รูปแปรของเสียงพยัญชนะต้นควบกล้ำ/r/ในหมู่นักศึกษาไทยระดับปริญญาบัณฑิตชั้นปีที่1: อิทธิพลของภาษาแม่และทฤษฎีความถี่ในการปรากฏของหน่วยเสียงในการจัดลำดับความยาก-ง่ายของการออกเสียง

นางสาวพีริยา พงษ์สาริกัน

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาอักษรศาสตรมหาบัณฑิต

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VARIANTS OF INITIAL CLUSTERS WITH /r/ AMONG THAI FIRST-YEAR UNDERGRADUATE STUDENTS: CROSS-LINGUISTIC INFLUENCE AND THE MARKEDNESS THEORY IN SETTING UP THE LEVEL OF DIFFICULTY IN PRONUNCIATION

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A Thesis Submitted in Partial Fulfillment of the Requirements
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Thesis Title	VARIANTS OF INITIAL CLUSTERS WITH /r/ AMONG THAI FIRST-YEAR UNDERGRADUATE STUDENTS: CROSS-LINGUISTIC INFLUENCE AND THE MARKEDNESS THEORY IN SETTING UP THE LEVEL OF DIFFICULTY IN PRONUNCIATION
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พีริยา พงษ์สาริกัน : รูปแปรของเสียงพยัญชนะต้นควบกล้ำ/r/ในหมู่นักศึกษาไทยระดับปริญญาบัณฑิตชั้นปีที่1: อิทธิพลของภาษาแม่และทฤษฎีความถี่ในการปรากฏของหน่วยเสียงในการจัดลำดับความยาก-ง่ายของการออกเสียง. (VARIANTS OF INITIAL CLUSTERS WITH /r/ AMONG THAI FIRST-YEAR UNDERGRADUATE STUDENTS: CROSS-LINGUISTIC INFLUENCE AND THE MARKEDNESS THEORY IN SETTING UP THE LEVEL OF DIFFICULTY IN PRONUNCIATION) อ.ที่ปรึกษา : ผศ.ปทมา อัตนโถ, 81หน้า.

งานวิจัยชิ้นนี้มุ่งที่จะศึกษารูปแปรของเสียงพยัญชนะต้นควบกล้ำ/r/ในหมู่นักศึกษาไทยระดับปริญญาบัณฑิตชั้นปีที่1 เพื่อจัดระดับความยาก-ง่ายของการออกเสียง ทฤษฎีหลักที่ใช้ในการตั้งสมมุติฐานได้แก่อิทธิพลของภาษาแม่ (Cross-Linguistic Influence) และทฤษฎีความถี่ในการปรากฏของหน่วยเสียง (the Markedness Theory) สมมุติฐานคือพยัญชนะต้นควบกล้ำ /r/ ที่มีคู่เทียบเสียงในภาษาไทยจะออกเสียงได้ง่าย และพยัญชนะต้นควบกล้ำ /r/ ที่เกิดน้อยและมีลักษณะเฉพาะจะออกเสียงได้ยาก จากสมมุติฐานดังกล่าว สามารถจัดระดับความยาก-ง่ายของการออกเสียงได้ กลุ่มตัวอย่างในการเก็บข้อมูลคือนิสิตจุฬาลงกรณ์มหาวิทยาลัยชั้นปีที่ 1 วิธีการทางสถิติที่ใช้พิสูจน์ความแตกต่างอย่างมีนัยสำคัญของร้อยละของรูปแปรที่ปรากฏคือค่าไคสแควร์

ผลการวิจัยพบว่า สมมุติฐานถูกต้องในภาพรวม กล่าวคือ พยัญชนะต้นควบกล้ำ /r/ ที่มีคู่เทียบเสียงในภาษาไทยจะออกเสียงได้ง่าย และพยัญชนะต้นควบกล้ำ /r/ ที่เกิดน้อยและมีลักษณะเฉพาะจะออกเสียงได้ยาก ข้อยกเว้นคือกลุ่มตัวอย่างออกเสียง [t^hr] ได้ถูกต้องมากกว่าที่คาดไว้ นั่นคือ กลุ่มตัวอย่างออกเสียง [t^hr] ได้ถูกต้องเท่า ๆ กับเสียง [p^hr]และ[k^hr] นอกจากนี้ยังออกเสียง /fr/ ได้ถูกต้องมากกว่าเสียง /br/ และ /dr/ ถึงแม้ว่าทั้งเสียง /fr/ /br/ และ /dr/ ต่างไม่มีคู่เทียบเสียงในภาษาไทย ข้อยกเว้นดังกล่าวอธิบายได้ด้วยทฤษฎีสัทลักษณ์ทวิภาคที่ช่วยใช้จัดกลุ่มของเสียงและอิทธิพลของคำยืมภาษาอังกฤษที่ปรากฏในภาษาไทย กล่าวคือมีคำยืมที่มีเสียง [t^hr] และ /fr/ อยู่มากในภาษาไทย พยัญชนะต้นควบกล้ำ [t^hr] และ /fr/ จึงง่ายต่อการออกเสียงของคนไทย

ภาควิชา ภาษาอังกฤษ ลายมือชื่อนิสิต .....

สาขาวิชา ภาษาอังกฤษ ลายมือชื่ออาจารย์ที่ปรึกษา .....

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PEERIYA PONGSARIGUN : VARIANTS OF INITIAL CLUSTERS WITH /r/ AMONG THAI FIRST-YEAR UNDERGRADUATE STUDENTS: CROSS-LINGUISTIC INFLUENCE AND THE MARKEDNESS THEORY IN SETTING UP THE LEVEL OF DIFFICULTY IN PRONUNCIATION. THESIS ADVISOR: ASST. PROF. PATAMA ATTANATHO, 81 pp.

The study aims to examine variants of initial clusters with /r/ among Thai first year undergraduate students, and to set up the level of difficulty. The theories that are used to form the hypothesis are Cross-Linguistic Influence and the Markedness Theory. The major hypothesis of this research is that clusters with Thai equivalents are assumed to be easier for learners, and the more marked clusters are likely to be more difficult. Therefore, based on the hypothesis, the level of difficulty is predicted. The data are collected from first year undergraduate students at Chulalongkorn University. The statistical method applied to prove the significant difference between the percentage of variants is the Chi-Square test.

The hypotheses prove to be true to a certain extent. That is, the clusters that have the Thai equivalents are easier for learners. Moreover, the clusters that are more marked are harder to acquire than the less marked ones. The exception to the hypotheses is that the [t^hr] sound appears easier than expected. Thai learners can pronounce it as they can do [p^hr] and [k^hr]. In addition, the cluster /fr/ proves to be much easier than the clusters /br/ and /dr/, although none of these has Thai equivalents. Both phenomena can be explained by the sound class, binary features, and the influence of English loan words in the Thai language. That is, the clusters [t^hr] and /fr/ are easier for learners because in comparison with /dr/ and /br/, the number of English loan words beginning with [t^hr] and /fr/ is relatively high.

Department English Student's signature .....
Field of study English Advisor's signature Patama Attanatho
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CHAPTER I
INTRODUCTION

1.1 RESEARCH RATIONALE

The pronunciation problems of Thai people have long been discussed because pronunciation is the key to the communicative skill and leads to intelligible speech. In other words, it can be said that pronunciation practice contributes gradually to competence in English. Still, many of Thai people lack confidence and certainty when speaking since they have not had enough training. It is likely that they simply delete the English sounds, or replace them with familiar Thai sounds without realizing that there is a big difference between the sound system of English and the sound system of Thai.

First of all, some phonemes such as /ʃ/, and /tʃ/ exist in English but do not exist in Thai. Some phonemes exist in both Thai and English but occur in different positions. For example, the /ŋ/ sound exists in the two languages, but in Thai, the /ŋ/ sound can occur alone in the initial and final position, whereas in English the /ŋ/ sound can occur medially and finally.

Secondly, the syllable structure of English is (C)(C)(C)V(V)(C)(C)(C)(C), but the syllable structure of Thai is $C(C)V^{T}(C)$*. In other words, English allows up to three consonants in the initial position, and up to four consonants in the final position, whereas Thai allows up to two consonants in the initial position, and only consonant in the final position.

The complex syllable structure of English is problematic for most Thai learners. They are not accustomed to three-member initial clusters and final clusters. Thus, when Thai people learn English, it is likely that they simplify the complex syllable structure of English by deleting one or more members of the clusters, or inserting the schwa sound between them.

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*The superscript T is a tonal marker that distinguishes meanings in Thai.

Few researches on the final consonant clusters have been accomplished. (see Chapter II) Patchanee Malarak (1997: 2) studies the pronunciation of final consonant clusters that include the morpheme -s, or -es among Thai Matthayom 1-3 students. Ratchanee Mano-im (1999: 3) studies the pronunciation of English final consonant clusters by Thai students.

Since there has been research focusing on the final consonant clusters, the thesis will investigate the initial consonant clusters in English. There are 35 two-member initial clusters in English, 9 are initial clusters with /r/. The /r/ sound is selected to be the main test token in this thesis because it occurs frequently in English, and is problematic for Thai people. Some cannot differentiate between the /r/ in English and the rolled /r/ in Thai. Some replace the English /r/ with the rolled /r/, or even the /l/. Moreover, a number of research focus on how to teach primary school and high school students the /r/ sound, but none of the research aims to examine the variants of the initial clusters with /r/.

Therefore, the study will investigate variants of initial clusters with /r/, namely [p^hr], [t^hr], [k^hr], /br/, /dr/, /gr/, /fr/, /θr/, and /ʃr/* among Thai first-year undergraduate students. The major theories that are used to form a hypothesis are Cross-Linguistic Influence and the Markedness Theory. Cross-Linguistic Influence will be used to prove whether Thai first-year undergraduates can pronounce the clusters that have equivalents in Thai more accurately than those that do not. In addition, the Markedness Theory will be applied to prove whether the clusters that are "less-marked" or contain less specific features and are frequently found in languages are easier for learners.

1.2 OBJECTIVES OF THE RESEARCH

1.2.1 To find out the variants of [p^hr], [t^hr], [k^hr], /br/, /dr/, /gr/, /fr/, /θr/, and /ʃr/ among Thai first-year undergraduate students

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*The clusters are arranged from bilabial to velar, voiceless to voiced, and stop to fricative.

1.2.2 To prove the validity of Cross-Linguistic Influence; the frequency of correct variants of initial consonant clusters with /r/ that have equivalents in Thai ([p^hr], [k^hr]) is assumed be higher than those that do not ([t^hr], /br/, /dr/, /gr/, /fr/, /θr/, and /ʃr/)

1.2.3 To prove the validity of the Markedness Theory:

(a) The number of deviated variants of the more-marked initial clusters with /r/ (/gr/, /θr/, and /ʃr/) should be higher than that of those less marked ([t^hr], /br/, /dr/, and /fr/).

(b) The frequency of correct variants of the less-marked initial consonant clusters with /r/ should be higher than that of the more-marked ones.

1.2.4 To compare the level of difficulty among initial clusters with /r/ which is determined by Cross-Linguistic Influence and the Markedness Theory with the level of difficult suggested by findings.

1.3 STATEMENT OF HYPOTHESIS

1.3.1 The frequency of correct variants of initial consonant clusters with /r/ that have equivalents in Thai is higher than that of those that do not.

1.3.2 (a) The number of deviated variants of more-marked initial clusters with /r/ is higher than that of those less-marked.

(b) The frequency of correct variants of the less-marked initial consonant clusters with /r/ is higher than the more-marked ones.

1.4 SCOPE OF THE RESEARCH

The data are collected from Thai first-year undergraduate students from Chulalongkorn University. The first-year undergraduate students selected are those who can pronounce the /r/ sound in isolation correctly since the study pays attention to the initial clusters with /r/. Thus, it must be assured that first-year undergraduate students pronounce the single /r/ correctly, so that the /r/ sound is not problematic for them. Therefore, the pronunciation problems lie in combination of sounds, or initial clusters with /r/.

1.5 LIMITATIONS OF THE RESEARCH

The study pays attention to the initial clusters with /r/ only. Other aspects of pronunciation problems of Thai learners are not focused. It is assumed that initial clusters with /r/ are problematic for Thai learners. In addition, the transcription of sounds from the cassette is done by the researcher alone without an interater.

Sound recording is carried out in the natural setting. Thus, the sounds are probably less clear than the sounds that are recorded in a sound laboratory with a sound spectrogram. In spite of this technical matter, the data collected are clear enough to reflect the pronunciation problems of Thai learners.

1.6 ASSUMPTIONS OF THE RESEARCH

The assumption of the study is that the data selected, collected, and analyzed, are representatives of the data population.

Although the age factor plays an important part in language analysis, it is assumed that the first-year undergraduate students are about 17-18.

As for sex, although it may affect language ability, it is not focused here since the data are collected from the same number of male and female subjects. It is assumed that no matter what sex, the subjects are equally educated and have the minimum competence of the English language. Moreover, the test is designed to investigate the pronunciation problems in single words. Therefore, it is less likely that sex affects language ability since the thesis does not pay attention to the suprasegmental aspects such as rhythm and intonation.

As for faculty, the purpose of the study is to see a broad picture of the pronunciation problems of Thai first-year undergraduate students. Thus, the first-year undergraduate students from the Faculty of Arts are not selected because it is assumed that the first-year undergraduate students from the Faculty of Arts are highly competent and have much experience in English.

1.7 RESEARCH TERMS

Cross-Linguistic Influence -- Cross-Linguistic Influence is the theory that aims to explain language phenomena, emphasizing on the influence of the mother tongue, considering it as one of the factors that affect the pronunciation of the second language.

The Markedness Theory -- The Markedness Theory is the theory that explains why sounds have different levels of difficulty. Phonological patterns which are common to all known languages, in other words, common and regularly occurring phenomena are referred to as "less-marked", and phonological patterns which are specific, distinctive, or unique phenomena are referred to as "more-marked". It is assumed that the more-marked sounds are hard to be acquired by learners whereas the less-marked ones are easier.

The level of difficulty -- The level of difficulty in this thesis refers to the arrangement of sounds by the difficulty in pronunciation determined by Cross-Linguistic Influence and the Markedness Theory, and suggested by findings. The term "level" is chosen to be different from the term "hierarchy", which has been in the strong version of CA to predict the difficulty of sounds that results in errors. (See Chapter II) The "level" here does not aim to predict errors but suggest tentative areas of the frequently found errors in pronunciation. The higher level of difficulty means there is a great possibility for the sounds to be problematic for Thai learners.

1.8 RESEARCH SIGNIFICANCE

The study will prove the validity of Cross-Linguistic Influence and the Markedness Theory. The level of difficulty determined by Cross-Linguistic Influence and the Markedness Theory is compared with the level of difficulty suggested by findings. The results can be exploited in pronunciation teaching, particularly in the clusters. That is, teachers can use the level of difficulty of initial clusters with /r/ suggested by findings to determine which sounds deserve more attention. The thesis will help ones understand the pronunciation problems and suggest ways to improve Thai learners' pronunciation skill.

CHAPTER II
LITERATURE REVIEW

Although the pronunciation problems of Thai people have long been discussed, there have been only few researches on the topic. The research can be roughly divided into two types. The first type concerns education and English teaching, and the second one involves descriptive linguistics.

However, the two types of research are done separately. In other words, the educational research deals with the problem sounds such as /r/, /l/, etc. in isolation and how to teach pronunciation, correct problem sounds, and improve the speaking skill. The linguistic research, on the other hand, is primarily descriptive. It focuses on Contrastive Analysis and how it influences pronunciation problems of learners. The problem sounds are selected and the deviated variants are grouped and calculated. The sounds that do not have equivalents in Thai are assumed to be difficult and the incorrect variants are the result of the mother tongue interference. However, the mother tongue interference alone cannot explain all language phenomena or errors made by learners. Frequency of occurrences and specific features of elements are to be considered as well. The theory that can explain errors in more details is the Markedness Theory.

In this chapter, the historical background of Contrastive Analysis will be provided, together with the need to change to Cross-Linguistic Influence. The Markedness Theory will be introduced to help Cross-Linguistic Influence set up the level of difficulty in pronunciation. Research on pronunciation problems of Thai people will also be discussed.

2.1 CROSS-LINGUISTIC INFLUENCE

There have been phrases, for examples, language transfer, native language influence, language mixing, linguistic interference, and the role of the mother tongue, referring to the theory which is often used to explain language phenomena. However, the term “Cross-Linguistic Influence” is the most commonly employed in contemporary second language acquisition research.

The initial term is “Contrastive Analysis” which has influenced the second language learning since1940s. “Contrastive Analysis”, as its name suggests, aims to explain language phenomena when a person learns a new language, by comparing and contrasting with his native language. Contrastive Analysis pays attention to the mother tongue interference and how it affects abilities and errors in grammar, lexicon and phonology.

Contrastive Analysis is rooted in the behaviorist learning theory. Fries (1953: 92), who is considered one of the most authoritative scholars in Contrastive Analysis theory, proposes that a human behavior is the sum of the small parts and components, and language learning is the acquisition of all those units. In other words, behaviorists believe in repeated units or habits that have become a part of one’s life. These habits influence people when they do new activities; they tend to carry old habits and look at the new in the same way as the old.

When it comes to language learning, language is viewed as a habit. That is, the native language is used in everyday life, and it is ingrained in the human language learning system from childhood. Thus, native speakers can use the language automatically but non-native speakers will face difficulties because the ingrained features of the old language affect learners’ usage. Lado (1957: 72), a leader of CA, proposes “We can predict and describe the patterns that will cause difficulty in learning, and those that will not cause difficulty, by comparing systematically the language and the culture to be learned with the native language and culture of the student” (72).

Thus, the strong version of CA (or “a priori”) is introduced. It aims to predict errors from the differences between the two languages in terms of grammar, phonology, syntax, and morphology. Errors may be classified according to the level of language: phonological errors, vocabulary or lexical errors, syntactic errors, and so on. Learners begin by transferring sounds (phonetic transfer) and meanings (semantic transfer), as well as various rules including word order and pragmatics. As learners progress and gain more experience with the target language, the role of transfer typically diminishes (White, 1990: 25).

For the phonological level, Stockwell and Bowen (1965: 3) propose that human beings can pronounce various sounds, but there is only a small number of sounds which

are used in natural languages. Thus, it is possible to compare and contrast sounds in two languages and there are two main points to be considered when comparing them; the acoustic properties or voicing quality of sounds, and the allophonic status of sounds. For example, the sound /b/ is voiced because the vocal cords vibrate when it is produced, whereas the sound /p/ is voiceless because the vocal cords do not vibrate during the sound production. The allophonic status is the status of sounds in a language. That is, a sound can be either a phoneme or an allophone in the language. For example, the /p/ sound is a phoneme in English because it contributes to changes in meaning; /pi/ (pea) is different from /bi/ (bee). The [p^h] sound is an allophone in English because it does not distinguish meanings but only makes the speaker sound "foreign" if he uses the wrong allophone. For example, [stul] and [st^hul] have the same meaning but [st^hul] signifies a foreign accent. In Thai, on the contrary, the sound /p/ and /p^h/ are phonemes because they distinguish meaning: /pa:n/ 'birthmark' is different from /p^ha:n/ 'footed tray'.

Practically, there are four steps in contrasting sounds in two languages. The first step is to list phonemes in two languages. This can be done easily by using the international symbol such as IPA. Then sounds are filled in the table of manner of articulation, and point of articulation, if sounds are consonants. As for vowel sounds, they are divided by the part and the position of the tongue.

The next step is to list the phonetic segments of each language and equate phonemes. For example, in English and Thai, the /l/ sound exists. By so doing, the phonemes are paired.

Thirdly, the phonemic and allophonic status of sounds is considered. One sound may have a phonemic status in one language, but an allophonic in the other. For example, [t] and [t^h] are allophones in English, but the equated /t/ and /t^h/ are phonemes in Thai.

The final step is to state the distributional restrictions on the allophones and phonemes. In other words, the position in the syllable the phonemes or allophones occur in is considered. For example, the /ŋ/ sound is not permitted in the initial position in English, but is allowed in Thai as an initial consonant. Thus, English speakers may find this sound problematic when they face the /ŋ/ sound in the initial position in Thai words.

These steps in contrasting sounds in two languages help Stockwell, Bowen, and Martin (1965: 161) posit a hierarchy of difficulty. The hierarchy ranges from level 0 to level 5 according to the presence and the absence of sounds in the two languages, and the allophonic or phonemic status of those particular sounds (161). Clifford Prator (1968: 63) proposes the hierarchy in six categories of difficulty. Prator's hierarchy ranges from levels 0-5 according to the presence, the absence, and the distribution of sounds in the two languages. That is:

> Level 0 – No difference or contrast is present between the two languages.
> Level 1 – Two items in the native language become one item in the target language.
> Level 2 – An item in the native language is absent in the target language.
> Level 3 – An item in the native language is given a new distribution in the target language.
> Level 4 – A new item that does not exist in the native language appears in the target language.
> Level 5 – One item in the native language becomes two or more in the target Language.

Later, Adam Brown (1991: 172) established another hierarchy of difficulty:

> 1. Sounds which the native language has, but which the target language does not have
> 2. Sounds which both the native language and the target language have, and which are used in similar ways in the two phonological systems
> 3. Sounds which both the native language and the target language have, but which are used in different ways in the two languages
> 4. Sounds which the target language has, but which the native language does not have

The hierarchy of Stockwell, Prator, and Brown are all based on human learning behaviorist theory. That is, the first or zero degree of difficulty represents one-to-one relationship and positive transfer occurs. And the higher levels represent one-to-many, or many-to-one relationship that causes negative transfer. It can be assumed from the hierarchies of difficulty that a native language impedes or facilitates learning; corresponding points are easy to learn, and thus they offer no problems, while contrasts lead to important problems.

However, a number of research have proved that hierarchies of difficulty are not always applicable to all pronunciation problems because they are too broad and may not be verifiable.

Ronald Wardhaugh (1977: 125-126) points out that there is no overall contrastive system that can be applied to any two languages. It is difficult to judge whether a phoneme in the native language equates a phoneme in the second language if both phonemes are slightly different. Moreover, the allophonic status of sounds depends largely on the environment, or the neighbouring sounds. In fact, linguists operate out of mentalististic subjectivity. In other words, it is hard to tell whether the sound in one language equates the sound in another since the sounds in languages are too complex to be set in a group within the hierarchy, and the criteria used to set phonemes in a group is always subjective.

Dulay, Burt and Krashen (1982: 97-98), resisting Contrastive Analysis-based materials, present the result of available empirical data that address the CA hypothesis:

> 1. The target language grammatical errors of both children and adults do not reflect the learner's native language.
> 2. Learners make many errors that are comparable in both the native language and the target language errors that should not be made if positive transfer were operating.
> 3. Learners' judgements of the grammatical correctness of the target language sentences are more related to the target language sentence type than to their own native language structure.

> 4. The native language influences the target language in term of phonology, but only a small portion of phonological errors is traceable to the learner's native language (97-98).

Moreover, a number of research have proved that it is a simpler task to learn totally foreign items than items which bear a resemblance to items found in the target language. For example, Oller and Ziahosseiny (1970) prove that English spelling is more difficult for people whose native language uses a Roman script than for those of a non-Roman script. Kevin John Keys (2005) also finds that the English /v/, which is totally foreign to Korean people and often replaced by /b/, is easier to learn than the English high front vowel /i/, which is similar to the Korean high front vowel /i/ but is durationally longer ("Contrastive Phonology"). When two phonological elements are seen by learners as nearly the same, they will settle for the native language based version of the target phoneme, rather than create a new phonemic category for that sound. The more unlike the phonemes of the target language are from the native language, the more easily they seem to be acquired because the previously established phonemic categories of the native language do not interfere.

The above results can demonstrate that CA falls short in predicting learners' errors, but Contrastive Analysis may still have a great deal to contribute, and this contribution is not to be ignored as Wardhaugh (1977: 70) notes that CA has intuitive appeal if teachers use it to observe difficulties in language learning.

Therefore, the attention is shifted to "Cross-Linguistic Influence", which can be said to be the weak version of CA (or "ex post facto"). Cross-Linguistic Influence does not aim to predict, but to explain language phenomena and diagnose errors, emphasizing on the influence of the mother tongue. Cross-Linguistic Influence does not neglect the mother tongue interference, but consider it as one of the factors that affect the pronunciation of the target language.

However, Cross-Linguistic Influence can only give a broad picture of the expected problems and may not be enough to explain all phenomena. There are still some factors that may cause errors, for example, the frequency of occurrences and the nature of certain individual sounds.

Maddieson surveys the 317 languages and finds that in a controlled sample of 317 languages, the vowel /i/, / /, and / / all appear in the phonemic inventories of over 250 languages; similarly, the bilabial nasal /m/ appears in almost 300 languages, and the voiced bilabial stop /b/ in almost 200 languages. On the contrary, some sounds are rarer, for example, the German /x/ appears in 76 languages and the German /ts/ in 46, and a voiceless pharyngeal fricative / / in Kurdish appears in only 12 languages (Maddieson, cited in Odlin, 1996: 120).

The study signifies that there seems to be a rough correlation between the frequency of a sound and its difficulty for second language learners (Odlin, 1996: 120). In other words, the difficult sounds are likely to occur less frequently and vice versa. Cross-Linguistic Influence alone may not be enough to explain language phenomena or errors made by learners. For the comparison between English and Kurdish, Cross-Linguistic Influence alone would explain that the / / as well as other sounds in Kurdish may cause difficulties for English learners because the / / and the other sounds do not have the English equivalents. The frequency and the characteristic of the specific / / sound are neglected. In other words, provided that the unmarked sound such as /p/ does not exist in Kurdish, Cross-Linguistic Influence would jump into conclusion that the /p/ sound is problematic because of its non-existence. The characteristics of sounds, or the specific features of sounds are also the important factor in determining whether the phonemes are problematic or not. The Markedness Theory reaffirms the difficulty of the sound that contains unique features and does not appear frequently in languages. Those "marked" sounds are likely to be difficult.

Therefore, Cross-Linguistic Influence, together with the Markedness Theory, is useful for determining the tentative areas of errors. In other words, in analyzing errors, both the existence and non-existence of phonemes in the two languages, and the frequency and the specific features of sound are equally important and need to be taken into account.

2.2 THE MARKEDNESS THEORY

The Markedness Theory is first proposed by the Prague school of linguistics. Trubetzkoy, the leader of the school, introduces phonemic markedness. It was originally

conceived of as applicable to phonemes; when one phoneme is different from the other by an additional relevant feature, for instance, voicing, nasalization or rounding, the phoneme which possesses this distinctive mark is called “marked”; the other is called “unmarked”.

The descriptive and explanatory potential of markedness is gradually noticed and exploited by other members of the Prague circle. The Markedness Theory is applied to error analysis and for understanding of simplification in all aspects of language including phonology, syntax, and lexicon. Chomsky and Halle (1968: 402) state:

> Certain aspects of this general problem can be dealt with if we incorporate the Praguian notion of ‘marked’ and ‘unmarked’ values of features into our account in some systematic way, and if we then revise the evaluation measure so that unmarked values do not contribute to complexity.

Terry Santos (2006) studies the Markedness Theory and error evaluation in phonology, syntax, and lexicon, more specifically the reactions of native speaker to non-native-speaker errors. It is found that errors reflecting the unmarked-to-marked direction cause greater irritation than errors reflecting the marked-to-unmarked direction (“Markedness Theory and Error Evaluation”). In other words, if elementss in the second language are more marked than those in the native language, learners will face difficulties. On the other hand, if elements in the second language are less marked than the first language, they will be easier for learners.

Celce-Murcia and Hawkins (1985: 66) propose the way to distinguish the marked elements from the unmarked one in morphology. If the patterns are paired, the marked one contains at least one more feature than the unmarked one. Moreover, the unmarked member of the pair is the one with a wider range of distribution than the marked one. For example, between the article ‘a’ and ‘an’, ‘a’ is unmarked whereas ‘an’ is marked because ‘an’ is an allomorph with the added –n. In addition, ‘a’ is the one with a wider range of distribution than ‘an’. In other words, ‘a’ is more frequently used than ‘an’.

The Markedness Theory also applied to the syllable structure. More complicated syllable structures are harder to master. That is, the syllable that consists of many initial clusters, diphthongs, and final clusters is likely to cause more problems because it contains marked features that do not usually occur frequently. Greenberg (1990: 78) proposes that the three-member clusters are more marked than the two-member clusters and within the class of two-member clusters, the stop or fricative clusters are more marked than the semi-vowel clusters. Carlisle (1992: 125) suggests that for Spanish speakers, the more marked three-member clusters cause more epenthesis than the less marked two-member clusters, and that in two-member clusters, the more-marked /s/ plus stop or fricative clusters, cause more epenthesis than the less-marked /s/ plus semi-vowel clusters. For example, vowel epenthesis in clusters such as [sp^{h}] and /sf/ is common, but is rare in clusters such as /sw/ and /sy/. Eckman (1977: 98) proposes that second language learners have difficulty in dealing with initial clusters regarding markedness, as well as with clusters in final position, as those formed in words ending in –ed. Later on, the experiment is carried on in the study of Eckman and Iverson (1993: 163). It is found that second language learners have difficulty in dealing with clusters in the initial position in regards to markedness, as well as with clusters in the final position (163). Yavas (1997: 96) formulates a hypothesis linking the Markedness Theory and place of articulation. He considers that the production of epenthesis after final consonants increases from the voiced bilabial to voiced alveolar, and then to the voiced velar (96). For example, the production of epenthesis is less common after the final /b/ as in the word ‘stab’ than after the final /d/ as in the word ‘stand’, and is the most common after the final /g/ as in the word ‘stang’. The voiced velar /g/ is the most marked among the three sounds, so it tends to be modified by learners. Baptista (2001: 223-230) suggests that the more complex and more marked the syllable is, the greater the tendency it has to be changed (53). The marked syllable may be simplified by deleting one or more sounds, or inserting the schwa sound between them. For example, the syllable structure of English is (C)(C)(C)V(V)(C)(C)(C)(C). In other words, English allows up to three consonants in the initial position, and up to four consonants in the final position. On the other hand, compared with the complex syllable structure of English, the syllable structure of Japanese is simply CV. It requires only an initial consonant and a vowel.

Thus, when Japanese people learn English, it is likely that complex clusters in English will be changed or simplified, resulting in sound deletion, or vowel epenthesis both initially and finally.

On the other hand, the syllable structure of Thai is $C(C)V^{T}(C)$; Thai allows up to two consonants in the initial, and only one in the final position. Thus, compared with English, Cross-Linguistic Influence can explain the vowel epenthesis in the initial clusters such as /st/, and /sk/ because these clusters do not have the Thai equivalents. The Markedness Theory helps reaffirm the level of difficulty in the marked English syllable with complex clusters. The Thai syllable structure is less marked so when Thai people learn English, it is likely that they simplify the complex syllable structure of English. The Markedness Theory can also be applied to explain the different level of difficulty in the two-member initial clusters and the three-member ones. The three-member clusters seem to be more problematic because they are complex and more marked. By the same token, the complex final clusters are more problematic than the less marked ones. Thus, omission of one or more sounds in the cluster, vowel epenthesis, assimilation, and substitution are common.

For the phonological level, Fred Eckman (1977: 61) develops the Markedness Theory as a method for determining difficulty. Phonological patterns which are common to all known languages, in other words, common and regularly occurring phenomena are referred to as “unmarked”, and phonological patterns which are specific, distinctive, or unique phenomena are referred to as “marked”. In other words, some sounds are found to be much more common throughout the languages of the world than others; within individual languages too, some sounds occur more frequently than others. Generally speaking, the commoner, more frequent sounds are also phonetically less complex or “less marked”. Furthermore, the complex sounds in its inventory of phonemes in a language will occur less frequently in use (Hawkins, 1984: 116). The more “marked” an element of the target language is, the more difficult it would be to gain control over. It is assumed that the “marked” sounds are hard to be acquired by learners whereas the “unmarked” ones are easier.

Hawkins (1984: 117) summarizes the Markedness Theory by referring to the unmarked sounds to distinguish the unmarked from the marked ones. The unmarked sounds

1. 'lack' a certain characteristic, for example voicing, velarization;
2. occur in the position of neutralization;
3. within a language, are greater in number (than their marked equivalents);
4. have a higher frequency of occurrence;
5. are acquired earlier by children;
6. replace their marked equivalents during early stages of acquisition;
7. replace their marked equivalents historically.

Thus, the marked phonemes are assumed to be harder for learners and are more likely to be changed. For example, in English, /θ/ is marked; it is unique and tends to be problematic for non-natives. Thus, errors and simplification can be predicted; it is likely that learners use the unmarked such as /s/, and /t/ to replace the marked ones. Takahashi (1987: 196) proposes:

> Those less marked phonetic or phonological characteristics of L1 are harder to unlearn. That is, those characteristics which are acquired early in L1 acquisition and are important (yet commonly occurring) characteristics of L1 are easily carried over in the production of the L2 phonological system and remain persistently as the L2 learner's foreign accent.

For the direction of sound change in second language acquisition, Greenberg (1990: 67) proposes:

> (i) In the case of isolative changes, the tendency is for the marked sounds to lose their mark.
>
> (ii) In the case of combinatory changes, however, a sound may assimilate to its neighboring sound, and thereby acquire a mark.

(iii) In cases of complex or conditioned merger, the marked sounds generally lose their mark (67).

It can be seen that the Markedness Theory helps Cross-Linguistic Influence explain the learners' errors in phonology. Cross-Linguistic Influence raises awareness about the mother tongue interference whereas the Markedness Theory focuses on the marked phonemes that are likely to be problematic. Cross-Linguistic Influence suggests the way to analyze the variation of those marked sounds. In the end, the level of difficulty of sounds in terms of acquisition can be set up based on the two theories.

2.3 RESEARCH ON ENGLISH PRONUNCIATION OF THAI LEARNERS

As mentioned earlier, there are only a few research on English pronunciation of Thai people. For the target sound /r/, most research aim to teach how to pronounce the /r/ sound, and provide techniques in pronunciation teaching. Leslie M. Beebe (1987: 387) conducts a research on the pronunciation of the /r/ sound among 25 Thai people in conversations. It is found that Thai people use 48% of the retroflex /r/ and only 2% of the rolled /r/. Beebe explains that the retroflex /r/, although non-native to Thai, are occasionally borrowed as an initial. Although the retroflex /r/ and the rolled /r/ are different, Thai learners tend to use the retroflex /r/ more than the rolled /r/.

There are fewer researches on the English clusters, especially initial clusters. Moreover, research that pays attention to the initial clusters is rare and is primarily descriptive.

The study of Foongfuang Kruatrachue, as summarized in Tippawan and Ratchanee's thesis, analyzes errors in English pronunciation made by twenty Thai students at Indiana University in 1958-1959. The study reveals that Thai students have problems with final clusters. Although the sounds in isolation exist in Thai, they never occur finally (Tippawan, 1999: 8).

Patchanee Malarak (1997: 85) studies the pronunciation of the single final /s/ and final clusters with /s/ among high school students according to exposure to English. It is revealed that the students with much exposure to English are more likely to use the correct variant than the students with less.

Ratchanee Mano-im (1999: 78-79) studies the pronunciation of final consonant clusters among Thai high-school students. The level of difficulty is set according to the investigation:

The most problematic
A fricative followed by a stop
A stop followed by a fricative
A nasal followed by an affricate
A lateral followed by a stop
A nasal followed by a fricative
A nasal followed by a stop
The least problematic

Boonpriab Prachanboribal (Prachanboribal, cited in Tippawan, 1982: 11) studies the problematic clusters among nine Thai students. The students are assigned to read 522 words with 174 clusters (one cluster per three words). The study reveals:

1.The more complicated the clusters are, the more difficult they will be for learners.

2.The final clusters are more problematic than the initial clusters.

3.The level of difficulty of clusters is:

The most problematic
-The final clusters with /z/ as in “shelves”
-The final clusters with /s/ as in “facts”
-The final clusters with /d/ as in “changed”
-The final clusters with /t/ as in “helped”
-The initial clusters with /w/ as in “dwell”
-The initial clusters with /l/ as in “glass”
The least problematic

Tippawan Chanyasupab’s study is the first Thai research that deals with initial clusters. In her work, the pronunciation problems of English major students at higher

certificate of education level in both segmental and supra-segmental features are examined. It is found that the most problematic consonants are the final consonant clusters, the initial consonant clusters, the final single consonants, the medial single consonants, and the initial single consonants respectively (Chanyasupab, 1988: 113).

However, there is some discrepancy in the total numbers of the test words for each type of sound.

Sound	Total number of words	Incorrect number of words	Percentage of incorrect number
final consonant clusters	**8,136**	5,414	66.54 %
initial consonant clusters	5,320	2,707	50.88 %
final single consonants	20,422	7,122	34.87 %
medial single consonants	9,344	2,860	30.61 %
initial single consonants	**26,342**	3,558	31.14 %

Table 1: Percentage of Incorrect Pronunciation in Tippawan's Study (emphasis added)

It can be seen from the table that the total number of words for testing each sound is much different. For example, there are 5,320 words for testing the initial consonant clusters, whereas there are as many as 26,342 words for the initial single consonants. Tippawan (1982: 158-159) also presents the interesting findings about the initial consonant clusters with /r/:

Cluster	Number of Words	Correct Variant		Incorrect Variant		
		Number of Words	Percentage	Incorrect Variant	Number of Words	Percentage
/pr-/	**100**	80	80.00	/p-/	20	20.00
/br-/	200	117	58.50	/bl-/	51	25.50
				/b-/	32	16.00
/tr-/	300	277	92.33	/t-/	23	7.67
/kr-/	100	90	90.00	/k-/	10	10.00
/gr-/	**1,000**	144	14.40	/kl-/	545	54.50
				/kr-/	299	29.90
				/k-/	10	1.00
				/g-/	2	0.20
/fr-/	204	118	57.84	/fl-/	72	35.30
				/f-/	14	6.86
/θr-/	302	114	37.75	/tr-/	160	52.98
				/t-/	13	4.31
				/ -/	4	1.32

Table 2: The Variants of the Initial Consonant Clusters with /r/ in Tippawan's Study (emphasis added)

The same problem remains. That is, the number of words for /pr/ and /kr/ is 100, but the number of words for /gr/ is as high as 1,000 in spite of the fact that the clusters /pr/ and /kr/ are much more frequently found than the cluster /gr/. This discrepancy does make difference when frequency is calculated, and the gap between the different number of words affects reliability of the percentage of correct and incorrect variants. In other words, with the higher the number of words, the test will be more reliable. Therefore, the number of words should have been controlled. The numbers of words for the clusters are totally different. For example, a thousand is ten times a hundred. Thus, the gap is too vivid and the percentage of the correct variants should not have been compared because the level of reliability is different.

Since a number of research are mainly either descriptive or educational, it is interesting to combine the linguistic knowledge and implication for teaching. Contrastive Analysis, the most used theory, may be too strict and may not be enough to explain language phenomena or analyze errors. Cross-Linguistic Influence, a newer version, is introduced as well as the Markedness Theory, which helps explain errors made by learners. Moreover, research on the pronunciation problem of initial clusters has not been accomplished. Thus, the thesis will study the variants of initial clusters with /r/ and aim to set up the level of difficulty in pronunciation.

CHAPTER III

METHODOLOGY

Based on Cross-Linguistic Influence, the target sounds are selected. In order to set up the level of difficulty, the combination of Cross-Linguistic Influence and the Markedness Theory is applied. The data collection consists of selecting subjects, constructing the test, and carrying out the test with subjects. The procedures in calculating the results are also provided.

3.1 SELECTING THE TARGET SOUNDS

The letter 'r' can be pronounced differently in various languages in the world. For example, in Czech, the 'r' is a voiced alveolar fricative trilled, in African languages, the 'r' is a voiced retroflex flap, and in one of the Parisian French, the 'r' is voiced uvular trill or flap.

In Thai, the 'r'(ร) is the voiced alveolar rolled; the tongue rolls and the tongue tip repeatedly touches the alveolar ridge during the production of the sound.

In the English inventory, the /r/ sound is a voiced alveolar retroflex; during the production, the tongue tip touches the alveolar ridge once and is drawn back to the back part of the mouth.

According to the study of Beebe (see Chapter II), although the retroflex /r/ and the rolled /r/ are different, Thai learners tend to use the retroflex /r/ more than the rolled /r/. It can be assumed that the /r/ pronunciation problem is mainly not the influence of the mother tongue. Moreover, the study pays attention to the initial consonants of clusters with /r/ only. The subjects are tested whether they can pronounce the retroflex /r/ in isolation, so that it can be assured that the pronunciation problems lie in the initial consonants.

There are 12 consonant clusters with /r/ in English, namely, [p^hr], [t^hr], [k^hr], /br/, /fr/, /dr/, /θr/, /ʃr/, /gr/, [spr], [str], and [skr].* Among these clusters, three are three-member initial consonant clusters and nine are two-member.

The four steps in contrasting sounds in two languages according to Cross-Linguistic Influence (See Chapter II) will be followed. The target phonemes in Thai and English are listed. The consonant sounds are filled in the table of manner of articulation, and point of articulation.

Manner of Articulation		Point of Articulation		
		Bilabial	Alveolar	Velar
Stop	Voiceless unaspirated	/p/	/t/	/k/
	Voiceless aspirated	/p^h/		/k^h/

Table 3: Sounds that can Form Initial Clusters with the Rolled /r/ in Thai

*The slanting lines are used to signify that the sound possesses a phonemic status, whereas the square bracket is used to signify that a sound possesses an allophonic status. The sounds /pr/ (ปร-) and /p^hr/ (พร-), and /kr/ (กร-) and /k^hr/ (คร-) are in slanting lines because /p/ (ป), /p^h/ (พ), /k/ (ก), and /k^h/ (ค) are individual phonemes in Thai, whereas [p^hr] and [spr], [t^hr] and [str], [k^hr] and [skr] are in square bracketห because [p^h], [p], [t^h], [t], [k^h], and [k] are allophones in English.

Manner of Articulation		Point of Articulation					
		Bilabial	Labiodental	Interdental	Alveolar	Palatal	Velar
Stop	Voiceless	[p^h]			[t^h]		[k^h]
	Voiced	/b/			/d/		/g/
Fricative	Voiceless		/f/	/θ/	/s/	/ʃ/	

Table 4: Sounds that can Form Initial Clusters with /r/ in English

When these phonemes occur with /r/ as an initial cluster, the combination of sounds is as follows.

Cluster	
/pr/ (ปร-)	Voiceless Bilabial Stop Unaspirated + Voiced Alveolar Rolled
/p^hr/ (พร-)	Voiceless Bilabial Stop Aspirated + Voiced Alveolar Rolled
/tr/ (ตร-)	Voiceless Alveolar Stop Unaspirated + Voiced Alveolar Rolled
/kr/ (กร-)	Voiceless Velar Stop Unaspirated + Voiced Alveolar Rolled
/k^hr/ (คร-)	Voiceless Velar Stop Aspirated + Voiced Alveolar Rolled

Table 5: Combination of Phonemes and the Rolled /r/ in Thai as Initial Clusters

Cluster	
[p^hr]	Voiceless Bilabial Stop Aspirated + Voiced Alveolar Glide
[t^hr]	Voiceless Alveolar Stop Aspirated + Voiced Alveolar Glide
[k^hr]	Voiceless Velar Stop Aspirated + Voiced Alveolar Glide
/br/	Voiced Bilabial Stop + Voiced Alveolar Glide
/dr/	Voiced Alveolar Stop + Voiced Alveolar Glide
/gr/	Voiced Velar Stop + Voiced Alveolar Glide
/fr/	Voiceless Labiodental Fricative + Voiced Alveolar Glide
/θr/	Voiceless Interdental Fricative + Voiced Alveolar Glide
/ʃr/	Voiceless Palatal Fricative + Voiced Alveolar Glide
[spr]	Voiceless Alveolar Fricative + Voiceless Bilabial Stop + Voiced Alveolar Glide
[str]	Voiceless Alveolar Fricative +Voiceless Alveolar Stop + Voiced Alveolar Glide
[skr]	Voiceless Alveolar Fricative + Voiceless Velar Stop + Voiced Alveolar Glide

Table 6: Combination of Phonemes and /r/ in English as Initial Clusters

The clusters with /r/ in Thai and English are illustrated in table 7 below:

The initial clusters with the rolled /r/ in Thai	The initial clusters with /r/ in English
/pr/ (ปร-)	[spr]*
/p^hr/ (พร-)	[p^hr]
/tr/ (ตร-)	[str]
/kr/ (กร-)	[skr]
/k^hr/ (คร-)	[k^hr]
	[t^hr]
	/br/
	/dr/
	/gr/
	/fr/
	/θr/
	/ʃr/

Table 7: The Clusters with /r/ in Thai and English

*The clusters /pr/ (ปร-), /tr/ (ตร-), and /kr/ (กร-) are paired with [spr], [str], and [skr] respectively because in English, the unaspirated /p/, /t/, and /k/ do not occur as the first member of the two-member clusters with /r/, but as the second member of the three-member clusters with /s/ and /r/.

The next step is to consider the phonemic or allophonic status of the sounds:

Language	Status	
	Phonemic	Allophonic
Thai	/pr/ (ปร-) /p^hr/ (พร-) /tr/ (ตร-) /kr/ (กร-) /k^hr/ (คร-)	
English	/br/ /dr/ /gr/ /fr/ /θr/ /ʃr/	[spr] [p^hr] [str] [t^hr] [skr] [k^hr]

Table 8: The Allophonic Status of Initial Clusters with /r/ in Thai and English

The phonemic and the allophonic status of sounds affect the degree of difficulty. In other words, the phonemic status is assumed to be more 'stable' than the allophonic status. The /p/ (ป) and /p^h/ (พ) sounds are individual phonemes in Thai, but the [p] and [p^h] are allophones in English. When foreigners learn Thai, it is hard for them to perceive that both sounds distinguish meaning. In the same way, when Thai people learn English, the differences between the sound status may pose problems. Since the sounds have allophonic status, it is likely that Thai learners use them interchangeably.

After the process of comparing the sound system of Thai and the sound system of English to set the tentative level of difficulty, the Markedness Theory is applied to cross out the clusters whose errors can be predicted. As Baptista (2001) proposes, the more complex and more marked the syllable is, the greater the tendency it has to be changed. The syllable structure of English is (C)(C)(C)V(V)(C)(C)(C)(C). In other words, English allows up to three consonants in the initial position, and up to four consonants in the final position. The syllable structure of Thai is $C(C)V^{T}(C)$; Thai allows up to two consonants in the initial, and only one in the final position. Thus, compared with English, Thai syllable structure is less marked. When Thai people learn English, it is likely that they simplify the complex syllable structure of English by deleting one or more sounds of the clusters, or inserting the schwa sound between them.

Among the three-member clusters, it is the most likely that Thai people delete sound(s), or insert a schwa sound, especially between the /s/ and the other two. This is because Thai people are familiar with words beginning with the /s/, followed by the vowel /↔/ (-ะ). Thus, Thai people's pronunciation problems of [spr], [str], and [skr] can be predicted from the Markedness Theory and the nature of simplification or nativization, so that the English clusters will be more like Thai. The problem involves only vowel epenthesis. For example, Thai people may pronounce the word 'spring' as /s↔prIŋ/, /s↔pIŋ/, or /spIŋ/. Therefore, the three-member clusters will not be included in the study.

It can be seen from table 8 that the English clusters which have the Thai equivalents are [$p^{h}r$] with /$p^{h}r$/ (พร-) and [$k^{h}r$] with /$k^{h}r$/ (คร-). According to Prator's hierarchy of difficulty (See Chapter II), the clusters [$p^{h}r$] and [$k^{h}r$] are at level 0 because the clusters [p^{h}] and [k^{h}] have the Thai equivalents /p^{h}/ and /k^{h}/. Thus, if Thai people can pronounce the /r/ sound in isolation, these clusters do not seem to be problematic for them. In contrast, the [t^{h}], /b/, /d/ and /f/ sounds exist as individual phonemes in Thai but do not in clusters. Differences here are not the differences between sound inventory but distribution. Although [$t^{h}r$], /br/, /dr/, and /fr/ are found in Thai, they occur only in Sanskrit and English loan words:

-[t^hr] ‘อินทรา’ /Int^{h}ra/ (about the Indhra: the god), and ‘ทริป’ /trIp/ (trip)

-/br/ ‘บริดจ์’ /brIt/ (the bridge game), and ‘บราเซีย’ /brasia/ (brassiere)

-/dr/ ‘ดราฟท์’ /drap/ (draft), and ‘ดรัมเมเย่อร์’ /dr↔mmey↔/ (drum-major)

-/fr/ ‘ฟรี’ /fri/ (free of charge), and ‘ฟรักโทส’ /fr↔kt^{h}ot/ (fructose)*[1]

The clusters [t^hr], /br/, /dr/ can be set in the higher level of difficulty as an item in the native language is given a new distribution in the target language. It is interesting to investigate the ways learners deal with the problem.

The clusters /gr/, /θr/, and /ʃr/ are hard to be acquired by learners. They are in the highest level; a new item that does not exist in the native language appears in the target language. The sound /θ/ and /ʃ/ are problematic since they do not exist in the sound system of Thai. The Markedness Theory also confirms that these two sounds are unique and are the so-called marked. Most learners, especially Asians, find that these are very difficult to pronounce since they do not exist in most Asian languages. For the sound /g/, although it is similar to the Thai /k/ (ก), it is still problematic according to the Markedness Theory. The /g/ sound is unaspirated and voiced, whereas the Thai /k/ (ก), is unaspirated and voiceless. The voicing quality of the /g/ sound is likely to be devoiced. Thus, the /gr/ sound is assumed to be difficult and is also one of the marked sounds for Thai learners.

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*The pronunciation provided here is a typical pronunciation of Thai people according to The Sound System of Thai (Naksakun, 1998: 97, 101, 105).

Cross-Linguistic Influence has been used in comparing and contrasting the sound system of Thai and English. The Markedness Theory has helped select the clusters focused. The process of considering whether the specific clusters would be problematic for learners has been carried out. In the end, the clusters with /r/ can be divided into three groups based on Cross-Linguistic Influence and the Markedness Theory in the following table.

Level	Initial Clusters with /r/		
1	With Thai equivalents		[p^hr] [k^hr]
2	Without Thai equivalents	Less marked	[t^hr] /br/ /dr/ /fr/
3		More marked	/gr/ /θr/ /ʃr/

Table 9: Level of Difficulty among Initial Clusters with /r/

According to the table, the initial clusters focused are [p^hr], [t^hr], [k^hr], /br/, /dr/, /fr/, /gr/, /θr/, and /ʃr/. The [p^hr] and [k^hr] sounds are assumed to be the easiest sounds for Thai learners since they are accustomed to the sounds that exist in the sound system of Thai. Thus, there should not be many variants of [p^hr] and [k^hr] except those already existing in Thai, and the frequency of correct variants is expected to be the highest.

The next group consists of [t^hr], /br/, /dr/, and /fr/. This group may cause some problems because the clusters do not exist in the sound system of Thai but the phonemes in isolation do, so they are labeled as less marked. Thus, this group may have more variants than the first group, and the frequency of correct variants is expected to be lower than the first group.

The last group, /gr/, /θr/, /ʃr/, is the most 'marked' and assumed to be the most problematic. It is likely that there are many variants in this group, and the frequency of correct variants is expected to be the lowest.

To conclude, it is assumed that the more 'marked' the clusters are, the more variants there will be and across the groups, the level of difficulty can be set up according to the frequency of correct variants.

3.2 SELECTING THE SUBJECTS

The subjects are 60 native Thai first-year undergraduate students from Chulalongkorn University.

Although the age and sex play an important part in language analysis, in this thesis, it is assumed that the first-year undergraduate students are about 17-18. As for sex, although it may affect language ability, it is not focused here since the data are collected from the same number of male and female subjects. It is assumed that no matter what sex, the subjects are equally educated and have the minimum competence of the English language. Moreover, the test is designed to investigate the pronunciation problems in single words; therefore, it is less likely that sex affects language ability since the thesis does not pay attention to the higher aspects such as rhythm and intonation.

As for faculty, the purpose of the study is to obtain a broad picture of the pronunciation problems of Thai first-year undergraduate students. Thus, the first-year undergraduate students from the Faculty of Arts are not selected because it is assumed that the first-year undergraduate students from the Faculty of Arts are highly competent and have much experience in English. According to the English test held by Chulalongkorn University Center of Academic Testing in 2006, a first-year undergraduate Arts student scores the highest at 666. In addition, the mean score of the first-year undergraduate Arts students is also the highest at 518.73, whereas the mean score of all faculties is 465.94.

The tentative subjects will be tested whether they can pronounce the /r/ sound in isolation, so that it can be assured that if the pronunciation problems occur, it is the result of the combination of sounds, or initial consonants. The first-year undergraduate students will be asked to read the wordlist. (See Appendix A) The wordlist is built from 75 words: 15 words beginning with /r/ and 60 words beginning with other sounds. Other sounds are included to make the test-takers unaware of the target sound. Moreover, the meaning of the words is in the same semantic class, for example, ‘school class teacher room student’. All of these words are involved with learning. Thus, the test-takers do not know what is intended in the test. Sixty subjects who can pronounce 12 words with the /r/ sound correctly will be included in the main test with clusters.

3.3 CONSTRUCTING THE TEST

The test is designed to examine the pronunciation of clusters (see Appendix B). There will be three sentences per one cluster. The test consists of 27 sentences starting with the words that begin with the clusters [p^hr], [t^hr], [k^hr], /br/, /dr/, /fr/, /gr/, /θr/, and /ʃr/ with various vowels. Common nouns, verbs, and adjectives are used to form sentences without difficult or unseen words that might result in the subjects stumbling. Most of the words are the first 300 frequently used words that make up about 65 percent of all written materials according to Fry (2006)'s The Reading Teacher's Book of Lists. Other words that do not appear on the list but are selected are 'thriller', 'shrines', 'shredded', and 'shrimps'. For the /θr/ sound, the first two common words are 'three' and 'throw' that are included in the test. One more word is needed and 'thriller' is selected because it is quite common for Thai learners since it appears in movies. For the /ʃr/ sound, all of them are not the first 300 frequently used words, but the selected items are assumed to be the most common for Thai learners. The sentences are arranged randomly with only the first word in each sentence being tested, for example:

Pray to God and you will succeed.
Bring a piece of paper with you.
Trees are good for people.

3.4 COLLECTING THE DATA

Sixty first-year undergraduate students from Chulalongkorn University will be asked to fill in the form that includes name, sex, age, and English experience. Then, they all have a chance to go through the test for about 5 minutes, and will be assigned to read the test for one time in natural setting (not in a sound laboratory). The reading will be recorded and checked for sound clarity.

3.5 ANALYZING THE DATA

In order to analyze the data, and to prove the statement of hypothesis, the following methods are used.

3.5.1 All the variants of [p^{h}r], [t^{h}r], [k^{h}r], /br/, /dr/, /fr/, /gr/, /θr/, and /ʃr/ pronounced by the subjects are listed and transcribed. Each subject is assigned to read three sentences for each cluster, so there will be 180 sentences in total for each cluster.

3.5.2 For each cluster, the variants are identified, and the frequency of each variant is counted, for example:

/p^{h}r/		
[p^{h}r]	[p^{h}l]	[p^h]
150	16	14
[k^{h}r]		
[k^{h}r]	[k^{h}l]	[k^h]
100	28	52
[t^{h}r]		
[t^{h}r]	[t^{h}l]	[t^h]
98	32	50

Table 10: The Frequency of Specific Variants

3.5.3 The percentage of specific variants is calculated:

The percentage of the variant = $\frac{\text{frequency of a specific variant X 100}}{\text{total occurrences (180)}}$

[p^{h}r]		
[p^{h}r]	[p^{h}l]	[p^h]
150 x 100 / 180 = 83.33	16 x 100 / 180 = 8.88	14 x 100 / 180 = 7.77
[k^{h}r]		
[k^{h}r]	[k^{h}l]	[k^h]
100 x 100 / 180 = 55.55	28 x 100 / 180 = 15.55	52 x 100 / 180 = 28.88
[t^{h}r]		
[t^{h}r]	[t^{h}l]	[t^h]
98 x 100 / 180 = 54.44	32 x 100 / 180 = 17.77	50 x 100 / 180 = 27.77

Table 11: The Percentage of Specific Variants

According to the example:

The percentage of the correct variant of [p^hr] is 83.33, and the total percentage of the incorrect variants of [p^hr] is 8.88 + 7.77 = 16.65.

The percentage of the correct variant of [k^hr] is 55.55, and the total percentage of the incorrect variants of [k^hr] is 15.55 + 28.88 = 44.43.

The percentage of the correct variant of [t^hr] is 54.44, and the total percentage of the incorrect variants of [t^hr] is 17.77 + 27.77 = 45.54.

This will be done for all the nine clusters.

3.5.4 The percentage correct variants of each cluster is ranked, for example:

The percentage of the [p^hr] correct variant is 83.33%.

The percentage of the [k^hr] correct variant is 55.55%.

The percentage of the [t^hr] correct variant is 54.44%.

According to the percentage, the [p^hr] sound is assumed to be the easiest sound for the informants, followed by the [k^hr] and [t^hr] sounds respectively. And the tentative level of difficulty can be set up.

more difficult→less difficult
[t^hr] → [k^hr] → [p^hr]

Table 12: Tentative Level of Difficulty

This will be done for all the nine clusters.

3.5.5 With the above ranking, the Chi-Square test will be applied to test whether the different percentage is statistically different. Chi-Square test may be the most common statistical test of significance; it may be the most used and best known (Rosenthal, 2001: 376). In this case, the percentage of the [p^hr] correct variant may be significantly different from the percentage of the [k^hr] correct variant, whereas the percentage of the [k^hr] correct variant may not be significantly different from the percentage of the [t^hr] correct variant. Pearson's Chi-Square test proves the statistical significance of the different percentage and show that the findings are 'significant' and

are not due to chance, and therefore that similar groups of subjects would probably show similar patterns of variability in their language, should the study be replicated (Tarone 129-130). The Chi-Square test helps compare an observed frequency distribution to an expected frequency distribution. The first step of Chi-Square test is to find the expected frequency. The expected frequency can be calculated from the sum of the observed frequencies divided by the number of all categories.

$$\text{The expected frequency (E)} = \frac{\text{the sum of observed frequencies (N(O))}}{\text{the number of categories (K)}}$$

The percentage of the [p^hr] correct variant and the percentage of the [k^hr] correct variant are compared. The expected frequency (E_1) is:

$$E_1 = 150 + 100 / 2 = 125$$

The percentage of the [k^hr] correct variant and the percentage of the [t^hr] correct variant are compared. The expected frequency (E_2) is:

$$E_2 = 100 + 98 / 2 = 99$$

Then, the difference between the observed and expected frequency is calculated. This is simply the observed frequency minus the expected frequency. Some observed frequency is higher than the expected frequency and some is lower. Thus, the differences or the observed frequency minuses the expected frequency will not be used directly because the positive and the negative result would cancel each other out, resulting in 'zero' which has no meaning. The problem is solved by squaring each difference to make them all positive. However, a particular amount of difference between observed and expected has a different importance according to what the expected frequency is. For example, a difference of 8 between observed and expected frequency is much greater if the expected frequency is 10 than if the expected frequency is 1,000. Thus, to come up with a good number to show the degree of difference between observed and expected frequency, the difference is needed to be adjusted. This is done by dividing the squared difference by the expected frequency. In this way, the squared difference is put onto a more appropriate scale of comparison. This final step is done by adding up the results for all categories. That is, the result of the squared difference divided by the expected frequency for the first category is summed up with the result of the squared difference divided by the expected frequency for the second category, and so on.

Aron (1997: 235) sums up the steps for calculating the Chi-Square test:

1. Determine the actual, observed frequencies in each category.
2. Determine the expected frequencies in each category.
3. In each category, compute observed minus expected frequencies.
4. Square these differences in each category.
5. Divide each squared difference by the expected frequency for its category.
6. Add up the results of step 5 for all the categories.

$$\text{The Chi-Square } (X^2) = \Sigma \frac{(O-E)^2}{E}$$

$$\text{The Chi-Square of } [p^hr] \text{ and } [k^hr] = \frac{(150-125)^2 + (100-125)^2}{125}$$

$$\text{The Chi-Square of } [p^hr] \text{ and } [k^hr] = \frac{(25)^2 + (-25)^2}{125}$$

$$\text{The Chi-Square of } [p^hr] \text{ and } [k^hr] = \frac{625 + 625}{125} = 10$$

$$\text{The Chi-Square } (X^2) = \Sigma \frac{(O-E)^2}{E}$$

$$\text{The Chi-Square of } [k^hr] \text{ and } [t^hr] = \frac{(100-99)^2 + (98-99)^2}{99}$$

$$\text{The Chi-Square of } [k^hr] \text{ and } [t^hr] = \frac{(1)^2 + (0)^2}{99}$$

$$\text{The Chi-Square of } [k^hr] \text{ and } [t^hr] = \frac{1 + 0}{99} = 0.01$$

Then the difference can be proved whether it is statistically significant by the Chi-Square table. The Chi-Square table consists of the Chi-Square, the degree of freedom and the 'p' or '∝'. The degree of freedom can be calculated from the number of categories minuses one. The 'p' or '∝' is usually set at 0.01 for the 99 % of reliability,

and 0.05 for the 95 % of reliability. If the Chi-Square calculated is less than the Chi-Square in the table, then the difference is not statistically significant. If the Chi-Square calculated is more than the Chi-Square in the table, then the difference is statistically significant.

Chi-Square		
Df	$\propto = 0.05$	$\propto = 0.01$
1	3.841	6.635
2	5.991	9.210
3	7.815	11.345
4	9.488	13.277
5	11.070	13.086

Table 13: The Chi-Square Table

Source: Aron, Arthur. Statistics for the Behavioral and Social Sciences: a Brief Course, New Jersey: Prentice Hall, 1997: 236.

In both cases, the degree of freedom (df) is 1, and the Chi-Square is 6.635 at the 0.01 level. The Chi-Square of [p^hr] and [k^hr] computes to 10, higher than 6.635. Thus, it can be concluded that the difference between the percentage of the [p^hr] and [k^hr] correct variants is statistically significant. In other words, the percentage of the [p^hr] correct variant is statistically higher than the percentage of the [k^hr] correct variant. On the contrary, the Chi-Square of [k^hr] and [t^hr] computes to 0.01, lower than 6.635. Therefore, the difference between the percentage of the [k^hr] and [t^hr] correct variants is not statistically significant. In other words, the percentage of the [k^hr] correct variant is not statistically higher than the percentage of the [t^hr] correct variant.

With the percentage of correct variants of clusters and the Chi-Square test, the hypotheses and the validity of Cross-Linguistic Influence and the Markedness Theory can be proved, and the level of difficulty in pronunciation can be set up for all the nine clusters.

CHAPTER IV

RESULTS AND DISCUSSION

Based on Cross-Linguistic Influence and the Markedness Theory, the nine initial clusters with /r/ are set in groups. Cross-Linguistic Influence suggests that the sounds which have the Thai equivalents are assumed to be easy for Thai learners. In addition, the Markedness Theory is applied to group the sounds. That is, the sounds that contain specific features are likely to be problematic for learners and assumed to be the most difficult. The English [p^hr] and [k^hr] sounds are set at the easiest level of difficulty because they have the Thai equivalents. The [t^hr], /br/, /fr/, and /dr/ sounds are likely to be more difficult for Thai learners because these clusters do not exist in Thai, though the phonemes in isolation have the Thai equivalent. The third and most problematic group of sounds consists of /gr/, /ʃr/, and /θr/ since neither the phonemes in isolation nor the clusters exist in Thai. Moreover, the clusters in this group are marked sounds. They contain specific features that are hard to be acquired by learners and do not occur frequently. Thus, when comparing the third group to the second group, the second group is "less marked", whereas the third group is "more marked". To conclude, the level of difficulty (Table 9) is repeated here:

Level	Initial Clusters with /r/		
1	With Thai equivalents		[p^hr] [k^hr]
2	Without Thai equivalents	Less marked	[t^hr] /br/ /dr/ /fr/
3		More marked	/gr/ /θr/ /ʃr/

Table 9: Level of Difficulty among Initial Clusters with /r/

In this chapter, the percentage of variants of clusters is presented. Then the percentage of correct variants of clusters is ranked from the highest to the lowest. The Chi-Square test is applied to prove the statistical significance of the different percentage. The discussion about the findings including the level of difficulty and incorrect variants is also provided.

4.1 FREQUENCY OF VARIANTS

The variants of [p^hr], [k^hr], [t^hr], /br/, /dr/, /fr/, /gr/, /θr/, and /ʃr/, pronounced by the subjects are as follows; the percentage of variants can be calculated (See Chapter III):

Cluster	Variant	Frequency	Percentage
[p^hr]	[p^hr]	166	92.22
	[p^h]	14	7.77
[k^hr]	[k^hr]	159	88.33
	[k^hl]	10	5.55
	[k^h]	11	6.11
[t^hr]	[t^hr]	168	93.33
	[t^h]	9	5.00
	/θr/	3	1.66
/br/	/br/	91	50.55
	/bl/	32	17.77
	/b/	57	31.66
/dr/	/dr/	92	51.11
	/dl/	34	18.88
	/d/	54	30.00
/fr/	/fr/	123	68.33
	/fl/	16	8.88
	/f/	41	22.77
/gr/	/gr/	52	28.88
	/g/	3	1.66
	[kr]	119	66.11
	[kl]	2	1.11
	[k]	4	2.22

/θr/	/θr/	45	25.00
	/θl/	12	6.66
	[t^hr]	115	63.88
	[t^hl]	2	1.11
	[t^h]	6	3.33
/ʃr/	/ʃr/	61	33.88
	/ʃl/	10	5.55
	/ʃ/	31	17.22
	/tʃr/	53	29.44
	/tʃ/	25	13.88

Table 14: Frequency and Percentage of Variants of Clusters

It can be seen from Table 14 that the percentage of correct and incorrect variant(s) of clusters is different. For example, the percentage of correct variants of [p^hr], [k^hr], [t^hr] is as high as 92.22, 88.33, and 93.33 respectively. On the contrary, the percentage of correct variants of /br/ and /dr/ is at 50.55 and 51.11. The percentage of correct variants of clusters [p^hr], [k^hr], [t^hr] is much higher than that of the clusters /br/ and /dr/. However, the percentage of the correct variant of /fr/ appears to be higher than /br/ and /dr/, although they are grouped at the same level of difficulty as determined by Cross-Linguistic Influence and the Markedness Theory. The percentage of /gr/, /θr/, and /ʃr/ correct variants seems to be very low at 28.88, 25.00, and 33.88 respectively.

Apart from correct variants, all the variants can be added up, forming the percentage of incorrect variant(s) as illustrated in table 15:

Cluster	Percentage of Correct Variants	Total Percentage of Incorrect Variant (s)
[p^hr]	92.22	7.77
[k^hr]	88.33	11.66 (5.55 + 6.11)
[t^hr]	93.33	6.66 (5.00 + 1.66)
/br/	50.55	49.43 (17.77 + 31.66)
/dr/	51.11	48.88 (18.88 + 30.00)
/fr/	68.33	31.65 (8.88 + 22.77)
/gr/	28.88	71.10 (1.66 + 66.11 + 1.11 + 2.22)
/θr/	25.00	74.98 (6.66 + 63.88 + 1.11 + 3.33)
/ʃr/	33.88	66.09 (5.55 + 17.22 + 29.44 + 13.88)

Table 15: Percentage of Correct and Incorrect Variant(s) of clusters

4.2 PERCENTAGE OF THE CORRECT VARIANTS OF CLUSTERS

In order to set up the tentative level of difficulty, the percentage of correct variants of clusters is ranked as follows:

Cluster	The percentage of correct variants
[t^hr]	93.33
[p^hr]	92.22
[k^hr]	88.33
/fr/	68.33
/dr/	51.11
/br/	50.55
/ʃr/	33.88
/gr/	28.88
/θr/	25.00

Table 16: The Ranking of Clusters Based on the Percentage of Correct Variants

The percentage of correct variants of clusters can be presented in Figure 1.

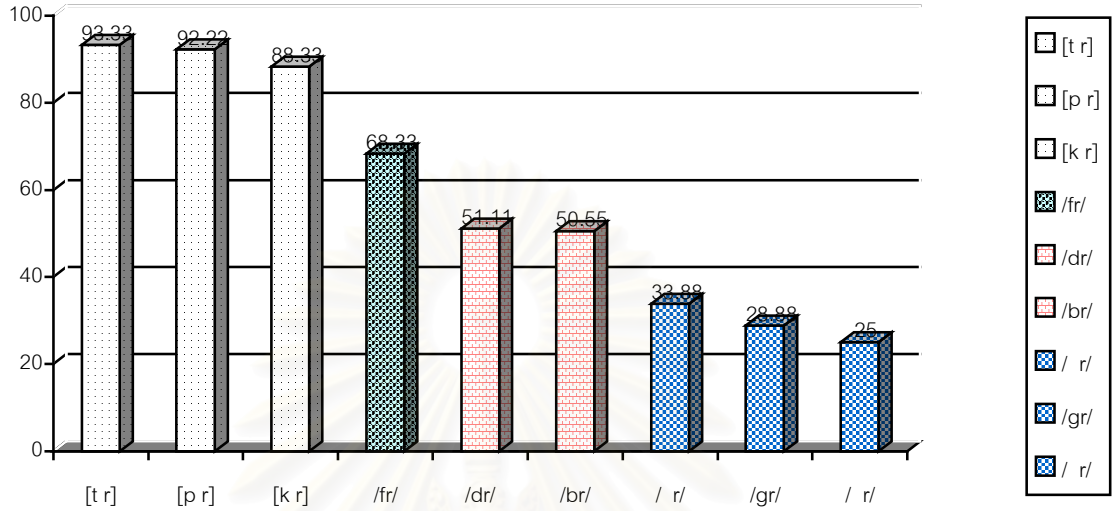

Figure 1: Percentage of Correct Variants of Clusters

From Figure 1, the tentative level of difficulty may be set from the different percentage of correct variants. For example, the [t^hr], [p^hr], and [k^hr] sounds are assumed to be the easiest sounds for learners, whereas the /ʃr/, /gr/ and /θr/ sounds should be the most difficult group. The /br/ and /dr/ sounds are equally difficult at the intermediate level between the cluster /fr/ and the group of the clusters /ʃr/, /gr/ and /θr/. The /fr/ sound, however, suggests itself as a group because its percentage of the correct variant is much lower than [p^hr], [k^hr], and [t^hr] and is much higher than that of /br/ and /dr/.

Based on the findings and Figure 1, the clusters seem to be divided into four groups according to their percentage of correct variants. The percentage of correct variants of clusters that do not differ much from one another is grouped as a level, so there will be four levels of difficulty. To confirm the tentative level of difficulty, and to prove the statistically significant of the percentage of correct variants of clusters in the rank, the Chi-Square test is applied within each group of clusters and across groups. In other words, the Chi-Square test will be used to prove that within each group of clusters, the percentage of the correct variant of each cluster is not statistically significant, so that it is affirmed that the clusters deserve to be in the same level of difficulty. The Chi-

Square test is also applied across groups to prove the existence of borderlines between groups. In other words, the Chi-Square test is used to prove that across groups of clusters, the lowest percentage of the higher level is statistically higher than the highest percentage of the lower level, so that the clusters deserve to be in different groups, or different level of difficulty. For example, in the group of /br/ and /dr/, the percentage of the correct variant of /br/ will be paired with that of /fr/, and the percentage of the correct variant of /dr/ will be paired with that of /ʃr/. In the end, the level of difficulty as suggested by the real data can be set as in Table 17:

Level of Difficulty	Cluster	The percentage of correct variants
1	[t^hr]	93.33
	[p^hr]	92.22
	[k^hr]	88.33
2	/fr/	68.33
3	/dr/	51.11
	/br/	50.55
4	/ʃr/	33.88
	/gr/	28.88
	/θr/	25.00

Table 17: Level of Difficulty Suggested by Raw Data

It can be seen from table 17 that clusters are grouped from the percentage of correct variants. Within each group, the Chi-Square test will be applied to prove that the clusters deserve to be at the same level. In addition, the Chi-Square test will also be applied to prove the borderlines between levels, and to confirm that the clusters deserve to be at a separate level of difficulty.

a) Within Each Group

The clusters are grouped when the percentage of correct variants of each cluster is not much different from one another. It is hypothesized that the percentage of correct variants of clusters is not statistically significant, and the Chi-Square test is applied to prove that the percentage of correct variants of clusters is not significantly different, and the clusters deserve to be at the same level of difficulty.

The steps for calculating the Chi-Square test by Aron (See Chapter III) will be applied here:

Group 1: [t^hr], [p^hr], and [k^hr]

In order to prove that [t^hr], [p^hr], and [k^hr] are at the same level of difficulty, the Chi-Square test is applied as follows.

The observed frequencies of [t^hr], [p^hr], and [k^hr] are 168, 166, and 159 respectively. The expected frequency of [t^hr], [p^hr], and [k^hr] is 164.33. The Chi-Square of [t^hr], [p^hr], and [k^hr] is 0.27, and the degree of freedom (df) is 2. Based on these numbers, the Chi-Square of [t^hr], [p^hr], and [k^hr] can be calculated. According to the Chi-Square table (Table 14), the Chi-Square is 9.210 at the 0.01 level (99% of reliability) and 5.991 at the 0.05 level (95% of reliability). The Chi-Square of [t^hr], [p^hr], and [k^hr] computes to 0.27, lower than 9.210 and 5.991. Therefore, the difference between the percentage of the [t^hr], [p^hr], and [k^hr] correct variants is not statistically significant, and the validity of the hypothesis is proved that [t^hr], [p^hr], and [k^hr] can be grouped at the same level.

Group 2: /fr/

The /fr/ sound is alone in this group because the percentage of its correct variant cannot be set in either Group 1 or Group 3. In other words, its percentage of the correct variant is much lower than the percentage of [t^hr], [p^hr], and [k^hr] correct variants, and much higher than the percentage of /dr/ and /br/ correct variants.

Group 3: /dr/ and /br/

In order to prove that /dr/ and /br/ are at the same level of difficulty, the Chi-Square test is applied as follows.

The observed frequencies of /dr/ and /br/ are 92 and 91 respectively. The expected frequency of /dr/ and /br/ is 91.5. The Chi-Square of /dr/ and /br/ is 0.00, and the degree of freedom (df) is 1. Based on these numbers, the Chi-Square of /dr/ and /br/ can be calculated. According to the Chi-Square Table, the Chi-Square is 6.635 at the 0.01 level (99% of reliability) and 3.841 at the 0.05 level (95% of reliability). The Chi-Square of /dr/ and /br/ computes to 0.00, lower than 6.635 and 3.841. Therefore, the difference between the percentage of the /dr/ and /br/ correct variants is not statistically significant, and the validity of the hypothesis is proved that the clusters /dr/ and /br/ are at the same level of difficulty.

Group 4 : /ʃr/, /gr/, and /θr/

In order to prove that /ʃr/, /gr/, and /θr/ are at the same level of difficulty, the Chi-Square test is applied as follows.

The observed frequencies of /ʃr/, /gr/, and /θr/ are 61, 52 and 45 respectively. The expected frequency of /ʃr/, /gr/, and /θr/ is 52.66. The Chi-Square of /ʃr/, /gr/,and /θr/ is 2.44 and the degree of freedom (df) is 2. Based on these numbers, the Chi-Square of /ʃr/, /gr/, and /θr/ can be calculated. According to the Chi-Square Table, the Chi-Square is 9.210 at the 0.01 level (99% of reliabily) and 5.991 at the 0.05 level (95% of reliabily). The Chi-Square of /ʃr/, /gr/, and /θr/ computes to 2.44, lower than 9.210 and 5.991. Therefore, the difference between the percentage of the /ʃr/, /gr/, and /θr/ correct variants is not statistically significant, and the validity of the hypothesis is proved that /ʃr/, /gr/, and /θr/ are at the same level of difficulty.

The number of correct variants of clusters within the same level of difficulty has been proved not to be statistically significant. The four levels of difficulty have been set, and the members of the four levels have been identified. Across the groups, the Chi-Square test is needed to reaffirm that the number of correct variants between each pair of

adjacent groups is statistically different. Therefore, it can be assured that the clusters deserve to be at different levels of difficulty, and the four groups deserve to be distinctive levels.

b) Across Groups

It is assumed that the percentage of the correct variants across groups is statistically significant. The Chi-Square test is applied to prove the validity of the hypothesis that the percentage of correct variants of clusters between each pair of adjacent groups is significantly different, and the clusters deserve to be at different levels of difficulty.

Therefore, there are three pairs of groups that need to be compared. The first one is Level 1 and Level 2, the second one is Level 2 and Level 3, and the last one is Level 3 and Level 4. The borderline between Level 1 and Level 2 is the clusters [k^hr] and /fr/ since the percentage of the correct variant of [k^hr] is the lowest in Level 1, and /fr/ is the only member in Level 2. The borderline between Level 2 and Level 3 is the clusters /fr/ and /dr/ since /fr/ is alone in Level 2, and the percentage of the correct variant of /dr/ is the highest in Level 3. The borderline between Level 3 and Level 4 is the clusters /br/ and /ʃr/ since the percentage of the correct variant of /br/ is the lowest in Level 3, and the percentage of the correct variant of /ʃr/ is the highest in Level 4. The Chi-Square test will be applied for all the three pairs in the same manner.

Pair 1: Level 1 and Level 2 ([k^hr] and /fr/)

The clusters [k^hr] and /fr/ are paired because they occur at the borderline between Level 1 and Level 2. It is hypothesized that the percentage of correct variants of [k^hr] and /fr/ is statistically significant, and the Chi-Square test is applied to prove the validity of the hypothesis that [k^hr] does not belong to the same group as /fr/.

The observed frequencies of [k^hr] and /fr/ are 159 and 123 respectively. The expected frequency of [k^hr] and /fr/ is 141. The Chi-Square of [k^hr] and /fr/ is 4.59, and the degree of freedom (df) is 1. Based on these numbers, the Chi-Square of [k^hr] and /fr/ can be calculated. According to the Chi-Square Table, the Chi-Square is 6.635 at the 0.01 level (99% of reliability) and 3.841 at the 0.05 level (95% of reliability). The Chi-

Square of [k^hr] and /fr/ computes to 4.59, lower than 6.635 but higher than 3.841. Therefore, it can be concluded that the difference between the percentage of the [k^hr] and /fr/ correct variant is statistically significant at the 0.05 level, and the validity of the hypothesis is proved that [k^hr] and /fr/ are at different levels of difficulty.

Moreover, it has been proved that the clusters [t^hr], [p^hr], and [k^hr] belong to the same level of difficulty, and the cluster [k^hr] and /fr/ deserve to be at different levels. Thus, it can be concluded that the group of [t^hr], [p^hr], and [k^hr], and the cluster /fr/ belong to different levels of difficulty.

Pair 2: Level 2 and Level 3 (/fr/ and /dr/)

The clusters /fr/ and /dr/ are paired because they occur at the borderline between Level 2 and Level 3. It is hypothesized that the percentage of correct variants of /fr/ and /dr/ is statistically significant, and the Chi-Square test is applied to prove the validity of the hypothesis that /fr/ does not belong to the same group as /dr/.

The observed frequencies of /fr/ and /dr/ are 123 and 92 respectively. The expected frequency of /fr/ and /dr/ is 107.5. The Chi-Square of /fr/ and /dr/ is 4.46, and the degree of freedom (df) is 1. Based on these numbers, the Chi-Square of /fr/ and /dr/ can be calculated.

According to the Chi-Square Table, the Chi-Square is 6.635 at the 0.01 level (99% of reliability) and 3.841 at the 0.05 level (95% of reliability). The Chi-Square of /fr/ and /dr/ computes to 4.46, lower than 6.635 but higher than 3.841. Therefore, it can be concluded that the difference between the percentage of the /fr/ and /dr/ correct variant is statistically significant at the 0.05 level, and the validity of the hypothesis is proved that /fr/ and /dr/ are at different levels of difficulty.

Moreover, it has been proved that the clusters /dr/ and /br/ belong to the same level of difficulty, and the clusters /fr/ and /dr/ deserve to be at different levels. Thus, it can be concluded that the group of /fr/, and the group of /dr/ and /br/ belong to different levels of difficulty.

Pair 3: Level 3 and Level 4 (/br/ and /ʃr/)

The clusters /br/ and /ʃr/ are paired because they occur at the borderline between Level 3 and Level 4. It is hypothesized that the percentage of the correct variants of /br/ and /ʃr/ is statistically significant, and the Chi-Square test is applied to prove the validity of the hypothesis that /br/ does not belong to the same group as /ʃr/.

The observed frequencies of /br/ and /ʃr/ are 91 and 61 respectively. The expected frequency of /br/ and /ʃr/ is 76. The Chi-Square of /br/ and /ʃr/ is 5.92 and the degree of freedom (df) is 1. Based on these numbers, the Chi-Square of /br/ and /ʃr/ can be calculated. According to the Chi-Square Table, the Chi-Square is 6.635 at the 0.01 level (99% of reliability) and 3.841 at the 0.05 level (95% of reliability). The Chi-Square of /br/ and /ʃr/ computes to 5.92, lower than 6.635 but higher than 3.841. Therefore, it can be concluded that the difference between the percentage of the /br/ and /ʃr/ correct variants is statistically significant at the 0.05 level, and the validity of the hypothesis is proved that /br/ and /ʃr/ are at different levels of difficulty.

It has been proved that /dr/ and /br/ belong to the same level of difficulty, and so do /ʃr/, /gr/, and /θr/. Moreover, it has been proved that the clusters /br/ and /ʃr/ deserve to be at different levels. Thus, it can be concluded that the group of /dr/ and /br/, and the group of /ʃr/, /gr/, and /θr/ belong to different levels of difficulty.

The clusters have been grouped into four distinctive levels of difficulty based on the percentage of correct variants. The different percentage of correct variants within each group of clusters is proved not to be statistically significant, and the different percentage of correct variants across groups is proved to be significantly different. Finally, the level of difficulty as suggested by findings is set up:

Level of Difficulty	Cluster
1	[t^hr] [p^hr] [k^hr]
2	/fr/
3	/dr/ /br/
4	/ʃr/ /gr/ /θr/

Table 18: Level of Difficulty Suggested by Findings

According to the table, the clusters [t^hr], [p^hr], and [k^hr] are at the lowest level of difficulty, followed by the cluster /fr/ at the second level. The clusters /dr/ and /br/ is at the third level. The clusters /ʃr/, /gr/ and /θr/ are at the fourth level, the highest level of difficulty.

4.3 DISCUSSION

4.3.1 The Level of Difficulty

The level of difficulty determined by Cross-Linguistic Influence and the Markedness Theory is compared with the level of difficulty suggested by findings:

Level of Difficulty	Level 1	Level 2	Level 3	Level 4
Determined by Cross-Linguistic Influence and the Markedness Theory	[p^hr] [k^hr]	[t^hr] /br/ /dr/ /fr/	/gr/ /θr/ /ʃr/	-
Suggested by findings	[t^hr] [p^hr] [k^hr]	/fr/	/dr/ /br/	/ʃr/ /gr/ /θr/

Table 19: Comparison of Levels of Difficulty.*

*The clusters in the level of difficulty determined by Cross-Linguistic Influence and the Markedness Theory are arranged from bilabial to velar, voiceless to voiced, and stop to fricative, whereas the clusters in the level of difficulty suggested by findings are arranged from the highest to the lowest percentage of correct variants.

The level of difficulty suggested in findings on the whole matches with the level of difficulty determined by Cross-Linguistic Influence and the Markedness Theory. The marked clusters /gr/, /θr/, and /ʃr/ are still at the highest level of difficulty as predicted by Cross-Linguistic Influence and the Markedness Theory. (The rank within each level is not statistically significant, as the insignificance within group has been proved earlier by the Chi-Square test) Although the highest level of difficulty suggested in findings is Level 4, whereas the highest level of difficulty determined by Cross-Linguistic Influence and the Markedness Theory is Level 3, the clusters /gr/, /θr/, and /ʃr/ are still at the highest level of both scales, and the number of deviated variants in this group is higher than other groups. The clusters that have the Thai equivalents [k^hr] and [p^hr] are at the easiest level of both scales also.

The clusters /br/ and /dr/, which used to be set at Level 2, are shifted to Level 3 of difficulty suggested by findings because of the /fr/ level of difficulty; however, it can be assumed that /dr/ and /br/ are still at the intermediate level of difficulty of both scales.

The cluster [t^hr] used to be set at Level 2 of difficulty determined by Cross-Linguistic Influence and the Markedness Theory because the cluster [t^hr] does not exist in Thai although phonemes in isolation do have the Thai equivalents. For the level of difficulty suggested by findings, the [t^hr] sound is at the same level as [p^hr] and [k^hr]. Moreover, one more level of difficulty is added; the cluster /fr/ is alone at Level 2 because its percentage of correct variants is much lower than [t^hr], [p^hr], and [k^hr], and much higher than /dr/ and /br/. Thus, the cluster /fr/ deserves to have its own level of difficulty.

4.3.2 Possible Explanation for the Deviated Findings

-Binary Features and Sound Classes

The binary features, or the features that distinguish phonemes from one another, can be exploited to explain the findings.

Based on the Markedness Theory, the initial clusters with /r/ are divided into three types:

Clusters with /r/		
Unmarked	Less marked	More marked
[p^hr] [k^hr]	[t^hr] /br/ /dr/ /fr/	/gr/ /θr/ /ʃr/

Table 20: Clusters with /r/ Set by the Markedness Theory

From findings, the initial clusters with /r/ have been set at the four levels of difficulty. The degree of Markedness can also be determined by the percentage of correct variants. That is, if the percentage of the correct variant of the cluster is higher than 50%, it is assumed that the cluster is less complex and less difficult for learners. Thus, it will be labeled as "less marked". If the percentage of the correct variant of the cluster is lower than 50%, the cluster is assumed to be more complex and more difficult, and will be labeled as "more marked".

Level	Cluster	Degree of Markedness
1	[t^hr] [p^hr] [k^hr]	Less marked
2	/fr/	
3	/dr/ /br/	
4	/ʃr/ /gr/ /θr/	More marked

Table 21: Level of Difficulty Suggested by Findings and the Degree of Markedness

According to the table, the [t^hr], [p^hr], and [k^hr] sounds are at Level 1 because these three clusters are in the same sound class; they are all voiceless stop. In terms of binary features, they share the same value of [+interrupted, –voiced]. The "interrupted" feature basically distinguishes between stops (interrupted) and fricatives (continuant), whereas the "voiced" feature distinguishes the voicing quality of sounds (Hawkins 1984: 83).

Moreover, based on the Markedness Theory, in the realm of consonantal place of articulation, the places represented by /p/, /t/, and /k/ are the most basic, occurring in almost all languages of the world (Odden, 2005: 227). Hawkins (1984: 121)

proposes that alveolar sounds have the best claim to represent the unmarked place of articulation, on the grounds:

1. that all languages have sounds at one or other of the bilabial or alveolar points of articulation,
2. that languages have more alveolar phonemes than labial or velar phonemes
3. that alveolar sounds are acquired very early.

Thus, based on the binary features, as well as the unmarked place of articulation of [t^hr], the sound [t^hr] deserves to be at the same level as [p^hr], and [k^hr] as suggested by findings.

Among the unmarked clusters, it is shown that the voiceless initial consonant clusters with /r/ are easier for learners. The binary feature that the less marked clusters share is [-voiced]. This explains why the /fr/ sound appears to be easier than the /dr/ and /br/ sounds which are [+voiced].

The cluster /fr/, which is expected to be as difficult as the clusters /dr/ and /br/, appear to be less problematic. This may be explained in terms of manners of consonant articulation. Most languages have at least one fricative, and the most common fricative is /s/, followed by /f/ (Odden, 2005: 227). Furthermore, of the languages with initial clusters, the most 'natural' is a sequence of a 'true' consonant (a plosive or fricative) and a liquid or glide, for example, /pl/, /fr/, and /kw/ (Hawkins, 1984: 60). In addition, evidence from language acquisition suggests that /f/ is acquired as early as, if not earlier than, /s/. The /f/ sound is as less-marked as /s/, just as it is for the plosives /p/ and /t/. Although the /fr/ sound does not have the Thai equivalent, it is common, less marked, and is assumed to be easy.

From the level of difficulty set by findings, it can be concluded that the clusters with /r/ which have Thai equivalents are unmarked and are not difficult ([k^hr] and [p^hr]). The degree of difficulty is the lowest at Level 1. The [t^hr] sound which is unmarked but does not have the Thai equivalent is also at Level 1, whereas the /fr/ sound is more difficult at Level 2. The clusters with /r/ which do not have Thai equivalents and are less marked are at Level 3 (/br/ and /dr/). The most difficult clusters at the highest level are

the clusters with /r/ which do not have Thai equivalents and are more marked (/ʃr/, /gr/, and /θr/). The degree of difficulty among the marked clusters depends on the degree of markedness. That is, the clusters /dr/ and /br/ are less marked than the clusters /ʃr/, /gr/, and /θr/, so the clusters /dr/ and /br/ are assumed to be less difficult.

Among the marked clusters, it is likely that the voicing quality may not affect the difficulty in pronunciation. All the clusters are marked and are assumed to be difficult for learners.

-The Influence of loan words

The influence of loan words can also explain the high percentage of correct variants of [t^h] and /fr/. C.C. Fries and K.L. Pike state that foreign words may be taken into a language in two ways: (a) they may be recast in a form already acceptable to the borrowing language; or (b) they may retain some alien features, and so introduced new phonological pattern (C.C. Fries and K.L Pike, cited in Henderson, 1970: 54). In the first case, loan words will not be different from native words. In the second case alien-introduced patterns of long standing may cease to appear 'foreign' to speakers of the language, and may come to form an integral part of the phonological system of the language, forming a new system (Henderson,1970: 55).

In the case of the [t^hr] sound, originally, the phoneme [t^h] exists in Thai as it exists in English, the retroflex /r/ sound are occasionally borrowed as an initial (Beebe, 1987: 387). There are a number of English loan words beginning with [t^hr] in Thai such as 'electronic', 'trumpet', 'try', 'tractor', 'trainer', 'treat', and 'train' (Naksakun, 1998: 98). According to Royal Institute Dictionary B.E. 2546, the English words beginning with [t^hr] that appear as loan words in Thai are ตรีโกณมิติ (trigonometry)*, ทรานซิสเตอร์

*The cluster [t^hr] is nativized into /tr/ in 'ตรีโกณมิติ'(trigonometry). Although this loan word with the nativized [t^hr] exists in Thai, this loan word might not contribute to facilitating the [t^hr] pronunciation in English.

(transistor), ทรัมเป็ต (trumpet), and ทรอมโบน (trombone). There are more [t^hr] loan words in Matichon Dictionary B.E. 2547. The [t^hr] loan words are ตรีโกณมิติ (trigonometry), ทรานซิสเตอร์ (transistor), ทรัสต์ (trust), ทรัมเป็ต (trumpet), ทรอมโบน (trombone), เทรนเนอร์ (trainer), and เทรลเลอร์ (trailer). English loan words introduce a new phonological pattern.

Existence of these loan words in Thai may be one factor that explains the high percentage of the correct variant of the cluster [t^hr]. The original [t^h] is combined with the occasionally borrowed /r/, and a new phonological pattern [t^hr] is introduced to the Thai language. Thus, it is likely that these loan words facilitate the pronunciation of the cluster [t^hr].

By the same token, the original /f/ sound is combined with the occasionally borrowed /r/, so the cluster /fr/ comes into existence by the influence of English loan words. Thus, the cluster /fr/, which is expected to be as difficult as the cluster /dr/ and /br/, appears to be less problematic since it has become a phonological pattern in Thai. According to The Sound System of Thai, the /fr/ loan words are 'free', 'frigate', and 'frank'. In Royal Institute Dictionary B.E. 2546, the /fr/ loan words are ฟรักโทส (fructose), ฟรี (free), and แฟรนเซียม (francium). There are more /fr/ loan words in Matichon Dictionary B.E. 2547, especially with the main word 'free' such as ฟรีคิก (free kick), ฟรีเซ็กซ์ (free sex), ฟรีเดย์ (free day), ฟรีบาร์ (free bar), ฟรีพอร์ต (free port), ฟรีโวต (free vote), and ฟรีสไตล์ (free style). The words with 'free' are commonly used among Thai people. The cluster /fr/ is a long-standing pattern that may cease to appear "foreign" to Thai learners. The influence of loan words is likely to make the clusters [t^hr] and /fr/ sound "familiar" and easier for Thai learners because they have become an integral part of the Thai phonological system.

On the contrary, the loan words with the initial /br/ are mainly Sanskrit and are not usually used in daily life. The only two English loan words beginning with /br/ are 'brassiere' and 'brake'. There are fewer loan words beginning with /dr/; only two loan words 'draft'and 'drum major' appear in dictionaries. With fewer numbers of loan words, the clusters /dr/ and /br/ appear to be more difficult than [t^{h}r] and /fr/ at the intermediate level of difficulty.

4.3.3 The Incorrect Variants

In this section, all the incorrect variants of clusters will be presented, followed by the incorrect variants in each level of difficulty. The relationship between Cross-Linguistic Influence and the Markedness Theory in setting up the level of difficulty in pronunciation will also be presented.

The level of difficulty is calculated from the percentage of correct variants as table 17 is repeated here:

Level of Difficulty	Cluster	The percentage of correct variants
1	[t^{h}r]	93.33
	[p^{h}r]	92.22
	[k^{h}r]	88.33
2	/fr/	68.33
3	/dr/	51.11
	/br/	50.55
4	/ʃr/	33.88
	/gr/	28.88
	/θr/	25.00

Table 17: Level of Difficulty Suggested by Raw Data

According to the table, among clusters in each level, the mean score of the percentage of correct variants can be calculated, and the percentage of incorrect variants can be presented in Table 22 and Figure 2:

Level of Difficulty	The percentage of correct variants	The percentage of incorrect variants
1	91.29	8.71
2	68.33	31.67
3	50.83	49.17
4	29.25	70.75

Table 22: The Percentage of Incorrect Variants

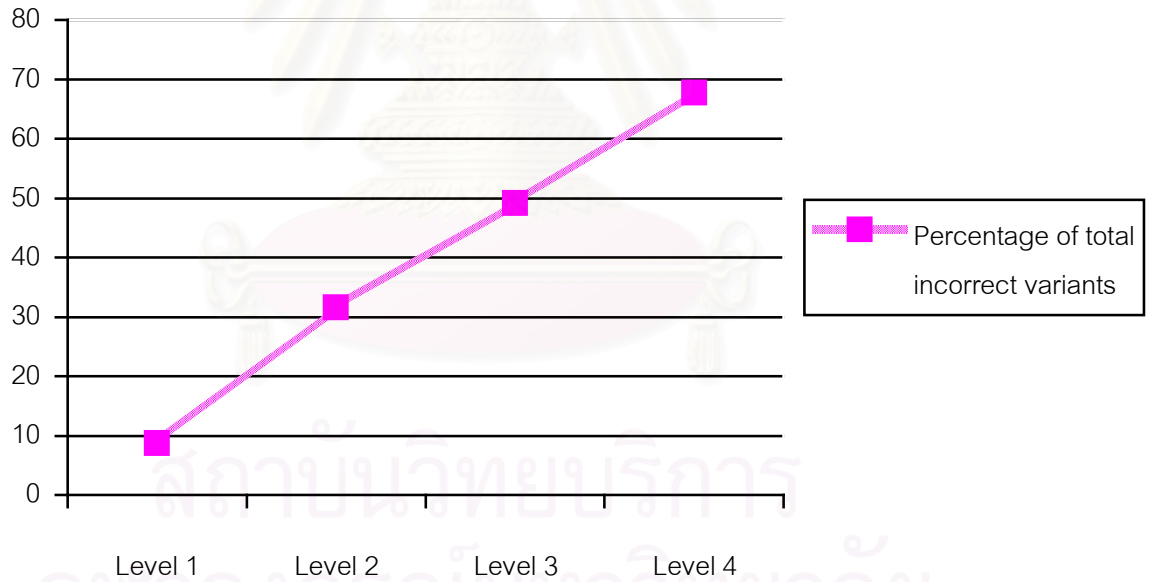

Figure 2: Percentage of Total Incorrect Variants

It is shown that the higher level of difficulty, the more incorrect variants there are, as presented in Figure 2:

From the total percentage of incorrect variants, there exist many types of incorrect variants, namely:

-/r/ Substitution -- refers to the replacement of the /r/ with the /l/, but the initial consonant is pronounced correctly

-/r/ Deletion -- refers to the deletion of /r/, so the clusters become a single initial consonant

-Initial Consonant Substitution -- refers to the replacement of the initial consonants with other sounds, but the /r/ sound is pronounced correctly

-Cluster Substitution -- refers to the replacement of the initial consonants with other sounds, and the replacement of the /r/ with the /l/

-Initial Consonant Substitution and /r/ Deletion -- refers to the replacement of the initial consonants with other sounds, and the deletion of /r/

All types of the incorrect variants of clusters are illustrated in the following table:

Level	Cluster	Incorrect Variant	Type	Frequency
1	[t^hr]	[t^h]	/r/ Deletion	9
		/θr/	Initial Consonant Substitution	3
	[p^hr]	[p^h]	/r/ Deletion	14
	[k^hr]	[k^hl]	/r/ Substitution	10
		[k^h]	/r/ Deletion	11
2	/fr/	/fl/	/r/ Substitution	16
		/f/	/r/ Deletion	41
3	/dr/	/dl/	/r/ Substitution	34
		/d/	/r/ Deletion	54
	/br/	/bl/	/r/ Substitution	32
		/b/	/r/ Deletion	57

4	/ʃr/	/ʃl/	/r/ Substitution	10
		/ʃ/	/r/ Deletion	31
		/tʃr/	Initial Consonant Substitution	53
		/tʃ/	Initial Consonant Substitution and /r/ Deletion	25
	/gr/	/g/	/r/ Deletion	3
		[kr]	Initial Consonant Substitution	119
		[kl]	Cluster Substitution	2
		[k]	Initial Consonant Substitution and /r/ Deletion	4
	/θr/	/θl/	/r/ Substitution	6
		[t^hr]	Initial Consonant Substitution	115
		[t^hl]	Cluster Substitution	2
		[t^h]	Initial Consonant Substitution and /r/ Deletion	12

Table 23: The Incorrect Variants of Clusters

The types of incorrect variants in the level of difficulty suggested in findings are summarized in Table 24:

Level of Difficulty	Type of Incorrect Variants				
	/r/ Substitution	/r/ Deletion	Initial Consonant Substitution	Cluster Substitution	Initial Consonant Substitution and /r/ Deletion
1	√	√	√		
2	√	√			
3	√	√			
4	√	√	√	√	√

Table 24: Types of Incorrect Variants

It can be concluded from the table that the more marked the clusters are, the more types of deviated variants there will be. For the less marked sounds, the problem lies in the pronunciation of /r/, whereas for the more marked sounds, the difficulty is caused mainly by those marked sounds themselves and sometimes accompanied by the /r/.

The percentage of types of incorrect variants of each level of difficulty can be concluded as follows:

Level	Total percentage Of Variants		Types of incorrect variants				
	Correct	Incorrect	/r/ Sub	/r/ Del	Ini Sub	Cl Sub	Ini Sub and /r/ Del
1	91.29	8.71	1.85	6.29	0.55	-	-
2	68.33	31.67	8.88	22.77	-	-	-
3	50.83	49.17	18.33	30.83	-	-	-
4	29.25	70.75	2.96	6.29	53.14	0.74	7.59

Table 25: Percentage of Incorrect Variants in the Level of Difficulty

/r/ Sub = /r/ Substitution

/r/ Del = /r/ Deletion

Ini Sub = Initial Consonant Substitution

Cl Sub = Cluster Substitution

Ini Sub and /r/ Del = Initial Consonant Substitution and /r/ Deletion

It can be seen from the table that types of incorrect variants that are found in all levels of difficulty are /r/ Substitution and /r/ Deletion. The percentage of Initial Consonant Substitution is low in level 1, but in level 4, the percentage of Initial Consonant Substitution is remarkably high at 53.14. The Cluster Substitution and the Initial Consonant Substitution and /r/ Deletion are found in Level 4 only. The percentage of Cluster Substitution is very low at 0.74, and so is the percentage of Initial Consonant Substitution and /r/ Deletion at 7.59. The percentage of the incorrect variants that appear in more than one level is illustrated in the following figure:

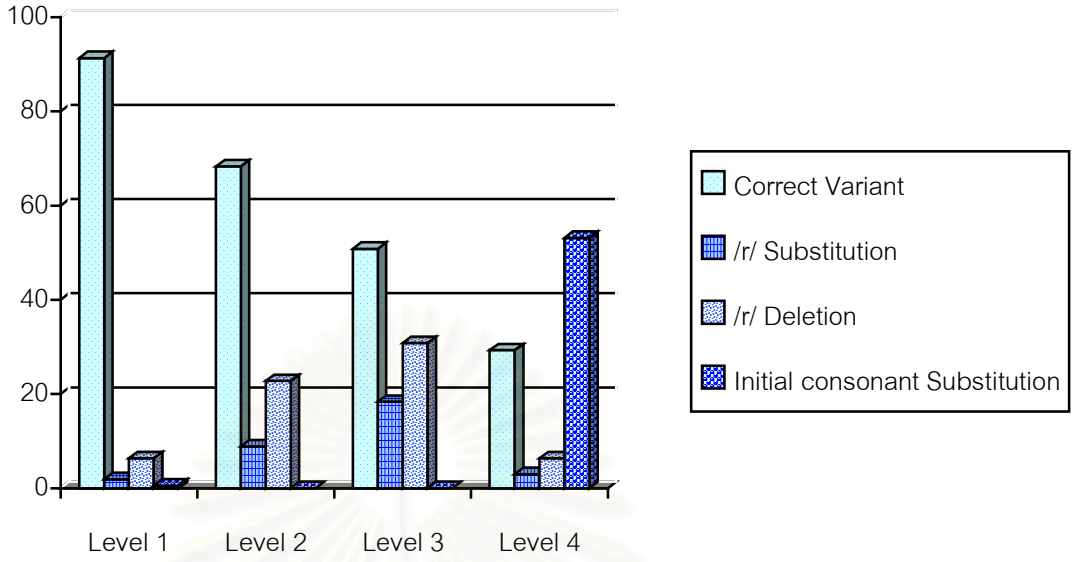

Figure 3: Percentage of Initial Clusters with /r/ across Levels

The percentage of correct variants is the highest at Level 1, and decreases from Level 2 to Level 3 to Level 4. The /r/ Substitution and the /r/ Deletion are frequently found at Level 2 and Level 3. The Initial consonant Substitution is very high at Level 4. Each type of the three most frequently found incorrect variants namely /r/ Substitution, /r/ Deletion, and Initial consonant substitution can be presented in graphs:

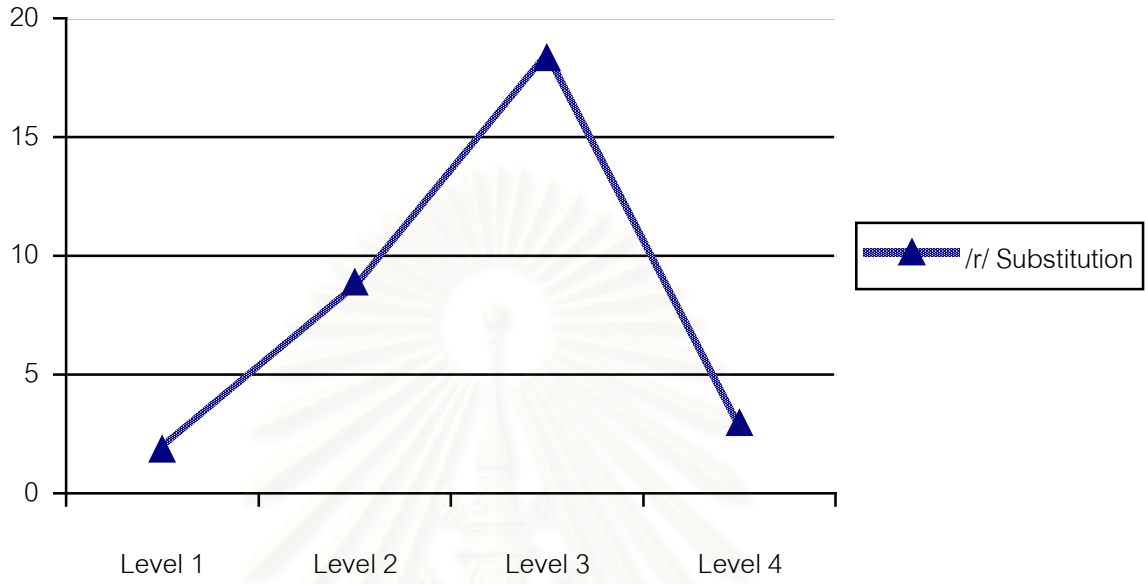

Figure 4: Frequency of /r/ Substitution across Levels

The /r/ Substitution appears at every level of difficulty. It is found that /r/ Substitution increases from Level 1 to Level 2 to Level 3, and drops in Level 4.

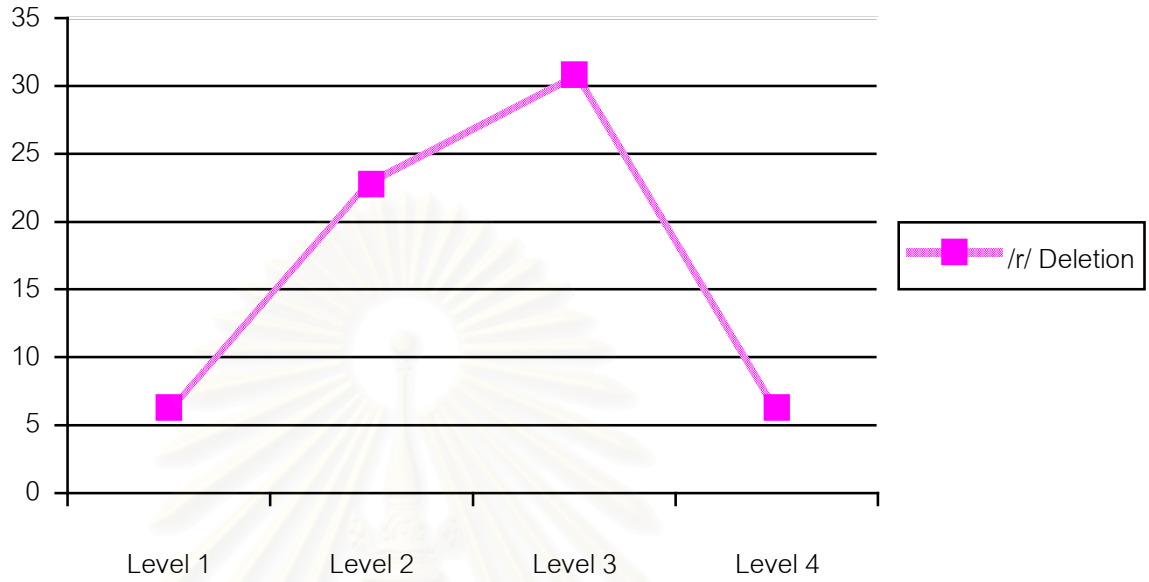

Figure 5: Frequency of /r/ Deletion across Levels

The /r/ Deletion is also found at every level of difficulty. It can be seen that the percentage of /r/ Deletion increases from Level 1 to Level 2 to Level 3, and drops in Level 4.

The percentage of /r/ Substitution and /r/ Deletion is compared in the following figure:

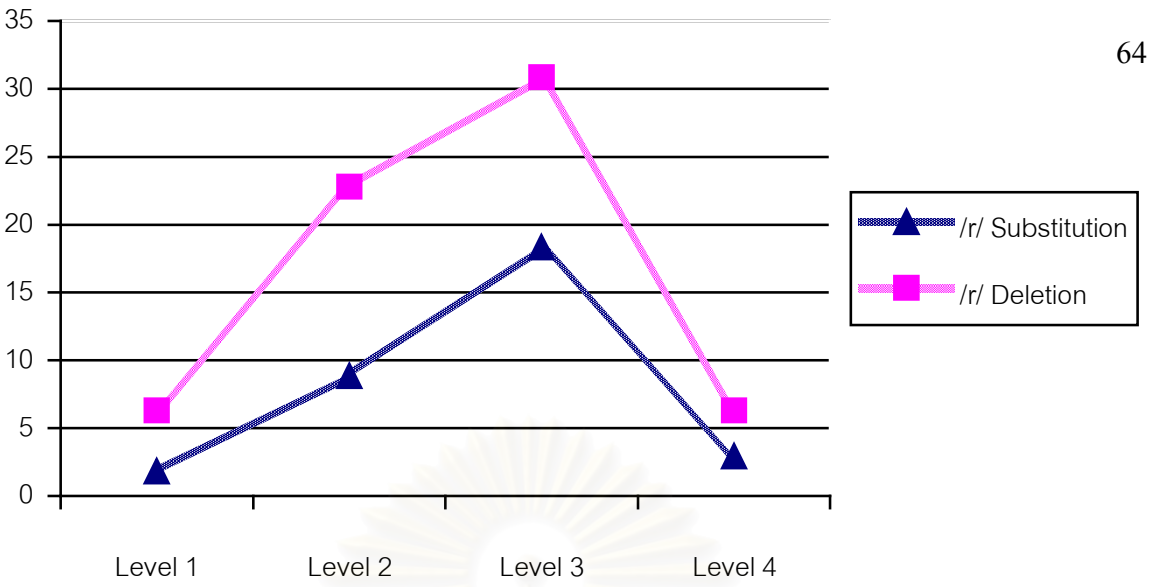

Figure 6: Frequency of /r/ Substitution and /r/ Deletion across Levels

According to the figure, the graphs of /r/ Substitution and /r/ Deletion are parallel, but the percentage of /r/ Deletion is higher than /r/ Substitution at all levels of difficulty. The data reflects that Thai learners tend to simplify consonant clusters. Instead of replacing the clusters with other sounds, it is likely that Thai learners simply delete the second member of the cluster. Thus, the syllable structure of the words will be modified from CC to C.

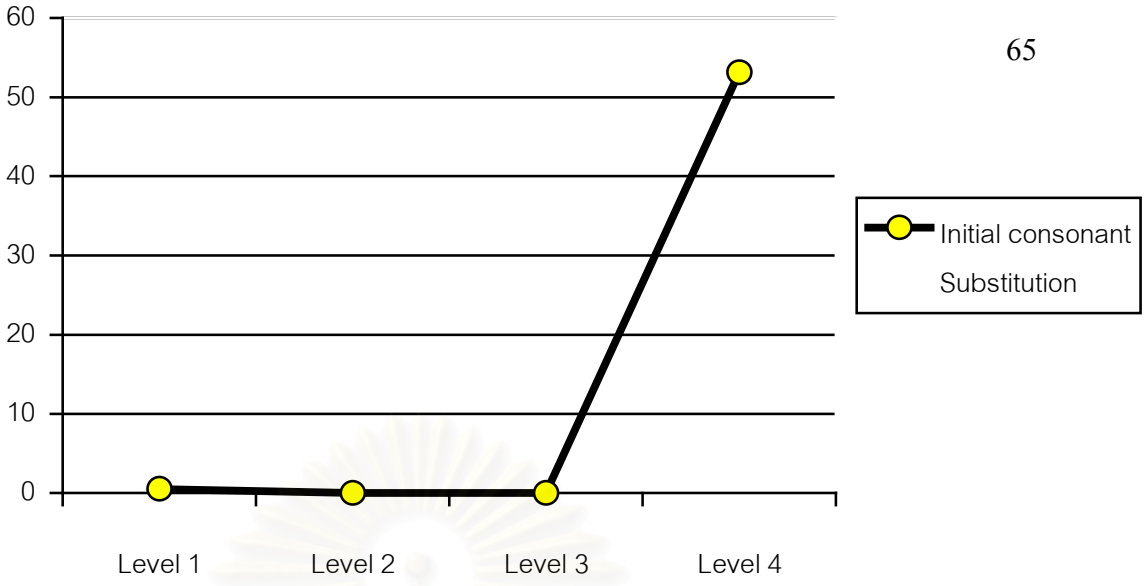

Figure 7: Frequency of Initial consonant Substitution across Levels

It can be seen that Initial consonant Substitution appears at Level 1 and Level 4. At Level 1, the Initial consonant Substitution occurs only with the cluster [t^hr] at a very low percentage. At Level 4, the percentage of Initial consonant Substitution is very high. This may be explained by the fact that the initial consonants at Level 4 (/ʃ/, /g/, and /θ/) are more marked when comparing with the /r/ sound. Thus, it is the initial consonants that tend to be modified.

All types of frequently found incorrect variants are presented in the following figure:

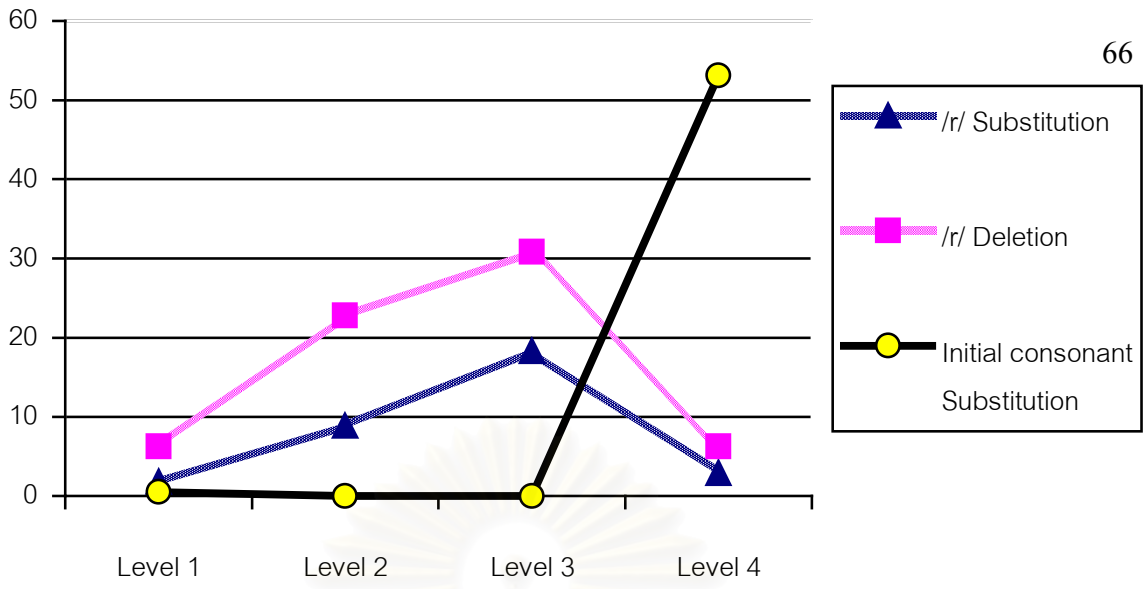

Figure 8: Types of Incorrect Variants across Levels

It can be concluded from the graph that /r/ Substitution and /r/ Deletion are frequently found in the lower levels of difficulty. The percentage of /r/ Substitution and /r/ Deletion drops at the highest level of difficulty as the clusters are more marked. The first marked sounds of clusters with /r/ are likely to be changed, resulting in a high percentage of the substitution of the first sounds.

In conclusion, apart from the level of difficulty that has been set by the percentage of correct variants, the incorrect variants of clusters in findings reflect the tendency for the sounds to be modified by Thai learners. That is, types of incorrect variants at each level suggest the different ways of sound simplification in English pronunciation of Thai people. The incorrect variants also help reaffirm Cross-Linguistic Influence and the Markedness Theory. In other words, the incorrect variants of clusters that do not have Thai equivalents reflect the mother tongue interference. That is, the more marked the clusters are, the more incorrect variants there will be. The number of incorrect variants correlates with the degree of markedness, the most marked clusters have the largest number of types of incorrect variants

4.3.4 Minor areas of findings

Besides the level of difficulty and incorrect variants, there are some minor points to be considered. These points include:

Some subjects confuse the cluster [t^hr] with /θr/. The cluster [t^hr] is unmarked and the problem should be the /r/ sound, but there appears the deviated variant /θr/ although the /θ/ sound is more marked than the [t^hr] sound. For the cluster /θr/, the deviated variant [t^hr] is common, as the marked sound /θr/ tend to lose their markedness more easily and is replaced by the unmarked sounds.

The cluster /gr/ deserves particular attention because the percentage of the variant [kr] is very high. The [kr] sound is equated with the /kr/ sound in Thai. This reflects that learners use the familiar sound in their native language to replace the marked sound in the second language. The voicing quality of /g/ is lost; however, substitution by the unaspirated /k/ does not affect intelligibility but only signifies a foreign accent.

4.4 CONCLUSION

In conclusion, the level of difficulty suggested in findings is generally similar to the level of difficulty determined by the two theories. That is, the clusters that have the Thai equivalents are easier for learners, and the more marked sounds are more difficult. However, both levels of difficulty differ in details. The minor differences are explained by the binary features and sound classes, and the influence of loan words. The findings suggest that the combination of Cross-Linguistic Influence and the Markedness Theory are effective in determining the degree of difficulty of clusters. Cross-Linguistic Influence can give a broad picture of cluster pronunciation problems learners might encounter based on the mother tongue interference. Moreover, the theory can explain the deviated variants that are influenced by the native language. The Markedness Theory is applied to explore cluster pronunciation problems in more details. Within the group of sounds that does not have the Thai equivalents and is assumed to be difficult, the Markedness Theory will help set up the detailed level of difficulty. That is, the more marked clusters are likely to be difficult for learners.

CHAPTER V
CONCLUSION AND IMPLICATIONS

The thesis proves that Cross-Linguistic Influence still plays an important role in the English language acquisition of Thai people. Cross-Linguistic Influence can be exploited in language learning. Comparing and contrasting the phonemes in the two languages can predict errors in advance, so that teachers can prepare to solve the mother tongue interference. The Markedness Theory helps explain the difficult features of problem sounds and the tentative replacement, so that teachers can pay more attention to them. In this chapter, the conclusion is provided with some implications for teaching as well as suggestion for further research.

5.1 CONCLUSION

The study investigates variants of initial clusters with /r/, namely [p^hr], [t^hr], [k^hr], /br/, /dr/, /gr/, /fr/, /θr/, and /ʃr/ among Thai first-year undergraduate students. It is hypothesized based on Cross-Linguistic Influence and the Markedness Theory that clusters that have Thai equivalents are easier for Thai learners, and the clusters that are more marked are more difficult.

The hypothesis proves to be true to a certain extent. That is, the clusters that have the Thai equivalents are easier for learners. Moreover, the clusters that are more marked are harder to acquire than the less marked ones. The exception to the hypothesis is that the [t^hr] sound appears easier than expected. Thai learners can pronounce it as they can do [p^hr], and [k^hr]. In addition, the cluster /fr/ proves to be much easier than the cluster /br/ and /dr/, although all do not have Thai equivalents. Both phenomena can be explained by the binary features and sound classes, and the influence of English loan words in the Thai language. That is, with higher numbers of English loan words, the clusters [t^hr] and /fr/ are easier for learners. In conclusion, from the findings, Cross-Linguistic Influence and the Markedness Theory are effective in determining the degree of difficulty of clusters. Cross-Linguistic Influence can give a broad picture of cluster pronunciation problems learners might encounter based on the mother tongue interference. The Markedness Theory is applied to explore clusters that do hot have

equivalents in more details. That is, the less marked clusters are assumed to be easier than the more marked ones.

5.2 IMPLICATIONS

Level of Difficulty	Cluster
1	[t^hr] [p^hr] [k^hr]
2	/fr/
3	/dr/ /br/
4	/ʃr/ /gr/ /θr/

Table 18: Level of Difficulty Suggested by Findings

Table 18 is repeated here for the discussion of the level of difficulty suggested by findings, the clusters [t^hr], [p^hr] and [k^hr] are assumed to be easy for learners. Teachers may point out the similarities and begin teaching with this level of difficulty since learners will be encouraged to practise pronunciation if they can pronounce correctly at the beginning. Then the sounds that are different from the learners' tongue are introduced. Firstly, teachers should exaggerate the articulation of the individual sound while the learners can imitate individually. Then the other consonant is added, forming a cluster, and the whole utterance is given and practised. This is because in most cases of the pronunciation problem of clusters, learners may be able to produce the elements of a cluster satisfactorily, but the combination of the elements in close sequence may prove to be problematical (Tench, 1981: 66).

For the cluster /fr/, the English loan words might help facilitate pronunciation problems. Therefore, teachers might introduce the cluster /fr/ before /dr/ and /br/. Teachers might adapt the loan words as examples, or exercises for practising. For the clusters /dr/ and /br/, teachers might explain that these clusters do not have the Thai equivalents, but learners can pronounce them the same way as they do /fr/. When the pronunciation of /fr/ has been accomplished, the pronunciation of /dr/ and /br/ will be easier.

For the marked clusters /ʃr/, /gr/, and /θr/, teachers may need to consider whether the marked features contribute to understanding. Therefore, teachers should pay more attention to the more marked sound such as /ʃr/ and /θr/, which the substitution often causes misunderstanding. For example, if /θr/ is replaced with [t^hr], the meaning of the words changes; 'three' and 'tree' refer to different things. Teachers should focus on the marked sounds that distinguish meanings and affect intelligibility. For the cluster /ʃr/, although it is marked and is likely to be replaced by the /tʃr/ sound, it receives the second priority because there are fewer words with /ʃr/, and there is no minimal pairs of /ʃr/ and /tʃr/ as well. Thus, the misunderstanding of /ʃr/ and /tʃr/ can be made clear by the contexts. For the cluster /gr/, Thai learners perceive it to be similar to [kr], and teachers should point out the difference. However, teachers might not need to pay extra attention to the marked /gr/ since it does not affect intelligibility. To conclude, it is suggested that teachers focus on /θr/ first, followed by /ʃr/ and /gr/ respectively.

Teachers also need to be well aware of tentative replacement of the correct variants. The clusters that deserve more attention are the marked sounds. Errors can be predicted beforehand and teachers can prepare to teach the differences between the correct variants and their substitution, so that learners can distinguish them and are able to pronounce them differently.

5.3 SUGGESTIONS FOR FURTHER RESEARCH

Further research can be developed in many aspects. For the subjects, research might be done with other groups that present different factors such as age, sex, career, social status, and level of education, to see how these factors affect the pronunciation of clusters. In addition, the subjects may be students from other universities so that more variants of /r/ might be found.

For the testing and methodology, further research might concentrate on how learners react to different types of the test. For example, the test words might be inserted between sentences in a paragraph, or the test words might appear as single words. The difference between types of tests may influence the performance of learners. In addition, the data might be collected in a sound laboratory for clarity. Other statistical methods can be applied to calculate and analyze data as well. For example, the t-test may be

applied to prove the relationship between clusters. In other words, it is interesting to hypothesized that if subjects can pronounce a cluster correctly, it is likely that they can also pronounce the other specific cluster, and if the percentage of correct variants of both clusters correlate.

For Cross-Linguistic Influence and the Markedness theory, further research might investigate how the combination of the two theories extends its roles to other phonological aspects. The hypotheses may be the same or different from this study, and the validity of hypotheses is encouraged to be proved, so that the results of further studies can confirm the reliability of the two theories, and can be exploited in the English language teaching. For example, it may be hypothesized that Cross-Linguistic Influence plays a key role in the study of syllable structures of Thai and English; the English syllables that have the equated syllables in Thai are easier to master. The Markedness Theory may deal with the complex or marked syllable structures that are harder. Therefore, teachers may pay attention to the more marked sounds but do not ignore the mother tongue interference. Moreover, it is also interesting to expand Cross-Linguistic Influence and the Markedness theory to the prosodic level such as rhythm and intonation. Cross-Linguistic Influence and the Markedness Theory is also encouraged to extend its roles to other aspects of linguistics such as syntax, morphology, and semantics as well.

It can be seen from Chapter IV that the influence of loan words can explain the minor language phenomena in some way. Further research should be done on how Thai learners nativize English loan words and how these loan words facilitate English pronunciation. In addition, research can investigate whether the frequency or the number of existence of loan words facilitates English pronunciation more than the other, and how they can be exploited in a classroom.

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APPENDICES

APPENDIX A

1. park	flower	run	walk	play
2. school	class	teacher	room	student
3. law	rule	police	thief	station
4. duck	dog	cat	rat	fox
5. sun	cloud	rain	sky	moon
6. pen	ruler	pencil	paper	book
7. always	seldom	rarely	often	usually
8. Bangkok	London	Venice	Rome	Paris
9. yellow	blue	white	black	red
10. movie	romantic	comedy	action	horror
11. roof	door	window	wall	home
12. bird	monkey	rabbit	bear	snake
13. shape	round	circle	square	dot
14. pop	jazz	blues	rock	soul
15. car	people	bike	light	road

APPENDIX B

1.Pray to God and you will succeed.
2.Bring a piece of paper with you.
3.Trees are good for people.
4.Creamy cakes are baked in the kitchen.
5.Friends are forever.
6.Brown elephants are walking to the zoo.
7.Shrines are made from wood.
8.Cruel people like to hurt others.
9.Fried fish is delicious.
10.Pretty girls appeared on television.
11.Trendy teens shop at Siam Square.
12.Draw a picture of yourself.
13.Crabs can be found on the beach.
14.Thriller movies scare a lot of people.
15.Trains are cleaner today.
16.Drugs must be used carefully.
17.Breakfast is ready!
18.Shredded cabbage is being fried.
19.Dreams are usually wonderful.
20.Green apples are full of vitamins.
21.Frogs like playing in the rain.
22.Groups of students are reading together.
23.Shrimps are imported from Japan.
24.Throw the ball up and catch it again.
25.Grey cats are eating fish.
26.Three dogs are playing with the ball.
27.Proud people sometimes look down on others.

APPENDIX C

Manner of Articulation		Place of Articulation					
		Bilabial	Labio-dental	Dental	Alveolar	Palatal	Velar
Stops	Voiceless	/p/			/t/		/k/
	Voiced	/b/			/d/		/g/
Fricatives	Voiceless		/f/	/θ/	/s/	/ʃ/	
	Voiced		/v/	/ /	/z/	/ /	
Affricates	Voiceless					/tʃ/	
	Voiced					/d /	
Nasals	Voiced	/m/			/n/		/ /
Liquids	Voiced				/l/	/r/	
Glides	Voiced	/w/				/y/	

Consonant Chart

Source: Odlin, Terence. Language Transfer: Cross-Linguistic Influence in Language Learning. Cambridge: Cambridge UP, 1996: 212.

BIOGRAPHY

Peeriya Pongsarigun was born in Nakhon Sawan on Wednesday, December 8, 1982. In 2004, she received a Bachelor of Arts, English (1st Class Honors) from the faculty of Arts, Chulalongkorn University. She continued studying for an M.A. in the same major. She received a scholarship for a thesis development from Chulalongkorn Graduate Studies on the auspicious occasion of the King' s 72nd birthday.