

AN INVESTIGATION OF THAI INTERFERENCE IN SELECTED AMERICAN ENGLISH PHONEMES¹

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INTRODUCTION

English language teaching has been compulsory in Thai schools for several decades. However, research into Thai problems in learning English has rarely been done, especially in the field of phonology. The only research available so far was done by Suter (1976) on "Pronunciation accuracy". He has found out that Thai speakers as well as Japanese speakers, both from the Far East, speak English less accurately than Persian and Arabic speakers from the Middle East. He noted that, "... the pronunciation of the speakers from the 'Middle East' were nearly always given high or middle range ratings" (1976: 248). He also remarked that the accuracy of pronunciation in a second language is due to many different factors and a very important one is the native language itself.

When a learner of a second language (L2) is confronted with a phonological system that is quite different from the phonological system of his native language (L1) errors in L2 are expected in the areas of differences. Differences can consist of speech sounds in L2 that are absent from L1, or of similar sounds that are distributed differently in L1 or do not have exactly the same distinctive features in common. When such differences occur, the learner of L2 frequently depends on his L1 for support. Weinreich (1953: 14) stated that, "interference arises when a bilingual identifies a phoneme of secondary system and, in reproducing it, subjects it to the phonetic rules of the primary

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language. Phenomena of this type were transcribed traditionally under the heading of sound substitution".

Lado (1958 : 13) says, "... when a foreign language uses a phoneme which does not exist in the learner's native language, the student will not be able to pronounce that phoneme readily in learning the foreign language. He will substitute some other phoneme from his native stock". And this sound substitution made in L2, called 'pro-active interference', 'native language interference', or just 'interference' is the cause of 'foreign accent'.

For the past three decades, a number of proposals have been made as to the most effective ways of predicting errors made by students of L2. One of them that has attracted the widest attention of applied linguists is known as a *contrastive analysis*.

Advocates of contrastive analysis (CA) believe that the primary cause of errors in second language learning is interference from the native language. They believe that a systematic comparison of the native language with the target language at all levels of structure — phonological, syntactic, and lexical — will predict areas of difficulty in the target language which the speakers of L1 will have in learning L2. According to the CA hypothesis, the sounds of L2 that are similar to those of L1 would be easy to learn. On the contrary, the sounds of L2 that are different from those of L1 will be difficult to learn. During the late 50's and the early 60's, contrastive studies were the center of interest among the linguists who were interested in constructing teaching materials and teaching L2 to speakers of L1. In spite of its popularity, the CA hypothesis has a number of shortcomings.

Brière et al (1968) found out that contrastive analysis did not predict errors with one hundred per cent accuracy. By using the sounds /h/, /g/, and /x/, a group of atypical sounds which do not occur in American English, he found that /h/ was significantly more difficult than the rest and that /g/ was significantly harder than /x/, which was learned very rapidly. A contrastive analysis would not have predicted such results. Taylor (1975 : 392) also remarked, "... researchers and teachers have noticed that students frequently have no great difficulty in learning some structures which CA predicted would be difficult". Marianne Celce-Murica (1976) stated that CA was relevant only in those language learning situations where the students all speak the same native language, and that the results of CA are more reliable on the phonological level than on the syntactic or lexical level. Newmark (1966) criticized the CA hypothesis saying that CA is irrelevant and unnecessary. He claimed that errors that appear to be caused by interference from the native language merely represent a gap in the learner's knowledge of the target language. The learner makes up for this deficiency by substituting something he already knows, that is his native language. The cure for such interference, Newmark

concluded, is the cure for ignorance, learning. Once the learner knows what he should do in target language, such errors will disappear.

Other scholars, like Selinker (1972) do not reject CA completely but feel that other factors are needed to account for the errors which actually occur in L2 which cannot be attributed directly to interference from L1. Selinker posits an "interlanguage" which consists of utterances in L2 made by speakers of L1 that are different from those produced by L2 native speakers. The differences can be not only the result of "language transfer" (L1 interference) but also the result of "transfer of training" (training procedures), "strategies of second language learning", "strategies of second language communication" and "overgeneralization of target language linguistic materials".

Richards (1975), also does not reject CA completely but minimizes its roles in terms of predicting difficulties at all levels of language. Richards says that CA is the most predictive at the level of phonology and least predictive at the syntactic level. He also says that, "Interference of the mother tongue is clearly a major source of difficulty in second language learning and CA has proved valuable in locating areas of interlanguage interference" (1975: 108).

Schachter (1974) prefers to combine error analysis with CA because the former accounts for errors which cannot be predicted by the latter. However, she feels an *apriori* CA is definitely needed because CA can predict areas which will be difficult to learn which could not be detected through an error analysis alone since students frequently avoid the structures which are difficult for them. Without an *apriori* CA, these difficult areas would never be identified.

Taylor (1975) has noted that second language learners will depend on the native language only at the beginning stage of learning. As a learner's proficiency increases, he will rely less and less on his native language and on the transfer strategy.

Krashen (1977a) also feels that L1 interference will be reduced as the learner becomes more proficient in L2. He has concluded that, "L1 may "substitute" for the acquired L2 as an utterance initiator when the performer has to produce in the target language but has not acquired enough to do this (1976: 11)... it can be eliminated or at least reduced by natural intake and language use" (1977a : 12).

In addition, Krashen (1977b) theorizes a monitor model for adult L2 performers in which there are two means for internalizing rules of the target language — language acquisition and language learning. Adults can both subconsciously acquire and consciously learn second languages. Language acquisition refers to a person's ability to comprehend and produce the language automatically. The acquisition is subconscious but it is not influenced by overt teaching. Simple input is crucial for the intake which provides acquisition. The learned language, on the other hand, consists of a conscious mental represent-

ation of linguistic rules. It is a result of either a formal language learning situation or a self-study program. When L2 rules have been learned, they can be used as a monitor to correct utterances.

PURPOSE

This study was undertaken to investigate two main questions involved in the pronunciation of American English (AE) by native speakers of Thai (T).

- 1) Which pronunciation errors in AE can be accounted for by CA and which cannot?
- 2) Is there a difference in the pronunciation of specific phonological segments when the speakers perform on two different tasks, one of which reflects "acquired" conditions, the other "learned"?

The study consisted of a CA of AE and T sound systems and then recording native T speakers using AE in "free speech" interviews and reading word lists containing selected predicted difficult AE phonological categories.

LIMITATIONS OF THIS STUDY

- 1) Not all AE target sounds were investigated which would be predicted to be difficult areas in the CA section, e.g., AE /g/ and /tʃ/ in final position were not investigated, since it was assumed that analyses of the AE sounds selected would give sufficient information to answer the question being asked.
- 2) The strength of distributional constraints was not investigated.
- 3) The amount of time that each subject has spent in the United States was not controlled.
- 4) The amount of time that each subject had studied AE was not controlled.

METHOD

The subjects were 4 Thai speakers, 2 males and 2 females. The time spent in this country varied between 1 month and 6 years. The amount of formal training in English ranged from 15 years to 21 years.

Procedure

The subjects were interviewed by an American woman. The interview consisted of two parts. The first part elicited the speakers' age when they could first speak English meaningfully, previous English language training and length of time of residence in the United States. This part of the interview was used only as a warm-up device in order to make them feel comfortable enough to speak freely in the second part of the interview. This part was not transcribed or investigated.

The second part consisted of a question previously used by Labov (1976).

The informants were asked whether they had been in a situation where they thought they were in serious danger of being killed. If the informant said "yes", the interviewer would ask, "What happened?". Then the informant would try to tell her everything that happened. They also were asked about their favorite holidays and favorite movie stars in order to provide additional data to analyze.

The "free speech" elicited in this part of the interview reflects Krashen's (1977a) "acquired" speech because there is a little use of the monitor. Because of the rapidity of speech and focus on content rather than form, there is little time or inclination to monitor the output through conscious use of rules.

Besides the free conversation, the informants were asked to read a word list. The word list consisted of 3 words for each target sound in 3 positions — initial, medial, and final. Within each target sound set, all words were matched for number of syllables and stress. For example /v/ in initial position, occurred in 3 syllable words, stressed on first syllable, viz., *victory*, *vitamin*, *victimize*. Then all words were randomized and the subjects read the randomized order.

Because the subjects were allowed ample time to evoke rules and monitor their output during the reading of word lists and because the subjects probably focused on form rather than content, it is felt that this condition represented "learned" or "monitored" speech rather than "acquired". Furthermore, one would predict that the pronunciation elicited in monitored situations would be better than pronunciation in unmonitored situations.

A linguist, other than the authors and well-trained in phonetic transcription, was asked to transcribe the speech of the four subjects. The transcriptions were then reviewed by the authors. The number of errors from both the free speech and word lists, were compiled for initial, medial, and final positions and the specific substitutions noted.

To determine if performance on reading word lists was statistically significantly different from performance in free speech, the mean number of errors made under each condition (expressed in percentages) were compared by using a one-tailed, correlated-differences t test. (Wood, 1977: 272—3).

The same test was used to determine if the difference between the percentage of errors predicted by CA and the percentage of errors which was not statistically significant.

CONTRASTIVE ANALYSIS OF AMERICAN ENGLISH AND THAI SOUNDS

The following hypotheses serve as the bases for predicting difficulties and phonological substitutions in pronouncing AE by native T speakers.

- 1) When one T sound is frequently used to represent two different T phonemes (phonemic overlapping), then the similar AE target phonemes will cause difficulties.

CHART 1

2) When an AE sound is completely absent from the T phonological system, there will be difficulties and substitutions from T will occur, e.g., AE /v/ does not occur in T.

3) When an AE sound has a corresponding similar sound in T but is distributed differently from the AE sound, difficulties and substitutions will occur, e.g., T /f/ does not occur in word final position.

Furthermore, when condition 2 is the case, the specific T sound substituted for the AE target sound will be based on the following hierarchy of importance:

4) The T sound substituted will share more Chomsky—Halle (1968) distinctive features with the AE target sound than any other sound in the T system.

4a) When two T sounds share the same number of features with the AE target sound, the substitution predicted will be the one which shares the same distribution as the target sound.

4b) When two or more T sounds share an equal number of features with the AE target sound, the predicted substitution must belong to the same natural class as the target sound, e.g., obstruent. (For a full discussion of "natural class", see Hyman, 1975, and Ladefoged, 1975).

4c) Considerations of distributional constraints in the T system of an AE phoneme are considered secondary to the number of shared features. (Obviously, some distributional constraints are stronger than the others, e.g., Brière (1966) showed that although both AE /ʒ/ and /ŋ/ do not occur in word initial position, AE speakers learned /ʒ/ much more rapidly than /ŋ/. Furthermore, Brière *et al* (1968) showed that /ŋ/ does occur syllable initial but /ŋ/ never does, therefore the facility for producing /ʒ/ in the unfamiliar word initial position is greatly enhanced whereas /ŋ/ has the stronger constraint.

Chart 1 is a comparison of AE and T consonants in terms of traditional articulatory features. Chart 2 consists of the selected Chomsky—Halle features which were used in the CA of selected AE and T sounds.

The selected Chomsky—Halle distinctive features were chosen for the CA because:

1) The number of features needed to distinguish and compare T and AE phonemes are much fewer than the number which would be required if the more traditional features, e.g., voiceless, alveo-palatal, affricate, were used alone.

2) The Chomsky—Halle features are considered universals which can be used across all languages. In short, we wanted to use distinctive features that were a) parsimonious and b) universally descriptive of all speech sound in any language.

The target sounds to be investigated in this study are AE /θ/, /ð/, /ʃ/,

English and Thai Consonants															
		Bilabial		Labio-dental		Apico-dental		Apico-alveolar		Alveo-palatal		Dorso-velar		Glottal	
		AE	T	AE	T	AE	T	AE	T	AE	T	AE	T	AE	T
Stops	vl	aspirated	p	p ^h				t	t ^h			k	k ^h		
	vl	unaspirated		Ⓟ				Ⓟ					Ⓟ		Ⓟ
	vd	unaspirated	b	b				d	d			g			
Fricatives	vl			f	f	θ		s	s	ʃ					h
	vd			v		ð		z		ʒ					
Affricates	vl	aspirated								tʃ	tʃ ^h				
	vl	unaspirated								tʃ					
	vd									dʒ					
Nasals			m	Ⓟ				n	Ⓟ			ŋ	Ⓟ		
Laterals								l	l						
Semivowels			w	Ⓟ				r	r	y	Ⓟ				

Ⓟ = Thai sounds which occur in word final position

CHART

	Thai											American English													
	t	t ^h	d	s	n	f	tʃ	tʃ ^h	p	p ^h	m	b	l	r	f	s	l	r	θ	ð	ʃ	ʒ	dʒ	z	v
high	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-
anterior	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+
coronal	+	+	+	+	+	-	+	+	-	-	-	-	+	+	-	+	+	+	+	+	+	+	+	+	-
voice	-	-	+	-	+	-	-	-	-	-	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+
continuant	-	-	-	+	-	+	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	-	+	+
nasal	-	-	-	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
strident	-	-	-	+	-	+	+	+	-	-	-	-	-	-	+	+	-	-	-	-	+	+	+	+	+
sonorant	-	-	-	-	+	-	-	-	-	-	+	-	+	+	-	+	+	-	-	-	-	-	-	-	-
aspiration	-	+	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
lateral												+	-				+	-							

Description of selected American English and Thai sounds in terms of Chomsky-Halle distinctive features.

/ʒ/, /dʒ/, /v/, /z/, /r/, /f/, /s/, and /l/ because either they are absent from the T system or are distributed differently from AE.

1) AE phonemes absent from T

AE phonemes /θ/, /ð/, /ʃ/, /ʒ/, /dʒ/, /v/, and /z/ are completely absent from the T system. CA predicts that these phonemes will cause difficulties to the

learners and substitutions from the T system will occur.

a) AE /θ/ and /ð/

AE /θ/ shares the same number of features with T /t/ and /s/, but we predict that T /t/ will be used as the substitution since the T /t/ occurs in all the same positions as AE /θ/.

On the basis of sharing the greatest number of features, T /d/, /l/, and /r/ could be predicted as possible substitutions for AE /ð/. However, on the basis of the "natural class" consideration T /d/ is predicted as the probable substitution since T /d/ and AE /ð/ are obstruents (—sonorant) whereas T /l/ and /r/ are not (+sonorant).

b) AE /ʃ/ and /ʒ/

AE /ʃ/ and /ʒ/ share the most features with T /tʃ/. We predict that the substitution for these AE sounds will be T /tʃ/.

c) AE /dʒ/

AE /dʒ/ shares the most features with T /tʃ/ which should be the substitution made.

d) AE /v/

The T phoneme that shares the most features with AE /v/ is T /f/ which should be the substitution made.

e) AE /z/

The substitution for this sound should be T /s/ since more features are shared between them than any other T sound.

2) AE phonemes with a similar sound in T but with dissimilar distributions.

AE phonemes /f/, /s/, /l/, and /r/ have corresponding sounds in T but in T these sounds never occur word final. Therefore, there will be difficulties in final position.

T /f/ and /s/ share the most features with AE /f/ and /s/, therefore we predict T /f/ and /s/ will be the substitutions made even though they do not occur word final in T.

Although T /l/ shares the most features with AE /l/, we predict that T /n/ will be used if any substitutions are made because that is what occurs in T. Catford and Palmer (1974) observed that the T letter representing /l/ is always pronounced /n/ in final position. "Hence the loaned words *basketball* and *football* are pronounced /bɛskɪtbɔ:n/ and /fʊtbɔ:n/ in Thai". (1974:17).

Although AE /r/ and T /r/ share the same number of features, the situation in T is complicated. First, T /r/ is most frequently realized as an apico-alveolar tap [ɾ] or an apico-alveolar lateral [l] (Harris, 1972). This case of phonemic overlapping is similar to the Danish /t/ and /d/ in that /t/ has an allophone [d] in weak position (Jacobson, Fant, and Halle, 1952:5). Second, the letter representing T /r/ is always pronounced /n/ in final position (Catford, *et al.*,

1974). However, according to hypothesis 1, phonemic overlapping, in our hierarchy for predicting phonological substitutions, T /ɾ/ and /l/ should be the substitutions made.

RESULTS

On Chart 3 below, the first column illustrates the total number of occurrences of each target sound under both free speech and word list conditions in initial, medial, and final positions. The second column illustrates the number

CHART 3

No. of occurrences of each target sound	Free Speech		Word List	
	F.S	W.F	Errors Substitutions	Errors Substitutions
(θ)	I 8	12	3 δ-1; t-2	— —
	M 3	12	— —	1 t-1
	F 4	12	— —	1 φ-1
(ð)	I 90	12	50 d-45; n-2; θ-2; ?-1	1 d-1
	M 4	12	— —	5 θ-3; t-1; φ-1
	F 4	12	1 θ-1	8 θ-7; δz-1
(ʃ)	I 3	12	— —	2 tʃ-1; s-1
	M 5	12	— —	— —
	F —	12	— —	6 tʃ-6
(ʒ)	M —	12	— —	1 z-1
	F —	12	— —	3 tʃ-2; dʒ-1
(dʒ)	I 1	12	1 ʒ-1	1 ʒj-1
	M 3	12	2 t-1; dj-1	1 g-1
	F —	12	— —	4 tʃ-3; dʒɹ-1
(v)	I 3	12	— —	1 θ-1
	M 31	12	6 f-3; θ-1; w-1; φ-1	— —
	F 21	12	10 p-1; f-9	6 f-6
(z)	I —	12	— —	5 s-5
	M 2	12	— —	2 s-2
	F 35	12	10 t-1; s-8; φ-1	— —
(r)	I 8	12	2 l-2	1 l-1
	M 54	12	7 l-7	3 φ-2; ɾ-1
	F 36	12	18 φ-18	2 φ-2
(f)	F 4	12	— —	— —
(s)	F 28	12	5 φ-5	— —
(l)	F 20	12	6 n-2; φ-2; w-2	1 n-1

F.S.—Free Speech; W.L.—Word Lists
I—Initial; M—Medial; F—Final

CHART 4
(Summary Chart)

Sounds	1			2		3	
	No. of Occurrences	No. of Errors	% OC.	Errors Predicted by CA	% TE.	Errors not Predicted by CA	% TE.
θ	51	5	10	3	60	2	40
ð	134	65	49	46	71	19	29
ʃ	44	8	18	7	88	1	12
ʒ	24	4	17	2	50	2	50
dʒ	40	9	23	4	44	5	56
v	91	23	25	18	78	5	22
z	73	17	23	15	88	2	12
r	134	33	25	11	33	22	67
f	16	—	—	—	—	—	—
s	40	5	13	—	—	5	100
l	32	7	21	3	43	4	57
Total	679	176	26	109	$\bar{X}=62$	67	$\bar{X}=38$

CA—Contrastive Analysis; %OC—Percentage of Number of Occurrences of Each Target Sound; %TE—Percentage of the Total Number of Errors for Each Sound.

of errors and the actual substitutions made in each position under the condition of free speech and the third column gives the same information under the word list condition.

Thus, for example, in initial position, AE /θ/ was attempted eight times in free speech and twelve times in reading word lists by all four subjects. Three errors were recorded in free speech, one AE /ð/ and two T /t/ substitutions were made. There were no errors made in initial position in reading word lists.

On Chart 4, in section 1, the number of occurrences of each target sound combines the number of attempts made in all three positions and under both conditions of free speech and word lists. The number of errors for each sound

CHART 5

Individual subject performance in Word List and Free Speech conditions

Subjects	Percentage of Correct Productions of AE Target Sounds	
	Word List	Free Speech
A	90	83
B	83	86
C	78	60
D	83	63
	$\bar{X}_1=83.5\%$	$\bar{X}_2=73\%$

is given and the percentage of occurrences represent the number of errors divided by the number of occurrences for each sound. Section 2 gives the number of errors predicted by the CA in this study and the percentage of the total number of errors for each target sound. Section 3 gives the number of errors and the percentage of the total errors for each target sound which are not predicted by CA.

Thus, e.g., AE /θ/ occurred fifty one times. There were five errors or 10% of the number of occurrences made. By looking at the actual substitutions made (given in Chart 3), we see that two T /t/ substitutions made in free speech and one T /t/ substitution reading word lists represent 3 errors which were predicted by the CA (shown as 3 and 60% in column 2, Chart 4). The two errors (40%) shown in column 3 were substitutions which had not been predicted by the CA.

Chart 7 shows the percentage of correct responses each subject made of the target sounds in all three positions combined under word list and free speech conditions. The mean number correct of the word list condition was found to be statistically significantly higher than the mean number correct of the free speech condition ($t=3.02$ (3 df)= $p<.05$).

DISCUSSION OF RESULTS

Of all the phonemes non-existent in the T system, the four speakers made the least percentage of errors in the production of /θ/. This may be because this sound *may* exist somewhere in the language but it is not described in literature.

In a phonetic study of Thai, Harris (1972) found four speakers out of 60 subjects who pronounced T /s/ as /θ/. He stated (p. 17) "/θ/ is voiceless lamino-dental flat fricative. This sound occurs only syllable initially". Although this seems to be a very small exception to the concept that AE /θ/ does not exist in T, (only 4 speakers out of 60), it could be that this variation for T /s/ is much more common than has been recorded.

Out of five errors made, three are accounted for by the CA and two are not. Of the two not accounted for by CA, one can be regarded as avoidance behavior due to the attempt to avoid the pronunciation of a difficult sound, e.g., when the sound /θ/ occurs after /n/ *month*, Thais find it difficult and frequently avoid articulating it.

When AE /θ/ in *thank* is pronounced by using AE /ð/, this probably reflects an "interlanguage" error since this sound does not occur in T and the substitution is from the AE system.

/ð/ is the sound that causes the most difficulty for Thai speakers. As predicted, T /d/ was used as a substitution for most of the errors made (46 occurrences). Of the errors not accounted for by CA, (18), two may be considered

to be the target language influence when the /ð/ in *and then* is dropped by saying /anən/. This shows that the performer knows the technique of reducing sounds as is the general practice by native speakers in rapid speech.

"Avoidance" is seen in reading the word lists when /ð/ in *brotherly* was left unarticulated. The speaker may find it more difficult to pronounce this sound in the word *brotherly* since there are two other problem sounds in the word, /r/ in two positions, thereby causing attention to be diverted from /ð/.

AE /ð/ was substituted by T /ʔ/ once. This may be due to the native language interference because in the pronunciation of some Thais, the glottal stop is usually used before pronouncing a sound in initial position like /kat/ will be pronounced /ʔkat/ by some speakers. (This phenomenon is also seen in some of the speech of these subjects.) When the following sound is non-existent in the T system, and the speaker finds it difficult, he may not articulate that sound, or avoid articulating it, and only the /ʔ/ before that sound is heard.

Another error was made by adding AE /z/ after /ð/ when pronouncing *breathe*. Since this is a verb, this may be a case of adding the third person singular morpheme where none is needed through some type of hypercorrection.

Finally, thirteen /θ/ substitutions for /ð/, would seem to reflect an "interlanguage" error since /θ/ does not exist in T and is part of the target system.

There are 8 errors occurring in the production of AE /ʃ/, seven of which have been predicted by CA, e.g., when T /tʃ/ is used as a substitution.

Another error was made by pronouncing AE /ʃ/ as T /s/. It could be that this one occurrence is due to: 1) imperfect control of the target system which resulted in an inaccurate interlanguage or 2) a reinterpretation of the target sound AE /ʃ/ as an alveolar fricative (T /s/) in word initial position or both.

Four errors were made in the production of /ʒ/. Two of them, T /tʃ/ used as the substitutions, are predicted by CA. The other two (when /z/ and /dʒ/ are used for AE /ʒ/) would seem to reflect an "interlanguage" error since neither sound occurs in the T system and both substitutions are from the AE system.

The variety of errors made in the production of AE /dʒ/ reflect the uncertainty of the speakers as to how this sound should be properly produced. The substitution predicted by CA, T /tʃ/, appears four times out of the total of nine errors. Two others, /ʒ/, and /ʒj/, both AE sounds probably reflect a concern by the speaker with the fricativity of the target sound thereby ignoring the full articulatory components of the affricate.

If there are interlanguage errors due to a reinterpretation of features on the speaker's part, the /dj/ substitution is an interlanguage error due to transfer of training. Some Thai teachers of English train their students to pronounce /dʒ/ as /dj/ especially in *soldier* /soldʒə/, and we feel that it is the transfer of this training which accounts for this particular substitution.

Another error made was the substitution of /g/ for AE /dʒ/. This error we ascribe to orthographic influence since the sound was substituted in the word *negligence* in which the first orthographic 'g' is, in fact, pronounced /g/ but the second is pronounced /dʒ/. Consequently, we feel the confusion is orthographic.

We have no explanation for the substitution /dʒn/ except to speculate that since this substitution occurred word final on the word lists, it could be that the speaker was using the syllabic /n/ as a "connector" between items on the list.

There were 23 errors in the production of AE /v/, eighteen of which are accounted for by CA when AE /v/ is pronounced /f/. AE /v/ is substituted by T /v/ (voiced labio-velar fricative) two times and AE /w/ one time. Harris stated in an unpublished paper that, "The Thai *v* of most Thai speakers is not the same as the English /w/. In fact, it is something like a funny kind of /v/ to an English ear". The /v/ substitution is from T but the /w/ substitution is probably from AE.

AE /v/ was pronounced /p/ once when it occurred in final position. This error could be interpreted as the native language interference since T /p/ is the only sound occurring in final position that shares the feature "labiality" with AE /v/.

There was an occurrence of avoidance behavior when AE /v/ was not articulated in *every*. The speaker may find /v/ difficult because of the presence of /r/, a problem sound for T speakers, in the stimulus word.

It was predicted that T /s/ would be used to substitute for AE /z/ and of the total 17 errors made, T /s/ was used as a substitution 15 times. Of the other two errors, one was made by using T /t/ when AE /z/ occurred in final position. This could be because only T /t/ can occur in final position in T which shares the same place of articulation as AE /z/. However, it seems to be a strange substitution (similar to T /p/ for AE /v/) since T /t/ is a voiceless stop. Another error is made because AE /z/ in *he's* is not articulated. Although this could be a case of avoidance behavior, it could also represent a morphophonemic error due to an imperfect understanding of AE grammar.

Of 33 errors made in the attempts to produce AE /r/, 11 (10 [l] 1 [r]) were predicted by CA.

The /r/ is not articulated two times. One is when the /r/ is dropped from the word *hundred*. This may be because T /r/ only occurs as a second member of a constant cluster when the first member is either /p/ /t/ or /k/. Since there is no /dr/ cluster in Thai, the learner may find it difficult to articulate and then avoidance behavior occurs.

The other 21 errors made when /r/ was not articulated, one in the word *party* and 20 in word final position, may be due to the result of the transfer of training.

Most Thai learners of English are trained in English programs which teach British English in which the final /r/ is usually dropped. Catford and Palmer (1974: 18), state that, "...Thai students are often trained in English programs which teach British English. The obvious result of this training is that some of the interference which Thai students experience in learning American English stems not from the background of Thai, but in their learning a different English dialect. The dropping of /r/ in word final or in a pre-consonantal position... can be accepted as a dialectal variant from standard American English".

As predicted, there were few errors made in the production of /f/, /s/, and /l/ in final position. There were no errors for AE /f/. Five errors were made when /s/ followed another consonant, e.g., in the word *six* /siks/, the /s/ following /k/ was dropped. But when /s/ occurred by itself, it did not cause any difficulty like /s/ in *yes*, *tennis*, and *curious*. Apparently, it is the unfamiliar cluster which caused the problems rather than the sound itself.

The only other sound that caused some difficulty was the final /l/. There were 6 errors in free speech and one error in the word lists, three of which were /n/ substitutions which were predicted by CA.

Since T /w/ and T /y/ are the only two approximants which occur in final position, this could account for the two substitutions of T /w/ for AE /l/.

On the two occasions when /l/ was not articulated and no substitutions were made, we speculate that avoidance behavior was responsible.

From Chart 5 we see that performance was better when reading the word list than in free speech. ($t=3.02$ (3 df) $=p<.05$ on a one-tailed, correlated differences *t* test).

One explanation for this may be Krashen's monitor model which indicates that the more time a speaker has to produce and the more attention he places on form rather than content, the more opportunity there is to monitor the production and the better the performance will be.

Whereas it is clear from Chart 4 that the CA in this paper did not predict errors with the 100% accuracy, which the strong CA position would claim, the procedure used in this paper did account for 62% of the errors and 38% was not predicted. This difference is statistically significant ($t=2.83$ (df=10) $=p<.01$ on a one-tailed correlated differences *t* test.) Therefore, one might conclude that this CA is a useful tool for predicting errors on the phonological level.

CONCLUSION

Due to the limitations of this study (discussed on page 104), any conclusions must be made with caution. However, for this study:

1) CA predicted 62% of substitutions made for all target sounds. We con-

cluded the CA was a useful tool at the phonological level.

2) Most of the errors that were not predicted by the CA seemed to be attributable to transfer of training or strategies of second language learning, thereby involving interlanguage sources of errors.

3) Of the few remaining errors, those which consisted of complete omissions were attributed to avoidance behavior.

4) The phonemic overlapping of T /l/ and /r/ had a strong effect on the performance of AE /l/ and /r/.

5) In most cases, the number of the shared features of AE and T phonemes seemed to be more effective in predicting specific errors than would be made by considering distributional considerations paramount.

6) Information concerning previous training, language learning strategies, permissible clusters in both languages and strategies used in orthographic to sound correspondences is needed in addition to an analysis in terms of Chomsky-Halle features if a CA of two phonological systems is to be sophisticatedly efficient.

7) Better performance on word lists was attributable to increased use of the monitor.

Further research in this area should investigate the entire system and control for amount of time spent in this country and amount of time English has been studied by the speakers.

APPENDIX 1

Word List

	<i>Initial</i>	<i>Medial</i>	<i>Final</i>
/r/	recognize regiment resident	shuddering victory decorate	discover another employer
/v/	victory vitamin victimize	discover receiving eleven	effective intensive selective
/ʃ/	shuddering shockingly shuttle-cock	vacation impartial ambition	jelly-fish feverish underbrush
/θ/	thousandfold thinkable thoughtfulness	marathon anything sympathize	underneath undergrowth seventeenth
/dʒ/	journalist jubilee germinate	negligence passenger languages	heritage personage interchange
/z/	zip-code	hazily	visualize

	zipper	hazardous	sympathize
	zealous	laziness	victimize
/ð/	then	brotherly	breathe
	their	bothersome	teethe
	those	worthiness	loathe
/ʒ/		visualize	camouflage
		measurement	sabotage
		usually	persiflage
<hr/>			
<i>Finals</i>			
/f/	handkerchief		
	paragraph		
	photograph		
/s/	hazardous		
	laziness		
	residence		
/l/	remedial		
	material		
	impartial		

APPENDIX 2

Word List Randomized

1. shuddering	21. photograph	41. remedial	61. victimize
2. persiflage	22. sympathize	42. vacation	62. underneath
3. victimize	23. jubilee	43. seventeenth	63. anything
4. thinkable	24. decorate	44. negligence	64. heritage
5. eleven	25. shuddering	45. measurement	65. shockingly
6. selective	26. teethe	46. thousandfold	66. jelly-fish
7. sympathize	27. discover	47. zipper	67. paragraph
8. impartial	28. recognize	48. sabotage	68. laziness
9. undergrowth	29. material	49. bothersome	69. their
10. personage	30. visualize	50. receiving	70. usually
11. victory	31. zealous	51. camouflage	71. handkerchief
12. those	32. loathe	52. germinate	72. resident
13. shuttle-cock	33. interchange	53. languages	73. hazardous
14. impartial	34. feverish	54. breathe	74. effective
15. underbrush	35. thoughtfulness	55. visualize	75. then
16. intensive	36. regiment	56. worthiness	76. zip-code
17. brotherly	37. passenger	57. ambition	77. marathon
18. victory	38. vitamin	58. discover	78. journalist
19. hazardous	39. residence	59. hazily	
20. another	40. employer	60. laziness	

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