

English Segmental Sounds adapted into Korean and Phonological Theory

Lee Hae-Bong (Inchon City College)
Gu Pon-Seok (Korea University)

<Contents>

- | | |
|---|----------------------------|
| 1. Introduction | 4. Segments and Optimality |
| 2. Generative Phonology Approach to Loanword Adaptation | Approaches |
| 3. Optimality Theory Approach to Loanword Adaptation | 5. Conclusions |

<Abstract>

한국어에 차용된 영어 분절음과 음운 규칙

이해봉, 구본석

생성음운론의 입장에서 본 Hyman 가설을 적용할 때 영어와 한국어에 공통으로 나타나는 영어 분절음 /p^h, t^h, k^h/는 한국어 화자에게서 그대로 인식되며, 영어에는 있지만 한국어에 없는 /f, v, θ/는 관련 음운 규칙이 적용되어 한국어음과 유사하게 된 [p^h], [p], [s]로 각각 인식된다고 설명했다. 이와 같은 Hyman 가설의 적용은 /f, v, θ/가 왜 한국어에서 존재하지 않고 관련 음운규칙이 적용된 형태로 나타나는 지에 대한 이유를 제시하지 못하는 한계가 있다. 그러나 최적성 이론에서는 입력형에서 모든 분절음을 받아들이고 언어간 제약등급의 차이로 /f, v, θ/와 같은 분절음이 한국어에서 나타나지 않고 [p, t, k]로 나타난다고 설명하였다. 따라서 최적성 이론은 영어 분절음이 한국어에서 나타나는 다양한 양상을 적절히 설명할 수 있음을 보여 주고 있다.

1. Introduction

When Korean speakers recognize English segments, Koreans perceive them in various forms. For example some English segments [m, n, ŋ, p^h, t^h, k^h] are adapted

as their original sounds [m, n, ŋ, p^h, t^h, k^h] in Korean. Other segments [f, v, θ] do not appear in Korean and these sounds are adapted as [p^h], [p], and [s]. English voiced stop segments [b, d, g] which are similar to Korean sounds but appear in a different environment are borrowed in the voiceless stop form [p, t, k]. Generative phonology, by using Hyman's hypothesis, explains the process of the above English segments in Korean, but it cannot explain why the English segments /f, v, θ, ž, č, j/ disappear during the adopting process.

In this paper we present a more persuasive explanation of English sounds adopted into Korean by using optimality theory.

2. Generative Approach to Loanword Adaptation

Here we review the generative phonological viewpoint of English words that are borrowed in Korean. Hyman (1970: 19-40) proposed the following hypothesis on loanwords.

- Hypothesis 1: Foreign sounds are perceived in terms of underlying forms.
- Hypothesis 2: Foreign segments equivalent to native segments derived by rules are lexicalized as the corresponding native underlying forms.
- Hypothesis 3: When a foreign segment appears in an environment in which the equivalent native derived segment does not appear, then the form of the incoming foreign words is modified so that the structural description is met and the segment in question is then derived in the appropriate environment.

The first hypothesis means that the sound form of a source language is perceived as the underlying form of a target language. The application of the first hypothesis assumes that in the case of pie[p^hay] and spy[spay] both [p^h] and [p] are differently realized but that they both are adapted as [p^h]. On the other hand, this paper adapts English native speaker's pronunciation as source language of loanword and the data chosen by the loanword dictionary as loanword form of target language (which means spelling borrowing). So English sounds themselves can be underlying form of Korean native speaker. Therefore English sound [p^h] becomes underlying form /p^h/ and then it

is adapted as [p^h] ([p^h]→/p^h/→[p^h]) and also [p] becomes /p/ as underlying representation, which is adapted as [p^h] ([p]→/p/→[p^h]) and this is supported by the assumption that underlying form of [p^h] and [p] in Korean is perceived differently owing to different pronunciation of these two sounds in English and [p^h] and [p]'s being regarded as different phonemes in Korean. So this paper can exclude the point of view of regarding underlying form of [p^h] and [p] as only /p/ in Korean.

This hypothesis explains English segments which exist in Korean and occur in similar environments. Among these sounds are English nasals [m, n, ŋ], voiceless aspirated stops [p^h, t^h, k^h], voiceless unaspirated stops [p, t, k], fricatives [s, h] and liquids [l, r].

(1) Adapting type of English nasals¹⁾

English		Adapting type
man[mæn]	→	[mæn]
nice[nais]	→	[naisi]
tank[t ^h æŋk]	→	[t ^h æŋk ^h i]

(2) Adapting type of English aspirated voiceless stops

English		Adapting type ²⁾
pass[p ^h æs]	→	[p ^h æsi]
taxi[t ^h æksi]	→	[t ^h æksi]
coat[k ^h out]	→	[k ^h out ^h i]

(3) Adapting type of English unaspirated voiceless stops

English		Adapting type
spend[spend]	→	[sip ^h ent]
stay[stei]	→	[sit ^h ei]
sky[skai]	→	[sik ^h ai]

1) Source language means the one adapted or borrowed from by people using a language different from it and target language means the language of people who adapt or borrow from the source language.

2) The realization of [s] in Korean can be different whether it is based on the pronunciation of Korean speaker of loanword dictionary. If [s] is based on the former, it may be realized as [s'], not [s] and if [s] is based on the latter, it may be borrowed as not [s'] but [s]. By the way, as this paper adopt spelling borrowing, the realization of [s] as [s'], not [s] in Korean loanword can be excluded.

(4) Adapting type of English fricatives [s], [h] and English liquids

English		Adapting type
second[sekənd]	→	[sekənti]
hand[hænd]	→	[hænti]
loss[lɔ:s]	→	[rɔ:si]
race[reis]	→	[reisɪ]

The second hypothesis means that similar sounds of a source language derived by rules become the corresponding underlying forms of a target language and are thus lexicalized.

These are English segments which do not exist in Korean. Examples are as follows.

(5) Adapting type of English voiceless fricatives [f] and voiced fricatives [v]

English		Adapting type
face[feis]	→	[p ^h eis]
volume[vɔljum]	→	[pɔljum]

(6) Adapting type of English voiced fricatives [z], [ʒ] and affricates [č], [ʝ]

English		Adapting type
zair[za:ɪər]	→	[cairi]
measure[meʒər]	→	[mecə]
champ[čæmp]	→	[chemp ^h i]
juke[ʝu:k]	→	[cuk ^h i]

(7) Adapting type of English voiceless fricatives [θ], [š]

English		Adapting type
theater[θiətər]	→	[siətər]
shine[ʃain]	→	[sain]

(8) Adapting type of the English voiced fricative [ð]

English		Adapting type
together[təgeðər]	→	[təkətə]

The third hypothesis means that when two similar segments of language A (source language) and language B (target language) occur in different environments, the

segments of language A change to be suitable for the language B structure.

This means that in the case of the similarity of English segments and segments in Korean which occur but occurring in different environments, English segments are modified so as to be suitable for the Korean structure.

The surface sound form of the source language becomes the underlying form of the target language. To this underlying form, the phonological rules of the target language are applied and become loanwords borrowed from English.

The following examples are the cases of the English voiced stops [b, d, g] becoming [p, t, k] in Korean.

(9) Adapting type of English voiced stops

English		Adapting type ³⁾
box[baks]	→	[paksɨ]
data[deitə]	→	[teitə]
guide[gaid]	→	[kaitɨ]

From the generative phonological point of view, English segments which exist in Korean are borrowed as they are. Those segments which do not exist are borrowed according to the application of Korean phonological rules.

The English fricative segments [f, v, θ, ð] are such sounds. When these sounds borrowed into Korean, it is questioned how Korean native speaker can accept these sounds as underlying representation. Namely, it is assumed the explanation that these sounds can be accepted as underlying representation is arbitrary. So in the generative phonology, without explaining why these sounds do not appear in the Korean language, the explanation that they are explained by phonological rule applications is also arbitrary. This lacks explanatory adequacy.

3) Voiceless stops /p, t, k/ in Korean may be realized as [b, d, g] at the phonetic level when intervocalic /p/ in /apəci/ (father) in Korean may be realized as voiced stop [b] at the phonetic level. On the other hand, it can be assumed that Korean native speakers perceive these segments as voiceless stop /p, t, k/ at the phonological level relating to spelling borrowing. By the way, as this paper limits loanword forms as spelling loanword contained at loanword dictionary, [b, d, g] as the realization of the phonetic level can be excluded. So it is assumed that the voicing of intervocalic [t] in [teitə] (data) can be excluded.

3. Optimality Theory Approach to Loanword Adaptation

In the past, phonologists concentrated on process-based approaches, but recently those approaches have changed to constraint-based approaches. To produce well-formed output, rules are often applied arbitrarily. In optimality theory, well-formedness constraints are universal. Constraints are often conflicting, but conflicts are resolved by the ranking of these constraints. The higher ranked constraints dominate the lower ranked constraints.

Languages differ basically in how they resolve the conflicts of constraints. Constraints are both rankable and violable. To select the optimal output, the function Harmony-evaluator evaluates a set of candidates generated by the function Gen, based on constraint ranking.

4. Segments and Optimality Approaches

In generative phonology, when segments exist in language A but do not exist in language B, there is no explanation of why those segments do not exist in language B. But in optimality theory as all the candidates can be allowed in input form whether language A language B, they can appear in input form, so at least these segments can exist in input form of language A or B and we assume that they cannot be realized language A or B owing to the different constraint ranking between two languages. In optimality theory, when segments exist in language A but do not appear in language B it is assumed the segments exist in input form in language B but do not appear in output form, on account of the different constraint ranking between the languages.

The reason that certain segments of language A do not appear in language B is due to the difference of constraint ranking between the languages. On this problem, Prince & Smolensky (1993, p.175) say as follows.

(10) Absolute ill-formedness

A structure φ is (absolutely) ill-formed with respect to a given grammar iff there is no input which when given to the grammar leads to an output that contains φ .

(10) means that when segments exist as an input form in language A but do not appear as an output form in language A, we consider these segments as ill-formed. This means that all the segments exist in input form in language A but the realization of the output form produces different results depending on the application of either language A grammar or language B grammar.

Itô & Mester (1995: 192) say the reason why certain segments in certain languages do not appear is that a certain constraint which prevents the segments from becoming realized in the output is higher ranked than the faithfulness constraint.

On the other hand, when we assume that the fricatives [f, v] appear in language A but do not appear in language B, we can explain the reason why the fricatives do not appear in language B by the following constraint ranking.

- (11) a. Ident(F): Every feature in the input has a correspondent present in the output.
 b. No fricative constraint: the fricative feature is not allowed.

(12) No fricative constraint >> Ident(F)

(11a) means that features in the input must be identical in the segmental level, or vice versa, which means feature co-occurrence. This constraint means every segment in the input must remain in the output.

(11b) means that fricative sounds are not allowed in the output.

(12) means that the no fricative constraint is higher ranked than the Ident(F).

Table (13) shows that the reason why the fricative [f] in language B does not appear when the ranking constraint (12) is applied.

(13)

/fik/	No fricative constraint	Ident(F)
a. .fik.	*!	
b. .ik.		*

The first candidate violates the no fricative constraint but satisfies the Ident(F). The second candidate [f] is deleted, so it violates the Ident(F) but it satisfies the no fricative constraint. As the no fricative constraint is higher ranked than the Ident(F) the

second candidate is the optimal form.

As can be seen in optimality theory the reason why fricative sounds do not appear in language B is that the no fricative constraint is higher ranked than the Ident(F). Here I will show how English loanwords appear in Korean in optimality theory.

4.1. English segments appearing in Korean

In segments which exist both in English and in Korean the Ident(F) is higher ranked than other constraints which do not allow such segments.

In the cases of [m] in man[mæn], [n] in nice[nais] and [ŋ] in ink [iŋk], the Ident(F) is higher ranked than the no nasal constraint.

(14) a. Ident(nasal): Every nasal feature in the input has a correspondent present in the output.

b. No nasal constraint : Nasal features are not allowed.

(15) Ident(nasal) >> No nasal

English /ŋ/ is borrowed as /ŋ/ in Korean and can be explained as in table

(16)

(16)

/i ŋ k/	Ident(nasal)	No nasal constraint
a. .i ŋ k ^h .		*
b. .ikk ^h .	*!	

The first candidate in (16) satisfies the Ident(nasal) but violates the No nasal constraint. The second candidate satisfies the No nasal constraint but violates the higher ranked Ident(nasal). Therefore the English loanword [ŋ] in Korean is the optimal form.

The rest of the nasal sounds [m, n] are borrowed in the same way. English segments [p^h, t^h, k^h] when borrowed in the initial position in Korean are explained by the following constraints and ranking.

- (17) a. Ident(aspirated): Every aspiration feature in the input has a correspondent present in the output.
 b. No aspirated stops constraint: Aspirated stops are not allowed.
- (18) Ident(asp) >> No aspirated stops constraint.

That [p^h] in English is borrowed as [p^h] in Korean and can be explained by tableau (19)

(19) pen /p^hen/ → [p^hen]

/p ^h en/	Ident(asp)	No aspirated stop constraint
a. .p ^h en.		*
b. .pen.	*!	

The first candidate aspirated stop [p^h] satisfies the Ident(asp) but violates the no aspirated stop constraint. The second candidate [p^h] is changed to [p] so it violates the higher ranked Ident(asp). Therefore [p^h] in English is optimally borrowed as [p^h] in Korean. The rest sound [th] in taxi and coat is borrowed in the same way. On the other hand, if we assume that aspirated feature is in the input, the unaspirated [p] in the case of [spay] based on English pronunciation is borrowed into Korean as aspirated [p^h] of [sip^hay]. In order to explain this, we tentatively assume the following constraints: syllable constraint (aspirated segments should appear before syllable initial position except for word initial position), Ident(F) and constraint ranking (syllable constraint >> Ident(F)).

If [p] of [spay] is adapted into [p], it violates syllable constraint higher than Ident(F). So [p] of [spay] may not be realized as [p^h] in Korean and also we think that this problem can be solved accurately through more study.

The case that the initial English [l] and [r] are borrowed as [r] in Korean can be explained as following.

- (20) No l in the syllable initial position : Initial syllable feature l is not allowed.
- (21) Ident(lateral) : Every lateral feature in the input has a correspondent present in the output.

The borrowing of [l], [r] in lane and race is as follows.

(22) a. lane /lein/ → [rein]

/lein/	No l in initial σ	Ident(lateral)
a. .lein.	*!	
☞ b. .rein.		*

b. race /reis/ → [reis]

/reis/	* σ [l]	Ident(lateral)
a. .leis.	*!	
☞ b. .reis.		*

In (22a) the first candidate violates the no l in the syllable initial position constraint but the second candidate satisfies the * σ [l] constraint, so it becomes optimal. In (22b) the first candidate violates the * σ [l], while the second candidate satisfies it, so this candidate is the optimal form. The reason that the English segments [b, d, g] do not appear in the initial position but they appear in the [p, t, k] form, is explained as follows.

(23) a. *[+voice, -cont]: Voiced stops are not allowed.

b. Ident[+voice]: Every voiced stop feature in the input has a correspondent present in the output.

By the (23) constraint the /b/ in box is not pronounced [b] but pronounced [p]. This can be explained by table (24).

(24) box /baks/ → [paksi]

/baks/	*[+voice, -cont]	Ident[+voice]
a. .baksi.	*!	
☞ b. .paksi.		*

The first candidate violates the higher ranked constraint and the second candidate violates the lower ranked Ident [+voice]. Therefore the second candidate which does not borrow the voiced [b] is the optimal form. By applying this constraint we can

explain the reason why voiced stops do not appear in Korean.

4.2. English segments not appearing in Korean

The English fricatives [f, v, z, θ, ð, ʃ, ʒ] and affricates do not exist in Korean sounds. Generative phonology explains that the English [f, v] are borrowed as the similar sounds [p^h, p] after application of phonological rules. But in optimality theory the reason the English [f, v] do not appear in Korean is explained by the segment prohibition constraint and the Ident(F).

In optimality theory we introduce the following segment prohibition constraint and Ident(F).

- (25) a. f: *[-voice, +cont, +strid, -cor]: Voiceless labio-dental fricatives are not allowed.
- b. v: *[+voice, +cont, +strid, -cor]: Voiced labio-dental fricatives are not allowed.

- (26) a. Ident[-voice]/[+cont]/[+strid]/[-cor]: Every voiceless labio-dental fricative feature in the input has a correspondent present in the output.
- b. Ident[+voice]/[+cont]/[+strid]/[-cor]: Every voiced labio-dental fricative feature in the input has a correspondent present in the output.

The (25) constraint which does not allow [f, v] in Korean is higher ranked than the (26) Ident(F).

(27) face [feis] → [p^heisi]

/feis/	*[-voice, +cont, +strid, -cor]	Ident[+voice]/ [+cont]/[+strid]/[-cor]
a. .feisi.	*!	
b. .p ^h eisi.		*

The first candidate violates the higher ranked constraint but the second candidate violates the lower ranked constraint. Therefore the second candidate is optimal.

The reason [v] does not appear in Korean is also explained by the fact that the no voice labio-dental fricative constraint is higher ranked than the Ident constraint.

In optimality theory we can introduce the following constraints and Ident constraints in explaining the English fricative sounds [z, ž, ĵ, č].

- (28) a. z: *[+anterior, +voice, +cont, +cor, +strid]: Voiced alveolar fricatives are not allowed.
 b. ž: *[-anterior, +voice, +cont, -nas, +strid]: Voiced alveopalatal fricatives are not allowed.
 c. ĵ: *[-anterior, +voice, -cont, -nas, +strid]: Voiced alveopalatal affricates are not allowed.
 d. č: *[-anterior, -voice, -cont, -nas, +strid]: Voiceless alveopalatal affricates are not allowed.
- (29) a. Ident[+anterior]/[+voice]/[+cont]/[+cor]/[+strid]: Every voiced alveolar fricative feature in the input has a correspondent present in the output.
 b. Ident[-anterior]/[+voice]/[+cont]/[-nas]/[-strid]: Every voiced alveopalatal fricative feature in the input has a correspondent present in the output.
 c. Ident[-anterior]/[+voice]/[-cont]/[-nas]/[+strid]: Every voiced alveopalatal affricate feature in the input has a correspondent present in the output.
 d. Ident[-anterior]/[-voice]/[-cont]/[-nas]/[+strid]: Every voiceless alveopalatal affricate feature in the input has a correspondent present in the output.

In optimality theory the reason why these sounds do not appear in Korean is that (28) is a higher ranked constraint than constraint (29)

In optimality theory the reason [s] appears in place of [θ] is that (30a) is higher ranked than (31a).

- (30) a. θ: *[-voice, +cont, -strid]: Voiceless interdental fricatives are not allowed

- (31) a. Ident[-voice]/[+cont]/[-strid]: Every voiceless interdental fricative feature in the input has a correspondent present in the output.

The reason why English [ð] is borrowed as [t] in Korean is that (32) is a higher ranked constraint than the (33) constraint.

- (32) *ð: Voiced dental fricative features are not allowed.

- (33) Ident[+voice]/[+cont]/[-strid]: Every voiced dental fricative in the input has a correspondent present in the output.

5. Conclusion

When English words are borrowed in Korean, English segments can be divided into three types. Some English segments which exist in Korean are borrowed into Korean. There are some English segments which do not appear in Korean.

Also there are some segments which are similar but the environment of occurrence is different in English and Korean. Generative phonology explains that the English segments /p^h, t^h, k^h/ are perceived as using the same sound, but the English segments /f, v, θ/ which do not appear in Korean are borrowed by the similar sounds [p^h, p, s].

But this does not explain why the English segments /f, v, θ/ disappear during the adapting process. I present a set of universal constraints from optimality theory that show these universal constraints, such as Ident(F) and No affricate stop, and the interaction of these constraints. I conclude that this optimality theory provides insights that better capture the perception of English segments in Korean.

References

- 구본석(1999), *최적성이론에서의 영어 차용어와 모음 삽입*, 『Studies in Phonetics, Phonology and Morphology』 5, 59-77, 서울: 한국문화사.
 _____(1999), 「영어 차용어와 음운이론」, 고려대학교 박사학위 논문.
 이호영(1996), 「국어 음성학」, 서울: 태학사.
 전상범(1990), 「영어 음성학」, 서울: 을유문화사.
 _____(1995), 「형태론」, 서울: 한신문화사.
 편집부 엮음(1995), 「외래어표기 용례」, 서울: 세창출판사.

- Archangeli, Diana and D. Terence Langendoen (1997), *Optimality Theory*, Blackwell Publishers Inc.
- Hyman, Larry (1970), The role of borrowing in the justification of phonological grammars, *Studies in African Linguistics 1*, 1-48.
- Itô, J. and A. Mester (1995), The core-periphery structure of the lexicon and constraints on reranking, *Papers in Optimality Theory: University of Massachusetts Occasional Papers 18*, 181-209.
- Kang, Ong-Mi (1996), An Optimality-Theoretic Analysis of Korean Loanword Phonology, *Journal of Korean Linguistics 28*, 113-158.
- Lee, Ponghyung (1995), Korean Loanword Phonology: An Optimality Perspective, *Journal of Korean Linguistics 20*, 121-152.
- McCarthy, John and Alan Prince (1995), Faithfulness and reduplicative identity, In J. Beckman et al., eds., *University of Massachusetts Occasional Papers In Linguistics: Papers in Optimality Theory 18*, 249-384.
- Prince, Alan and Paul Smolensky (1993), *Optimality Theory: Constraint Interaction in Generative grammar. ms.*, Rutgers University and University of Colorado.

접수일자: 2000년 10월 16일

게재결정: 2000년 12월 8일

▶ Lee Hae-Bong

address: 235, Dowha2-dong, Nam-gu, Incheon

affiliation: Incheon City College

Tel: 032-760-8798

▶ Gu Pon-Seok

address: 1, 5-Ka, Anam-dong Sungbuk-ku, Seoul, 136-701 Korea

affiliation: Korea University

Tel: 02-3290-1152