

รายงานการวิจัย

เรื่อง

การรับรู้เสียงพยัญชนะภาษาอังกฤษ Voiceless Interdental Fricative

ของนักศึกษาวิชาเอกภาษาอังกฤษ

สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง

The Acquisition of English Voiceless Interdental Fricative by

English Major Students at

King Mongkut's Institute of Technology Ladkrabang

โดย

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ภาควิชาภาษาและสังคม คณะครุศาสตร์อุตสาหกรรม
สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง

ปีงบประมาณ 2545

เอกสารนี้เป็นเอกสารที่สงวนไว้สำหรับการใช้งานเพื่อการศึกษาเท่านั้น ไม่อนุญาตให้นำไปใช้ประโยชน์ด้านการค้า
ไม่ว่ากรณีใดๆทั้งสิ้น อีกทั้งห้ามมิให้ตัดแปลงเนื้อหา และต้องอ้างอิงถึงเจ้าของเอกสารทุกครั้งที่มีการนำไปใช้

บทคัดย่อ

การรับรู้เสียงพยัญชนะภาษาอังกฤษ Voiceless Interdental Fricative ของ นักศึกษาวิชาเอกภาษาอังกฤษ สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง

งานวิจัยนี้มุ่งศึกษาการออกเสียงพยัญชนะภาษาอังกฤษ Voiceless Interdental Fricative /θ/ ในตำแหน่งต้นคำและท้ายคำภาษาอังกฤษ ของนักศึกษาวิชาเอกภาษาอังกฤษ สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง กลุ่มตัวอย่าง คือนักศึกษาหญิงจำนวน 15 คน ข้อมูลที่ใช้ในการศึกษา คือ คำภาษาอังกฤษ ที่มีเสียงพยัญชนะตัวแรก เป็นเสียง /θ/ จำนวน 9 คำ และตัวท้ายเป็นเสียง /θ/ จำนวน 9 คำ คำภาษาอังกฤษจำนวน 18 คำดังกล่าวนี้ ปรากฏในรูปแบบ คำเดี่ยว (word list) และปรากฏอยู่ในประโยค (sentence list) นักศึกษาอ่านคำ 18 คำ และประโยค 18 ประโยค ที่เตรียมไว้ทั้งหมด และข้อมูลได้ถูกนำมาวิเคราะห์ทางสถิติ โดยใช้โปรแกรมสำเร็จรูป SPSS ค่าสถิติที่ใช้คือ ไคแอสควร์ (Chi-square) ผลการวิจัย พบว่า นักศึกษาไม่สามารถออกเสียง /θ/ ได้ถูกต้อง ไม่ว่าจะปรากฏอยู่ในต้นคำหรือท้ายคำ ทั้งนี้ นักศึกษาจะออกเสียง voiceless alveolar stop /t^h/ และ /t/ แทนเสียง /θ/ นอกจากนี้ เสียงที่เปล่งโดยผู้เรียน (interlanguage) สามารถอธิบายได้โดยพิจารณาความสัมพันธ์ของ การถ่ายโอนทางภาษา (Language Transfer) และ ทฤษฎีความยากง่ายทางภาษา (Theory of Markedness)

Abstract

The Acquisition of English Voiceless Interdental Fricative by English Major Students at King Mongkut's Institute of Technology Ladkrabang

The purpose of the study was to investigate the production of the voiceless interdental fricative /θ/ in word-initial and word-final positions by English major students at King Mongkut's Institute of Technology Ladkrabang (KMITL). The data for this study, target English words, came from fifteen female native speakers of Thai. The words to be read appeared on a word list and a sentence list. Eighteen target English words contained the voiceless interdental fricative /θ/. Nine words had /θ/ in word-initial positions and nine words in word-final positions. The Chi-Square from the SPSS program was run in the statistical analysis. The results revealed that whether

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in a word-final or a word-initial positions, the speakers substituted voiceless alveolar stops /t^h/ and /t/ for English /θ/. Based on Language Transfer and Theory of Markedness, Interlanguage phonology (IL) of native Thai speakers can be accounted for.



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**The Acquisition of English Voiceless Interdental Fricative by
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INTRODUCTION

Based on phonological processes in second language (L2) acquisition, there are systematic phonetic relationships between the sounds of the target language and those of the learner's interlanguage (Macken and Ferguson, 1987). Studies focusing on only one type of linguistic constraint such as markedness or L1 transfer does not fully account for the acquisition of an L2 phonology. As stated by Hansen (2001), multiple linguistic constraints can affect the acquisition and use of a single segment.

In this paper, the production of the voiceless interdental fricative [θ] in a word-initial and word-final positions by English major students at King Mongkut's Institute of Technology Ladkrabang was investigated. Interlanguage phonology of native Thai speakers was investigated with respect to linguistic constraints like markedness and L1 transfer. The choice of consonants was based on a consideration of differences between the sound systems of English and Thai.

The following are the twenty segmental consonant phonemes in Thai (Hudak, 1990).

	Bilabial	Labio- dental	Alveolar	Palatal	Velar	Glottal
Stops						
voiceless unaspirated	p		t	c	k	
voiceless aspirated	p ^h		t ^h	c ^h	k ^h	
voiced	b		d			
Fricatives		f	s			h
Sonorants						
Nasals	m		n		ŋ	
Lateral			l			
Trill / Tap			r			
Semi-vowels	w			y		

All twenty consonants may appear in a word-initial position. Only *p t k m n ŋ w y* occur in a word-final position.

According to Jakobson's acquisition productions cited by Macken and Ferguson (1987), fricatives are replaced by stops. In this connection, we expect that native speakers of Thai will have difficulty pronouncing both the voiced [ð] and voiceless [θ] interdental fricatives. Even though both the voiced and voiceless interdental fricatives do not appear in Thai, the present study focuses only on the voiceless interdental fricative. Additionally, data were analyzed with respect to linguistic constraints like markedness and transfer.

PURPOSE

To investigate the production of the voiceless interdental fricative /θ/ in word-initial and word-final positions by English major students at King Mongkut's Institute of Technology Ladkrabang (KMITL)

Language Transfer

Native language influence is an important factor in the acquisition of target language phonetics and phonology. Similarities and differences in phonemics and phonetic inventories can result in positive and negative transfer, respectively. Odlin (1989) states that German has a phonemic contrast between the voiceless velar fricative [x] and the voiceless velar stop [k]. While the latter consonant exists in English, the former does not. Consequently, many native speakers of English have difficulty pronouncing [x] and often fail to distinguish minimal pairs such as [naxt] 'night' and [nakt] 'naked'.

Sekiya (1991) investigates the mechanism of children's second language (L2) phonological acquisition in naturalistic settings. The results show that L1 transfer seems to be a dominant process in shaping Japanese children's L2 phonology at the initial stages of their L2 learning. However, the L1 transfer decreases as the learners' pronunciation improves. This developmental pattern is similar to the one suggested for the adults' L2 phonological acquisition.

Hansen (2001), citing the study of T. Piper (1984), states that L1 developmental effects such as substitution and assimilation also effect syllable coda production. That is, one learner may substitute a /t/ for English [θ] and [ð] and another one may substitute [s]. Flege et al. (1996) shows that native speakers of Italian resemble native speakers of Japanese in substituting a fricative ([s] or [z]) for English [θ] and [ð]. Furthermore, Macken and Ferguson (1987) cites the study of Ferguson (1987) and Ingram (1978) about substitution processes of child language. Fricatives [f v s z] are replaced by stops [p b t d] of the corresponding place of articulation. For example, in English *there* is replaced with [dɛ] or in French [so] *sceau* 'bucket' with [to].

Odlin (1989) posits that although native language has a major influence on the phonetic and phonological patterns evident in second language acquisition, the cross-linguistic frequency of sounds is one factor that accounts for the difficulty of adults learning a second language. For instance, Odlin cites the study by Briere (1968) suggesting that American students will have far more difficulty in learning the rarest

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sounds: [ħ] as opposed to [x]. From Maddieson's (1984) survey (as cited in Odlin, 1989), the German voiceless velar fricative [x] appeared in 76 languages, while a voiceless pharyngeal fricative [ħ] in Kurdish appeared in only 12 other languages.

Markedness

The Markedness Differential Hypothesis (MDH), first explained by Eckman (1977; as cited in Gass & Selinker, 1994), as opposed to the well-known Contrastive Analysis Hypothesis (CAH) can predict the areas of phonological difficulty that a language learner will experience in second language acquisition. According to Parker and Riley (2000), the concept of markedness follows naturally from the concept of universals. Structures that are consistent with universals are considered unmarked, and those that are inconsistent with universals are considered marked. Marked structures are thought to be more difficult to acquire than are unmarked structures. Markedness can be viewed in implicational sense: since voiced stops imply the presence of voiceless stops, but not vice versa, voiced stops are considered marked and voiceless stops are considered unmarked. Markedness may also be viewed in a statistical sense:

property X is more marked than property Y if X is rarer than Y.

Under this definition, the interdental fricative [θ] is more marked than the alveolar fricative [s], since [θ] occurs in fewer of the world's languages.

Gass & Selinker (1994), citing work by Eckman (1977), proposes a Markedness Differential Hypothesis as follows:

1. Those properties of the L2 which differ from the L1 and are more marked than the L1 will be difficult.
2. Among properties of the L2 that are more marked than the L1, the relative degree of difficulty will correspond to the relative degree of markedness.
3. Those properties of the L2 which differ from the L1, but are not more marked than the L1, will not be difficult.

To support the Markedness Differential Hypothesis, the following research is proposed. Wang (1995) investigates the production of word-final nasals, voiceless

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obstruents, and voiced obstruents by speakers of two Chinese dialects, Mandarin and Taiwanese. Subjects made significantly more errors in areas where there was a difference between the coda constraints in the native language and the target language. Mandarin speakers made significantly more errors in voiced stops than in voiceless stops; Taiwanese allows both [m] and voiceless stops in coda position, but Taiwanese speakers made significantly more errors in voiceless stops than in [m]. Such errors can be explained by the assumption that coda obstruents are more marked than sonorants, and voiced stops more marked than voiceless stops in coda position. In addition, Battistella (1990) claims that the affricates [tʃ], [dʒ], [ts], and [dz] and the fricatives [x], [χ], [θ], [ð], [f], and [v] are marked. Stops and the sibilant fricatives [s], [z], [ʃ] and [ʒ] are unmarked.

Hansen (2001) states that voiceless consonants are generally considered unmarked in relation to voiced consonants, and the more rare consonants, such as the interdental fricatives, are also considered more marked in relation to more common consonants such as stops and other fricatives. According to Hansen's study on linguistic constraints on the acquisition of English syllable codas by native speakers of Mandarin Chinese, Hansen found that the segments with which the learners had the most difficulty were the liquid [l] as in *tell*, voiced fricatives (i.e. [z] as in *plays*), and the voiceless interdental fricative [θ] as in *bath*.

In the present study, all tokens were also presented in a carrier frame in order to investigate whether the speakers produced the voiceless interdental fricative [θ] better in a word list or a sentence list. Based on Castino (1991), pronunciation from both a reading task and spontaneous speech by twenty university students learning Spanish at the third semester level was studied. The results show that: (1) students, both in the reading task and spontaneous speech, performed better on unmarked sounds compared to marked ones; (2) students performed better in the reading task than in the spontaneous task when averaging across marked and unmarked phones; and (3) the difference between the performance on the reading task and spontaneous task is greater for marked sounds than for unmarked ones.

According to the language transfer and markedness discussed above, it can be concluded that unmarked properties of language will be more likely to transfer. Marked properties will not be liable to transfer and will be harder to acquire in L2.

Based on the above-mentioned perspectives, we predict that native speakers of Thai will substitute the alveolar stops [t^h, t] or the alveolar fricative [s] for the English voiceless interdental fricative [θ]. We, moreover, would like to make use of linguistic constraints like language transfer and markedness to account for the interlanguage phonology of native Thai speakers.



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HYPOTHESES

In the present study, according to the production of the voiceless interdental fricative [θ] in word-initial and word-final positions appeared in a word list and a sentence list, if the speakers produce the voiceless interdental fricative [θ] correctly 90 percent, it is considered to be acquired. Accordingly, to test whether the speakers can produce [θ] correctly, the chi-square statistic was run in order to test the following hypotheses:

- (1) H_0 : The production of [θ] is nine times as common as the production of other sounds.
 H_a : The production of [θ] is not nine times as common as the production of other sounds.

In addition, to test whether the [θ] production in word-initial and word-final positions appeared in a word list and in a sentence list are the same, the chi-square statistic was run in order to test the following hypothesis.

- (2) H_0 : In a word list, the production of [θ] in a word-initial position and in a word-final position are the same.
 H_a : In a word list, the production of [θ] in a word-initial position and in a word-final position are not the same.
- (3) H_0 : In a sentence list, the production of [θ] in a word-initial position and in a word-final position are the same.
 H_a : In a sentence list, the production of [θ] in a word-initial position and in a word-final position are not the same.

Finally, to examine whether the [θ] production in word-initial and word-final positions are the same in both a word list and a sentence list, the following hypotheses are tested.

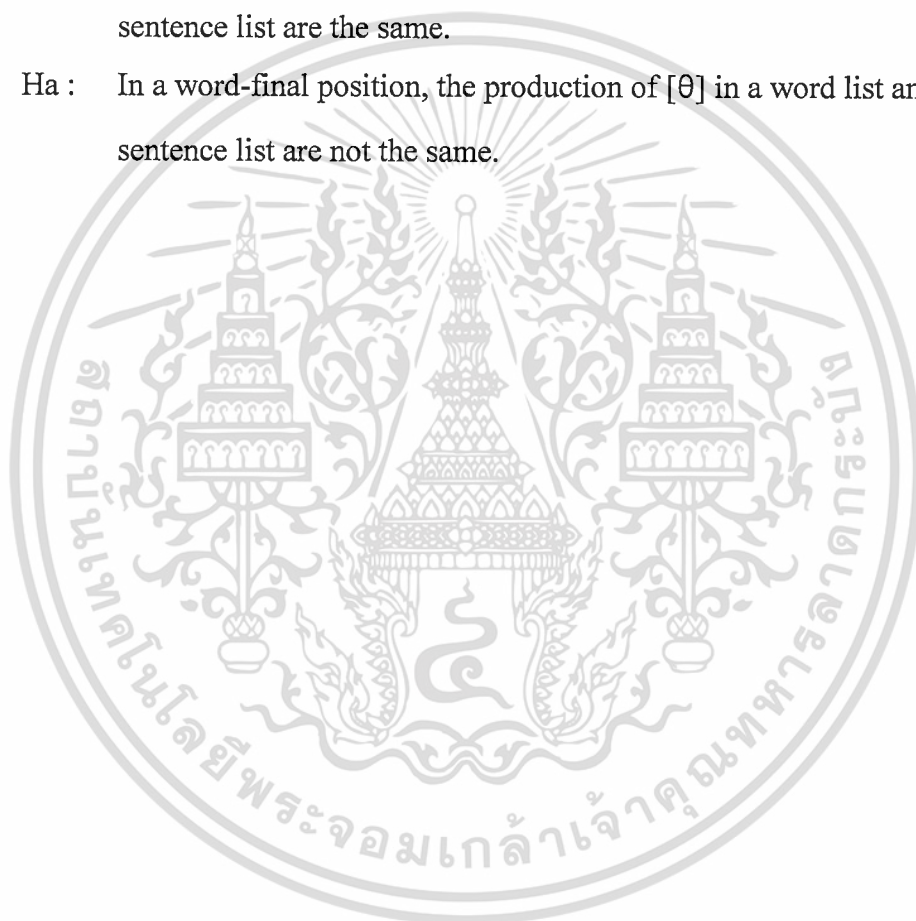
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(4) H_0 : In a word-initial position, the production of $[\theta]$ in a word list and in a sentence list are the same.

H_a : In a word-initial position, the production of $[\theta]$ in a word list and in a sentence list are not the same.

(5) H_0 : In a word-final position, the production of $[\theta]$ in a word list and in a sentence list are the same.

H_a : In a word-final position, the production of $[\theta]$ in a word list and in a sentence list are not the same.



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EXPERIMENTAL DESIGN

Subjects

Fifteen females native speakers of Thai studying at King Mongkut's Institute of Technology Ladkrabang and majoring in English participated in this study.

Stimuli

Eighteen target English words contained the voiceless interdental fricative [θ]. Nine words had [θ] in word-initial positions and nine words in word-final positions. Eighteen fillers were also provided. All test words were provided as a word list and a sentence list. With regard to the sentence list, the stimuli were produced in a carrier frame as shown in (6) and (7). The target words are underlined. The full set of stimuli is presented in Appendix.

(6) [θ] in a word-initial position

Subject (1 syllable) + Verb (1 syllable) + Articles “a” + #θ _____ + Prepositional Phrase

For example: Sue chose a **theme** for her paper.

(7) [θ] in a word-final position

Subject (1 syllable) + Verb (1 syllable) + Articles “the” or “a” + _____ #θ + Prepositional Phrase “at _____”

For example: She drew a **mouth** at art school.

In each sentence, the voiceless interdental fricative was provided in the pattern “V θ V.”

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Recording Procedure

All tokens were printed in large English letters on index cards. The cards were presented in random order. Six different randomized versions of the word list (36 words x 6 repetitions) and the sentence list (36 words x 6 repetitions) were used. A total of 432 utterances were recorded for each speaker ($n = 15$). The first 3 good repetitions of the word list and the sentence list produced by a speaker were used in the study (a total of 810 words in the word list and 810 words in the sentence list). Utterances were excluded only if they contained a slip of the tongue or other disfluency (e.g., a long pause). The subjects were recorded in a soundproof room. The entire chosen word list and sentence list were presented to an English instructor trained in the International Phonetic Alphabet (IPA) for sound production judgement. The English instructor considered whether each test word was target-like [θ] or non-target like (ð, t^h, t, d, s, z, or others).

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RESULTS

The results of the study are organized as follows. First, the percent correctness and errors of the production of the voiceless interdental fricative [θ] are given, followed by the statistical results for the [θ] production in a word-initial and word-final positions each of which was provided in both a word list and a sentence list. Following this, the statistical results for the [θ] production in a word-initial position versus a word-initial position in a word list and in a sentence list are presented. Finally, percent conversions into different segments other than [θ] are given.

Overall percent correctness and errors of the production of the voiceless interdental fricative in word-initial and word-final positions are shown as follows:

Table 1. Percent Correctness and Errors

Position	Word List				Sentence List			
	Correctness		Errors		Correctness		Errors	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Initial	26	6.41	379	93.58	32	7.90	373	92.10
Final	76	18.77	329	81.23	76	18.77	329	81.23

In Table 1, we can see that whether in a word-initial position or a word-final position, which were provided as a word list or a sentence list, the percent correctness of the [θ] production is lower than the percent errors. This means that English L2 speaker cannot pronounce the voiceless interdental fricative correctly.

Now let's see whether the production of [θ] is nine times as common as the production of other sounds. That is, if the [θ] production in a word list and a sentence list is 90 percent accuracy, it can be considered that speakers can pronounce the voiceless interdental fricative. The chi-square statistic from the SPSS program was run in the statistical analysis. Tables of statistical results are given below.

Table 2. Statistical Results for the [θ] Production in a Word-Initial Position in a Word List

	Observed	Expected	Residual
Errors	379	40.5	338.5
Correctness	26	364.5	-338.5
Total	405		
$\chi^2 (1, N = 405) = 3143.546, p < .05$			

Table 3. Statistical Results for the [θ] Production in a Word-Final Position in a Word List

	Observed	Expected	Residual
Errors	329	40.5	288.5
Correctness	76	364.5	-288.5
Total	405		
$\chi^2 (1, N = 405) = 2283.464, p < .05$			

Table 4. Statistical Results for the [θ] Production in a Word-Initial Position in a Sentence List

	Observed	Expected	Residual
Errors	373	40.5	332.5
Correctness	32	364.5	-332.5
Total	405		
$\chi^2 (1, N = 405) = 3033.093, p < .05$			

Table 5. Statistical Results for the [θ] Production in a Word-Final Position in a Sentence List

	Observed	Expected	Residual
Errors	329	40.5	288.5
Correctness	76	364.5	-288.5
Total	405		
$\chi^2 (1, N = 405) = 2283.464, p < .05$			

In Tables 2-5, we see that the chi-square statistic is large and the observed significance level is small, so we reject the H_0 that the production of the voiceless interdental fricative [θ] is nine times as common as the production of other sounds.

The results reveal that the [θ] production in word-initial and word-final positions each

of which appeared in both a word list and a sentence list is lower than 90 percent accuracy.

To determine whether in a word list or in the sentence list, the production of the voiceless interdental fricative [θ] in a word-initial position and in a word-final position are the same, a crosstabulation and the Pearson Chi-square from the SPSS program were run in the statistical analysis. The results are shown in Tables 6-7.

Table 6. Statistical Results for the [θ] Production in a Word-Initial Position versus a Word-Final Position in a Word List

		Word List		Total
		Initial	Final	
Errors	Observed Count	379	329	708
	Expected Count	354	354	708
Correctness	Observed Count	26	76	102
	Expected Count	51	51	102
Total	Observed Count	405	405	810
	Expected Count	405	405	810
$\chi^2 (1, N = 810) = 28.041, p < .05$				

Table 7. Statistical Results for the [θ] Production in a Word-Initial Position versus a Word-Final Position in a Sentence List

		Sentence List		Total
		Initial	Final	
Errors	Observed Count	373	329	702
	Expected Count	351	351	702
Correctness	Observed Count	32	76	108
	Expected Count	54	54	108
Total	Observed Count	405	405	810
	Expected Count	405	405	810
$\chi^2 (1, N = 810) = 20.684, p < .05$				

The results shown in Tables 6-7 reveal that the observed significance level is less than 0.05, so we reject the H_0 that in both a word list and a sentence list, the production of the voiceless interdental fricative [θ] in word-initial position and in a

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word-final position are the same. According to a crosstabulation of the [θ] production for a word-initial position and a word-final position in a word list in Table 6, the findings indicated that the correctness of the [θ] production in a word-initial position (26) is lower than that in a word-final position (76). Similarly, in Table 7, the findings indicate that the correctness of the [θ] production in a word-initial position (32) is lower than that in a word-final position (76).

To investigate whether the production of the voiceless interdental fricatives [θ] in word-initial and word-final positions is the same in both a word list and a sentence list, a crosstabulation and the Pearson Chi-square from the SPSS program were run in the statistical analysis. The results are presented in Tables 8-9.

Table 8. Statistical Results for the [θ] production in a Word-Initial Position in a Word List versus One in a Sentence List

		Word-Initial Position		Total
		Word List	Sentence List	
Errors	Observed Count	379	373	752
	Expected Count	376	376	752
Correctness	Observed Count	26	32	58
	Expected Count	29	29	58
Total	Observed Count	405	405	810
	Expected Count	405	405	810

$\chi^2 (1, N = 810) = 0.669, p > .05$

Table 9. Statistical Results for the [θ] production in a Word-Final Position in a Word List versus One in a Sentence List

		Word-Final Position		Total
		Word List	Sentence List	
Errors	Observed Count	329	329	658
	Expected Count	329	329	658
Correctness	Observed Count	76	76	152
	Expected Count	76	76	152
Total	Observed Count	405	405	810
	Expected Count	405	405	810

$\chi^2 (1, N = 810) = 0.000, p > .05$

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The results shown in Table 8 reveal that the observed significance level is higher than 0.05, so we accept the H_0 that the production of the voiceless interdental fricative [θ] in a word-initial position is the same in both a word list and a sentence list. Similarly, in Table 9, we accept the H_0 that the production of the voiceless interdental fricative [θ] in a word-final position is the same in both a word list and a sentence list.

According to the results shown in Tables 2-5 and 8-9, whether the voiceless interdental fricative [θ] appeared in a word alone or in a word with a context, the [θ] production is lower than 90 percent accuracy. Based on this result, I can combine the results of the [θ] production in a word list with ones in a sentence list.

In order to examine the errors of the sound production, percent conversions into different segments in word-initial and word-final positions were calculated as shown in Table 10.

Table 10. Percent Conversions into Different Segments Other Than [θ]

	t		t ^h		d		s		ð		Others	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Initial	349	43.1	331	40.9	8	1	2	0.2	34	4.2	28	3.5
Final	1	0.1	292	36	186	23	61	7.5	2	0.2	116	14.3
Total	350	21.6	623	38.5	194	12	63	3.9	36	2.2	144	8.9

Note: /t/ refers to a voiceless unaspirated alveolar stop.

/t^h/ refers to a voiceless aspirated alveolar stop.

/d/ refers to a voiced alveolar stop.

/s/ refers to a voiceless alveolar fricative.

/ð/ refers to a voiced interdental fricative.

“Others” refers to unidentified segments.

As Table 10 and Figure 1 illustrate, in a word-initial position, substituting the voiceless unaspirated alveolar stop [t] (43.1%) and the voiceless aspirated alveolar stop [t^h] (40.9%) for English [θ] is higher than substituting other consonants (8.9%).

In a word-final position, the speakers substituted the voiceless aspirated alveolar stop [t^h] (36 %) for English [θ] rather than other consonants like [d] = 23 %, [s] = 7.5 %, [ð] = 0.2 % and others = 14.3 %.

As shown in Figure 2, overall, whether in a word-final or a word-initial position, the speakers substituted the voiceless alveolar stops ([t] and [t^h]) (60.1%) rather than other consonants ([d] = 12%, [s] = 3.9%, [ð] = 2.2 % and others = 8.9 %).

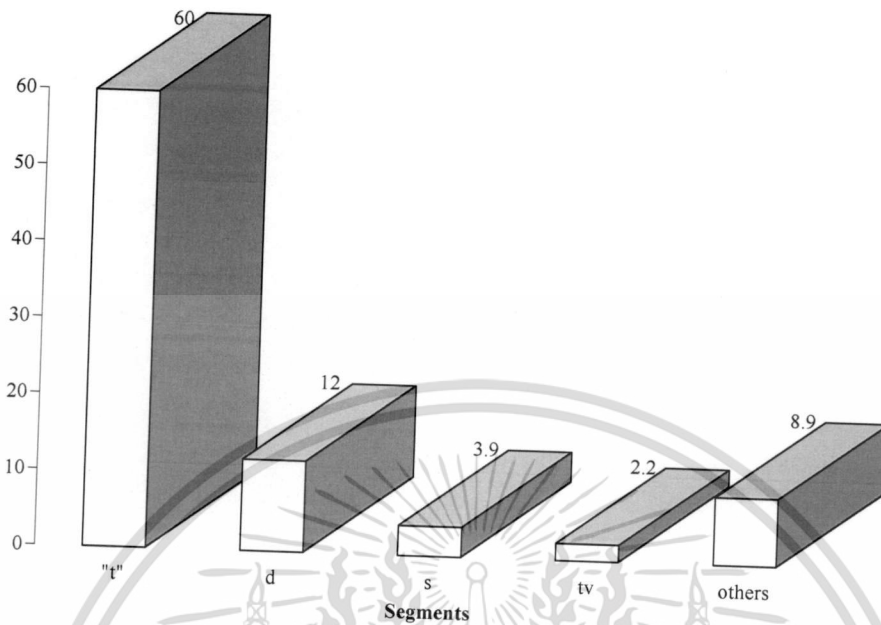


Note: tv refers to the voiced interdental fricative [ð]

Figure 1. Percent Conversions into Different Segments

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Note: "t" refers to voiceless alveolar stops ([t] and [tʰ])

Figure 2. Overall Percent Conversions into Different Segments

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DISCUSSION

What was expected with regard to the production of voiceless interdental fricative [θ] by native speakers of Thai, based on previous studies, is that the speakers substitute the alveolar stops [t^h, t] or the alveolar fricative [s] for the English voiceless interdental fricative [θ].

Based on the percentage results from Table 1 and the statistical results from Tables 2-5, we can conclude that whether in a word-initial position or a word-final position, English L2 speakers cannot pronounce the voiceless interdental fricative [θ] correctly. The findings support the theoretical background of language transfer as stated in Section 2.1 that native language influence is an important factor in the acquisition of target language phonetics and phonology. Since the voiceless interdental fricative [θ] does not appear in Thai, Thai speakers have difficulty pronouncing [θ] and produce other sounds appearing in Thai instead.

Moreover, according to the statistical results from Tables 8-9, whether the voiceless interdental fricative [θ] appears in a word alone or in a word with a context, it does not cause any differences. The present study reveals that the speakers have difficulty pronouncing [θ] in both a word list and a sentence list. In Table 8, however, it should be noticed that in a word-initial position, the speakers tend to perform better in sentence list task (32 correct words) than in the word list task (26 correct words). The findings tend to be opposed to Castino (1991)'s claim that students performed better in the reading task than in the spontaneous task.

According to the statistical results shown in Table 10, in terms of substitution process, native Thai speakers substituted voiceless alveolar stops ([t] and [t^h]) for English [θ]. The findings support the fact that unmarked properties of language like voiceless alveolar stops will be more likely to transfer. Marked properties like the voiceless interdental fricative [θ] will no be liable to transfer and will be more difficult to acquire in L2. As claimed by Macken and Ferguson (1987), fricatives are more marked than stops. However, the voiceless alveolar fricative [s] should have been transferred to L2 rather than the alveolar stops [t] or [t^h] because in terms of place of

articulation and manner of articulation, only one feature [alveolar] of the fricative [s] is different from the voiceless interdental fricative [θ]. In contrast, the stops [t^h] or [t] have two features: [alveolar] and [stop] differing from the voiceless interdental fricative. This substitution process can be explained by a Theory of Markedness proposed by Eckman (1977) mentioned earlier. Since fricatives are more complex articulatorily and more marked than stops (Macken and Ferguson, 1987), speakers substituted stops for English [θ].

In addition, the speakers produced the unaspirated alveolar stop [t] in a word-initial position rather than the aspirated alveolar stop [t^h] because [t^h] is more marked than [t]. Macken and Ferguson (1987) cites the study of Preston (1974) that the production of voiceless unaspirated stops are articulatorily easier to control than the production of either prevoiced or aspirated stops. In contrast, the speakers produced the voiceless aspirated stop [t^h] rather than unaspirated stop [t] in a word-final position in spite of the fact that the Thai consonant [t] not [t^h] occur in a word-final position. This may be explained that the native Thai speakers learning English pronounce English [t^h] with aspiration in a word-final position. They may accustom themselves to the production of English [t^h] instead of [t] at the final position.

It is interesting that the voiced alveolar stop [d] was substituted for [θ] in a word-final position rather than the voiceless alveolar fricative [s]. It can be concluded that fricatives are more marked than stops so it is more difficult to acquire fricatives. Furthermore, the voiced interdental fricative [ð] was substituted for the voiceless interdental fricative [θ] in spite of the fact that the [voiced] feature and the [fricative] quality are more marked and [ð] does not appear in L1 inventory. In my view, misperception or difficult judgement by an English instructor may cause this error. In addition, since Thai speakers produce fricatives in word-initial position, the speakers should have had less difficulty in pronouncing [θ] in a word-initial position than in a word-final position. According to the present study, the speakers had the less difficulty in pronouncing [θ] in a word-final position than in a word-initial position. Such finding illustrates that the occurrence of [θ] in a word-final position or a word-initial position is reflective of acquisition processes, and requires further research.

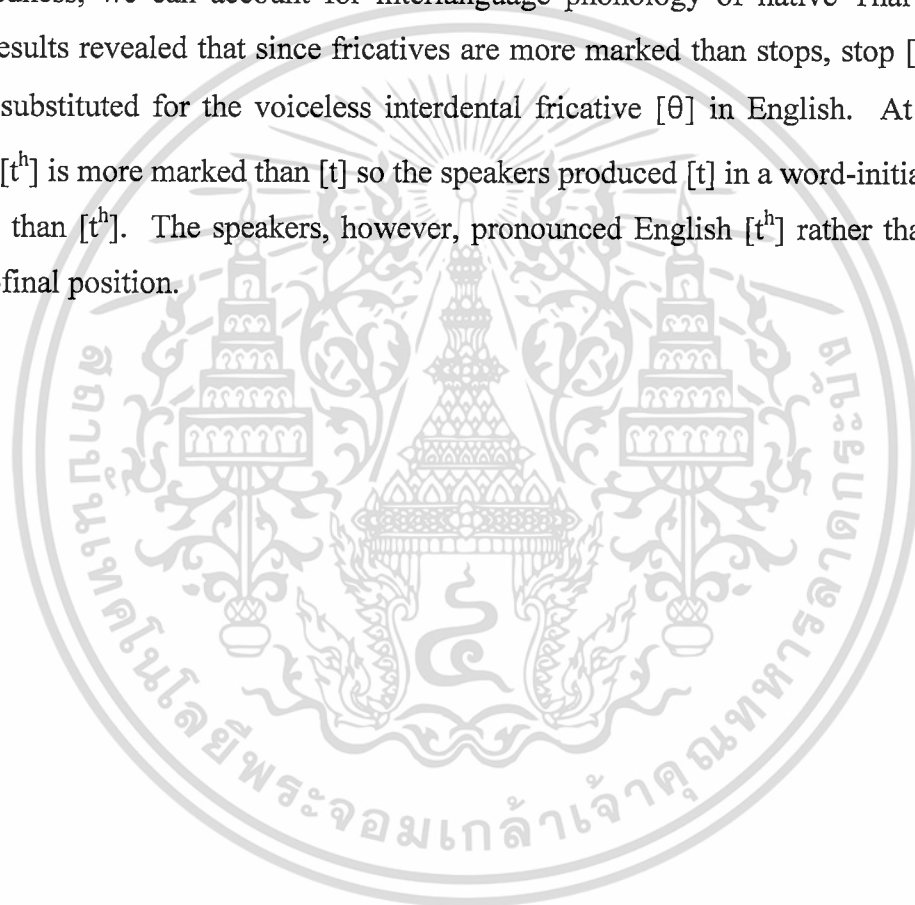
In sum, according to the study, the interaction between language transfer and markedness can account for interlanguage phonology of native Thai speakers.



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CONCLUSION

The purpose of the study is to investigate the production of the voiceless interdental fricative [θ] in a word-initial and word-final positions by English major students at King Mongkut's Institute of Technology Ladkrabang. The students learned English as a second language (L2). Based on language transfer and a theory of markedness, we can account for interlanguage phonology of native Thai speakers. The results revealed that since fricatives are more marked than stops, stop [t^h] and [t] were substituted for the voiceless interdental fricative [θ] in English. At the same time, [t^h] is more marked than [t] so the speakers produced [t] in a word-initial position rather than [t^h]. The speakers, however, pronounced English [t^h] rather than [t] in a word-final position.



REFERENCES

- Battistella, Edwin L. (1990). Markedness: The evaluative superstructure of language. Albany: State University of New York Press.
- Castino, Joe Mitchell. (1991). Markedness as a predictor of difficulty in the second language acquisition of Spanish phonology (Doctoral dissertation, University of Pittsburgh, 1991). Dissertation Abstracts International, 52(11), 3904.
- Flege, James Emil, Munro, Murray J., & MacKay, Ian R.A. (1996). Factors affecting L2 consonant production. In Robert Bayley & Dennis R. Preston (Eds.), Second language acquisition and linguistic variation. Philadelphia: John Benjamins Publishing Company.
- Gass, Susan M. & Selinker, Larry. (1994). Second language acquisition: An introductory course. New Jersey: Lawrence Erlbaum Associates, Inc.
- Hansen, Jette G. (2001). Linguistic constraints on the acquisition of English syllable codas by native speakers of Mandarin Chinese. Applied Linguistics, 22(3), 338-365.
- Hudak, Thomas John. (1990). Thai. In Bernard Comrie (Ed.), The World's major languages. New York: Oxford University Press.
- Macken, Marlys A. & Ferguson, Charles A. (1987). Phonological universals in language universals in language acquisition. In Georgette Ioup & Steven H. Weinberger (Eds.), Interlanguage phonology: The acquisition of a second language sound system. New York: Newbury House Publishers.
- Oldin, Terence. (1989). Language transfer. New York: Cambridge University Press.
- Parker, Frank & Riley, Kathryn. (2000). Linguistics for non-linguists: A primer with exercises. Massachusetts: Allyn and Bacon.
- Sekiya, Yasushi. (1991). The acquisition of English phonology by Japanese children learning English in naturalistic settings (Doctoral dissertation, Columbia University Teachers College, 1991/1992). Dissertation Abstracts International, 52(07), 2535.
- Wang, Chilin. (1995). The acquisition of English word-final obstruents by Chinese speakers (nasals). (Doctoral dissertation, State University of New York at Stony Brook, 1995/1996). Dissertation Abstracts International, 56(10), 3941.

เอกสารนี้เป็นลิขสิทธิ์ของมหาวิทยาลัยราชภัฏวชิรญาณอุบล การนำเอกสารนี้ไปเผยแพร่โดยไม่ได้รับอนุญาตถือว่าผิดกฎหมาย
ไม่ว่ากรณีใดๆทั้งสิ้น อีกทั้งห้ามมิให้ตัดแปลงเนื้อหา และต้องอ้างอิงถึงเจ้าของเอกสารทุกครั้งที่มีการนำไปใช้

APPENDIX

Word list (9 words in word-initial positions and 9 words in word-final positions including 18 fillers)

- | | | |
|------------------|--------------------|------------------|
| 1. horse | 13. myth | 25. thirst |
| 2. rat | 14. lake | 26. key |
| 3. thug | 15. check | 27. bin |
| 4. path | 16. thief | 28. thong |
| 5. rug | 17. leak | 29. cloth |
| 6. tooth | 18. thing | 30. ring |
| 7. bed | 19. pin | 31. bath |
| 8. moth | 20. thought | 32. boat |
| 9. car | 21. chef | 33. thump |
| 10. heath | 22. goat | 34. theme |
| 11. thorn | 23. youth | 35. knife |
| 12. hat | 24. can | 36. mouth |

Sentence list

1. Ray lost a key in the room.
2. Tom had a **thought** on that report.
3. He bought a goat at the market.
4. She lost a **thong** at the beach.
5. I saw a lake at the foot of the mountain.
6. Joe bought a bed at the store.
7. I heard a **thump** in the room.
8. He broke a **tooth** at the football game.
9. He saw a **thug** in the park.
10. Jen met a chef in the supermarket.
11. She read the **myth** at the library.
12. Jen saw a rat at the top of the stairs.
13. He rode a horse in the racecourse.

14. Tim saw a **thing** on the playing field. ศึกษาเท่านั้น ไม่อนุญาตให้นำไปใช้ประโยชน์ด้านการค้า
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15. Tim saw a **youth** at the nightclub.
16. We rowed a boat up the river.
17. Ken had a **thirst** for education.
18. I found a hat at the door.
19. Tom mowed the **heath** at noon.
20. Ray bought a ring at the mall.
21. She took a **bath** at midnight.
22. They put a bin in the kitchen.
23. She drew a **mouth** at art school.
24. He bought a car from his friend.
25. He took the **path** at the corner.
26. I saw a leak in the water pipe.
27. They caught a **thief** in the bank.
28. Kay lost a check at the office.
29. Sue saw a **moth** at the door.
30. I dropped a can at the corner.
31. Joe saw a **thorn** on the ground.
32. Kay put a knife in the cupboard.
33. Sue choose a **theme** for her paper.
34. I bought a pin at noon.
35. She showed the **cloth** at the party.
36. They had a rug in the living room.

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