

Constraint Cloning and Lexical Listing in Korean Irregular Verbs and Adjectives*

Ponghyung Lee
(Daejeon University)

The present study addresses the question of whether Korean irregular conjugations are really irregular. Traditional approaches are in agreement espousing the dichotomy between regulars and irregulars. What is problematic is that Korean conjugations conflict with our common sense that regulars are the majority and irregulars the minority. In reality, p, li-irregulars overwhelmingly outnumber their regular counterparts, and t, s, h, lə-irregulars are statistically comparable to regulars. To address this problem, regulars vs. irregulars are identified as inconsistent in terms of constraint hierarchy, and constraint cloning with concomitant listed lexical items is proposed. One of my key findings is that a unitary schema $\text{Markedness}_{\text{irregular items}} \gg \text{Faithfulness} \gg \text{Markedness}_{\text{regular items}}$ guarantees the rise of regulars vs. irregulars. Second, the size of the set of listed lexical items affects existing inflectional paradigms. Larger sets are likely to launch a paradigm innovation such as total leveling for li-irregulars. Cloned constraints enriched with listed lexical items contribute to the dilution of the demarcation between regular and irregular lexical items, disclosing the continuous undercurrent of Korean.

Keywords: exception, inconsistency, irregular conjugation, cloning, paradigm innovation, lexical listing

1. Introduction

What comprises the so-called “irregular” verbs and adjectives in Korean have been household names of which even middle schoolers are aware. In academia, interest in verbal and adjectival conjugations was spurred on by the pioneering work of H-P Choy (1937). He defined irregular verbs and adjectives as “aberrant from archetypal forms and metamorphosed into others in a distinctive way.” Under not-so-fine-grained criteria, he identified 11 irregular types in verb and 8 types in adjective. Among the 19 types, 7 types overlap between the two groups, resulting in 12 types. Among the remaining 12 types, 1 and i-irregular verbs and adjectives are eliminated from the inventory, considering that there are no exceptions as disclosed by the subsequent researches. Among the remaining 10 types, the present study concerns p, s, t, h, li, and lə-irregulars. Notice that remaining four types, u, o, jə, nəla/kəla-irregulars occur to only a singleton: p^huta ‘to pour,’ tallata ‘to ask for,’ hata ‘to do,’ ota ‘to come,’ respectively.¹

Let us review the previous literature produced during the last seven decades since H-P Choy (1937). They

* My special thanks go to Michael Becker and Stuart Davis. During the sabbatical leave at Indiana University-Bloomington, they aptly responded to my requests for consulting about my work. For the statistical analysis, Je-Hyun Lee at National Institute of the Korean Language helped me by sending the electronic files containing the Sejong Corpus. On top of that, I was much benefited by three anonymous reviewers. One of them provided me a priceless chance to rethink about the ideas offered in this paper as a whole. Lastly, I am grateful to Sara Sowers for her assistance to straighten what is distorted by a non-native in one way or another. All errors remain my own.

can be recapitulated into two strands. One includes the efforts to track the origin of the split between regular and

¹ It is tricky to decide whether it is necessary to seek regularities within a singleton set or to leave it as an exception. Taking that point into account, u, o, jə, nəra/kəra-irregulars are excluded from our further consideration.

irregular conjugations from a historical viewpoint. S-N Lee (1957) represents this thread of tradition that has taken strong roots among practitioners of the Korean language. Considering that we are interested in how current Korean speakers acquire their native language, the historical approach diverges from our purposes. The other strand of literature can be characterized as relying on abstract underlying structure. What the series of attempts in (1) have in common is that they try to draw phonological generalizations to the maximal extent at the expense of allowing abstract structures that are not true at the surface.

(1)

irregulars	C-W Kim (1973)	C-G Kim (1971)	B-G Lee (1973)	Kim-Renaud (1973)
p	w/p	β/t	b/p	long/short vowel
t	r/t	ð/t	d/t	long/short vowel
s	s/s ^h	z/s	z/s	long/short vowel
h	unknown	unknown	Xi = əh--jə	Xh-ja/h-ə
li	li/ri	ləl/li	li-lə/ li-ə	lli/li
lə	unknown	denies irregularity	li-lə/li-ə	lili/li

NB The segment to the left of the virgule represents irregular types and that to the right represents regular types. The symbol “=” represents a formative boundary in the sense given by SPE.

The overarching problem with previous approaches comes from their postulation of structures that lack contrasts for Korean, e.g. s^h (C-W Kim 1973), β, ð, z (C-G Kim 1971), b, d, z (B-G Lee 1973), schwa (C-G Kim 1973), abstract boundary (B-G Lee), vowel length (Kim-Renaud). The presence of nondistinctive or partially distinctive units is apt to give rise to learnability problems in language acquisition. Aside from language acquisition, a number of rules like those in (2), mapping underlying to surface representations, are another problem. What makes us skeptical is that those rules are designed as “minor rules” invalid beyond irregular conjugations. Let us illustrate the specific point.

(2) h-irregular (B-G Lee 1973) [noredo] ‘even if yellow’

noli=əh-jəto → noləh jəto → noləh jəto → noləjəto → nolajto → noləto
i-deletion **lowering** h-deletion **ə-deletion** **monophthongization**
→ noreto → noredo
flapping voicing

Among the seven rules in (2), mediating the underlying and surface representations, at least the bold-faced four are valid only for h-irregular conjugation. This is not a welcome result when we consider that, as C-W Kim (1973: end note) addresses, we want to keep track of regularities “of” irregularities rather than regularities “in” irregularities.²

In this sense, it is mandatory to shift our fundamental perspective on regular vs. irregular lexical items in general as well as in Korean. I adopt the view that the base of inflections is selected from surface forms,

² To the best of my knowledge, since the 1980s, the discussion of Korean irregular verbs and adjectives has been sparse, aside from the piecemeal characterization of their morphophonemic specialties.

proposed by Hayes (1999), Albright(2002, 2008), and Becker (2009). What is prerequisite to our purpose is that it is necessary not to view exceptions or irregularities as separate from regular processes but as having a thread of interconnection, as espoused by Pater (2006, 2008b).

The present work is structured as follows: Section 2 concerns the justification of the presence of multiple rules for a single phonological process. The algorithm offered by Recursive constraint demotion and Constraint cloning will be recapitulated in Section 3. Data analyses of Korean irregular verbs and adjectives will be attempted in Section 4. Section 5 wraps up and explores the implications of the present study.

2. Advocating Multiple Rule Approaches

Contra the Neogrammarians in the late 19th century, who contended that sound changes are without exception, it is true that synchronically, there is no exception-free grammar. This line of thought is ascertained from *the Sound Pattern of English* (SPE):

Phonology...can tolerate some lack of regularity (exceptions can be memorized); being highly intricate system, resulting ...from diverse and interwoven historical processes, it is expected that a margin of irregularity will persist in almost every aspect of the phonological description (p.172)

Facing exceptions, traditional phonology employed a couple of devices. One is a negative rule feature [-rule_n] to exempt a lexical item from undergoing a rule. For instance, a set of exceptions like *rind*, *pint*, *chamber*, and *field* are marked [-laxing] and waived from the rule V →[-tense]/__CC. The other is a minor rule feature [+minor rule]. For example, Halle and Mohanan (1985) strive to find patterns in past tense conjugations in English irregular verbs through contriving numerous rules. However, more serious is what is witnessed in the attempts to maximize the realm of phonological rules, precluding exceptions. For instance, to secure the assignment of stress rule at the second syllable in *eclipse*, SPE adds a final /e/ as /eklipse/, plus a rule e →∅ / __#. However, the traditional endeavors to account for phonological exceptions overlook an important point. Those lexical items set apart as exceptions mostly prove to require grammar in their own right.³ What distinguishes them from regular grammar is that the grammar valid for exceptional items is simply “inconsistent” with regular grammar. As Pater (2006) points out, the inconsistency arising from regular grammar and exceptional lexical items ought to be grammatically resolved. In this vein, there is a growing literature concerning the patterned exceptions or incorporation of exceptions into grammar (Hayes 1999, Zuraw 2000, Albright 2002, 2008, Pater 2006, 2008b, Becker 2009 among others). For embracing exceptional lexical items into the area of grammar, it is necessary to lay out a couple of fundamental premises .

First, when inconsistency takes place, in other words, when lexical exceptions are available, each item is listed in a specific group. When no exceptions are available, no listing of lexical items is required. The listed lexical items participate in the process of constraint cloning in terms of designating each of them to cloned

³ It is believed that suppletive items like go-went and is-were are exempt from the regularity search.

constraints, as was attempted by Pater (2006, 2008b) and Becker (2009, 2012).⁴ The resolution of inconsistency involved with lexical exceptions comes to be feasible in collaboration with Recursive constraint demotion (Tesar and Smolensky 1998, Tesar and Prince 2002), which was to account for the transitions occurring in language acquisition. In case where there is no exception, no cloning is invoked. Regulars and irregulars appear in tandem with each other under the rubric of the product-oriented architecture of Optimality Theory.

Second, the base of roots is chosen from one of surface-true root forms, and only affixes allow abstract underlying forms.⁵ The surface-oriented phonological enterprise launched by Hayes (1999) brings about the notion of the existence of multiple regularities on a single phonological process, culminating in an “island of reliability”, as proposed by Albright (2002).⁶ No abstract underlying roots are allowed.

Here it is essential to address the question of what has made us abandon the conventional analysis based on abstract underlying representations and instead adopt surface-true base forms possible. First of all, it reminds us of the fact that the pursuit of subrules is nothing new. However, the subrules made available by the conventional phonologists have never been taken seriously. The reason is that the subrules are believed to be valid only at the language acquisition stage and have no significance in adult grammar. Thus, only general rules are eligible to apply to novel words. A ground-breaking discovery of contrary idea was advanced on the basis of a series of computational experiment by Albright and Hayes (2003). Refuting the previous misconception, they assert that subrules are still valid in the adult grammar, as verified by a novel form *pred* from *preed* on the basis of the subrule *feed*→*fed*, *hold*→*held*. What it signifies for us is that subrules are able to co-exist with general rules. Taking a step forward, they observe that the applicability of rules is proportionate to the size of “islands of reliability,” as will be made clear in Section 4.

Further evidence to support lexically controlled multiple rules is obtained from cross-linguistic observation. The belief that general rules and specific rules are interdependent is confirmed by the observation that a general rule in one language is a lexical trend in another. e.g., intervocalic voicing is a general rule in Korean but a lexical trend in Turkish, as made explicit by Becker (2009).

In the next section as a solution to the inconsistency involved with exceptional conjugations, let us recapitulate the algorithm developed by Recursive constraint demotion (Tesar and Smolensky 1998, Tesar and Prince 2006) and constraint cloning offered by Pater (2006, 2008b) and Becker (2009).

⁴ Reacting to an anonymous reviewer, let me clarify one point. It needs to be cautious about what we mean by exception. For instance, all Korean verbs and adjective roots ending with *l* disallow no exceptions. In that case, any sort of lexical list is ruled out. By contrast, all the conjugations dealt with in this paper require lexical listing to both regular and irregular items. The reason comes from the fact that a single instantiation of exception demands indexing whether the item belongs to regular or irregular group.

⁵ The leading ground for abstract underlying forms only to affixes is found in language acquisition. For the sake of maximally reducing the learning load, any abstract underlying roots are disallowed, considering the formidable number of roots vs. limited number of affixes in a language. Hayes (1999) names the surface-true base “inside out” base.

⁶ What is meant by “island of reliability” is that a set of lexical items, to which the applicability of a particular rule is especially robust. That is, that kind of morphemes shows saliency in obeying specific rules. For instance, in English the past tense inflection like *mean-meant*, and *send-sent*, the rule /d/ →/t/ has a high applicability in the context of post-nasal consonants.

3. Algorithm of Recursive Constraint Demotion and Cloning

3.1. Recursive Constraint Demotion

To start Recursive constraint demotion (RCD), a comparative tableau like (3) is prerequisite, as offered by Tesar and Smolensky (1998), and Tesar and Prince (2006). As a necessary condition for RCD to run, there must be a column with at least one W without L. In (3) below, W's mean that the constraint at hand favors the winner in winner-loser pairs, called Support, while L's means loser-favoring. In (3) the column headed by Constraint1(C1) has only a W lacking L's. RCD intervenes to place C1 immediately below the previously established constraint hierarchy. In RCD parlance, C1 is installed. The installation is accompanied by the removal of the installed constraint, and by sweeping out the entire row including the cell with W favored by the installed constraint, as in (3).

(3)

	C1	C2	C3
a.winner1 > loser1	W	L	W
b.winner2 > loser2		W	L
c.winner3 > loser3		L	W

After the concerned row and column are removed, (3) is reinvented as (4):

(4)

	C2	C3
a.winner2 > loser2	W	L
b.winner3 > loser3	L	W

Here there is no column carrying W's-only and thus we do not have constraints to install any more, i.e., constraints are "stalled" and RCD concludes (cf. Prince 2002). What the traditional RCD can do ends here, but Pater (2006, 2008b) and Becker (2009) keep an eye on the fact that the stalled constraint ranking coincides with the inconsistency caused by exceptional lexical items: winner 2 is favored by C2 and disfavored by C3 while the opposite happens to winner 3 and loser3. That is exactly what happens to exceptions in Korean regular and irregular verbs and adjectives; in English regular and irregular verbs, and so forth. The inconsistency of lexical items can be translated into the constraint ranking conflict that occurs in the concerned lexical items. The idea is crystalized as constraint cloning.

3.2 Constraint Cloning

When RCD stalls and further installation of constraints comes to a standstill, constraint cloning is invoked as a breakthrough to carry on the installation. Constraint cloning begins with locating the constraints to clone.⁷ One necessary condition for cloning is the least populous column having at least one W and one L. When concerned columns results in tie, any constraint will do. For instance, when C2 in (4) is chosen for duplication, the result is as in (5):

⁷ When it comes to the algorithm associated with constraint cloning, I rely on Becker (2009).

(5)

	$C2_{winner2}$	$C2_{winner3}$	C3
a.winner2 > loser2	W		L
b.winner3 > loser3		L	W

Now, constraint cloning guarantees a resolution for the inconsistency of winner2 and winner3 via splitting $C2_{winner2}$ and $C2_{winner3}$, by which different winner-loser pairs are affected. RCD mobilizes once again. Notice that the column headed by $C2_{winner2}$ consists of winner-only cells. Thus $C2_{winner2}$ installs and the comparative table reinvents itself as in (6):

(6)

	$C2_{winner3}$	C3
a.winner3 > loser3	L	W

Among the remaining two constraints $C2_{winner3}$ and C3, when the winner favoring C3 outranks the loser favoring $C2_{winner3}$, the correct output is guaranteed. The overall constraint hierarchy is given below:

$C1 \gg C2_{winner2} \gg C3 \gg C2_{winner3}$

3.3 Cloned Constraints and Listed Lexical Items

With constraint cloning, OT grammar is enriched with two kinds of constraints: general constraints and cloned constraints. One thing to keep in mind is that two kinds of constraints are entirely different in their application. First, general constraints are those which apply categorically to lexical items without restriction. On the other hand, cloned constraints apply only to listed lexical items, which are specified to every cloned constraint. Application of each cloned constraint to the listed items is categorical as well. In this respect, there is no difference between general and cloned constraints. For instance, we do not find Korean speakers who waver about the status of *pul-i-ta* ‘to call,’ which is irregular all the time. However, distinguishing properties of cloned constraints emerge when they apply to novel forms. Considering that novel items are not listed anyway, we need to submit a guess and to do so, probability comes into play. The strength of grammar enriched with constraint cloning lies in its predictive power. It is supposed that the cloned constraints with more lexical items are expected to have more influence on the novel items than those with fewer lexical items. Pater (2008a) takes cloning as an alternative to the Gradual Learning Algorithm (GLA) on the grounds that GLA fails to guarantee convergence on a single ranking. However, cloning is not just an alternative to GLA. It allows a grammar “to apply categorically to known items and stochastically to novel items.” (Becker 2009: 190) Competition among subgrammars is called on to predict novel forms. Let us take an example of Korean l-ending, li-irregulars and lə irregulars, as will be discussed in Section 4. Three types of verbs and adjectives show dramatically unbalanced ratios between irregular and regular conjugations. L-ending has no exception in its alternation and thus the rule applies (l-deletion) whenever the structural description (in front of n, p, s) is met. Thus general rule l-deletion

rules out cloning.

(7)		regular	irregular	irregularity(%)
	l-ending	150 items	0 items	0%
	li-irregular	5 items	84 items ⁸	90.3%
	lə-irregular	5 items ⁹	4 items	4.3%

On the other hand, with li-irregulars, irregular items amount to 90.3% while the rest is 9.7%. Thus the vast majority of novel items involving li in roots are expected to undergo irregular inflection. On the contrary, with lə-irregulars, the affiliated lexical items are only four 4 among 93 li ending roots (4.3%), and thus marginal novel items are predicted to undergo irregular inflections.

4. Analyses of Korean Irregular Verbs and Adjectives

4.1 Introduction

As mentioned above, constraint cloning is called upon to resolve the inconsistency revealed by lexical items regarding a process. From the viewpoint of OT, Korean irregular verbs and adjectives can be couched with constraint conflict. For the sake of exposition, let us divide six types of (ir)regular inflections into two macro-types. One is the group displaying independent conflict, in other words, the contradictory constraint ranking between regular and irregular types takes place: p, t, s, and h- irregular conjugations are affiliated with this macro-type. The second macro-type includes li- and lə (ir)regular inflections. Here Faithfulness is intertwined with both li and lə (ir)regulars at the same time. Rather than treating each type of (ir)regular inflections separately, it would be economical to treat them as a corollary of a single intermingled process. This sort of macro-type is called “overlapping conflict” by Becker (2009).

4.2 Independent Conflict

4.2.1 p-regular/irregular

The vast majority of Korean verbs and adjectives with p-ending roots undergo a process of p to w shift in the intervocalic context, as illustrated in (8). This process would be understood as a kind of phonological weakening.

⁸ Among 84 lexical items carrying li-irregularity listed in S-K Ha (2012), a fair amount prove to be obsolete or archaic that it would be doubtful whether those rarely used or never used lexical items make any significant difference in deciding novel paradigms or words. However, even if those nearly extinct words are excluded from our consideration, the number of li-irregulars by far outnumbers li-regular, and lə-regular/irregulars. When I examined what is really happening in current Korean, using the Sejong Corpus which is the collection of the contemporary Korean, I observed that at least 34 items among 84 words are in use in present Korean.

⁹ The items manifesting li- and lə-regular inflections are assumed to be shared between with one another.

Among the attested p-ending roots in the Sejong Corpus, it turned out that the process prevails over non-alternating regular conjugations at the ratio of 68 roots to 5 roots.

(8) p-regular	p-irregular
tʃap-ta ‘to catch’	tʃ ^h up-ta ‘cold’
tʃap-ko ‘catch and’	tʃ ^h up-ko ‘cold and’
tʃap-əs’-ta ‘caught’	tʃ ^h uw-əs’-ta ‘was cold’
tʃap-im ‘a catching’	tʃ ^h u-um ‘being cold’

When we depict the relationships between p-regulars represented by tʃapta ‘to catch’ and p-irregular represented by tʃ^hupta ‘cold’ as the Support given in (9), the inconsistency of the lexical items is translatable into the constraint conflict, as noted in (9):

(9)

/tʃ ^h up-ta/ ‘cold’ /tʃap-ta/ ‘to hold’	*V-obst-V	Faithfulness
a. tʃ ^h u-um > tʃ ^h up-im	W	L
b. tʃap-im > tʃaw-im	L	W

Since both constraints tie in the number of nonempty cells of their columns, it does not matter which of the two is chosen to clone. Here let us clone *V-obst-V as shown in (10):

(10)

	*V-obst-V _{tʃ^hup-ta}	*V-obst-V _{tʃap-ta}	Faithfulness
a. tʃ ^h u-um > tʃ ^h up-im	W		L
b. tʃap-im > tʃaw-im		L	W

After cloning, *V-obst-V_{tʃ^hup-ta} is installed and pair (10a) is removed from the Support. In order to achieve the correct outcome, among the two remaining constraints, the winner favoring Ident(F) is installed above *V-obst-V_{tʃap-ta}. The final result will be as shown below:

*V-obst-V_{tʃ^hup-ta} >> Faithfulness >> *V-obst-V_{tʃap-ta}

To account for the irregular conjugations, the hierarchy matching concerned constraints is a necessary but not a sufficient condition. As mentioned in Section 2, it is necessary to be able to project the current lexical trends to the novel forms. For the purpose, the hierarchy ought to be reinforced by stochastic statistics. By searching the Sejong Corpus, p-ending verbal and adjectival roots prove to be overwhelmingly irregular: among 73 roots, 68

irregular items vs. 5 regular items, with percentage of 93.1% vs. 6.9%. The final result is as shown below:

*V-obst-V_{ʃʰup-ta <68 items>} >> Faithfulness >> *V-obst-V_{ʃʃap-ta <5 items>}

With respect to previous literature on p, t, s-(ir)regular verbs and adjectives, I think the previous approaches were misguided in that they were preoccupied with how to map the abstract underlying, e.g., /s^h/ to surface [s] with /us-ta/ ‘to smile’ and /is-ta/ to i-in ‘to connect’ (cf. C-W Kim 1973). I think the surface realization is determined by the identical principle throughout three types of irregular conjugations: the obstruents convert into sonorant consonants, keeping their place of articulation. Thus /t/ corresponds to /l/, and /p/ to /w/. In the case of /s/, the single oral coronal sonorant is preempted by /t/-final words, and opts for a null segment as its partner. When we put Korean irregular verbs and adjectives in perspective, the surface implementation is our secondary concern, and instead, we focus on the relations between regular and irregular conjugations.

4.2.2 t-regular/irregular

As current Korean nouns lack t-ending roots, as shown by Y-J Kang 2003, Albright 2008, Silverman 2010, the number of t-ending roots with verbs and adjectives is marginal, too. An investigation of the Sejong Corpus reveals that 12 t-ending verbs and adjectives are available, of which 5 items show irregular alternation, and 7 items comply with the regular alternation.

- | | |
|---|---|
| <p>(11) t-regular</p> <p>mut-ta ‘to bury’
 mut-ko ‘bury and’
 mut-əs’-ta ‘buried’
 mut-im ‘burial’</p> | <p>t-irregular</p> <p>mut-ta ‘to ask’
 mut-ko ‘ask and’
 mul-əs’-ta ‘asked’
 mul-im ‘question’</p> |
|---|---|

The inconsistency of the 7 lexical items and remaining 5 items can be visually represented as in (12).

(12)

/mut-ta/1 ‘to ask’ /mut-ta/2 ‘to bury’	*V-obst-V	Faithfulness
a.mul-ə > mut-ə	W	L
b.mut-ə > mul-ə	L	W

Constraint cloning applies to *V-obst-V at random, and RCD runs again to install *V-obst-V_{mut-ta1}, and pair (13a) is removed from the Support.

(13)

	*V-obst-V _{mut-ta1}	*V-obstr-V _{mut-ta2}	Faithfulness
a.mul-ə > mut-ə	W		L
b.mut-ə > mul-ə		L	W

For the strength of cloned constraints to predict novel forms, V-obst-V_{mut-ta 1} is given 41.7% (5 items among 12 items), and *V-obstr-V_{mut-ta 2} is given 58.3% (7 items among 12 items).

The final hierarchy is shown below:

*V-obst-V_{mut-ta 1 <5 items>} >> Faithfulness >> *V-obstr-V_{mut-ta 2 <7 items>}

4.2.3 s-regular/irregular

The number of Korean verbal and adjectival roots that end with s is also small, as in the case of t-ending roots discussed above. A search through the Sejong Corpus results in 5 irregular and 4 regular lexical items.

(14) s-regular	s-irregular
us-ta ‘to laugh’	is-ta ‘to join’
us-ko ‘laugh and’	is-ko ‘join and’
us-əs’-ta ‘laughed’	iø-əs’-ta ‘joined’
us-im ‘laughter’	iø-im ‘joint’

In terms of comparative tableau, the inconsistency related to s-regular and irregular lexical items is converted into (15), and constraint cloning accompanied by cloning RCD proceeds like (16), installing V-obst-V_{put-ta} and the rest of the constraints.:

(15)

/pus-ta/ ‘to pour’ /us-ta/ ‘to laugh’	*V-obst-V	Faithfulness
a. pu-ə > pus-ə	W	L
b. us-ə > u-ə	L	W

(16)

/pus-ta/ ‘to pour’ /us-ta/ ‘to laugh’	*V-obst-V _{put-}	*V-obst-V _{us-ta}	Faithfulness
a. pu-ə > pus-ə	W		L
b. us-ə > u-ə		L	W

The final result harboring the strength of the cloned constraints is shown below:

*V-obst-V_{put-ta <5 items>} >> Faithfulness >> *V-obst-V_{us-ta <4 items>}

4.2.4 h-regular/irregular

In Korean verbal and adjectival roots ending with /h/, two sets are distinct in the face of following suffixes. One set of roots are lenient to hiatus, whereas the other are not. The former group has been called regular and the latter irregular. It is obvious that the irregular set is stringent against hiatus, as evidenced by i-deletion, e.g., p^hara--mjən ‘if blue’ vs. the acquiescence of hiatus in na-ijmjən ‘if someone bears’ in (17)

- | | | | |
|-------------------------|---|------------------|---|
| (17) h-irregular | <p>p^halah-ta ‘It’s blue’</p> <p>p^halah-ko ‘bule and’</p> <p>p^hala-mjøn ‘if blue’</p> <p>p^halɛ-to ‘even if blue’</p> | h-regular | <p>nah-ta ‘to bear’</p> <p>nah-ko ‘to bear and’</p> <p>na-ɪmjøn ‘if (one) bears’</p> <p>na-ato ‘despite birth’¹⁰</p> |
|-------------------------|---|------------------|---|

Specific strategies that account for the hiatus resulting from conjugations are beyond our concern. Instead, we focus on the interconnection between regular and irregular conjugations. Upon investigation in the Sejong Corpus, it is observed that 7 roots contained within Korean verbs and adjectives show the trend of regular inflection while 10 roots, specifically primary color terms show irregular propensity. When inconsistency between two sets of words is translated into comparative tableaux, followed by cloning RCD, it proceeds as (18) and (19):

(18)

$/p^h$ alah-ta/ ‘blue’ $/nah$ -ta/ ‘to bear’	*hiatus	Faithfulness ¹¹
a. p^h ala-mjøn > p^h ala-ɪmjøn	W	L
b. na-ɪmjøn > na-mjøn	L	W

(19)

$/p^h$ alah-ta/ ‘blue’ $/nah$ -ta/ ‘to bear’	*hiatus _{p^halah-ta}	*hiatus _{nah-ta}	Faithfulness
a. p^h ala-mjøn > p^h ala-ɪmjøn	W		L
b. na-ɪmjøn > na-mjøn		L	W

The final hierarchy coupled with the strength of the cloned constraints is as follows:

*hiatus_{palah-ta <10 items>} >> Faithfulness >> *hiatus_{nah-ta <7 items>}

Thus far, we have shown that the traditional dichotomy of regulars vs. irregulars can be overridden by consistent conjugations when they are couched within cloning RCD. What is found is that the polarity between regulars and irregulars is due to what grammar does rather than to abstract underlying structure. What is more, our

¹⁰ In the previous literature, the intricate series of derivation is harnessed to mediate from surface to underlying levels through intermediate levels. For instance, to contrast nolɛ-to ‘even if yellow’ with. na-ato ‘even if birth’, the following analyses of the former are attempted:

Kim-Renaud (1973) nolah-jato → nolajato → nolaajto → nolɛ:to: → noletto → noɾedo
h-deletion metathesis vocalic merger shortening

B-G Lee (1973) noli=əh-jəto → noləh jəto → nolah jəto → nolɛəto → noletto → noɾedo
i-deletion lowering h-deletion& ə-deletion monophthongization

¹¹ Here constraint Faithfulness specifically penalizes i-deletion, which takes place as part of inflectional operations. An anonymous reviewer offers an alternative: separation of i-deletion as suffixal allomorphy, which is independent of our current concern of stem allomorphy. Yet, the separation of suffixal allomorphy would result in obliterating the disparity between h-regular and irregular conjugations.

approach unveils the hidden generalization behind four types of conjugation. They can be combined into two:

*V-obst-V $\text{ʃ}^{\text{h}}\text{up-ta} \langle 68 \text{ items} \rangle \gg \text{Faithfulness} \gg *V\text{-obst-V} \text{ʃ}^{\text{h}}\text{ap-ta} \langle 5 \text{ items} \rangle$
 $\text{mut-ta } 1 \langle 5 \text{ items} \rangle$ $\text{mut-ta } 2 \langle 7 \text{ items} \rangle$
 $\text{put-ta} \langle 5 \text{ items} \rangle$ $\text{us-ta} \langle 4 \text{ items} \rangle$
 *hiatus $\text{p}^{\text{h}}\text{alah-ta} \langle 7 \text{ items} \rangle \gg \text{Faithfulness} \gg *hiatus \text{nah-ta} \langle 10 \text{ items} \rangle$

To take a step forward, the two hierarchies above are collapsed into a single one, noticing that the two cloned markedness constraints, *V-obst-V and *hiatus behave counter to the faithfulness constraint: irregulars outrank Ident(F) while regulars are dominated by it, as is shown below:

Markedness_{irregular items} \gg Faithfulness \gg Markedness_{regular items}

4.3 Overlapping Conflict

What makes li and lə-irregular conjugation special is that unlike the preceding p, s, t, h-ending roots, li-ending roots show tripartite distinction as given in (21).

(21)	li-irregular	li-regular	lə-irregular
	puli-ko ‘to call and’	ʃ ^h ili-ko ‘to pay and’	ili-ko ‘to arrive and’
	puli-ni ‘when called’	ʃ ^h ili-ni ‘when paid’	ili-ni ‘when (one) arrives’
	pull-ə-to ‘despite calling’	ʃ ^h il-ə-to ‘despite paying’	ilil-ə-to ‘despite arriving’

Disparity among the three types of paradigms comes out when the roots are augmented by suffix /ə/. For one thing, liquid gemination and i-deletion occurs in the li-irregular set. Meanwhile, lə-irregular roots undergo l-insertion, and with li-regular, i-deletion takes place. To simplify the explanation, let us assume that all of the disparate measures are taken with a view to meeting constraint Align (root, syllable, right). On top of that, a constraint opts for intervocalic geminate lateral consonant via *vLv and geminate consonants are penalized by Dep(L). Let us begin to account for (21) in terms of cloning RCD.

(22)

/puli-ə/ ‘to call’ $\langle 84 \text{ items} \rangle$	Align(root, syll)	*vLv	Max(i)	Dep(L)
/ili-ə/ ‘to arrive’ $\langle 4 \text{ items} \rangle$				
/ʃ ^h ili-ə/ ‘to pay’ $\langle 5 \text{ items} \rangle$				
a. pull-ə > puli-lə	L	W	L	L
b. ili-lə > ill-ə	W	L	W	W
c. ʃ ^h il-ə > ʃ ^h ill-ə		L		W

As it stands, multiple constraint conflicts flock together with winner-loser pairs in (22). As a first step toward

resolving the inconsistency, let us clone constraint Align(root, syllable), which is one of the least populous columns in (22):

(23)

/puli-ə/ 'to call' <84 items> /ili-ə/ 'to arrive' <4 items> /tʃʰili-ə/ 'to pay' <5 items>	Align (root,syll) puli-ta	Align (root,syll) ili-ta	*vLv	Max (i)	Dep(L)
a.pull-ə > puli-lə	L		W	L	L
b.ili-lə > ill-ə		W	L	W	W
c.tʃʰil-ə > tʃʰill-ə			L		W

Constraint Align (root, syllable)_{ili-ta} is installed and pair (22b) is removed from the Support. Then, the overhauled tableau (24) is stalled and RCD stops. No winner only column is available, as verified in (24):

(24)

/puli-ə/ 'to call' <84 items> /ili-ə/ 'to arrive' <4 items> /tʃʰili-ə/ 'to pay' <5 items>	Align (root,syll) puli-ta	*vLv	Max(i)	Dep(L)
a.pull-ə > puli-lə	L	W	L	L
b.tʃʰil-ə > tʃʰill-ə		L		W

Again constraint cloning is requisite and we arbitrarily target *vLv among two options: *vLv and Dep(L). The result of cloning is (25) and constraint *vLv_{puli-ta} is to be installed.

(25)

/puli-ə/ 'to call' <84 items> /ili-ə/ 'to arrive' <4 items> /tʃʰili-ə/ 'to pay' <5 items>	Align (root,syll) puli-ta	*vLv puli-ta	*vLv tʃʰili-ta	Max (i)	Dep(L)
a.pull-ə > puli-lə	L	W		L	L
c.tʃʰil-ə > tʃʰili-lə			L		W

After eliminating the installed constraint Align(root, syllable)_{ili-ta}, (26) is obtained:

(26)

/puli-ə/ 'to call' <84 items> /ili-ə/ 'to arrive' <4 items> /tʃʰili-ə/ 'to pay' <5 items>	Align (root,syll) puli-ta	*vLv tʃʰili-ta	Max (i)	Dep(L)
c.tʃʰil-ə > tʃʰili-lə		L		W

Table (26) tells us that Dep(L) outranks *vLv_{tʃʰili-ta}. Thus Dep(L) is installed and we obtain the ultimate hierarchy like this:

Align (root,syll)_{il_i-ta <4 items>} >> *vLV_{pul_i-ta <84 items>} >> Dep(L) >> *vLV_{ʔ^{hi}il_i-ta. <5 items>}, Align(root,syllable)_{pul_i-ta <84 items>}, Max(i)

4.3 Surge of Multiple Paradigms

Concerning li, lə-(ir)regular conjugations, another noteworthy point is that an innovative paradigm occurs for li-irregular verbs and adjectives in current Korean, as given in (27):

(27) **Multiple paradigm: li-irregular**

paradigm1	paradigm2	
pul _i -ta	pull _i -ta	‘to call’
pul _i -ko	pull _i -ko	‘to call and’
pull-ə	pull-ə	‘by calling’
pul _i -ni	pull _i -ni	‘when called’

In addition to the conventional paradigm 1, in paradigm 2, all the roots end with a geminate /l/, resulting in total leveling. Meanwhile, the innovation never happens to li-regular, or lə-irregular. They are invariant and exempt from the matter of innovation.

For the ascendancy of geminate lateral ending of roots in the innovative li-irregular paradigm, let us propose that the base of the paradigm switches from a singleton to geminate. e.g., /pul/ to /pull/ in the case of /pul_i-ta/ ‘to call.’ As discussed in Section 2, the base of a paradigm is chosen from one of the surface forms of a root.¹² In this case, it is believed that the root of [pull-ə] is a trigger to give rise to the innovative paradigm in (26). To translate the rise of an innovative paradigm into OT comparative tableaux, let us assume that three constraints Ident(lateral), *hiatus and *geminate come into play. As verified in (28), an array of the same constraints but different base forms makes a difference.

(28)

/pul-/ ‘to call’	Ident(lateral)	*hiatus	*geminate
a.pul _i -ta > pull _i -ta	W		W
b.pul _i -ko > pull _i -ko	W		W
c.pull-ə > pul _i -ə		W	L
d.pul _i -ni > pull _i -ni	W		W

¹² In the previous literature (Albright 2008, Silverman 2010, Becker 2009 among others), the surface base hypothesis takes into account the independent forms, that is, forms viable without affixation. In Korean it means nominal category. Likewise, McCarthy (2005) denies the base in the analysis of inflections. However, when the base is chosen from the available surface forms, there is no inherent phonological ground from which to ban the base of verbal and adjectival categories. And I am not able to find any convincing ground for limiting the base to separation forms. In this sense, the base of inflection in verbs and adjectives will be identified throughout this paper.

In (28), the ranking between Ident(lateral) and *hiatus does not matter, considering that both of them favor winners, whereas *geminate is split in its evaluation of winners and losers. Thus ranking is installed as Ident(lateral), *hiatus >> *geminate. The same ranking among the concerned constraints applies to the innovative paradigm when a geminate liquid is identified as the base final consonant.

(29)

/pulli/ 'to call'	Ident(lateral)	*hiatus	*geminate
a. pulli-ta > puli-ta	W		L
b. pulli-ko > puli-ko	W		L
c. pull-ə > puli-ə	W	W	L
d. pulli-ni > puli-ni	W		L

Thus far it is observed that in our analysis of the innovative paradigm occurring with li-irregulars, the shift of base from a singleton to geminate lateral is a prior condition. Now, let us identify the empirical grounds on which to support the hypothesis of geminate-l base. Supporting evidence in favor of the geminate lateral with the innovative paradigm can be found in compound verbs, which consist of main verb/adjective stems followed by auxiliary verb/adjective, as illustrated in (30):

(30)	pullə-nəda	*puli-nəda
	pullə-dirida	*puliə-dirida
	pullə-oda	*puliə-oda
	pullə-bərīda	ˈpuliə-bərīda

It is noticeable that main verb/adjectives stems carry geminate liquid consonants whenever they undergo augmentation by attaching auxiliary verb/adjectives. The paradigm shift with the innovative li-ending inflections looks to be influenced by the overwhelming trends occurring in the geminate-base of the compound-verbs and adjectives. To examine the strength of the lexical trend based on the size of the concerned lexical items, I explored li-ending verbal and adjectival roots in the Sejong Corpus collected from written texts and found the following result:

(31)	singleton	geminate
Number	152	287
Percentage	34.6%	65.4%

The corpus search shows that in word-medial position, among singleton and geminate liquids, geminates are majority over singletons. It is believed that the size of relevant data exerts influence on the shift of inflections with li-irregular verbs/adjectives. The shift of base has no chance to take place with li-regular and lə-irregulars. There is no base candidate carrying geminate liquids to produce innovation. Consequently, no shift in base is expected elsewhere outside of li-irregular. The argument in favor of the idea that the size of a relevant root set is decisive in restructuring the base of inflections implies that the strength of regularities influences not only novel forms but also existing paradigms. Even though further evidence is called on, this result is welcome from the

perspective that lexical trends are affected by the magnitude of a data set.

5. Putative Alternatives

Here let us examine the problems occurring when we adopt the theory of Optimal paradigms (McCarthy 2005) or Anti-correspondence (Hayes 1999). The theory of Optimal paradigms (OP) was proposed to deal with paradigm leveling of inflections, whether total or partial. What is salient about this idea is that OP never sets up a base, but instead, each member of a paradigm is equal. However, if no base hypothesis is adopted, it is difficult to predict in what direction paradigm leveling takes place. For instance, when a constraint OP outranks the rest of constraints, paradigm leveling (32a) is predicted, while the actual innovative paradigm (32b) is harmonically bound and never to occur. As it stands, OP predicts that those with minimal change from the input are a winner. What is more, even if the theory of OP permits a certain candidate as a base, it is not clear why the candidate in question is chosen as the trigger of the paradigm leveling.¹³ By contrast, when we identify a base of paradigm leveling on the basis of the size of the relevant set, we secure the empirical grounds for the base.

(32)

/puli-ta/	OP	Ident-I-O	*geminate
a.<puli-ta, puli-ko, puli-ə, puli-ni>			
b.<pulli-ta, pulli-ko, pull-ə, pullini>		****	****

Furthermore, OP is not able to answer the question why lə-irregular disallows leveling, as given in (32):

- (33) ili-ko *ili-ko
 ili-ni *ili-ni
 ililə-to *ililə-to

Under our analysis based on the strength of lexical trends, the blocking of paradigm leveling with lə-irregulars is owing to the paucity of the number of lexical items, only 4 among 93 potential items. It is difficult to expect that trends valid for marginal items will dominate others.

As an alternative analysis, let us probe the analysis relying on Anticorrespondence, proposed by Hayes (1998, 1999).

Anticorrespondence (Hayes 1999: 203)

If morpheme μ appears with shape X in a particular context C, it must appear with shape X' in a distinct context C'.

This constraint is similar to OP in that it refers to surface members of a paradigm rather than mapping from an

¹³ I am not sure about majority-rule effect proposed by McCarthy (2005), by which “the pattern that is most common in a paradigm acts as an attractor to other paradigm members”. The primary problem with the idea is that members of a paradigm are not definite in many cases, and, thus, it is not clear to decide which one is a majority among possible choices.

underlying to a surface realization. The crucial difference is that it actively enforces morphemes to alternate rather than to undergo leveling. At a glance, it looks to work in favor of partial leveling in Korean irregular conjugations. When it prevails over constraint OP, partial paradigm leveling is projected. However, this idea fails when we scrutinize the conceivable paradigms. Among the five options in (34), attested paradigms include only (34b) and (34e), while other three are unattested. Notice that (34a) and (34e) are totally leveled whereas (34b, c, d) are partially leveled.

(34)	paradigm	Anticorrespondence	attested or not?
	a.<puli-ta,puli-ko, puli-ə, puli-ni>	*	No
	b.<puli-ta,puli-ko, pull-ə, puli-ni>		Yes
	c.<puli-ta,pulli-ko, pull-ə, puli-ni>		No
	d.<puli-ta,pulli-ko, pull-ə, pulli-ni>		No
	e.<pulli-ta, pulli-ko, pull-ə, pulli-ni>	*	Yes

The problem with the analysis is that it is dysfunctional to distinguish which is preferable among the partially leveled paradigms. There is no way to evaluate how the performance among the partially leveled paradigms fares. For instance, two candidates (34a) and (34e) tie in their performance against Anticorrespondence. However, (34e) is permitted, while (34a) is ruled out. To conclude, Anticorrespondence is not adequate to project the emergence of multiple paradigms

6. Concluding Remarks

In the preceding sections we have offered an analysis of Korean regular and irregular conjugations from the standpoint of the resolution of inconsistency emerging from lexical trends. The most prominent tenet of our approach is that a phonological process possessing exceptions is not extraordinary. Another thing is that regular and irregular (exceptional) lexical items vis-à-vis a process are distinct owing to concomitant grammatical properties rather than to either underlying representations or the attributes of obedience vs. disobedience. For the purpose, constraint cloning coupled with Recursive constraint demotion lies at the heart of our approach. One of the findings of our analysis is that p, t, s, h-regular and irregular conjugations can be couched within a unified constraint schema $\text{Markedness}_{\text{irregular items}} \gg \text{Faithfulness} \gg \text{Markedness}_{\text{regular items}}$, despite the impression that they are disparate processes. The other finding is that in addition to the predictive power of novel forms, as advocated by the previous literature, the application of the strength of lexical trends depending on the relative size of concerned lexical items should be extended, including compound as well as simple verbs and adjectives.

This idea squarely refutes conventional approaches to lexical exceptions, relying on abstract underlying representations. The analysis attempted by Kager (2009) is not different in this respect, judging from his statement that “all unpredictable properties should be expressed solely in the lexicon, including their alternating or nonalternating status” (p.419), in spite of his view that regular and irregular allomorphy are not discrete but continuous.

Finally, the statistical exploration capitalizing on the Sejong Corpus is fruitful enough to give us a perspective that the traditional taxonomy of regular vs. irregulars brings about formidable chaos. Above all, the dichotomy challenges our common sense that regular items are in the majority whereas irregular items are in the

minority group. It is hardly expected that the numbers of irregulars overwhelm regulars. Especially, p- and li-irregulars by far surpass their regular counterparts. The remaining four types, t, s, h, and lə-irregulars are almost comparable to regulars in terms of the magnitude of relevant sets. As a consequence, to preclude the disarray and misunderstanding concerning Korean irregular and regular conjugations, instead of the previous dichotomy, the statistical size of concerned conjugations should be incorporated into the discussion of Korean conjugations.

Appendix: Ten Paradigms of Korean Irregular Conjugations

	p-irregular		s-irregular	
<i>infinitive</i>	tʃ ^h up-ta	‘cold’	is-ta	‘to join’
<i>conjunctive</i>	tʃ ^h up-ko	‘cold and’	is-ko	‘join and’
<i>past tense</i>	tʃ ^h uw-əs’-ta	‘was cold’	i-əs’-ta	‘joined’
<i>nominal</i>	tʃ ^h u-um	‘being cold’	i-im	‘joining’
	t-irregular		h-irregular	
<i>infinitive</i>	mut-ta	‘to ask’	p ^h alah-ta	‘blue’
<i>conjunctive</i>	mut-ko	‘ask and’	p ^h alah-ko	‘blue and’
<i>conditional</i>	mul-imjən	‘if (one) asks’	p ^h ala-mjən	‘if blue’
<i>reversive</i>	mul-əto	‘even if (one) asks’	p ^h alə-to	‘even if blue’
	li-irregular		lə-irregular	
<i>infinitive</i>	puli-ta	‘to call’	ili-ta	‘to arrive’
<i>conjunctive</i>	puli-ko	‘call and’	ili-ko	‘arrive and’
<i>past tense</i>	pull-əs’-ta	‘called’	ili-ləs’-ta	‘arrived’
<i>nominal</i>	pul-im	‘calling’	ili-lim	‘arriving’
	u-irregular		o-irregular	
<i>infinitive</i>	p ^h u-ta	‘to scoop’	talla-ta	‘to ask for’
<i>imperative</i>	p ^h u-əla	‘scoop!’	ta-o	‘give me!’
<i>past tense</i>	p ^h -əs’-ta	‘scooped’	tall-es’-ta	‘asked for’

<i>nominal</i>	p ^h u-m	‘scooping’	tall-əm	‘asking for’
	jə-irregular		nəla/kəla-irregular	
<i>infinitive</i>	ha-ta	‘to do’	o-ta	‘to come’
<i>imperative</i>	ha-jəla	‘do!’	o-nəla	‘come!’
<i>past tense</i>	hɛ-s’-ta	‘did’	wa-s’-ta	‘came’
<i>nominal</i>	ha-m	‘doing’	o-m	‘coming’

References

- Albright, Adam. (2002). *The Identification of Bases in Morphological Paradigms*. Ph.D. dissertation. University of California-Los Angeles.
- Albright, Adam. (2002). Islands of reliability for regular morphology: evidence from Italian. *Language* 78. 684-709.
- Albright, Adam and Bruce Hayes. (2003). Rule vs. analogy in English past tenses: a comparative experimental study. *Cognition*. 1-45.
- Becker, Michael. (2009). *Phonological Trends in the Lexicon—the Role of Constraints*. Ph.D. dissertation. University of Massachusetts- Amherst.
- Becker, Michael. (2012). Universal grammar protects initial syllables. A handout for a job talk given at Indiana University-Bloomington.
- Berko, Jean. (1958). The children’s learning of English morphology. *Word* 14. 150-177.
- Choi, Myung-Ok. (1988). Exploring phonological phenomena of lɪ, lə, ɛ(jə), h irregular verbs. *Language Research* 24. 41-68. Seoul National University.
- Choi, Myung-Ok. (1985). Exploring phonological phenomena of p-, t-, s- irregular verbs. *Gukeohak* 14. 149-188.
- Choy, Hyen-Pey. (1937). *Uri-Malpon* [A Grammar of our Language]. Seoul: Jeongeum-sa.
- Chomsky, Noam and Morris Halle. (1968). *The Sound Pattern of English*. MIT Press [electronic version].
- Ha, Sekyung. (2012). Verbal inflectional paradigms and homophony avoidance constraints. *Linguistics* 62. The linguistic society of Korea, Inc.
- Halle, Morris and K.P. Mohanan. (1985). Segmental phonology of modern English. *Linguistic Inquiry* 16. 57-116.
- Hayes, Bruce. (1998). On the richness of paradigms, and the insufficiency of underlying representation in accounting for them. Handout for Atanford talk.
- Hayes, Bruce. (1999). Phonological restructuring in Yidj and its theoretical consequences. In Ben Hermans and Marc van Oostendorp, eds. *The Derivational Residue in Optimality Theory*. 175-205. Amsterdam: John Benjamins.
- Kager, Rene. (2009). Lexical irregularity and the typology of contrast. In Kristin Hanson and Sharon Inkelas. eds. *The Nature of Word: Studies in Honor of Paul Kiparsky*. The MIT Press. 397-432.
- Kang, Yoonjung. (2003). Perceptual similarity in loanword adaptation: English postvocalic word-final stops in Korean. *Phonology* 9. 219-274.
- Kim, Cha-Gyun. (1971). Investigation of irregular verbs. *Hangeul* 147. The Society of Korean Alphabet. 85-118.
- Kim, Chin W. (1973). Regularity of the so-called irregular verbs in Korean. In Charles Kisseberth ed. *Studies in Generative Phonology*. 104-113. Champion: Linguistic research, Inc.
- Kim-Renaud, Young-Key. (1975). *Korean Consonantal Phonology*. Ph.D. dissertation. University of Hawaii-Manoa.
- Lee, Byung-Gun. (1973). *Underlying Segment in Korean Phonology*. Ph.D. dissertation. Indiana University-Bloomington.
- Lee, Sung-Nyeong. (1957). Raising a hypothesis of double-stems. *Working Papers in Humanities and Social Science* 6. 81-106. Seoul National University.
- McCarthy. John J. (2005). Optimal paradigms. In Laura Downing, Tracy Alan Hall, and Renate Raffelsiefen, eds., *Paradigms in Phonological Theory*. 170-210. Oxford: Oxford University Press.
- Min, Hyun-Sik. (2009). *Gugeo Munpeop Yeongu* [A Study on Korean Grammar]. Seoul: Yeokrak.

- Pater, Joe. (2006). The Locus of exceptionality: morpheme-specific phonology as constraint indexation. In Leah Bateman and Adam Werle eds. *UMOP: Papers in Optimality Theory III*, Amherst, MA: GLSA. 1-36.
- Pater, Joe. (2008a). Gradual learning and convergence. *Linguistic Inquiry* 39. 334-345.
- Pater, Joe. (2008b). Morpheme-specific phonology: Constraint indexation and inconsistency resolution. In Steve Parker, ed., *Phonological Argumentation: Essays on Evidence and Motivation*. Equinox. 1-33.
- Prince, Allan. (2002). Arguing Optimality. ROA-562.
- Renaud-Kim, Young-Key. (1973). Irregular Verbs in Korean revisited. *Language Research* 9. 207-225.
- Silverman, Daniel. (2010). Neutralization and anti-homophony in Korean. *Journal of Linguistics* 46. 453-482.
- Song, Cheol-Ui. (2009). On irregularities of decelensions and conjugations. In Saman Hong ed. *Morphological and Semantic Exploration of Korean*. 47-70. Seoul: Yeokrak.
- Tesar, Bruce and Allen Prince. (2006). Using phonotactics to learn phonological alternations. ROA #620.
- Tesar, Bruce and Paul Somolensky. (1998). Learnability in Optimality theory. *Linguistic Inquiry* 29. 229-268.
- Zuraw, Kie. (2000). *Patterned Exceptions in Phonology*. Ph.D. dissertation. University of California-Los Angeles.

Ponghyung Lee
Department of English Language and Literature
Daejeon University
96-3 Yongun-dong Dong-gu
Daejeon, 300-716, South Korea
Email: phlee@dju.kr