

Several Consonant Clusters Phenomena rising in Pronunciation

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The purpose of this paper is to consider two phonological phenomena, Deletion and Insertion of Consonants, occurring in consonant clusters in Korean students' pronunciation of English words. In order to analyze these phenomena, I performed an experiment with Korean students in which they (a) listened to words of a native speaker that included deleted or inserted consonants, and (b) pronounced words to a native speaker that included deleted or inserted consonants. From the experiments I tried to determine which of these phenomena Korean students tend to perform better with – in both listening and speaking, and the reasons for this. I concluded that Korean students listen to consonant-deleted words better than consonant-inserted words, while, conversely they pronounce inserted words better than deleted words. To explain these results, I first will explain the articulation aspects of these phenomena, and then explain the causes of insertion and deletion occurring in those words by adopting a phonological approach based on Feature Geometry Theory.

1. Introduction

There are several reasons why this paper is concerned with these two phenomena. One reason is that Korean students have a tendency to pronounce all consonants in words strongly, and also have difficulty pronouncing phonemes that do not exist in the Korean language, for example, /f, v/, etc. Another reason is to confirm if Korean students who learn a foreign language employ two general strategies in dealing with consonant clusters that they find difficult to pronounce – that is, they either insert a consonant between the consonants, or they delete one of the consonants. (Avery, P & Ehrlich, s., 1988). If they do, in fact, use these two strategies, I also wish to know which they tend to use more when they pronounce words. To confirm these facts, I experimented on 61 Korean middle school students and 47 university students, with a few words involving a deleted or inserted consonant between consonants. In this experiment, two kinds of tests were performed. In one test, students marked whether consonants in words were deleted or inserted when a native speaker pronounced the words. Another was a speaking test in which a native speaker checked the

pronunciation of subjects when they said these words in front of him. From the experiments, I also want to know which phenomena - deletion or insertion - the students perform better in for both listening and speaking.

To explain the results of these experiments, I will analyze them only from the articulation side of consonants, and then I will explain them in terms of the phonological aspects between consonant clusters. For the latter consideration, I will rely on the Feature Geometry of Yip (1988), because this not only shows the relations of consonants in a hierarchical structure, but also give us an appropriate understanding about the difficulty in pronunciation by using features of consonants.

With regard to these facts, although Borowsky (1986) considered the phonological aspects of insertion and deletion as marked, we may regard them as unmarked. This is because when we consider the reasons for students' pronunciation, at least phonetically, it is possible to say that these phenomena are due to the consonant relations of the place nodes in the feature structure and the easiness of articulation in pronunciation. In addition to this, when we consider the final consonant clusters of Korean words, we know that there are no triconsonantal clusters, but at most two consonants in the final position of words, for example, /kaps/ 'price', /saks/ 'fee'. We can assume that this may also be an element of difficulty with Koreans' pronunciations.

2. Consonant Clusters of Insertion and Deletion

The phonological phenomena referred to this paper can also be regarded as a type of consonant cluster simplification, because learners of a language tend to simplify the syllable structure of words by making the words conform to the pattern of their own native language as much as possible. To confirm this fact, on the basis of this premise, it is necessary to investigate related words and experiment with language learners.

Let us now consider the consonant clusters of insertion or deletion that will be used in this paper. They are listed in (1) below, which is based on Jespersen (1965), Ladefoged (2001), Hawkins (1984) and Murray (1982). As we can see from (1), there are 30 words which involve /p, t, k/ that are inserted or deleted in each word. (1a) shows cases where /p/ is inserted in the consonant clusters, for example, as [p] in *something* [-mpθ-]; (1b), in contrast, involves cases where the deletion of /p/ occurs, as in *cupboard* [kʌbəd]. (1c) shows words where /t/, as in [t] of *prince* [prints] is inserted, while (1d) lists words where /t/, is deleted as in [t] in *hasten*

[heɪsn]; (1e) refers to words where /k/, as [k] in *youngster* [jʌŋkstər] is inserted, while (1f) lists words where the opposite occurs and /k/ is deleted, as in [k] in *muscle* [mʌsl].

- (1) a. warmth, something, triumph
- b. cupboard, empty, Campbell, tempt, symptom, contempt, camphor
- c. once, tenth, prince, answer, sense
- d. often, castle, Christmas, listen, fasten
- e. length, amongst, youngster, angst, strength, distinct, punctual
- f. muscle, blackguard, know

Although there are other consonants that are inserted or deleted in consonant clusters, this paper will focus strictly on the segments /p, t, k/, because it is these segments that are usually involved when we examine words with respect to insertion and deletion.

3. Experiment and Discussion of the Words

3.1 Material

As mentioned, the main point of this paper is to examine Korean middle school and university students listen and speak words from the list (1) above. We want to know which phenomena - insertion or deletion - they have more difficulty with, and how we can explain these differences in their listening and speaking. Generally, in pronouncing complex final consonant clusters, most learners often simplify these clusters by deleting or inserting one or more of the consonants. To study this processes I gave the subjects two kinds of test papers, one for checking their listening ability as a native speaker pronounced the words, and the other to check their pronunciation in front of the native speaker. The students involved in this test were divided into two groups. One group was composed of two classes of middle school students, whose class sizes were 32 and 30. The other group was composed of two classes of university students, whose class sizes were 24 and 23. The words listed in (1) were given to them.

As mentioned above, the words in (1) are classified into four separate segments. They are as follows: (1a) words in which /p/ is inserted; (1b) words in which /p/ is deleted; (1c) words in which /t/ is inserted; (1d) words in which /t/ is deleted; (1e) words in which /k/ is inserted and (1f) words in which /k/ is deleted.

The first test is described below, in Table 1. This describes the part of the listening

3.2 Results of the Experiments

My expectation for the listening test was that the students would show more response to the consonant-inserted words than the consonant-deleted words. For the speaking test, I expected that the students would be less accurate with consonant-deleted words than with the consonant-inserted words. I expected this because most Koreans tend to pronounce all segments of words a bit strongly. But the results were very different from my expectations. In the listening test, both the middle school students and university students performed better with the deleted words than the inserted words.

Table 3.

Group Classification		Test Type	Listening Section			Speaking Section		
			Insertion	Deletion	Total Record	Insertion	Deletion	Total Record
Middle students	Yodo (32)*	Total	185	309	494			
		Average	5.7	10	15.4			
		Percent	35	71	51			
	Museon (29)	Total	84	244	328	250	247	497
		Average	2.8	8.4	11.3	8.6	8.5	17.1
		Percent	19.2	56	37.6	57	56	57
Univ. students	A Class (24)	Total	226	282	508	349	263	612
		Average	9.4	11.7	21.1	14.5	10.9	25.5
		Percent	58	83	70	90	77	85
	B Class (23)	Total	179	203	382			
		Average	7.7	8.8	16.6			
		Percent	48	62	55			

*students' number taken part in the tests.

In the speaking test, all 24 university students who participated in the test pronounced the inserted words better than the deleted words. However, the 29 middle school students did not show any difference in their pronunciations of inserted and deleted words. The results of both the listening and speaking parts of the study are shown above in Table 3.

3.3 Analysis of the Experiments

As shown in the results of the experiments in Table 3, in the listening part of the test, both middle school students and university students tended to perform better with inserted words than deleted words. In the speaking part of the test, the university students performed better with the inserted words, but the middle students showed almost no difference in their performances with the inserted or deleted words.

3.3.1 Listening Test

In this paper, the students' performance with consonant-deleted and consonant-inserted words in the listening part of the test can be explained as follows:

*The accurate listening of the inserted words is due to their previous exposure and hence familiarity with certain words. For example, '*youngster, strength*'.

*The inaccurate listening of the inserted words may be due to their perception of a given word's pronunciation based on its spelling. If there is no consonant in the actual spelling of the consonant-inserted words, they do not pronounce the inserted consonant. For example, '*prince, answer, sense, warmth, something, strength, length*'.

*The accurate listening of the deleted words is due to two factors:

- (1) as with consonant-inserted words, the students may be familiar with certain words. For example, '*often, castle, Christmas, listen, fasten; empty, know; cupboard*'. and,
- (2) Koreans tends to pronounce words by deleting the final consonants. For example, /salm/ - [sam] 'life', /talk/ - [tak] 'fowl', /ilk+ta/ - [ik³ta] 'reads'.

* The inaccurate listening of the deleted words is due to two factors

- (1) the students' existing pronunciation habits, and
- (2) their perception of a given word's pronunciation based on it's spelling. This involves the pronunciation of several related consonants.

For example, almost all middle school students think of the words '*length, amongst, youngster*' as /k/-deleted because these words do not include /k/. They think of words such as '*blackguard*' as /k/-pronounced because /k/ is in such words as '*blackboard, breakfast*'. They perceive some /t/ inserted words to be without the

/t/ sound since there is no /t/ in the actual word. For example, ‘*prince, answer, sense, once*’. Their inaccuracies with /p/ inserted words can be explained in a similar way. For example, the students may not perceive the /p/ in the inserted words ‘*warmth, something*’, since the letter ‘p’ is not in the actual word. In contrast, they may fail to recognize such words as ‘*contempt, camphor*’, because they think /p/ is to be pronounced in these words because of this consonant’s appearance in the actual words.

3.3.2 Speaking test

*The reason why the students pronounce insertion words well may be due to the following factors:

(1) easy articulation of some of the words, for example, ‘*youngster, prince, answer, something, amongst*’.

(2) their knowledge of a word’s spelling helps them pronounce the words correctly. For example, they can pronounce /p/ well because this segment appears in the word, ‘*triumph*’.

*The reason why students pronounce inserted words incorrectly may be similar to their reason for listening to inserted words incorrectly. That is, students may not pronounce the /p/ in the inserted words ‘*warmth, something*’, since /p/ is not in the actual word.

*The reason for pronouncing the consonant-deleted words correctly may be due to the effects of the mother language because Koreans tend to delete the final consonant. For example, /kaps+to/ – [kap[̃]to] ‘price also’, /ɔnč+ta/ - [ɔnta] ‘place on’. With respect to these facts, Carr (1999:280) also said that ‘Consonant Cluster Simplification deletes the second of two consonants when they occur word-finally or before another consonant, if that second consonant is coronal.’

*The reason for not pronouncing the consonant-deleted words correctly (for both middle school and university students) may be due to the appearance of a segment in the word. For example, they committed the error of pronouncing /p/ the words ‘*cupboard, symptom, contempt*’, because this segment appeared in the words.

3.4 Results of Analysis and Explanation

Now, all the things we have discussed until now can be summarized briefly as

follows:

(1) Korean students have a tendency to pronounce and listen based on spelling except in cases where the words are familiar. When they do this, they feel that they can easily articulate the words. In other cases, due to the phonemes of language, Korean speakers tend to substitute certain sounds. For example, Korean does not have the sounds /f/ and /v/, and Korean speakers tend to substitute /p/ and /b/, respectively, such as, /pan/ → /fan/, /supper/ → /suffer/, /pry/ → /fry/; /boat/ → /vote/, /buy/ → /vie/, /rebel/ → /revel/. (Avery & Ehrlich, 1998:138). Interestingly, both middle school students and university students record the highest error frequency with the sound /p/ in both insertion and deletion. This may thus be due to the absence of certain phonemes in the Korean language. With the other two sounds, there is a difference in the sequence of the sound errors, as shown below:

Middle students : p > k > t

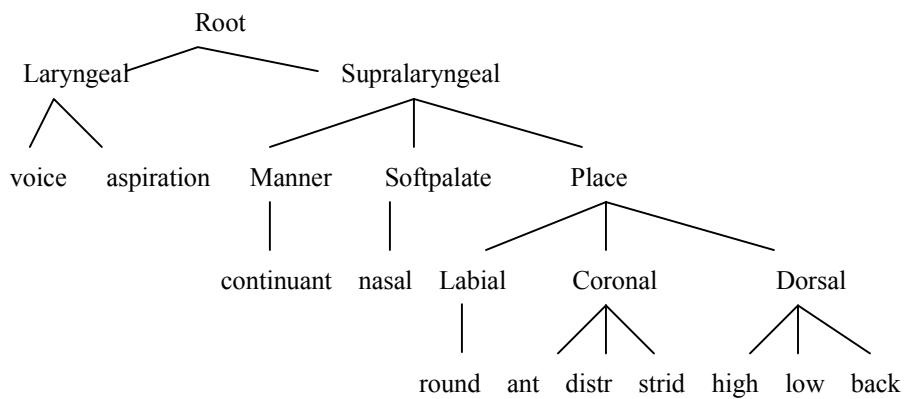
University students: p > t > k

- (2) One Korean teacher said that the strong tendency in the listening test to correctly perceive words was a result of teaching, because this teacher emphasizes consonant cluster deletion in her classes.
- (3) Another teacher referred to the fact that these days, Korean students are exposed to more listening exercises than in the past.
- (4) A third teacher said that because textbooks do not have sections devoted strictly to pronunciation drills, they tend to pronounce words according to their own habits.

4. Phonological Analysis in Feature Structure

This paper follows a phonological approach, because it is possible to show the causes of difficulty in insertion and deletion through the feature structure of the Geometry Feature Theory. For convenience, I will first explain the base concepts of what the hierarchical feature structure is, based on Yip (1988). Yip's feature structure adopted the Manner node from Clements' model (1985), and the Place node from Sagey's model (1986). Therefore Yip's model can be considered as a combination of the two models. His model about Feature Geometry is as follows:

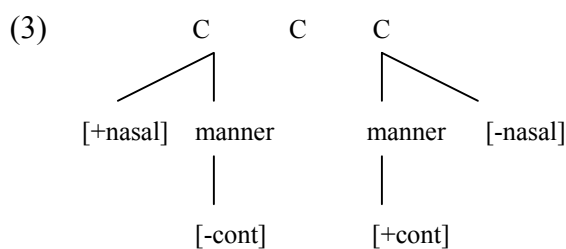
(2) Yip's Feature model



In this paper, we are mainly concerned with the articulations between consonant clusters, and therefore in the structure of the model, we will consider the features associated with articulation. Therefore, the features we will consider are as follows: the [cont] of the Manner node, the [nasal] feature, and the [labial], [ant], [cor] and [back] of the Place node. The reason why we are considering these particular features is because when we examine the consonant cluster relations of CCC that occur in insertion or deletion, it is these features that are almost always connected within the feature structure analyses. Therefore from this analysis, we can get a clearer understanding of the phenomena of articulatory difficulty with the referred words.

4.1 Insertion Analysis

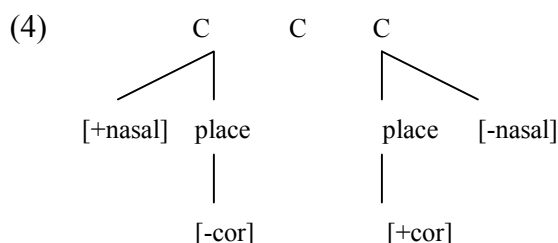
Now let's consider cases of insertion on the feature structure. First, there are three kinds of insertion in which /p, t, k/ are inserted between consonants when they are articulated. They are as follows: [n-t-s], [m-p-θ], and [ŋ-k-θ(s, t)]. The consonant clusters, [n-t-s], will be represented as shown here (3).



As we see in (3), the first nasal sound /n/ and the third stop sound /s/, as in 'prince' have opposite features, and so in manner of articulation, it is not difficult to

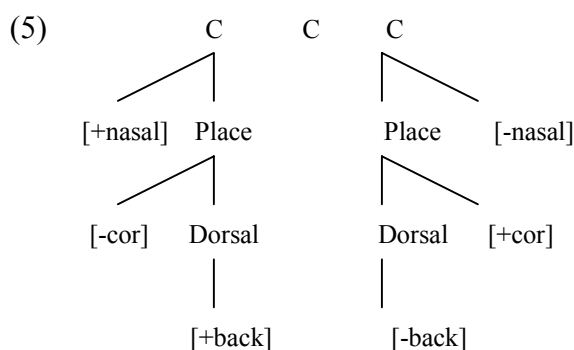
pronounce if we immediately articulate the sound [-nasal, +cont] after the sound [+nasal, -cont] in sequence. Therefore, after [n], a [t] insertion occurs which sounds similar to the nasal, that is, [-cont].

Next we will consider [m-p-θ], such as ‘something’, in which [p] insertion rises between [m] and [θ]. This will be represented as in (4).



From the structure of (4), we know that because it is difficult to articulate the sound [-nasal, +cor, -labial] right after [+nasal, -cor, +labial], the similar sound of the first sound, [-cor, +labial], [p], is inserted for easy articulation.

The final type of insertion, [ŋ-k-θ(s, t)] could also be explained using the feature structure of [k] insertion. The first sound [ŋ] is articulated in the dorsal of mouth and also the nasal. For that reason, it is necessary to consider the Dorsal node under the Place node as in the following (5).



As we can see from (5) above, there is a big articulatory difference between [m] and [θ], and indeed, it is hard to pronounce the two sounds immediately in sequence, because the first sound [m] and the second sound [θ] are opposite in [nasal, cor, back]. Therefore it is necessary to insert a sound between [m] and [θ] for easy articulation. Also, in the third sound in (5), although the sound is [s] or [t], we will get the same result as in [θ].

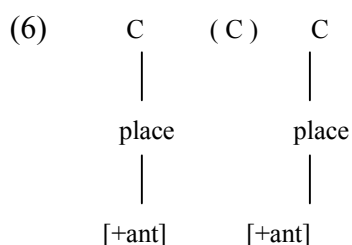
In conclusion, we can say that the insertion happens in a slightly delayed interval between the first sound and the second. Indeed, when we observe all the cases of

insertion discussed until now, we see that the first sounds are the nasal sounds, [n, m, ŋ]. How are the nasal sounds articulated in the mouth? If the air is stopped in the oral cavity but the soft palate is down, the air can go out through the nose. In this way, the sound that is produced is a nasal sound. The sound is different according to the places of its closure, for example, /m/ in bilabial closure, /n/ in alveolar closure, and /ŋ/ in velar closure. Therefore on the basis of these facts, we can say that the inserted sounds happen to serve as a bridge for transition between the sounds on either side. (O'grady, Dorovolsky, and Aronoff, 1977) Because, after producing [ŋ], the inserted [k] occurs between [ŋ] and [s], [t] or [θ]. The inserted [k], which serves as a bridge, has common features of both [ŋ] and [θ]. However, we can also say that the reason for this phenomenon may simply be due to the student's effort to easily articulate the word.

The reason why insertion occurs may be because of an anticipation of an upcoming sound. For example, let's consider the inserted [t] produced between [n] and [s], as in 'prince'. First, the air is stopped in the oral cavity, and then the soft palate is down so that the air can go out through the nose. After the nasal sound, our articulator moves toward the next sound, the fricative sound.

4.2 Deletion Analysis

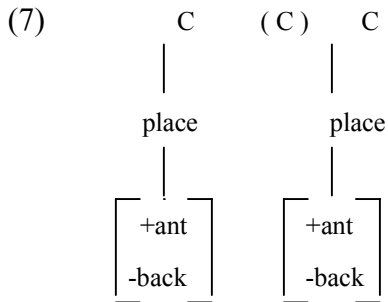
The cases of deleted consonants, /p, t, k/, are the same as in insertion because the frequency of their production is usually high. But when we observe the features of the first sound and the third sound, their features are almost the same, and therefore we can assume that the English language tends to prefer similarities operating across intervening sounds. The area of consonant-deletion within words are of three types, as follows: [f(s)-t-n (m, l)], [m-p-b(f, t)], and [s-k-l]. Let's consider the first case, [f-t-n] on the structure presented in (6).



In (6) we can see that the first sounds, [f, s], have the same feature as the third sounds [n, m, l], for example, *often*, *fasten*, *castle*, and *Christmas*. If we articulate the sounds [t] and [n] in sequence, we can see that it is very difficult to pronounce

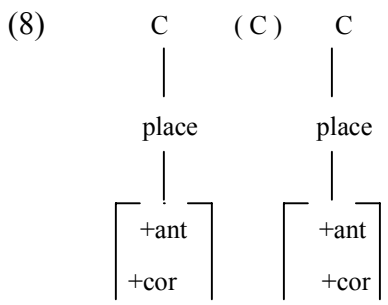
the two sounds. For this reason, in pronunciation, the medial sound tends to be deleted for easy articulation.

The next, deleted sound we will consider is the [p] deletion that occurs between [m] and [f, t], as in '*empty, symptom, camphor, contempt*'. This is represented in the feature structure as shown in (7).



As we see in (7), the features of the first sound and the third are the same. Therefore, as in (6), this will result in deletion for the purpose of easy articulation. This is because when we compare the two articulatory features, that is, [p], [+labial, -cor] and [t], [-labial, +cor], we recognize that it is difficult to pronounce them in sequence. However, when we consider the other cases in which the [p] deletion occurs, such as in *cupboard and Campbell*', it is obvious that this occurs because of the difficulty in our articulation if we try pronounce [p] and [b] in succession, even if Jespersen claimed that this is due to the reduction of two consonants, differing only by voice and absence of voice. This supports the fact that learners usually have more difficulty with a set of sounds that share the same articulatory features rather than with isolated sounds. This articulation occurs because the soft palate is raised a fraction of a second earlier or later, after the nasal sound is produced.

The final type of deletion, [s-k-l], is also explained using the feature structure. As seen below in (8), the first sound [s] and the third sound [l] have the same articulatory features, which cause the medial sound [k] to be deleted in pronunciation.



In this structure, if the deleted [k] is pronounced in '*muscle*', it would be very difficult to articulate because the features of [k] are [-ant, -cor]. It would also be a very unnatural pronunciation.

5. Examination of Alternative

To develop correct pronunciation in words, Avery & Ehrlich (1988: 104) suggested three tips to help learners.

(1) Difficult final consonant clusters can be practiced using two words. For example, to practice the final cluster /ld/ as in '*field*', use the phrase '*feel down*'. This is a method in which the student can gradually eliminate more and more of the second word as follows:

feel down → feel dow → feel d → field

This is a good method to help the students, but in cases where the medial position and consonant insertion occur, for example, '*symptom, blackguard; something*', there is difficulty in using this method.

(2) Have students produce syllables with final consonant clusters of increasing complexity.

bread → brand → brands; tax (/ks/) → taxed (/kst/) → texts (/ksts/)

I think this will help students understand the insertion of consonant clusters, but there is also a problem in that it can not explain situations when insertion of a given sound occurs in words that do not reflect this sound in their spelling, for example, '*prince, sense*'.

(3) Lastly, let the learners know that native speakers of English often simplify final consonant clusters. Although this is beyond the scope of this paper, this is a good tip for Korean students because they tend to pronounce every consonant in words strongly. Although these suggestions are very helpful, I think that some of them may be hard to follow. Thus, there still needs to be a more suitable method to teach pronunciation.

6. Conclusion

This paper has considered two phonological phenomena, the deletion and insertion of consonants in Korean students' pronunciation of English words. First, by using two types of tests I experimented on Korean middle school and university students with a few words that included deleted or inserted consonants. The results of the experiments were that Korean students listened to consonant-deleted words better than consonant-inserted words. Conversely, when speaking these words, they were more likely to pronounce inserted words better than deleted words. To explain these results, I discussed the phenomena from the perspective of articulation, and then, in order to show the structural phenomena, I adopted a phonological approach based on Feature Geometry Theory.

When we think of the reasons for the students' pronunciation failures, we may say that these phenomena arise from the consonant relations of the place nodes in the feature structure and the easiness of articulation in pronunciation. In addition to this, as Avery (1988) said, we can say that Korean students also employ 'two strategies, insertion and deletion, in dealing with consonant clusters which they find difficult to pronounce.' But for Koreans, the results of the speaking test show us that they have a stronger tendency to try to put an inserted sound between consonant clusters (although this contrasts with listening test in which they responded well to the deleted words). This may be due to Korean words, where there are no final triconsonantal clusters, but only two consonants at the most in the final position of words. Finally, in teaching vocabulary, I think it is important to not only understand the meaning of the new vocabulary, but also to learn how it is pronounced.