CUKUROVA UNIVERSITY

THE INSTITUTE OF SOCIAL SCIENCES

IN THE SUBJECT OF ENGLISH LANGUAGE TEACHING

MARKEDNESS DIFFERENTIAL HYPOTHESIS AND THE PHONOLOGICAL ERRORS OF TURKISH EFL LEARNERS

Namık ÜLKERSOY

A PhD DISSERTATION

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Supervisor: Assoc. Prof. Dr. Hatice SOFU

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ÖZET

BELİRTİLİLİK AYIRT ETME VARSAYIMI VE İNGİLİZCEYİ YABANCI DİL OLARAK ÖĞRENEN TÜRK ÖĞRENCİLERİN SESLETİM HATALARI

Namık ÜLKERSOY

Doktora Tezi, İngiliz Dili Eğitimi Anabilim Dalı

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Türkiye'de İngilizce'yi yabancı dil olarak öğrenen öğrencilerin yanısıra, İngiliz Dili Eğitimi Anabilim Dalı Öğrencileri de İngilizce konuşurken sesletim konusunda zorlanmaktadırlar. Geleceğin öğretmenleri olarak, bu öğrencilerin doğru sesletim yapmayı öğrenmeleri İngilizce'deki sesleri doğru öğretmenleri açısından gereklidir. Bu nedenle, çalışmamızın amacı, geleceğin ingilizce öğretmenlerinin sesletim yaparken karşılaştıkları zorlukları yenmelerine yardımcı olmaktır. Bu yüzden de çalışmamızda İngiliz Dili Eğitimi öğrencilerinin sesletim hatalarına odaklandık. Tanımlanan hatalar, belirtililik kavramı sesletimdeki güçlüklere yol açan bir etken olduğu için, Eckman'ın (1977) "Belirtililik Ayırt Etme Varsayımı" doğrultusunda analiz edilmiştir.

Bu çalışmanın katılımcıları Çukurova Üniversitesi İngiliz Dili Eğitimi Anabilim Dalı 2. Sınıf öğrencileridir. Her biri 26 kişiden oluşan bir Deney ve bir Kontrol Grubu'na Öntest verildikten sonra, hatalar tanımlanarak, bu hataların giderilmesi için düzenlenmiş bir uygulama Deney Grubu'na yapıldı. Uygulama içeriği, katılımcıları bilinçlendirmek amacıyla geniş bir hata analizinin yanısıra, Türkçe ve İngilizce'nin ses yapılarının kapsamlı bir karşılaştırmasını da içine almıştır. Uygulamanın tamalanmasının ardından Deney ve Kontrol Grupları'na Sontest verilmiştir. Test sonuçları, Gruplar ve testler arasında sesletimde düzelme yönünden anlamlı farklılık bulunup bulunmadığını görmek amacıyla istatistiksel analizlerden geçirilmiştir.

Sonuçlara göre, sesletim güçlüklerinde belirtililik tek başına etkili değildir. Bunun yanısıra, bir sesin sözcük içinde bulunduğu konumunda önemli bir rolü vardır. Bu yüzden, *konumsal belirtililik* kavramı ön plana çıkmaktadır. Ayrıca, kalıplaşmış yanlış öğrenilen biçimler, anadilin etkisi, ve yazım karakterleri gibi etkenlerin de sesletim güçlüklerine yol açtığı gözlenmiştir.

Anahtar Sözcükler: belirtili, belirtisiz, konumsal belirtililik, sesletim bilgisel aktarım, sesbirim

ABSTRACT

MARKEDNESS DIFFERENTIAL HYPOTHESIS AND THE PHONOLOGICAL ERRORS OF TURKISH EFL LEARNERS

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Students of English Language Teaching (ELT) departments in Turkey experience difficulties in terms of accuracy in pronunciation. As prospective English language teachers, it is essential for the students of ELT Departments to have accurate pronunciation so that they will teach English sounds correctly when they become teachers. Therefore, the goal of this study is to enable prospective teachers to overcome the difficulties they encounter in English pronunciation. For that reason, the main focus of the study has been the phonological errors of student teachers. The errors that were identified have been analyzed in relation to Eckman's "the Markedness Differential Hypothesis", since the notion of markedness is a determining factor for the level of difficulty in pronunciation.

The participants of this study are the sophomore students at Cukurova University ELT Department. Treatment and Control Groups, each consisting of 26 students, have been formed. After the application of the Pre-test, the errors have been identified and a treatment designed to deal with those errors have been given to the Experimental Group. The syllabus of the treatment included an extensive error analysis and a detailed comparison of English and Turkish phonological structures. Following the completion of the treatment, a Post-test has been conducted. Both Groups have been compared by means of statistical analysis so as to observe if there is any significant difference in terms of improvement in pronunciation.

The results have shown that markedness alone does not have a determining effect on the level of difficulty in pronunciation. In addition, the environment in which a sound is used plays an important role. Thus, the term *environmental markedness* needs to be emphasized. Fossilized incorrectly learned forms, the effect of native language, and the orthography have been observed as the other factors that cause difficulties in pronunciation.

Key Words: marked, unmarked, environmental markedness, phonological transfer, phoneme

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CHAPTER 1

INTRODUCTION

1.0. Introduction

Referring to the discussions among EFL teachers as well as reflecting upon our personal experience, we have reached the conclusion that the students of the ELT departments in Turkey have complaints regarding their pronunciation skills, specifically in terms of producing the speech sounds accurately. Bada (1993) addresses this issue with reference to phonological transfers from L1 to L2: "the teacher in the classroom makes his or her most effort to get learners to produce the sound desired. While learners, with some sounds, do not seem to have much difficulty, with some others, they face such great difficulty that the teacher may often prove of little help in assisting them to surmount their problems" (p. 14).

Phonological errors made by second language speakers have been examined in terms of the theory of interlanguage (Selinker, 1972; Tarone, 1984; Major, 1994), and language transfers (Selinker, 1972; Broselow, 1984). Studies of interlanguage have shown that the forms produced by second language speakers were distinct from both L1 and L2. Celce-Murcia (1978) observed her own daughter learning English and French simultaneously. Celce-Murcia's findings have revealed an evidence of a process operating to shape interlanguage phonology. Her daughter tried to avoid physiologically difficult forms. For instance, she had great difficulty with fricatives. Rather than saying football, she created a new word "piedball", and used it for a long time.

On the other hand, studies conducted in terms of language transfers were in favor of the idea that phonological errors were mostly due to transfers from L1 into L2. Thompson (in Bada 1993, p.18) has spotted the following problematic speech sounds in English that are pronounced inaccurately by Turkish ESL learners: vowels /i:/, /e/, /æ/, /o:/, /u:/, /I/, and consonants /θ/, /δ/, word-finally occurring /b,d,g/, /v/, and /w/ as an allophone of /v/ before rounded vowels.

Studies by Bada and Thompson imply that phonological transfers from L1 to L2 may lead to inaccurate pronunciation. This problem has to be dealt with carefully in the case of EFL learners who plan to teach English since teaching the target language accurately with all its aspects also entails teaching its phonology with accuracy.

In addition to studies on language transfers, analyses conducted on second language data have shown evidence of both language transfers and language universals. Tarone (1976) did research on L2 syllabification working with two speakers of Cantonese, Korean, and Portuguese. Her findings revealed that native language transfer was a dominant factor in determining syllable simplification occurrences. In addition, she found cases of syllable simplification that could not be explained by transfer. Similarly, Anderson (1987) worked on L2 syllabification dealing with two L1 groups (Chinese and Egyptian Arabic speakers) so as to demonstrate that L2 learner's syllabification performance could be best explained by the contrastive analysis hypothesis. Her data showed evidence of language transfer. She also discovered some parallels between universals of syllable structure and certain patterns of error in her data.

Furthermore, with regard to pronunciation in L2, Scovel (1969) uses the term fossilization of phonology to refer to situations where matters of accent continue to mark adult learners as non-native speakers long after fine points of syntax, semantics or even style have been mastered. Krashen (1977) supports the psychological hypothesis to explain the fossilization of phonology where non-native accent is explained as a matter of habit formation. According to Tarone (1984) the causes of phonological fossilization are yet to be clearly determined. One needs to conduct studies to determine whether such fossilization is a matter of interlanguage phonology or that of language transfers.

1.1. Background of the Study

Lado (1957), in his Contrastive Analysis Hypothesis, predicts that forms in the target language (TL) that contrast with equivalent forms in the native language (NL) will be difficult to learn, while forms that are similar will be easy to learn. The Universals Hypothesis, on the other hand, does not take into account NL structure; instead, it bases its predictions of difficulty on universality. The least expected or the least universal forms across the languages of the world are considered to be the most difficult for L2 learners to acquire, while the most expected or natural forms are considered to be the easiest, independent of native language transfer. Eckman (1977) has proposed the Markedness Differential Hypothesis (MDH) stating that forms in L2 that are different and are more marked than L1 will be difficult to learn, and the relative degree of difficulty will correspond to relative degree of markedness. The aspects of language in L2 that are not different but unmarked will not be difficult to learn. In this

view, a phenomenon in language A implies the presence of B, but the presence of B does not imply the presence of A.

The MDH can be applied at the level of phonology in second language learning. Thus, we can predict that the phonological forms that are more marked in L2 will be more difficult to learn. In that case, what an analyst needs to do is to determine the degree of markedness from the least marked to the most marked so that the degree of difficulty in learning can be determined through a detailed analysis. Such analysis entails a thorough comparative study of L1 and L2 phonological structures. According to Major (1994), Eckman uses the following definition to make the MDH a strong hypothesis: If x has been acquired, y necessarily has also been acquired.

According to Eckman (1977), the Markedness Differential Hypothesis treats both NL transfer and language universals as equally important. The hypothesis states that forms in the target language that differ from and are more marked than NL forms will be difficult to learn, and that relative degree of difficulty will correspond to relative degree of markedness. Therefore, the aspects of language that are difficult but unmarked will not be difficult to learn. To exemplify markedness, Eckman uses the distinction between voiced and voiceless stops. Thus, voiced stops always imply the presence of voiceless stops and are thus said to be more marked than voiceless ones.

1.2. Statement of the Problem

As we have pointed out earlier, Turkish EFL students have difficulty in terms of their pronunciation skills. Thus, problematic sounds need to be defined clearly and a detailed analysis needs to be provided in order to determine the reason for such difficulty to take place. The role of language transfers and markedness should be taken into consideration so as to provide a better explanation for phonological errors. Once those reasons are identified, the duty of the analyst is to come up with a treatment to solve those problems which will enable EFL students to improve their pronunciation skills. If they can get rid of their errors, the prospective English teachers will be able to teach pronunciation correctly in the classroom.

1.3. The Aim of the Study

In this study, we investigated the difficulties experienced by Turkish EFL learners with reference to the production of English vowels and consonants. First, we aimed to give a description of vowels and consonants that were difficult to produce for Turkish EFL learners. This study was based on Eckman's MDH where the author had taken into account both NL transfers and language universals, which implied that EFL learners would apply to language transfers when they came across universally marked structures that did not occur in their native language. Therefore, once we determined the problematic phonemes, we focused on giving an account of the relationship between the level of difficulty and the degree of markedness. Our final purpose was to provide a discussion of whether the treatment that we used during the experiment enabled the students to solve their problems regarding sound production.

1.4. Research Questions

In our thesis, we sought answers to the following research questions:

- Which phonemes are more difficult to produce for Turkish EFL learners?
- What is the role of the difference in syllable structure between English and Turkish in terms of phonological errors?
- Would an implementation of a course designed specifically to point out the differences between L1 and L2 phonology help the students in terms of their personal development in pronunciation?

In relation to the research questions we hypothesized the following by making specific reference to MDH:

- MDH will hold at phonemic level; that is, when we consider distinction between marked and unmarked phonemes, the marked ones will be more difficult to produce by second language learners. For example, mid-vowels, semi-vowels, and inter-dentals will be more marked than other phonemes and thus will be more difficult to learn.
- MDH will be valid for syllable structure with reference to phonotactic differences between the English and Turkish languages; for example we predict that consonant clusters will be marked and therefore will be more difficult to learn.

- A course specifically designed to point out phonetic differences between English and Turkish will help students in terms of their personal development in pronunciation.

1.5. Operational Definitions

Our study dealt with both phonetics and phonology since we dealt with the phonemes of two specific languages, which are, English and Turkish. The concept of phoneme is defined as "a minimal unit in the sound system of a language, which is able to change the meaning of words" (Demirezen, 1986, 1987; Ladefoged, 1975; Roach, 1991). In addition, from the definitions of Ladefoged and Demirezen and Roach, we also adopt the terms allophones as the variants of the same phoneme occurring in different environments and thus causing no difference in meaning; minimal pairs as the set of phonemes occurring in the same environment and thus causing a meaning difference. Our discussion of Turkish Phonology was based on the works of Underhill (1976) and Demircan (2000), and Ergenç (2002).

The phonological analysis included two linguistic theories in order to explain the linguistic phenomena. In terms of phonemic analysis, we utilized the theory of Feature Geometry (Clements, 1991), which is the linguistic methodology of explaining phenomena such as consonant and vowel assimilations. For instance, the representation of the voiced velar stop /g/ is described in figure 1 by the Clements' (1991) feature geometry:

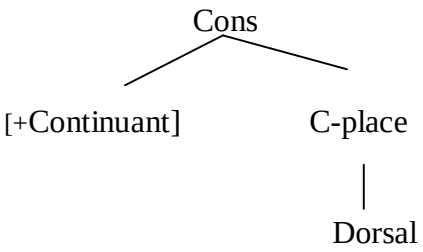

Figure1. The Geometrical representation of the voiced velar stop [g]

1.6. Assumptions and Limitations

One limitation of the study is that it included a limited number of participants for data collection. However, we believed that running the appropriate statistical analyses would provide useful insights. Our second concern is that we obtained our transcriptions by making the participants pronounce a list of isolated words. Since we examined a

wide range of phenomena such as English consonants, vowels, and syllable structure, using spontaneous speech would hardly enable us to obtain every single piece of data.

In addition, our study disregarded the dialectal backgrounds of the participants and it was assumed that they all spoke the standard variety of Turkish. This was done for standardization and unification purposes. However, it created one problem; that was, we had to ignore the fact that differences in vowel production such as long and short vowel distinction might have come from L1 dialectal differences.

Our transcripts demonstrated that the participants in our study had an awareness of the English long and short vowel distinction in terms of perception. On the other hand, when we consulted a native speaker, we found out that the learners were producing vowels longer in duration than a native speaker would. Unfortunately, time restrictions made it for us impossible to thoroughly analyze the data in terms of vowel duration.

CHAPTER 2

REVIEW OF LITERATURE

2.0. Introduction

In section 2.1, we discuss the sound inventories of both Turkish and English. Section 2.2 is dedicated to a discussion of syllable structure and phonotactics of both languages. In 2.3, we examine interlanguage studies. Section 2.4 is dedicated to contrastive Analysis Hypothesis. Section 2.5 is dedicated to a detailed discussion of the Markedness Differential Hypothesis. In section 2.6, we talk about studies conducted on L2 vowel acquisition. Finally, in section 2.7 we discuss the studies conducted on teaching L2 pronunciation.

2.1. Sound Inventories of Turkish and English

In this section, we discuss the sound inventories of Turkish and English providing examples and phonetic transcriptions. For phonetic transcriptions, we have used the conventions of the IPA).

2.1.1. Consonants of Turkish and English

English and Turkish have 20 consonants in common. Almost every consonant that exists in Turkish also exists in the English language. English has a total number of 25 consonants whereas Turkish has a total of 21. Tables 2.1 and 2.2 display the phonetic nature of consonants in both languages:

Table 2.1. English consonants (Adapted from Collins and Mees, 2003).

		Bilabial	Labio-dental	Dental	Alveolar	Palato-alveolar	Palatal	Velar	Glottal
Stops	Vl	p			t			k	
	Vd	b			d			g	
Fricatives	Vl		f	}	s	ß			h
	Vd		v	ð	z	¹			
Affricates	Vl					tß			
	Vd					d¹			
Nasals		m			n			{	
Laterals					l				
Approximants		w				r	j		

Turkish consonants, on the other hand, differ from English consonants in terms of their place of articulation as Table 2.2 displays:

Table 2.2. Turkish consonants (Adapted from Demircan, 1996)

		Bilabial	Labio-dental	Dental	Palato-alveolar	Alveo-palatal	Palatal	Glottal
Stops	Vl	p		t			k	
	Vd	b		d			g	
Fricatives	Vl		f		s	ß		h
	Vd		v		z	¹		
Affricates	Vl				tß			
	Vd				d¹			
Nasals		m			n			
Laterals					r l			
Approximants						j		

We feel that it is necessary to include a discussion of consonants in both languages providing examples.

2.1.1.1. Stops

According to Collins and Mees (2003), stop consonants have a stricture of complete closure in the vocal tract which blocks the airstream. The soft palate is raised

in order to prevent the air from escaping through the nose. Then, the articulators part quickly releasing the air with explosive force.

a) /p/ and /b/ occur both in Turkish and English

Turkish	English
para /pʌrʌ/ 'money'	pie /pai/
baba /bʌbʌ/ 'father'	bite [bait]

b) /t/and /d/:

Turkish	English
tel /tel/ 'wire'	take /teik/
dal /dal/ 'branch'	dim /dim/

Kornfilt (1997) suggests that plosives in Turkish have a more dental character than their English counterparts, which have a stronger alveolar character.

c) [k] and [g]

Turkish	English
kan [kan] 'blood'	cool [kul]
gaga [gaga] 'beak'	good [gud]

According to Kornfilt, velars are true velars in Turkish when they precede back vowels as in the examples ***kan*** [kan] "blood" and ***gaga*** [gaga] "beak"; however, they become palatalized when they precede front vowels as in ***kese*** [cese] 'pouch' and ***gezegen*** [ˌezeˌen] 'planet'.

In an acoustic analysis of Turkish stops, Kopkallı-Yavuz (2000) found that the differences for Turkish intervocalic stops were significant for four temporal parameters: vowel duration, voicing into stop closure, stop closure duration and aspiration duration. Vowel duration and voicing into stop closure were significantly longer for voiced stops than for voiceless ones. On the other hand, closure and aspiration durations were significantly longer for voiceless stops than for voiced ones.

2.1.1.2. Affricates [tß] and [d^1]

The articulators part quickly producing friction at the same point of articulation.

Turkish	English
çiçek [tßˆtß°k] 'flower'	chain [tße^{j}n]
cam [d^1am] 'glass'	jeep [d^1ip]

2.1.1.3. Fricatives

Demirezen (1987) defines a fricative as a sound during the production of which the lung air leaves the mouth and creates an audible friction.

a) [f] and [v]:

Turkish	English
fil [fˆl] ‘elephant’	free [fri]
vakit [vakˆt] ‘time’	vein [ve^{j}n]

Demircan (1996) and Kornfilt (1997) suggest that the voiced labio-dental [v] becomes the glide [w] when it is in intervocalic position before a rounded vowel:

tavuk [tawuk] ‘chicken’

kavun [kawun] ‘melon’

On the other hand, Kopkalli-Yavuz (2000) suggested that Turkish /v/ sound is an approximant rather than a labio-dental fricative because there is no friction in its production. Kopkalli-Yavuz relied upon acoustic data to draw such conclusion. According to the author, the allophonic [w] is also an approximant between rounded vowels. However, in this study, we have adopted the views of Demircan and Kornfilt.

b) [s] and [z]:

Turkish	English
sinek [sˆn°k] ‘fly’	sink [sˆnk]
zeki[z°kˆ] ‘intelligent’	zoom [zum]

c) [ß] and [¹]

Turkish	English
şarap [ßarap] ’wine’	shy [ßa^{j}]
jilet [¹ˆl°t] razor	pleasure [pl°¹\r]

d) [h]

Turkish	English
halat [halat] ‘rope’	heat [hit]

e) Dental [}] and [ð] occur only in English as in ***three*** [}ri] and ***their*** [ð°r]. Turkish language does not have these two phonemes.

2.1.1.4. Approximants

According to Collins and Mees (2003), approximants have a stricture of open approximation. The space between the articulators is wide enough for the airstream to escape without causing any audible friction.

a) The /l/ sound

Turkish	English
lahana [lahana] 'cabbage'	light [lait]

English has both alveolar and velar /l/. Alveolar [l] occurs before front vowels as in leap [lip], or before /j/ as in value [vælju]. Velar [÷] occurs before consonants and pause, e.g. still [stı÷].

On the other hand, Kornfilt (1997) claims that Turkish lateral is velarized before a tautosyllabic back vowel as in ***hala*** [hala] "aunt" whereas it is palatalized before a tautosyllabic front vowel as in ***bile*** [bile] "even". However, Kornfilt further suggests that palatalized lateral can also occur with tautosyllabic back vowels in borrowed words as in ***lale*** [lale] "tulip". In some cases the palatalized lateral can follow a back vowel in borrowed words as in ***sual*** [sual^{j}] "question" and ***orjinal*** [orjinal^{j}] "original".

b) The /j/ sound

Turkish	English
yaka [jaka] 'collar'	yield [yild]

c) The [w] sound

Turkish	English
kavun [kawun]'melon'	wait [we^{i}t]

Turkish [w] occurs as an allophone of [v] only before rounded vowels.

d) The [r] sound

Turkish	English
rahat [rahat]	rock [rak]

2.1.1.5. Nasals

Collins and Mees (2003) state that nasals create complete oral closure in the oral cavity, but the soft palate is lowered allowing the air stream to escape through the nose. Nasals [m], [n], [{]

Turkish	English
masa [masa]'table'	milk [mˆ÷k]

ne [ne] ‘what’ nick [nˆk]

denge [de{ge] ‘balance’ ring [rˆ{]

The velar nasal [{] occurs allophonically both in Turkish and English with a slight difference. In Turkish, it occurs when the velars /k g/ occur as the onset of the following syllable, whereas in English it occurs as the coda of the final syllable of a word in as in the words *sing* and *walking*.

2.1.2. Vowels of Turkish and English

English has a 12 vowel system with three degrees of tongue height such as high, mid and low. Table 2.3 illustrates the English vowels:

Table 2.3 English vowels (Adapted from Ladefoged, 1975)

	Front	Central	Back
High	i		u
	ˆ		¤
Mid	e	\	o
	°		Š
Low		ʌ	Å
	æ		å
			a

Ladefoged (1975, p. 27) gives the following examples of English vowels:

/i/ in heat, bead, heat, keyed

/ ˆ/ in hit, bid, hid, kid

/e/ in hayed, bate, hate, Cade

/°/ in head, bed

/ æ/ in had, bad, hat, cad

/\/ in the second syllables of table, baker, faster

/å/and /Å/ in hod, bod, hot

/u/ in who, booed, hoot

/¤/ in hood, could

/o Š / in hoed, bode, code

/ Š/ in hawed, haw, cawed

/ʌ/ in bud, hud, cut

In addition to the vowels discussed above, English also has diphthongs. Collins and Mees (2003) include the following series of diphthongs in their discussion of English phonology:

[eˆ] in face

[\¤] in goat

[aˆ] in price

[Šˆ] in choice

[a¤] in mouth

[ˆ\] in near

[°\] in square

Turkish, on the other hand, has 8 vowels with two positions of tongue height; high and low as it is shown in Table 2.4:

Table2.4. Turkish vowels (Adapted from Demircan, 1996)

	Front		Back	
	Rounded	Unrounded	Rounded	Unrounded
High	y	i	u	†
Low	œ	°	o	ʌ

Examples of Turkish vowels can be given as follows:

/ʌ/ as in [ʌnʌ] “mother”

/°/ as in [°km°k] “bread”

/i/ as in [iplik] “thread”

/†ɬ as in [†ß†k] “light”

/u/ as in [uzun] “long”

/y/ as in [yzym] grape

/o/ as in [ot] “grass”

/œ/ as in [œp] “kiss”

One area of research regarding Turkish vowels relates to the acoustic quality of vowels. Kilic (2003), tested how native speakers of Turkish perceive the vowels of IPA. The results yielded that the participants in the study perceived IPA vowels /a å ʌ á æ ɜ/ as Turkish /α/; /e ° æ/ as Turkish /e/; /¥ † ´/ as Turkish /ˆɬ, /i e ˆ/ as Turkish /i/; /Š o Å/ as /o/; /œ/ as Turkish /ö/; /u ¤/ as Turkish /u/; and finally /y Ø Á / as /ü/. This can relate

to our study because the way EFL learners perceive the English vowels may also be reflected in the production of those vowels.

Morphological occurrence of vowels in Turkish words has been an area of interest. Clements and Sezer (1982) found that within single morphemes, vowels /i, e, α, o, u/ freely occur, while the vowels /Á,œ, ˆ‹ may occur only harmonically. In a more recent study, Zimmer and Kuntay (2003) tested the vowel perception of Turkish native speakers by asking them to fill in the missing vowels in accordance with their assessment of Turkish phonological structure. The authors found that there were two groups of vowels: /i, e, Á, œ/ and /´, α, u, o/. The members of each group did not tend to co-occur with members of the other. On the other hand, vowel duration in relation to type of syllable has also interested researchers. Kopkalli-Yavuz (2003) found that closed syllable vowel shortening is not found; that is, vowel duration is not different in open and closed syllables.

Unlike the English language, modern Turkish does not maintain a long versus short vowel distinction; however, Ligeti (in Kabak, 2004) has made the observation that the presence of minimal pairs in Yakut and Turkmen suggest that Proto-Turkic stems did have such opposition: for example in Turkmen and Yakut /at/ “horse” vs /a:t/ “name”. According to Kabak (2004), Proto-Turkic is assumed to have at least sixteen vowels in which every short vowel had a long counterpart such as /a/ and /a:/. According to Kabak, long-short vowel distinction is lost in modern Turkish. Kabak further claims that fricatives /} ð/ are also lost as a result of fusion with /t d/ in Inner Anatolian Greek although Turkish was the dominant language. The author also suggests that there might be a relationship between the fusion of /} ð/ with /t d/ and Turkish learners’ substitution of /t d/ for the English inter-dentals /} ð/.

2.2. Syllable Structure of Turkish and English

This section is dedicated to a discussion of the phonotactics of both Turkish and English. Our goal is to point out the differences that may cause problems for EFL learners. In sections 2.2.1 through 2.2.6, we provide a discussion of Turkish and English syllable structures and phonotactics.

2.2.1. Phonotactics

Kornfilt (1997) claims that Turkish Phonotactic Structure requires the following constraints:

1. Word-final consonants are admitted but there are restrictions. Word-final obstruents are devoiced. Voicing occurs only when the word is followed by a vowel suffix:
   kitap "book" /kitʌp/
   kitab-ı "book-accusative" /kitʌb † /
2. Native words do not, in general, begin with the segments [d¹], [f], [z], [l], [m], [n], [r], or [z]. On the other hand, borrowed words provide exceptions as in the words *can* /d¹ʌn/ "life", *filozof* /filozof/ "philosopher", *lamba* /lʌmbʌ/ "lamp", maksat /mʌksʌt/ "purpose".
3. Word-initial consonant clusters are not permitted in Turkish. They are broken up by epenthesis: *tren* "train" /tiren/.
4. Word-medial consonant clusters are not allowed within the same syllable due to the Onset First Principle (Clements and Keyser, 1983). Thus, resyllabification takes place as in *fark+a* "difference+dative" /fʌr.kʌ/.
5. Rounded vowels [o] and [œ] are only found in borrowed stems in word-final position.
6. Vowel clusters are not allowed in native words; however, there are borrowed words that contain such cluster: *dua* "prayer", *saat* "hour", *boa* "boa" (Kornfilt, 1997, p. 495).

In a discussion of English phonotactics, Collins and Mees (2003, p.73) state the following constraints:

1) /{ / never occurs in onsets.
2) /h j w/ never occur in codas.
3) /r/ never occurs in codas in non-rhotic varieties of English
4) /v ð z ¹/ never occur in onset clusters.
5) In three element onset clusters the initial consonant is invariably /s/.
6) /t d }/ never combine with /l/ in onset clusters.
7) Nasals never combine with stops in onsets.
8) Nasals combining with stops in coda clusters are invariably homorganic, e.g. /mp {k/ but not /mk np/.

2.2.2. Word-final Consonants

According to Demircan (1996) and Kornfilt (1997), Turkish allows word-final consonants but there is a restriction on voicing; that is, only voiceless consonants can

occur word-finally. Voicing takes place only by assimilation to the voice quality of the vowel in the suffix that follows:

dolap [dolʌp] "closet" *dolab-ı* [dolʌb †] "closet-accusative"

In analyzing, Turkish word-final voiced stops, Kopkalli (1993) found that native speakers of Turkish were unable to discriminate the underlying voicing contrast. Thus, Kopkalli suggested that final stop devoicing in Turkish is neutralizing due to the lack of acoustic or perceptual distinction between devoiced and voiceless stops. On the other hand, Demircan (1996) also suggests that there are exceptional cases in which word-final voiceless-voiced consonant distinction can constitute minimal pairs as in at [ʌt] "horse"-ad [ʌd] "name", haç [hʌtß] "crucifix"-hac [hʌd¹] "haj". It should be noted that the words ending in voiced consonants are borrowed words.

In discussing English word-final consonants, Collins and Mees (2003) state that /h j w/ newer occur in coda position; therefore, they may not occur word-finally. In addition, certain dialects do not have the /r/ sound as in the British pronunciation of the word far /fa:/. Word-final consonant clusters are possible in English such as CC (lawns), CCC (strands), and CCCC (glimpsed).

2.2.3. Word-initial Consonants

Kornfilt (1997, p.492) claims that "words of the native vocabulary do not, in general, begin with the following segments: /d¹/, /f/, /¹/, /l/, /m/, /n/, /r/, /z/. Exceptions are onomatopoeic words or words taken from children's language, e.g. *cici* /d¹i d¹i/ "cute", as well as the interrogative clitic *mI* and the particle *ne* /n°/ "what".

English language, on the other hand, does not allow /{ / in the onset position; therefore, it cannot occur word-initially. Collins and Mees (2003) give examples of word-initial consonant clusters CC as in the words glide, train, star and CCC as in the words *spring, straw,* and *splash*.

2.2.4. Consonant Clusters

a) Word-initial consonant clusters are not allowed in Turkish. When a borrowed word is introduced into the language an epenthetic vowel is inserted to break up the cluster as in

krema /k † remʌ/ "cream"

tren /tiren/ "train"

b) Word final consonant clusters are permitted in Turkish. According to Kornfilt (1997), the following types of clusters are permitted in word final position:

1. Sonorant + obstruent:

kürk /kyrk/ “fur”

kazanç /kʌzʌntß/ “gain“

2. Voiceless fricative + oral plosive:

çift /tßift/ “couple”

aşk /ʌßk/ “love”

3. k+s

raks /rʌks/ “dance”

boks /boks/ “boxing”

Turkish allows word-final consonant clusters; however, there may be exceptions in some borrowed words where the original form of the borrowed word undergoes resyllabification as in the word *film* “movie” becoming *filim* by means of resyllabification.

c) Word medial consonant clusters

Kornfilt (1997) states that word medial consonant clusters are permitted as long as the cluster is not tautosyllabic. In other words, Turkish does not allow consonant clusters word medially within the same syllable. Consonants occurring in different syllables are not considered clusters. For example, the original form of the borrowed word *hak* “right” is /hʌkk/. It contains consonant gemination which is not part of Turkish. When it receives the dative suffix, it becomes *hakka* and resyllabified as /hʌk.kʌ/ “right+dative”

In this example, the second /k/ sound is the onset of the syllable that follows. Thus, the /k/ sounds do not form a cluster.

2.2.5. Vowels in Syllables.

According to Kornfilt (1997), all vowels are found in word final position. However, [o] and [ö] are restricted to borrowed words:

tiyatro [tijɑtro] “theater”

banliyö [bɑnliyœ] “suburb”

b) Word initial vowels are also permitted in Turkish:

araba [ɑrɑbɑ] “car”

iplik [iplik] “thread

ekşi [ekßi] “sour”

2.2.6. Syllable Structure

Kornfilt (1997) states that the canonical syllable type in Turkish is CV; however, the forms CVC, V, and VC are also permitted:

kapı “door” CV CV

ihtimal “possibility” VC CV CVC

acı “pain” V CV

When the canonical order of syllables are in the form of CVC CV; in other words, if a syllable ending with a coda is followed by another one with an onset, the situation is analyzed differently. The assignment of medial units or clusters to syllables is done according to a principle called Onset First Principle (Clements and Keyzer, 1983). The Principle asserts:

a. Syllable initial consonants are maximized to the extent consistent with the syllable structure conditions of the language in question.
b. Subsequently, syllable final consonants are maximized to the extent consistent with the syllable structure conditions of the language in question (Clements and Keyser, 1983, p. 37).

The Onset first Principle can be seen in the following examples where a word final consonant is broken up by means of re-syllabification:

alt /ʌlt/ “bottom”

alt+a /ʌl.tʌ/ “bottom+dative”

In an analysis of borrowed words, Demircan (1996) suggests that borrowed words undergo resyllabification by means of epenthesis:

/plʌn/ >/pi.lʌn/ “plan”

/sʌnt.rʌl/>/sʌn.t † .rʌl/ “central”

/°kspr°s/>/°kis.pi.r°s/ “express”

Demircan further suggests that prothesis (insertion of an initial segment) is also another possibility of resyllabifying a borrowed word as in the English word station pronounced as /istʌsjon/, or steam pronounced as /istim/.

In addition to the examples above, Demircan also includes a discussion of certain word-final consonant clusters which are violations to Turkish phonotactic structure. In such cases, an epenthetic vowel determined by Turkish vowel harmony is inserted to alter the syllable structure:

/ʌkl/ “mind”> /a.k † l/

/ß°hr/ “city”>/ß°.hir/

On the other hand, the epenthetic vowel is not needed when the root is suffixed in the accusative or dative case:

/ʌkl/>/ʌk.l†/

/ß°hr/>/ß°h.ri/

Another issue discussed by Demircan (1996) is what the author refers to as transition sounds. These are the sounds that are inserted between two homophonous vowels when the roots are suffixed. The examples are given as follows:

/yʌp†/ “structure” > /yʌp†-y-†/ “structure+accusative”> / yʌp†-s-†/ ‘ structure+genitive’>

/ yʌp†-s-†-n-†/ ‘structure+genitive+accusative’.

On the other hand, possible consonant and vowel selection for English syllables is shown below:

awe /Š:/ V

saw /sŠ:/ CV

ought /Š:t/ VC

sawn /sŠ:n/ CVC

lawns /lŠ:nz/ CVCC

draw /drŠ:/ CCV

drawn /drŠ:n/ CCVC

straw /strŠ:/ CCCV

strands /strændz/ CCCVCCC

glimpsed /glˆmpst/ CCVCCCC (Collins and Mees, 2003, p. 72)

2.3. Interlanguage Studies

In the argument of the structure of second languages and interlanguages (ILs), Eckman (1988) suggests that the following assumptions are true:

a. The forms that are produced by L2 learners are systematic (Corder, 1967)
b. L2 learners internalize a series of rules (ILs), which may be separate from both the native language (NL) and the target language(TL); (Selinker, 1972)
c. Interlanguages are languages in their own right; therefore, they must be evaluated as separate entities; (Adjemian, 1976; Bley-Vroman, 1983)
d. Interlanguages are simpler than the target language in question; (Corder, 1978)

Eckman (1988) who studied Cantonese, Japanese and Korean speakers learning English as a second language, tried to find out the relationship between the IL phonological rules and the NL and TL phonological rules. In addition, the author also tried to observe whether there are universal constraints or principles governing IL phonological rules. In his analysis, Eckman examined the segment deletion in final consonant clusters. First of all, he found that although consonant reduction is a phonological rule applied by native speakers of English, the cluster reduction applied by the subjects of his study were somewhat of different nature. Therefore, Eckman concluded that consonant reduction functions as the simplification of certain interlanguage rules.

Secondly, Eckman claims that his findings conform to the following universal generalizations based on Greenberg's (1976) ideas:

a. In languages with final consonant clusters, the presence of a final cluster consisting of stop-stop implies the presence of final clusters consisting of fricative-stop.
b. In a language with final consonant clusters, the presence of a final cluster consisting of a fricative-fricative implies the presence of a cluster consisting of either a final fricative-stop or a final stop-fricative.

In evaluating the studies conducted on interlanguage, Eckman (2004) states that the construct of learner language has been a key concept. According to this view:

> SLA becomes the construction of a mental grammar—the learner language—based on input from the L2.The value of this construct is that it has allowed researchers to propose answers to questions that could not even be asked previously. With the concept *interlanguage* the term that has endured, it is not only possible but also reasonable to raise the question of whether interlanguage grammars are similar in important ways to L1 grammars (Eckman, 2004, p. 524)

The answer to the question is given by Eckman's earlier research (1981a) and (1981b), where the author examines speakers from four different native language backgrounds: Mandarin, Japanese, Spanish, and Cantonese. The study focused on the English voiced obstruents in coda position. These results had the implication for the theory of interlanguage; that is, final obstruent devoicing is not part of the English phonology, nor is it part of L1. Other research has also shown that L2 learners were applying strategies that are not part of L1 or L2.

Among the additional research are Altenberg and Vago's (1983) study of Hungarian native speakers learning English as L2 and Eckman's (1984) study of Farsi native speakers learning English as L2. In both cases the L2 learners in question regularly devoiced word-final obstruents, something that is not motivated by the English facts, nor is such a pattern defensible either for Hungarian or Farsi because both languages have a word-final voice contrast in obstruents.

2.4. The Contrastive Analysis Hypothesis

According to many researchers, it is difficult for adults to learn L2 with a native-like quality in accuracy. The Critical Period Hypothesis claims that L2 learners may not learn L2 at the competence level of native speakers after a certain critical period. However, according to Major and Kim (1996), it is not known when the critical period ends. Major and Kim further claim that it is also questionable whether there is a critical period at all. Some, like Scovel (1988), have claimed the Critical Period ends at puberty and applies only to phonology; others claim it applies to other additional areas of language as well; for instance, Long (1990) claimed that the Critical Period for phonology may end as early as 6 or 7 but for other areas of competence may extend to, even past, puberty.

Munro, Flege, and MacKay (1996) examined English vowel production by Italian immigrants in Canada. They found significant effects of the age of arrival, and in fact the latest-arriving group failed to produce any of the 11 English vowels in a consistent native-like manner, although these immigrants had been long-term residents of Canada. In sum, the phonologist has yet to demonstrate that anyone who has learned an L2 after puberty can pass for native 100% of the time in all areas for which native speakers pass for native 100% of the time.

Despite all the claims about the Critical Period, there is the long-time known fact that L2 learners make phonological errors in their production of L2 sounds. Therefore, scholars have felt the need to investigate whether those errors are systematic or not. For the sake of analyzing errors, differences between L1 and L2 has been one area of interest. Contrastive Analysis Hypothesis (CAH) derives from the idea that areas of difficulty in second language learning should be explained in terms of the differences between native language and target language. The hypothesis is explained as follows:

> …in the comparison between native and foreign language lies the key to ease or difficulty in foreign language learning.

> We assume that the student who comes in contact with a foreign language will find some features of it quite easy and others extremely difficult. Those elements that are similar to his native language will be easy for him and those elements that are different will be difficult. (Lado, 1957, pp 1-2)

In a criticism of CAH, Eckman (2004) suggests that Lado has addressed the question of maximum phonological difficulty, and allophonic differences between the L1 and L2 were important in his predictions. According to Lado, the greatest difficulty took place when the learner assigned two or more allophones in the L1 to different phonemes in the L2. Lado (1957) gave the example of the sounds [d] and [ð], which are allophones of [d] in Spanish, but which contrast in English. Lado claimed that assigning the allophones [d] and [ð] to separate phonemes in English by a Spanish native speaker constituted maximum learning difficulty. From Lado's description, it is inferred that one should be able to predict the errors that a language learner will make by means of a comparison between the native and the target language. Eckman (1977) suggests that since many of the predictions made by the strong form of the CAH are wrong, a weaker version has been brought into attention. Such version of CAH can be characterized by the following statement:

> In contrast to demands made by the strong version, the weak version requires of the linguist only that he use the best linguistic knowledge available to him in order to account for observed difficulties in second language learning. It does not require what the strong version requires, the prediction of those difficulties and conversely, of those learning points which do not create difficulties at all. (Wardhaugh, 1974, p.181)

The weak version of the CAH suggests that the analyst use his/her linguistic ability and resources in order to account for the errors and difficulties in language learning. However, unlike the strong version, the weak version does not make any predictions about the errors to be made. According to Eckman, the weak version is merely a method of analyzing student errors in second language learning.

Moulton (1962), in his study of German and English sounds, points out the distributional differences of phonemes in both languages. German has only voiceless obstruents in word-final position whereas English has both voiceless and voiced obstruents in the same position. The CAH would predict this difference as an area of difficulty for German speakers learning English and English speakers learning German.

However, Moulton states that there is a directionality of difficulty. His findings have shown that the native speaker of German learning English had difficulty in pronouncing word-final voiced obstruents whereas native speakers of English learning German had no difficulty in learning voiceless and voiced obstruent distinction unless they were misled by spelling.

According to Eckman (2004) patterns observed in L1 acquisition play a more significant role in the explanation of L2 sound patterns than do L1/L2 differences. For example, studies by Kohler (1971) and Nemser (1971) showed that many L2 substitutions were not due to L1 transfer. Eckman (2004) briefly summarizes the situation as follows:

> Research within the CAH paradigm ...showed that, although L1 influence had a role to play in explaining L2 pronunciation errors, the influence of the L1 could explain only a portion of the errors. It became clear that other principles were necessary to explain difficulty that could not be directly related to L1/L2 differences (p. 517)

In criticizing the CAH, Major and Kim (1996) state that CAH alone does not offer any explanation of order or rate of acquisition because there is no theoretical basis to predict which areas should be more difficult than the others. In Lado's (1957) terms, any area of difference between L1 and L2 should cause difficulty.

However, Oller and Ziahosseiny propose a moderate version in an attempt to explain hierarchy of difficulty: "wherever patterns are minimally distinct in form or meaning in one or more systems, confusion may result" (1970, p. 186). They found that ESL learners whose L1 used a non-Roman script, such as Japanese, found English spelling easier than did learners whose L1 used a Roman script, such as French.

In the discussion of the similarities and differences between L1 and L2, Wode (1983) incorporated the notion of similarity/dissimilarity to claim that L1 transfer can take place only when crucial similarity measures occur between the L2 target items and the corresponding L1 items. That is, "only the L2 elements that meet specifiable similarity requirements are substituted by L1 elements" (Wode, 1983, p.185). Other L2 elements, which do not meet the similarity requirements, are acquired by means of developmental sequences similar to the ones that characterize L1 acquisition. A substitution of the latter type in German speakers of English is Wode's example of [w] substitution for English /r/, rather than the L1 substitution German /r/.

In another study of L1 and L2 similarities and differences, Flege (1987) argues

that similar sounds are difficult to acquire because a speaker classifies or perceives them to be equivalent to those in his or her L1, whereas different sounds are easier because the speaker is consciously aware of the differences. Flege conducted a number of studies to support his hypothesis. For example, he found that experienced L2 learners of French produced a dissimilar sound, French /ü/, correctly, whereas their French /u/, which has a close counterpart in English /u/, remained English-accented. In their study of German speakers' production of dissimilar and similar sounds, Bohn and Flege (1992) found similar results. They found that long-term L2 experience did not help German speakers produce the similar English sounds /i ɛ/ correctly because they did not establish phonetic categories for similar sounds. On the other hand, these experienced German speakers produced the dissimilar sound /æ/ authentically because apparently they had concentrated on and had learned important phonetic characteristics of the dissimilar vowel category.

In a critical review of the CAH, Eckman (1977) claims that the hypothesis does not take the notion of relative degree of difficulty into consideration. He suggests that the CAH merely compares the native and target languages in order to predict the areas of difficulty in second language learning. According to Eckman, on the other hand, universal factors should be the basis of determining the notion of difficulty; that is, the factors such as typological markedness should be taken into account in analyzing the areas of difficulty. Eckman (1977) defines markedness as: "a phenomenon A in some language is more marked than B if the presence of A in a language implies the presence of B; but the presence of B does not imply the presence of A" (p. 320).

In the search for a more effective theory to account for L2 learners' phonological errors Eckman proposes the Markedness Differential Hypothesis. The following section is devoted to the notion of markedness, and the studies and theories that follow up on the Markedness Differential Hypothesis.

2.5. The Markedness Differential Hypothesis

Markedness was pioneered by the Prague Scholars Trubetzkoy (1939) and Jakobson (1941). The theory of markedness is summarized as follows by Jacobson (in Castino, 1991):

a) The acquisition of fricatives presupposes the acquisition of stops in child language; and in the linguistics systems of the world the former cannot exist unless the latter exist as well.

b) The acquisition of back consonants presupposes the development of the child acquisition of front consonants…the acquisition of back oral and nasal stops presupposes the acquisition of front oral and nasal consonants.

c) A so called half stop consonant (or affricate)…is acquired by the child only after the fricative of the same series.

d) Oppositions which occur in the languages of the world comparatively rarely are among the latest phonological acquisitions of the child (pp. 8-9).

Similarly, in drawing a distinction between marked and unmarked sounds, Eckman (2004) proposes:

> The idea behind markedness is that binary oppositions between certain linguistic representations, e.g., voiced and voiceless obstruents or open and closed syllables are not simply polar opposites but that one member of the opposition is assumed to be privileged in that it has wider distribution, both across languages and within a language. To assign the term "unmarked" to this privileged member is a way of giving it special status and indicating that it is considered to be, in some definable way, simpler, more basic, and more natural than the less widely occur-ring member of the opposition, which is designated as being marked (p. 529)

As an example of markedness, Eckman (1977) talks about the obstruent phonemes. He suggests that there are languages with only voiceless obstruent phonemes such as Korean, or languages with both voiceless and voiced obstruent phonemes such as English. However, there are no languages with only voiced obstruent phonemes. In that case, the presence of voiced obstruents implies the presence of voiceless obstruents and therefore, voiced obstruents are more marked than voiceless obstruents.

In the light of the notion of markedness, Eckman (1977) proposes the markedness differential hypothesis (the MDH) in order to provide a better account of the difficulties encountered by second/foreign language learners:

> The areas of difficulty that a language learner will have can be predicted on the basis of a systematic comparison of the grammars of the native language, the target language and the markedness relations stated in universal grammar, such that
>
> a) Those areas of the target language which differ from the native language and are more marked than the native language will be difficult.

b) The relative degree of difficulty of the areas of the target language which are more marked than the native language will correspond to the relative degree of markedness.

c) Those areas of the target language which are different from the native language, but are not more marked than the native language will not be difficult. (p.321)

Eckman suggests that the MDH is a step in the direction solving the dilemma of whether second language learning errors are due to interlingual or intralingual interference. He further suggests that there is also evidence in first language acquisition with regard to the relationship between the degree of markedness and difficulty in learning. Stampe in Eckman (1977) points out that the voice contrasts in word-final obstruents is acquired later by English speaking children than initial and medial contrasts.

According to Eckman, the MDH does not suggest abandoning the CAH altogether. It rather proposes the incorporation of the notion of markedness into a theory of second language acquisition. The errors of the second language learner make may be due to the learner's first language, and specifically these errors will be dependent on the native language to the extent that the areas of difference between the native and target language are marked.

In an investigation of consonant clusters, Benson (1986) comes up with the following hierarchy of markedness as shown on Table 2.5.:

Table 2.5. Hierarchy of Markedness (adapted from Benson, 1986, pp. 275-276)

	Least marked	More marked	Most marked
Syl init clus	Obs+liquid		Obs+nasal
Syl final clus	Nasal+unvoi	Nasal+homo obs	Nasal+voi Het obs
Syl final clus Obs only	Unvoi fric+stop; unvoi stop+fric	Unvoi stop+stop; unvoi fric+fric; voi fric+stop; voi stop+fric	Voi stop+stop Voi stop+stop Voi fric+fric

syl= syllable, init=initial, clus= cluster, obs=obstruent, voi=voiced, fric=fricative, hom=homorganic, het=heterorganic

In Benson's (1986) study, Vietnamese native speakers were asked to pronounce English words that correspond to clusters in table 3. Benson's hypothesis was that the

percentage of incorrect pronunciation would correspond to the order of increased markedness. The results were in consistency with the degree of markedness in that the speakers had more difficulty with more marked clusters.

Carlisle (1988) modified the MDH by his Intralingual Markedness Hypothesis (IMH), which incorporated markedness relationships within the target language (TL), not just between the L1 and TL as Eckman had done. Both the MDH and IMH can be supported by studies of voicing contrasts in obstruents (summarized by Yavas, 1994). Korean has only voiceless obstruents; because English voiced obstruents in final position are more marked than in initial and medial position, Koreans should acquire English voicing contrasts in final position only after the other two positions have been acquired. This prediction was borne out in Major and Faudree's (1996) study of Korean speakers of English, who showed nearly 100% accuracy for voiced obstruents in initial and medial position but only about 50% accuracy in final position.

In a detailed study of the distribution of word-final obstruents, Dinnsen and Eckman (1975) study the distribution of voiced and voiceless obstruents. The authors describe English as a language that maintains a superficial voice contrast in initial, medial and final positions. On the other hand, German is classified as maintaining a superficial voice contrast in initial and medial positions, but not in final position. Thus, the MDH predicts that the German speaker should have great difficulty with English word-final contrasts than should an English speaker with a lack of such contrast in German. In terms voice contrast, Eckman (1977, p.322) proposes the following voice contrast hierarchy from the most marked to the least marked: word-finally> word-medially>word-initially. The implication of such hierarchy is interpreted as follows:

> Maintenance of a superficial voice contrast at any position on this hierarchy necessarily implies the maintenance of that contrast at all higher positions on the hierarchy but does not imply such a contrast at lower positions. Thus… any language which maintains a voice contrast in obstruents word-medially, necessarily maintains this contrast word-initially, but…not…word-finally (Eckman, 1977, p.322).

In a study of L2 learners' phonological errors, Wang (1995) agrees with Eckman's MDH and claims that the less marked voiceless obstruents should be easier to learn than the more marked voiced obstruents. In his study, Wang examined the pronunciation of English codas by 10 Mandarin speakers aged 23-30. Each participant had 6-7 years of EFL instruction in their home country and had been in an English

speaking country for less than a year. Wang found that subjects had difficulty in producing the codas that do not occur in Mandarin. The incorrect forms included the epenthesis of a vowel after the coda stop (i.e. target [vˆg] pronounced as [vˆg\]), the deletion of the coda stop (i.e. target [vˆg] pronounced as [vˆ]), and devoicing of a final stop (i.e. [vˆg] pronounced as [vˆk]).

In a later study of L2 phonological acquisition, Broselow, Chen & Wang (1998) define the difficulty of Mandarin speakers with English word-final voiced obstruents as a case of the emergence of the unmarked, and in order to formalize this, they propose the following constraints:

a. NO OBS CODA: Syllable codas may not contain obstruents.
b. MAX (C): Maximize the consonants in the input.
c. DEP (V): The vowels in the output should be dependent on the input (p.267).

Broselow, Chen & Wang state that the constraint (a) above is a markedness constraint, which penalizes more marked forms. However, the authors observed that Mandarin speakers violated this constraint and applied to final devoicing as a result of markedness effect. On the other hand, they also observed that the participants were also employing epenthesis and deletion to make English codas fit the syllable structures of Mandarin. Broselow, Chen & Wang conclude:

> The choice of devoicing as a mechanism to fix undesirable English codas by Mandarin speakers is independent of the native language and the target language. We argue that devoicing of English coda stops by Mandarin speakers provides a clear case of the emergence of the marked (p. 275)

Data on first language acquisition reveals that L1 learners employ similar strategies to L2 learners during the process of language acquisition. According to Weinberger (1994), consonant deletion is one strategy used by children acquiring their L1. Weinberger further suggests that epenthesis is another possibility; however, children do not employ epenthesis as a simplification strategy as they do consonant deletion:

Consonant deletion	
Target item	produced item
“seed”	[si]
Vowel epenthesis	

Target item	produced form
“seed”	[sid\]

Some analysts tried to account for coda deletion by means of linguistic laws. Venneman (1988) proposes the Coda Law where he claims that the syllable head or onset is the most preferred part of a syllable and that the smaller number of speech sounds are ore preferable in the coda. Carlisle (1997), making specific reference to Venneman’s Coda Law, states that CV s the most preferred type in languages and therefore can be called the unmarked syllable type, and that any increase in length of syllable corresponds to a relative degree of increase in markedness.

Markedness studies also relate to insertion of an epenthetic vowel within consonant clusters. Epenthesis is not merely observed word-finally in second language learning. There are cases in which onsets are modified via epenthesis. Carlisle (1998), in a longitudinal study examines the acquisition of onsets and concludes that the English trilateral onsets such as /spr/ and /str/ are more marked than bilateral ones such as /sp/, and therefore are more difficult to produce for Spanish native speakers.

In a similar study, Abrahamsson (1999) in his observation of Spanish native speakers that learn Swedish has observed that the frequency of epenthesis is higher for three-member onsets than for two-member onsets. In realization of final consonant clusters, Eckman (1987) found that Cantonese, Korean and Japanese learners of English tended to delete one member of bi- and tri-literal clusters according to a cluster reduction rule by which trilateral clusters are reduced to bilateral clusters and bilateral clusters are reduced to a single-consonant coda. According to Abrahamsson (1999), such reduction rule exists neither in Japanese, Korean and Cantonese nor in English. Thus, we can infer that the cluster reduction is part of the learners’ interlanguage.

Research in interlanguage phonology demonstrates that L2 learners are more likely to modify the more marked syllable structures than they do less marked syllable structures. Carlisle claims that there is a preference for the open syllable: “A few studies in interlanguage phonology have revealed that longer margins are reduced to shorter margins. In other words, a less marked structure is produced instead of a more marked one” (1997, p. 330). The evidence of the preference for the open syllable can be found in earlier research. In one study, Tarone (1987) examined the English narratives of Korean, Cantonese and Portuguese native speakers. In her findings, she could not attribute 30 % of her findings to L1 transfer and therefore felt to conclude that those were the examples of a universal preference for the CV syllable. In a similar study,

Hodne (1985) collected data of 666 syllables from Polish native speakers and found that % 17 of the data were non transferable modifications resulting in open syllables. Finally, three studies of syllable reduction in the production of English syllables by Vietnamese native speakers (Sato, Benson, and Riney in Carlisle, 1997) provide evidence for preferring the open syllable. In the first study, Sato found that 17% of the modifications of two-member codas resulted in CV syllables. In the second study, Benson found that 12% of the modifications were not due to transfer. Finally, Riney restricting his selection to structures that also occur in the Vietnamese language demonstrated that even when word-final closed syllables occur in the native language, L2 syllable structures can be reduced to open syllables. These findings suggest that L1 transfer is one way of accounting for the errors of L2 learners. However, when learners apply strategies other than merely L1 transfer, we should seriously consider the effect of markedness on interlanguage phonology.

To provide a better explanation of markedness on interlanguage phonology Structural Conformity Hypothesis is proposed: “the universal generalizations that hold for primary languages also hold for interlanguages” (Eckman, 1991, p.24). To support this hypothesis, Eckman examines the reduction of complex codas and onsets by 11 native speakers of 3 different languages: Japanese, Korean and Cantonese. None of these languages allow complex codas and onsets. In his analysis, Eckman uses a criterion for measurement which is 80% in order to determine the presence or absence of a particular structure. He found that in 3 cases a 3-member cluster was present at the criterion level, but two-member clusters were absent. This provided a strong case for the Interlanguage Structural Conformity Hypothesis.

According to Yavas (1994), Structural conformity hypothesis is much stronger than the markedness differential hypothesis in that the latter makes its predictions on the basis of implicational universals whereas the former also considers the differences between the native language and the target language.

Final stop devoicing has been a concern of researchers working on interlanguage phonology. According to Yavas (1994), languages like English allow voicing distinction word-finally. Languages like Kikuyu, Twi and Swahili do not allow final consonants. Some languages such as Japanese and Mandarin allow only sonorants in this position. Finally, languages such as German, Turkish, Polish, Bulgarian and Russian allow only voiceless stops in word-final position. With reference to the MDH,

one might expect that speakers of languages that do not allow voiced stops word-finally might experience difficulty in producing these sounds correctly.

Scholars have been interested in the phenomenon of final stop devoicing in L2 learning. Eckman (1981) has found that a final stop devoicing rules is needed for the interlanguages of Spanish speakers. Similarly, Flege and Davidian's (1984) study has revealed that Polish native speakers devoiced most of the final voiced stops. In a different study, Edge (1991) has taken an entirely different approach and examined final stop devoicing taking into consideration the environment; that is she took into account the effect of the following sound. Edge's findings have shown that most of the devoicing, occurring from greater to smaller, has been identified as before a pause, before a voiceless consonant, before a voiced consonant, and before a vowel.

In a similar study Anderson (1987) examined the errors of native Arabic/Egyptian and Chinese speakers of English. Chinese included fewer syllable-final consonants whereas Egyptian Arabic included fewer syllable initial consonants. Anderson's results have demonstrated that Chinese subjects made more final consonant errors than Egyptian Arabic subjects. However, the errors of both groups increased significantly as the complexity of the syllable structure increased. Thus, Anderson's results were in conformity with Eckman's (1977) MDH. They showed that the frequency of errors was affected by the relative difficulty of L1/L2 contrast.

Not all the studies in final consonant errors are in conformity with the MDH. In a slightly different study, Stockman and Pluut (1999) examined native Mandarin speakers of English. Their data include only the cases in which native and target languages had identical or similar segments with different syllable distributions. The authors conclude:

> L2 syllable initial and final consonant errors may not be determined simply by L1/L2 positional contrasts. Expected syllable biases can be nullified by the phonetic characteristics of the particular segments that are produced or identified. Nasal and oral stops appear to yield different performances. To the extent that universal constraints motivate their differences, the expected error predictions based on L1 and L2 syllable position contrasts may not be observed for any group of L2 speakers (Stockman and Pluut, 1999, p. 205)

According to Major and Kim (1996), "markedness and similarity/dissimilarity can work together to the benefit or detriment of the learner. An L2 sound that is both more

marked and similar to an L1 sound should be harder to acquire than an L2 sound that is less marked and dissimilar to an L1 sound" (p.158). Thus, the authors come up with the following hypothesis: "similar sounds are more difficult to acquire than dissimilar sounds; that is, L2 experience will not affect L1 speakers' acquisition of a similar L2 sound as much as their acquisition of the dissimilar sound" (Major and Kim, 1996, p. 159).

The authors call this hypothesis the Similarity Differential Rate Hypothesis (SDRH). In order to support this hypothesis, Major and Kim conducted an experiment with three groups of 10 Korean native speakers of English. They investigated the difference between a similar sound ([d¹]) and a dissimilar sound ([¹]). The authors found that the advanced learners had greater difficulty than beginners in producing the similar sound correctly. Major and Kim (1996) claim that the SDRH accounts for or follows logically from different rates and different stages, overgeneralization and interaction of phenomena, markedness principles, and evidence from other studies.

There are also instances where language learning difficulties result from allophonic splits. Eckman, Elreyes and Iverson (2001) have stated that "a special status has been accorded to positional differences in which the allophones of an NL phoneme represent separate phonemes in the TL" (p.3). In that case, the learner will have to evaluate the native language allophones ass separate target language phonemes. Eckman, Elreyes and Iverson mention examples from Spanish and Korean, where Spanish has /d/ and /ð/, and Korean has /s/ and /ß/ allophonically, whereas, they are separate phonemes in the English language. In those cases, Korean learners will have to acquire the contrasts between /s/ and /ß/, and Spanish learners will have to acquire the contrasts between /d/ and /ð/. In their experiment on Spanish and Korean learners of English, Eckman, Elreyes and Iverson predict three stages: stage 1 includes forms produced with no contrast, stage 2 includes forms with partial contrasts, and stage 3 includes forms with complete contrast. The study focused on phonemic contrasts in morphologically derived and nonderived contexts. Eckman et al hypothesize that the interlanguage grammars in which native language allophones contrast only in derived environments will never be learned. Their findings confirmed the hypothesis in that learners were either at Stage 2 having the contrast only in nonderived environments, or they lacked contrast both in derived and nonderived environments. There were no instances of contrast in derived environments. In order to understand the nature of L2 phonology, vowels as well as consonants should be taken into account. Therefore, in the

following section, we provide a summary of some studies conducted on L2 vowel perception and production.

2.6. Markedness in Vowels and the Studies on L2 Vowel Acquisition

When the notion of markedness is applied to vowels, one can refer to implicational universals to define marked vowels:

> Many languages have phonemic nasalized vowels; however, the implicational universal predicts that if a language has nasal vowels, then it will, in addition, have oral vowels. Therefore, according to the implicational universal criterion of markedness, nasal vowels are the marked forms (Castino, 1991, p. 5)

Another example is taken from Kaye (1989), where the author examines four high vowels of Turkish: [i ü ´ u]. Kaye suggests that " it is easy to find languages that have i and u but not ü and ´...what we never find, however, is a language that has ü without having i…or ´ without having u" (p. 63). It can be inferred from Kaye's statement that Turkish vowels ü and ´ are considered to be marked.

Although markedness is a notion that applies to vowels as well as consonants, studies on L2 vowel acquisition do not take the matter as an area of interest. Most studies on the production of vowels in L2 usually relate to the influence of L1 on L2. One such study by McAllister, Flege, and Piske (2000) focuses on Swedish as a second language learned by native speakers of English, Spanish and Estonian, where the authors concentrate on short and long vowel contrasts. The results of the study have shown that Estonian speakers were the most successful in learning the long-short vowel contrast in Swedish. The hypothesis that the mid-vowel long-short contrast based on duration would be more difficult for learners whose L1 does not have this feature seems to hold for Spanish and English native speakers.

On other hand, there are studies in which the results have shown that non-native speakers can perform as well as native speakers in their perception and production of vowel qualities. In one such study, Kalliorinne, Peltola and Aaltonen (2005) compared the Finnish learners of French with native speakers of French. In the experiment, the subjects were asked to rate the goodness of the stimuli. The results have shown that nonnative speakers are able to identify L2 phonemes. The learners were able to rate the goodness of the vowels in a similar way as native speakers of the target language.

Flege and McKay (2004) emphasize the importance of understanding how the vowels of a second language are perceived by learners. For instance, Rochet hypothesized that "native-nonnative differences in perception may limit the accuracy with which L2 phonetic segments can be produced" (in Flege and Mc Kay, 2004, p. 2). The studies on L2 vowel production focused on either early learners (childhood) or late learners (late adolescence or early adulthood). These studies have shown that the influence of L1 is apparent especially in the early stages of learning in late learners' production of L2 vowels (Major, 1987; Munro, 1993). However, it has also been observed that experienced late learners can produce certain L2 vowels accurately, "especially when the L2 vowels are located in a portion of vowel space that is not occupied by an L1 vowel" (Bohn and Flege; Ingram and Park in Flege and MacKay, 2004, p. 2). On the other hand, the studies focusing on early learner's L2 vowel production have found that early learners perform better than late learners, and they do not significantly differ from English native speakers (Flege, McKay, and Meador, 1999).

Research findings on early learner speech production raise the question whether early learners can perceive L2 vowels accurately. In seeking answer to this question, Flege (in Flege and MacKay, 2004) proposes Speech Learning Model (SLM). In discussing the SLM Flege and McKay state:

> Even adults retain the capacities used by infants and children to acquire their L1, including the ability, in time, to perceive the properties of L2 speech sounds accurately and to establish new phonetic categories. However, the SLM hypothesizes that the likelihood of category formation for L2 speech sounds depends on perceived cross-phonetic distance and the state of development of L1 phonetic categories. More specifically, it predicts that the likelihood of category formation for L2 speech sounds increases as a function of their perceived distance from the closest L1 speech sound (p. 6).

Flege and McKay claim that the SLM works much faster during the childhood and this enables children to build powerful L2 phonetic categories without the intervention of L1 categories. In support of this, Flege, McKay and Meador (1999) study yields results in favor of the SLM. The study examines the perception of English vowels by Italian native speakers. A total number of four experiments were conducted. The perceptual stimuli consist of CVC words produced by adult native speakers of Canadian English.

The experiment included vowel contrasts such as /i/ and /ˆ/, and /e/ and /°/. The authors found that the Italian students discriminated English contrasts more poorly than native English students. Overall results suggested that lower scores were obtained for the late L2 learners than for the early L2 learners. In addition, it was observed that early learners who continued to use Italian often, but not the ones who used it seldom, differed significantly from native speakers of English in perceiving English vowels. According to Flege and McKay (2004), this suggests that L1 vowel system does not by itself prevent an accurate perception of L2 vowels. The authors conclude that their results are also consistent with the SLM hypothesis that holds that the capacity to establish new vowel categories remains intact across the life span; that is, some late learners were found to perceive English vowels accurately.

Studies on perception demonstrate that two distinct L2 vowels can be perceived as allophones in L1. Jonge (1995) claims that the perception of English /°/ and /e/ by the native speakers of Spanish can be the same because in Spanish /e/ becomes /°/ in closed syllables. Bohn and Flege (1990a) study concentrated on the perception of English vowels /i/ and by the native speakers of German. Bohn and Flege conclude that learners came closer to native speakers' level of perception as their proficiency increased. In a slightly different approach, Boatman (1990) relied on natural speech rather than synthetic stimuli in testing American English speakers' perception of French vowels /u/ and /ü/. Two groups were tested: one with knowledge of French and the other with no prior contact with the French language. The results have shown that the French instructed group was better at the labeling task; however, both groups performed similarly in the discrimination task.

There are also studies in which the analysts focus on perception and production relationship. Bohn and Flege (1990b) and Blankenship (1991) studies have shown that in the acquisition of L2 sounds that are not found in L1, production is usually better than perception. Briere (1966) and Gass (1984) also presented similar results.

On the other hand, in a different study on the relationship between the perception-production in the acquisition of second language vowel contrasts, Jacewicz (2002) states that vowel contrast is also a lexical contrast because L2 learners learn to make distinctions between lexical items when they acquire vowels. For instance, the vowels in the English words pit, pet, and put are lexically contrastive. In her study, Jacewicz examines the perception and production of four lexically contrastive German vowels /ˆ Á ¤ °/ by 12 adult native speakers of American English who are beginning

learners of German as L2. In the case of /ˆ °/, the results demonstrated that the vowels were perceived and dispersed accurately; however, the production of the L2 learners was influenced by their L1 vowel locations. Thus, Jacewicz concludes that "the link between perception and production was guided by the acquisition of lexical contrast, which was identified mentally but not entirely realized phonetically" (p.329). In the case of / Á ¤/ contrast, L2 learners had difficulty in both perception and production. However, the subjects were able to slightly differentiate between the two vowels in terms of coarticulatory patterns. Jacewicz notes that the production of neither vowel was English-like, and this indicates that "the speakers did not invoke their English base of articulation to implement the contrast phonetically" (Jacewicz, 2002, p. 329).

In addition to all the studies in vowel perception and production in L2, the role of vowels in the assignment of stress patterns is also an issue of concern. Thus, the following section is dedicated to the studies conducted on L2 stress patterns.

In another study of perception and production of English vowels, Wang (1995) collected data from 15 native Mandarin and 15 native English speakers. The performance of the participants was identified by four native English speakers. Wang found that Mandarin speakers' production of [i ° æ ¤ Å] was significantly less well identified than their production of [i e^{i} u $o^{¤}$]. The results of Wang's study showed that Mandarin speakers' performance was much better with English vowels that are similar to those in Mandarin. On the other hand, their performances on English vowels that are dissimilar to those in Mandarin were not as efficient. Similarly, Munro (1993) found that Arabic speakers' production of 10 English vowels had the effects of L1 experience.

2.7. Studies on Teaching L2 Pronunciation

Teaching pronunciation requires the language teacher to have certain skills. The teacher must have an awareness of the target language phonological system and rules. The learner also has responsibilities. According to Brumfit et al (1978), "to hear the new language accurately enough to imitate it, the foreign learner must respond to a whole new sound system (p. 49). Similarly, Leather (1999) suggests that "the core problem in speech perception is to explain how acoustically varying productions are mapped by the listener onto constant phonetic categories.

It is stated that teaching pronunciation is goal-oriented:

> The aim of pronunciation teaching must be that the students can produce

> English speech which is intelligible… The teacher will have to concentrate on the important phonemic contrasts and select allophonic variations only to ensure intelligibility, not to achieve a total set of native-speaker-like variations (Brumfit et al, 1978, p. 58).

It can be inferred that in the views of Brumfit et al, intelligibility in L2 pronunciation is much more important than reaching a native-like phonological competence. As far as teaching techniques are concerned, Brumfit claims that giving the technical details of sound production to the students cannot be relied on. The author suggests that students should be encouraged to use intuitive mimicry which enables them to imitate the required accent effectively. In addition, Brumfit et al state that by means of comparing the phonemes and allophones of the native and target language, the teacher can guess the areas of difficulty in learning. It is clear that Brumfit et al are in favor of Lado's (1957) CAH, since their suggestions relate to predicting the areas of difficulty by comparing L1 and L2 phonemic inventories.

The use of technology in the language teaching classroom is one of the methods in teaching pronunciation. According to Jenkins, "the pioneering use of CD-ROMs enables large amounts of contextualized native speaker data to be provided for learners" (2004, p. 112). In addition, the lexical approach enabled teachers to teach lexical phrases along with their intonation patterns. Most recently, computer technology has been added to the field of teaching pronunciation. Kaltenboeck (in Jenkins, 2004) has developed s CD-ROM for the purpose of teaching intonation. Furthermore, Daniel Jones's (in Jenkins, 2004) *English Pronouncing Dictionary* provides details of American and British English pronunciation.

The course books designed to teach English pronunciation (Collins and Mees, 2003; Nilsen and Nilsen, 1971) do not involve a discussion of matters such as ambisyllabicity or the role of L1 phonology. In foreign language teaching situations, it is usually the case that the language teacher and learners share the same L1 background. Therefore, it is the language teacher's responsibility to incorporate a comparison of the native and the target language phonological structures into the syllabus. The text books regarding teaching English pronunciation most often will lack such comparisons. Their content is mostly based on the phonemic contrasts of the English language. Thus, the language teacher needs to have a perfect awareness of both L1 and L2 phonology in order to teach his/her students the phonology of the target language accurately.

A different approach strongly emphasizes the importance of orthography in speech production. Erdener and Burnham (2005) study focuses on the effect of orthography on learning Spanish and Irish pronunciation. In the study, the participants were presented an orthographic stimulus and asked to read the stimulus, but not aloud. The results of the study show that visual information is helpful in terms of reducing phonemic errors in nonnative speech production. Thus, Erdener and Burnham conclude:

> In this study, providing orthographic information has been shown to be effective in the reduction of phoneme errors in production. Foreign language instruction methods could be amended to render them more efficient and beneficial by including the use of orthographic information. In particular, development of new training methods for the teaching of languages such as Italian, Spanish, and Turkish, that have transparent orthographies might be developed in order to reinforce auditory and visual inputs (p. 222).

Erdener and Burnham's conclusions may provide useful insights for teaching of the languages with "transparent orthography". However, English is not one such language with it is difficult spelling. On the other hand, the orthographic reality might be useful in analyzing some of the phonological errors committed by Turkish native speakers in that the perception of the relationship between sound and orthography may operate for L2 learners in similar manner to what happens in their L1.

Once we have defined systematic errors of Turkish L2 learners after transcribing our data, our purpose is to take advantage of the ideas proposed for teaching English pronunciation and to integrate those ideas into a syllabus that is specifically designed to deal with the common speech production of Turkish L2 learners. This will be further discussed in the methodology chapter of this thesis.

CHAPTER 3

METHODOLOGY

3.1. Research Design

This research took place at the ELT Department of Cukurova University, Adana, Turkey. For the purpose of incorporating our study into a syllabus easily, we chose sophomore students who were taking a course in phonetics and phonology. Two different groups were chosen; one as the Experimental Group and the other as the Control Group. The groups were formed by means of random assignment. Since no syllabus was specifically designed to deal with the errors of Turkish EFL learners, we designed our own syllabus to train the students in the treatment group for the duration of the course so that they would be able to produce the sounds of the target language accurately.

3.2. Participants

For the purpose of our study, two groups each consisting of 26 sophomore students at Cukurova University ELT Department were selected to form the Experimental Group and the Control Group. The students of the ELT Department at Cukurova University come from different educational backgrounds such as state high schools, private high schools and so on. Regardless of their background in English, the comprehensive test they take in order to get into an ELT program mostly measures their knowledge in grammar and vocabulary. Thus, many high school students do not specifically focus on their pronunciation. In addition, the newly admitted students are given a proficiency test by the ELT department to measure their abilities in English grammar, reading, writing and speaking. Should they fail the test, they enroll in one year-long English program during which the students improve their knowledge of the English language. However, comprehensive knowledge of English phonology is not a specific part of their training. We chose sophomore students since the curriculum already included a course in Phonetics and Phonology during the Fall Semester, namely *TD 215 Turkish phonology and morphology*, which was normally designed for a comparison of Turkish and English phonology and morphology.

3.3. Instruments

3.3.1. Pre-test

At the beginning of our study we conducted a Pre-test in order to determine the accuracy of the forms produced by Turkish EFL learners. Due to our general observations of the phonological errors made by the Turkish EFL learners in the classroom, we designed our own test in order to specifically deal with errors that may result from language transfers. For that reason, the test included phonemes occurring in problematic environments for native speakers of Turkish. The test consisted of a list consisting of 60 English words to help us determine the errors in phoneme production (See Appendix I).

3.3.2. Treatment

The Control Group was not dealt with in terms of error analysis. The actual TD 215 course which was an introductory course in English and Turkish phonology and morphology was taught throughout the semester. The differences between the two languages were pointed out, but we have not provided a detailed analysis for them to create an awareness of the errors they were making.

The regular TD 215 course did not specifically deal with phonological errors of Turkish EFL learners, and thus our treatment included a syllabus specifically designed to deal with such phenomena. Our goal was to help the participants in the Experimental Group to become aware of their phonological errors. The syllabus was based on the textbooks by Nilsen and Nilsen (1973), Ladefoged (1975), and Collins and Mees (2003). However, no single text book is designed to specifically handle the phonological errors of the Turkish EFL learners. Therefore, we came up with specific sets of examples to raise the consciousness of the participants once we defined what the common errors were from the transcriptions of the Pre-test. Our treatment mainly focused on two types of errors: 1) errors in consonant and vowel production; 2) epenthesis in initial consonant clusters.

The first weeks of the syllabus (See Appendix III) is focused on the basic knowledge of articulatory phonetics, whereby the participants as prospective language teachers gained the knowledge of terms such as places and manners of articulation and voicing, as well as English phonological structure. Consonants and vowel phonemes of both Turkish and English were illustrated with many examples. The

participants were also trained in phonetic transcription so that they would be able to describe the sounds that they produced by means of phonetic conventions. In addition, phonetic features such as aspiration, voicing and devoicing were explained in detail with examples so that the participants as prospective language teachers would have a grasp of the sounds that they would be teaching in the classroom.

After the basic instructions in phonetics and phonology, the participants were introduced the erroneous forms that they produced. The analysis of the errors continued for the remainder of the treatment. A comparison of English and Turkish phonology was often made so as to create an awareness of the sources of phonological errors. Because of such awareness, we believed that the participants in the Experimental Group would pay more attention to producing the English forms correctly. In teaching the correct forms, due to our long time personal exposure to American English, we took this particular dialect as the criterion of evaluation. In addition, the social popularity of American language and culture among the EFL learners was also a point of decision making. Nevertheless, the previously learned forms of the British English were also taken into consideration and they were accepted as correct forms when the participants displayed knowledge of such forms.

We believed that we had to create an awareness of the phonological differences between English and Turkish because some of the English phonemes that were produced incorrectly by the participants existed in Turkish allophonically. For instance, [w] is an allophone of [v] in Turkish that occurs before and after rounded vowels as in the Turkish words davul [dawul] “drum” and kovulmak [kowulmak] “to be fired”. Thus, when it precedes unrounded vowels in English words, it is likely to be replaced by [v] by Turkish native speakers.

Phonetic transcriptions of the data obtained from the Pre-test had been useful in determining the phonological errors of the participants in both the Experimental Group and the Control Group. Focusing on those errors, we designed a treatment in order to enable the participants to become aware of the errors that they made. During the treatment, sounds of the native language and the target language were compared. Participants were informed in detail about the sort of errors they made. In addition, for a better understanding of certain English sounds, Turkish-English minimal pairs were prepared so that that the participants would be able to distinguish between two different sounds more clearly. An example of this is the distinction between the Turkish word ***çil*** “freckle” and the English word ***chill***. By means of such minimal

pairs, we believed that the participants would develop a better understanding of the phonetic differences between English and Turkish. To enable the students successfully produce the phonemes and structures which they produced erroneously in the Pre-test, the participants in the Experimental Group were provided with exercises that included both English words and Turkish words so that they would distinguish between the phonemic differences of both languages. The treatment has lasted ten weeks. After that the participants of both the Experimental Group and the Control Group have been given the Post-test. The Control Group has not been given any treatment; however, they have been given the Post-test in order to observe to what extent the treatment has been effective.

3.3.3. Post-test

The Post-test was conducted to measure the same criteria as the Pre-test (See Appendix II). The test was administered to both the Control and the Experimental Groups in order to determine to what extent our treatment was a success. The test once again contained a word-list to observe if the participants in the treatment group were able to overcome the phonological errors they made in the Pre-test.

3.4. Procedure

The Pre-test was given to both Control and Experimental Groups at the beginning of the semester. At the completion of the semester-long treatment for the Experimental Group, the participants of both the Experimental and the Control Groups took the Post-test. The tests were conducted in a quiet room for reducing the noise factor. The recording sessions had one participant at a time. Each participant was given the word-list. During the recording, the participants were instructed to examine the lists first. Then, they were instructed to read them out loud. For both lists, they were instructed to read the items at normal speed. In addition, two adult native speakers of American English, one male and one female, were asked to read both lists out loud so that we could compare their data with those of our participants. To collect the data, *Music Pen Digital Audio Recorder* was used. Recording sessions lasted about one to two minutes per person.

3.5. Data Collection

To collect the data, each participant was asked to read out loud both lists. A digital audio recorder was used for each recording session. Word lists were transcribed phonetically so that we could determine incorrectly pronounced phonemes and the occurrence of epenthesis. We were unable to collect spontaneously produced data from a large number of participants due to time restrictions because our study entails the analysis of the entire phonemic inventory of the English language rather than simply looking at a few problematic sounds in certain environments.

CHAPTER 4

RESULTS AND DISCUSSION

4.0. Introduction

This chapter is dedicated to a discussion of the results of our analysis. In 4.1, we examine the results of the Pre-test and the Post-test. In 4.2, we discuss the results of the Wilcoxon Test conducted to observe the effectiveness of the treatment. In section 4.3, we discuss the relationship between markedness and the level of difficulty in pronunciation.

4.1. The Results

In this section, we provide a detailed analysis of the participants' errors in consonant and vowel production. Chi-square analysis has been conducted to observe if there is any significant difference in the production of the desired and the undesired forms within the Experimental and the Control Groups individually in both the Pre-test and the Post-test. In subsections 4.1.1 thorough 4.1.13, we provide an analysis of the consonant and vowel phonemes that cause difficulty in the pronunciation of the students. The selection of the sounds analyzed in sections 4.1.1 through 4.1.13 was determined after the Pre-test was conducted. The word-list of the Pre-test included the complete phonemic inventory of the English language. The data were transcribed phonetically and only those that were pronounced incorrectly were included in the analysis so that we can determine how these sounds can be handled in the treatment.

4.1.1. Inter-dental Fricatives /}/ and /ð/

Majority of Turkish EFL learners have difficulty in producing the inter-dental fricatives correctly. In most cases, it is observed that these sounds are mostly replaced by /t/ and /d/. Table 4.1 below shows the results of the statistical analysis conducted on the pronunciation of voiceless inter-dental fricative [}] word-initially and word-finally. To observe the pronunciation of the [}] sound word-initially and word-finally, test words *thorn* and *bath* were selected. Word-medial [}] sound was ignored because it occurs less frequently.

Table 4.1. Pre-test desired and undesired forms in pronouncing the words with the /}/

Pre-test		Desired /}/		Undesired /t/		Total		¼^2	P
		N	%	N	%	N	%		
Exp. Grp	Thorn (initial)	4	15.4	22	84.6	26	100	12.46	0.00
	Bath (final)	8	30.8	18	69.2	26	100	2.46	0.11
Con. Grp	Thorn (initial)	7	26.9	19	73.1	26	100	5.53	0.01
	Bath (final)	5	19.2	21	80.8	26	100	9.84	0.00

As the results in Table 4.1 indicate, in pronouncing the word ***thorn***, the Experimental Group used the desired form [}] by15.4% while the undesired form [t] was preferred by 84.6% (¼2=12.46, p=0.00). On the other hand, 26.9 % of the Control Group pronounced [}] correctly whereas 73.1% substituted [t] word-initially (¼2=5.53, p=0.01). In pronouncing the word ***bath*** where the [}] sound occurs word-finally, the Experimental Group used [}] 30.8% and [t] was used 69.2 % (¼2=2.46, p=0.11). The Control Group, on the other hand, used [}] 19.2% and [t] 80.8% in the word-final position (¼2= 9.84, p=0.00). Chi-square results suggest that the difference between the desired and undesired form production is statistically significant for all test words, except for the word ***bath*** pronounced by the participants of the Experimental Group.

The percentages in Table 4.1 show that the voiceless inter-dental fricative [}] is substituted by the L1 sound [t]. This can be interpreted as a case of L1 transfer. Such transfer also implies that there are no relic forms of the [}] sound in Turkish. Therefore, it is safe to claim that the results are in conformity with Kabak's (2004) views where the author suggested that fricatives /} ð/ in Turkish were lost as a result of fusion with /t d/ in Inner Anatolian Greek although Turkish was the dominant language. Such loss is observed in the Turkish native speakers' pronunciation of the English inter-dentals today because they substitute /t d/ for the English inter-dentals /} ð/ via L1 transfer.

Pre-test results show that students have great deal of difficulty in producing inter-dental fricatives correctly. In the Post-test we have included similar words to those of the Pre-test in order to observe if there is any change in favor of the desired forms.

Table 4.2 shows the frequencies of the desired and the undesired forms produced by learners with words that contain the voiceless inter-dental fricative /}/. The words ***theme*** and ***math*** were tested for statistical analysis.

Table 4.2. Post-test desired and undesired forms in pronouncing the /}/ sound

		Desired /}/		Undesired /t/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Theme (initial)	17	65.4	9	34.6	26	100	2.46	0.11
	Math (final)	14	53.8	12	46.2	26	100	0.15	0.69
Con. Grp	Theme (initial)	9	34.6	17	65.4	26	100	2.46	0.11
	Math (final)	6	23.1	20	76.9	26	100	7.53	0.00

Table 4.2 indicates the results for the post-test /}/ words in the word-initial and word-final positions. In the word-initial position, 65.4% of the Experimental Group produced the desired form and 34.6 % produced the undesired form (¼2=2.46, p=0.11). In the word-final position, 53.8% of the Experimental Group produced the desired form and 46.2% produced the undesired form (¼2= 0.15, p= 0.69). On the other hand, 34.6% of the Control Group produced the desired form and 65.4 % of the participants produced the undesired form word-initially (¼2=2.46, p= 0.11). Word-finally 23.1 % of the participants produced the desired form and 76.9 % produced the undesired form (¼2=7.53, p= 0.00). Of these results, only the production of the word-final /ð/ sound by the Control Group seems statistically significant. The results can be interpreted as follows:

a) The rate of the desired form production at both word-initial and word-final positions is higher for the Experimental Group.
b) The voiceless inter-dental fricative provides a more marked environment for Turkish EFL learners in the word-final position.

Phonetic transcripts of our data have shown that the learners have even greater difficulty in producing the voiced inter-dental fricative [ð]. Table 4.3 shows the

frequencies of the forms produced in words containing /ð/ in three different environments, where the test words *there, father*, and *bathe* were selected for analysis

Table 4.3. Pronunciation of the words with the [ð] sound in the Pre-test

		Desired /ð/		Undesired /d/		Undesired /t/		Undesired /}/		Total		¼^2	P
		N	%	N	%	N	%	N	%	N	%		
Exp. Grp	There (initl.)	0	0	26	100	---		---		26	100	---	---
	Father (med.)	3	11.5	23	88.5	---		---		26	100	15.38	0.00
	Bathe (final)	0	0			23	88.5	3	11.5	26	100	15.38	0.00
Con. Grp	There (initl)	2	7.7	24	92.3	---		---		26	100	18.61	0.00
	Father (med.)	7	26.9	19	73.1	---		---		26	100	5.53	0.01
	Bathe (final)	---		---		21	80.8	5	19.2	26	100	9.84	0.00

The results of Table 4.3 demonstrate that the [d] sound is the substitute for the [ð] word-initially in the pronunciation of the word *there* in the Experimental Group. Therefore, Chi-square analysis cannot be conducted. On the other hand, the Control Group preferred the desired form [d] 92.3% and the undesired form [ð] 7.7% (¼2=18.61, p=0.00). In pronouncing the word *father,* 88.5% of the Experimental Group preferred [t] and 11.5% pronounced [ð] correctly (¼2= 15.38, p=0.00). On the other hand, 73.1% of the Control Group produced the undesired form whereas 26.9 % of the participants produced the desired form in pronouncing the same word (¼2= 5.53, p=0.01). For the word-final test word *bathe,* two incorrect forms /t/ and /}/ substitute the correct form. In the Experimental Group, 88.5% of the participants produced [t] and 11.5% of the participants produced [}] (p=0.00). On the other hand, in the Control Group 80.8 % of the participants produced [t] and 19.2% of the participants produced [}] (¼2= 15.38, p=0.00). The percentages and statistical values indicate that the results were statistically significant in favor of the undesired forms.

In comparison with the results of Table 4.1, percentages imply that the [ð] sound which is more marked than [}] seems more difficult to produce correctly for Turkish native speakers. In that case, voiced stop [d] becomes the substitute word-initially and word-medially. On the other hand, word-final [ð] sound presents an interesting case in which Turkish final-stop devoicing rule comes into realization. As Table 4.2 indicates, the voiceless stop [t] is the most frequent substitute for the [ð] sound. In addition, the less frequent occurrence of the [}] sound in word-final position is in conformity with the MDH which states that the unmarked value is easier to learn than its marked counterpart.

In the Post-test, the initial, medial and word-final occurrences of the [ð] sound were examined in the words *there, father,* and *bathe*. Table 4.4 displays the frequency of desired and undesired forms produced by learners in their pronunciation of words with the /ð/ sound occurring in different environments:

Table 4.4. Pronunciation of the words with the /ð/ sound in the Post-test

		Desired /ð/		Undesired /d/		Undesired /t/		Undesired /}/		Total		¼^2	p
		N	%	N	%	N	%	N	%	N	%		
Exp. Grp	That (initial)	8	30.8	18	69.2	0	0	0	0	26	100	3.84	0.05
	Brother (medial)	11	42.3	15	57.7	0	0	0	0	26	100	0.61	0.43
	Breathe (final)	0	0	0	0	14	53.8	12	46.2	26	100	0.15	0.69
Con. Grp	That (initial)	3	11.5	23	88.5	0	0	0	0	26	100	15.38	0.00
	Brother (medial)	4	15.4	22	84.6	0	0	0	0	26	100	12.46	0.00
	Breathe (final)	0	0	0	0	22	84.6	4	15.4	26	100	12.46	0.00

In Table 4.4, the Post-test results show that the /ð/ sound is problematic for Turkish EFL learners. Word-initially and medially, this sound was substituted by the /d/ sound, and in the word-final position, it was replaced by /t/ or /}/. In the Experimental Group, 30.8% of the participants produced the desired form in the word-initial position, and in

the word-medial position 42.3% of the participants produced the desired form. In the word-final position, there was no occurrence of the correct form since it was replaced by 53.8% /t/ and 46.3% /}/. Chi-square analysis shows that, the results of word-initial occurrences of /ð/ and /t/ have been statistically significant (¼2= 3.84, p=0.05). As for the word-medial and the word-final positions, the results are not statistically significant (p>0.05).

In comparison, the results of the Control Group are statistically significant. In the Control group, 11.5% of the participants produced the desired form word-initially (¼2= 15.38, p=0.00) and 15.4 % of the participants produced the desired form word-medially (¼2= 12.46, p=0.00), and similar to the findings for the Experimental Group, there were no occurrences of the correct form word-finally. In the word-final position, 84.6% of the participants produced the undesired form /t/ and 15.4 % of the participants produced the undesired form /}/ (¼2=12.46, p= 0.00).

When the results of Table 4.3 and Table 4.4 are compared, it is seen that between /}/ and /ð/, the marked /ð/ sound is more difficult to produce for L2 learners. In addition, it is clearly seen in Table 4.4 that the word-final position is more marked environmentally than the word-initial and the word-medial positions for the /ð/ sound. The effect of L1 final stop devoicing provides evidence for such environmental markedness in that /}/ and /t/ are both voiceless phonemes and they replace the marked phoneme /ð/, which is a voiced sound.

4.1.2. Word-final Voiced Stops

Turkish has a rule that devoices all word-final stops. In order to see, if such L1 rule has an effect on L2 pronunciation of Turkish native speakers, the Pre-test included words ending with voiced stops. The transcripts indicated that the learners had a tendency toward devoicing word-final voiced stops in English words. Table 4.5 shows the frequencies of the desired and the undesired forms produced by L2 learners. Test words *cab* and *wind* were analyzed.

Table 4.5. Pronunciation of the words with word-final voiced stops in the Pre-test

		Desired Voiced Stop		Undesired Voiceless Stop		Total		¼^2	p
		N	%	N	%	N	%		
Exp.Grp	Cab	3	11.5	23	88.5	26	100	15.38	0.00
	Wind	8	30.8	18	69.2	26	100	3.84	0.05
Con. Grp	Cab	1	3.8	25	96.2	26	100	22.15	0.00
	Wind	1	3.8	25	96.2	26	100	22.15	0.00

The percentages in Table 4.5 imply that there is a tendency to devoice word-final voiced stops. For the word ***cab***, 88.5% of the Experimental Group produced the undesired form [p] instead of the desired [b] which remained in 11.5% (¼2= 15.38, p=0.00). For the word ***wind***, the frequency of producing the undesired form [t] is 69.2%; whereas, the desired form [d] was produced by 30.8 % of the participants (¼2= 3.84, p=0.05). The percentages of the desired form production is much lower for the Control Group than the Experimental Group for both ***cab*** and ***wind*** since the desired forms [b d] were produced only by 3.8% of the participants and the undesired forms [p t] were produced by 96.2% (¼2= 22.15, p=0.00). The overall results for both groups show that there statistical significance in favor of the undesired forms.

In terms of the accurate production of the voiced stops in word-final position, the participants of our study have more difficulty than those of the study conducted by Major and Faudree (1996), where the researchers have found that Korean speakers of English show only about 50% accuracy with word-final voiced stops. Similar results were also obtained by Eckman (1981), and Flege and Davidian (1984).

For Turkish native speakers, the preference of the voiceless stops in word-final position implies that English words with voiced word-final stops constitute a marked environment for Turkish learners. For that reason, the learners experience difficulty in producing the desired form due to transfer from L1which facilitates the application of the final-stop devoicing rule.

The results of the Pre-test show that L2 learners have a tendency to devoice word-final voiced stops due to the effect of L1. The Post-test results for the words with final voiced stops are given in Table 4.6, where the test words ***red*** and ***rude*** are analyzed.

Table 4.6. Pronunciation of the words with final voiced stops in the Post-test

		Voiced Stop		Voiceless Stop		Total		¼^2	p
		N	%	N	%	N	%		
Exp.Grp	Red	4	15.4	22	84.6	26	100	12.46	0.00
	Rude	1	3.8	25	96.2	26	100	22.15	0.00
Con. Grp	Red	1	3.8	25	96.2	26	100	22.15	0.00
	Rude	2	7.7	24	92.3	26	100	18.61	0.00

Table 4.6 shows the Post-test results for the pronunciation of words with final voiced stops. It is clearly seen that word-final voiced /d/ is replaced by its voiceless counterpart. In the Experimental Group, 84.6% of the participants produced the undesired /t/ in pronouncing the word ***red*** (¼2= 12.46, p= 0.00), and 96.2 % of the participants produced the undesired /t/ in pronouncing the word ***rude*** (¼2= 22.15, p= 0.00). In the Control Group 96.2% of the participants produced the undesired /t/ for the word ***red*** (¼2= 22.15, p= 0.00) and 92.3% of the participants produced the undesired form for the word ***rude*** (¼2= 18.61, p= 0.00). The statistical analysis shows that the results are statistically significant for both the Experimental Group and the Control Group. These results show that the effect of the L1 final stop devoicing rule is a very strong one, and they are in conformity with Eckman's (1977) suggestion that word-final position is the most marked environment in terms of the voice contrast. In that case, the term ***environmentally marked*** can be coined to account for Turkish learners' difficulty in producing the word-final stops because the word-final position is extremely marked for Turkish native speakers. Although Turkish has the /d/ sound, the word-final position requires devoicing of it. Thus, producing the English words such as ***red*** and ***rude*** with a word-final /d/ will be rather difficult for Turkish native speakers.

4.1.3. Words with /w/ Sound

As previously discussed, Turkish language has /w/ before rounded vowels. In other environments /v/ sound occurs. In order to see, how Turkish native speakers deal with the English words that have the/w/ sound, The Pre-test included words ***wear*** and ***swim*** where the /w/ sound occurs word-initially or internally. Table 4.7 displays the desired and undesired forms produced by L2 learners.

Table 4.7. Pronunciation of [w] words in the Pre-test

		/w/		/v/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Wear	4	15.4	22	84.6	26	100	12.46	0.00
	Swim	4	15.4	22	84.6	26	100	12.46	0.00
Con. Grp	Wear	1	3.8	25	96.2	26	100	22.15	0.00
	Swim	3	11.5	23	88.5	26	100	15.38	0.00

Table 4.7 illustrates the results of errors in the production of the [w] sound. It is clearly seen that [v] is the most commonly preferred substitute for [w]. Word-initially and word-medially, 84.6 % of the Experimental Group produced the undesired [v] instead of the desired [w] (¼2= 12.46, p= 0.00). On the other hand, the Control Group substituted [v] for [w] at 96.2% word-initially (¼2= 22.15, p= 0.00) and 88.5% word-medially (¼2= 15.38, p= 0.00). Chi-square analysis and the frequencies imply that in both groups the difference between the desired and the undesired form production is statistically significant.

Turkish has [w] at allophonic level; that is there is no [v] and [w] contrast in Turkish, and the [w] sound occurs only before a rounded vowel. Our test words *wear* and *swim* do not contain rounded vowels. The participants seem to substitute [v] for [w] both word-initially and word-medially in most cases. This seems to be a problem of assimilation since Turkish native speakers are likely to produce [w] only when it is followed by a rounded vowel word-medially. In the English test words, since the vowels following [w] are unrounded, assimilation in terms of rounding does not take place. Therefore, the unrounded voiced fricative [v] becomes a substitute via L1 transfer. Our findings yield similar results to those of Eckman, Elreyes and Iverson (2001) since learners have trouble in acquiring the contrasts of two sounds that are allophones in L1 but separate phonemes in L2. The low frequencies of the correct form production suggests that in Eckman, Elreyes and Iverson's terms, the learners in our study are somewhere between Stage 1 and Stage 2; that is, partial contrast or no contrast at all occurs.

The Pre-test words for /w/ sound (Table 4.4) have demonstrated that L2 learners generally substitute /v/ for /w/. The Post-test words *waiter* and *rower* have been given to observe if there is any significant change toward the desired form. The results are displayed in Table 4.8 below:

Table 4.8. Pronunciation of the words with the /w/ sound in the Post-test

		Desired /w/		Undesired /v/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Waiter	3	11.5	23	88.5	26	100	15.38	0.00
	Rower	1	3.8	25	96.2	26	100	22.15	0.00
Con. Grp	Waiter	3	11.5	23	88.5	26	100	15.38	0.00
	Rower	0	0	26	100	26	100		

Table 4.8 illustrates the results of /w/ production word initially and word-medially. The results show that the /w/ sound is replaced by the /v/ sound by most of the participants in both groups. According to Table 4.8, 11.5% of the Experimental Group produced the desired /w/ sound word initially, whereas, 88.5% of the participants in the same group produced the undesired /v/ sound as the substitute (¼2= 15.38, p= 0.00). Word-medially, the /w/ was produced by 3.8% of the participants in the Experimental Group, and the /v/ sound was produced by 96.2 % (¼2= 22.15, p= 0.00). On the other hand, in the Control Group 11.5% of the participants produced the desired /w /sound, and 88.5% of the participants produced the undesired /v/ sound in the word-initial position (¼2= 15.38, p= 0.00). Word-finally, all of the participants substituted the desired /v/ sound for the undesired /w/ sound. Chi-square is conducted for the word-initial position, and the results are statistically significant (p=0.00).

In Chapter 2, we have discussed that Turkish has the /w/ sound before rounded vowels as in /kʌwun/ "***watermelon"*** or in ***vur*** /w "hit, and after rounded vowels as in ***kov*** /kow/ "to expel". The English words that are used in the Post-test do not have rounded vowels that follow the /w/ sound. Therefore, it can be concluded that L1 transfer occurs because /w/ is marked for Turkish L1 speakers when it is followed by an unrounded vowel. Once again, environment plays a role in determining markedness and thus the level of difficulty in producing the sounds correctly.

4.1.4. Consonant Clusters

The Turkish language does not permit initial consonant clusters. Thus, we expect Turkish EFL learners to have difficulty in producing English initial consonant clusters. Table 4.9 displays the frequencies of the desired and the undesired forms. Tests words *slim*, *bring*, *smith*, and *strong* were analyzed.

Table 4.9. Pronunciation of words with initial consonant clusters in the Pre-test

		Desired (Without Epenthesis)		Undesired (With Epenthesis)		Total		X^2	p
		N	%	N	%	N	%		
Exper.	Slim	6	23.1	20	76.9	26	100	7.53	0.00
Grp.	Bring	12	46.2	14	53.8	26	100	0.154	0.69
	Smith	8	30.8	18	69.2	26	100	3.84	0.05
	strong	11	42.3	15	57.7	26	100	0.61	0.43
Control	Slim	2	7.7	24	92.3	26	100	18.61	0.00
Grp.	Bring	4	15.4	22	84.6	26	100	12.46	0.00
	Smith	2	7.7	24	92.3	26	100	18.61	0.00
	strong	6	23.1	20	76.9	26	100	7.53	0.00

Table 4.9 shows the frequencies and percentages of desired forms (without epenthesis) and the undesired forms (with epenthesis) produced in pronouncing the words with initial consonant clusters /sl/, /br/, and /sm/ with or without epenthesis. In the Experimental Group, for the word ***slim***, 23.1% of the participants produced the desired form and 76.9% of the participants produced the undesired form (¼2= 7.53, p= 0.00). The difference between the desired and undesired form production in terms of the frequency of usage seems statistically significant. In pronouncing the word bring, the percentage of producing the desired form is twice as high with 46.2% and the rate of producing the undesired form is 53.8%; however, these values do not show any statistical significance (¼2= 0.15, p=0.69). In pronouncing the word ***smith***, 30.8% of the participants produced the desired form and 69.2% of the participants produced the undesired form. The difference in the frequency of usage between the desired and undesired forms is statistically significant (¼2= 3.84, p=0.05). Finally, the three-membered cluster /str/ was examined via the test word ***strong***. Of all the participants, 42.3% pronounced the desired form and 57.7% pronounced the undesired form. These values are not statistically significant (¼2= 0.61, p=0.43).

In the Control Group, the rate of desired form production is much lower: 7.7% of the participants produced the desired form and 92.3% of the participants produced the undesired form when pronouncing the test word slim. The difference between the desired and undesired form in terms of the frequency is statistically significant (¼2=

18.61, p=0.00). In pronouncing the word ***bring***, 15.4% of the participants produced the desired form and 84.6% of the participants produced the undesired form. The difference in frequency is statistically significant (¼2=12.46, p= 0.00). In pronouncing the word ***smith***, 7.7% of the participants produced the desired form and 92.3 % produced the undesired form. The difference in the frequency of usage between the desired and the undesired forms is statistically significant (¼2= 18.61, p=0.00). Finally, in pronouncing the word ***strong***, 23.1% of the participants produced the desired form and 76.9% of the participants produced the undesired form. The difference in the frequency of usage of the desired and the undesired forms is statistically significant (¼2= 7.53, p=0.00).

In their analyses of epenthesis in consonant clusters, Carlisle (1988) and Abrahamsson (1999), who both looked at Spanish speakers' epenthesis of English consonant clusters, had found that the frequency of epenthesis was higher for three-member onsets than two-member onsets. Our study did not show any such implication since the frequency of epenthetic forms was not greater in three member lateral consonant clusters than two member ones as Table 4.9 displays. Since the Phonotactic Structure of the Turkish language does not allow initial consonant clusters, borrowed words that originally have initial consonant clusters undergo resyllabification through epenthesis. Thus the effect of L1 is quite strong for Turkish EFL learners when they come across words with word-initial consonant clusters. Resyllabification by epenthesis is indicated in Figure 2 below:

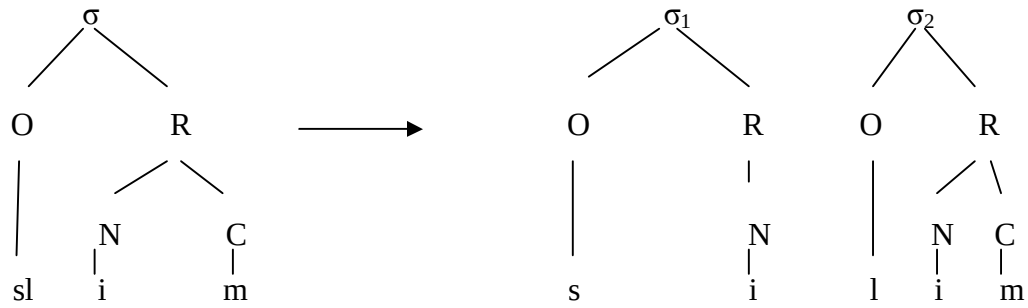

Figure 2. Re-syllabification of the word ***slim*** by Turkish EFL learners

This can be interpreted as preference of the unmarked syllable type as Carlisle (1997) suggests in that CV is the most preferred syllable type in languages and therefore it can be called the unmarked syllable type. Consonant clusters in that case can be said to create marked syllables. The preference for the unmarked syllable is also in conformity with the MDH.

The analysis of the Pre-test on consonant clusters shows that L2 learners in general have a tendency to break up the clusters by inserting an epenthetic vowel. For the Post-test the words *slash*, *promise*, and *treasure* were selected for analysis. Table 4.10 displays the results of the Post-test analysis conducted for word-initial consonant clusters. Three-member consonant clusters were ignored since the participants were already having troubles with two-member consonant clusters.

Table 4.10. Pronunciation of the words with initial consonant clusters in the Post-test

		Desired Without Epenthesis		Undesired With Epenthesis		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Slash	14	53.8	12	46.2	26	100	0.15	0.69
	Promise	15	57.7	11	42.3	26	100	0.61.	0.43
	Treasure	14	53.8	12	46.2	26	100	0.15	0.69
Con. Grp	Slash	0	0	26	100	26	100		
	Promise	3	11.5	23	88.5	26	100	15.38	0.00
	Treasure	4	15.4	22	84.6	26	100	12.46	0.00

Table 4.10 shows the Post-test results for the words with initial consonant clusters. The results of the Experimental Group show that the percentages of the produced desired forms are higher than those of the undesired forms: 53.8% for *slash* and *treasure*, and 57.7% for *promise*. However, Chi-square analysis indicates that there is no statistically significant difference between the desired and the undesired form production (¼2= 0.15, p= 0.69). The Control Group, on the other hand, had a great deal of difficulty in producing the clusters without epenthesis. As the results indicate, the correct form production was none for *slash*, 11.5% for *promise* (¼2= 15.38, p= 0.00), and 15.4% for *treasure* (¼2= 12.46, p= 0.00). The results show a significant difference in favor of the incorrect epenthetic form.

4.1.5. Velar /{/

Velar /{/ occurs in all words ending in /-ing/. Majority of Turkish native speakers are observed to pronounce /-ing/ words with a highly plosive word-final /k/, most probably as a result of L1 interference. Table 4.11 below shows the frequencies of different forms in pronunciation of /-ing/ words by L2 learners:

Table 4.11. Pronunciation of the words with the velar /{/ in the Pre-test

		{		-ink		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Ring	2	7.7	24	92.3	26	100	18.61	0.00
Con. Grp	Ring	---		26	100	26	100	---	---

To analyze the pronunciation of words with word final /{/, four variables /{/ , /-in/, /-ink/, and /ing/ were taken into consideration as possible occurrences. However, the results indicate that the participants seemed to prefer one desired (/{/) and one undesired (/-ink/) form. Table 4.11 shows that 7.7% of the Experimental Group pronounced the desired velar nasal; whereas, 92.3% produced the undesired form (¼2= 18.61, p=0.00). These results are statistically significant in favor of the undesired form. On the other hand, since all participants of the Control Group produced only the undesired form, no statistical analysis could be conducted; however, the percentages imply that the undesired form was the dominantly produced variable.

The occurrences of the velar /{/ in Turkish is only syllable-internal as in the Turkish word ***denge*** [de{ge] “balance”. The English velar nasal which is used in the word-final position is marked in comparison to /n/ sound. Furthermore, it does not occur word-finally in Turkish. This is in conformity with Eckman’s MDH in that marked forms that do not occur in L1 will be more difficult to learn. Although the /{/ sound occurs in Turkish, word-final position is a marked environment and thus it is difficult for Turkish EFL learners to produce correctly.

The analysis of the Pre-test words ending in /-ing/ has shown that L2 learners substitute /-ink/ for /{/. The word ***sing*** was tested to observe if there is any significant change toward the desired form in the pronunciation of L2 learners. Table 4.12 shows the frequency of forms produced in pronunciation of words ending in /-ing/:

Table 4.12. Pronunciation of the words with the velar /{/ in the Post-test

		Desired Velar n N %	Undesired -in N %	Undesired -ink N %	Undesired -ing N %	Total N %	¼^2	p
Exp. Grp	Sing	10 38.5	-----	14 53.5	2 7.7	26 100	8.61	0.01
Con. Grp	Sing	10 38.5	2 7.7	13 50.0	1 3.8	26 100	16.15	0.00

As Table 4.12 shows there are four different variables for the production of velar /{/. However, in both the Experimental and the Control Groups the correct form production is 38.5%. The most commonly produced substitute seems to be /-ink/ at 53.5 % for the Experimental Group and 50% for the Control Group. The difference in frequency is statistically significant in favor of the undesired form /-ink/ (¼2= 8.61, p=0.01). This can be interpreted as a result of the final-stop devoicing rule that comes from L1. Turkish native speakers are misled by orthography and pronounce /k/ as a substitute for /g/. In Turkish, the velar /{/ occurs in words such as ***çengi*** [tß°{gi] "dancer". However, it is word internal and, followed by /g/ which is the onset of the syllable that follows. In English words, the velar /{/ occurs word-finally and it is orthographically represented by the letters /ng/. Word-final position for velar /{/ is a marked environment for Turkish L1 speakers and it causes learning difficulties for English words, where word-final /{/ occurs. Thus, we conclude that the velar /{/ is environmentally marked in the word-final position.

4.1.6. English Words with the Velarized [÷]

English has occurrences of velarized [l] in words such as *kill, pill, silk, milk*. When the data was transcribed, it was observed that learners had difficulty in producing the desired form and thus produced the alveolar [l] instead. Table 4.13 displays the frequencies of the desired and undesired forms.

Table 4.13. Pronunciation of the words with the velarized [÷] in the Pre-test

		Desired [÷]		Undesired [l]		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Milk	3	11.5	23	88.5	26	100	15.38	0.00
Con. Grp	Milk	6	23.1	20	76.9	26	100	7.53	0.00

The pronunciation of the English velarized [÷] was examined and the results show that participants preferred the undesired alveolar [l] to a large extent. In the Experimental Group, 11.5 % pronounced the word *milk* with velarized [÷]; whereas, 88.5% pronounced it substituting alveolar [l] (¼2= 15.38, p=0.00). On the other hand, in the Control Group, 23.1% produced the desired form, and 76.9% the undesired form (p=0.00). The results are statistically significant (¼2= 7.53, p=0.00).

Turkish [l] is alveolar when it is preceded by the front vowel /i/ as in *pil* "battery", *dil* "tongue", and *ilk* "first". Therefore, the substitution of the alveolar /l/ for the velarized /÷/ seems to be a case of L1 transfer since the consonant assimilates to the preceding vowel. This can be illustrated in terms of Clements' (1997) Feature Geometry in Figure 3:

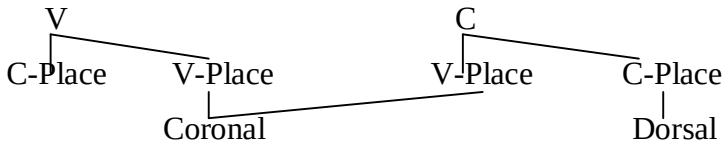

Figure 3. Coronalization of the /l/ sound

Figure 3 displays that Coronal V-Place feature of the vowel [i] spreads on to the V-Place feature of [l], and therefore, the [l] sound becomes alveolar which also has coronal quality. This can be defined as a case of regressive assimilation.

The difficulty in producing the velarized [÷] creates a different situation from what Eckman, Elreyes and Iverson (2001) propose because the velarized [÷] and the alveolar [l] are allophones in both Turkish and English. However, in Turkish the [l] is always alveolar when it is preceded by a front vowel; whereas, in English the velarized [÷] may occur even when the preceding vowel is front. Therefore, the difficulty in producing the velarized [÷] sound can be explained in terms of environmental markedness since front vowels preceding the alveolar [l] create a marked environment in English.

Our findings create a similar situation to the study of Japanese learners' production of alveolar and velarized [÷] by Flege, Naoyuki and Mann (1995). They had found that experienced speakers who lived in the United States for an average of 21 years were able to distinguish between the two sounds with a native like quality; whereas, those who lived in the US for an average of two years produced significantly less intelligible forms. Such results imply that it is natural for Turkish learners, who are not exposed to actual spoken language long enough, to have difficulty in distinguishing between alveolar and velar forms of the [l] sound.

The results of the Pre-test have shown that L2 learners have a tendency to replace the velarized [÷] with alveolar [l] when it is preceded by a front vowel. Table 4.14 displays the results of the Post-test for the pronunciation of the English word ***silk*** in order to observe if there is still difficulty in the pronunciation of the velar [l]:

Table 4.14. Pronunciation of the words with velarized [÷] in the Post-test

		Desired [÷]		Undesired [l]		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Silk	16	61.5	10	38.5	26	100	1.38	0.23
Con. Grp	Silk	14	53.8	12	46.2	26	100	0.15	0.69

Table 4.14 reflects the results of the production of the velarized [÷] and its substitution by the alveolar [l]. In the Experimental Group, 61.5% of the participants produced the desired velar [÷] in the English word ***silk***, and 38.5 % of the participants substituted the undesired alveolar [l] (¼2= 1.38, p= 0.23). In the Control Group, on the other hand, 53.8% of the participants produced the desired velar [l] and 46.2% of the participants produced the undesired alveolar [l] (¼2= 0.15, p= 0.69). Chi-square analysis shows that the difference between the desired and the undesired form production is not statistically significant for both the Experimental Group and the Control Group (p>0.05). Nevertheless, in comparison with the Pre-test, the percentages of the desired form show increase for both groups.

The difficulty in producing the velarized [÷] results from the environment in which the sound is used; that is, the Turkish language does not have the velarized [÷] after front vowels as in the words ***pil*** battery", ***ilk*** "first". In that case, English words with the velar [l] preceded by front vowels such as ***milk*** and ***silk*** will cause difficulty in pronunciation for Turkish native speakers since front vowels condition alveolar [l] in

Turkish words. Thus, L1 transfers are likely to occur. Once again, we might conclude that the role of the environmental markedness is undeniable.

4.1.7. Words with the Flap /‰/

The flap is a commonly used sound in American English. In its production, the tongue rapidly touches the alveolar ridge. It occurs in words such as *letter*, *bottle*, and *metal*. In order to observe whether learners have already acquired this sound, the Pre-test included the word *bottle*. Table 4.15 displays the frequencies of the desired and the undesired forms.

Table 4.15. Pronunciation of the words with the flap [‰] in the Pre-test

		Desired [‰]		Undesired [t]		Total		¼^2	p
		N	%	N	%	N	%		
Exp.Grp	Bottle	8	30.8	18	69.2	26	100	3.84	0.05
Con.Grp	Bottle	10	38.5	16	61.5	26	100	1.38	0.23

Table 4.15 shows that, Turkish EFL learners have difficulty in producing the American English flap; which is produced by tongue touching against the alveolar ridge very rapidly. According to Table 4.13, the Experimental Group produced the desired form 30.8 % and the undesired form 69.2% (¼2= 3.84, p=0.05). The desired form production is slightly higher in the Control Group with 38.5%. The undesired form was produced at the rate of 61.5 % (¼^2= 1.38, p= 0.23). Chi-square values imply statistical significance only for the Experimental Group.

The American English flap is described as an example of a post lexical rule by Eckman, Elreyes and Iverson (2001): “because it is not structure preserving in that it produces the sound [‰] which is not part of the phonemic inventory of English. In that case, we can presume that the [‰] sound is highly marked, and thus it is natural for the learners to have difficulty in producing it. As the MDH predicts, marked sounds that do not occur in L1 will be more difficult to learn.

According to Pre-test, L2 learners preferred [t] sound as a substitute for the flap in the word *bottle*. In the Post-test, word *waiter* has been analyzed to see if the desired form flap has been learned by the students. The results are displayed in Table 4.16:

Table 4.16. Pronunciation of the words with the flap /ɾ/ in the Post-test

		Desired [ɾ]		Undesired [t]		Total		¼^2	p
		N	%	N	%	N	%		
Exp.Grp	Waiter	11	42.3	15	57.7	26	100	0.61	0.43
Con.Grp	Waiter	7	26.9	19	73.1	26	100	5.53	0.01

Table 4.16 indicates the results of the American English flap production and its substitution by [t] sound. As the percentages show, 42.3 % of the Experimental Group produced the flap correctly and 57.7% of the participants produced [t] as the substitute. The difference between two forms is not statistically significant (¼2= 0.61, p=0.43). On the other hand, the Control Group remained only at 26.9% in producing the flap and 73.1% of the participants substituted the undesired [t] sound. The results for the Control Group seem statistically significant (¼2= 5.53, p=0.01).

In terms of the frequency of usage the American English flap [ɾ] can be considered more marked than the [t] sound because in English the flap occurs only word-internally between a stressed and an unstressed vowel. The orthographic representation in the words in which the flap is pronounced can be an explanation for the choice of [t] rather than [d] as a substitute. In addition, the MDH is proven right in its prediction that a sound that is marked and does not occur in L1 will be more difficult to learn since the Turkish language does not have the flap [ɾ] in its phonemic inventory.

4.1.8. The Vowel /æ/

American English commonly uses the vowel /æ/ whereas Turkish does not have such vowel in its phonemic inventory. Thus, Pre-test included words with /æ/ so that we can observe how students react to it. Table 4.17 displays the frequencies of desired and undesired forms in words that contain the vowel /æ/. The test word ***bag*** was selected for analysis.

Table 4.17. Pronunciation of the words with the vowel /æ/ in the Pre-test

		/æ/		/°/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Bag	9	34.6	17	65.4	26	100	2.46	0.11
Con. Grp	Bag	7	26.9	19	73.1	26	100	5.53	0.01

According to Table 4.17, the common American English vowel /æ/ was replaced by /°/ by most participants. 65.4% of the Experimental group produced the incorrect form /°/, and 34.6% the correct form /æ/ (¼2= 2.46, p=0.11). The percentages implicate a tendency toward the correct pronunciation of /°/; however, the difference between producing the correct and incorrect form is not statistically significant. On the other hand, 73.1% of the Control Group produced the incorrect form and 26.9% the correct form (¼2= 5.53, p=0.01). The difference between the two forms is statistically significant in favor of the incorrect form for the Control Group.

The American English vowel /æ/ is not part of Turkish vowel inventory. It is typologically marked since it is rare in languages of the world in comparison with the vowels /e/ and /a/. In terms of the MDH, one is likely to expect difficulty in learning. Therefore, Turkish learners refer to L1 transfer and substitute /e/ for /æ/. Wang (1995) had also found that Mandarin speakers' performance on /æ/ was weak since it only occurs allophonically in Chinese after the front vowel /i/. The preference of the vowel /°/ for /æ/ can be explained in terms of orthography because Turkish EFL learners have a tendency to pronounce the letter [a] as the /°/ sound. Therefore, the English words such as *cat*, fat, and *rat* are pronounced with the vowel /°/. This tendency is probably learned in the language classroom and remains fossilized in the phonological repertoire of the L2 learners.

According to our findings on the Pre-test, L2 learners prefer the vowel /°/ as a substitute for the /æ/ sound. The Post-test word *rat* has been analyzed and the results are displayed on Table 4.18.

Table 4.18. Pronunciation of the words with the vowel /æ/ in the Post-test

		Desired /æ/		Undesired /°/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Rat	24	92.3	2	7.7	26	100	18.61	0.00
Con. Grp	Rat	10	38.5	16	61.5	26	100	1.38	0.23

Table 4.18 displays the performance of the learners in producing the American English vowel /æ/. In the Experimental Group, 92.3% of the participants produced the desired form /æ/ and 7.7% of the participants produced the undesired form /°/. The difference between the production of two sounds is statistically significant (¼2= 18.61, p=0.00). The Control Group, on the other hand, had difficulty in producing the /æ/

sound. As it is seen from Table 4.23, the desired form was produced by 38.5% of the participants; whereas, the undesired form was produced by 61.5% of the participants. The difference between the desired and the undesired form production is not statistically significant (¼2= 1.38, p=0.23).

4.1.9. Vowels /a/ and /ʌ/

English makes a distinction between long vowel /a/ and the short one /ʌ/. To observe, whether L2 learners have acquired such distinction or not, the Pre-test included words containing /a/ and /ʌ/. Table 4.19 shows the frequencies of desired and undesired forms for the words with /a/. The test word *father* was analyzed.

Table 4.19. Pronunciation of the words with /a/ in the Pre-test

		Desired /a/		Undesired /ʌ/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	father	20	76.9	6	23.1	26	100	7.53	0.00
Con. Grp	father	18	69.2	8	30.8	26	100	3.84	0.05

As Table 4.19 displays, for the test word *father,* both the Experimental Group and the Control Group produced the long vowel /a/ correctly: 76.9% of the Experimental Group produced the desired form /a/ and 23.1 produced the undesired form /ʌ/ (¼2= 7.53, p=0.00); whereas 69.2% of the Control Group produced the desired /a/ and 30.8% produced the undesired /ʌ/ (¼2= 3.84, P= 0.05). The Chi-square analysis implies that for the Experimental Group, the difference between the desired and the undesired form production is statistically significant. For the Control Group, the results are not statistically significant; however, the percentages are greater in the production of the desired form.

The Pre-test analysis has shown that L2 learners have no difficulty in producing vowel /a/ in the word *father*; however, there was confusion between /a/ and /ʌ/ in the pronunciation of the word *mother,* and the preference for the undesired form /a/ was slightly higher. The Post-test word *bother* has been selected to test to observe if the learners have a tendency toward the desired form /a/. Table 4.20 displays the results:

Table 4.20. Pronunciation of the words with the vowel /a/ in the Post-test

		Desired /a/		Undesired /ʌ/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Bother	1	3.8	25	96.2	26	100	22.15	0.00
Con. Grp	Bother	7	26.9	19	73.1	26	100	5.53	0.01

According to Table 4.20, the learners had a great deal of difficulty in producing the vowel /a/ in the word ***bother***. As the table displays, only 3.8 % of the Experimental Group was able to produce the desired form /a/, while 96.2 % of the participants substituted the undesired /ʌ/ (¼2= 22.15, p= 0.00). Similarly, the Control Group had trouble in producing the correct form although they scored slightly better than the Experimental Group in that 26.9 % of the Control Group was able to produce /a/ correctly; however, 73.1% of the participants produced the undesired form. In both groups, the results are statistically significant (¼2= 5.53, p= 0.01).

The situation with the /ʌ/ sound was a little different in that students had difficulty in producing the desired form as Table 4.21 below illustrates. Test words *mother* and ***but*** were analyzed.

Table 4.21. Pronunciation of the words with the vowel /ʌ/ in the Pre-test

		Desired /ʌ/		Undesired /a/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	mother	12	46.2	14	53.8	26	100	0.15	0.69
	But	26	100	0	0	26	100		
Con. Grp	mother	14	53.8	12	46.2	26	100	0.15	0.69
	But	26	100	0	0	26	100		

The results of Table 4.21 shows that 53.8% of the Experimental Group produced the undesired form 53.8% and 46.2% of the participants produced the desired form; whereas, it is the other way around for the Control Group with 46.2% of the participants producing the undesired form and 53.8% producing the desired form. The results are not statistically significant (¼2= 0.15, p= 0.69). On the other hand, for the word ***but*** both groups produced the short vowel /ʌ/ correctly 100%. Therefore, no statistical analyses can be conducted. This suggests that incorrect sound production can be a learning error.

For the Post-test, the word *brother* was selected for the analysis of the /ʌ/ sound. The results are displayed in Table 4.22:

Table 4.22. Pronunciation of the words with the vowel /ʌ/ in the Post-test

		Desired /ʌ/		Undesired /a/		Total		¼^2	P
		N	%	N	%	N	%		
Exp. Grp	Brother	12	46.2	14	53.8	26	100	0.15	0.69
Con. Grp	Brother	2	7.7	24	92.3	26	100	18.61	0.00

As Table 4.22 illustrates, the learners have difficulty in producing the vowel /ʌ/. The desired form was produced by a lower number of participants than the undesired form; that is, 53.8% of the Experimental Group (¼2= 0.15, p= 0.69) and 92.3% of the Control Group preferred the undesired form (¼2= 18.61, p= 0.00). The results are statistically significant only for the Control Group. As it is seen on table 4.22, the frequency of usage for the Experimental Group is nearly equal for the desired and the undesired forms. This can be due to the effect of the treatment given in the classroom throughout the semester. The confusion between /a/ and /ʌ/ can be interpreted as a result of incorrect learning since the participants of our study generally confuse the pronunciation of the terms of relativity such as *father, mother, brother*. In addition, the word *bother* is also mispronounced because of overgeneralization resulting from the resemblance to the terms of relativity in spelling. Our findings are in conformity with the hypothesis of McAllister, Flege and Piske (1999) because they propose that the learners whose L1 does not have the long and short vowel contrast phonemically will have difficulty in learning those contrasts in L2.

4.1.10. The Schwa /\/

The English vowel schwa has been observed to cause difficulties especially when it occurs word-initially. Table 4.23 shows the frequencies of the desired and the undesired forms in pronunciation of words with the vowel schwa. Test word *ago* was selected for analysis:

Table 4.23. Pronunciation of the words with word-initial /\/ in the Pre-test

		Desired /\/		Undesired /°/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Ago	0	0	26	100	26	100		
Con. Grp	Ago	1	3.8	25	96.2	26	100	22.15	0.00

According to Table 4.23, all the informants in the Experimental Group produced the undesired form. Therefore, Chi-square could not be conducted. On the other hand, 96.2 % of the Control Group produced the undesired form and 3.8% produced the desired form. The results are statistically significant in favor of the desired form (¼2= 22.15, p=0.00).

The problem with word-initial schwa can be accounted for in terms of markedness. Schwa is a highly marked vowel, and therefore, its production by L2 learners will be in conformity with the MDH since the learners will have difficulty in producing this sound correctly. In that case, the learners will refer to their L1 vowel inventory to replace Schwa. This also seems to be the case in our study. Moreover, it must be noted that Turkish EFL learners have a tendency to pronounce the words that are spelled with the letter [a] as the vowel /e/. Words such as *ago* and *above* are generally pronounced with an initial /e/ by Turkish EFL learners.

The Pre-test results demonstrate that L2 learners have difficulty in producing word-initial schwa correctly, and thus they substitute /°/ for it. In order to observe whether the desired form has been learned, we have included the word *around* in the Post-test. The results are given on Table 4.24 below:

Table 4.24. Pronunciation of the words with word-initial /\/ in the Post-test

		Desired /\/		Undesired /°/		Total		¼^2	p
		N	%	N	%	N	%		
Exp. Grp	Around	17	65.4	9	34.6	26	100	2.46	0.11
Con. Grp	Around	8	30.8	18	69.2	26	100	3.84	0.05

The Pre-test results have shown that learners have difficulty in producing schwa when it occurs word-initially. Table 4.24 illustrates the results of the Post-test for the production of schwa in the word-initial position. There is an increase in the correct

pronunciation of this vowel for the Experimental Group, in which 65.4% of the participants produced the schwa, and 34.6% of the participants produced the vowel /°/ as a substitute. The results are not statistically significant (¼2= 2.46, p=0.11). The Control Group, on the other hand, seems to have more difficulty in producing the desired form: 30.8% of the participants produced the schwa and 69.2% of the participants produced the undesired /°/. The results for the Control Group are statistically significant (¼2= 3.84, p=0.05).

4.1.11. The Vowel /°/

English words such as *wear, tear,* and *pear* are usually mispronounced by Turkish EFL learners due to association with the words *fear*, and *rear*. Table 4.25 displays the results of the Pre-test on the pronunciation of the word *wear*:

Table 4.25. Pronunciation of the words with the vowel /°/ in the Pre-test

		Desired /°/		Undesired /i\/		Total		¼^2	p
		N	%	N	%	N	%		
Exp.Grp	Wear	1	3.8	25	96.2	26	100	9.84	0.00
Con.Grp	Wear	3	11.5	23	88.5	26	100	15.38	0.00

As Table 4.25 displays, both the Experimental Group and the Control Group have difficulty in pronouncing the vowel /°/ correctly, and the vowel was substituted by /i\/ to a great extent in both groups: 96.2% in the Experimental Group (¼2= 9.84, p= 0.00) and 88.5% in the Control Group (¼2= 15.38, p= 0.00). These results are statistically significant for both groups.

The problem here seems to be more of lexical rather than phonetic since the erroneous form production is a result of resemblance in terms of spelling. They word *wear* is often confused with the more frequently used words such as *feel*, and *real*, which are pronounced with /i\/. The vowel /°/ occurs both in Turkish and English. Thus, one would not expect any difficulty in its production. The participants had no trouble in producing the vowel /°/ in the words *bet* and *forget.*

The Pre-test results have shown that the participants are unable to pronounce the vowel /°/ in the word *wear*. Table 4.26 below displays the Post-test results on the pronunciation of /°/ in the English word *pear* :

Table 4.26. Pronunciation of the words with the vowel /°/ in the Post-test

		Desired /°/		Undesired /i\/		Total		¼²	p
		N	%	N	%	N	%		
Exp.Grp	Pear	1	3.8	25	96.2	26	100	22.15	0.00
Con.Grp	Pear	4	15.4	22	84.6	26	100	12.46	0.00

The analysis of the word *wear* produced similar results to those of the Pre-test in that learners continue to replace /°/ by /i\/. The rate of the desired form production still remains very low in the Experimental Group despite the treatment since the desired form was produced by only 3.8% of the participants. The Control Group scored a little higher than the Experimental Group with 15.4% of the participants producing the desired form. In both groups the rate of the undesired form production was high: 96.2% of the participants in the Experimental Group ($¼^2$= 22.15, p= 0.00), and 84.6% of the participants in the Control Group ($¼^2$= 12.46, p= 0.00). The results are statistically significant. The problem with spelling seems to have remained in the Post-test since the participants of both groups did not have any trouble in producing the vowel /°/ in the word *red*.

In the previous section, we have employed Chi-square analysis in order to observe in order to compare the Experimental Group and the control Group in terms of the desired form production in both the Pre-test and the Post-test. Wilcoxon Test on SPSS has been utilized in order to observe to what extent the treatment given to the Experimental group has been useful. In order to apply the test, all the incorrect forms that were produced by the participants were coded as zero and the correct forms were given the value of one. Section 4.3.1 is dedicated to the discussion of the Wilcoxon Test results for the production of consonants; whereas, section 4.3.2 is devoted to a discussion of Wilcoxon Test Results for vowel production.

4.2. Wilcoxon Test Results on the Effectiveness of the Treatment

Following sections are dedicated to a discussion of Wilcoxon test results conducted on the effectiveness of the treatment given to the Experimental Group.

4.2.1. Wilcoxon Test on Consonants

To determine whether the treatment given to Experimental Group throughout the semester worked or not, Wilcoxon Test was used. Sections 4.2.1.1 thorough 4.2.1.7 are dedicated to Wilcoxon analysis of consonants in order to determine whether the treatment has enabled students to overcome the difficulties they encounter in producing English consonants correctly.

4.2.1.1. Inter-dental Fricatives /}/and /ð/

To determine whether the treatment has been useful in terms of producing the inter-dental fricatives /}/ and /ð/ correctly, Wilcoxon Test has been conducted. Table 4.27 below indicates the usefulness of the treatment for inter-dental fricatives in different environments:

Table 4.27. Pronunciation of the /}/ sound word-initially and word-finally

	POT-PRT	n	Mean Rank	Sum of ranks	p
/}/ initial	Negative Ranks	2	9.00	18.00	0.02
	Positive Ranks	15	9.00	135.00	
	Ties	9			
/}/ final	Negative Ranks	2	5.50	11.00	0.05
	Positive Ranks	8	5.50	44.00	
	Ties	16			

The statistical analysis shows that there is a significant difference between the results of the Pre-test and the Post-test ($p<0.05$). The positive ranks are higher than the negative ranks for both environments in which /}/ was pronounced. This means that the difference between the Pre-test and the Post-test is in favor of the Post-test for the Experimental Group since higher positive ranks indicate credibility of the Post-test scores. Thus, we can infer that treatment has been useful in terms of producing the /}/ sound correctly

In addition to the pronunciation of the /}/ sound, its voiced counterpart the /ð/ sound was also examined so that we may be able to determine whether the treatment has been useful in terms of enabling the learners to produce it correctly. Table 4.28 displays the results of the Wilcoxon Test conducted for the pronunciation of the voiced inter-dental fricative /ð/:

Table 4.28. Pronunciation of the /ð/ sound word-initially and word-finally

	POT-PRT	n	Mean Rank	Sum of ranks	P
/ð/ initial	Negative Ranks	0	0.00	0.00	0.05
	Positive Ranks	8	4.50	36.00	
	Ties	18			
/ð/ medial	Negative Ranks	0	0.00	0.00	0.05
	Positive Ranks	8	4.50	36.00	
	Ties	18			
/ð/ final	Negative Ranks	0	0.00	0.00	1.00
	Positive Ranks	0	0.00	0.00	
	Ties	26			

The analysis shows that the results are statistically significant for /ð/ sound used word-initially and word-medially (p=0.05). Since the positive ranks are higher than the negative ranks, it can be inferred that the Post-test scores indicate success. However, the analysis for the word-final /ð/ shows that there is no statistical significance (p=1.00). Chi-square analysis conducted earlier had shown that word-final position is the most marked environment of the /ð/ sound for Turkish native speakers. In this case, the treatment has not been as effective as the other two environments for the production of /ð/ sound.

4.2.1.2. Word-final Voiced Stops

Chi-square analyses had shown that L2 learners still had difficulty in producing word-final voiced stops despite the treatment. Table 4.29 displays the results of Wilcoxon Test conducted for word-final voiced stops:

Table 4.29. Pronunciation of the word-final voiced stops

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	7	5.50	38.50	0.206
Positive Ranks	3	5.50	16.50	
Ties	16			

The Post-test results for the word-final voiced stops indicate that there is no improvement in the correct pronunciation of the word-final voiced stops. According to Table 4.29, the value of the negative ranks is higher than the positive ranks. These results are not statistically significant ($p>0.05$). This means that in terms of the word-final voiced stops, word-final position is environmentally marked and this leads to transfer from L1. It seems that the treatment has not provided the desired effect.

4.2.1.3. Consonant Clusters

In order to observe the effectiveness of the treatment with reference to consonant clusters, the data were analyzed. Table 4.30 indicates the results of Wilcoxon Test:

Table 4.30. Pronunciation of the Consonant Clusters

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	4	6.00	24.00	0.36
Positive Ranks	7	6.00	42.00	
Ties	15			

According to Table 4.30, the positive ranks are higher than the negative ranks. Even though the results are not statistically significant ($p>0.05$), it can be inferred that the

treatment has an effect to some extent on the correct pronunciation of the consonant clusters.

4.2.1.4. The /w/ Sound

The /w/ sound occurs in Turkish words as an allophone of /v/ before and after rounded vowels. Table 4.31 below illustrates the results of the Wilcoxon Test conducted for the English words with the /w/ sound:

Table 4.31.Pronunciation of the /w/ sound

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	3	3.00	9.00	0.65
Positive Ranks	2	3.00	6.00	
Ties	21			

Table 4.31 shows that the positive ranks and the negative ranks are equal. The results are not statistically significant ($p>0.05$). It can be inferred from these results that there is no improvement in the Post-test in terms of producing the desired form; that is, most of the participants continue to substitute the /v/ sound for the /w/ despite the treatment.

4.2.1.5. The Velarized /÷/

Chi-square analysis of the Pre-test has shown that the velarized [÷] is substituted by the alveolar [l] by Turkish EFL learners. Table 4.32 displays the results of Wilcoxon Test for us to determine whether the treatment to enable the learners to produce thevelarized [l] correctly:

Table 4.32.Pronunciation of the velarized [÷]

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	0	0.00	0.00	0.00
Positive Ranks	13	7.00	91.00	
Ties	13			

According to Table 4.32, the positive ranks are greater than the negative ranks. The difference in ranks is statistically significant (p=0.00). This implies the credibility of the Post-test scores and therefore it can be inferred that the treatment has been quite useful in terms of creating an awareness of the distinction between the alveolar [l] and the velar /÷/.

4.2.1.6. Velar /{/

Chi-square analysis for the Pre-test and the Post-test have shown that L2 learners have a tendency to pronounce words with /{/ with /-ink/. Table 4.33 demonstrates the effectiveness of the treatment on the production of the desired form:

Table 4.33.Pronunciation of the velar /{/

POT-PRT	N	Mean Rank	Sum of ranks	p
Negative Ranks	1	5.50	5.50	0.01
Positive Ranks	9	5.50	49.50	
Ties	16			

As Table 4.33 demonstrates, the positive ranks are greater than the negative ranks. The difference between the two ranks is statistically significant (p=0.01). However, as Chi-square analyses for the velar /{/ indicate (see tables 4.11 and 4.12), the learners preferred the undesired form /-ink/ most of the time even on the Post-test (53.8%). Nevertheless, there is an increase from 7.7% to 38.5% in the production of the desired form in the Experimental Group. This can be interpreted as success by the Wilcoxon Test.

4.2.1.7. The American English Flap /‰/

Both the Pre-test and the Post-test scores have demonstrated that L2 learners have trouble in perceiving the flap, and they have a tendency to replace it with the /t/ sound. This already implies that the treatment has not been effective. Table 4.34 indicates the results of the Wilcoxon Test on the pronunciation of the flap:

Table 4.34. Pronunciation of the flap /‰/

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	8	4.50	36.00	0.00
Positive Ranks	0	0.00	0.00	
Ties	18			

As the figures display, the negative ranks higher than the positive ranks. The results are statistically significant (p=0.00) in the direction of the undesired form. This suggests that despite the treatment, learners still had difficulty in producing the flap in the Post-test.

4.2.2. Wilcoxon Test on Vowels

This section deals with the pronunciation of vowels. The aim of the Wilcoxon test is to see whether the treatment has a positive effect on the performances of the participants of the Experimental Group.

4.2.2.1. The Vowel /æ/

This particular sound was substituted by /°/ by most learners in the Pre-test. However, Post-test scores have shown that Experimental Group learners have successfully produced /æ/. Table 4.35 demonstrates the effectiveness of the treatment on the Post-test:

Table 4.35.Pronunciation of the/æ/ sound

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	0	0.00	0.00	0.00
Positive Ranks	15	8.00	120.00	
Ties	11			

As it is seen from Table 4.35, the positive ranks are far greater than the negative ranks. These values are statistically significant (p=0.00). This implies that the treatment has been quite effective in enabling the students to produce the vowel /æ/ without difficulty.

4.2.2.2. Words with/a/

Chi-square results have demonstrated that L2 learners have confusion between /a/ and /ʌ/ in their pronunciation of words *father, mother, bother,* and *brother*. Table 4.36 displays the results of Wilcoxon Test on the effectiveness of the treatment for words pronounced with the /a/ sound

Table 4.36.Pronunciation of the /a/ sound

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	19	10.00	190.00	0.00
Positive Ranks	0	0.00	0.00	
Ties	7			

As it is shown on Table 4.36, the negative ranks are higher than the positive ranks. The results are statistically significant (p=0.00) in the direction of the undesired form. Thus, it can be concluded that the treatment has not been effective in terms of creating a complete awareness of the distinction between /a/ and /ʌ/.

Similar situation is also observed in the case of words with /ʌ/ as it is the figures on Table 4.37 display:

Table 4.37.Pronunciation of the /ʌ/ sound

POT-PRT	N	Mean Rank	Sum of ranks	p
Negative Ranks	5	5.50	27.50	1.00
Positive Ranks	5	5.50	27.50	
Ties	16			

According to Table 4.37, the positive and the negative ranks are equal. The results are not statistically significant (p=1.00). This means that L2 learners still have some difficulty in distinguishing between /ʌ/ and /a/. Thus, it can be inferred that the treatment has not been effective.

4.2.2.3. Word-initial Schwa /\/

Chi-square analysis of the Post-test has shown that word-initial schwa has been produced correctly by 65.4% of the learners in the Experimental Group (see Table 4.24). In order to observe the effectiveness of the treatment on the Post-test, Wilcoxon test has been conducted. The results are displayed on Table 4.38:

Table 4.38.Pronunciation of the /\/

POT-PRT	n	Mean Rank	Sum of ranks	p
Negative Ranks	0	0.00	0.00	0.00
Positive Ranks	17	9.00	153.00	
Ties	9			

According to Table 4.38, the positive ranks are far greater than the negative ranks. The results are statistically significant (p=0.00); that is, the treatment has been useful in enabling students to pronounce the word-initial schwa without difficulty.

4.2.2.4. The Vowel /°/

Chi-square analysis has demonstrated that learners have great difficulty in producing the vowel /°:/ and it is replaced by /i\/ by mot learners. Table 4.39 displays the results of Wilcoxon Test for the effectiveness of the treatment on the production of /°/:

Table 4.39. Pronunciation of the /°/ sound

POT-PRT	N	Mean Rank	Sum of ranks	P
Negative Ranks	5	3.50	17.50	0.10
Positive Ranks	1	3.50	17.50	
Ties	20			

As table 4.39 indicates, negative ranks are greater than positive ranks. This is in compliance with the Chi-square results. It can be inferred that the treatment has not been effective in terms of producing the vowel /°/ correctly.

4.3. The Relationship between Markedness and the Level of Difficulty in Pronunciation

The main purpose of this thesis is to account for the phonological errors of the Turkish EFL learners in relation to the notion of markedness. As previously discussed, Eckman (1977) proposed the Markedness Differential Hypothesis (the MDH) in order to explain why L2 learners produced certain L2 sounds incorrectly. The most important part of Eckman's Hypothesis is the suggestion that the L2 forms that are marked and non-existent in L1 will be more difficult to learn. Taking this suggestion as the basis of our evaluation, in this section we will try to determine the common characteristics of the incorrectly produced sounds by L2 learners. Table 4.40 illustrates the difference between the Pre-test and the Post-test in terms of the improvement in desired form production of the English consonants. In observing such improvement, we have run crosstabs in Chi-square analysis so as to determine whether there is a significant difference between the Pre-test and the Post-test given to both groups:

Table 4.40.Pre-test and Post-test desired forms in the pronunciation of consonants

	Experimental Group				Control Group			
	Pre-test	Post-test	¼^2	p	Pre-test	Post-test	¼^2	p
/}/ initial	15.4%	65.4%	0.49	0.48	26.9%	34.6%	5.73	0.01
/}/ final	30.8%	53.8%	2.08	0.14	19.2%	23.1%	4.75	0.02
/ð/ initial	0%	30.8%	-----	------	7.7%	11.5%	3.14	0.07
/ð/ medial	11.5%	42.3%	4.62	0.03	26.9%	15.4%	1.28	0.25
/{/	7.7%	38.5%	0.24	0.88	0%	38.5%	---	---
Dark /÷/	11.5%	61.5%	2.12	0.14	23.1%	50.8%	0.51	0.47
Flap /‰/	30.8%	42.3%	0.65	0.42	38.5%	26.9%	0.07	0.78
/sl/ initial	23.1%	53.8%	0.04	0.82	7.7%	0%	---	---

In Table 4.40, according to ¼^2 and p values obtained for the Experimental Group, the differences in terms of producing the desired forms are not statistically significant. On the other hand, for the Control Group, the results are statistically significant for /}/ initial (¼^2=5.73, p=0.01), and /}/ final (¼^2= 4.75, p=0.02); however, the percentages of the desired form production indicate a low ratio of improvement when they are compared with the percentages of the Experimental Group.

Since statistical significance is not a determining factor for the results in Table 4.40, we can determine the level of difficulty in pronunciation by looking at the differences in percentages between the Pre-test and the Post-test. According to Table 4.40, the increase in the desired form production between the Pre-test and the Post-test displays the following hierarchy of desired form production from the most successfully produced to the least:

/}/initial >dark/÷/ >/sl/ initial cluster >/}/final >flap/‰/ *>/ð/ medial >* ***the velar /{/ >/ð/ initial***

This hierarchy leads to the conclusion that markedness is not the only factor that causes difficulty in learning L2 speech sounds.

In addition, the following factors also play an important role in determining the level of difficulty:

a) L1 and L2 has the same sound, but the environment these sounds are used in both languages is different: e.g., the dark /l/, and the velar /{/.
b) The marked sound occurs only in L2. But the level of difficulty is rather determined by the environment in which the sound occurs. For example, the voiced inter-dental fricative /ð/ in word-initial position is more marked than in the word-medial position in L2.

In producing certain sounds, the participants showed either very little improvement, or decrease in terms of producing the desired forms. Table 4.41 illustrates the consonants that were produced with difficulty in both the Pre-test and the Post-test.

Table 4.41.Troublesome consonants for the learners

	Experimental Group				Control Group			
	Pre-test	Post-test	¼^2	p	Pre-test	Post-test	¼^2	p
/ð/ final	0%	0%	2.90	0.08	0%	0%	9.46	0.00
/d/ final	11.5%	15.4%	0.61	0.43	3.8%	3.8%	0.04	0.83
/w/ initial	15.4%	11.5%	0.83	0.36	3.8%	11.5%	7.97	0.00
/w/ medial	15.4%	3.8%	5.72	0.01	11.5%	0%	----	----

According to Table 4.41, only the results for the production of the desired form /w/ in word-medial position came out statistically significant (¼^2= 5.72, p= 0.01) in the Experimental Group. On the other hand, in the Control Group the results for word-final /ð/ (¼^2= 2.90, p= 0.08), and word-initial /w/ (¼^2= 7.97, p= 0.00) are statistically significant. The percentages in Table 4.41 imply the following hierarchy in terms of desired form production from the most difficult sound to the least difficult one:

Word final /ð/ >word final /d/ >initial /w/ >word-medial /w/

This hierarchy also supports the notion of environmental markedness because the difficulty of the desired form production is determined by the environment in which the sound is used. The word-final /ð/ sound shares similar characteristic with the word-final /d/ sound because in attempting to produce both sounds, the participants substituted voiceless phonemes (/} and t/ for /ð/ and /t/ for /d/). The /w/ sound is also interesting since Turkish has this sound but it occurs only after or before rounded vowels.

Therefore, the environment in which the /w/ sound occurs is conditioned by the position of the lips.

To summarize, the use of the term *environmentally marked* seems appropriate because rather than typological markedness, the environment in which a sound is used seems to determine the degree of difficulty in learning to produce a sound correctly. The fact that a sound occurs in L2 but not in L1 has not been found as effective in our analysis as it has been claimed in Eckman's MDH because sounds such as /ð/ do not occur in L1; however, the results in Table 4.40 show that they can be learned without difficulty depending on the environment in which they are used.

The participants' performance on the production of the English vowels can also be examined so as to come up with a hierarchy of difficulty in pronunciation. Table 4.42 displays the results of the difference between the Pre-test and the Post-test in terms of the desired vowel production.

Table 4.42.Pre-test and Post-test desired forms in the pronunciation of vowels

	Experimental Group				Control Group			
	Pre-test	Post-test	¼^2	p	Pre-test	Post-test	¼^2	p
/æ/	34.6%	92.3%	1.14	0.28	26.9%	38.5%	1.41	0.23
/ʌ/	46.2%	46.2%	1.33	0.24	53.8%	7.7%	0.01	0.91
/a/	76.9%	3.8%	0.31	0.57	69.2%	26.9%	0.65	0.41
/\/	0%	65.4%	----	-----	3.8%	30.8%	0.46	0.49
/°/	19.2%	3.8%	0.24	0.61	11.5%	15.4%	6.85	0.00

When Table 4.42 is examined, only the results for the production of the long vowel /°:/ seem statistically significant (¼^2= 6.85, p= 0.00). The difference between the Pre-test and the Post-test in terms of the increase in the desired form production implies the following hierarchy of vowels from the most difficult vowel to the least difficult one in terms of pronunciation:

/°/ >/ɑ/ >/ʌ / >/\/ >/æ/

According to this hierarchy the vowel /æ/ was produced by the greatest number of participants in the Experimental Group, and the vowel /°:/ was the one which was the most troublesome for the participants. It can be inferred from the hierarchy that similar to consonants, markedness is not the factor that determines the level of difficulty in the pronunciation of the English vowels. For instance, the /a/ sound is more marked than

the /ʌ/; however, the Pre-test results imply that most participants did not have any difficulty in producing it. As it was previously discussed, the decrease in the incorrect pronunciation of the vowel /a/ in the Post-test is due to either fossilized incorrect learning or to the incorrect association of the Post-test word ***bother*** with the words such as ***mother,*** and ***brother,*** which are pronounced with the short vowel /ʌ/. Similarly, the participants confused the pronunciation of the Pre-test word ***mother*** and the Post-test word ***brother*** to a great extent and produced the long vowel /a/ instead of the desired form /ʌ/.

The problem with the vowel /°/ seems to be a matter of overgeneralization since the learners pronounce the words such as ***wear*** and ***pear*** with the /i\/ sound as a result of resemblance to words such as ***heal*** and ***real*** in spelling. On the other hand, the participants had no difficulty in producing the vowel /°/ in the words ***red*** and ***bet.*** This suggests that the fossilized forms that results from incorrect learning or spelling associations must not be ignored.

CHAPTER 5

CONCLUSION

5.0. Introduction

In this study, we have taken Eckman's (1977) "the Markedness Differential Hypothesis as basis and tried to find out whether there is a relationship between markedness and phonological errors of Turkish EFL learners or not. In this chapter, Section 5.1 is dedicated to a discussion of how the analysis handled the research questions and hypotheses formulated in Chapter 1 of this thesis. In 5.2, we will discuss what implications this study provides in the field of English Language Teaching. In Section 5.3, the implication for future studies will be discussed.

5.1. Research Questions and Hypotheses

This thesis was formulated around three research questions and three hypotheses.

Research question 1: Which phonemes are more difficult to produce for Turkish ESL learners?

Hypothesis 1: MDH will hold at phonemic level; that is, when we consider distinction between marked and unmarked phonemes, marked ones will be more difficult to produce by second language learners.

The analysis of the Pre-test has shown that the learners have difficulty in producing the following consonants: the inter-dental fricatives [}, ð], word-final voiced stops [b d g], the [w] sound, the velar nasal [{], the dark [÷], and the flap [‰]. In addition, the learners also have difficulty in producing the consonants clusters without epenthesis. The results of the Post-test have shown that the participants of the Experimental Group have improved in producing the word-initial and final /}/, the dark/÷/, /sl/ initial cluster, the flap/‰, word-initial and medial /ð/, and the velar /{/. On the other hand, the learners showed little or no improvement in producing word-final /ð/, word-final /d/, word-initial and medial /w/. The Post-test results imply that markedness is not the only factor that determines the level of difficulty. The role of the environment in which a sound is used is more important. Thus, we use the term *environmentally marked* to suggest that the difficulties that learners experience relate to the environment in which a sound is used. For instance, the voiced inter-dental fricative [ð] is more marked than its voiceless

counterpart, especially when it occurs in the word-final position. The effect of environmental markedness has also been observed for the [w] sound, the velar [{], and the word-final voiced stops. Although these sounds occur in the Turkish language, certain environments in which they occur in the English Language are marked for the native speakers of Turkish. Thus, Turkish native speakers of EFL experience difficulty in producing such sounds. Moreover, the participants have difficulty in producing the word-final voiced stops. This is interpreted as a case of environmental markedness where certain environments in which L2 sounds occur can be considered marked for L2 learners and thus they cause difficulties in learning.

In terms of vowel production, the Pre-test analysis has shown that the learners have difficulty in producing the vowels [æ], [\] and [°:]. It has also been observed that the learners confuse the vowels [ʌ] and [a]. The Post-test results have shown that the difficulty in producing [°] and the confusion between [ʌ] and [a] still remains. The problems encountered with these vowels are interpreted with reference to orthography and fossilized incorrect learning. Markedness of the vowels does not seem to be a determining factor since marked vowels such as [æ] and [\] have been produced correctly to a great extent at the Post-test. The errors in vowel production are rather interpreted as a result of fossilized incorrect learning and overgeneralization of certain forms as well as being misled by the orthographic representation of the words.

Research question 2: What is the role of the difference in syllable structure between English and Turkish in terms of phonological errors?

Hypothesis 2: MDH will be valid for syllable structure with reference to phonotactic differences between the English and Turkish languages; for example we predict that consonant clusters will be marked and therefore will be more difficult to learn.

The analysis of the Pre-test has shown that the learners have great difficulty in producing the consonant clusters without epenthesis because the role of L1 transfer is highly effective. The Pre-test did not focus on the tri-member consonant clusters because the learners were already having trouble with the two-member clusters. Turkish undergoes resyllabification with the foreign words that have initial consonants clusters. This is done by means of inserting an epenthetic vowel and thus turning a CCV syllable into CV CV syllables. Our findings have provided evidence for such resyllabification. The Post-test results have shown that after the treatment the participants of the Experimental Group have improved their pronunciation to some extent. The fact that the percentages are high as expected implies that consonant clusters being more marked

than the more frequent CV type of syllables are difficult to produce for the learners whose L1 does not have such syllable patterns. In such cases, the effect of L1 will account for the erroneous forms produced by the L2 learners.

Research Question 3: Would an implementation of a course designed specifically to point out the differences between L1 and L2 phonology help the students in terms of their personal development in pronunciation?

Hypothesis 3: A course specifically designed to point out phonetic differences between English and Turkish will help students in terms of their personal improvement in pronunciation.

In order to account for the credibility of the treatment given to the Experimental Group, we have conducted the Wilcoxon Test. The results of the test conducted for each problematic sound has shown that the number of the participants producing correct forms have increased for certain sounds. The learners started producing these sounds correctly: [}], [ð], the dark /÷/, the velar /{/, /æ/, /\/, and consonant clusters. It should be noted here that the schwa [\] sound was examined for the word-initial environment, and the pronunciation of the voiced inter-dental fricative [ð] improved word-initially and medially but not word-finally.

In order to observe whether there is a significant difference between the Pre-test and the Post-test given to both groups, Chi-square analysis with crosstabs was conducted (see section 4.3). Even though results were not statistically significant most of the time, the percentages indicating the frequency of usage demonstrated that the ratio of desired form production was higher in the Post-test in the Experimental Group than in the Control Group.

The overall results imply that the treatment has been effective in enabling the participants to correct their phonological errors to a certain extent. However, factors such as environmental markedness and fossilized incorrect learning effectively remain as causes of undesired form production. On the other hand, the awareness of phonological errors should enable the student teachers to work on their errors so that they will improve their pronunciation. Therefore, we strongly believe that by creating such awareness, the treatment has helped the participants evaluate their pronunciation and correct their errors.

5.2. Implications for English Language Teaching

Teaching Pronunciation is an important part of ELT. Part of learning a foreign language entails developing pronunciation skills. Achieving a native-like pronunciation is a desired but a very difficult task due to factors such as age and living in an environment where English is not spoken as L1. Moreover, the effect of L1 reflects in learning L2 pronunciation as much as or even more than learning other skills such as learning the grammar. Our findings have shown that markedness creates a great deal of difficulty in learning speech sounds. Whenever learners come across a marked sound that is not part of their L1, they seem to struggle in terms of producing such sound correctly. Once we determine which sounds are problematic, it is necessary to seek ways of enabling the learners to become aware of what causes the problems. Therefore, English phonemes should not be taught in isolation, but rather they be taught in context which includes all the environments each phoneme is used. In addition, learners should be made aware of phonological differences between L1 and L2. Teaching minimal pairs in English is useful. However, our analysis has shown that merely giving examples such as pin and pen may not be enough in certain cases where L1 separates from L2. For instance, in the case with the clear-dark /l/ distinction, Turkish EFL learners preferred alveolar [l] most of the time because their L1 required such sound when it is preceded by a front vowel due to a process we might call coronalization. In English, the situation is different in that front vowel has no such effect since the /l/ remains velarized even though it is preceded by a coronal vowel. Situations like this require extra attention which means that we need to provide counter examples from L1 whenever phonological systems of L1 and L2 operate differently; that is, minimal pairs should be constituted from both languages so that learners will develop an awareness of the differences consciously. Giving minimal pairs such as the English word ***pill***, and the Turkish word ***pil*** "battery" might help learners understand the fact that the two are similar words that are pronounced differently. This way, learners may be able to develop some kind of phonological repertoire closer to that of an L2 native speaker.

The effect of L1 is one of the factors that might affect pronunciation of the EFL learners. In addition, orthography is also brought into attention. Our analysis has shown that learners are often misled due to resemblances in spelling. For instance, English words including initial Schwa such as ***above*** and ***ago*** are often pronounced with /°/ word-initially. Furthermore, words such as ***good*** and ***foot*** are often confused with words

such as *food* and *moon* and thus are pronounced with the long vowel /u/ instead of /¤/. Therefore, language teachers should make their students aware of the fact that spelling is not a completely reliable factor in pronunciation.

The aim of the treatment given to the Experimental Group in our study was to create an awareness of the phonological errors in learners so that they will be able to produce English phonemes correctly and later on teach them correctly when they become professional instructors of the English language. Our analysis has shown that certain speech sounds are more difficult to produce for Turkish EFL learners than others. Therefore, it is necessary for both teachers and learners to become aware of the problematic sounds. Teaching English pronunciation should entail a comparison of L1 and L2 phonological structures. Student teachers may still experience difficulties in pronunciation in their casual speech; however, it is our belief that they will be more careful in terms of teaching pronunciation in the classroom because they will act more consciously having been aware of the problematic sounds. Thus, a phonological comparison of L1 and L2 as well as error analysis should be incorporated into a syllabus that is designed to teach L2 pronunciation.

5.3. Implications for Further Studies

Our analysis has several implications for further studies. First of all, the word-lists included in the tests were not as detailed as those in the studies that focused on a single topic such as final atop devoicing. Therefore, a more detailed word list can be prepared to see if the preceding vowels have an effect on the devoicing of stops. Second of all, studies conducted on English vowels included experiments of perception as well as production. The notion of perception has been ignored in our study. Therefore, it might be useful to examine if Turkish EFL learners perceive English vowels accurately. In addition, this study has ignored the differences in vowel length due to time restrictions. As a further study, it may also be useful to look into L2 learners' production of long vowels and diphthongs in comparison with data obtained from the native speakers of the English language. As we have previously mentioned as one of the limitations, due to time restrictions, the acoustic analysis of vowel length has been excluded in our study. Even though we are aware of the vowel length problem, we believe that perception and production of the vowels by the learners in exactly the same manner and duration as performed by a native speaker would be an almost impossible task to achieve in terms of applying a treatment to EFL learners. However, it is our

belief that a future analysis of errors regarding long and short vowel distinction will be of great linguistic value.

Finally, our goal was to provide certain guidelines for language teachers so that they will be able to deal with phonological errors of their students. Therefore, in our analysis we have avoided the use of theories that might be too technical for them. However, it may provide useful insights for linguistic analysis to examine the relationship between markedness and phonological errors on a constraint based analysis using the Optimality Theory (Prince and Smolenzky, 1995).

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Appendix I

The Pre-test

Instruction: Read each word out loud.

1. seat
2. sit
3. bait
4. bet
5. father
6. mother
7. caught
8. bought
9. boat
10. full
11. fool
12. but
13. bite
14. about
15. toy
16. table
17. forget
18. America
19. elephant
20. ago
21. early
22. girl
23. wear
24. ear
25. call
26. milk
27. wind
28. swim
29. few
30. ring

31. bath
32. thorn
33. bathe
34. there
35. jeep
36. very
37. live
38. singer
39. writer
40. bag
41. cab
42. boys
43. head
44. cats
45. train
46. slim
47. slim
48. bring
49. asked
50. strong
51. splash
52. girls
53. smiths
54. atom
55. mute
56. happily
57. coward
58. cotton
59. bottle
60. analysis

Appendix II

The Post-test

Instruction: Read each word out loud

1. Read
2. Rid
3. Rate
4. Red
5. Rat
6. Bother
7. Brother
8. Joke
9. Joy
10. Hole
11. Hall
12. Coin
13. Roll
14. Role
15. Cook
16. Moon
17. Good
18. Rude
19. That
20. Theme
21. Breathe
22. Math
23. Ether
24. Church
25. Waiter
26. Rower
27. Row
28. Real
29. Feel
30. Jumper

31. Gin
32. Books
33. Dogs
34. Working
35. Sing
36. Sin
37. Scene
38. Above
39. Around
40. Treasure
41. Rock
42. Spoon
43. Found
44. Promise
45. Kill
46. Silk
47. Sharks
48. Corn
49. Faiths
50.Hammer
51. Few
52. Slash
53. Star
54. Flame
55. Road.
56. Runner
57. Soon
58. Fall
59. Pear
60. Cruel

Appendix III

The Syllabus for the treatment designed for the Experimental Group

Week 1

Application of the Pre-test

Week 2

Introduction: Phoneme and allophone, phonetics and phonology. Speech production, consonants, vowels, phonetic and phonemic transcription

Week 3

Phonemes of the Turkish language: vowels, and consonants, Turkish vowel harmony, phonotactics, syllable structure, stress

Week 4

Turkish stress rules

Week 5

English consonants and vowels and syllable structure. Phonetic Transcription and pronunciation exercises in English and Turkish.

Week 6

The participants are introduced the errors they made in producing the consonant phonemes:
The interdental fricatives /}/ and /ð/ in all environments
The flap /‰/

Week 7

L1 related errors:
Turkish alveolar [l] versus English dark /÷/
Word-final voiced stops
The velar /{/
Initial consonant clusters
The /w/ sound

Week 8

Error analysis of the consonants continues

Week 9

Error analysis of the vowels

Week 10

Error analysis of the vowels continued

Week 11

Application of the Post-test

Coursebooks:

Collins, B. & Inger M. Mees. (2003), *Practical phonetics and phonology: A resource book for students*, Routledge: London.

Ergenc, I. (2002), *Konuşma dili ve Türkçenin söyleyiş sözlüğü*, Istanbul: Multilingual.

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