ is an example of a phonemic pronunciation error. One student said when he went to the movies he ate *bobcorn*. The second type of errors I noticed amongst my students were morphological errors—errors demonstrated by a student's difficulty pronouncing a morpheme of a word. My students' distinct pronunciation of regular past tense verbs is an example of a morphological pronunciation error. Several students would pronounce the final *ed* as a second syllable, thus breaking up one-syllable words such as *walked* and *watched* into two-syllables: *walk-ed* and *watch-ed*. Dropping the final /s/ on verbs in the third person, such as *contrasts*, or plural forms of nouns, such as *girls*, are other examples of morphological pronunciation errors that I noticed.

As I continued to work with my students, helping them to become better English speakers, I began to wonder what spoken errors other teachers noticed amongst their students. I, therefore, decided to find out what pronunciation errors my colleagues had heard. At the end of every month, students at the MOD take a 90-minute assessment of

their English listening, vocabulary, and grammar skills to determine if they have obtained their individual target score, as determined by their unit's military commander. Once they achieve this score, it is no longer necessary for them to attend English courses at the MOD, unless they petition to do so. While students are occupied with the assessment, teachers are either designing supplemental grammar and vocabulary materials to share with their colleagues or giving a demonstration lesson to their colleagues and administrators for the purpose of receiving feedback in regards to their teaching. About half way through the assessment, most of the teachers take a short break. It was during one such break time that I decided to ask some of my colleagues about the pronunciation errors that their students make. I spoke to as many colleagues as I could. In total, I asked 16 out of my 30 colleagues (four Americans, three Britons, two Canadians, four Egyptians, and three Syrians) the following question: What English words or sounds are difficult for your students to pronounce? I jotted down notes as each of my colleagues responded and later analyzed the notes to see if I could discover any similarities. There were several errors in the category of phonemic pronunciation errors. One of the most common errors that my colleagues mentioned was the substitution of /b/ for /p/. Additional errors that they noticed amongst their students include: using /dʒ/ and /g/ interchangeably in words like *judge* and *girl*, using /θ/ and /ð/ interchangeably in words such as *thin* and *this*, pronouncing words ending in /ŋ/ + ing with a strong /k/ or /g/ before the -ing while pausing between syllables so as to make a single two-syllable word sound as two distinct words, as in pronouncing *thinking* as /θɪŋk/ /kɪŋ/ instead of /θɪŋkɪŋ/ and *bringing* as /brɪŋ/ /gɪŋ/ instead of /brɪŋɪŋ/, mispronouncing the phoneme /ʒ/ in words such as *measure* and *leisure*, pronouncing /r/ as a rolled /r/, using /θ/ and /s/

interchangeably in word-initial position, such as *think* and *sink*, having difficulty knowing how to pronounce words that contain a letter which can represent the same phoneme, such as the letters *d*, *g*, and *j* which can all be represented by the phoneme /dʒ/, as in *graduate*, *generous*, and *joy*, respectively, having difficulty knowing how to pronounce words that contain a letter which has more than one phoneme, such as the letter *d* which can be pronounced as /d/ or /dʒ/, as in *dog* and *soldier*, respectively. In the category of morphological pronunciation errors, nearly all of my colleagues that I interviewed mentioned the same types of morphological errors that I noticed: leaving off the final /s/ of third-person verbs and plural words and pronouncing one-syllable regular past tense verbs as two syllables. While a couple of my colleagues mentioned that they noticed students having difficulties pronouncing vowels, either pronouncing long vowels as short vowels and vice versa or substituting one vowel phoneme for another, the majority of the errors they mentioned involved consonants, thus consonants became my focus for further research.

After speaking to my colleagues about their students' pronunciation difficulties, I started researching Arabic speakers' difficulties with consonants on the internet. I came across a great deal of information on EFL/ESL students' difficulties pronouncing sequences of consonants, known as consonant clusters. I stumbled upon a website on Arabic speakers' difficulties with learning English (<http://www.lerc.edu.ubc.ca/LERC/courses/489/worldlang.index.html>), designed for one of the University of British Columbia's Language Education Research Center's courses. I was fascinated to learn about the similarities and differences between Arabic and English, especially about the consonant cluster constraints in Arabic as compared to

English. According to the website above, final consonant clusters are much more difficult to learn than initial consonant clusters. I wanted to learn more about the challenges Arabic speakers have pronouncing final consonant clusters, especially consonant cluster sequences of more than two phonemes, which are non-existent in Arabic, and how to go about teaching this phenomenon.

Pronunciation

In my experiences living and teaching abroad, I have discovered that speaking a second language is important for several reasons. First, learning another language can be exciting because it lets you communicate with a wider range of people, from a variety of cultures. Second, knowing how to speak a second language can be helpful in preventing minor verbal exchanges from becoming major ordeals involving a web of miscommunication, extraneous queuing, time delays, and overall frustration. Speaking a second language is also important if you want to study abroad or conduct business with those who do not speak your first language. Speaking a second language may be important for those who want to broaden their career options, increasing their likelihood for promotions and access to opportunities that their colleagues may not have. Thus, the desire or need to speak another language depends on the goals of the learner. For the three subjects in my study, their reason for learning English is because their parents want their daughters to have more opportunities after they graduate from high school in terms of jobs and the ability to attend university in Kuwait, where English is a prerequisite.

Yahya (2002) points out that spoken language has two major functions: transactional and interactional. The main goal of transactional functions is for the speaker to convey a message. A patient discussing his or her symptoms with a doctor or

a teacher explaining math concepts to a group of students are examples of transactional functions. The main goal of interactional functions of spoken language is to maintain social relationships and is thus listener oriented. Interactional functions are friendly, agreeable conversations between or amongst interlocutors that are typically characterized by frequent topic-shifting, sharing the role of speaker and listener, and expressing opinions (Yahya, 2002).

In order to accomplish the transactional and interactional functions of spoken language, it is not enough to simply speak a second language. A certain degree of intelligibility is necessary if you want your message to be understood by the listener. (Celce-Murcia, Brinton & Goodwin, 1996). An intelligible speaker, according to Anderson-Hsieh (1989), is defined as someone whose speech has achieved a degree of accuracy sufficient to be understood. A major component to becoming an intelligible speaker is developing good pronunciation. Yet how English language teachers should go about teaching pronunciation is still a much debated issue (Moy, 1986), as is what to teach: segmental features of pronunciation such as consonant and vowel sounds or suprasegmentals such as stress, rhythm, and intonation (Gilbert, 1990). In fact, some researchers question whether or not pronunciation training is effective at all (Madden, 1983). Perhaps it is of little wonder then, why pronunciation training is oftentimes left out of the EFL/ESL curriculum or relegated to warm-up status (Yahya, 2002). The fact remains, however, that every time we struggle to understand someone in our otherwise perfunctory communication exchanges at the doctor's office, in a restaurant, or on the phone, we become acutely aware of how important intelligible pronunciation is and how frustrating communication is without it.

As Anderson-Hsieh (1989) points out, native-like pronunciation is not necessary, and perhaps not even likely, but an intelligible level of pronunciation is. In order to reach an intelligible level, or threshold level, of pronunciation, a speaker's errors must not impede communication. Many of the errors that my Arabic speaking students make with pronouncing final consonant clusters hinders communication with them. Helping my students overcome such errors is necessary in order for them to become more intelligible speakers.

Background of the Researcher

Upon entering ASK, middle school EFL learners are assessed on their reading skills by reading a variety of increasingly difficult passages, vocabulary skills by orally identifying what they see in pictures (the Peabody Test), and writing skills by writing as much as they can about either their favorite place or what they did over the summer holiday. English pronunciation skills are not formally assessed. Collaborating with my colleagues at ASK and at the MOD, and participating in conversations with other ESL/EFL teachers have made me come to the conclusion that too often school administrators and teachers, both in Kuwait and in Minnesota, assume that EFL/ESL learners will simply pick up the pronunciation of English without formal instruction. However, this is a dangerous assumption. Hamline University's Phonetics and Phonology course has made me realize that the acquisition of intelligible English pronunciation should not be relegated to just an extra activity or a time filler, but rather recognized as a cornerstone of any EFL/ESL lesson that deserves as much thought and planning outside of class and as much attention in class as the other aspects of learning a second language.

Role of the Researcher

I was planning to conduct my research at the MOD, but I was not granted approval to conduct such a study. Thus, the participants for my study are three native Kuwaiti Arabic speaking female siblings. I first met this family through one of my colleagues at the MOD who asked me if I would be willing to help Hithari (all proper names have been changed to pseudonyms), the eldest daughter, with her coursework for the English literature and language degree she is working on at Kuwait's branch of the British Open University. On occasion, particularly around the end of the semester when most students in Kuwait are preparing for big exams in each subject area, Hithari's parents have asked me if I would help their three youngest daughters with their English homework. Sometimes I would read with them or assist them with writing exercises. Hithari's sisters study English in school, particularly vocabulary and grammar, but they have little opportunity to actually speak English. As part of their English courses in school, they are asked to complete several reading assignments and answer comprehension questions or complete grammar exercises. Hithari is the only one in the house with enough English to help her sisters, but she does not have much time to do so, as she works six days a week in a clinic to help support her family in addition to taking more than a full-time load of classes each semester. Their parents are far from fluent in English, thus they have difficulty assisting their children with their English homework, yet they want their children to learn English so that they can attend university some day and have a wider range of job opportunities. Realizing that Hithari's sisters could use more help with their English skills, particularly with pronunciation, I decided to inquire

about the possibility of using them as a case study for my capstone research. I was eventually given permission from both the family and Hamline University to do so.

Guiding Questions

My capstone study is on how three female siblings from a family living in Kuwait learn to pronounce final three-segment English consonant clusters. I set out to answer the following questions: How do my subjects pronounce final three-segment consonant clusters? What effect does pronunciation training using a combination of native speaker modeling and self-correction using audio recordings have on the subjects' pronunciation of final three-segment consonant clusters?

Summary

In chapter one, I introduced my research by establishing the significance and need for this study. I described how designing the EFL program at ASK while simultaneously taking coursework for my master's in ESL made me realize the importance of helping my students improve their English pronunciation. I explained how attention to my students' spoken errors at the MOD gave me the idea for my capstone. In this study, I focused on how three sisters living in Kuwait pronounce final three-segment consonant clusters and whether or not pronunciation training with consonant clusters helps improve their pronunciation of them. I devised and implemented a pronunciation teaching method that relies primarily on listening to a native speaker (myself) using final three-segment consonant clusters and self-correction using audio recordings. The target accent was North American English (NAE) as it is the preferred accent of my students' school. The results of my study show that, rather than being ignored or omitted, teaching pronunciation is a vital part of any ESL/EFL program.

Chapter Overviews

In Chapter Two I provided a review of the literature relevant to consonant clusters. I discussed the difficulties that Arabic speakers have with English consonants and further explained how I decided to focus on consonant clusters. I then defined consonant clusters and described their significance. Next, I described consonant cluster simplification strategies used by second language learners to help them pronounce English consonant clusters. Finally, I discussed the issues involved with teaching pronunciation and the goal of becoming an intelligible speaker. Chapter Three includes a description of my research design and the methodology that guides this study. I described the case study paradigm and explained the specifics of my six-week study with my three subjects. I went into detail as to how I used choral repetition and audiocassette recordings for the purpose of self-correction to aid the subjects' pronunciation of final three-segment consonant clusters. In Chapter Four I presented the results of this study. I transcribed the pre- and post-assessment recordings and the pre- and post-training recordings from the six-week study according to the transcription key in Appendix G. The transcriptions were then organized into tables according to the subjects' pre- and post-training pronunciation of the target final consonant clusters by task—word list, sentences, and passages. The data I collected showed how my subjects pronounced final three-segment consonant clusters before and after training, thus allowing me to conclude whether or not pronunciation training using the techniques I chose resulted in improved pronunciation as measured by the subjects' use of more target-like pronunciation. Finally, a description of the verification of the data was presented, followed by a section on how I maintained the ethics of the study. In Chapter Five, I reflected on what I have

learned by doing the research and conducting this study. I discussed the limitations of the study and implications for further research, and presented recommendations for other EFL/ESL teachers.

CHAPTER TWO: LITERATURE REVIEW

A great deal of research has been done on the kinds of errors native Arabic speakers make in English (Broselow, 1982; Kopczynski & Meliani, 1993; Mitleb, 1987; Mukattash, 2001). Researchers have also come up with theories as to why second language learners make errors in the target language (Eckman, 2004, 1991, 1977; Carlisle, 1997; McCarthy, 2002). Knowing what errors students are making and speculating about why they might be making them is necessary, but simply gathering this information is of no benefit to our students. Our job as English language teachers is to be able to put this knowledge into practice as we try to answer the question: How can I help my students overcome their pronunciation errors, or produce more comprehensible English? Answering this question is an important part of teaching pronunciation to our students so that we can most effectively and efficiently help them become more fluent and accurate speakers. Helping students to achieve a certain degree of speaking fluency and accuracy in a second language is necessary in order to foster communication. Thus the goal of pronunciation training is to help students reach a minimal level of pronunciation whereby they can communicate and be understood.

If English language learners do not reach this minimal, or threshold, level of pronunciation, that is an understandable level of pronunciation where the errors in one's speech do not impede the delivery of the message, then they will not be able to

communicate orally no matter how good their control of English grammar and vocabulary might be (Celce-Murcia, Brinton & Goodwin, 1996). Despite its importance, pronunciation training is something that teachers have not given enough attention to in their classrooms (Singh, 1992). Oftentimes, pronunciation training is not considered as important as teaching the other language skills: listening, reading, and writing and thus it is frequently omitted from the ESL/EFL curriculum (Yahya, 2002). Another problem is that very little evidence exists as to whether one focus of pronunciation instruction is superior to another or even whether any form of instruction is beneficial at all (Derwing, Munro & Wiebe, 1998). Research in this area is imperative so that our students gain the skills to communicate effectively. Thus, the focus of my capstone is on answering two questions: How do my subjects pronounce final three-segment consonant clusters? What effect does pronunciation training using a combination of native speaker modeling and self-correction using audio recordings have on the subjects' pronunciation of final three-segment consonant clusters?

Overview of Chapter

In this chapter, I discuss what the literature says about the difficulties Arabic speakers have pronouncing English consonants and consonant clusters. I then define consonant clusters and discuss their significance and why accurate pronunciation of them is important. Next, I discuss the ways second language learners simplify consonant clusters in order to ease their pronunciation. Finally, I describe the issues of teaching pronunciation and the importance of reaching a threshold level of pronunciation.

Arabic Speakers' Difficulties with English Consonants

After doing an informal inventory with my colleagues at the MOD on student pronunciation difficulties, I began searching for academic articles on Arabic speakers' difficulties with their pronunciation of English consonants. Schwabe, Director of English as a Foreign Language at the University of California Davis, wrote an article (1978) that compiled data on the contrastive features of the English and Arabic sound systems, particularly those features that cause semantic confusion such as phoneme substitution in the following words: *bath* and *path*, *brood* and *prude*, and *yan* and *fan*. Included in the article is error data collected from intermediate and advanced-level Arabic speaking students learning English at the University of California Davis. Schwabe's description of the difficulties, along with several examples and possible explanations, shows that Arabic speakers' pronunciation errors with English consonant phonemes that are most likely to impede understanding occur within three manners of articulation: 1) stops, sounds which block the airflow and include /p, b, t, d, k, g/; 2) fricatives, sounds made by air being forced through a narrow passageway in the mouth or throat and include /f, v, θ, ð, s, z, ʃ, ʒ, h/; and 3) affricates, sounds that begin as stops and then are released as fricatives and include /tʃ, dʒ/ (Schwabe, 1978). A study conducted at the Center for English as a Second Language at Southern Illinois University (Leahy, 1980) found results similar to Schwabe. One-hundred twenty-four students, 14 of whom were native Arabic speakers, were asked to read 89 words chosen to elicit specific target sounds. The results showed that Arabic speakers have difficulty with consonant phonemes within the following manners of articulation: 1) stops, specifically /p, b, d, g/; 2) fricatives, specifically /f, v, /θ/, /ð/, /tʃ/; 3) affricates, specifically /tʃ/; and 4) nasals, sounds that are made as air is

continuously released through the nasal cavity while the speech organs assume a stop-like position, specifically /ŋ/. Gillette's (1994) pronunciation manual describes characteristics of the English language and includes a list of the English phonemes with a description of how they are supposed to be produced and spelled, along with sample words, phrases, and sentences containing words with each phoneme to be used for teaching purposes. Gillette categorizes the potential pronunciation difficulties that English language learners will have. Gillette indicates that Arabic speakers may have trouble with the following English consonants: rolling the /r/, replacing /p/ with /b/, as in *baber* for *paper*, replacing /θ/ with /s/, as in *sin* for *thin*, replacing /ð/ with /z/ or /d/, as in *zat* or *dat* for *that*, pronouncing the aspirated /t/ like a /d/, as in *duo* for *tuo*, replacing /tʃ/ with /ʃ/, as in *sheep* for *cheep*, and pronouncing the grapheme /g/ only as /dʒ/ as in *gentle*. Meinhoff & Meinhoff's (1976) article is a collection of papers discussing the linguistic characteristics amongst a sample of 300 students attending Kuwait University. One chapter is devoted to two noticeable pronunciation errors: substituting /b/ for /p/ and substituting /ŋk/ for /ŋ/. A study (Altaha, 1995) conducted over a four-year period of sophomore Saudi university students majoring in English found that that the students make the following errors with English consonants: substituting /b/ for /p/, such as saying the word *pray* as /breɪ/ instead of /preɪ/; substituting /v/ for /f/, such as saying the word *very* as /fɛriy/ instead of /vɛriy/; pronouncing /g/ as /dʒ/, as in *garage*, /dʒərədʒ/ for /gərədʒ/ and vice versa; origin /ɔrɪgɪn/ for /ɔrɪdʒɪn/.

Through my reading, I discovered that Arabic speakers not only have difficulty with individual consonant phonemes in English, but with groups, or adjacent, consonant sounds, known as consonant clusters. Consonant clusters can be defined in two ways: 1) a sequence of two or more consonant phonemes strung together initially, medially, or finally within the same syllable, as in the first three phonemes /str/ of the word *straight*; or 2) abutting phonemes, either across two syllables, as in the consonant phonemes /ndl/ in *endless* or across words, as in *rain storms* (Odisho, 1979). According to Altaba's (1995) study Arabic speakers insert the vowel /ə/ before all two-segment initial consonant clusters, as in the word *stop*: /əstɒp/ for /stɒp/ and between all three-segment initial consonant clusters, as in the word *stress*: /sɛtɹɛs/ for /strɛs/. This phenomenon of inserting a vowel, such as /ə/ or /ɪ/, or a consonant between adjacent consonants, either within a word or across two words, is known as epenthesis (Celce-Murcia, Brinton & Goodwin, 1996). Arabic does not permit two- or three-segment consonant clusters at the beginning of words, which is one reason why they struggle with such sequences in English (Altaba, 1995). However, in English there are more consonant clusters in final position than in initial position (Celce-Murcia, Brinton & Goodwin, 1996). In fact, there are 174 consonant clusters permitted in English (Nasr, 1997), over half of which are either three- or four-segment clusters. Arabic, however, only allows two-segment final consonant clusters (Schwabe, 1978). The large number of final consonant clusters in English and the discrepancies between Arabic and English in terms of the number of consecutive consonants permitted at the end of words make English final consonant clusters even more challenging for Arabic speakers to pronounce (Schwabe, 1978).

According to Schwabe (1978), while there are 39 initial English consonant clusters that are either lacking in Arabic or difficult for Arabic speakers to pronounce in English, there are 150 final consonant clusters occurring in English not permitted in Arabic. In fact, only about a third of the two-segment final consonant clusters in English are permissible in Arabic. One common error that Arabic speakers make is dropping the following final English word inflection phonemes—/s, z, d, t/—from their speech in a cluster environment. This could be due to the fact that Arabic doesn't permit as much final consonant clustering as English does. English syllables, for example, can consist of up to four consonant phonemes after a vowel, (c)(c)(c)v(c)(c)(c)(c), while Arabic syllables can have up to only two consonant phonemes after a vowel, (c)cv(c)(c) (Schwabe, 1978). According to Celce-Murcia, Brinton & Goodwin (1996), many English language learners have difficulty with final consonant clusters, especially if their native language, such as Arabic, has a simpler syllable structure than English. Corroborating the information in Schwabe (1978) and Altaha (1995), Celce-Murcia, Briton & Goodwin (1996) describe common errors that English language learners make when pronouncing final consonant clusters, including dropping the final consonant phoneme in the cluster, such as saying *car* instead of *cars*, dropping the entire final cluster, such as saying /kɒw/ instead of /kɒwld/ for *cold* and using epenthesis to break up final clusters, as in /wɒtʃəd/ for /wɒtʃt/. A study (El-Halees, 1986) with 203 Jordanian students amongst three high school English classes provides additional evidence of Arabic speakers' difficulty with final consonant clusters in English. The subjects were asked to read a short story from a book of fables and orally reproduce it in their own

words in an informal situation. The subjects' reproductions were recorded and transcribed. An analysis of the subjects' errors in retelling the story found that Jordanian students modified the final syllables of English words by 1) deleting the final consonant in final consonant clusters, such as saying /nɛks/ instead of /nɛkst/ for the word *next*, 2) and inserting the vowel /ə/ to break up final consonant clusters, such as saying /vɛkəst/ instead of /vɛkst/ for the word *vexed*.

Upon reading articles and studies involving Arabic speakers' challenges with consonant clusters, I realized that the morphological errors that the students at the MOD were making occurred in final consonant clusters. Similar to the subjects in El-Halees (1986) study, my students were using epenthesis to break up final clusters in regular past tense verbs, such as saying the word *changed* as /tʃeɪndʒəd/ rather than /tʃeɪndʒd/. They were also deleting the final /s/ on words when it was part of a final consonant cluster, as in the words *lists* and *sports*. In addition to my own teaching experiences with Arabic speakers, as well as those of my colleagues, the research I did on Arabic speakers' difficulties with final consonant clusters further justified and confirmed my reasons for doing a case study involving Arabic speakers' pronunciation of final consonant clusters and how to help them improve their pronunciation of them.

Consonant Clusters

Definition

As previously mentioned, Odisho (1979) describes two ways to define adjacent consonants. First, a groups of consonants can be defined as abutting, that is, occurring

across syllables within a word, as in the /nt/ of *enter*, or across word boundaries, as in /ntr/ of *I can't run*. Second, a group of consonants can be defined as a cluster, that is, consonants occurring in a sequence within a syllable, as in the /mp/ of *jump*. For the purpose of this study, I have restricted my definition of adjacent consonants to the latter definition. The latter appears to be the accepted definition as to what a consonant cluster is, as this is how other sources such as Britton (2000) and Stewart, Jr. & Vailette (2001) define consonant clusters. The latter definition also provides a more accurate representation of syllabic divisions. For example, the /gr/ in *agree* and the /str/ in *astride* are two- and three-segment clusters, respectively, because they occur within a single syllable. However, while /mpr/ in *improbable* looks like a three-segment cluster, it is actually a single consonant /m/ in the first syllable followed by the two-segment cluster /pr/ in the second syllable (Odisho, 1979, p. 206). Odisho (1979) points out that investigators that do not distinguish between consonant clusters and abutting consonants run the risk of arriving at pseudo-linguistic statements about languages. Deciding on how to define adjacent consonants is also important for teaching. A teacher of Arabic speakers may not need to concentrate on abutting consonants, as the syllable division may alleviate pronunciation difficulties, and instead choose to concentrate on three- and four-segment clusters, which are non-existent in Arabic and usually regarded as troublemakers for Arabic speakers (Odisho, 1979).

Significance

Consonant clusters are indicators of the phonotactics of a language and can therefore help explain why the learner is making certain errors in their English pronunciation. Phonotactics (Britton, 2000; Stewart, Jr. & Vailette, 2001) are the

language-specific constraints on positions and sequences of sounds in a language.

Positions of single sounds and combinations of certain sounds, consonant clusters, may be permitted in another language which are not permitted in English, such as the phoneme /ŋ/ (like in the word *sing*) and the cluster /pw/, which are never word initial in English (Briton, 2000). Speakers will oftentimes try to impose the phonotactic constraints of their first language on the second language they are learning, as in the case of Arabic speakers who pronounce *hanged* as /heyŋəd/ instead of /heyŋd/.

Communication is not impeded if non-native English speakers' phonemic substitutions and strategies for handling phonotactic constraints result in slight foreign accents and minor changes to words (Stewart, Jr. & Valette, 2001). However, English language learners need to be made aware that inaccurate pronunciation of consonant clusters can make their speech difficult for native speakers to understand, particularly in cases where the learners use epenthesis to break up clusters or omit a consonant in a cluster (Celce-Murcia, Brinton & Goodwin, 1996).

Consonant clusters can also include important grammatical markers (Brinton, 2000). For example, the three-segment final clusters indicate a noun plural and/or possessive, as in the /-wn(d)z/ on *pounds*, or third person singular of the verb, as in the /-lks/ on *sulks*. According to Celce-Murcia, Brinton & Goodwin (1996), teachers need to stress to their students the stigmatizing effect of dropping morphological endings. For example, native English speakers may mistakenly conclude that the non-native speaker doesn't know English grammar or lacks proficiency in English.

Consonant Cluster Simplification Strategies

Pronouncing English final consonant clusters in their entirety may be cumbersome, even for native speakers (Celce-Murcia, Brinton & Goodwin, 1996). Oftentimes native speakers of English use simplification strategies, or methods to ease their pronunciation of final consonant clusters. For example, a native English may pronounce *asked* /æskt/ as /æst/ and *facts* /fækts/ as /fæks/. Much research has been done that indicates that final consonant clusters are often difficult for second language learners because their native language may not allow consonant clusters at all, or it may have a more limited distribution of consonant clusters like Arabic (Celce-Murcia, Briton & Goodwin, 1996). Not surprisingly, English language learners also use simplification strategies to pronounce consonant clusters. However, the simplification strategies used by native English speakers are not randomly chosen by the individual speaker, but are accepted by other speakers of English. English language learners, on the other hand, do not have a command of accepted simplification strategies nor the knowledge or skills to know where to use them in a word. Instead, the phonotactic constraints of their first language influence how English language learners, especially those new to English, simplify the pronunciation of final consonant clusters in English.

Although mispronunciation of target language clusters represents an attempt by the language learner to bring second language forms into conformity with first language syllabic restrictions (Broselow, 1980), unacceptable application of consonant cluster simplification strategies in the target language results in pronunciation errors and speech that is difficult for native speakers to understand. As Schwabe (1978) points out, Arabic can only have up to two segments in a final consonant cluster, while English can have as many as four. As previously mentioned, according to El-Halees' (1986) study with

Jordanian students taking high school English classes, Arabic speakers use two types of simplification strategies of final consonant clusters. One technique is to omit the final consonant of a final cluster, thus a word such as *carts* becomes *cart*. The second technique is to insert the vowel /ə/ to break up final consonant clusters, such as saying /vɛkəst/ instead of /vɛkst/ for the word *vexed* (El-Halees, 1986). I have heard my students at the MOD employ both of these simplification strategies when pronouncing words with final consonant clusters.

Lin (2001) also did a study on consonant cluster simplification strategies. While Lin's (2001) study was conducted on initial consonant clusters, it is relevant since the simplification strategies used by Lin's subjects are strategies also used by Arabic speaking students at the MOD in their pronunciation of final consonant clusters. Participants in Lin's study on initial consonant cluster simplification strategies consisted of 20 male and female Taiwanese students, ages 21 to 25, enrolled in the summer program at the Industrial Management Department of Chung Hua University in Taiwan. The subjects were asked to read minimal pair lists, word lists, sentences, and answer questions, each requiring the use of words containing initial consonant clusters. Lin (2001) found that his subjects used three types of simplification strategies: 1) epenthesis, insertion of a vowel or consonant to break up the consonant cluster, such as pronouncing *class* as /kəlæs/, 2) substitution, replacing one phoneme for another, such as pronouncing *play* as /pwey/ and 3) deletion, omitting one or more phonemes from the cluster, such as pronouncing *cast* as /kæs/. Lin also found that the type of strategy used was task dependent. The results of Lin's study supported his hypothesis: the use of epenthesis will

increase in situations that require more attention to form (minimal pairs and word lists) and the use of consonant cluster reduction and substitution will increase in situations that require more attention to content (sentences and questions).

Yet another study on consonant clusters that is particularly pertinent to my own study was conducted by Kim & Jung (1998) on 10 adult Korean speakers' acquisition of initial and final two-segment consonant clusters. The subjects were all enrolled in the intermediate and advanced levels at the English Language Institute of the University of Florida. Kim and Jung's study contained 25 consonant clusters, 12 initial and 13 final clusters and required subjects to read a list of words, followed by a list of sentences and finally a passage containing those words. Once Kim and Jung collected their data, they then classified the subjects' pronunciation of the 25 consonant clusters as either target language form or non-target language form. The non-target language form was broken down further into the following simplification strategies: articulatory feature change, consonant cluster reduction, and consonant cluster deletion. Articulatory feature change means that the number of segments, or phonemes, in the cluster is maintained, but with some change in place or manner of articulation. An example of this strategy is pronouncing *calves* /kævz/ as /kævs/, where the /z/ becomes devoiced. Another form of articulatory feature change is metathesis, which means switching the order of two phonemes, such as pronouncing *crisp* /krɪsp/ as /krɪps/. Kim & Jung define consonant cluster reduction as omitting one or more phonemes from the cluster, thus reducing the original number of segments in the cluster. An example of this is pronouncing *coughs* /kɔfs/ as /kɔs/. Kim & Jung include epenthesis in this category because epenthesis

involves splitting a cluster into a smaller number of clusters or individual phonemes. Pronouncing *gloves* /glʌvz/ as /glʌvəz/, for example, reduces the final two-segment consonant cluster into two single phonemes separated by a vowel. The third category used by Kim & Jung was consonant cluster deletion, whereby subjects omit the entire consonant cluster. For example, subjects that say *coughs* as /kɔ/ instead of /kɔfs/ are using total consonant cluster deletion as a simplification strategy. Similar to Lin's (2001) study, Kim & Jung (1998) found that their subjects do indeed use consonant cluster simplification strategies to ease pronunciation and that the choice of simplification strategy was influenced by the task being performed. For instance, their results showed better target pronunciation when the subjects were engaged in the text-reading task rather than the word-list reading task.

Teaching Pronunciation

Issues

Speaking a second language is about communicating with someone, and thus a certain degree of fluency and accuracy is necessary if the speakers want their messages to be understood (Yahya, 2002). Several issues, however, with teaching English pronunciation prevent students from getting the “best English education,” according to the father of my case study subjects (E. M. Hamdan, personal communication, April 3, 2008). First, given the importance of communication, it seems that a considerable amount of time in any ESL/EFL course should be on English pronunciation. Yet that is oftentimes not the case. As previously mentioned, pronunciation training is all too often neglected or omitted from ESL/EFL courses (Olness, 1991). Another problem is that

oftentimes teachers lack pronunciation training. According to El-Halees (1986), who wrote about the teaching situation in Jordan, teachers oftentimes know very little about the phonological systems of English and Arabic and, therefore, not always in the best position to help their students in improving the pronunciation of English. Lack of opportunity to actually speak English may be another reason why pronunciation is often forgotten. Many students rarely use English outside of class and thus schools place little, if any, emphasis on learning how to speak English (El-Halees, 1986). Another problem with pronunciation has to do with assessment. If pronunciation is excluded from the classroom there is little reason to include it in English language skill assessments. Upon completion of secondary school, students in Jordan must pass the secondary certificate exam, where they are tested on their competence in English grammar, vocabulary, and written comprehension, but not in pronunciation (El-Halees, 1986). The same is true of both public and private schools in Kuwait.

The Threshold Level of Pronunciation

The main goal of pronunciation training is to help English language learners become intelligible speakers for the purpose of effective communication (Yahya, 2002). Anderson-Hsieh (1989) points out that intelligibility, rather than native-like pronunciation, is a more realistic goal of English language courses. Intelligibility, however, depends on achieving the threshold level of pronunciation. The threshold level of pronunciation is the minimal level of pronunciation that is required in order to communicate and be understood (Celce-Murcia, Brinton & Goodwin 1996). However, reaching the threshold level of pronunciation is a gradual process. Prior to reaching the threshold level, language learners are in an early period (Shrum & Glisam, 2000), or a

pre-threshold phase, where they are testing out the new language and increasingly using more target-like language features, but without consistency and complete accuracy of the target language. During this period, learners will make errors (Anderson-Hsieh, 1989) and employ simplification strategies, such as the consonant cluster simplification strategies previously mentioned to ease their pronunciation of difficult consonant cluster combinations (El-Halees, 1986; Lin, 2001; Kim & Jung, 1998).

If the goal is to help language learners become more intelligible speakers and effective communicators, then using consonant cluster simplification strategies should only be temporary until they can use more target-like language and reach the threshold level of pronunciation. Learners should therefore start to become less reliant on such simplification strategies. Yet, the studies which I have read do not offer suggestions as to how to help the students replace pre-threshold simplification strategies with strategies that result in more accurate pronunciation so that they can become more intelligible speakers and reach the threshold level. Once troublesome areas of English language learners' speech and how they cope with such difficulties have been identified, the next step as a language instructor is to decide how to help students become better speakers (Lightbown & Spada, 1999). As already mentioned, the goal of pronunciation classes today is not for non-native speakers to sound like a native speakers of English, but rather to strive to achieve a minimal, or threshold, level of pronunciation in order to avoid oral communication problems (Celce-Murcia, Brinton & Goodwin, 1996). Thus, taking into consideration the goal of students to become intelligible English speakers, I decided to do my capstone on the pronunciation of final three-segment consonant clusters, the strategies

that my subjects employ to pronounce clusters that are non-existent in the native language, and making my subjects more intelligible speakers.

Conclusion

My literature review describes the difficulties that Arabic speakers have with individual English consonants and consonant clusters. I defined and described consonant clusters and their significance, as well as the simplification strategies that speakers employ to pronounce them. Poor pronunciation of consonant clusters can impede the speaker's intelligibility and thus affect the message the listener is receiving, making it difficult to understand the speaker. Thus, reaching a threshold level of pronunciation of consonant clusters is important. However, with little emphasis on pronunciation in schools in Kuwait, the opportunity to reach this threshold is unlikely without practice. Thus, I have used this gap in English language teaching as an area to do further research into the effect of pronunciation teaching.

CHAPTER THREE: METHODOLOGY

This study was designed to explore the acquisition of final three-segment consonant clusters by three sisters living in Kuwait. In this study, I wanted to know how my subjects pronounce final three-segment consonant clusters and if a pronunciation teaching method that involves making audio recordings and self-correcting would help my subjects to improve their pronunciation of final consonant clusters.

Overview of Chapter

This chapter describes the methodologies used in this study. First, I describe the inventory I did of my subjects' needs. Then I explain how this determined what methods I chose to use. Next a brief description of my pronunciation teaching method follows and why a case study was suitable for my research. Next, the data collection methods I used are described. I include information about the participants and the setting. I describe my four data collection techniques: the pre-assessment, the biweekly tape recordings before and after pronunciation training, the weekly log, and the post-assessment. Next, I describe how I compiled my data using tables, transcriptions, and tallies. Finally, I describe how I verified my data and the ethics of my study.

Inventory of Subjects' English Exposure and Needs

In deciding which pronunciation teaching method to use to best help my subjects with their pronunciation of final three-segment consonant clusters, I needed to do some

preliminary work. The first step was to begin with an informal inventory on how my subjects have been learning English, particularly if and how they have been taught pronunciation. This is what the American English Institute at the University of Oregon did when it wanted to revamp its ESL program to include pronunciation in a context-based curriculum (Olness, 1991). Furthermore, it is important to identify student needs from the beginning because as Singh (1992) points out there is oftentimes a great difference between what the students want and what they are getting in their language courses. I found this to be true amongst my students at the MOD, who've asked me and other teachers repeatedly for more opportunities to improve their English pronunciation, even though the language course assesses only grammar, listening and vocabulary skills. In light of such research and personal experience, I asked my case study subjects, through their older sister Hithari's Arabic translations when it was necessary, about their experiences learning English. I found out that each of my subjects began learning English at the age of six, in first grade. They have had one hour of English class, five days a week at school since then. Their English teachers are, and have always been, non-native speakers from Egypt. My subjects said they do a lot of grammar and vocabulary exercises in class and some reading aloud. Their textbooks are from a series entitled *English for the Emirates*, published in Dubai and approved by the Kuwait Ministry of Education. Each of my subjects has a textbook and a workbook to go with her grade level: grade six has book six, grade seven has book seven, and grade ten has book ten. Every day they must copy notes off of the chalkboard about English verb tenses and example sentences. The majority of an hour-long English lesson is taught in Arabic, as their teachers do a lot of translating from Arabic to English. Their homework consists of

memorizing lists of vocabulary words, doing grammar exercises, and answering comprehension questions about page-long reading passages containing a great deal of undefined technical language on seemingly irrelevant subjects to young women living in Kuwait, such as working in Dubai, constructing buildings, and becoming a soldier. None of the in-class or out-of-class exercises appear to require my subjects to use English to describe their own experiences or invent their own stories. Rather the written exercises only ask my subjects to simply locate and rewrite information found in a passage in order to answer a question.

The second step in my preliminary work was to find out the needs of my subjects. Singh (1992) suggests that if English language teachers want to ensure that their students achieve a basic command of the language, then they need to encourage a teaching program that is responsive to the learners' specific needs. Thus, I needed to consider several factors relevant to the lives of my subjects. First, the family whose three daughters I used for this case study is from one of the lowest socioeconomic classes in Kuwait (Human Rights Watch, 1995). Thus, they are not able to afford expensive computer software that would assist their daughters' English language development. I, therefore, needed to use a technique that wouldn't cost them anything. Second, my subjects always converse in Arabic with friends and family members. Apart from their English lessons in school, they have minimal exposure to English. The majority of the movies they watch and most of the music they listen to is in Arabic. Thus, I wanted to provide them with access to native English speaker speech even when I was not there. Third, the parents in this family speak minimal English so I needed to use a pronunciation teaching method that doesn't require the parents' assistance and would allow my subjects

to study and learn independently. Fourth, despite the fact that my subjects appear to have little reason to learn English at the moment, their parents want them to develop their English skills so that they can attend university like their older sister Hithari. Their parents see English as a way of creating more opportunities for their daughters in the future. Taking into consideration the needs of my subjects, I decided to use a pronunciation teaching method that focused on the following components: listening, segmentals, modeling and imitation, error correction, and audio recordings.

My Method

One important element of my pronunciation training method is the connection between listening and speaking. Listening and speaking go hand in hand because oftentimes there is an interchange between listening and speaking, and speaking appropriately depends, in part, on comprehending spoken input (Kitao & Kitao, 1996). Thus, effective pronunciation teaching relies on the integration of listening and speaking skills (Anderson-Hsieh, 1989). While the focus of my capstone was on helping my subjects become more proficient in pronouncing final three-segment consonant clusters, my subjects' listening skills were an important part of helping them to improve their pronunciation. First, they needed their listening skills to identify accurate pronunciation of the target consonant clusters in the words lists, sentences, and passages on the cassette tapes I left with them for homework at the beginning of each week. They then had to rely on their listening skills to help them distinguish between accurate and inaccurate pronunciation as they compared their own and each other's recordings to my recordings of the word lists, sentences, and passages containing the target consonant cluster words.

Another key element of my pronunciation training method is the focus on segmentals. The emphasis of pronunciation instruction keeps changing. In the past, pronunciation instruction centered primarily on teaching at the segmental level, such as getting sounds right at the word level and dealing with words in isolation or with words in very controlled and contrived sentence level environments (Gilbert, 1990). Later on, English language teachers tipped the scale in the opposite direction to concentrate on the suprasegmental features of language such as rhythm, stress, and intonation in a discourse context. They argued that such aspects of language have a greater impact on the learner's comprehensibility than segmental elements (Gilbert, 1990). However, more recent research shows that learners whose command of sounds deviates too far from standard speech are difficult to understand regardless of how targetlike their stress and intonation might be (Goodwin, 2001). Most pronunciation instruction today incorporates the teaching of both segmental and suprasegmental features (Celce-Murcia, Brinton & Goodwin, 1996). Those who have adopted this view recognize that "both an inability to distinguish sounds that carry a high functional load (such as /ɪ/ in *list* and /iy/ in *least*) and an inability to distinguish suprasegmental features (such as intonation and stress differences in yes/no and alternative questions) can have a negative impact on the oral communication—and the listening comprehension abilities—of nonnative speakers of English" (Celce-Murcia, Brinton & Goodwin, 1996, p. 10). Salah (1991) points out that remedial work on pronunciation is important at an early stage in learning English in order to help Arabic speaking students overcome problems that arise from mother-tongue interference and establish correct English sounds. Salah (1991) goes on to say that

pronunciation drills are an integral part of English teaching in Arab schools and warns that if learners don't have any remedial work on pronunciation at an early stage of language development then they will establish incorrect forms of the English sounds. Graham (1990) also suggests teachers have students do remedial work on troublesome phonemes. Gillette (1994) recommends concentrating on sounds and patterns of speech that interfere with students being understood. She also points out that students must be taught to hear the sounds of English before they can repeat them. Recognizing that segmentals are still an important part of pronunciation teaching, my case study focused on how my subjects pronounce strings of phonemes rather than on intonation, for example, or other features at the suprasegmental level. I also chose to focus on segmentals because of the lack of research done on pronunciation training at the segmental level. Occasionally I would find a single study advocating segmental training. For example, a study with Mandarin Chinese speakers found that English segmental intelligibility training involving common consonant and vowel errors resulted in an improvement in the pronunciation of isolated target words and target sentences, as judged by native English speakers who listened to the participants pre- and post-training recordings (Burlison & Dalby, 2007). I wanted to know if my case study would support or negate such results.

Another major component of my pronunciation training method involves modeling and imitation. Salah (1991) claims that the best method for teaching the sound system is repetition and imitation, which means that the teachers speaks, or models the target language, and the students imitate. Choral repetition is one method of having students imitate the teacher. According to Yahya (2002), choral reading is a valuable tool

for oral language development, especially for beginning English language learners. First, performing as a group is non-threatening and allows learners to practice speaking the language without being forced to perform before they are ready for an individual performance. Second, choral reading allows learners to hear the pronunciation of English spoken by their peers. Thus, even if the learner doesn't know the words precisely, he or she can repeat the words upon hearing their peers speak them. Third, research by Bradley and Thalgott (1987) indicates that choral reading helps children improve their diction and fluency (as cited in Yahya, 2002). Reflecting upon my teaching experience, I realized that I have begun nearly every ESL/EFL class with an activity that encouraged them all to talk. It seemed to get the students' minds turned on to English and ready for the day. Thus, I incorporated modeling and imitation into my capstone research. During the first few minutes of the pronunciation training sessions with my subjects, I asked them to repeat the target words after me, again, for the purpose of getting them mentally prepared for the day's pronunciation lesson. For homework, they were expected to listen to the cassette tapes of me using the target language in hopes that this would give them another opportunity to hear and imitate the target language on their own and reinforce what we were doing in the after school sessions.

Error correction was also a key component of my pronunciation training method because it is an important part of helping students become better speakers of English. Lack of error correction may lead to fossilization, errors that have become such an ingrained part of the learners' speech, as a result of lack of motivation and training to overcome them, that they are difficult, if not impossible, to change, even if a great deal of effort and training is eventually applied (Yahya, 2002). Yet directly correcting students'

errors does not necessarily help them to correct their own errors in the future, may frustrate students, and may cause them to focus too much on language form and too little on meaning (Shrum & Glisan, 2000). Thus, English language teachers need to strike a balance between overcorrection and undercorrection. They must also decide on the best method(s) for correcting student errors and when to use such methods. Thus, I let my subjects attempt to make their own corrections, rather than immediately correcting their errors myself. Since my subjects have minimal help at home with their English language acquisition, it is imperative that they become independent learners. Thus, I want my subjects to correct each other, as well as be able to identify their own errors so that they can make the necessary pronunciation repairs even when someone else is not there to correct them.

The final component of my pronunciation teaching method I used for my case study involves the use of audio recordings. I first heard about this idea from a colleague at the MOD who used this method when he taught high school students in South Korea. He said he made cassette tapes of himself using the target language for his students to borrow to study at home. In class, he had his students make audio recordings of themselves as they attempted to use the target language in sentences and paragraphs. He then played back the recordings in class and had his students try to spot their errors. He said he noticed his students' pronunciation improving and that they seemed to enjoy making and playing back recordings of themselves (Stephen Wilson, personal communication, March 17, 2008).

Audio recordings are an invaluable tool to teach pronunciation because they allow the learner to develop better speech awareness and place more responsibility on the

students for their own learning (Anderson-Hsieh, 1989). According to Celce-Murcia, Brinton & Goodwin (1996), self-monitoring, students' ability to *notice* their spoken errors, and self-correcting, students' ability to *produce* more targetlike language once they recognize their error(s), play a key role in helping students develop better speech awareness. Making and playing back audio recordings of subjects' speaking is one way of helping them develop such awareness. According to Al-Sawaf (1979), in order to unlearn any mispronunciations, students should be made aware of the sounds they are making and how they are making them. Gillette (1994) recommends that teachers "tape-record the students if possible so they can hear themselves improving. . . . It's important. . . that students develop a sensitivity and awareness to the sounds and patterns they need to correct" (p. 18). Teachers can also make audio recordings of themselves in order to provide an accurate and fluent model for students to listen to in order to help them develop a sensitivity and awareness to the sounds and patterns they need to correct (Gillette, 1994). Teachers can then have students make taped oral readings and compare their recordings to the model tape so that students imitate the correct pronunciation (Yahya, 2002). Paulston & Bruder (as cited in Yule, Damico & Hoffman, 1987) have also found that self-monitoring is one of the most efficient techniques for improving pronunciation. Leather (as cited in Yule, Damico & Hoffman, 1987) agrees and points out that an individual's ability to identify forms accurately in the target language is a key component in developing spoken language proficiency. In support of Anderson-Hsieh's (1989) second point, audio recordings allow students to take more responsibility for their language accuracy so that their oral proficiency can improve. Making and playing back audio recordings of themselves using the target language and then working with their

peers to identify and correct the errors increases student independence (Shrum & Glisan, 2000). Students can compile a listing of the kinds of errors they hear and focus on eliminating certain errors over a specified time (Shrum & Glisan, 2000). Yahya also supports this idea of peer correction and emphasizes that it is important to “create a community of learners who will help each other in correcting their mistakes” (2002 p. 215). Singh concurs that learning is not only a sharing of responsibility between the teacher and the students, but also between the students themselves (1992).

Case Study Research Paradigm

Mackey and Gass (2005) describe a case study as being characterized by a holistic description of language learning or use within a specific population and setting and detailed descriptions of specific learners. It is the study of an instance in action. In other words, the researcher selects an instance, such as a second language learner or a particular classroom, from the class of objects and phenomena under investigation, and studies the way this instance functions in context (Nunan, 1992). Case studies allow the researcher to focus on the individual in a way that is unlikely in group research. Although correlational, survey, and experimental research, for example, may enjoy a privileged status in second language research, very little is learned about the individual language learners in these types of studies. Case studies provide insights into the complexities of both the learners and the learning environment. Case studies can be conducted with more than one individual learner or more than one existing group of learners for the purpose of comparing and contrasting their behaviors within their particular context (Mackey & Gass, 2005).

Upon much consideration, conducting a case study seemed the most suitable method for trying to find answers to my research questions. The first part of my study focused on determining which final three-segment consonant clusters were difficult for my subjects to pronounce in English. The research I did for my literature review indicates that Arabic speakers of different dialects do not necessarily have the same difficulties in learning to pronounce English. Conducting a case study on three subjects allowed me to determine which of those final consonant clusters were problematic for a specific group of learners who have had the same educational experiences and who speak the same dialect of Arabic. The second part of my study examined the simplification strategies that my subjects employed to ease their pronunciation of three-segment final consonant clusters. As I mentioned in my literature review, learners who have different native languages, and even different dialects, employ different simplification strategies when pronouncing English consonant clusters. Thus, by focusing on discovering the simplification strategies employed by learners who speak the same native dialect I was able to obtain data specific to one population, which is useful information for English language teachers in Kuwait where most Arabic students speak Kuwaiti Arabic. The third part of my study aimed to determine whether choral repetition, listening to a native speaker, and comparing native speaker audio recordings with the subjects' own recordings for the purposes of self-correction would help my students better pronounce final three-segment English consonant clusters. Concentrating on a small group of learners allowed me to spend more time listening to each learner as she attempted to self-correct.

Case studies do have one important drawback that must be considered. Because case studies involve only a few participants, researchers need to be very careful about using the results to extrapolate generalizations about the larger population of second language learners (Mackey & Gass, 2005). According to Nunan (1992), however, the conclusions that can be made about a small representative sample are just as important as the conclusions that can be made about the wider population that it is a part of. Thus, a single case study is important and has value. However, Mackey and Gass (2005) point out that combining the findings from multiple case studies can help researchers draw better supported conclusions from their research. Corroborating results from several case studies done by various researchers on a subject is more credible than the conclusions drawn from a single case study because multiple case studies can reveal patterns whereas a single case study may simply be an anomaly. It is my hope that my case study will be replicated with other groups of English language learners living in Kuwait. Perhaps a conglomeration of the results of similar case studies will provide additional evidence to teachers of the benefits of teaching pronunciation to their pupils and to employ more effective teaching techniques in schools in Kuwait.

Parameters

The model for my study came from Kim and Jung's (1998) study on adult Korean speakers' acquisition of initial and final two-segment consonant clusters. As previously described, Kim and Jung's (1998) study looked at 25 consonant clusters (12 initial and 13 final clusters) and required the subjects to read a list of words, a list of sentences and a passage containing those words. Thus, the pronunciation of each of the 25 clusters was tested three times in three different capacities. After reading this study, I felt that the

conclusions made by Kim and Jung would have been more sound if the subjects had had more opportunity to demonstrate their pronunciation skills of the 25 consonant clusters under consideration. Thus for my own study, I decided to collect double the amount of data that Kim and Jung (1998) collected by testing each of the consonant clusters in my study six times, twice in the word list, twice in the sentence list, and twice in the passage. Each weekly task—the word list, the sentences, and the passage—contained the same set of rhyming pairs. In week one, for example, subjects read the rhyming pair *milks-silks* in the word list, in the sentences, and in the passage. This gave the subjects six opportunities to say the target cluster *-lks*, whereas Kim and Jung would give their subjects just three opportunities. I hoped that using a bigger set of data and giving my subjects more practice with each cluster would allow me to see consistencies and patterns.

The final consonant clusters for this study came from the book *Applied English Phonology* by Raja T. Nasr, Professor of Education and Applied Linguistics at Marymount University. Nasr lists a total of 174 final consonant clusters and one word next to each cluster that contains the cluster. For example, under three-segment clusters he lists the cluster *-mps* and beside it the word *amps*. Among these final consonant clusters are 77 two-segment, 83 three-segment, and 14 four-segment final consonant clusters. As I am interested in studying how second language learners acquire the pronunciation of a feature non-existent in their first language, I selected to study three-segment final consonant clusters because Arabic permits only two-segment final consonant clusters (Schwabe, 1978). I didn't include four-segment final consonant clusters in my study because there are not as many of them in English and I wanted to

have my subjects become more proficient in an area that they are most likely to encounter and have the opportunity to frequently use. Furthermore, many of the four-segment final consonant clusters are simplified by many native speakers to three-segment clusters, as in the case of the word *sixths* /sɪksθs/ which is commonly pronounced as /sɪks/ (Celce-Murcia, Brinton & Goodwin, 1996, p. 88). Thus, even when one encounters what looks to be a four-segment final consonant cluster, rarely is it pronounced as such.

Once I selected to study three-segment clusters, I carefully studied Nasr's list. Incorporating 83 clusters into my study seemed too large. I began to look at how to limit the number of three-segment clusters for research purposes. In Kuwait there are approximately 40,000 teachers in both public and private schools (Global Education Reference, 2007). Only about a third of these teachers are Kuwaiti-born, another third are native English speakers from the United States, the United Kingdom, Canada, and South Africa, and the final third are mostly from Egypt, but this segment also includes teachers from other Arabic speaking countries such as Jordan, Syria, Lebanon, as well as India. Most Kuwaiti-born teachers teach in kindergarten and primary schools. It's only private schools, such as ASK, that hire teachers from the United States, the United Kingdom, Canada, and South Africa to teach all of the students' subjects in English (Kuwait Ministry of Information, n.d.). As a result, most of the teachers in intermediate and secondary Kuwaiti government (public) schools are Egyptian (Global Education Reference, 2007). Consequently, it is more than likely that someone with an Egyptian accent usually teaches the daily mandatory hour-long English class at the intermediate and secondary schools. One of the prominent features of an Egyptian accent is using

epenthesis to break up final consonant clusters in both the regular past tense and the third-person simple present tense (Broselow, 1980). Thus, words such as *punched* and *carves* are pronounced as /pʌntʃəd/ rather than /pʌntʃt/ and /kɑrvəz/ rather than /kɑrvz/ (Broselow, 1980, p. 15). My subjects said that this is how their English language instructors, who have always been Egyptian, pronounce the regular past tense and third person present tense. When Noor, one of my subjects, questioned her instructor's pronunciation as a result of her sister Hithari's prodding, the instructor insisted that his pronunciation was correct. Thus, my subjects are taught pronunciation that is considered non-native English by native speakers of English. Hithari began correcting her sisters when they mispronounced the regular past tense and third-person simple present. Thus, my subjects' pronunciation in these areas is already quite good. I wanted to select an area of pronunciation that they had not had any training on outside of class and thus I chose to eliminate words containing the regular past tense and the third-person present tense from my study.

I finally had a more manageable list of three-segment final consonant clusters to use in my study. I still, however, had only one word, those from Nasr's (1997) list, representing each consonant cluster. My goal, as stated earlier, was to have two words for each consonant cluster. Thus, I searched under Wikipedia (http://en.wikipedia.org/wiki/Rhyming_dictionary) to find websites where I could locate additional words containing final three-segment consonant clusters to use in my study. The first three websites I found that came up under Wikipedia were: WriteExpress Free Online Rhyming Dictionary, RhymeZone, and WikiRhymer Rhyming Dictionary. Using

these websites to generate words for my study was another way in which I scaled down my list of three-segment final consonant clusters even more. I began with the website www.rhymer.com, typing in a word from Nasr's list containing a three-segment final consonant cluster. If a word came up that was not found in the other two websites, I eliminated it from the study. Words such as *girths* and *lymphs* fell into this category. I want to make sure that I was testing words containing only one final three-segment consonant clusters. Thus, words containing more than one three-segment final consonant cluster, such as *strengths*, which has two three-segment clusters, were also eliminated. I noticed that the English textbooks used by my subjects, a series entitled *English for the Emirates*, introduce consonant clusters with single syllable words containing only one cluster. According to Stewart, Jr. and Vailette (2001) individuals learning another language acquire more common sounds, such as /d/ and less complex language features, such as single syllable words and short phrases, before acquiring less common sounds, such as /ð/, and more complex language features, such as multisyllable words and full sentences. Therefore, I decided to include only single syllable words containing a single final three-segment consonant cluster. Words with more than one syllable, such as *conflicts*, were not included in the study.

Some of the words on the websites I looked listed words with multiple spellings for the same sound, such as *yearns* and *turns*. One of the problems in English is there is no one-to-one correspondence between the orthography and the sounds themselves. Due to this lack of correlation between orthography and sound, I selected single syllable words that didn't differ in spelling, such as *turns* and *burns*, rather than *yearns* and *turns*. Orthography is an important consideration in my study since my subjects will be reading

words containing three-segment final consonant clusters. Thus, I want to make sure that pronouncing those clusters, rather than learning to pronounce words containing multiple spellings of the same sound, is the variable under investigation.

I finally had a list of 24 three-segment final consonant clusters. I noticed that all of them ended in “s” except for *-rst*, as in *wurst* and *-kst*, as in *text*. According to research by El-Halees (1986), Arabic speakers often drop the final *-s* in consonant clusters. Since the final *-s* in a consonant cluster is an important grammatical marker, I decided to limit the scope of my study to incorporate only those three-segment final consonant clusters ending in *-s*. Thus, the final clusters *-rst* and *-kst* were dropped from the study. As a result of my limitation procedures, I used 22 three-segment final consonant clusters in my study.

Once I narrowed the scope of my study down to 22 three-segment final consonant clusters, I designed the specifics of it. I wrote my own sentences and passages for the purpose of testing my subjects’ ability to pronounce three-segment final consonant clusters. The vocabulary and grammatical structures that I used in my sentences and passages can be found in my subjects textbooks entitled *English for the Emirates* for grades six, seven, and ten. I thought by creating my own testing materials rather than using someone else’s materials, I would better be able to test my subjects on a single variable—their ability to pronounce three-segment final consonant clusters—rather than risking the chance of simultaneously testing them on anything else.

Data Collection

The Bedoon

My case study involved three siblings of an urban-dwelling Bedoon family living in Kuwait. The Bedoon (Human Rights Watch, 1995) are a more traditional and conservative group of people, mostly of Shi'ite Muslim faith, that consist of an extended group of tribes spread across the borders of Iraq, Iran, Syria, Saudi Arabia, and Kuwait. They number about 120,000 within Kuwait and about 240,000 outside of Kuwait. The Bedoon, which means *without* in Arabic, refers to people without nationality, whereas the Bedouin refers to people of nomadic tribes who are legal citizens of the country they reside in. In Kuwait, the Bedoon are of a low socioeconomic class and are not allowed to legally drive, work, own property or leave the country (Human Rights Watch, 1995). As long as Kuwaiti authorities don't have reason to believe or even suspect an individual of being Bedoon, peace between the Kuwaitis and the Bedoon is maintained. However, the Bedoon try to avoid contact with Kuwaitis in positions of authority as much as possible because of fear. No one wants to be accused of being Bedoon. If a male Bedoon is put in jail, for example, there is hardly likely to be a trial and he may never be let out. Furthermore, each year an unreported number of Bedoon go missing. It is believed that they are forcibly removed from Kuwait and released somewhere in the desert.

The Family

In the Bedoon family that I knew, both the parents and their eight children live in a small three-bedroom apartment in a run-down area next to an empty pit. Their front yard was bulldozed by the government, no one knows why. They haven't been able to afford to pay the rent for six months, but Emad, the father of the family, says they lived in their last apartment for a year without paying rent before they were kicked out. They have managed to get Lebanese passports through a friend so that they can hide their

identity as Bedoon in case they are asked to show identification, which frequently happens at random police checkpoints throughout Kuwait. Emad served in the Kuwaiti military for 14 years until the military told him they no longer needed him. For several years now he has worked illegally for cash as a taxi driver. His two sons, both in their twenties, live at home and work illegally doing odd jobs fixing computers and repairing cars. Neither has shown any interest in marriage yet. Emad arranged the marriages of his three eldest daughters to Kuwaiti men in the hopes that one day these men will allow his daughters to obtain Kuwaiti passports, once they produce male offspring, whereby they will have all the legal rights of Kuwaiti citizens. His daughters' marriages are not without difficulties, however—two husbands are alcoholics and physically abuse their wives and the third husband is a suspected homosexual, a big problem in Kuwait as it prevents the likelihood of producing children, most importantly a son, the main reason for getting married in Kuwait. Every couple of months one of Emad's married daughters comes home to stay for a time, maybe weeks or months, due to problems she is having with her husband. The daughters eventually go back to their husbands because Emad's wife Amira does not want a divorce in the family and believes it is the woman's job to calm her husband, help him control his behavior and provide him with children, especially boys. Amira raised her eight children and provided them with a good home, but no longer has the energy she used to, as she has a great deal of heart trouble. Emad and his youngest daughter are not well either and both have diabetes. Emad's three youngest daughters live at home and attend school. Despite the family's struggles, they are all quick to laugh, easy-going, welcoming to strangers, and show a great deal of love and affection for one another.

The Case Study Subjects

My case study subjects are Emad's three youngest daughters: Layla, Mariana, and Noor. Layla, also referred to as Subject A, is the youngest—she is twelve years old and in the sixth grade. Mariana, or Subject B, is thirteen years old and in seventh grade. They attend the same school. Noor, or Subject C, entered high school this year. She is fifteen years old and in tenth grade. All three girls attend government (public) schools, where they have received one hour of English language instruction each school day from first grade onwards until they graduate from high school. The rest of their courses are in Arabic, unlike private schools in Kuwait, often attended by wealthy Kuwaitis, where all of the courses are taught in English.

As already described, there are several issues surrounding the teaching of English pronunciation, including: neglecting or omitting pronunciation training from the curriculum, teachers' lack of pronunciation training, lack of opportunity to speak English, and no assessment. My case study subjects' educational experiences reflect these pronunciation teaching issues. My case study subjects' English lessons are taught by a non-native speaking English teacher, usually an Egyptian, whose pronunciation is oftentimes inaccurate. For example, Noor's English teachers insisted that the word *watched* is pronounced as /wɔʃɪd/ instead of /wɔʃt/. When she questioned her teacher about this, the teacher insisted that his pronunciation was correct. Perhaps it is due to the teachers' lack of accurate pronunciation that English lessons in Kuwaiti public schools focus predominantly on learning English grammar and vocabulary, with a strong dose of Arabic translations, and very little on English pronunciation. My case study subjects say

that while they may spend up to 15 minutes of an hour-long English lesson actually speaking English, most days they don't speak English at all in class. They said that the majority of their English lesson is devoted to copying notes and examples of English grammar off of the board, reading passages in English without pronunciation correction by the teacher, and listening to the teacher speak in Arabic about English grammar.

Layla, Mariana, and Noor take monthly and end-of-semester English exams, where they are asked to read short passages in English and answer comprehension questions and demonstrate knowledge of English vocabulary and grammar. They are not accountable for reaching a threshold level of English pronunciation as their pronunciation skill are never assessed. It may not be a problem now, but at the university level students are expected to be able to discuss in English. Emad said he has learned a "harsh lesson" by marrying off his eldest daughters to "bad men" and does not want his three youngest daughters to get married until after they have attended university (E. M. Hamdan, personal communication, April 3, 2008). Thus, it would be wise for my case study subjects to hone good pronunciation skills now.

Location

This study was done at my subjects' home in a small city in Kuwait. Recordings were done with each participant individually in a back bedroom, the quietest room of the house. Group study took place in this room as well.

Procedure

I conducted an eight-week study. The first and the eighth weeks were devoted to pre- and post-assessments, respectively, which can be found in Appendix E. The procedure for the other six-weeks of my study is as follows:

Table 3.1

Plan for Six-Week Study

Sunday	Monday	Tuesday	Wednesday	Thursday
Pronunciation Training with Researcher: *Subjects' do journal entry on previous weeks' progress *1 st (pre-training) recording of each subject reading the of word list, sentences, and passage for the week Homework: Listen to cassette of researcher reading word list, sentences, and passage	Pronunciation Training with Researcher: *Choral repetition of word list *Listen to researcher's recording and subject A's 1 st recording back-to-back *Stop play backs as necessary to identify and discuss errors Homework: Listen to cassette of researcher reading word list, sentences, and passage	Pronunciation Training with Researcher: *Choral repetition of word list *Listen to researcher's recording and subject B's 1 st recording back-to-back *Stop play backs as necessary to identify and discuss errors Homework: Listen to cassette of researcher reading word list, sentences, and passage	Pronunciation Training with Researcher: *Choral repetition of word list *Listen to researcher's recording and subject C's 1 st recording back-to-back *Stop play backs as necessary to identify and discuss errors Homework: Listen to cassette of researcher reading word list, sentences, and passage	Pronunciation Training with Researcher: *2 nd (post-training) recording of each subject reading the word list, sentences, and passage for the week

I visited my subjects Sunday through Thursday from 3:00 pm to 3:45 pm. Every Sunday, my subjects made audio recordings of themselves reading the word list, the sentences, and the passages for the week. The purpose of this first taping was to have a record of how the subjects were pronouncing three-segment final consonant clusters prior to any training. Each week's first tapings were compared with the week's second tapings during data analysis to determine if pronunciation progress was made. Upon leaving on Sundays, I gave my subjects a tape cassette of me reading the same word lists, sentences, and passage for the week so that they could listen to it when I was not there. I had both parents sign a form saying that the girls listened to the cassette tape at least once a day. When I meet with my subjects on Mondays, Tuesdays, and Wednesdays, we began with

choral repetition of the words for that week. Then I played back one of the subjects' first recordings while simultaneously playing back my recording of myself reading the same material in order to see if the subjects could identify their errors. I stopped the cassette tapes as necessary so that we could discuss errors. On Thursdays, the subjects made a second recording of themselves reading the week's word list, sentences, and passage. The second recordings were only used for comparison and contrast purposes during data analysis. They were not played back for the subjects.

Data Collection Technique #1 Pre-Assessment

The pre-assessment can be found in Appendix E. It was given to my subjects during the first week of my study, prior to any pronunciation training on final three-segment consonant clusters. Each subject was recorded as she read a list of 44 words that contain final three-segment consonant clusters, a list of 22 sentences containing the 44 words from the word list, and six short paragraphs containing the 44 words.

Data Collection Technique #2 Tapings

Each week of this study, my subjects read a list of words containing final three-segment consonant clusters, a list of sentences, and a passage (see Appendices B, C, and D). My subjects made audio recordings of themselves reading the three sets of text in front of them. For each audio recording I identified who was speaking by saying Subject A, B, or C and having her speak as close as possible to the microphone. Making audiotaped recordings offers several benefits for English language learners (Celce-Murcia, Brinton & Goodwin, 1996). First, playing back the recordings gives the learners a chance to locate and self-correct their errors. Second, making audio recordings are a way of compiling data for the purpose of measuring progress. Third, making audio

recordings is a form of student directed learning. In my study, I had my subjects play back their recordings while simultaneously playing back mine. I stopped both cassettes when one of the subjects heard a discrepancy and indicated this by either raising her hand or telling me “stop.” This technique helped the participants identify their pronunciation errors. I used the recordings to measure progress by having my subjects make two recordings each week, one prior to any pronunciation training, and one at the end of the week when the week’s training was completed. I compared the results of both tapings during my data analysis to determine if the pronunciation training was effective. Since making audio recordings is a type of student directed learning, my subjects were more interested in learning than if I were to simply tell them the errors that they had made. They were also more likely to remember their errors if they spotted them themselves.

Audio recordings are beneficial for the language teacher as well. Since everything was recorded, I could play back the cassettes as many times as necessary in order to transcribe my participants’ pronunciation of the three-segment final consonant clusters during data analysis. Having the data recorded ensured accuracy when I transcribed the data.

There were some problems that arose with the making of audio recordings. One of the problems of having my participants read sentences and passages that they had not rehearsed was that they were not familiar with all of the words within those sentences and passages. My subjects kept asking me to help them pronounce these unfamiliar words. I addressed this problem, however, by assuring them that I was only going to listen to their pronunciation of the consonant clusters and that they should simply try their best to pronounce any new words. Another problem was that the participants seemed nervous

about speaking into a microphone and making recordings. I addressed this problem by giving them up to three chances to make any one recording. A third concern was that my subjects live in a small apartment; whenever I was there tutoring Hithari, I noticed that there were oftentimes other relatives or neighbors there as well, so my subjects sometimes had difficulty concentrating while doing the recordings. I reduced any potential distractions by conducting all recordings, as well as all English lessons, in the back bedroom, which has a door that can close it off from the rest of the apartment. Sometimes I had a subject begin her recording again if she became too distracted or if someone opened the door to the bedroom.

Data Collection Technique #3 Log

I had my subjects keep a log of their pronunciation progress of the final three-segment consonant clusters (Appendix F). Every Sunday I had my subjects write their responses to the same set of questions regarding the clusters that they had studied the week before. The first item was a box containing the three to four consonant clusters that my subjects had just finished studying the previous Thursday. My subjects were supposed to rank the clusters from the easiest to the most difficult, one through three, or one through four, respectively. The second task listed the six to eight target words from the week before and asked my subjects to rank them from the easiest to the most difficult, one through six, or one through eight, respectively. The third question asked my subjects to write any comments they had. The final question asked the subjects if they had any questions, which I then answered at the beginning of the following week. I provided a log for each subject that consisted of three sheets of paper stapled together, one sheet for

every two weeks of the study with the questions typed on it. The subjects simply wrote out their answers in the space provided under each question.

Data Collection Technique #4 Post-Assessment

The post-assessment was identical to the pre-assessment. It can be found in Appendix E. It was given during the eighth and final week of my study. Each subject was audio recorded as she read a list of 44 words that contain final three-segment consonant clusters, a list of 22 sentences containing the 44 words from the word list, and six short paragraphs containing the 44 words.

Data Analysis

I did quantitative data analysis. Quantifying results has many benefits. First, it allows the researcher to see patterns within the data which fosters the generation and testing of hypotheses. Second, quantifying data allows a researcher to present research findings in a concise manner that makes it obvious “why researchers have drawn particular inferences and how well their theories reflect the data” (Mackey & Gass, 2005, p. 182). Finally, numerical representation of data allows other researchers to rapidly determine whether or not the results of an experiment are pertinent to their own research or other contexts (Mackey & Gass, 2005).

Compilation of Data Collection Technique #1-Pre-Assessment

I listened to each subject’s recording of the pre-assessment in Appendix E. I transcribed all of the target consonant cluster words found in the three sections of the pre-assessment: word list, sentences, and passages. I used the transcription key from Appendix G. In total, I transcribed 132 words for each subject’s pre-assessment. The words were organized by subject and put into the following type of table:

Table 3.2

Subject A Transcription of Target Words from Pre-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-ŋks: minks, sinks	/mɪŋks/, /sɪŋks/			

This table contains only a sample of the actual table used. The actual table lists all 22 consonant clusters, as well as their corresponding target words and target transcriptions. The right three columns contain the transcriptions of the subject's pronunciation of the target words. Once I transcribed each subject's pronunciation of the relevant words by task, I grouped them into one of two categories: target pronunciation and non-target pronunciation. I then broke down the non-target pronunciation, as Kim & Jung (1998) did in their study, into further categories according to the simplification strategies that the subjects used to pronounce the consonant clusters of the target words. The basis for the categorization of my simplification strategies came from three studies: El-Halees (1986), Lin (2001), and Kim & Jung (1998), previously described in the consonant cluster simplification strategies section of Chapter Two. The simplification strategies I found necessary to use, based on the data I collected, were articulatory feature change, which includes devoicing (saying *terms* as /tʃ^hms/ instead of /tʃ^hmz/) and metathesis, (saying *task* as /tæks/ instead of /tæsk/), consonant cluster reduction, which includes epenthesis (saying *gasps* as /gæspɪs/ instead of /gæspɪs/) and the omission of consonants from the cluster (saying *milks* as /mɪlk/ instead of /mɪlks/), and substitution (saying *herds* as /hɜ^hbz/ instead of /hɜ^hdz/). None of my subjects used total consonant

cluster deletion so I did not find it necessary to include it as a simplification strategy category. I did find, however, several instances of my subjects using more than one simplification strategy to pronounce the final consonant cluster of a single target word. For example, a subject that said *germs* as /dʒɜːmɪs/ instead of /dʒɜːmz/ used both articulatory feature change (saying /s/ instead of /z/) and consonant cluster reduction (inserting the phoneme /ɪ/ between the cluster) as simplification strategies. She, therefore, received two tally marks for her pronunciation of this word, one under the articulatory feature change category and one under the consonant cluster reduction category. Thus, the total number of tally marks in the tables, like the sample one below, does not correspond to the number of target words since a single word can be marked in more than one category depending on how many simplification strategies the subject used to pronounce it. Once I categorized each subjects' transcriptions and tallied them, I then organized the pre-assessment data into tables that look like the following sample:

Table 3.3

Subject A Pre-Assessment Consonant Cluster Classification

	Classification	Word List	Sentences	Passages	Total
Pre- Assessment	Substitution				
	Consonant Cluster Reduction				
	Articulatory Feature Change				
	Simplification Strategy Totals				
	Target				

The actual pre-assessment tally table was attached to the post-assessment tally table.

Compilation of Data Collection Technique #2-Tapings

The second data collection method I used involved analyzing the pre- and post training audio recordings that my subjects made throughout the six-week study. Similar to the pre-assessment data analysis, I began by transcribing all of the target consonant cluster words from the six-week study and arranging them in a table according to the following categories: word list, sentences, and passages. As I conducted pre-training recordings on Sundays and post-training recordings on Thursdays, I had two aggregate sets of data and therefore two tables. I organized the pre-training recording data in a table like the following sample:

Table 3.4

Subject A Transcription of Target Words from Pre-Training Recordings

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-ŋks: minks, sinks	/mɪŋks/, sɪŋks/			

This table contains only a sample of the actual table I used. The actual table lists all 22 consonant clusters, as well as their corresponding target words and transcriptions. The right three columns contain the transcriptions of the subject's pronunciation of the target words. Each participant's actual pre-training table is also followed by a table like the one above containing her post-training recording transcriptions.

Next, I used the pre- and post-training six-week study transcriptions to tally the total number of simplification strategies the participants used each week. I calculated bi-weekly simplification strategy totals, one for pre-pronunciation training and one for post-pronunciation training, which showed a net change over five days. These totals represent the number of times each participant used consonant cluster reduction, substitution, and/or articulatory feature change before and after pronunciation training. This data was compiled into the following sample table for each subject:

Table 3.5

*Subject A's Number of Simplification Strategies Used Before and After Pronunciation**Training*

Week 1		Week 2		Week 3		Week 4		Week 5		Week 6	
Pre	Post										

Compilation of Data Technique #3-Log

My third data collection technique involved analyzing my subjects' weekly logs. After I read the six entries for each subject, I organized their rankings of the target consonant clusters and target consonant cluster words into the following two types of tables:

Table 3.6

Subjects' Rankings of Target Consonant Clusters

Subject	Rank		
	1 (easy)	2 (medium)	3 (difficult)
A	-lks	-rts	-lps
B			
C			

Table 3.7

Subjects' Rankings of Target Consonant Cluster Words

Subject	Rank					
	1 (easiest)	2	3	4	5	6 (most difficult)
A	minks	silks	rasps	gasps	camp	hurls
B						
C						

Compilation of Data Technique #4-Post-Assessment

As with the pre-assessment, I listened to each subject's recording of the post-assessment in Appendix E. I transcribed the 132 words found in the three sections of the post-assessment: word list, sentences, and passages. The transcriptions of the target words were organized by subject and put into the following type of table:

Table 3.8

Subject A Transcription of Target Words from Post-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-ŋks: minks, sinks	/mɪŋks/, sɪŋks/			

This table contains only a sample of the actual table I used. The actual table lists all 22 consonant clusters, as well as their corresponding target words and transcriptions. The right three columns contain the transcriptions of the subject's pronunciation of the target words. Once I transcribed each subject's pronunciation of the relevant words by task, I grouped and tallied them according to the simplification strategies that the subjects used to pronounce them. I organized the post-assessment data into another table that looks like the following:

Table 3.9

Subject A Post-Assessment Consonant Cluster Classification

	Classification	Word List	Sentences	Passages	Total
Post- Assessment	Substitution				
	Consonant Cluster Reduction				
	Articulatory Feature Change				
	Simplification Strategy Totals				
	Target				

As already mentioned, the tally of the post-assessment strategies is attached to the pre-assessment strategies so as to allow easier comparison and contrast.

Verification of Data

I ensured the validity of my data by making sure it had the three necessary components of qualitative data: credibility, transferability, and dependability (Mackey & Gass, 2005). I ensured credibility by conducting my study over an adequate amount of time so that my subjects could get used to me and behave as they normally do. I also ensured credibility by gathering data in the following formats: a pre-assessment, bi-weekly tape recordings of my subjects reading word lists, sentences and passages, a weekly log of the subjects' progress, and a post-assessment. Thus, I gathered more than one set of data in order to help answer my research questions: 1) How do my subjects pronounce final three-segment consonant clusters? 2) What effect does pronunciation

training involving audio recordings and self-correction have on my subjects pronunciation of such clusters? I ensured transferability by providing enough details about my participants and my research context so that my readers can compare and contrast their research situation to mine and then decide if my results can be transferred to their situation. Another researcher would be able to analyze my data and either confirm, change, or reject it. Finally, I ensured dependability by using audio recordings. Audio recordings allow researchers to go back and review their data in order to determine that appropriate inferences were made. Also, doing audio recordings ensured that I had accurate first-hand data as opposed to only my own notes, which can be distorted by memory and have questionable accuracy if they are not written immediately after an event takes place. (Mackey & Gass, 2005).

Ethics

This study employed the following safeguards to protect the informants' rights:

- 1) All verbal and written instructions and documents were in English and translated into Arabic by Hithari, the eldest daughter who is fluent in English;
- 2) Research objectives were shared with study participants;
- 3) Written permission in English was obtained from the participants and their parents to participate in the study;
- 4) Human subjects review and approval of my research proposal from Hamline University was granted;
- 5) Approval from Hamline University was received to conduct this study prior to doing so;

- 6) Anonymity of the participants and use of the following pseudonyms: Layla, Mariana, and Noor. I also referred to my case study subjects as Subject A, Subject B, and Subject C, respectively.

Conclusion

In this chapter, the specifics of my study were described. The research paradigm was explained, as was the pronunciation teaching method that I used. In Chapter Four I presented the results of this study. I described the results of each subject and then compared and contrasted all three subjects' results.

CHAPTER FOUR: RESULTS AND DISCUSSION

In this chapter I discuss the results of my eight-week study on teaching the pronunciation of final three-segment consonant clusters to three Kuwaiti Arabic speakers. The results of this study help answer the two questions I set out to answer at the beginning of the study: 1) How do my subjects pronounce final three-segment consonant clusters? and 2) How does pronunciation training using native speaker modeling and self-correction using audio recordings effect the subjects' pronunciation of final three-segment consonant clusters?

Overview of Chapter

This chapter consists of three sections. The first section is a discussion of the pre- and post-assessment results, further divided into subsections according to subject, with a final subsection that discusses the comparisons and contrasts amongst the three subjects. The second section is a discussion of the six-week study, also divided into subsections according to subject with a final subsection on comparisons and contrasts amongst all of the subjects. The third and final part of this chapter, again, divided into subsections according to subject, discusses the analysis of the logs kept by the subjects.

Pre- and Post-Assessment

I chose to analyze each subject's data from the pre- and post-assessment in two ways. First, I compared and contrasted the data totals from the pre-assessment with the

data totals from the post-assessment. Then I analyzed the same set of data by comparing and contrasting the pre- and post-assessments according to task.

Subject A

The following are the results of Subject A's pre- and post assessment:

Table 4.1

Subject A Pre- and Post-Assessment Consonant Cluster Classification

	Classification	Word List	Sentences	Passages	Total
Pre-Assessment	Substitution	14	11	12	37
	Consonant Cluster Reduction	34	35	38	107
	Articulatory Feature Change	19	18	15	52
	Simplification Strategy Totals	67	64	65	196
	Target	2	2	1	5
Post-Assessment	Substitution	4	7	10	21
	Consonant Cluster Reduction	9	7	7	23
	Articulatory Feature Change	16	16	16	48
	Simplification Strategy Totals	29	30	33	92
	Target	20	20	17	57

Subject A's results show that she made a great deal of improvement in the time between the pre-assessment to the post-assessment. Subject A had a total of five correctly pronounced target clusters in the pre-assessment, compared to 57 in the post-assessment.

Her use of simplification strategies dropped dramatically, from 196 in her pre-assessment results to 92 in her post-assessment. Subject A's use of substitution dropped from 37 to 21, her use of consonant cluster reduction dropped from 107 to 23, and her use of articulatory feature change decreased slightly from 52 to forty-eight. The most common simplification strategy still used in the post-assessment was articulatory feature change.

The second way I analyzed the data was by comparing and contrasting the pre- and post-assessment according to task. The most noticeable difference within all three tasks was Subject A's decrease in her use of consonant cluster reduction from the pre- to the post-assessment. Subject A's biggest areas of improvement according to task from the pre- to the post-assessment were in the word list and the sentences, with an equal increase in the number of accurately pronounced target clusters for each task from two to 20, respectively.

Subject B

The following are the results of Subject B's pre- and post-assessment:

Table 4.2

Subject B Pre- and Post-Assessment Consonant Cluster Classification

	Classification	Word List	Sentences	Passages	Total
Pre- Assessment	Substitution	3	5	7	15
	Consonant Cluster Reduction	12	20	15	47
	Articulatory Feature Change	18	18	16	52
	Simplification Strategy Totals	33	43	38	114
Post- Assessment	Target	19	12	15	46
	Substitution	1	1	1	3
	Consonant Cluster Reduction	6	4	5	15
	Articulatory Feature Change	16	16	16	48
	Simplification Strategy Totals	23	21	22	66
	Target	22	26	24	72

Subject B's results also show that she made a great deal of improvement in the time between the pre-assessment to the post-assessment. Subject B had a total of 46 correctly pronounced target clusters in the pre-assessment, compared to 72 in the post-assessment. Her use of simplification strategies dropped dramatically, from one 114 in her pre-assessment results to 66 in her post-assessment. Subject B's use of substitution dropped from 15 to three, her use of consonant cluster reduction dropped from 47 to 15, and her

use of articulatory feature change decreased slightly from 52 to forty-eight. The most common simplification strategy still used in the post-assessment was articulatory feature change.

The second way I analyzed the data was by comparing and contrasting the pre- and post-assessment according to task. The most noticeable difference within all three tasks was Subject B's decrease in her use of consonant cluster reduction from the pre- to the post-assessment. Subject B's biggest areas of improvement according to task from the pre- to the post-assessment was in the sentences, with an increase in the number of accurately pronounced target clusters from 12 to 26, respectively.

Subject C

The following are the results of Subject C's pre- and post-assessment:

Table 4.3

Subject C Pre- and Post-Assessment Consonant Cluster Classification

	Classification	Word List	Sentences	Passages	Total
Pre- Assessment	Substitution	0	2	1	3
	Consonant Cluster Reduction	18	9	13	40
	Articulatory Feature Change	18	19	21	58
	Simplification Strategy Totals	36	30	35	101
	Target	19	19	17	55
Post- Assessment	Substitution	1	1	1	3
	Consonant Cluster Reduction	2	2	1	5
	Articulatory Feature Change	14	14	16	44
	Simplification Strategy Totals	17	17	18	52
	Target	27	28	27	82

As with both Subjects A and B, Subject C's results show that she, too, made a great deal of improvement in the time between the pre-assessment to the post-assessment. Subject C had a total of 55 correctly pronounced target clusters in the pre-assessment, compared to 82 in the post-assessment. Her use of simplification strategies dropped dramatically, from 101 in her pre-assessment results to 52 in her post-assessment. Subject C's use of consonant cluster reduction dropped from 40 to five and her use of articulatory feature

change decreased from 58 to 44, while her use of substitution remained the same at three. The most common simplification strategy still used in the post-assessment was articulatory feature change.

The second way I analyzed the data was by comparing and contrasting the pre- and post-assessment according to task. The most noticeable difference within all three tasks was Subject C's decrease in her use of consonant cluster reduction from the pre- to the post-assessment. Subject C's biggest areas of improvement according to task from the pre- to the post-assessment was in the passages, with an increase in the number of accurately pronounced target clusters from 17 to 27, respectively.

Comparisons and Contrasts Amongst Subjects

Each subject showed an increase in her number of correctly pronounced target clusters and a decrease in her used of simplification strategies when comparing the post-assessment to the pre-assessment. All three subjects used articulatory feature change as their primary simplification strategy in the post-assessment. The subjects differed, however, on the task where they showed the most improvement. Subject A's biggest areas of improvement were her number of correctly pronounced target clusters within the word list and the sentences, whereas Subject B showed the greatest improvement in the sentences. Subject C showed about the same amount of improvement in all three tasks. Overall, Subject A showed the greatest degree of improvement in her pronunciation of the target clusters. This is indicated by having the biggest drop in simplification strategies and the largest increase in her number of correctly pronounced target clusters in the post-assessment recordings amongst the three subjects.

Six-Week Study

For the six-week study, I focused on the total number of simplification strategies each subject used when reading the weekly word lists, the sentences, and the passages before and after pronunciation training. For each week of the study, I calculated two totals: the total number of simplification strategies the subject used prior to pronunciation training (tape recorded on Sunday) and the total number of simplification strategies the subject used after pronunciation training (tape recorded on Thursday).

Subject A

The following are the results of Subject A's pre- and post-training recordings from the six-week study:

Table 4.4

Subject A's Number of Simplification Strategies Used Before and After Pronunciation Training

Week 1		Week 2		Week 3		Week 4		Week 5		Week 6	
Pre	Post										
45	31	24	23	35	18	24	19	29	13	38	32

Subject A used a total of 194 simplification strategies in her pre-training recordings and 137 in her post-training recordings. Subject A showed the greatest improvement in week three, with a reduction from 35 to 18 simplification strategies in her post-training recording. This was closely followed by weeks five and one, with reductions from 29 to 13 and 45 to 31, respectively. She showed the least amount of improvement in week two, with a reduction from 24 to 23 simplification strategies. Weeks four and six showed only moderate improvements.

Subject B

The following are the results of Subject B's pre- and post-training recordings from the six-week study:

Table 4.5

Subject B's Number of Simplification Strategies Used Before and After Pronunciation Training

Week 1		Week 2		Week 3		Week 4		Week 5		Week 6	
Pre	Post										
27	17	29	18	10	8	7	3	9	7	32	22

Subject B used a total of 108 simplification strategies in her pre-training recordings and 81 in her post-training recordings. Subject B showed the greatest improvement in week two, with a reduction from 29 to 18 in the number of simplification strategies in her post-training recording. This was closely followed by weeks one and six, with reductions from 27 to 17 and from 32 to 22, respectively. She showed the least amount of improvement in weeks three and five, with reductions from 10 to eight and from nine to seven, respectively. Week four showed only a moderate improvement.

Subject C

The following are the results of Subject C's pre- and post-training recordings from the six-week study:

Table 4.6

*Subject C's Number of Simplification Strategies Used Before and After Pronunciation**Training*

Week 1		Week 2		Week 3		Week 4		Week 5		Week 6	
Pre	Post										
19	18	13	12	22	15	6	2	10	8	17	16

Subject C used a total of 87 simplification strategies in her pre-training recordings and 67 in her post-training recordings. Subject C showed the greatest improvement in week three, with a reduction in the number of simplification strategies from 22 to 15 in her post-training recording. She showed the least amount of improvement in weeks one, two, and six, with reductions from 19 to 18, 13 to 12, and 17 to 16, respectively. Weeks four and five showed only moderate improvements.

Comparisons and Contrasts Amongst Subjects

Overall, Subject A showed the greatest degree of improvement, indicated by the fact that she showed the greatest decrease in her use of simplification strategies in the post-training recordings. Subject C has the best English pronunciation, as she used the fewest number of simplification strategies in both her pre- and post-training recordings as compared to Subjects A and B. Although Subject A and C both showed the greatest amount of improvement in week three, there were almost no similarities amongst the subjects as to which weeks they showed the greatest or least amount of improvement. Thus, even though individuals speak the same language they do not necessarily share the same difficulties with learning a second language.

Weekly Log

The log data analysis involved two parts. First, I looked at how the subjects ranked each target cluster and target word. Then I compared and contrasted their easiest and most difficult rankings from their logs with the target words of their post-training recordings of the six-week study. Since the post-training recordings were made after pronunciation training, I thought that they would be a better representation of which target clusters and words were easiest and which were most difficult for each subject.

Subject A

Subject A ranked the following six target clusters as the easiest: -rdz, -lps, -rps, -rts, -lmz, and -sps. She ranked the following six target clusters as the most difficult: -rbz, -rks, -wn(d)z, -s(k)s, -mps, -rgz. Subject A ranked the following twelve target cluster words as the easiest: *minks*, *yelps*, *carps*, *carts*, *elms*, *ergs*, *milks*, *dirks*, *toasts*, *mints*, *kilts*, and *hurls*. She ranked the following twelve target cluster words as the most difficult: *barbs*, *turns*, *pounds*, *hints*, *helms*, *curls*, *garbs*, *burns*, *gifts*, *masks*, *ramps*, and *bergs*. From this data, it is clear that Subject A's rankings for the target clusters and target words did not necessarily coincide. For example, she ranked -sps as amongst the easiest target clusters, however, neither *gasps* nor *rasps* was ranked amongst the easiest target cluster words. The same discrepancy was found with her rankings of the difficult clusters and words. For example, Subject A ranked -rks as amongst the difficult target clusters, yet neither *dirks* nor *irks* was ranked amongst the most difficult target cluster words.

According to the results of the post-training recordings from the six-week study, Subject A pronounced the following words one or more times amongst the three tasks—word lists, sentences, and passages—without use of a consonant cluster simplification

strategy: *milks, minks, sinks, dirks, helps, irks, gifts, lifts, carps, harps, toasts, mints, hints, darts, turfs, ramps, kilts, tilts, and camps*. These results indicate that these target words were easier for Subject A to pronounce than those that necessitated her use of one or more simplification strategies. However, Subject A's log did not completely coincide with the results of the post-training recordings. For example, only the words *helps, carps, harps*, and *darts* from the post-training recordings coincided with the clusters that she ranked in her log as amongst the easiest: -lps, -rps, and -rts. Three of the target clusters Subject A ranked in her log as amongst the easiest—rdz, -lmz, and -sps—did not coincide with her target words from the post-training recordings. Only the following words from the post-training recordings overlapped with those ranked as amongst the easiest in Subject A's log: *minks, milks, dirks, carps, toasts, mints, and kilts*. Five out of the twelve easiest words from Subject A's log—*yelps, carts, elms, ergs, and hurls*—did not coincide with the target words from the post-training recordings. Thus, Subject A's perception of which clusters and words were actually difficult for her is not always accurate.

Subject B

Subject B ranked the following six target clusters as the easiest: -rdz, -rks, -rps, -rfs, -lts, and -sps. She ranked the following six target clusters as the most difficult: -lks, -rmz, -wn(d)z, -s(k)s, -mps, and -rlz. Subject B ranked the following twelve target cluster words as the easiest: *milks, helps, sounds, surfs, camps, gasps, sinks, dirks, pounds, hints, kilts, and rasps*. She ranked the following twelve target cluster words as the most difficult: *minks, irks, gifts, mints, tilts, ergs, nerds, turns, toasts, masks, elms, and curls*. From this data, it is clear that Subject B's rankings for the target clusters and

target words did not necessarily coincide. For example, she ranked -rdz as amongst the easiest target clusters, however, neither *nerds* nor *herds* was ranked amongst the easiest target cluster words. In fact, *nerds* was ranked amongst the most difficult target cluster words. The same discrepancy was found with her rankings of the difficult clusters and words. For example, Subject B ranked -rmz as amongst the difficult target clusters, yet neither *terms* nor *germs* was ranked amongst the most difficult target cluster words.

According to the results of the second recordings from the six-week study, Subject B pronounced the following words one or more times amongst the three tasks—word lists, sentences, and passages—without use of a consonant cluster simplification strategy: *minks, milks, sinks, silks, dirks, irks, yelps, helps, terms, gifts, lifts, carps, harps, boasts, toasts, surfs, darts, carts, turfs, mints, hints, kilts, tilts, ramps, camps, gasps, and rasps*. These results indicate that these target words were easier for Subject B to pronounce than those that necessitated her use of one or more simplification strategies. However, Subject B's log did not completely coincide with the results of the post-training recordings. For example, only the words *dirks, irks, carps, harps, kilts, tilts, surfs, turfs, gasps, and rasps* from the post-training recordings coincided with the clusters that she ranked in her log as amongst the easiest: -rps, -rfs, -rks, -lts, and -sps. One of the target clusters Subject B ranked in her log as amongst the easiest—rdz—did not coincide with her target words from the post-training recordings. The following words from the post-training recordings overlapped with those ranked as amongst the easiest in Subject B's log: *milks, helps, surfs, camps, gasps, sinks, dirks, hints, kilts, rasps*. Two out of the twelve easiest words from Subject B's log—*sounds* and *pounds*—did not coincide with the target words from the post-training recordings. Thus, while Subject B's perception of

which clusters and words were actually difficult for her was more accurate than Subject A, there was still some discrepancy.

Subject C

Subject C ranked the following six target clusters as the easiest: -lks, -rks, -rps, -rts, -lts, and -rgz. She ranked the following six target clusters as the most difficult: -rdz, -rmz, -wn(d)z, -s(k)s, -mps, -sps. Subject C ranked the following twelve target cluster words as the easiest: *silks, helps, sounds, surfs, camps, ergs, sinks, dirks, lifts, darts, elms,* and *hurls*. She ranked the following twelve target cluster words as the most difficult: *nerds, yelps, toasts, tasks, helms, rasps, minks, burns, gifts, masks, kilts,* and *gasps*.

From this data, it is clear that Subject C's rankings for the target clusters and target words did not necessarily coincide. For example, she ranked -lts as amongst the easiest target clusters, however, neither *tilts* nor *kilts* was ranked amongst the easiest target cluster words. The same discrepancy was found with her rankings of the difficult clusters and words. For example, Subject C ranked -wn(d)z as amongst the difficult target clusters, yet neither *pounds* nor *sounds* was ranked amongst the most difficult target cluster words.

According to the results of the post-training recordings from the six-week study, Subject C pronounced the following words one or more times amongst the three tasks—word lists, sentences, and passages—without use of a consonant cluster simplification strategy: *minks, milks, sinks, silks, dirks, irks, yelps, helps, gifts, lifts, carps, harps, surfs, darts, carts, turfs, mints, hints, masks, tasks, kilts, tilts, ramps, camps, gasps, ergs, bergs* and *rasps*. These results indicate that these target words were easier for Subject C to pronounce than those that necessitated her use of one or more simplification strategies. Unlike Subjects A and B, the target clusters ranked as the easiest in Subject C's log

completely coincided with the results of the post-training recordings. The words *milks*, *silks*, *dirks*, *irks*, *carps*, *harps*, *darts*, *carts*, *kilts*, *tilts*, *ergs*, and *bergs* from the post-training recordings coincided with the all six of the clusters that she ranked in her log as the easiest: -lks, -rks, -rps, -rts, -lts, and -rgz. The following words from the post-training recordings overlapped with those ranked as amongst the easiest in Subject C's log: *silks*, *helps*, *surfs*, *camp*s, *ergs*, *sinks*, *dirks*, *lifts*, and *darts*. Three out of the twelve easiest words from Subject C's log—*sounds*, *elms*, and *hurls*—did not coincide with the target words from the post-training recordings. Thus, while Subject C's perception of which clusters and words were actually difficult for her was more accurate than either of the other two subjects, there was still some discrepancy.

Comparisons and Contrasts Amongst Subjects

There was very little agreement amongst the subjects' rankings of the target consonant clusters and target words. Only one cluster—rps—was ranked as easy by all three subjects and just three clusters—wn(d)z, -s(k)s, and -mps were ranked as difficult. The subjects all ranked *camp*s and *dirks* as amongst the easiest target consonant cluster words and *gifts* and *masks* as amongst the most difficult. Thus, even though the subjects share the same language background, they do not necessarily share the same perceptions as to which target clusters and target words are easy or difficult.

While there was a great deal of difference between their rankings, there was much similarity amongst all three subjects post-training results. According to the post-training results of the six-week study, Subject A pronounced 19 of the target words one or more times amongst the three tasks—word lists, sentences, and passages—without using consonant cluster simplification strategies. Subjects B and C's post-training results

indicate that they, too, accurately pronounced the same 19 target words, along with an additional eight target words, for a total of 27 accurately pronounced target words each. The only discrepancy amongst the subjects post-training target word results was that Subject B pronounced *boasts*, *toasts*, and *terms* one or more times without simplification strategies while Subject C pronounced *masks*, *tasks*, and *bergs* without simplification strategies. Thus, the actual results of the study indicate that there is a correlation between language background and accurate pronunciation of the target words.

Subject A showed the greatest amount of discrepancy between her rankings and her actual post-training results, while Subject C showed the least amount of discrepancy. Subject C's level of English pronunciation appears to be the highest amongst the three subjects, as indicated by the fact that both her pre-training and post-training results showed a higher frequency of accurately pronounced target clusters and target words than the other two subjects. Perhaps a higher level of English coincides with an increased awareness and perception of one's difficulties with language.

Conclusion

This chapter explained the results of the pre- and post-assessments and the six-week study. It also described what the subjects wrote in their weekly logs. The results and data analysis of this study reveal that pronunciation training is indeed effective. Each subject showed an increased use of correctly pronounced target clusters in her post-assessment as compared to her pre-assessment and a decreased use of simplification strategies in her six-week study post-training recordings as compared to her pre-training recordings. The logs revealed that the subjects' perceptions about what target clusters

they think are easy or difficult do not necessarily coincide with their assessment results.

The student perceptions, while important, are not necessarily accurate.

CHAPTER FIVE: CONCLUSIONS

The goal of this study was to answer the following two questions: 1) How do my subjects pronounce final three-segment consonant clusters? and 2) What effect does pronunciation training using a combination of native speaker modeling and self-correction using audio recordings have on the subjects' pronunciation of final three-segment consonant clusters? In the previous chapter the results were reported and analyzed in order to answer the above questions. In this chapter, I reflect on my personal experience with this study. Next, I describe the limitations of the study. Then I suggest recommendations to English language teachers and school administrators based on the results of my study. Finally, I discuss the implications of the study and what they mean for the future of English language teaching and learning.

Personal Reflection

Doing the research and conducting the study for my capstone taught me a great deal. Most importantly, I have learned how vital and how effective pronunciation teaching is. So many schools I have worked at completely omit pronunciation teaching from English language courses, or they minimize it to the status of a time filler at the end or at the beginning of class, all too often taking a backseat to reading, writing, grammar, vocabulary, and listening exercises. At best, I have seen some ESL/EFL courses include conversation time, informal discussions led by the teacher who simply asks students

questions about various topics. While these sessions are good opportunities for students to speak English and become more fluent speakers, little to no pronunciation training or error correction is involved. Thus, the students are not given the opportunity to become better, that is, more intelligible speakers of English. Completing my capstone has made me realize what a disservice it is to our students by not providing them with the tools to reach at least the threshold level of English pronunciation. Nowadays, whenever I speak to a non-native speaker of English I realize how important it is to be an intelligible speaker and how communication is compromised when the speaker has not had pronunciation training and the listener is struggling to understand the intended message. Intelligible pronunciation does not just happen. It needs to be formally taught to students.

I have also learned that pronunciation teaching can be fun. Prior to conducting this study, whenever I thought of the words “pronunciation training” images of rote drills, sleepy students and a bleary-eyed teacher shouting out corrections filled my mind. Back when I was thinking about how to teach pronunciation to my subjects, I perused the nearby shopping mall in search of pronunciation computer software. Some of the software looked exciting and would probably have interested my subjects, but the software also cost money and required a reliable computer, neither of which my subjects’ family has. I never thought using a simple cassette recorder/player to make and play back audio recordings would evoke as much interest amongst my subjects as it did. They always appeared eager to make the recordings and slightly giddy with nervousness when I played them back. I was also surprised and thrilled at how effective it was to play back my recording simultaneously with one of theirs. All three of my subjects said they

liked making the recordings and upon completion of the study, they asked when they could make recordings again.

Limitations and Recommendations for Future Research

A review of this study brought several limitations to the forefront. First, each of the pronunciation training sessions was 45 minutes long. Sometimes the sessions felt rushed, especially on Mondays, Tuesdays, and Wednesdays when I played back my subjects' first recordings simultaneously with my own. The frequent starting, stopping and rewinding of the cassettes necessary in order for my subjects to have the opportunity to identify their pronunciation errors took more time than I had anticipated. Sometimes, I needed to play back a segment of the subjects' recording several times before any one of them could identify the error. In the future, more time should be spent with the subjects listening to their first recordings and identifying errors, perhaps two days per subject instead of one.

Once my subjects made their second recordings at the end of the week, we moved on to a new set of target consonant clusters the following week. My subjects didn't get the opportunity to hear their second recordings. I recommend that future researchers follow the same procedure for the second recordings as is done for the first recordings—play back the second recording of each subject while simultaneously playing back the instructor's recording for the purpose of error identification. Once subjects have listened to their second recordings, an additional session should be spent on comparing and contrasting their first recordings with their second ones.

My subjects did not have a written record of their errors. During the play back sessions, my subjects simply identified their errors with a gasp or a quick wave followed

by an audible “stop here.” One of them would briefly describe the error, first in English and then in Arabic, if necessary, to the others and then I would continue playing back the tape until we got to the next error. During the play back sessions, subjects should be provided with a transcription of the instructor’s recording and a highlighter. Then they can listen to the play back as well as following along on the transcription. They can highlight their errors on the transcription so that they have a record of their errors. The same procedure should be done for the second recordings so that subjects can compare and contrast their recordings and see the progress they have made and which areas they might still be having difficulty.

This eight-week study ended with a post-assessment. The results show that pronunciation training did indeed help improve my subjects’ pronunciation of consonant clusters. However, additional delayed assessments could give even more credibility to pronunciation training. I recommend that the post-assessment be given to the subjects again, perhaps three to six months after the study ends. If the results of a second post-assessment show a decrease in performance as compared to the first post-assessment, then future researchers have even more evidence that pronunciation training is effective.

Implications

The results of this study lead to several implications. First, the results imply that pronunciation instruction yields positive results and is beneficial in helping students more accurately pronounce final three-segment consonant clusters, which perhaps enhances intelligibility. Therefore, pronunciation instruction should not be omitted from EFL/ESL curriculum and it needs to be done regularly, not just as a time filler (Yahya, 2002). We also cannot assume that our students will just “pick up” accurate pronunciation. My

subjects, who were ages 12, 13, and 15, had been learning English since the age of six, yet none of them had completely accurate pronunciation. Pronunciation needs to be formally taught it does not just happen (Singh, 1992).

Second, all teacher preparation programs need to include pronunciation instruction so that teachers are prepared to meet students' pronunciation needs. Several teachers whom I have worked with, both in Minnesota and abroad, have told me that their educational coursework did not teach them about pronunciation instruction. Teachers cannot be expected to know how to meet students' pronunciation needs if they themselves have not been taught how to deal with student pronunciation difficulties (El-Halees, 1986).

Third, pronunciation needs to be assessed upon students' entrance into a language program, throughout the course, and upon completion of the program, preferably with immediate feedback for the students. Educational institutions such as the American School of Kuwait, which assesses its English language learners on every aspect of English language learning except pronunciation, are the norm, not the exception (El-Halees, 1986). Students who attend these institutions are short-changed, as they are victims of an educational deficit.

Fourth, helping students learn to identify their own pronunciation errors is an effective way to help them to become not only more intelligible speakers, but also more independent learners (Shrum & Glisan, 2000). Teachers are doing their students a disservice by simply showing the students their errors. Students may become resentful and are unlikely to remember how to correct future errors of a similar nature if they are simply told what their error is. Helping students develop a better awareness of their own

pronunciation and teaching them how to self-correct will be much more beneficial to the student and save time for the teacher in the future, as he or she will not have to make repeat corrections.

Fifth, assessing the needs of the students is important in order to design a pronunciation training program that meets their goals and fits with their circumstances (Olness, 1991; Singh, 1992). As the type of students I had at ASK and at the Kuwait MOD differed, so did their educational needs. Students at ASK needed to learn a combination of basic interpersonal communication skills (BICS) and cognitive academic language proficiency skills (CALPS), whereas students at the Kuwait MOD needed to be able to pronounce words and speak fluently about their branch of the military both in Kuwait and abroad. I designed programs to fit the needs of each of these distinct groups of students, as any trained English language teacher would do.

Sixth, more opportunities need to be created for students both in and out of class so that they can see the relevance of pronunciation training and the importance of becoming an intelligible second language speaker (El-Halees, 1986; Anderson-Hsieh, 1989; Yahya, 2002). Facilitating interviews and debates with their native English speaking peers, reading to youngsters at nearby primary schools, as well as giving class presentations, plays, and talent shows, are amongst some of the activities I have had my English language learners engage in. Such activities show students that learning accurate English pronunciation is necessary.

Seventh, more research should be done on pronunciation accuracy and subjects' perceptions of their pronunciation. As I discovered in my case study subjects' weekly logs, oftentimes there is a discrepancy between an individual's actual pronunciation and

how she perceives her pronunciation. Future studies could help teachers understand why this discrepancy exists and how to help their students become more self-aware so that they can learn to self-correct and become more independent learners (Shrum & Glisan, 2000).

Eighth, future studies could also be done on the use of articulatory feature change as a consonant cluster simplification strategy (Lin, 2001; Kim & Jung, 1998). In my study, I found that in both the pre-assessment-post-assessment comparison and the pre-pronunciation training-post-pronunciation training comparison in the six-week study, all three subjects, but particularly with Subjects B and C, showed much more dramatic decreases in their use of consonant cluster reduction and substitution when compared to articulatory feature change.

Finally, more case studies should be done on the effects of pronunciation training. As Mackay and Gass (2005) point out, one of the important benefits of case studies is that they allow researchers to take a holistic, or comprehensive look at a small number of subjects. Case studies can provide researchers with information about the complexities of learners and their learning environment which may go unnoticed in a larger sample of subjects. Perhaps further case studies can be done with other Kuwait Arabic speakers using different pronunciation training techniques in order to find out which pronunciation training methods are the most effective with Kuwaiti Arabic speakers learning English. Researchers could also compare and contrast pronunciation training case studies with Kuwait Arabic speakers learning English to those with subjects whose first language is not Arabic in order to determine the effectiveness of the same pronunciation training techniques across different language groups.

Conclusion

Conducting the research for this capstone has been an invaluable experience both personally and professionally. In Chapter One I described how an increased awareness of my students' pronunciation and my own teaching practices encouraged me to ask the following questions: How were my students learning to pronounce words in English? How was I fostering pronunciation accuracy and fluency? What difficulties were my students having with English and how was I addressing such difficulties? Was I correcting their pronunciation mistakes? How was I doing so and in what way? When was it necessary to correct my students' mistakes? How could I more effectively and creatively teach pronunciation? Completing my capstone has provided me with thorough answers to these questions for the subjects of this particular case study. However, in order to meet the needs of students that I teach in the future, I will need to ask these questions again. The process of doing the literature review and conducting the study for this capstone has provided me with the knowledge and skills to continue to seek answers to these questions. Furthermore, because of what I have learned, I will always be an advocate for pronunciation training in any ESL/EFL classroom. I now realize how important intelligible pronunciation is and how effective pronunciation training can be.

As an EFL/ESL teacher I have oftentimes had the privilege to teach other content areas to my students, particularly middle and high school level science. In the past year I have thus begun working on a science degree in order to be properly qualified to teach science to EFL/ESL learners. The research I have conducted for this capstone is invaluable because it not only taught me the importance of pronunciation training but it has also shown me how to incorporate pronunciation training into my future lessons and

will therefore help me be a more effective teacher for my future students of both English and science.

APPENDIX A
FINAL CONSONANT CLUSTERS

Appendix A

Final Consonant Clusters

Final Consonant Clusters

Week 1: /ŋks, lks, rdz, rbz/

Week 2: /rmz, rks, lps, rnz/

Week 3: /wn(d)z, rps, s(t)s, f(t)s/

Week 4: /rfs, rts, sks, nts/

Week 5: /mps, lmz, lts/

Week 6: /sps, rls, rgz/

APPENDIX B
WORD LISTS

Appendix B

Word Lists

Word Lists

Week 1: minks, sinks, silks, milks, nerds, herds, garbs, barbs

Week 2: dirks, irks, germs, terms, yelps, helps, burns, turns

Week 3: pounds, sounds, carps, harps, toasts, boasts, gifts, lifts

Week 4: surfs, turfs, darts, carts, masks, tasks, mints, hints

Week 5: camps, ramps, helms, elms, kilts, tilts

Week 6: gasps, rasps, curls, hurls, bergs, ergs

APPENDIX C
SENTENCES

Appendix C

Sentences

Sentences

Week 1:

The movie stars had a lot of minks and silks.
Every morning the farmer cleans the sinks and milks his cows.
The nerds wore silly garbs to school.
The herds of sheep ran into the barbs.

Week 2:

The kings used dirks to enforce the terms of the agreement.
Having germs on his hands irks the president.
The dog yelps when I touch its burns.
The girl's ice-skating teacher helps her with her turns.

Week 3:

The men had ten pounds of carps.
My mother harps about the loud sounds of music coming from my room.
People at the wedding party made toasts and gave gifts.
The big man boasts to his friends about the heavy items he lifts.

Week 4:

The boy surfs and plays darts everyday after school.
The children saw some old carts on the turfs near their school.
We wore masks and ate mints at the party.
I don't like it when my father hints about the tasks I have to do.

Week 5:

Every summer my family camps by the elms.
The ships' ramps and helms were not working well.
The children wearing kilts were sick.
The ice-skater tilts his head.

Week 6:

The old woman rasps about bad children when the boy hurls food across the room.
The seal curls in a ball and sleeps on the bergs.
The old teacher gasps when he talks to the class about ergs.

APPENDIX D
TEXT PASSAGES

Appendix D

Text Passages

Text Passages

Week 1:

The beautiful women were going to the ball. They put on their new garbs. They wore silks and minks. Then they got on their horses. They rode past herds of cows. They waved to the farmer who milks the cows. Then the nerds of the town attacked the horses with barbs. The women fell off the horses into the mud. They missed the ball because they had to go home to wash in the sinks.

Week 2:

The two men with burns always fight with dirks. When the tall man yelps, the short man helps him. The tall man hates to lose so he always changes the terms of the fight. This irks the short man. Today the short man did one of his fast turns. He tried to stab the tall man. The tall man fell on the floor and yelled, "Stop! I am afraid of germs!"

Week 3:

The man goes into town to buy some fish and birthday gifts for his wife. He walks past a woman who boasts about her carps in her shop. He buys 20 pounds of fish from her. Then the man buys a ring and a necklace for his wife. The man stops to listen to the sounds of harps playing in the center of town. The man puts down his bags. There are many people listening. The man lifts the wrong bags and goes home. On her birthday, the man's wife will get a machine that toasts bread.

Week 4:

The old woman surfs every Friday. Before she leaves, she hints about what the children must do. After the children finish their tasks, they play on the turfs in the park. They push each other in carts. Then they return home. They dress up in old clothes and masks. They throw darts at the walls. Finally, they settle down to a movie and lots of chocolate mints.

Week 5:

The men stood at the helms on the ships and looked at the empty beach. Their ships were damaged. The men lowered their ramps and built camps. They used the dry elms to build a fire. The men were cold because they were wearing kilts. They covered in tilts and sang by the fire.

Week 6:

The science teacher is telling the class about ergs. The child who lives near the bergs is bored. She rasps on the board with her nails. She hurls erasers at the other children. The

teacher gasps. The child curls her fingers into a fist, hits her desk, and runs from the room.

APPENDIX E
PRE- AND POST-ASSESSMENT

Appendix E

Pre- and Post-Assessment

Pre- and Post-Assessment

Word List

minks, silks, nerds, garbs, dirks, germs, yelps, burns, pounds, carps, toasts, gifts, surfs, darts, masks, mints, camps, helms, kilts, gasps, curls, bergs, sinks, milks, herds, barbs, irks, terms, helps, turns, sounds, harps, boasts, lifts, turfs, carts, tasks, hints, ramps, elms, tilts, rasps, hurls, ergs

Sentences

1. The doctor helps the children who stepped on the barbs.
2. The man camps and burns wood in the fire.
3. The men put on their garbs and ran to the helms of their ships.
4. The girl who always eats pounds of cheese surfs everyday.
5. The old woman toasts her bread and listens to the sounds of the birds.
6. The woman curls her hair and puts on her dress of silks.
7. It irks my teacher when I don't complete my tasks.
8. The farmer walks up the ramps to the barn and milks his cows.
9. The men wore funny masks and kilts to the party.
10. The boy hurls darts at the board.
11. The science teacher rasps to his class about ergs.
12. The women in minks push their carts in the supermarket.
13. The nerds didn't know how to clean the carps.
14. The rich man boasts about all the gifts he buys for his friends.
15. The people didn't wash away the germs so they were sick.
16. There were brown turfs near the dead elms.
17. The herds of animals walk across the bergs.
18. The dog yelps when the women play their harps.
19. The men with dirks discussed the terms of the treaty.
20. The housekeeper gasps when she sees dirty sinks.
21. The children took turns throwing mints into their mouths.
22. The man lifts the heavy weights and tilts his head to the camera.
23. The man hints about marriage.

Passages

There were herds of people living in camps in the elms. Most of the people were very rich because the women wore minks and expensive jewelry. The owner of the business always carps on about all the nerds who give lots of gifts which cost pounds.

The lords had curls and they wore kilts and ate mints. Their garbs were made of many different silks and they took turns to wear masks.

The soldiers wore dirks and gave yelps as they went about their tasks in the bergs. They traveled in carts with women at the helms who gave gasps when they drove over ramps.

The soccer player often tilts his head at the ball and sometimes even hurls himself into the air when the ball rasps by and sinks into the goal. The goalkeeper plays on his terms but helps win the game. It irks him if he misses.

The politician lifts his glass and toasts his supporters. He boasts about what he will do and he sounds truthful. His opponent hints at his lies by using barbs in her speech. She harps on about all his failures. She milks her speech for all it is worth.

The scientist uses up hundreds of ergs of energy as he surfs and darts from one wave to another. He collected germs from the different turfs he had gathered from all over the poisoned area. Then he will destroy them when he burns what is left.

APPENDIX F
WEEKLY LOG

Appendix F

Weekly Log

Weekly Log

Subject: _____ Pseudonym: _____

Week: 1 (the same format is used for subsequent weeks)

1. Under each cluster, write 1, 2, 3, or 4. One is the easiest. Four is the most difficult.

-ŋks	-lks	-rdz	-rbz

2. Under each word, write 1, 2, 3, 4, 5, 6, 7, or 8. One is the easiest to say. Eight is the most difficult.

minks	silks	nerds	garbs	sinks	milks	herds	barbs

3. What comments would you like to make about this week?

4. What questions do you have?

APPENDIX G
TRANSCRIPTION KEY
NORTH AMERICAN CONSONANT PHONEMES
AND
NORTH AMERICAN STRESSED AND UNSTRESSED VOWELS

Appendix G
 Transcription Key
 North American Consonant Phonemes
 and
 North American Stressed and Unstressed Vowels

North American Consonant Phonemes

Manner of Articulation	Place of Articulation						
	Bilabial	Labiodental	Dental	Alveolar	Palatal	Velar	Glottal
Stop							
Voiceless	/p/			/t/		/k/	
Voiced	/b/			/d/		/g/	
Fricative							
Voiceless		/f/	/θ/	/s/	/ʃ/		/h/
Voiced		/v/	/ð/	/z/	/ʒ/		
Affricative							
Voiceless					/tʃ/		
Voiced					/dʒ/		
Nasal							
Voiced	/m/			/n/		/ŋ/	
Liquid							
Voiced				l, /ɾ/	/ɹ/	/ɻ/	
Glide							
voiceless	/hw/						
voiced	/w/				/y/		

Note: For the purpose of this study, a syllabic letter is indicated with a ^ə/ before the following syllabic consonant. For example, one subject pronounces the word *hurls* as /hɜ^əd^əɹls/ instead of as /hɜ^əɹlz/. A colon following a phonemic symbol indicates an

elongated sound, as in the word *gasps*, which one subject pronounces as /gæs:/ instead of as /gæsp/. This subject lengthens her pronunciation of the /s/ so that it sounds like she is saying two /s/.

North American Stressed and Unstressed Vowels

Stressed Vowels						
/iː/ <u>beat</u>	/ɪ/ p <u>it</u>	/eɪ/ d <u>ate</u>	/ɛ/ s <u>et</u>	/æ/ m <u>at</u>	/ɑ/ p <u>ot</u>	/ɔ/ b <u>ought</u>
/oʊ/ s <u>o</u>	/ʊ/ g <u>ood</u>	/u/ b <u>oot</u>	/aɪ/ t <u>ime</u>	/aʊ/ h <u>ow</u>	/ɔɪ/ b <u>oy</u>	/ʌ/ s <u>ome</u>
/ɜ/ b <u>ird</u>						
Unstressed Vowels						
/ə/ <u>a</u> bout	/ə/ bu <u>tt</u> er	/i/ ci <u>ty</u>	/ɪ/ mu <u>sic</u>	/o/ h <u>o</u> tel	/u/ in <u>t</u> o	

APPENDIX H
SUBJECT A TRANSCRIPTION OF TARGET WORDS FROM PRE-TRAINING
RECORDINGS

Appendix H

Subject A Transcription of Target Words from Pre-Training Recordings

Subject A Transcription of Target Words from Pre-Training Recordings

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/salkɪs/, /maynkɪs/	/sɪlk/, /mɪlk/	/klɑns/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɛrbʌs/, /hɜːdʌs/	/nɜːs/, /hɜːds/	/nɛrvəts/, /hɛr/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/gɛrz/, /bowt/	/glɔːrds/, /bɔːrds/	/glʌns/, /bɔːyds/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɑːrks/, /ɑːrks/	/hɜːd/, /ɑːrks/	/dɑːrks/, /ɑːrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/græms/, /tɑːrms/	/gɛr/, /tɜːm/	/græm/, /tɑːrm/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɪps/, /hɛlp/	/yɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/brʌt/, /tɛrns/	/bɔːrds/, /tɜːn/	/bɜːds/, /tɛrn/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/prɑːmɪst/, /sownz/	/pownz/, /sown/	/bɜːds/, /sowndey/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrpɪts/, /hɛrpɪns/	/kɑːrpɪt/, /hɛr/	/kɑːrpɪts/, /hɛr/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towsɪt/, /brown/	/tɔːrɪts/, /bowsɪt/	/towsɪt/, /bowsɪt/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/dʒɛræfts/, /layft/	/grɪfts/, /lɛfɪts/	/gɪfs/, /lɪf/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɪyɛrfɪts/, /tɑːrfɪts/	/sɛrfɪst/, /træfs/	/fɑːrst/, /træks/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/drɑːps/, /kɑːrts/	/dɑːrts/, /kɑːrpɪnts/
-s(k)s: masks, tasks	/mæs(k)s/, /tæs(k)s/	/mɑːrks/, /træks/	/mɑːrks/, /tɑːrks/	/mɑːrkɪst/, /træks/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mʌnt/, /hɛnt/	/mɛnts/, /hɑːrmt/	/mɛntɪs/, /hævɛnt/
-mps: camps, ramps	/kæmps/, /ræmps/	/kɑːrmɪs/, /rɛmɪps/	/kɑːrmɪts/, /rɛmɪts/	/kʌmps/, /rɛmɪps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛts/, /eylɪms/	/hɛlɪms/, /ɛlmɪs/	/hɛms/, /ɛmɪts/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɑːlɪt/, /tɑːlɪts/	/klayt/, /lɪt/	/kɪlts/, /lɪt/
-sps: gasps, rasps	/gæspz/, /ræspz/	/gɑːrmɪts/, /ræmpz/	/dɑːrpɪs/, /ræps/, /græps/, /ræmɪs/	
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɑːrts/, /hɑːrts/	/kɜːvɪts/, /hæms/	/kɜːvs/, /hɛrd/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/dɜːks/, /ɛrgs/	/bɜːdʒɪs/, /gɛrbs/	/bɪydʒə/, /ɛrdʒɑːmɪts/

APPENDIX I

SUBJECT A TRANSCRIPTION OF TARGET WORDS FROM POST-TRAINING
RECORDINGS

Appendix I

Subject A Transcription of Target Words From Post-Training Recordings

Subject A Transcription of Target Words From Post-Training Recordings

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɔlk/, /mɪlks/	/sɪlks/, /mɪlks/	/kɪleɪŋks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɛrbəs/, /hɜːbs/	/nɛrbs/, /hɛrd/	/nɛrbs/, /hɛrds/
-rbz: garbs, barbs	/gɑrbz/, /bɑrbz/	/græp/, /bɜːds/	/greyps/, /bɔːrds/	/græps/, /bɔːrds/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɛrks/, /ɛrks/	/dɜːks/, /teyks/	/dɑrks/, /tɑrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/grɑms/, /tɛrms/	/gɜːns/, /tɛrms/	/græms/, /tɛrms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlɪps/, /hɛlps/	/yɛps/, /hɛlps/	/yɛps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɜːds/, /tɛrms/	/bɔːrds/, /tɛrms/	/bɜːds/, /tɛrns/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/pawns/, /sawds/	/pɑrds/, /sownds/	/pɜːs/, /sownds/
-rps: carps, harps	/kɑrps/, /hɑrps/	/kɑrps/, /hɑrps/	/kɑrps/, /hɛr/	/kɑrps/, /hɜːps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towst/, /bowst/	/tows/, /bowst/	/towst/, /bowst/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/gɪfs/, /lɪfs/	/gɪfs/, /lɪfs/	/gɪfs/, /lɪfs/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːs/, /tɜːs/	/sɜːrs/, /tɜːfs/	/fɜːs/, /tɜːfs/
-rts: darts, carts	/dɑrts/, /kɑrts/	/dɑrks/, /kɑrps/	/dɑrts/, /kɑrs/	/dɑrks/, /kɑrmps/
-s(k)s: masks, tasks	/mæs(k)s/, /tæs(k)s/	/mayŋks/, /teyŋks/	/meyŋks/, /tɜːks/	/meysk/, /kɜːts/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/	/meyŋks/, /hɛnt/
-mps: camps, ramps	/kæmps/, /ræmps/	/kænts/, /ræmps/	/kɛmps/, /rɛmps/	/kæmps/, /rɛmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hæmps/, /ɛlts/	/hɛlms/, /ɛms/	/hɛms/, /ɛlms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɑlts/, /tɑlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/
-sps: gasps, rasps	/gæspz/, /ræspz/	/gæs:/, /ræmps:/	/gɜːps/, /ræmps/	/grɪps/, /ræmps/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɜːvs:/, /hɜːvs:/	/kɜːps/, /hɜːvs/	/kɜːbs/, /hɜːps/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bays:/, /ɜːbs:/	/bɜːds/, /dʒɜːbs/	/bɜːds/, /dʒɪrɪp/

APPENDIX J

SUBJECT B TRANSCRIPTION OF TARGET WORDS FROM PRE-TRAINING

RECORDINGS

Appendix J

Subject B Transcription of Target Words From Pre-Training Recordings

Subject B Transcription of Target Words From Pre-training Recordings

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɜːds/, /hɜːds/	/nɜːds/, /hɜːs/	/nɜːs/, /hɜːs/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/dʒɜːps/, /bɑːrsbɪs/	/dʒɔːrds/, /bɜːds/	/dʒɜːps/, /bɜːbs/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɜːks/, /ɜːks/	/drɪŋk/, /ɑːrks/	/drɪŋks/, /ɑːrs/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/gɜːms/, /tɜːmps/	/græm/, /tɜːms/	/græməʊs/, /tɜːmz/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɜːps/	/yɛps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɜːps/, /tɜːps/	/bɜːps/, /tɜːps/	/bɜːps/, /teɪŋgə/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/bawns/, /sawns/	/bawns/, /sawnds/	/bawnds/, /sawnds/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɜːps/	/kɑːrps/, /hɜːps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towsts/, /bowsts/	/tows/, /bowts/	/towsts/, /bowts/
-f(t)s: gifts, lifts	/gɪft(s)/, /lɪft(s)/	/gɪfts/, /lɪfts/	/dʒɪfts/, /laɪfs/	/gɪfts/, /laɪfs/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɜːts/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mɑːsk(s)/, /tɑːsk(s)/	/mɑːrks/, /tæsk(s)/	/mæks/, /tæsk(s)/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɛnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɜːts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kɛmps/, /rɛmps/	/kɛmps/, /rɛmps/	/kæmps/, /rɛmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛmps/, /ɛlms/	/hɛlms/, /ɛlms/	/hɛms/, /ɛlms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/
-sps: gasps, rasps	/gæps/, /ræps/	/gæps/, /ræps/	/gæps/, /reɪsɪps/	/gɜːps/, /ræps/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɪlts/, /hɪlts/	/kɪlɔːs/, /hɛlps/	/kɜːs/, /hɛlds/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɜːgs/, /ɜːgs/	/bɛrɪgs/, /ɛrgs/	/bɛrɪŋ/, /ɛrɪgs/

APPENDIX K
SUBJECT B TRANSCRIPTION OF TARGET WORDS FROM POST-TRAINING
RECORDINGS

Appendix K

Subject B Transcription of Target Words From Post-Training Recordings

Subject B Transcription of Target Words From Post-Training Recordings

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɜːds/, /hɜːds/	/nɜːs/, /hɑːds/	/nɜːds/, /hɑːds
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/gɜːbs/, /bɑːrbs/	/gɜːbs/, /bɑːrbs/	/gɜːbs/, /bɑːrbs/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɜːks/, /ɜːks/	/dɜːks/, /ɜːks/	/dɜːks/, /ɑːrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/dʒɜːmps/, /tɜːms/	/dʒɜːms/, /tɜːms/	/dʒɜːps/, /tɜːmz/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛs/, /heɪlps/	/yɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɜːns/, /tɜːmps/	/bɜːns/, /tɜːks/	/bɜːns/, /tɜːns/
-wn(d)z: pounds, sounds	/pawnd(z)/, /sawnd(z)/	/bawns/, /sawns/	/bawns/, /sawnd/	/bawns/, /sawns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɜːps/	/kɑːrps/, /hɑːrps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towst/, /bowst/	/towst/, /bowsts/	/towsts/, /bowts/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/gɪfs/, /lɪfs/	/gɪfs/, /ləɪfs/	/gəɪfs/, /ləɪfs/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɑːrfs/	/sɜːfs/, /tɜːfs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrts/, /skɑːrts/	/dɑːrts/, /kɑːrts/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mæksks/, /tæksks/	/mæksɪks/, /tæksɪks/	/mæksks/, /tæksks/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɪts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɛts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kɛmps/, /rɛmps/	/kæmps/, /ræmps/	/kæmps/, /rɛmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/
-sps: gasps, rasps	/gæsp(s)/, /ræsp(s)/	/gæsp(s)/, /ræps/	/gæspɪs/, /ræsp(s)/	/gæspɪs/, /ræps/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɜːls/, /hɜːs/	/gɜːbs/, /hɜːdɪls/	/kɜːls/, /hɜːs/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɜːgs/, /ɜːgs/	/bɜːgs/, /ɜːgs/	/bɜːgs/, /ɜːgs/

APPENDIX L
SUBJECT C TRANSCRIPTION OF TARGET WORDS FROM PRE-TRAINING
RECORDINGS

Appendix L

Subject C Transcription of Target Words From Pre-Training Recordings

Subject C Transcription of Target Words From Pre-Training Recordings

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɛrds/, /hɛrds/	/nɜːds/, /hɛrbs/	/nɜːds/, /hɜːbs/,
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/greyps/, /bɑːrbs/	/grʌbs/, /bɑːrbs/	/gɑːrbs/, /bɑːrbs/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɛrks/, /ɛrks/	/dɜːks/, /ɛrks/	/dɛrks/, /ɛrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/dʒɜːms/, /tɛrms/	/dʒɛrms/, /tɛrms/	/gɛrms/, /tɛrms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/wɛlps/, /hɛlps/	/wɛlps/, /hɛlps/	/wɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɛrns/, /tɛrns/	/bɛrns/, /tɛrns/	/bɛrns/, /tɛrns/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/pawns/, /sawns/	/pawns/, /sawns/	/pawns/, /sawns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towst/, /bowst/	/towst/, /bɒst/	/towst/, /bɒst/
-f(t)s: gifts, lifts	/gɪft(s)/, /lɪft(s)/	/gɪfst/, /lɪfst/	/gɪfst/, /lɪfst/	/gɪfst/, /lɪfst/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mæsk/, /tækst/	/mæsk/, /tækst/	/mæsk/, /tækst/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kɑːmps/, /rɑːmps/	/kɑːmps/, /rɑːmps/	/kɑːmps/, /rɛmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛlms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/
-sps: gasps, rasps	/gæsp/, /ræsp/	/gæsp/, /ræsp/	/gæsp/, /rɛsp/	/gæsp/, /ræsp/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɛrls/, /hɛrts/	/kɛrvs/, /hɛrls/	/kɛrls/, /hɛrs/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɛrgs/, /ɛrgs/	/bɛrgs/, /ɛrgs/	/bɛrgs/, /ɛrgs/

APPENDIX M
SUBJECT C TRANSCRIPTION OF TARGET WORDS FROM POST-TRAINING
RECORDINGS

Appendix M

Subject C Transcription of Target Words from Post-Training Recordings

Subject C Transcription of Target Words from Post-Training Recordings

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɛrds/, /hɛrbs/	/nɛrds/, /hɜːbs/	/nɛrbs/, /hɛrbs/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/gɑːrbs/, /bɑːrbs/	/gɑːrbs/, /bɑːrbəːs/	/gɑːrbs/, /pæpəːs/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɛrks/, /ɛrks/	/dɛrks/, /ɛrks/	/dɛrks/, /ɛrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/dʒɛrms/, /tɛrms/	/dʒɛrms/, /tɛrms/	/dʒɛrms/, /tɛrms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɛrns/, /tɛrns/	/bɛrns/, /tɛrns/	/bɜːns/, /tɛrns/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/pawns/, /sawns/	/pawns/, /sawns/	/pawns/, /sawns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɛrps/	/kɑːrps/, /hɛrps/	/kɑːrps/, /hɜːps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towst/, /bowst/	/towst/, /bowst/	/towst/, /bɒst/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/gɪfs/, /lɪfs/	/gɪfs/, /lɪfst/	/gɪfs/, /lɪfs/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /sɜːfs/	/sɛrfs/, /tɜːfs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrks/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mæsk(s)/, /tæsk(s)/	/mæsk(s)/, /tæsk(s)/	/mæsk(s)/, /tæsk(s)/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnst/, /hɪnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɛnts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kæmps/, /ræmps/	/kæmps/, /rɑːmps/	/kɑːmps/, /rɑːmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlms/, /ɛlms/	/hɛlps/, /ɛlms/	/hɛlps/, /ɛlms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/
-sps: gasps, rasps	/gæsp(s)/, /ræsp(s)/	/gæsp(s)/, /ræsp(s)/	/gæps/, /ræps/	/gæsp(s)/, /ræsp(s)/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɔːrɪʃ/, /hɔːrs/	/kɜːls/, /hɔːrtʃ/	/kɑːrɪs/, /hɜːps/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɛrgs/, /ɛrgs/	/bɛrgs/, /ɛrgs/	/bɛrgz/, /ɛrgz/

APPENDIX N
SUBJECT A TRANSCRIPTION OF TARGET WORDS FROM PRE-
ASSESSMENT

Appendix N

Subject A Transcription of Target Words from Pre-Assessment

Subject A Transcription of Target Words from Pre-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlkɪs/, /mɪlkɪs/	/skæts/, /mɪlk/	/sɪlk/, /meyks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɛrvɪs/, /hɛrbɪs/	/nɛrbɪts/, /hɛrp/	/nɛrp/, /hɜːdɪs/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/dʒɪrɪps/, /bɜːrps/	/gɑːrds/, /bɜːrps/	/dʒɜːrɪps/, /bɑːrds/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɑːrks/, /ɑːrk/	/dɛrɪk/, /ɑːrks/	/dɑːrk/, /ɛrkɪts/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/dʒrɛmɪs/, /tɑːrm/	/grɛm/, /tɑːrms/	/dʒrɛms/, /trɛm/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛps/, /hɛld/	/yɛls/, /hɛlp/	/yɛlɪps/, /hɛld/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɔːrds/, /tɔːwɜːst/	/brʌn/, /tɛrps/	/bɛrd/, /tɛrn/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/bɑːrɛnts/, /sown/	/pyuwɔːld/ /sɑːlvɪts	/bown/, /sɑːns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrɪt/, /hɛr/	/kɑːrts/, /hɛrd/	/kɑːrɪt/, /hɛrɪps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/tɑːwsɪt/, /pɑːpɛts/	/tɑːs/, /bowsɪt/	/towt/, /bɑːbɛts/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/dʒɪrɪfs/, /lɑːfɪt/	/dʒɪrɪts/, /lɑːfɪts/	/grɪfɪts/, /lɪts/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɪyɛrfɪst/, /trɪfɪts/	/sɛrfɪs/, /trɪps/	/fɛns/, /tɑːrfɪts/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrks/, /kɑːrvs/	/dɑːrst/, /kɑːrts/	/dɑːrts/, /kɑːrs/
-s(k)s: masks, tasks	/mæs(k)s/, /tæs(k)s/	/mɑːrks/, /tɑːrks/	/meyks/, /tɹæks/	/mɑːrkɪs/, /teyk/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɛntɪs/, /hɛntɪts/	/mɛnst/, /hɜːts/	/maynt/, /hɪnt/
-mps: camps, ramps	/kæmps/, /ræmps/	/kʌm/, /rɑːmɪmp/	/kʌmpɪs/, /rɛmɪps/	/kɑːrmp/, /rɛmɪts/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɑːms/, /ɛlmɪts/	/hɛms/, /ɛlɪms/	/hɛlɪms/, /ɛlmɪts/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/klɑːts/, /tɜːts/	/lɑːɪkst/, /tɑːlɪts/	/kɑːlɪt/, /lɪt/
-sps: gasps, rasps	/gæspz/, /ræspz/	/grɛps/, /ræps/	/drɪps/, /rɛysɪp/	/dʒɜːrɪps/, /rɛms/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɜːvs/, /hɛns/	/kɪls/, /hɛrd/	/kɜːvɪts/, /hɑːrmpz/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/drɪks/, /dʒɜːrɪps/	/bɑːrdʒɪs/, /grɪps/	/dʒɜːrɪps/, /ɛygrɪks/

APPENDIX O

SUBJECT B TRANSCRIPTION OF TARGET WORDS FROM PRE-ASSESSMENT

Appendix O

Subject B Transcription of Target Words from Pre-Assessment

Subject B Transcription of Target Words from Pre-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɜːds/, /hɜːs/	/nɜːs/, /hɜːds/	/nɜːds/, /hɜːs/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/dʒɜːps/, /bɜːds/	/dʒɜːbs/, /bɑːrbɪs/	/gɜːps/, /bɑːrps/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɑːrks/, /ɛrks/	/drɪŋks/, /ɜːs/	/drɪŋk/, /ɑːk /
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/geɪms/, /tɛrms/	/gɜːms/, /tɜːmps/	/græm/, /tɜːms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɪls/, /hɛlps/	/yɛlps/, /hɛrps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɜːps/, /tɜːps/	/bɜːps/, /tɜːps/	/bɜːps/, /trɪps/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/bawns/, /sawns/	/bawns/, /sɑːns/	/bawns/, /sawns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/	/krɑːps/, /hɛrps/	/kɑːrps/, /hɜːps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/tows/, /bowts/	/towsɪt/, /bowts/	/tows/, /bowsts/
-f(t)s: gifts, lifts	/gɪft(s)/, /lɪft(s)/	/dʒɪfts/, /laɪf/	/gɪft/, /laɪft/	/dʒɪftɪs/, /lɪs/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɪfs/	/syɜːfs/, /trʌfs/	/sɜːfs/, /tɜːfs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/drʌks/, /kɑːrts/	/dɑːrts/, /kɑːrs/	/dɑːrts/, /kɑːrts/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mæskɪts/, /tæsk/	/mæks/, /tæks/	/mɑːrks/, /tæksɪks/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hʌnts/	/mɛnts/, /hɪnts/	/mɪnts/, /hɜːts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kɛmps/, /rɛmps/	/kɛmps/, /rɛmɪps/	/kæmpɪs/, /rʌmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlms/, /ɛlms/	/hɛmps/, /ɛlms/	/hɛms/, /ɛlmps/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪls/, /tɪlts/
-sps: gasps, rasps	/gæps/, /ræps/	/gæspɪs/, /ræps/	/gæps/, /ræspɪs/	/dʒɜːps/, /ræps/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɪlɜːs/, /hɛls/	/kɜːlɜːs/, /hɪlts/	/kyɜːs/, /hɜːs/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɜːdʒɪs/, /ɑːrgs/	/bɜːdʒ/, /ɛrɪgs/	/bɛrgs/, /ɛrg/

APPENDIX P

SUBJECT C TRANSCRIPTION OF TARGET WORDS FROM PRE-ASSESSMENT

Appendix P

Subject C Transcription of Target Words from Pre-Assessment

Subject C Transcription of Target Words from Pre-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɛrds/, /hɛrds/	/nɛrs/, /hɛrs/	/nɛrds/, /hɛrbs/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/greyps/, /bɑːrbɪs/	/gɑːrbs/, /bɑːrbs/	/græbs/, /peypəːs/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɛrks/, /ɛrks/	/dɑːrks/, /ɑːrks/	/dɜːks/, /ɛrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/gɛrms/, /tɛrms/	/dʒɛrms/, /tɛrms/	/gɛrms/, /tɛrms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/wɛlps/, /hɛlps/	/wɛlɪps/, /hɛlps/	/wɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/byɔːrns/, /tɛrns/	/bɛrns/, /tɛrns/	/byɜːns/, /tɜːns/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/bawns/, /sawns/	/bawns/, /sawns/	/pawns/, /sawns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɛrps/	/kɑːrps/, /hɑːrps/	/krɑːps/, /hɑːrps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towtst/, /bowts/	/towtɪs/, /bowst/	/towst/, /bɒst/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/gɪfst/, /lɪfst/	/dʒɪfst/, /lɪfst/	/gɪfs/, /lɪfst/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɛrfs/, /tɜːfs/	/sɜːfs/, /tɛrfs/	/sɛrfs/, /træfɪs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrks/, /kɑːrts/	/dɑːrts/, /kɑːrts/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mæsk(s)/, /tækst/	/mæsk(s)/, /tæks/	/mæks/, /tæks/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɪts/	/mɪnts/, /hɪnts/	/mɪnst/, /hɪnts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kɑːmps/, /rɛmps/	/kʌmps/, /rɛmps/	/kɛmps/, /rɛmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlms/, /ɛlɪms/	/hɛlms/, /ɛlms/	/hɛms/, /ɛlms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪtʰls/	/kɪlɪts/, /tɪtʰls/	/kɪlts/, /tɪtʰls/
-sps: gasps, rasps	/gæsp(s)/, /ræsp(s)/	/gæps/, /ræps/	/gæsp(s)/, /rɛsp(s)/	/dʒæps/, /ræsp/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɛrɪls/, /hɛrɪls/	/kɛrs/, /hɜːts/	/kɛrɪls/, /hɛrs/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɜːdʒɪs/, /ɑːrgs/	/bɛrgs/, /ɛrgs/	/bɛrdʒɪs/, /ɛrdʒɪs/

APPENDIX Q

SUBJECT A TRANSCRIPTION OF TARGET WORDS FROM POST-ASSESSMENT

Appendix Q

Subject A Transcription of Target Words from Post-Assessment

Subject A Transcription of Target Words from Post-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪŋks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɜːds/, /hɜːds/	/nɛrds/, /hɜːbs/	/nɜːbs/, /hɜːds/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/græps/, /bɜːbs/	/grɑːbs/, /dɑːrps/	/gɜːbs/, /bɑːrds/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɑːrks/, /ɑːrks/	/dɜːks/, /ɛrks/	/dɜːks/, /ɪlks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/dʒɜːms/, /tɛrms/	/dʒɑːrms/, /tɜːms/	/græms/, /tɛrms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɜːrns/, /tɜːns/	/bɜːds/, /tɜːms/	/bɜːns/, /tɛrns/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/pawns/, /sawnds/	/bawns/, /sawns/	/pawns/, /sawns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɛrs/	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɜːps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towst/, /bows/	/tows/, /bowst/	/towst/, /bowst/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/gɪfts/, /lɪfs/	/gɪfs/, /lɪfts/	/gɪfs/, /lɪfs/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tælf/	/sɜːs/, /tɛrfs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrks/, /kɑːrts/	/dɑːrts/, /kɑːrps/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mæks/, /taks/	/meysk/, /tarks/	/mæks/, /tæks/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɛns/	/mɛnts/, /hɪnts/	/mɪnts/, /hɛnts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kæmps/, /rɛmps/	/kæmps/, /ræmps/	/kænts/, /ræmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlds/, /ɛlɪms/	/hɛlms/, /ɛlms/	/hɪlms/, /ɛlts/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪls/, /tɪlts/
-sps: gasps, rasps	/gæsp(s)/, /ræsp(s)/	/gæps/, /ræmps/	/gæs:/, /ræps/	/gæsp/, /ræps/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɜːs/, /hɜːds/	/kɪls/, /hɜːs/	/kɜːds/, /hɜːds/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɜːds/, /gɜːgs/	/bɜːgs/, /ɜːbs/	/bɜːds/, /dʒɜːgs/

APPENDIX R

SUBJECT B TRANSCRIPTION OF TARGET WORDS FROM POST-ASSESSMENT

Appendix R

Subject B Transcription of Target Words from Post-Assessment

Subject B Transcription of Target Words from Post-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɑlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɜːds/, /hɜːds/	/nɜːs/, /hɜːds/	/nɜːds/, /hɑːds/
-rbz: garbs, barbs	/gɑrbz/, /bɑrbz/	/gɑrbs/, /bɜːps/	/gɑrbs/, /bɑrbs/	/gɪrps/, /bɑrbs/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɜːks/, /ɜːgs/	/dɜːks/, /ɜːks/	/dɜːks/, /ɛrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/dʒɜːms/, /tɜːms/	/dʒɜːms/, /tɜːms/	/dʒɜːms/, /tɜːms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɜːns/, /tɜːns/	/brʌns/, /tɜːms/	/bɜːns/, /tɜːns/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/bawns/, /sawns/	/bawns/, /sawns/	/bawns/, /sawns/
-rps: carps, harps	/kɑrps/, /hɑrps/	/kɑrps/, /hɑrps/	/kɑrps/, /hɜːps/	/kɑrps/, /hɑrps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towst/, /bowt/	/towsts/, /bowsts/	/towst/, /bowst/
-f(t)s: gifts, lifts	/gɪf(t)s/, /lɪf(t)s/	/gɪfs/, /lɪfs/	/gɪfs/, /lɪfs/	/gɪfs/, /lɪfs/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/
-rts: darts, carts	/dɑrts/, /kɑrts/	/dɑrts/, /kɑrts/	/dɑrts/, /kɑrts/	/dɑrts/, /kɑrts/
-s(k)s: masks, tasks	/mæs(k)s/, /tæs(k)s/	/mæskɪks/, /tæskɪks/	/mæks/, /tæskɪks/	/mæksɪks/, /tæks/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɛnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kæmps/, /rɛmps/	/kɛmps/, /ræmps/	/kɑmps/, /ræmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛlms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/
-sps: gasps, rasps	/gæspz/, /ræspz/	/gæspɪs/, /ræspz/	/gæspz/, /ræspɪs/	/gæspz/, /ræspz/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɜːls/, /hɛrɪls/	/kɜːls/, /hɜːs/	/kɛrs/, /hɛls/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɜːgs/, /ɜːgs/	/bɜːgs/, /ɜːgs/	/bɜːgs/, /ɜːgs/

APPENDIX S

SUBJECT C TRANSCRIPTION OF TARGET WORDS FROM POST-ASSESSMENT

Appendix S

Subject C Transcription of Target Words from Post-Assessment

Subject C Transcription of Target Words from Post-Assessment

Clusters and Target Words	Transcription			
	Target	Word List	Sentences	Passages
-lks: silks, milks	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/	/sɪlks/, /mɪlks/
-rdz: nerds, herds	/nɜːdz/, /hɜːdz/	/nɛrds/, /hɛrds/	/nɛrds/, /hɛrbs/	/nɛrds/, /hɛrds/
-rbz: garbs, barbs	/gɑːrbz/, /bɑːrbz/	/gɑːrbs/, /bɑːrbs/	/gɑːrbs/, /bɑːrbs/	/gɑːrbs/, /bɑːrps/
-rks: dirks, irks	/dɜːks/, /ɜːks/	/dɜːks/, /ɛrks/	/dɛrks/, /ɜːks/	/dɜːks/, /ɛrks/
-rmz: germs, terms	/dʒɜːmz/, /tɜːmz/	/dʒɛrmz/, /tɛrms/	/dʒɜːmz/, /tɛrms/	/dʒɛrms/, /tɜːms/
-lps: yelps, helps	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/	/yɛlps/, /hɛlps/
-rnz: burns, turns	/bɜːnz/, /tɜːnz/	/bɜːns/, /tɜːns/	/bɜːns/, /tɛrms/	/bɛrms/, /tɜːns/
-wn(d)z: pounds, sounds	/pawndz/, /sawndz/	/pawns/, /sawns/	/pawns/, /sawns/	/pawns/, /sawns/
-rps: carps, harps	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɑːrps/	/kɑːrps/, /hɛrps/
-ws(t)s: toasts, boasts	/tows(t)s/, /bows(t)s/	/towsts/, /bowst/	/towsts/, /bowst/	/towst/, /bowsts/
-f(t)s: gifts, lifts	/gɪft(s)/, /lɪft(s)/	/gɪfts/, /lɪfts/	/gɪfts/, /lɪfts/	/gɪfts/, /lɪfts/
-rfs: surfs, turfs	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɜːfs/	/sɜːfs/, /tɛrfs/	/sɛrfs/, /tɜːrfs/
-rts: darts, carts	/dɑːrts/, /kɑːrts/	/dɑːrks/, /kɑːrts/	/dɑːrts/, /kɑːrts/	/dɑːrts/, /kɑːrts/
-s(k)s: masks, tasks	/mæsk(s)/, /tæsk(s)/	/mæsk(s)/, /tæsk(s)/	/mæsk(s)/, /tæsk(s)/	/mæsk(s)/, /tæsk(s)/
-nts: mints, hints	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/	/mɪnts/, /hɪnts/
-mps: camps, ramps	/kæmps/, /ræmps/	/kæmps/, /ræmps/	/kæmps/, /ræmps/	/kæmps/, /ræmps/
-lmz: helms, elms	/hɛlmz/, /ɛlmz/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛlms/	/hɛlms/, /ɛlms/
-lts: kilts, tilts	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/	/kɪlts/, /tɪlts/
-sps: gasps, rasps	/gæsp(s)/, /ræsp(s)/	/gæsp(s)/, /ræsp(s)/	/gæsp(s)/, /ræsp(s)/	/gæsp(s)/, /ræsp(s)/
-rlz: curls, hurls	/kɜːlz/, /hɜːlz/	/kɛrls/, /hɛrls/	/kɛrls/, /hɛrls/	/kɛrvs/, /hɛrls/
-rgz: bergs, ergs	/bɜːgz/, /ɜːgz/	/bɛrgs/, /ɛrgz/	/bɜːgz/, /ɛrgs/	/bɛrgs/, /ɜːgs/

APPENDIX T

SUBJECTS' RANKINGS OF TARGET CONSONANT CLUSTERS

Appendix T

Subjects' Rankings of Target Consonant Clusters

Subjects' Rankings of Target Consonant Clusters

Subject	Rank		
	1 (easy)	2 (medium)	3 (difficult)
A-Layla	-rdz, -lps, -rps, -rts, -lmz, -sps	-ŋks, -lks, -rmz, -rnz, -ws(t)s, -f(t)s, -rfs, -nts, -lts, -rlz	-rbz, -rks, -wn(d)z, -s(k)s, -mps, -rgz
B-Mariana	-rdz, -rks, -rps, -rfs, -lts, -sps	-lks, -rbz, -lps, -rnz, -ws(t)s, -f(t)s, -rts, -nts, - lmz, -rgz	-ŋks, -rmz, -wn(d)z, -s(k)s, -mps, -rlz
C-Noor	-lks, -rks, -rps, -rts, -lts, -rgz	-ŋks, -rbz, -lps, -rnz, -ws(t)s, -f(t)s, -rfs, -nts, -lmz, -rlz	-rdz, -rmz, -wn(d)z, -s(k)s, -mps, -sps

APPENDIX U

SUBJECTS' RANKINGS OF TARGET CONSONANT CLUSTER WORDS

Appendix U

Subjects' Rankings of Target Consonant Cluster Words

Subjects' Rankings of Target Consonant Cluster Words

Subject	Rank					
	1 (easiest)	2	3	4	5	6 (most difficult)
A-Layla	minks, yelps, carps, carts, elms, ergs	milks, dirks, toasts, mints, kilts, hurls	herds, sinks, terms, helps, sounds, boasts, surfs, darts, tilts, rasps	silks, nerds, irks, germs, lifts, harps, tasks, turfs, camps, gasps	barbs, turns, pounds, hints, helms, curls	garbs, burns, gifts, masks, ramps, bergs
B-Mariana	milks, helps, sounds, surfs, camps, gasps	sinks, dirks, pounds, hints, kilts, rasps	silks, garbs, germs, yelps, carps, harps, carts, tasks, helms, bergs	barbs, herds, terms, burns, lifts, boasts, darts, turfs, ramps, hurls	minks, irks, gifts, mints, tilts, ergs	nerds, turns, toasts, masks, elms, curls
C-Noor	silks, helps, sounds, surfs, camps, ergs	sinks, dirks, lifts, darts, elms, hurls	milks, herds, germs, irks, harps, pounds, mints, turfs, tilts, curls	barbs, garbs, terms, turns, carps, boasts carts, hints, ramps, bergs	nerds, yelps, toasts, tasks helms, rasps	minks, burns, gifts, masks, kilts, gasps

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