The phonetics and phonology of Korean loanword adaptation[*]

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The paper reviews some of the recent research on Korean loanword adaptation, placing it in a larger theoretical context. Two competing models of loanword adaptation are outlined; they differ on whether the input to adaptation is phonetically or phonologically based. The paper then reviews the adaptation of English liquids and stops in terms of these models.
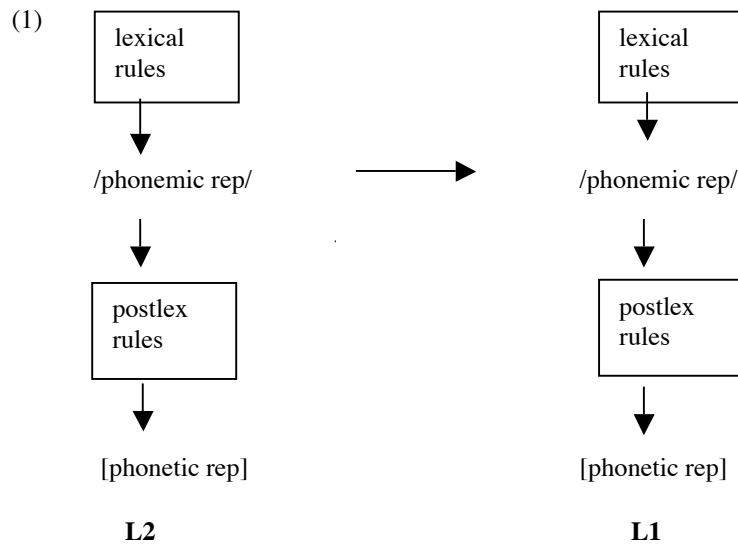
1. Introduction

With the rise of constraint-based formalisms such as Optimality Theory, theoretical interest in loanword adaptation has burgeoned. Loanword phonology involves the intricate interplay between forces that require the loan to conform to native grammar segmental and phonotactic constraints on the one hand, while at the same time remaining faithful to the loan source on the other. A model of input-output mapping that formalizes the resolution of conflicting forces driving the input towards specific output targets seems a priori better suited to model this aspect of linguistic competence than the ordered-rule framework of traditional generative phonology. Also, when viewed from this perspective, languages such as Thai that have little if any morphophonemic alternation (and hence few rules) present sound changes such as *style* -> [sətaj] that are comparable to those found in English, Russian, etc. and allow these languages to play a more active role in phonological theorizing. Finally, in adapting a loanword, speakers converge on a repair strategy, which often lacks a precedent in the native grammar or sometimes even contradicts native processes raising serious learnability problems.

   Korean has figured prominently in this line of research. Unlike Mandarin Chinese, which adapts foreign words primarily via calques, Korean joins with Japanese in readily accepting both the phonetic and grammatical faces of a lexical item. The loanwords have been documented in dictionaries providing an easily accessible wealth of material for analysis. Speakers have robust intuitions on the proper way to adapt a word. Researchers such as Y-K. Kim-Renaud, M. Oh, H-Y. Kang, O-M. Kang, H-S. Sohn, S-J. Rhee, Gregory Iverson, Stuart Davis, Y-J. Kang, S-Ch. Ahn and many others have uncovered generalizations showing the complexity and subtlety of the process that pose real challenges to general models of loanword adaptation and phonological grammar.

In the current theoretical literature one can distinguish two models of loanword adaptation. The first, most forcefully promoted by Carole Paradis and her collaborators (see LaCharité and Paradis 2005 and references) holds that loanwords are primarily adapted by bilinguals who draw on their competence in both the donor (L2) and the recipient (L1) languages to discern equivalences in grammatical structure (see (1)). This hypothesis is predicated on the view--standard since Sapir (1925)--that speakers perceive and interpret the sounds of their language in terms of its underlying phonological structure--essentially a phonemic representation. The specific claim is that loanword equivalences are fashioned at the phonological level of the two grammars and hence abstract away from allophonic, predictable properties added by lower-level (postlexical) rules that are normally below the threshold of phonological awareness. When the phonemic and prosodic structures of the two languages do not align then the loan is reshaped to the closest available alternative measured in terms of the phonological features operative in the recipient language and their location in feature geometric and prosodic structure.

(1)

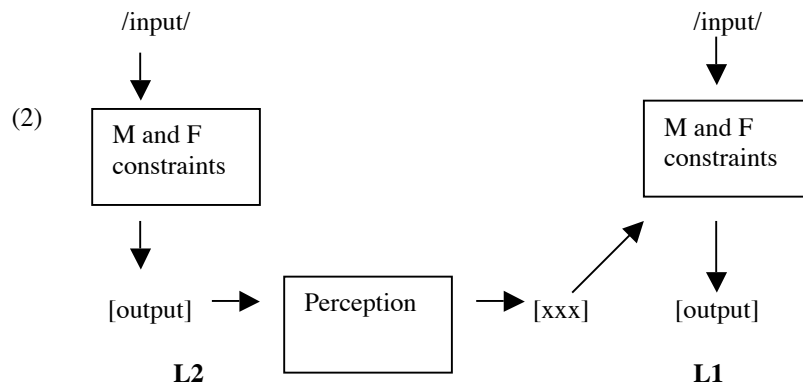| lexical rules		lexical rules
↓	→	↓
/phonemic rep/		/phonemic rep/
↓		↓
postlex rules		postlex rules
↓		↓
[phonetic rep]		[phonetic rep]
L2		**L1**

A large corpus of loans (primarily from French and English) into various languages have been assembled and studied from this point of view.

An alternative approach (sometimes dubbed Perceptual), starting with Silverman (1992), sees the input to loanword adaptation as primarily phonetic (either a raw acoustic signal or some phonetic transcription imposed by Universal Phonetics). See (2). Adapters may filter this information through the lens of their native phonological categories merging nonnative contrasts and omitting non-salient

information (Silverman's Perceptual Scan; see also Kenstowicz 2001/4 and Yip 1993, 2004). This transformed input is then subject to the constraints of the native grammar. Researchers differ as to what happens at this point in the adaptation process. The (transformed) input might be treated the same as a native input (Jacobs and Gussenhoven 2000) or it might also be subject to special transformations peculiar to the loanword phonology, generally in an effort to preserve more information from the source (Yip 1993, Kenstowicz 2001/4).

(2)

/input/   /input/

M and F   M and F
constraints   constraints

[output] → Perception → [xxx]   [output]

L2   **L1**

An OT grammar consists of Markedness and Faithfulness constraints ranked in a particular fashion. According to the model in (2) loanwords are subject to the same ranked set of markedness constraints as native lexical items. But loans can differ in terms of the ranking of faithfulness constraints. We shall call these loan-sensitive faithfulness constraints Output-Output constraints--in our case EO for English loans. In the default case the OO constraints occupy the same place in the ranking as corresponding IO constraints and thus treat the loan the same as a native input. But in some cases an OO faithfulness constraint can rank differently from its IO counterpart. Three different kinds of reranking can be identified that correspond to three different types of loanword adaptation in the traditional literature. See (3). First, the loanword may display a different repair to violations of the same phonotactic constraint as compared to a native input. Such *divergent repairs* were noted by Steinbergs (1978) for the Bantu language Oshikwanyama where the ban against a nasal plus voiceless stop is resolved by coalescence in native words (/n+p/ -> [m]) but by voicing in loans (/mp/ -> [mb]). This is modeled by ranking the relevant OO faithfulness constraint above its IO counterpart: OO-Ident-[F] >> IO-Ident-[F]. Second, the loanword may end up violating a native phonotactic or inventory constraint that holds over the native vocabulary. Known as *importations* in the traditional literature, they are modeled by reranking the relevant OO faithfulness constraint above the markedness constraint(s) that enforce the

phonotactic: OO-Ident-[F] >> M-[F] >> IO-Ident-[F]. Third, loanwords may be altered even though the relevant sound or sound sequence is permitted in the native system. For example, Hungarian (Nádasdy 1989) geminates a consonant following a short stressed vowel in originally German and now all loans (*sweater -> szvetter*). Gemination blocks on voiced obstruents even though voiced geminates are readily created in native Hungarian grammar. Such *retreat to the unmarked* is modeled as reranking an OO faithfulness constraint below the markedness constraint that bans the relevant sound or sound sequence: IO-Ident-[F] >> M >> OO-Ident-[F].

IO-F

(3)   M >> F … M >> F >> M >> F >> M >> F … M >> F

OO-F

If the divergent OO rankings diagrammed in (3) persist in the grammar and speakers lose cognizance of the loan source then the result is a stratified lexicon in the sense of Ito and Mester (1995) with the same basic ranking of markedness constraints but different rankings of faithfulness constraints.

In what follows we illustrate the two models by surveying some of the results from the Korean loanword literature concerning the adaptation of two sound classes: liquids and plosives.

2. The adaptation of liquids

Korean has one liquid phoneme with two allophones. It surfaces as a lateral in the syllable coda and as a flap in the (intervocalic) syllable onset (4a). Principles of syllable contact bar the liquid from a postconsonantal onset (4b). The liquid is also banned in word-initial position (4c). Finally, when geminated the lateral version of the liquid surfaces (4d). (The data in (4) are taken from O-M. Kang 1992).

(4) a. mul 'water'   b. /cho-rok/ -> chorok 'grass green'
        mu.r-i nom.   /yǝp-rok-so/ -> yǝmnoks'o 'chlorophyll'
    c. /rok-cha/ -> nokcha 'green tea' d. /sin-rok/ -> sillok 'spring green'

In English /l/ and /r/ contrast freely. The lateral is velarized in the coda and the rhotic is a [+consonantal] approximant [ɹ] in the onset and a [-consonantal] glide [ɹ̯] in the coda. Nonrhotic varieties bar the [ɹ̯] from the coda; but American English (the source of most recent Korean loans) preserves it, where it significantly colors and restricts the range of vowel contrasts. Finally, both liquids can form the nucleus of a syllable. In the analyses that follow we assume the following feature specifications.

(5)   r   l   n

continuant +   -   -
nasal   -   -   +

From the perspective of the Phonological model of loanword adaptation in (1) we expect the two liquid phonemes of English to map to the single liquid phoneme of Korean which will then (re)interpret it as [l] or [r] depending on the context.

(6)   English   Korean
       /l/   [l]

                     /liquid/

       /r/   [r]
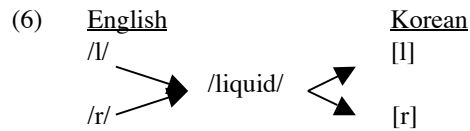
As pointed out in Kenstowicz and Sohn (2001), the facts are rather different and suggest that the Korean speaker is cognizant of the English contrast even though it is a subphonemic distinction in his own grammar. Moreover, it appears that the Korean adapter is also sensitive to certain subphonemic features of the realization of the liquids in English and strives to preserve them in the adaptations as well--while still satisfying native Korean constraints. In the following discussion we examine three contexts that illustrate these points.

2.1 Medial onsets

First, in intervocalic position the English contrast between /l/ and /r/ can be preserved by geminating the /l/ (7a). Older loans (perhaps via Japanese) adapt with the rhotic (7b). Some have alternants (7c). But there are no cases in which English /r/ is adapted as a geminated lateral (7d), showing that the two English phonemes are distinguished. (Data from Sohn 1997).

(7)   English   Korean
   a. cola   [kʰolla]   b. jelly   [ceri]
       talent   [tʰallentʰɨ]   balance   [paransɨ]
       silicon   [sillikʰon]   calendar   [kʰarenda]
   c. olive   [oripɨ] ≈ [ollibɨ] d. chorus   [kʰo:rasɨ]
                                         orange   [orenʒi]
                                         mystery   [misɨtʰeri]

This divergence in the treatment of /l/ and /r/ is unexpected if the English liquid distinction is being viewed from the phonological perspective of Korean where there is just a single liquid phoneme. But it makes perfect sense if the speaker modifies the adaptation in order to maintain the intervocalic liquid. In terms of the schema outlined in (3), this can be modeled as follows. In Korean grammar the lateral is

barred from (intervocalic) onset position by a constraint *(V).lV. Ahn (1999) considers the intervocalic flapping as part of the more general laxing of intervocalic consonants that shortens their duration. Given the feature structure in (5), *(V).lV is satisfied by change of the [-continuant] lateral to the [+continuant] flap.   The alternative repair that geminates the liquid so that it spans both the coda and the following onset is rejected indicating that Dep-Mora ("don't insert a mora") also dominates Ident-[continuant]. This aspect of the grammar of Korean is sketched in the tableau in (8). The phonotactic (markedness) constraint *(V).lV barring the lateral in the onset compels a change in the input.

(8) /mul+i/	*(V).lV	Dep-Mora	IO-Ident-[cont]
muli	*!		
-> muri			*
mulli		*!	

On the other hand, in (recent) English loans the intervocalic lateral is preserved via gemination, a process that links the lateral to the preceding coda where it is licensed by Korean grammar. This is formalized by saying that the EO counterpart to IO-Ident-[continuant] is ranked above Dep-Mora. As shown in the tableau of (9), the geminate candidate is now the optimal output.

(9) /olimpik/	*VlV	EO-Ident-[cont]	Dep-Mora
olimp^{h}ik	*!		
orimp^{h}ik		*!	
-> ollimp^{h}ik			*

   The adaptations discussed in this section make two general points. First, we see sensitivity to a contrast that might otherwise be expected to lie below phonological consciousness. Second, we see an input-output mapping that diverges from the native one--a mapping that is designed to preserve information from the loan source in the face of the general phonotatic ban on an onset lateral. This is modeled by the ranking in which the EO faithfulness constraint splits off from its IO counterpart to rank above the competing repair of gemination (Dep-Mora).

2.2 Final codas

In word-final position we find another divergence in the treatment of liquids in English loans.   The lateral remains in the coda as a perfect (phonetic or phonological) match (10a) while the rhotic is realized as [ə] (10b).

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(10) | | English | Korean | | English | Korean |
|---|---|---|---|---|---|
| a. | style | [sɨtʰa.il] | b. | gear | [ki.ə] |
| | hotel | [hotʰel] | | cure | [kʰju.ə] |
| | scandal | [sɨkʰendal] | | fair | [pʰe.ə] |

We see this adaptation as the closest Korean approximation to the glide-like realization of the English approximant [ɹ] in coda position, which has less constriction, higher intensity and clearer formant structure compared to onset /ɹ/ (Hagiwara 1995). In other words, just as Korean vocalizes the off-glides of the English diphthongs in *dry* [dɹaj] -> [tɨra.i], *crown* [kʰɹawn] > [kʰɨra.un], so the rhotics of *fair* [feɹ] and *cure* [kʰjuɹ] are vocalized to /ə/: [pʰe.ə], [kʰju.ə].

(11) [feɹ̬]

	EO-Ident-[cons]	EO-Ident-[coronal]
pʰel	*!	
-> pʰe.ə		*
pʰer	*!	
pʰerɨ	*!	

On this view, [phe.ə] is more faithful to *fair* [fɛɹ̬] than is [pʰerɨ]. The English coda [ɹ̬] is [-consonantal]. Adaptation as [pʰe.ə] shifts the rhotic's correspondent to the syllabic nucleus while the alternative [pʰe.rɨ] changes the rhotic's feature structure from [-consonantal] [ɹ̬] to the [+consonantal] flap as well as its position in the syllable. Hence [pʰe.ə] is a more minimal change and thus preferred to [pʰe.rɨ].[1]

    The vocalization of the English rhotic is comparable to the gemination of [l] in *Olympic* -> [ollimpʰik]. Both adaptations increase the duration of a segment with an accompanying change in syllabic profile. See Yip (2004) for additional cases from Cantonese loanword phonology where changes in duration and timing are preferred to changes in vowel quality. Prolonging an articulation or adjusting its phasing seem to distort the sound less than changing its feature structure and hence are probably more minimal and hence more optimal adjustments.

    In vocalizing English [ɹ̬] Korean speakers display sensitivity to a subphonemic distinction in English. This conclusion is strengthened by the fact that a few loans from other languages that realize their rhotics as trills are treated differently with the rhotic preserved through epenthesis: Italian *largo* > [rarɨko], French *Versailles* > [perɨsaiyu], Russian *Gorbachev* -> [kor ɨpacʰopʰɨ]. This analysis is also comparable to the one in (9) in that a different repair is imposed on the loan as compared to a native input. In native Korean grammar a coda liquid is realized as the lateral. C-W. Kim (1971) sees this process as a reflex of the more general oral closure imposed in

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[1] Tongue tip positioning is correlated with tongue body positioning such that retroflexes are naturally connected to a retracted position of the tongue body. Thus, when the rhotic is vocalized, a back vowel is the natural outcome. See Flemming (2003) for recent discussion.

the Korean coda and exemplified by the realization of /os/ 'clothes' as [ot] (cf. [osɨl] acc.).

(12) /os/   Coda-Con   Dep-V   IO-Ident-[contin]

    os   *!

  -> ot   *

    osɨ   *!

    /largo/   Coda-Con   E-O Ident-[contin]   Dep-V

    largo   *!

    lalgo   *!

  -> larɨgo   *

2.3 Initial position

In recent loans the Korean constraint barring the initial liquid is not imposed. The paradigm in (13) shows that the underlying liquid phoneme in /Lak/ 'enjoy' surfaces as [n] at the left edge of a phonological word. Word-internally it is in onset position and so surfaces as the rhotic. (Data from O-M. Kang 1992).

(13) /Lak/   'enjoy'   /khwɛ/ + /Lak/ -> [khwɛrak] 'pleasure'

    /khwɛ/   'cheerful'   /Lak/ + /wən/ -> [nagwən] 'paradise'

    /wən/   'garden'

In native grammar *#L dominates faithfulness to [nasal] and so L is realized as [n].

(14) /Lak/   *#L   IO-Ident-[nasal]

    lak   *!

    rak   *!

  -> nak   *

The data in (15) illustrate the treatment of recent loans where the ban on initial liquids is suspended.[2]

(15) English   Korean   English   Korean

    rail   [re.il]   line   [ra.in]

    rope   [ropʰɨ]   lobby   [robi]

    raincoat   [rɛinkʰotʰɨ]   level   [rebel]

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[2] Stefan Knoob (p.c.) reports that some Korean speakers still enforce the ban on initial liquids, substituting a nasal in such words as *lighter* [naitha].

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This adaptation is analyzed by saying that the EO counterpart to IO-Ident-[nasal] dominates *#L. In this case the EO faithfulness constraint rises above a phonotactic (markedness) constraint allowing a novel structure to emerge (an import). The rhotic realization of the liquid is chosen because that is the allophone compatible with a syllable onset. The gemination option to preserve the lateral that operates in *Olympic* -> [ollimpʰik] is not available in initial position.

(16)   /lajn/   EO-Ident-[nasal]   *#L   Onset-Con
          la.in   *   *!
       -> ra.in   *
          na.in   *!

3. The Adaptation of Plosives

3.1 Phonetic adaptation

Other examples have been documented where the Korean adapter is sensitive to phonetic information. We review briefly Y-J Kang's (2004) study of the adaptation of English word-final stops into Korean. Two of her findings are relevant here. First, Kang statistically corroborated a speculation from the earlier literature that epenthesis is more common after English tense vowels (e.g. *week* -> [wikʰɨ]) than lax ones (e.g. *quick* -> [kwik]). She reports that in the NAKL loanword list there are 283 final stops after an E lax vowel; 184 (65%) show no vowel insertion, 79 have an inserted vowel (28%) and 20 (7%) are variable. The are 164 examples after an English tense vowel; only 10 (6%) show no epenthesis while 147 (90%) do and 7 (4%) are variable. On the basis of the transcriptions in a large database of American English speech (the TIMIT corpus), Kang shows that voiceless stops are more likely to be released after a tense vowel than after a lax vowel (in roughly a 60% vs. 40% ratio). She infers that epenthesis is targeting a released stop in English and is a repair that preserves the release in the form of an epenthetic vowel. As she notes, whether a stop is released or not is variable, subphonemic information in English. Since coda stops are obligatorily unreleased in Korean (part of C-W. Kim's 1971 more general Principle of Implosion), it is plausible that Korean speakers are sensitive to the difference between a released vs. unreleased stop. The other important point is that the repair to preserve release is epenthesis. This could be described as the perceptual equivalence of released [p] with [pɨ] in a pregrammatical perceptual scan or it could arise from another EO faithfulness constraint dominating Dep-V (EO- Ident-[release] >> Dep-V) that is different from the native repair in which final stops are deprived of release: Dep-V >> IO-Ident-[release]. Either way, we have sensitivity to a salient but noncontrastive property.

Y-J. Kang's (2004) other relevant finding is that English word-final voiced stops are significantly more likely to be repaired by epenthesis than voiceless ones (88% vs. 40%): e.g. *pub* -> [pʰəbɨ]. This is faithfulness to English voiced stops. Korean lax stops are arguably phonologically voiced (Kim and Duanmu 2004) and so this adaptation is inconclusive between phonological and phonetic mapping. But the adaptation of English word-final /b/ as Korean [bɨ] runs counter to the native grammar repair in which laryngeal contrasts are neutralized word finally: cf. [cib-i] 'house' nom. but [cip] 'house'.

(17)

/cib/	Coda-Con	Dep-V	IO-Ident-[voice]
cib	*!		
cibɨ		*!	
-> cip			*

/pʰəb/	Coda-Con	EO-Ident-[voice]	Dep-V
pʰəb	*!		
-> pʰəbɨ			*
pʰəp		*!	

Here is another case in which a different repair is employed to satisfy the native Korean constraint of no-final voiced (released) stops--one that is motivated by faithfulness to the loanword source.

3.2 Phonetic distinctions ignored

Continuing with the discussion of the adaptation of English stops into Korean, we now turn to cases in which the phonetically closest match is systematically rejected. First, in initial position English voiceless stops are aspirated. They are adapted as Korean aspirated ones (18a). This behavior contrasts with French voiceless stops, which are unaspirated; they are adapted as tense stops (18b)--(data from S-H. Kim 2004). Since both French and English have just a phonological voiced vs. voiceless opposition, it appears again that the adapter is paying attention to the phonetic realization.

(18)

	English	Korean		French	Korean
a. poker	[pʰowkəɹ̩]	[pʰo:kʰa]	b.	Paris	[p*ari]
target	[tʰaɹ̩gɪt]	[tʰa:get]		Toulouse	[t*ullucɨ]
cola	[kʰowlə]	[kʰolla]		Cannes	[k*a.nɨ]

There are contexts, however, where English voiceless stops are realized as unaspirated and hence essentially equivalent phonetically to the French unaspirated

stops. But we find that Korean loanword adaptation ignores this difference and selects the voiceless aspirated phoneme over the more phonetically comparable tense one.

The first context is in initial #sC clusters. Oh (1996) specifically notes this case as problematic for Silverman's (1992) model of loanword adaptation in which the input is the phonetic signal. She cites the examples in (19).

(19) <u>English</u>   <u>Korean</u>
  spy[spaj]   [sɨpʰa.i]
  style[stajl]   [sɨtʰa.il]
  ski [skij]   [sɨkʰi]

This behavior contrasts with Thai (Kenstowicz and Suchato 2004). As is well known Thai has a three-way /pʰ/, /p/, /b/ distinction in stops. In loanword adaptation English word-initial voiceless stops are equated with aspirated ones while voiceless stops in #sC clusters are assigned to Thai voiceless unaspirated stops--the expected phonetic match.

(20)   <u>English</u>   <u>Thai</u>   <u>English</u>   <u>Thai</u>
  pin [pʰɪn]   [pʰin]   spare [spɛɭ]   [sˀpēe]
  test[tʰɛst]   [tʰées]   style [stajl]   [sˀtāaj]
  cone [kʰown] [kʰōon]   scan [skæn]   [sˀkɛ̄ɛn]

The other context in which Korean overlooks a phonetic distinction that Thai does not occurs in word-medial, intervocalic position. It is well known that aspiration is minimized in post-tonic contexts in English--'*ra[p]id* vs. *ra'[pʰ]idity*' (part of a more general lenition process that also flaps dental stops in many dialects, as in '*a[ɾ]om* vs. *a'[th]omic*'). While Thai generally assigns these stops to the voiceless unaspirated category (21a) (see Kenstowicz and Suchato 2004), Korean rejects the phonetically more comparable tense stops in favor of the aspirated ones (21b). On the other hand, French medial voiceless stops continue to be adapted with tense phonemes (21c)--(data again from H-S. Kim 2004).

(21)   <u>English</u> <u>Thai</u>   <u>English</u> <u>Korean</u>
  a. cupid   [kʰjupɪd] [kʰɨwpît]   b. happy   [hæpij]   [hɛpʰi]
   beta   [bejtə]   [bēetâa]   monitor [manɪtɔɭ] [monitʰa]
   market   [maɭkɪt] [māakêt]   chicken [tʃɪkɪn] [cʰikʰin]

        <u>French</u>   <u>Korean</u>
  c. espoir   [ɛspwaʁ] [e.sɨp*ɨ.a]
   petit   [pəti]   [p*ɨt*i]

école   [ekɔl]   [e.k*ol]
boutique [butik]   [put*ik*ɨ] (Sohn 1997)

The adaptations of French voiceless unaspirated stops as [p*,t*,k*] and English aspirated stops as [pʰ, tʰ, kʰ] shows that Korean speakers are able to distinguish a voiceless unaspirated stop from an aspirated one in loanword adaptation (as well as of course in the native system where the three-way contrast is well-entrenched in morpheme-initial onset position). The question is why the native [b-p*-pʰ] distinction is not employed to represent the [b-p-pʰ] inventory of stops present in the phonetic representation of English-input loans. A possible answer is that the three-way distinction is given up in favor of polarizing a contrast along a phonetic dimension (in this case VOT) in the sense of Flemming (2004) and Padgett (2003). Formalizing Bjorn Lindblom's notion of adaptive dispersion in an OT grammar, Flemming sees a language's phonological inventory as emerging from the interplay of constraints from three separate systems: acoustic-perceptual, articulatory, and formal grammar. The perceptual constraints--dubbed Mindist (Minimal Distance)--maximize the acoustic distance between pairs of sounds along a given phonetic dimension. Since dispersing a pair of sounds towards the opposite poles of an acoustic dimension generally expends more energy, they are opposed by articulatory constraints minimizing effort. Finally, the grammatical requirement to make lexical contrasts will crowd the phonetic dimension with grammatical categories entailing both a loss of perceptual distinctness as well as increased articulatory effort.
  Assuming just a three-way distinction along the VOT dimension, a minimal distance scale of two steps is relevant and returns the evaluations in (22).

(22)   Mindist-VOT=2
    b-p* | *
    p*-pʰ | *
    b-pʰ |
    b-p*-pʰ | **

The native Korean [b-p*-pʰ] inventory arises from ranking the opposing constraint demanding a three-way contrast ahead of Mindist-VOT=2.

(23)   VOT-contrast=3   Mindist-VOT=2
    b-p* | *!   *
    p*-pʰ | *!   *
  -> b-pʰ | *!
    b-p*-pʰ | **

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Since we are interested in the inventory of contrasts holding at different sectors of the (loanword) vocabulary, we employ Padgett's (2003) *Merge faithfulness constraints that penalize the loss of contrasts in the mapping between one level and another. For the native Korean input-output mapping in intervocalic position, *Merge is highly ranked and so the underlying system of contrasts is preserved: IO-*Merge >> Mindist-VOT=2. But in the EO mapping relevant for English loanwords EO-*Merge slips below Mindist-VOT=2 to allow the more widely spaced [b-p^h] contrast to emerge as optimal.

(24)

	Mindist-VOT=2	EO-*Merge
b-p*	*!	*
p*-p^h	*!	*
-> b-p^h		*
b-p*-p^h	*!*	

On this view the expected [p*-p^h] translation of the [p-p^h] distinction found in the surface inventory of English loans such as *[p^h]in* vs. *s[p]in* and *ra[p]id* vs. *ra[p^h]idity* is given up in the interests of a more widely-spaced VOT contrast [b] vs. [p^h]. It thus falls under the rubric of retreat to the unmarked analogous to the rejection of geminate voiced obstruents in Hungarian loans even though such segments are readily created in the IO mapping holding over the native vocabulary.

We still lack an explanation for why Korean adaptation overlooks the [p, p^h] distinction in *ra[p]id* vs. *ra[p^h]idity*. If bilinguals are the agents of loanword adaptation (as stressed by Paradis following Haugen 1951), it is possible that Korean L2 speakers of English do not control the lenition process that operates in the posttonic position--perhaps because they are "stress deaf" in a way comparable to French speakers (Peperkamp and Dupoux 2002). If this process fails to apply in their English speech then the aspirated stop will emerge as the principal allophone in syllable onsets. Loanword adaptation might then reflect this property of nonnative Korean speakers of English.[3]

While we are not aware of any experimental studies of Korean speakers comparable to Peperkamp and Dupoux (2002), a lack of sensitivity to stress would not be surprising. If there is any prominence at all in Korean, then it is fixed on the initial syllable of the word or accentual phrase. Moreover, we are not aware of any clear cases in which the location of English stress plays a systematic role in Korean loanword adaptation. Indeed, in the pitch accent system of the Kyungsang dialects English loans are assigned a default accent that pays no attention to the location of the stressed syllable in the English source (Kenstowicz and Sohn 2001). On the

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[3] See Yip (2004) for examples in which the L2/vernacular English of Hong Kong stands as the proximal source for Cantonese loans from English.

other hand, the location of the stress plays a role in determining the tone assigned in Thai loans from English (Kenstowicz and Suchato 2004) suggesting that Thai speakers have some awareness of English stress--presumably the site of an F0 peak.

This appeal to bilingual's speech might also explain another case of nonphonetic adaptation. As noted by LaCharité and Paradis (2005), intervocalic unaspirated dental stops are flapped in American English, as in the famous *writer* vs. *rider* minimal pair. They report that in their database of English loans into Mexican Spanish, there are 79 cases of intervocalic /t/ and /d/ which would be realized with a flap in the English source. But the corresponding Mexican Spanish loans never adapted these consonants with the flapped [ɾ] (a phoneme in Spanish). Rather they show perfect recovery of the underlying phoneme as /t/ (46 cases) or /d/ (30 cases). Korean presents a comparable state of affairs. As we have seen, the intervocalic liquid phoneme is realized as a flap and so should be comparable to Mexican Spanish. Here as well English /t/ and /d/ are never adapted as a flap. Korean speakers also accurately recover the underlying /t/ vs./ d/ contrast, presumably aided by cues from the orthography.

(25) **It**aly   [itʰallia]   mo**d**el   [model]
      compu**t**er [kʰəmphyu:thə]   la**d**y   [reidi]
      moni**t**or   [monitʰa]   tuxe**do**   [tʰəksido]

LaCharité and Paradis (2005) see this finding as support for the phonological model of adaptation. If adaptation takes place at the phonemic level then the L2 flap realization will be invisible and so L1 Korean/Mexican Spanish grammar has no reason to adapt /t/ and /d/ as a liquid (flap). However, an alternative explanation is available--that the L2 English of Korean (and Mexican Spanish) speakers lacks the flapping rule. This could be due to stress deafness (plausible for Koreans, less so for Spanish speakers) or it might reflect superimposition of the Korean/Spanish P-Map (Steriade 2001) on their L2 English speech in which noncontrastive segments like the flap are known to derive from underlying liquids and not from underlying stops. In other words, the only way the Korean and Spanish speakers can produce an intervocalic flap is to aim at an underlying liquid--not at an underlying stop. Such L1-biased phonological hearing is not unexpected. Indeed, our examples from earlier discussion presupposed it. In Korean the lateral is bound to the coda; a prevocalic [l] could only come from a geminate given the Korean P-Map; a released stop is only possible in Onset position--hence the epenthesis.

This interpretation is highly speculative and obviously depends on whether bilingual speech displays the properties claimed above--specifically in the case of Korean stress deafness and hearing intervocalic rhotics as underlying liquids--and is a task for future research. It is worth bearing in mind that if we have to admit some adaptation at the phonological level, as implied in (1), then such a finding would

have significant implications for our general conception of grammar. In the standard model of OT with the thesis of parallelism, the input is mapped to the output in one step with no intermediate representations. But the phonological mapping that LaCharité and Paradis speak of is not at the underlying lexical level but at some more shallow level--perhaps comparable to the output of the lexical phonology in the sense of Kiparsky (1982). Since the standard OT model lacks such a level, phonological adaptation could count as evidence in favor of alternative conceptions of the OT grammar such as Kiparsky's (2000) strattal model. Thus, what looks like a parochial matter of loanword phonology could turn out to have implications for our understanding of the general architecture of phonological grammar.

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