Effects of Transfer on Interlanguage Phonology

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While acquiring a second language phonology, the learners internalize a system of phonological rules which may be distinct from the target language and the native language. This structured system which learners construct during the process of second language acquisition is termed interlanguage. Interlanguage phonology has become an important area of investigation leading to the resurgence of interest in the phonological aspects of second language acquisition research. This study examined the role of language transfer in determining the form of interlanguage phonology. It also attempted to verify the predictions made by contrastive analysis; a pedagogical tool used to predict areas of difficulty for language learners in acquiring a second language. The speech data of Hindi speakers, speaking English, were audiotaped for transcription and analysis. Close inspection of the data analysis revealed that transfer is not the only process operating to shape interlanguage phonology. The concepts of markedness, language transfer, and development universals are clearly evident and interact with one another in many interesting ways, yielding different degrees of variation. This study also provided some evidence that the contrastive analysis hypothesis is not tenable unless it incorporates universal phonological properties of language acquisition.

1. Introduction

Since the late sixties, a considerable amount of research has been conducted in the field of second language acquisition. The complicated process of language learning has attracted continuing interest from researchers in English, Linguistics, Psychology, and Education. Such interest has led to the emergence of second language studies as an area of professional emphasis within academic communities taking into consideration both teaching and learning perspectives. The field of second language acquisition has become a vibrant field with a literature of its own, frequently using explorations in first language (L1) as a starting point.

While much work has been done in studying the acquisition of morphology and syntax, there is one area of second language acquisition that has been largely overlooked by researchers. Heretofore, little has been done in the field of interlanguage phonology. While summarizing existing second language research, Schumann (1976) found absolutely no studies on the phonology of interlanguage. The term 'interlanguage' coined by Selinker (1972) refers to "the structured system which the learner constructs at any given stage in his development." (Ellis 1986) Until recently, there has been a paucity of phonological data collected from second language learners in reasonably natural speech situations (Tarone 1976).

The reason for the dearth of studies in interlanguage phonology is the common belief that all phonological errors are the result of direct transfer of the native language phonology to the interlanguage system in some uninteresting ways (Tarone 1978). This conviction is still prevalent among second language acquisition researchers, second language teachers, and students. However, it would be misleading to presume that language

learners only need to acquire the grammar system and vocabulary of a second language (L2). It is equally essential that they acquire the rules of the second language phonology in order to be intelligible to others speakers of that language. Furthermore, it is reasonable to assume that "research in this area will shed much light on our understanding of the process of speech perception in general." (Tarone 1978)

With the development of modern linguistic science, several new techniques have surfaced in the field of language teaching. Many researchers have attempted to make a systematic comparison of the native language (NL) and English, analyzing the linguistic systems of these two languages, and keeping in mind that one of them is to be taught to those who have the other one as their NL (Bansal 1978).

1.1 Contrastive Analysis Hypothesis

Perhaps the most controversial issue of the last three decades is the Contrastive Analysis Hypothesis (CAH) which states that it is possible to predict the areas of difficulty for language learners by comparing and contrasting the linguistic systems of the NL and the target language (TL) (Eckman 1977). The main principle behind the CAH, namely that the comparison of the native and second language is "crucial in predicting the areas of difficulty that a language learner will have, can be maintained as a viable principle of second language acquisition." (Eckman 1977)

Lado (1957), one of the strongest proponents of contrastive linguistics, suggests that the major objectives of contrastive analysis (CA) are:
1. Providing insights into similarities and differences between languages;
2. Explaining and predicting problems in second language learning; and
3. Developing course material for language teaching.
He further claims that the "teacher who has made a comparison of the foreign language with the native language of the students will know better what the real problems are an can provide for teaching them." (Lado 1957). It is obvious from this statement that the major concern of CA is pedagogic.

While many papers have been written predicting performance in interlanguage pronunciation based on CA of the phonologies of English and the native languages, very few have presented empirical evidence to prove the validity of these predictions (Tarone 1976). This vividly indicates that the predictions given by CA should be verified by presenting systematically gathered and analyzed performance data.

Although it is valid to hold that certain factors other than transfer from the L1 are involved in shaping the interlingual productions of language learners, CAH's inability to predict certain errors by comparing the first and second languages is by no means a sufficient ground for abandoning it altogether. Furthermore, it can be said that "our inability to predict the occurrence and nature of many errors may well stem from inadequacies in our understanding of native speakers' competence rather than from the failure of the contrastive analysis hypothesis..." (Broselow 1983). Broselow (1983) strongly believes that transfer plays a crucial role in the acquisition of a second language

phonology and that language learners tend to alter the target language syllable structures in order to conform to native language restrictions. Regarding the subjects of this study for example, Hindi speakers in speaking English exhibit a particular pronunciation pattern which is influenced by the pronunciation patterns of their NL (Sethi 1981). Since both Hindi and English belong to the Indo-European family of languages and have much in common, it is deemed necessary to take a brief account of the linguistic and cultural backgrounds of these languages in India.

1.2 Hindi

Hindi is the lingua franca of India in its spoken form and covers a large number of dialects. It is the standardized form of Khari boli spoken by a substantially educated class of speakers (B.A./B.Sc.) in their refined style as well as the most informal day-to-day talk (Kachru 1983). Over twenty three million people use it as a necessary part of their working lives (Kachru 1983). It is frequently used in the various faculties of law and administration. As said previously, Hindi speakers modify English syllable structures which are not permitted in their NL. This can be regarded as an attempt to bring English syllable structures into conformity with Hindi syllable structure constraints (Bansal 1978).

1.3 Consonant Clusters in Hindi and English

The focus of this study is the distribution of consonant sequences in English spoken by native Hindi speakers. Emphasis will be on the pronunciation of English words beginning with consonant clusters by Hindi speakers. Two general categories of consonant sequence distribution will be considered: allowable and non-allowable.

For the purposes of this study, the term allowable sequence is used to describe consonant sequences that occur in both languages regardless of distribution restriction. The clusters that are defined as allowable are /sp-, sk-, & st/ because they appear both in English and Hindi. However, in Hindi, they do not occur in the word initial position. Thus, these elements are shared but they differ systematically in references to syllable boundaries in the two languages (Kachru 1983). On the other hand, non-allowable sequences are those consonant sequences that appear in English but do not occur in Hindi in any position. The sequences /sl-, fl-, bl-, fr-, tr-, & ❅r/ are considered to be non-allowable because they do not occur in Hindi at all.

The motivation for selecting English consonant sequences comes from what Broselow (1988) calls the 'syllable structure transfer hypothesis' which states that "when the target language permits syllable structures which are not permitted in the native language, learners will make errors which involve altering these structures to those which would be permitted in the native language." (Broselow 1988) In other words, language learners force target language syllable structures into conformity with native language restrictions. This is more prevalent when the target language syllable structures do not occur in the NL in the same position and are subject to distributional restrictions (Anderson 1983)

It is the object of this study to investigate specifically the ways in which Hindi speakers' productions of the allowable clusters differ from their productions of the non-allowable clusters, and from the productions of native English speakers. Based on the findings of Eckman (1977), Tarone (1978), and Broselow (1988), it can be assumed that Hindi speakers will have some difficulty in pronouncing the allowable sequences (sp, sk, & st) in English. While this type of argumentation is highly plausible, it is not an empirical argument. One question that emerges at this point is why syllabification rules are specifically susceptible to transfer. This also leads to the question of what phenomena participate in transfer. In the light of the discussions, it is reasonable to assume that target language syllable structures seem to exert some influence on both the perception and production of second language strings. The postulation of such phonological rules, according to Broselow (1988), will make possible an explanation of actually occurring errors. Also, many language learning errors, especially those relating to target language syllable structures can be shown resulting from transfer.

1.4 Hypothesis

The systematic choices adopted by Hindi speakers (the subjects of this study) in resolving the problem of distributional restrictions with regard to allowable sequences in English and Hindi may result from transfer. In other words, Hindi speakers' tendency to modify second language syllable structures which are not permissible in their NL may be viewed as an attempt to bring English consonant sequences into conformity with Hindi syllable structure constraints. But this is just a hypothetical notion and must be determined empirically. For this purpose, the speech data of Hindi speakers speaking English was collected and analyzed to confirm the veracity of the aforesaid hypothesis.

2. Methodology

2.1 The Subjects

This investigator adhered to rigid criteria for selection of Hindi speaking subjects, because it was important to control both social and linguistic variables. For the purposes of this study, it was deemed necessary that Hindi be the subjects' NL. This requirement was extremely essential because it would be difficult to determine any possible influence of the native languages on the spoken English of multilingual subjects.

It was important to consider that Hindi and English were not learned simultaneously by native Hindi speakers. This criterion was established for a somewhat different reason. According to the current theory, the first four years of a child's life are crucially important in determining his or her language behavior as it is considered a 'critical period' before lateralization takes place (Lenneberg 1967, Krashen 1973).

The third criterion required the subjects to have learned their NL before having been introduced to English. This was to ensure that if transfer exerted some influence on the L2, it must be originating from a solitary source, i.e., Hindi.

It was considered important to ensure that Hindi speakers learned English in India. This criterion has some pedagogical implications. Hindi speakers, speaking English, exhibit a particular pronunciation pattern, which is influenced by the pronunciation patterns of their NL (Sethi 1981). They also may have non-native English speech models which might impede acquiring native-like pronunciation in their L2, i.e., English.

Additionally, this criterion was selected to verify whether this particular speech behavior can be singularly attributed to the lopsidedness in India's educational system. It is important to mention that the pronunciation patterns of the teachers may influence the way Hindi speakers learned English in India. For these reasons, the above mentioned requisites were considered mandatory.

Since it was essential for the purposes of this study to find native speakers of Hindi in Los Angeles, the Office of International Exchange and Program at California State University, Northridge (CSUN) was contacted. This office provided information regarding potential subjects.

A total of eleven Hindi speaking students (two females and nine males) gave their consent to participate in the data-collection process. These students were majoring in their respective disciplines and were working either part-time or full-time to meet their academic and miscellaneous expenses. Of the eleven, four subjects were born and raised in Delhi. An equal number of students had lived studied in Bombay, a metropolitan city based on the western coast of India. Three subjects were born and educated in different cities of the state of Uttar Pradesh.

In spite of the fact that the subjects had different geographic origins in India, they frequently used Hindi at home. That is to say, they used only Hindi in India to communicate with their parents and relatives. This was contrary to the situation in America where they use English for communicative and academic purposes.

Out of the eleven subjects, two students were not fluent in spoken English as compared to those who have spent a considerable period of time in the United States. Despite the fact that these students were not comfortable speaking English, they had no other option but to work hard toward gaining communicative competence in English, since they live in an English-speaking environment.

The number of years these subjects have spent in the United States ranged from two years to nine years; four in the two-to-four year span and seven in the five-to-nine year span. All subjects were older than four years when they started learning English in India. The number of years studying English in India varied from four-to-seventeen. They were all in the age group of twenty-to-twenty five years. Either because they lived in campus housing or because of the influence of the second language culture, the use of English was reported to be more frequent than that of Hindi. Furthermore, working students used English as their main means of communications, and only those students who had some contact with the Indian community occasionally used Hindi.

Seven students were pursuing master's courses at CSUN in their respective fields. The remainder of the subjects was enrolled in undergraduate courses.

2.2 Procedure

Once the subjects were located, the next step was to select an appropriate procedure for collection of the speech data. Most studies reported in the literature have used artificial laboratory settings for data collection (Tarone 1978). This type of artificial setting affects learners' pronunciation of a L2 (Nemser 1971). Keeping this in view, it was considered important to decide exactly what type of methodology should be used for studying their interlanguage systems. Selinker (1972) argues that the data for interlanguage should be based on sources other than those used in conventional error analysis. He notes, "the only observable data from meaningful performance in controlled situations (as opposed to classroom drills and experiments with nonsense material) we can establish as relevant for interlingual identification are (1) utterances in the learner's native language produced by the learner; (2) interlanguage utterances produced by the learner; and (3) target language utterances by the native speakers of that target language." (Selinker 1972)

As opposed to Selinker who feels that the analyst in the interlingual domain cannot rely on intuitive grammatical judgments since he will gain information about another system...,i.e., the target language, Corder (1971) does not consider this a drawback and argues that the judgment of the learner will give valuable information about his interlanguage system. It is also important to understand that the method used to collect data exerts significant influence on the nature of the data collected (Nemser 1971).

Considering the above discussed arguments, it was decided that the speech data would be collected in a reasonably natural situation. The subjects were initially contacted by telephone and the requirements of the study were explained to them. At this time, the subjects agreed to participate in the study and agreed to have the investigator visit them at home for the data collection. The home setting was selected in order to avoid the unnaturalness of a laboratory setting and the possible effects on the data set. Appointments were set up with the subjects, and they were visited at a time which was convenient to them. The purpose of the study was not explained to the subjects in order to minimize any conscious efforts to enhance their pronunciation of the sounds targeted in the study.

At the time of the data collection, subjects answered a specially prepared questionnaire (see Appendix A). This was done to gather demographic data which would later be examine to account for possible trends in the data.

2.3 Elicited Speech

A list of fifty-three words was prepared, twenty-five words containing the allowable sequences (sp, sk, & st) and twenty-eight words containing the non-allowable sequences

(bl, fl, fr, sl, tr, & ❄r) (see Appendix B). However, the words were not presented in the same order as shown in Appendix B. They were given in a random order to minimize a response bias pattern (see Appendix C).

The subjects were asked to respond to pictured items which elicited production of /sp, sk, st/ and /bl, fl, sl, fr, tr, ❄r/ consonant clusters in word initial position. They were instructed to name the pictures using the fixed frame sentence structure, e.g., "I can say school, I can say flower." Each subject was shown the pictures in the same order. Their responses were audiotaped using a Sony cassette-corder (TCM-34V). This machine has a special voice operated recording function which eliminates unnecessary sound when the speaker is not speaking.

L1 acquisition researchers suggest that sentence repetition tasks result in better performance than spontaneous speech (Dickerson 1974). The effect of sentence versus spontaneous discourse on the phonology of L2 users is unknown. However, in order to obtain a sufficient data sample, a sample that was consistent across subjects, sentence production was selected for this study. Johansson's (1973) use of target language sounds at the sentence level is a significant improvement over previous experimental studies, for example.

2.4 Connected Speech

In addition, a sample of spontaneous connected discourse was elicited from each subject for purposes of comparison and documentation of any differences in his or her production of the allowable and non-allowable consonant sequences.

The natural speech of each speaker, speaking English, was audiotaped as they spoke a monologue. In order to elicit natural utterances, the subjects were asked to speak for five minutes on selected topics such as their educational background, work, personal interest, and academic goals, etc. Prompting was kept at a minimum. The subjects were asked to speak on the aforesaid topics with the expectation that they would produce words with the consonant sequences targeted in he study, e.g., school, study, three years, etc. This technique proved to be very effective in eliciting production of both the allowable and non-allowable consonant sequences under investigation.

Once all data were collected, the subjects were asked if they perceived any difficulty in articulating the targeted consonant sequences. Later a portion of the audio recording was selected for transcription and analysis. The subjects' productions of the target clusters were compared qualitatively for differences in the elicited and natural speech samples. The English as spoken by native English speakers was also compared to the data in order to see whether these subjects pronounced both allowable and non-allowable consonant sequences correctly.

3. Data Analysis and Discussion

3.1 Syllable Structure Transfer Hypothesis

Before analysis and discussion of the speech data, it is advisable to discuss what the syllable structure transfer hypothesis would predict. As stated previously, target language syllable structures, especially those which are not permitted in the NL, seem to exert some influence on the pronunciation of second language learners. In other words, syllable structures which are subject to distributional restrictions and are allowed in both the TL and NL would be problematic for them. If we take this notion as a point of departure, then the syllable structure transfer hypothesis would predict that Hindi speakers will have problems with the allowable sequences and will employ certain strategies to modify English consonant clusters in order to bring them into conformity with Hindi syllable structure restrictions.

This hypothesis is based on the notion that sound patterns in first language may account for errors in TL. French speakers, for example, use their knowledge of French syllable structure in processing French sequences while reacting to single syllable or double syllable target strings. This also implies that syllabification plays an important role in speech processing (for a detailed study see Mehler, Domergues, Frauenfelder, and Segni 1981) and that transfer of syllable structure rules from the NL to the TL may be a source of learners' errors.

Another sort of transfer related to syllable structure has been reported by Briere, Campbell, and Soemarmo (1968). Their study concentrated on the pronunciation of word initial z and ž by language learners whose L1 was English. The CAH would seem to predict that English speakers will have difficulty in producing each of these sounds at the beginning of a word, since English has neither z nor ž in word initial position. The study showed that English speakers had little trouble in producing word-initial z, and a great deal of difficulty in pronouncing word-initial ž. This vividly suggests that the role of syllable structures must be taken into account to test the validity of the CAH.

Since this study focused on Hindi speakers' production of both allowable and non-allowable sequences, it is reasonable to take account of the predictions made by the CAH. As stated previously, allowable consonant sequences (sp, sk, & st) occur in word-initial position in English but this cluster position does not exist in Hindi. That is to say, these consonant sequences occur in word-medial position in Hindi with syllable divisions between the clusters and do not occur at the beginning of a word. Based on this difference in target language-native language cluster position, a CAH would predict that Hindi speakers will have difficulty in producing the allowable consonant sequences in word-initial position. It would also predict that they will have problems in producing the non-allowable consonant sequences (bl, fl, fr, sl, tr, & šr) because they do not occur in Hindi in any position and are, therefore, new to them. The data collected from Hindi speakers were analyzed to verify whether these claims can be validated empirically.

3.2 Interlanguage Rules

A closer scrutiny of the data revealed that epenthesis (vowel-insertion) seems to be a characteristic strategy employed by Hindi speakers. In other words, with respect to

syllable structure modification strategies, the subjects inserted a vowel before the allowable consonant sequences at the beginning of a word. Interestingly, all speaker showed a preference for the same strategy. That is to say, other strategies such as consonant deletion and cluster reduction were not found at all. This supports Oller's (1974) claim that epenthesis occurs frequently in second language speech. It is important to mention, however, that the use of epenthesis was restricted to the subjects' production of the allowable consonant sequences. They had little or no trouble in producing English words beginning in non-allowable consonant sequences. An obvious breakdown of the transcript leads to two possible interpretations:

1. Native language (Hindi) - allowable CC sequences not found in word-initial position.
   Target language (English) - allowable CC sequences present in word-initial position.
   Interlanguage - rule of vowel-insertion (epenthesis)

2. Native language (Hindi) - non-allowable CC sequences not found in any position.
   Target language (English) - non-allowable CC sequences found in word-initial position.
   Interlanguage - little or no use of epenthesis.

It is obvious that interlanguages are systematic enough to enable scientific description. A more sophisticated linguistic analysis is essential to determine the possible reason for Hindi speakers' use of epenthesis as a syllable structure modification strategy. For this reason, a detailed discussion of the data follows.

3.3 Elicited Speech

Barring a few exceptions, all subjects had difficulty in producing the allowable sequences (sp, sk, & st) in word-initial position (see table 1). Out of the eleven, two subjects (S2 and S11) had more problem in pronouncing these clusters than the other subjects. S2 used vowel insertions 48 percent of the time whereas S11 used 52 percent of vowel insertions. S7 was the third highest in terms of epenthesis with 40 percent use of vowel insertions. Three subjects (S1, S3, & S5) had the same number of insertions (nine out of twenty five). Although all Hindi speakers epenthesized English words beginning in allowable sequences, the frequency of occurrence of vowel insertions ranged from eight to fifty two percent. An average rate of thirty two percent insertions was obtained.

As opposed to their production of /sp, sk, & st/ clusters, Hindi speakers seemed to have almost no difficulty in pronouncing the non-allowable consonant sequences. With the exception of S4 and S11, the subjects did not modify target language syllable structures and pronounced /bl, fl, fr, sl, tr, & ❈r/ consonant clusters as native speakers of English. S4 epenthesized one out of twenty eight clusters occurring in word-initial position with a 3.57 percent use of insertion. On the other hand, S11 inserted a vowel before two clusters having a rate of 7.14 percent. This resulted in an aggregate of 0.97 percent use of epenthesis. One possible explanation could be that they were using an article a before the words frog, tree, and flag, saying "I can say a frog, I can say a tree," etc. It can be

said that there seemed to be no systematic patterning and it was not reflected in the transcripts.

TABLE 1
Elicited Speech

subjects	C + Obstruent (sk, sp, st)		C+Liquid (bl, fl, sl, fr, tr, ❂▢)	
	# of insertions Total productions	% use of insertions	# of insertions Total productions	% use of insertions
S1	9/25	36	0/28	0
S2	12/25	48	0/28	0
S3	9/25	36	0/28	0
S4	8/25	32	1/28	3.57
S5	9/25	36	0/28	0
S6	6/25	24	0/28	0
S7	10/25	40	0/28	0
S8	6/25	24	0/28	0
S9	2/25	8	0/28	0
S10	4/25	16	0/28	0
S11	13/25	52	2/28	7.14
Aggregate	88/275	32	3/308	0.97

3.4 Connected Speech

As stated previously, Hindi speakers' speech was also audiotaped as they spoke a monologue. The transcription of their speech data gave some interesting results (see table 2). S4 had a 100 percent use of vowel insertion as regards the pronunciation of allowable sequences. Nearly fifty percent of the total productions of these consonant clusters was epenthesized by S1, S2, S10, and S11. The use of syllabification rule was a little higher in the speech of S5, S6, and S8. The alteration of target language syllable structure was comparatively minimum in the utterance of S3, S7, and S9 respectively. In total, 49 allowable sequences out of 101 were epenthesized at an average rate of 48.1 percent in the connected speech of Hindi speakers.

On the other hand, five subjects had absolutely no problem in producing the non-allowable consonant sequences. In similar fashion to the elicited speech, no modification or alteration of these clusters was found in the spontaneous speech of these subjects. The remainder of the subjects did not produce any non-allowable sequences. It is, therefore, hard to say whether they would have produced the same with native-like pronunciation.

TABLE 2
Conversation - Connected Discourse

Subjects	C + Obstruent (sk, sp, st)		C + Liquid (bl, fl, sl, fr, tr, ✳☐)	
	# of insertions Total productions	% use of insertions	# of insertions Total productions	% use of insertions
S1	1/2	50.00	0/0	0
S2	1/2	50.00	0/7	0
S3	3/8	37.50	0/2	0
S4	1/1	100.00	0/0	0
S5	3/5	60.00	0/0	0
S6	8/13	61.50	0/0	0
S7	4/11	36.30	0/0	0
S8	7/9	77.70	0/0	0
S9	5/19	26.30	0/8	0
S10	4/8	50.00	0/5	0
S11	12/23	52.10	0/1	0
Aggregate	49/101	48.1	0/23	0

The data collected from Hindi speakers' elicited speech and connected speech was compared qualitatively to see any difference in their speech patterns and to determine the relative influence of the speech situation on their interlanguage phonology (see table 3). As shown in the table, the rate of syllable structure modification increased in the connected discourse of some subjects. S4's percent use of insertions, for example, rose up from 32 in monitored speech to 100 in connected speech. However, it should be noted that this subject had produced only one allowable consonant sequence in his spontaneous speech and had epenthesized it. It is not certain that he would always modify the target language syllable structures if he produced more English words beginning in allowable consonant clusters in his connected speech.

The same is the case with S1 and S2 whose rate of vowel insertions increased as they spoke in different situations. It is important to mention here that although the data collected from the subjects' connected speech showed a significant difference in the rate of syllable structure modification, their production of allowable consonant sequences was restricted as compared to when they were engaged in the naming task involving 53 flash card pictures. Because of this reduction of the corpus, it may seem that all subjects exhibited a tendency to frequently epenthesize target language syllable structure in their connected speech in comparison to their monitored speech. Nevertheless, some subjects did have difficulty in pronouncing /sp, sk, & st/ clusters in word-initial position. S10, for instance, epenthesized four words out of a total of eight resulting in an increase of 34 percent use of insertions in his connected speech (see table 2 and 3).

TABLE 3

Subjects	S + Obstruent

	% use of insertions	
	Monitored Speech	**Connected Discourse**
S1	36.00	50.00
S2	48.00	50.00
S3	36.00	37.50
S4	32.00	100.00
S5	36.00	60.00
S6	24.00	61.50
S7	40.00	36.30
S8	24.00	77.70
S9	08.00	26.30
S10	16.00	50.00
S11	52.00	52.00
Aggregate	32.00	48.10

There was a great deal of variation in the percent use of epenthesis depending on the individual. For example, S7's performance improved slightly in his connected speech in terms of pronunciation (40 to 36.3%). On the other hand, S11's rate of vowel insertion remained the same in both speech situations. The ratio of epenthesis slightly increased in the connected speech or S3 but it was not significant enough to draw serious attention.

The remainder of the subjects showed an increased preference for epenthesis as syllable structure modification strategy. The aggregate use of epenthesis increased from 32% in monitored speech to 48.1% in connected speech.

3.5 Correlation Between the Variables and Interlanguage Phonology

It was hard to determine the correlation between the variables and the subjects' interlanguage phonology (see table 4). For example, S11, who studied English in India for 6 years and has lived in the United States for 9 years, had the highest percentage of syllable structure modifications. As shown in the table, she started learning English at the age of eight, which is much later than the occurrence of lateralization. The speech of this particular subject stands as a telling example of the influence of affective factors on the interlanguage phonology of adult language learners. In the interview that followed the connected speech, she expressed intimate feelings for her country and her compatriots, and an apathy for the native speakers culture of her second language (English). Implicit in her statement was the impression that she had neither the conviction nor the motivation to change her accent.

TABLE 4
Demographic (Correlational)

Subjects	AE	NI	NE	S + Obstruent (sk, sp, st)

				% use of insertions	
				Monitored Speech	**Connected Discourse**
S11	08	04	09	52.00	52.10
S2	04	14	07	48.00	50.00
S7	11	07	02	40.00	36.30
S1	05	11	07	36.00	50.00
S3	03	13	06	36.00	37.50
S5	11	09	02	36.00	60.00
S4	03	17	05	32.00	100.00
S6	05	11	06	24.00	61.50
S8	11	08	04	24.00	77.70
S10	04	13	03	16.00	50.00
S9	05	13	06	08.00	26.30

AE = Age Started Learning English
NI = Number of Years Studying English in India
NE = Number of Years Living in an English Speaking Environment

In contrast with S11, S9 had the least problem in pronouncing target language syllable structures without any modification. There are no apparent clues to the reason for this subject's better performance as compared to that of other Hindi speakers. He had spent 6 years living in an English speaking environment, which is less than that of S11. Also, he had studied English in India for 13 years, which is more than three times the number of years S11 studied. The only possible reason for his native-like pronunciation could be an early exposure to English. He started learning English at the age of 5 which might have had some influence on his second language phonology.

The biographic information provided by S10 supports this notion. Despite having spent only 3 years in the Unites States and having studied English in India for an equal number of years as that of S9, this subject had only 16% use of epenthesis in his monitored speech. It should be noted, however, that he had started learning English at the age of four. It would have been possible to consider this variable predominant in terms of exerting some influence on the interlanguage phonologies of the Hindi speakers, had it not been for the comparatively higher percentage of epenthesis in the speech of S2. Interestingly, this subject was of the same age (4 years) when he started learning English. Some other subjects (S3 and S4) had been exposed to their second language at an even earlier age. Their performance, however, was not better than that of S10 and S9.

S5, S7, and S8 had all begun to learn English at the age of eleven. While both S5 and S7 were close to each other in terms of the use of epenthesis as syllable structure modification strategy, S8 performed better than these subjects in his monitored speech. In this case, another factor seems to be working, i.e., number of years living in an English speaking environment. This subject has lived in the United States for 4 years, which is

twice the number of years S7 and S5 have spent in America. This factor might be considered operating to shape his interlanguage phonology.

But as we can see, S1's performance contradicts this assumption. As compared to S8, S1 started learning English at an earlier age (5 years), and had lived in her second language culture for 7 years. However, these factors did not seem to have a significant effect on her speech. Her percentage use of epenthesis was higher than that of S8. Similarly, S6 had lived in America for a longer period of time as compared to S8 but had the same percentage of vowel insertion as that of S8. His performance in connected speech, however, was slightly better than that of S8.

As discussed earlier, there seemed to be no apparent correlation between the subjects' variables and their interlanguage phonologies. It can be said that any relative influence of these variables on Hindi speakers' speech is subject to individual variation. That is to say, some factors may exert some influence on a specific individual's speech and the same factors may not operate to shape the interlanguage of a different individual. Moreover, some non-linguistic constraints also may hinder the acquisition of native-like pronunciation in a second language. For example, physiological constraints, psychological constraints, and socio-emotional factors also can cause the fossilization of interlanguage phonology.

In the interview that followed connected speech, the subjects were asked whether they had any difficulty in pronouncing the target language syllable structures (both allowable and non-allowable). With the exception of S7, all subjects said that they did not realize any conscious manipulation of their second language pronunciation pattern. The subjects also admitted that both allowable and non-allowable sequences were equally natural to them and that they did not notice consciously any systematic patterning in their speech. On the other hand, S7 realized that words belonging to the allowable sequences group (sp, sk, & st) were more difficult to pronounce than those belonging to the non-allowable sequences group (bl, fl, fr, sl, tr, & ❄r). That is, he felt that allowable sequences were difficult in terms of articulation and non-allowable sequences were much easier to pronounce. His background information shows that he had a delayed exposure to English (AE = 11 years), and had lived only two years in the United States. However, this does not provide sufficient grounds to attribute his pronunciation problems to these factors. Considering the majority of speakers who did not perceive any difficulty in pronouncing both allowable and non-allowable sequences, S7 may be considered an exception.

3.6 Explanation of Syllable Structure Modification

Although the subjects admitted that they did not have any difficulty in producing English words beginning in either allowable or non-allowable sequences, the data shows that they did have problems in pronouncing target language syllable structures, especially those which are subject to distributional restriction in their native language, i.e., allowable consonant sequences. It may be worth examining, then, why they resorted to epenthesis as syllable structure modification strategy.

Greenberg (1983) provides solid evidence that language transfer occurs not only as a result of contrasts between L1 and L2 consonant clusters inventories, but also because of differences in preferred cluster position - syllable initial or syllable final in the two languages. Greenberg (1983) studied three native speakers each of Turkish, Greek, and Japanese, and concluded that native language-target language contrasts in permissible cluster positions affect the syllable structure in interlingual productions.

The present study will seek to corroborate, then, the finding that language transfer manifests itself in terms of cluster position preference. As Kachru (1983) observes, the allowable sequences (sp, sk, & st) are subject to distributional restrictions in Hindi. In other words, these consonant clusters are shared structurally but they differ systematically. However, it would be wrong to presume that the word "shared" means the "same." It rather suggests that the sequences of these sounds occur in both languages in CCV pattern.

At this point, it may be interesting to discuss how Hindi speakers handled the problem of distributional restriction. It is important to mention here that the allowable consonant sequences occur in English in word-initial position and have the following pattern:
/sp/ - spu:n (CCV)
/sk/ - sku:l (CCV)
/st/ - stu:l (CCV)
On the other hand, these consonant clusters occur in word-medial position in Hindi and are, therefore, restricted in terms of cluster position. Consider this:
/sp/ - □ꕥ□ꕥ♦ॐ□ꕥ□   'together' (VCCV)
/sk/ - ◯ꕥ♦ॐ&ॐ೨:   'flattery' (VCCV)
/st/ - ◯◆♦ॐ◆ꕥ■೭೨:   'stocky' (VCCV)
In Hindi, these syllable structures have a VCCV pattern, i.e., they are always preceded by a vowel. More importantly, there is a syllable break which is shown by a slash between each consonant cluster. In /□ꕥ□ꕥॐ□ꕥ□ॐ, 's' is the member of the preceding syllable whereas 'p' is the member of the following syllable. Similarly, in /◯ꕥ♦&೨:/, 's' is the member of the preceding syllable and 'k' is the member of the following syllable and so on. In other words, these permissible consonant clusters constitute a bisyllabic pattern in Hindi whereas they are monosyllabic in English. In attempting to epenthesize target language syllable structures, Hindi speakers seem to reinforce their native language syllable structures:

s p u: n _____   ꕥ ♦ □   ◆:n
CCV   V+CCV

s k u: l _____   ꕥ s k u: l
CCV   V+ CCV

s t ✌ □ _____   ꕥ   ♦ ◆ ✌ □
CCV   C+CCV

This tendency can be seen as an attempt to analyze English consonant clusters from the bisyllabic VCCV pattern in Hindi. A transfer hypothesis would predict that English onset syllable (sp, sk, & st) would be problematic for Hindi speakers. Although transfer was demonstrated for cluster position in this study, Hindi speakers were also able to pronounce allowable consonant sequences like native English speakers. In other words, syllable structure modification (VCCV) was used as an optional interlanguage rule. The variable status of this phonological rule as part of an interlanguage supports the common belief that interlanguages are variable.

The reason for their native-like pronunciation may be attributed to the fact that they had all lived in second language culture for an ample period of time. Moreover, some subjects mentioned that native English speakers corrected them whenever they epenthesized /sp, sk, & st/ clusters. They said this helped them improve their pronunciation of the problematic sound patterns of English. Brown (1980) also holds similar views. He argues that second language learners tend to correct their errors when they are pointed out very subtly to them. Although Hindi speakers' use of epenthesis as syllable structure modification strategy was optional, the bulk of the data showed transfer to be the main influence on the interlingual production of these subjects. This finds good resonance in Broselow (1988) who postulates that syllable structure plays a crucial role in the production and perception of language and that transfer of syllable structure rules from the native language to the target language may be a major source of learners' errors.

While Hindi speakers' production of the allowable sequences (sp, sk, & st) was in accordance with the syllable structure transfer hypothesis, their production of the non-allowable sequences contradicted the prediction made by the CAH. A CAH would predict that English consonant clusters will be problematic to Hindi speakers, because these sequences are subject to distributional restriction in Hindi and are, therefore, susceptible to transfer. It also would predict that non-allowable sequences (bl, fl, fr, sl, tr, ❅❑) will be hard to pronounce, because they do not occur in Hindi. A closer inspection of the findings shows that while the first prediction turned out to be right, the second prediction failed to take into account processes other than transfer.

This vividly suggests that the CAH cannot consider transfer to be the only dominant factor operating to shape the interlanguage phonologies of second language learners. According to Eckman (1977), it also must incorporate universal properties of second language acquisition in order to be able to predict exactly what type of target language - native language differences will cause problems to language learners. He argues that the CAH must include the Markedness Differential Hypothesis (MDH), because it takes into account both language universals as well as native language transfer. According to him, MDH predicts that target language structures that are more marked than corresponding native language structures will be difficult to learn and the relative degree of markedness will correspond to the relative degree of markedness. It also predicts that areas that differ but are unmarked will not be difficult.

It would be interesting to take account of the prediction made by MDH, since a cluster also can be marked or unmarked according to its position in the syllable. A CAH

incorporating the notion of 'relative markedness' would then rightly predict that English onset consonant clusters (sp, sk, & st) are comparatively more marked than Hindi consonant clusters occurring in word-medial position. More importantly, there is a syllable break between Hindi consonant clusters which makes it less marked than that of English.

Based on this contention, it is reasonable to assume that processes other than transfer seem to interact with it in shaping interlanguage phonology. Broselow, for example, agrees with Eckman that principles of markedness may interact with transfer phenomena in determining the form of the interlanguage system. There is no doubt, however, that syllable structures, especially those which are permissible in both the TL and NL, are particularly susceptible to transfer.

It is hard to say whether the non-allowable sequences (bl, fl, fr, sl, tr, & ❋❑) are less marked than the allowable sequences (sp, sk, & st). The question why Hindi speakers had almost no difficulty in pronouncing English words beginning in non-allowable clusters need to be addressed. One possible explanation comes from Broselow (1988) who studied Egyptian speakers of English and claimed that vowel insertion before /st/ by her subjects is due to the fact that this kind of cluster violates the universal sonority hierarchy, because /t/ is not very sonorant, whereas /sn/ does not. On the other hand, /n/ in 'snow' is more sonorant than /s/ and, therefore, does not violate the universal sonority hierarchy.

There might be the possibility that the initial consonant clusters beginning with fricatives /f, ❋/ and followed by liquids /l,r/ are less marked than those beginning with a sibilant /s/ and followed by obstruents /t, k, p/. Whatever the case may be, this finding leaves room for further investigation to seek a convincing answer to the above mentioned question. It is interesting to note that Hindi speakers overcame easily the initial clusters that do not exist in their NL. It is this writer's personal belief that the existence and non-existence of the initial consonant clusters in the NL of these subjects are crucially important as they may exert a great deal of influence on their interlanguage phonology.

4. Conclusion

This study has investigated the role of transfer in the acquisition of second language phonology. It also attempted to evaluate the validity of the predictions given by the CAH as regards Hindi speakers' pronunciation of both allowable and non-allowable consonant sequences. Interpreting the data in this study is somewhat complicated because of the varied nature of the subjects, and their length of exposure to the second language culture. For example, there seemed to be no definite relationship between the subjects' linguistic variables and their interlanguage phonologies, implying that the influence of these variables on the shape of interlanguage systems is subject to idiosyncratic variation.

This study has presented some evidence in support of the following hypothesis:

1. Transfer plays a role in the acquisition of second language phonology, but there are other processes and constraints that interact with it in determining the form of the interlanguage systems.
2. Syllable structures which are allowed in both the target language and native language are particularly susceptible to transfer.
3. Language learners show a preference for less marked (more sonorant or natural) syllable structures.

The CAH predicted that Hindi speakers would have difficulty in producing target language syllable structures (sp, sk, & st), because they occur in their NL and are subject to distributional restriction. The bulk of the data shows that Hindi speakers attempted to modify allowable consonant sequences which do not occur in word-initial position in their NL. This can be seen as an attempt to bring English syllable structures in conformity to native language constraints. In other words, the systematic choice adopted by the subjects in resolving the problem of cluster position restrictions (word initial - word medial) may be considered resulting from transfer of their NL rule.

Another prediction made by the CAH proved to be wrong. While it predicted that Hindi speakers would have problem with non-allowable consonant sequences (bl, fl, fr, sl, tr & ❊❒) because they do not exist in their NL, the subjects demonstrated native-like pronunciation of these clusters. This vividly suggests that a CA solely based on the notion of transfer is inadequate and needs some revisions. The fact that the subject did not have any problem with the non-allowable sequences suggests that some characteristics may not be due to transfer and may appeal to language universals. It would be interesting, however, to conduct the same study in India to investigate whether native Hindi speakers who have not lived in an English speaking environment pronounce these consonant clusters as native English speakers do.

The wrong prediction made by the CAH highlights that there are processes and constraints other than transfer which operate to shape the interlanguage phonologies of language learners. Eckman (1977) argues that the notion of 'relative markedness' should be incorporated into the CAH to account for universal properties of second language acquisition. The central claim of MDH, according to him, is that given a number of differences between languages, only some of the differences will be potential areas of difficulty for language learners. Based on this theory of markedness, it is reasonable to assume that humans learn to do things which are less complex before they learn to do things which are more complex.

The present study provides some evidence supporting this notion. There is a possibility that the non-allowable sequences are less marked than the allowable sequences. More research should be conducted, however, to get a deeper insight into the markedness phenomena drawing on empirical evidence.

This study did provide some proof that target language syllable structures, which are allowed in the NL, seem to exert some influence on both the production and perception of second language strings. The postulation of such phonological rules will make

possible an explanation of actually occurring errors. Moreover, many language learning errors, especially those relating to target language syllable structure, can be shown resulting from transfer. The type of epenthesis employed by Hindi speakers in overcoming native language restrictions on syllable structure is entirely predictable by CA criteria, if it adheres to a particular theoretical approach to syllable structure such as the notion of relative markedness. The results indicate that transfer may operate in a non-obvious fashion, discernible only upon the application of a more sophisticated linguistic analysis.

It is important to mention that many question still need to be answered more fully in order to understand the complicated interlanguage systems. They are as follows:
1. Why are syllabification rules so susceptible to transfer?
2. What sort of phenomena tend to participate in transfer?
3. What is the relative influence of processes such as transfer, overgeneralization, avoidance, and first language acquisition on the shape of interlanguage phonology?
4. What are the causes of the fossilization of interlanguage phonology?

Further attempts should continue in order to get a better understanding of the interrelationship of language, mind, body, and society in the process of second language acquisition. In our attempts to answer these polemic questions, we will learn much about linguistic universals. At this point, it is reasonable to assume that the reason why certain first-language structures are transferred and others are not may relate to the degree of markedness of the structures in the various languages. Implicit in this statement is the assumption that universal constraints interact with the L1 and that interlanguage forms result from this multiple causation.

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APPENDIX A:
PARTICIPANTS INFORMATION SHEET

1. Name:
2. Age:
3. Gender:
4. Mother tongue:
5. Languages spoken:
6. Place of birth:
7. Where did you live the first 13 years of your life:
8. Languages spoken or learned from 0-4 years of your age:
9. Age you started learning English:
10. Number of years studying English in India:
11. Native tongue of your English teacher:
12: Number of years living in an English speaking environment; indicate location(s) or countries:
13: Indicate below which language you usually speak in the following situations:
In classroom:
Out of Classroom:
At work:
At home:
14. When do you speak English with Hindi speakers:
15. What languages are spoken by the members of your family:
16. How does your English pronunciation differ when you communicate with speakers of Native English:
Non-native English:

APPENDIX B:
WORD LIST

ALLOWABLE SEQUENCES

/sk/:
1. skeleton
2. ski
3. skin
4. skipping rope
5. skirt
6. school
7. scooter

/sp/:
8. spear
9. spider
10. spin
11. spade
12. spit
13. spoon
14. spool

/st/:
15. stage
16. stair
17. stay
18. steam
19. stem
20. stereo
21. stethoscope
22. stick
23. stop
24. stop
25. stump

NON ALLOWABLE SEQUENCES

/bl/:
26. black
27. blade
28. bloom
29. blow
30. blue

/fl/:

31. flag
32. flame
33. flower
34. fly

/sl/:

35. slap
36. sleep
37. slice
38. slide

/fr/:

39. frame
40. free
41. freeze
42. frog
43. fruit
44. fry

/tr/:

45. train
46. track
47. tractor
48. tree
49. truck

/❄☐/:

50. thread
51. three
52. throat
53. throw

APPENDIX C:
WORD ORDERING

1. stair
2. blue
3. scooter
4. spider
5. slice
6. stop
7. freeze
8. track
9. bloom
10. throat
11. stool
12. fly
13. spear
14. stay
15. free
16. sleep
17. steam
18. spade
19. truck
20. blow
21. tractor
22. stick
23. flame
24. stage
25. train
26. school
27. spoon
28. slide
29. stump
30. ski
31. spool
32. blade
33. thread
34. stem
35. spit
36. throw
37. stethoscope
38. skin
39. three
40. black
41. tree
42. stereo
43. slap

44. fruit
45. spin
46. frog
47. skirt
48. flag
49. frame
50. skeleton
51. flower
52. skipping-rope
53. fry