

Underlying representations in glide formation in Korean: A reply to Cho (2000)*

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Kim, Hyung-Soo. 2002. Underlying representations in glide formation in Korean: A reply to Cho (2000). *Studies in Phonetics, Phonology and Morphology* 8.1. 65-83. One of the most recalcitrant problems in Korean phonology has been the explanation of the irregular continuative form $w\check{a} < *oa$ ‘‘come[continuative]’’(cf. inf. o-ta) where, unlike verbs such as *poa*, *pwā* ‘‘see[continuative]’’(cf. inf. po-ta), glide formation occurs obligatorily without compensatory lengthening. In Kim (1999) it has been proposed that the exceptional behavior of the verb *o-* can be most aptly explained by positing its underlying form as $*w\check{a}$, whose stem vowel drops before a vowel-initial ending but contracts with the preceding *w* to become *o* before a consonant-initial suffix. Cho (2000), however, has criticized this analysis as being too opaque, employing a synchronically unmotivated underlying representation. This paper responds to her criticism by reviewing and reevaluating all of the underlying representations posited in previous analyses while offering additional arguments for the abstract underlying form $*w\check{a}$. (Jeonju University)

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1. Introduction

One of the most recalcitrant problems in Korean phonology has been the explanation of glide formation and compensatory lengthening in, e.g. the following continuative forms:

(1) <u>Infinitive</u>	<u>Continuative with -a/ə</u>			
a) po-ta	poa	$\check{c}pw\check{a}$ ¹	$pw\bar{a}$	‘‘to see’’
b) o-ta	$\check{c}oa$	$w\check{a}$	$\check{c}w\bar{a}$	‘‘to come’’
c) ci-ta	$ci\check{a}$	$\check{c}c\check{a}$	$c\bar{a}$	‘‘to carry on one’s back’’
d) ci-ta	$\check{c}ci\check{a}$	$c\check{a}$	$\check{c}c\bar{a}$	‘‘to lose’’

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¹ To avoid unnecessary confusion, I have used throughout the paper the symbol \check{c} to indicate an incorrect form: *c* for ‘correct’, / for ‘not’. The asterisk is reserved for a reconstructed form, or (synchronically speaking) an underlying form.

In (1a) and (1c) optional glide formation is accompanied by compensatory lengthening but in (1b) and (1d) glide formation is obligatory and no subsequent lengthening occurs.

Analysis of this problem has a long history in Korean generative phonology: Beginning with P-G Lee (1979), the list includes H. Kang (1987, 1998), Y-K Han (1888), E. Han (1990), Y-S Kim (1993), Y. Lee (1996, 1997), O. Kang (1999), H-S Kim (1999), and Cho (2000). Their theoretical differences notwithstanding, these analyses all make use of underlying structures to explain the exceptional behavior of the verbs in (1b) or (1d). For example, Han (1990) and Lee (1997) posit an unmarked moraic structure for the verb *o-* in (1c) whereas Kang (1987) and Y-S Kim (1994) posit an underlying vowel *i* for the verb in (1d), which elides before the suffixal vowel.

In Kim (1999) I explained the exceptional glide formation of the verb *o-* by reconstructing its underlying form as $*w_A$, whose stem vowel drops before vowel-initial endings but undergoes contraction with the preceding *w* to *o* before consonant-initial endings: $*w_A-a > wa$ but $*w_A-ta > ota$. Cho (2000), however, has criticized this analysis as being too opaque, employing a synchronically unmotivated underlying representation. But her analysis, which derives optionality and compensatory lengthening in glide formation through constraint ranking in Optimality Theory, has to treat the verb *o-* as exceptional while resorting to the same abstract underlying vowel posited by Kang (1987) and Kim (1994) for explanation of the verb in (1d) above.

This paper is thus a response to the objections raised in Cho (2000) against Kim (1999), as well as a review and evaluation of all the underlying representations used in the previous analyses. Since the verbs in (1c) and (1d) are virtually the same on the surface, it is inevitable to posit different underlying representations to explain their behavior in glide formation and compensatory lengthening, whether these be syllabic, moraic, or segmental. The question is how well motivated such underlying representations are. A crucial observation in this regard is that (1b) and (1d) show exactly the same exceptional behavior, which suggests that if the verb in (1d) is to be explained by referring to an underlying structure, so should the verb *o-* in (1b). This paper will defend the analysis of Kim (1999) by showing that the underlying form previously posited for the verb in (1d) is not well motivated and therefore must be revised in line with the analysis presented for the verb *o-* in (1b). I will draw on ideophones in Korean and some historical data to support the reanalysis, concluding with remarks on the ramifications of such analysis on phonological theory in general.

2. Underlying representations in Previous analyses

As mentioned in the above, all of the previous analyses of the verbs in (1)

use underlying representations in one way or another. In this section, I will review briefly what these representations were and evaluate each analysis with respect to its explanatory adequacy. The brief summary of the analyses will be in chronological order so that we could see how the analyses have changed in tandem with the theoretical development in generative phonology.

2.1. Pyung-Geun Lee (1979)

Lee's analysis was perhaps the first systematic attempt in analyzing glide formation and compensatory lengthening and contains an extensive array of data for compensatory lengthening in Korean, including the examples in (1). But since his analysis treats the forms *wǎ* and *cǎ* as exceptions to the rule of compensatory lengthening, it does not posit any underlying forms for these verbs different from the verbs such as *po-ta* and *cita* "to carry on one's back".

2.2. Hyunsook Kang(1987)

Kang's analysis is the first to posit an abstract underlying form. In (2) the stem vowel drops by a well-known rule that elides the so-called minimal vowel *i* before a vowel-initial continuative ending.

(2)	<u>Infinitive</u>	<u>Continuative</u>	
	k'i-ta	k'ǎ	"to extinguish"

Noting that when this vowel truncation rule occurs in Korean there is typically no compensatory lengthening, she argues that the verb *ci-ta* "to lose" should have the same underlying stem vowel, i.e. **ci-ta*. The subsequent application of vowel fronting after the palatal *c* will eventually give *ci-ta*. The continuative form *cǎ* can then easily be derived by the same vowel truncation rule that applied in *k'ǎ* < **ki-ǎ*. Compare the following derivation of two 'ci-ta' verbs:

- (3) Derivation of the continuative forms of *cǎ* "lose" and *cǎ* "carry on one's back"

<i>cita</i>	<i>ci-ǎ</i>	<i>ci-ta</i>	<i>ci-ǎ</i>	
"	<i>cǎ</i>	"	"	vowel truncation: $i \rightarrow \emptyset / __ + V$
<i>cita</i>	"	"	"	vowel fronting: $i \rightarrow i / C_{[palatal]} __$
"	"	"	<i>cyǎ</i>	glide formation and comp lengthening
"	"	"	<i>cǎ</i>	glide deletion: $y \rightarrow \emptyset / C_{[palatal]} __$
("lose")		("carry on one's back")		

Noticing, however, that the vowel fronting rule fails to occur in verbs such

as *cilki*- ‘to enjoy’, not *ɸcilki*, Kang assumes that the vowel fronting occurs (in her nonlinear framework) by obligatory [-bk] spreading to the stem-final vowel. Beside exceptions such as *cilkəŋ* < **cilkəŋ* which is explained in more detail in section 2.5. below, an obvious question is why the fronting rule should be restricted to occur only to a stem-final vowel.

2.3. Young-Kyun Han (1988)

Since Han, like Lee(1979), regards *wǎ* as exceptional no underlying structure is assumed for the verb *o-*. He makes, however, the important point that compensatory lengthening in Korean occurs only when the glide formation is optional, though he does not explain why this should be so.

2.4. Eunjoo Han (1990)

E. Han attempts to explain the irregular behavior of *wǎ* by assuming two different levels of syllabification:

- (4) *po-a* > *poʃa* (syllabification) > *pwa* (resyllabification)
 but *oa* > (no intermediate *oʃa*) > *wa* (direct initial syllabification of segments unspecified for syllabicity)

The reason she gives for why **oa* changes directly to *wa* is that the stem vowel is not preceded by a consonant. The problem with her analysis is that the verb *i-* ‘to bear on one’s head’ is not preceded by a consonant either but still undergoes (optional) glide formation and compensatory lengthening: *iə* ~ *yǎ*.

On the other hand, for the verb *cə* ‘lose[continuative]’, she assumes the underlying form **ci-ə* to which a rule of obligatory palatal merger is applied. By this rule the glide *y* formed by glide formation is merged into the preceding palatal consonant. She, however, obviously did not take into consideration verb forms such as *ciə*, *cǎ* < **ci-ə* ‘carry on one’s back[continuative]’ where the same palatal merger fails to occur.

2.5. Young-Seok Kim (1993)

Y-S Kim argues that *wǎ* is derived from **o-a* by an obligatory onset creation rule which fails to occur in examples such as *iə* ~ *yǎ* ‘carry on one’s head[continuative]’ because the underlying stem begins with *y*, from **yi-ə*. For the two ‘*ci-ta*’ verbs he assumes a solution expressed in the following derivation:

(5)	ci-ə	ci-ta	ci-ə	ci-ta	
	cə	“	“	“	i → Ø / ___ + V
	“	“	cyā	“	glide formation and comp lengthening
	“	“	cə	“	post-palatal glide deletion
	“	cita	“	“	i → i / C _[palatal] _____
	(“lose”)		(“carry on one’s back”)		

As an independent argument for the vowel fronting after a palatal consonant, he considers the vowel harmony in Korean ideophones such as those in (6).

(6) cilkəng < *cilkəng calkang “chewing”

These examples are interesting in that they pattern much like the pairs such as ‘hinil/hanil’ “in an airy manner” except that the vowel *i* is fronted after the palatal consonant. As Kim notes, however, there are exceptions to his analysis. In examples such as *cilki-* “enjoy”, *kocinəki* “modestly”, etc., the vowel fails to be fronted even though it is preceded by a palatal consonant. As mentioned above, Kang (1987) has restricted her vowel fronting rule to stem-final position just to exclude examples such as these, but her revised rule will not work because the post-palatal vowel fronting from *i* to *i* does occur even though the vowel is obviously not in the stem-final position as we can see in the above example *cilkəng* < **cilkəng*. As a possible way to prohibit the vowel fronting rule from occurring in these exceptional examples, Kim makes the suggestion that the *i*-fronting rule be restricted to the so-called ‘sound symbolic morphemes’ but concedes that even if this revision of the vowel fronting rule is allowed, exceptions still remain, in ‘sound symbolic’ pairs such as *cilen-cilen* “in affluence”, *c’is-c’is* “tut, tut” where the vowel fronting still fails to occur. We will consider the vowel fronting rule in detail in section 3.3., when we analyze the vowel harmony correspondence in Korean ideophones.

2.6. Youngsung Lee (1996, 1997)

Lee (1996) is perhaps the first to attempt to explain *wǎ* in an Optimality Theoretic framework. He argues that glide formation is obligatory between two onsetless syllables. Thus **oa* obligatorily converts to *wa* but **poa* optionally to *pwa*. Lee, however, does not consider in this first article the problem of why the compensatory lengthening as occurring in *poa* ~ *pwā* exceptionally fails in *wǎ*, saying that young generation Koreans no longer distinguish vowel length. Although it is true that the vowel length is no longer distinctive for many of young Koreans,² this does not mean that the problem of compensatory lengthening does not exist in Korean phonology, because the disappearing trend is only a separate problem to be studied in a

² See Park (1994) for more details.

sociolinguistic framework. For example, for any given dialect, there will be people with idiolects that distinguish the vowel length, so for such idiolects the problem of why no lengthening occurs only in *wǎ* still remains.

Unlike the first article, Lee (1997) does attempt to explain both the glide formation as well as the compensatory lengthening problem, by assuming distinct underlying structures. His argument is in terms of different moraic structures; Lee assumes that the stem vowel in *o-* carries no underlying mora but the stem vowel in *po-* does:

- (7) a) $\begin{array}{c} \mu \\ o + a \\ \text{“come”} \end{array}$ b) $\begin{array}{c} \mu \quad \mu \\ po + a \\ \text{“see”} \end{array}$

Similarly for the two ‘cita’ verbs the different moraic structures in the underlying representation will eventually lead to different surface forms, one with the lengthened stem vowel and the other without.

- (8) a) $\begin{array}{c} \mu \\ ci + ə \\ \text{“lose”} \end{array}$ b) $\begin{array}{c} \mu \quad \mu \\ ci + ə \\ \text{“carry on one’s back”} \end{array}$

There are basically two problems with this analysis. First is that even with the above moraic structures you still need to posit a vowel fronting rule similar to the one posited by Y-S Kim (1993). This means that the analysis is flawed with the same exceptions that Kim (1993) has recognized in his analysis. Secondly Lee does not give any independent argument, such as given by Y-S Kim (1993), for the assumption that only the verb stems that undergo obligatory glide formation and no compensatory lengthening should lack underlying mora. His argument thus falls into the danger of circular logic because what the analysis purports to explain has already been stated in the premise.

2.7. Hyunsook Kang (1998)

Unlike her previous article (Kang 1987), Kang assumes a correspondence theory in the Optimality framework and says that the forms with (optional) glide formation and compensatory lengthening are casual forms derived as a result of output-to-output correspondence with the uncontracted formal forms. She does not explain, however, what the casual/formal form for *wǎ* is. Nor does her analysis say whether *wǎ* is a formal form or a casual form or both. If it is both, which is most likely the case because there is no other form available that corresponds to it, then the question becomes: why is

there no compensatory lengthening in the casual form *wǎ*?

2.8. Ongmi Kang (1999)

O. Kang, working under the same correspondence theory, basically agrees with H. Kang for explanation of optional and obligatory glide formation and compensatory lengthening but unlike Kang (1998) she does consider the problematic forms of the verb *i-*, which she explains by reversing the established constraint ranking. But she gives no independent reason why the established ranking must be reversed just for this verb, while rejecting the suggestion made by one of her reviewers to consider positing the underlying **yi*, such as that posited in Y-S. Kim (1993), for being too abstract.

2.9. Hyung-Soo Kim (1999)

Kim argues that the underlying form for the continuative form *wǎ* is **wΛ* whose stem vowel drops before a vowel-initial suffix but contracts with the preceding *w* to *o* before a consonant-initial suffix, as in

(9)	wΛ-ta	wΛ-a	po-a	
	“	wa	“	vowel truncation: Λ → Ø / ____ +V
	ota	“	“	labialization and contraction: wΛ → o
	“	“	pwā	glide formation and comp lengthening (optional)

Recall the aforementioned vowel truncation rule as occurring in (2) above: **k'i-ə > k'ə* “extinguish”. The rule also applies to *Λ*, the counterpart vowel of *i* in vowel harmony. For examples of labialization and contraction note: *MK sigΛβΛ > *sigΛwΛ > sigΛol > NK sigol* “countryside” where Middle Korean *β* first lenites to *w* in the intervocalic position and then **wΛ* contracts to *o* giving the attested *sigΛol*.

This analysis differs from most of the analyses that have been reviewed so far in that its underlying form is motivated by natural phonological rules that already exist in the history of Korean. The problem, however, is that it leaves the two ‘cita’ verbs unexplained, making the explanation only half satisfactory. In the below, I will provide an explanation of the two ‘cita’ verbs and argue that we finally have a complete solution of the problem which in turn reinforces the arguments made in my derivation of the continuative *wǎ* from **wΛ-a*.

2.10. Young-Mee Yu Cho (2000)

Cho provides an analysis in terms of syllable structure: lack of an onset triggers obligatory glide formation of **o-a > wa* but presence of an onset

in examples such as **po-a* triggers an optional glide formation of *poa* ~ *pwā*. She criticizes H-S Kim (1999) for positing an opaque underlying representation **wA*. But for the problem of *iə* ~ *yə* “carry on the head [continuative]” which is not explainable in terms of her syllable structure because glide formation occurs optionally in these examples even though the stem lacks an onset, she proposes an underlying verb stem /yⁱ/ that eventually surfaces as [i].³ This analysis, however, suffers from several problems. First is that she has posited an abstract underlying form in a theory that specifically prohibits it. Secondly, her underlying form would not yield the correct forms because of the obligatory nature of vowel truncation as occurring in examples such as **k'ɨə* > *k'ə*. From **yɨə* we would get only the nonlengthened *yə* rather than the desired forms of *iə* ~ *yā*.

For the problem of why no compensatory lengthening occurs in *wā*, she writes that:

“In this context, the puzzle in /o-a/ → [wa] is harder to resolve unless for some reason the verb stem /o-/(‘to come’) is not marked for an underlying mora... Whatever the proper solution might be, there is no doubt that this is an exception to the general CL phenomena.”

For explanation of the two ‘cita’ verbs, on the other hand, she simply follows the suggestion made by Y-S Kim (1993) and maintains that the underlying stem vowel for verbs such as *cə* “lose” is *ɨ*, i.e. **cɨə* > *cə*. But besides the fact that such an analysis is again flawed with exceptions mentioned in Y-S Kim (1993), her analysis is in conflict with her criticism of the underlying **wA* for *wā* as being opaque because the stem vowel in **cɨ*, which never surfaces in the infinitive *cita* “to lose” nor in its continuative form *cə*, is also abstract.

In the sections that follow, I will first cite some historical evidence for underlying **wA* and **yɨ* and then provide a natural explanation of glide formation and compensatory lengthening in the two ‘cita’ verbs. To support this analysis, I will consider the vowel harmony phenomenon in the Korean ideophones, which essentially have a problem similar to what we have been discussing in regards to glide formation in the two ‘cita’ verbs.

3. Historical evidence for underlying **wA* and **yɨ*

3.1. Hwunmencengum (Kang 1974; Ledyard 1998)

Our first evidence is from the often cited statement of Hunmencengum where in the section explaining how the newly invented Korean alphabets

³ It is difficult to understand why she assumes **yɨ* as the verb stem rather than **yɨ* as assumed by, for example, Y-S Kim (1993) which would have given her the correct results.

are combined, it is suggested that *yʌ and *yʲ do occur in the dialects of ‘frontier regions’. The citation that follows in (10a) is from Kang (1974). For the English translation in (10b), I have relied on Ledyard (1998):

- (10) a) “· 一起 | 聲於國語無用. 兒童之言. 邊野之言. 或有之. 當合二子而. 如 ㄱ! ㄱ! 之類. 基先縱橫. 與他不同.” (Kang 1974: 54)
- b) “There is no need in the national speech for [phonetic units in which] · a and — ε arise from | i. But these sometimes occur in the speech of children or in languages in the frontier regions. [In such cases] the two letters may be used in combination, as in [vocables] like ㄱ!kia or ㄱ!kie. The writing of first a vertical and then a horizontal is different from the other [letter combinations].” (Ledyard 1998: 314)⁴

The above statement clearly mentions the existence of yʌ and yʲ in the ‘frontier’ dialects of Middle Korean. Since such forms are observed dialectally, this partially justifies assuming them underlyingly for general Korean.

3.2. Ki-Moon Lee (1977)

Lee (1977) is important in providing a clue to possible existence of *yʌ in the history of Korean, which he reconstructs from comparison of forms between Ceu dialect and Middle Korean:

(11)	<u>Ceu dialect</u>	<u>Middle Korean</u>	
*kyʌp	c ʌp	kyəp	“layer, fold”
*kyʌr ʌl	c ʌrʌr	kyərir	“leisure time”
*kyʌntʌy	c ʌnti	kyəntʌy-, kyəntiy-	“endure”
*tyʌr ʌ	c ʌri-	tyərʌ-, tyəri-	“short”

Combined with the statement in Hunminjeongeum in 3.1, the above data certainly provides an argument for assuming *yʌ and its harmonically corresponding *yʲ in the underlying representation of Korean. From these it is also not too difficult to see the plausibility of positing underlying *wʌ and *wʲ, the arguments for which come from examples such as the following in the history of Korean:

- (12) MK əryəβin > *əryəwin > NK əryəun “difficult”
 MK sigʌβʌl > *sigʌwʌl > sigʌol⁵ > siygol > NK sigol “countryside”

⁴ Ledyard’s ‘ε’ is IPA [i]. As Kang (1974: 48f) mentions in his Korean translation, the statement shows how observant and attentive to details the editors of Hunminjeongeum were concerning the sounds of Korean spoken at the time.

⁵ Examples without the asterisks are the forms that have been attested in historical texts. Such attestation sometimes can reinforce the arguments for the posited phonological rule,

In both of these examples occurs first the lenition of β to w , followed by contraction of wi to u (in the first example) or of $w\Lambda$ to o (in the second example). As already mentioned in the above, these changes provide an independent argument for deriving the exceptional $w\check{a}$ from $*w\Lambda-a$ because if the stem vowel, which drops before a vowel-initial ending, is followed by a consonant-initial ending $-ta$, it does not drop, enabling it to undergo contraction with the preceding glide w , as in $ota < *w\Lambda-ta$.

In the following section, I will provide a more detailed argument for assuming underlying $*y\Lambda$ and $*yi$ as well as $*w\Lambda$ and wi , from a reanalysis of vowel harmony in certain ideophones of Korean. Included in this reanalysis will also be the explanation of the exceptions to the vowel fronting rule after the palatal-initial stems such as $ci-$ ‘lose’ $< *ci$ as noticed by Y-S Kim (1993), which will eventually lead to an exceptionless analysis of glide formation and compensatory lengthening in the two ‘cita’ verbs in Section 4.

3.3. Vowel harmony in Korean ideophones

It is well known that the vowel harmony rule applying widely in Middle Korean is no longer strictly observed in Modern Korean except in the so-called sound symbolic morphemes. In Middle Korean, the light vowels a , o , Λ corresponded to the dark vowels ϑ , u , i respectively. In Modern Korean however, we no longer find such one-to-one correspondence, even in many sound symbolic morphemes. Rather one often finds one vowel corresponding to two different vowels. Such irregularities in sound symbolic morphemes have long been known to Korean phonologists. Like the problems in glide formation and compensatory lengthening, however, they have not yet received satisfactory explanation.

There are several reasons why the Middle Korean one-to-one correspondence in vowel harmony was replaced by one-to-many correspondence in modern Korean. One, and the most important reason, is that due to certain changes that have occurred to vowels between Middle Korean and Modern Korean, vowels have merged. This happened to the vowel Λ , which began to disappear already in the 15th century in the noninitial syllable where it has generally changed to i while in the initial syllable it has merged with a , though at a much later date than the change in the noninitial position. Another reason is that there have been phonological changes that affected the appearance of the vowels in harmony. Consider the following examples (from Y-S Kim 1988):

especially when subsequent rules have obliterated the change described by the rule, as in this particular example where the result of applying the contraction rule $*w\Lambda \rightarrow o$ is clearly shown. Note that the Modern Korean form (abbreviated as NK ‘New Korean’ to distinguish it from Middle Korean), *sigol*, lacks this clarity due to the further contraction of $\Lambda o \rightarrow o$.

(13)	Dark	Light	
	a) putik	patik	“with a grating sound”
	b) čilkəŋ	čalkaŋ	“chewing”
	čikil	čakil	“with a sizzling sound”
	c) ilkis	yalkis	“in a rickety manner”
	ičuk	yačuk	“gabbling”
	kilim	kyalim	“longish”

The examples in (13a) well illustrate the problems involved with analyzing vowel harmony in sound symbolic morphemes. In these examples, the dark vowel *u* appears to correspond to the light vowel *a* while the dark *i* remains the same in its light counterpart. Thus it would be a tremendously difficult task to make the vowel harmony rule work in examples such as these because according to the general rule of vowel harmony in Korean the light vowel *a* should correspond to the dark vowel *ə*, not *u*. Whence then comes this correspondence between *u* and *a*? Recall that in Middle Korean Λ has merged with *a* in the initial syllable, while it changed to *i* in the noninitial syllable. We see both reflexes of this vowel in the light form *patik*, whose underlying form we reconstruct as **pAtak*. Corresponding to this light form would have been **pitik*, whose first vowel, however, has been labialised to *u* under influence of the preceding labial consonant *p*. Thus a satisfactory explanation of the vowel harmony correspondence for the pair ‘putik/patik’ requires positing abstract underlying vowels of Λ and *i* even if these vowels may not appear synchronically as one of the surface vowels in alternation. Consider the derivation in (14):

(14)	pitik	pAtak	
	“	patik	$\Lambda \rightarrow i$ in the noninitial syllable
	“	patak	$\Lambda \rightarrow a$ in the initial syllable
	putik	“	labialization: $i \rightarrow u / C_{[labial]}$

One may object to positing the vowel Λ in the above derivation arguing, as Cho (2000) did, that it is not a member of the Modern Korean vowel system. This is indeed what has generally been assumed in most of the previous analyses of Korean ideophones. The only rule required in such analysis would be the above labialization rule that derives *putik* from **pitik*. Such an analysis, however, is unable to answer the question why the dark vowel *i* (or surface *u*) should correspond to the light *a* in the pair ‘putik/patik’, despite that it is the dark vowel *ə* which generally matches up with the light *a*, as in the pair ‘əlluk/allok’ “mottled”. Furthermore, it does not touch on the question why the dark vowel *i* should appear not only in the dark form *putik* but also in the light form *patik*. In the analysis proposed here, which maintains that Λ belongs to the underlying vowel system of Korean, the one-to-one correspondence in vowel harmony between the light and dark pairs of Korean ideophones is well maintained,

while the appearance of the dark *ɨ* is explained by the rule changing *ʌ* to *ɨ* in the noninitial syllable.

Although one may argue that assuming the vowel *ʌ* in the underlying vowel system of Korean complicates the already complex Korean vowel system, not doing so would mean treating examples such as those in (13b) as exceptional, where now, on the surface anyway, it appears that another vowel, *i*, which is considered to be neutral in vowel harmony, is corresponding to *a*. This would mean that three vowels, *ɨ* (or surface *u*), *ə*, and *i*, can correspond to the vowel *a*, a rather undesirable outcome. It is for this reason that Y-S Kim (1993: 22) posits the abstract underlying vowel *ɨ* for the dark forms in (13b), which is then fronted by the rule fronting *ɨ* after a palatal consonant: $\check{c}ilkəŋ < *ɨilkəŋ$. Such an analysis, however, although better than totally refraining from positing an underlying vowel distinct from the surface one, is still burdened with two problems: 1) it still cannot explain why two vowels, *ɨ* and *ə*, correspond to *a* and 2) as mentioned earlier, the vowel fronting rule that applies after a palatal consonant has exceptions such as *cɨlki*- “enjoy”, *kocɨnəki* “modestly”, and *cɨlən-cɨlən* “in affluence”. In all of these examples, *ɨ* does not undergo fronting even though it is preceded by a palatal consonant.

A better solution, however, is available in which the abovementioned problems are resolved by referring to natural phonological rules. Although Kim (1993), while referring to the above analysis, says that ‘a little abstract underlying form should be allowed to resolve a problem such as the one observed in $\check{c}ilkəŋ < *ɨilkəŋ$ ’, the problem of exceptions to the post-palatal vowel fronting arises because his underlying forms are not abstract enough. This is even more apparent if we consider the examples in (13c) where now the vowel *i* is corresponding not just to *a* but *ya*!. This could only mean that the word initial *i* of *ilkis* is from **yilkis* where *yi* changes to *i* by contraction. Similarly *kilim* is derived from **kyilim* (cf. *kyalim* < **kyalim*) by the same rule of contraction. This contraction rule is also responsible for the fronting of the vowel in $\check{c}ilkəŋ$, now to be derived from **ɨyilkəŋ*. In this solution, the problem of exceptions to the post-palatal vowel fronting rule does not arise because the vowel fronting occurs by an independent phonological rule of contraction.

What remains to be explained, then, is the problem of vowel harmony correspondence in ideophonic forms of Korean. We have already mentioned that it is necessary to posit underlying *ʌ* as the counterpart of *ɨ* in order to maintain the one-to-one correspondence between vowels. What is needed in addition to the rules mentioned above is the rule deleting *y* after a palatal consonant, another well known rule in Korean phonology⁶. Consider the following derivation in (15):

⁶ This rule is not totally new. It has already been mentioned in passing while reviewing Y-S Kim (1993)’s analysis in section 2.5.

(15)	pitik	čyilkəŋ	čyalkəŋ	yilkis	yalkas	
	“	čilkəŋ	“	ilkis	“	contraction: yi → i
	“	“	“	“	yalkis	Λ → i in noninitial syllable
	“	“	čyalkəŋ	“	yalkis	Λ → a in initial syllable
	“	“	čalkəŋ	“	“	y → Ø / C _[palatal] _____
	putik	“	“	“	“	labialization

Much like the pair ‘ilkis/yalkis’ are the following examples in (16) below, which initially appear anomalous because the vowel that corresponds harmonically to *u* should be *o*, as in the pair ‘ut’uk/ot’ok’ “aloft” while any word corresponding to the light form beginning with *wa* should begin with *wə* as in the pair ‘wəsək/wasak’ “with a rustle”.⁷

(16)	Dark	Light	
	ulilij	walilij	“clattering”
	usisi	wasisi	“with a rustling sound”

These forms appear to violate the one-to-one correspondence in vowel harmony because of the same changes that have occurred in the pair ‘ilkis/yalkis’: contraction of the glide and the following vowel *i* (i.e. *y_i → i* and *w_i → u*) and the appearance of *l* as *i* in the noninitial syllable. Consider the following derivation in (17)

(17)	wililij	wlllilij	yilkis	yalkas	
	ulilij	“	ilkis	“	contraction: yi → i, wi → u
	“	wllilij	“	yalkis	Λ → i in noninitial syllable
	“	walilij	“	yalkas	Λ → a in initial syllable

While the analysis of the pair ‘ilkis/yalkis’ has provided arguments for assuming **y_l* and **y_i* in the underlying representation, the above analysis of ‘ulilij /walilij’ “clattering” in (17) provides arguments for underlying **w_l* and **w_i*. An attentive reader, however, might have noticed that another contraction rule could occur to the underlying form **wlllilij* in (17), namely the contraction of *w_l → o* that occurs in *o-ta* “to come” < **w_l-ta*. This contraction rule indeed appears to occur in certain ideophonic forms such as those given in (18) where corresponding to the dark form *ucək* is not only *wacak* but also *ocak*.

(18)	Dark	Light	
	ucək	wacak ~ ocak	“with a crunch”

It is clear that underlying these forms are the dark **w_icək* and the light **w_lacək* because there is no such form as *čwəcək* recorded in the dictionary.

⁷ I thank the reviewer for suggesting that I should find more evidences for underlying **w_l* and **w_i*, which has led to my discovery of the data in (16).

Of the two light forms in (18), *wacak* results from the rule changing the initial λ to a while *ocak* derives by the aforementioned contraction rule of $w\lambda$ to o . Why then do we have these two alternative light forms? Recall that the rule changing λ to a in the initial syllable occurs at a much later date than the change of λ to i in the noninitial syllable, which according to the textual evidence already began to occur in the 15th century. Another rule that has also occurred early is the contraction of $w\lambda$ to o , as can be deduced from the fact that *o-ta* and *wa* are the forms already attested in the 15th century Korean.⁸ It is thus likely that *ocak* is an older counterpart of *ucak*, while *wacak* is its recent counterpart, arising through application of the relatively recent rule changing λ to a in the initial syllable.⁹

The above analysis of vowel harmony correspondence in Korean ideophones, based on the assumption that λ corresponds to i as o and a each corresponds to u and ə in the underlying vowel system of Korean, does not have any exceptions that have plagued the previous analyses, still maintaining the desirable one-to-one correspondence between the vowels in the dark and light forms, and giving a natural explanation of the development of the Korean ideophones in terms of rules that are well-known in Korean phonology. But most importantly it shows how an intractable phonological problem can be resolved when a well motivated abstract underlying representation is combined with natural phonological rules, thus providing a defending argument for the original abstract analysis provided in H-S Kim (1999) for the problem of glide formation and compensatory lengthening in $w\check{a} < *w\lambda a$. With these arguments in mind, we finally turn to the reanalysis of the two ‘cita’ verbs.

4. The two ‘cita’ verbs reanalyzed

What we have done in the section 3.3 with regard to analysis of Korean ideophones should be enough to suggest a solid solution of the problems associated with the two ‘cita’ verbs. The problem here is simple; one ‘cita’ verb, the one meaning ‘to carry on one’s back’ exhibits optional glide formation and compensatory lengthening as both *ciə* and *cē* are allowed in standard Korean while the other, the one meaning ‘to lose (in a game)’ only shows obligatory glide formation and no compensatory lengthening as only *cə* but neither *çciə* nor *çcē* is allowed. As mentioned earlier, this problem is parallel to the problem of glide formation of the vowel *o* in *pota* ‘to see’ and *ota* ‘to come’ where the former allows optional glide formation

⁸ Note that although *po-ta* ‘to see’ and *poa* are attested in Middle Korean, *pwā* is not, suggesting that the glide formation is a relatively recent phenomenon.

⁹ It is not difficult to imagine that there will be more examples like *ucak* and *ocak* with underlying $*wi$ in the dark form corresponding to the underlying $*w\lambda$ in its light counterpart. But it is difficult to find them because on the surface such examples will look just like the pairs showing correspondence between u and o .

and compensatory lengthening (i.e. both *poa* and *pwā* are allowed) but the latter only obligatory glide formation and no compensatory lengthening (i.e. *wā* but neither *ɕoa*, nor *ɕwā* is allowed). Since the surface stem of the two ‘cita’ verbs is virtually the same, it is inevitable to posit two different underlying representations. And as in the case of the verbs with the stem vowel *o*, we posit an abstract underlying representation with the one that exhibits exceptional behavior of obligatory glide formation and no compensatory lengthening. From our experience in analyzing vowel harmony in Korean ideophones in 3.3, we designate the underlying form of this verb stem to be **cyɨ-* ‘lose’, which, if combined with the vowel-initial continuative ending *-ə*, would eventually yield *cɨ* but, if combined with the consonant-initial infinitive ending *-ta* will generate *cita*. Consider the following derivation in (19):

- (19) *cyi-ta* *cyi-ə*
 “ *cyə* vowel truncation: *i* → \emptyset / __+V
cita “ contraction: *yɨ* → *i*
 “ *cə* deiotation: *y* → \emptyset / C_[palatal]

We can see the significance of this derivation more clearly if it is combined with the derivation of the other ‘cita’ verb meaning ‘to carry on one’s back’, as in (20):

- (20) *cyi-ta* *cyi-ə* *ci-ta* *ci-ə*
 “ *cyə* “ “ “ vowel truncation
cita “ “ “ “ contraction
 “ “ “ *cyə* glide formation and comp
 lengthening (optional)
 “ *cə* “ *cə* deiotation
 (“to lose”) (“to carry on the back”)

Since the glide formation rule is optional in the above derivation, both *ciə* and *cə* are possible outcomes from the underlying **ci-ə*, and the compensatory lengthening in Korean generally follows from this optional glide formation as we have mentioned earlier. The reason why there is no compensatory lengthening in forms such as *cɨ* < **cyɨ-ə* is because there was no glide formation to begin with, but only truncation of the so-called minimal vowel *i*, which is, as we have seen earlier, is obligatory and does not induce compensatory lengthening. Here then we have finally arrived at a natural explanation of the exceptional behavior of the two ‘cita’ verbs. The development of the verb forms in the above derivation is parallel to the development posited for the analysis of the verb forms *wā* from **wA-a* and *pwā* ~ *poa* from **po-a*. This can be seen in the following derivation (21) which combines the above two derivations.

(21)	cyi-ta	cyi-ə	ci-ta	ci-ə	wΛ-ta	wΛ-a	po-a	
	“	cyə	“	“	“	wa	“	vowel truncation
	cita	“	“	“	ota	“	“	contraction
	“	“	“	cyə̄	“	“	pwā	(optional) glide formation and comp lengthening
	“	cə	“	cə̄	“	“	“	deiotation

5. Ramifications on the phonological theory

What are the ramifications of the above analysis on the phonological theory in general? I think that there are at least two aspects we should consider in relation to the current state of the art in the development of the phonological theory. First is of course, as every reader would have guessed, the attitude concerning the abstract underlying representations in phonological theory. As we well know, there was a heated debate on the subject between Kiparsky (1968) and Hyman (1970) in the heydays of the classical generative phonology. Kiparsky, afraid that the generative derivational machine was quickly becoming too powerful to control, proposed that we should constrain how abstract phonology can be, while Hyman countered to this proposition with his analysis of Nupe data, arguing that it is the abstract underlying representation that offers the most viable explanation. Since the debate, the arguments of which often centered on the issue of psychological reality of phonological rules and their learnability, it has been generally accepted that abstract underlying representations should not be used in phonological analysis. The logic was that since these abstract forms, which do not show up in any of the alternating forms on the surface, are not accessible to the language learner, they are difficult to learn. Therefore their use should be restricted in the theory that purports to write a psychologically real grammar.

However, as we have seen in section 2 above, it is not the case that phonologists have totally abstained from positing abstract underlying representations. Some did use them sparingly, when a reasonable solution to a problem is unavailable by positing a concrete underlying form, as we have seen in Y-S Kim (1993)'s analysis of two 'cita' verbs where he assumes the abstract **cɨ* (the *i* never shows up on the surface forms of *cita* and *cə*) adding that 'use of abstract underlying forms should not be totally banned'. And as the phonological theory progressed, the segmentally abstract underlying forms have been replaced with structurally abstract representations, as in, for example, Lee's analysis of two 'cita' verbs where he assumes that *cə* "to lose [continuative]" has no underlying mora in the stem, compared with the verb *cə̄* "to carry on the back [continuative]" which carries the thematic mora; thus the former shows up with obligatory glide formation and no compensatory lengthening but the latter with optional glide formation and compensatory lengthening. To me, this is just another way of utilizing abstract underlying representations, because there

is no difference in the surface forms of the two ‘cita’ verbs that would indicate that only the former form should not have the underlying mora in the stem vowel. If one counters to this assessment saying that it is because of the vowel length in the two forms, short in *cǎ* but long in *cǎ̃*, that they have different moraic structures, the argumentation becomes immediately circular, for you are assuming as the beginning argument what you are supposed to explain. So the first ramification of the above abstract analysis is this: The debate on the abstract controversy is not over. We need to reconsider many of the assumptions regarding abstractness controversy in phonological theory and compare their consequences in phonological problem solving, which I have done in this paper with regard to the problem of glide formation and compensatory lengthening in Korean.

Secondly, we need to consider a more general question of why we do phonology, because we have seen on too many occasions a phonological theory trying to accomplish too many objectives with one framework. For example, theories have been claimed to be able to solve phonological problems, at the same time reflecting psychological reality of the native speaker, and sometimes even said to lend themselves well to language processing on the computer. We need to sort out, however, the various purposes of scientific theories. We need to make a distinction between theory and application, and realize that a theory geared for solving phonological problems of the type illustrated by glide formation and compensatory lengthening in Korean may not necessarily be suitable for practical application, such as, for example, processing language data on the computer. Similarly, a theory whose main purpose is to explain how a child acquires language may not necessarily be particularly appropriate for solving complex phonological problems of the type illustrated by the lack of compensatory lengthening in *wǎ̃*. Moreover, since *wǎ̃* is the only example that exhibits such complexity, it may just be the case that the child learning Korean just memorizes it, in which case it may indeed make sense to regard the exceptional form simply as an exception to the rule.¹⁰ The problem arises only when we mix the two purposes in one theory, when

¹⁰ This is indeed what has been suggested by the reviewers. One problem with such suggestion, as I have indicated in my reply to them, is: What is the exact number of examples we can admit as exceptions? If one exception can be admitted because it is the only example that violates the rule, then should any exceptions that number more than two be prohibited in the grammar? What then is the basis for doing that? Since the reason for admitting exceptions is because it would be relatively easy for the language learner to memorize them, any criterion to decide whether to admit exceptions formally as exceptions or not should be based on evidences in language acquisition studies, but no studies on the subject has been forthcoming in the studies on glide formation in Korean. But a graver problem, I believe, is that admitting exceptions violates the spirit of scientific investigation. Exceptions to a rule should stimulate the researcher to look into the reasons for their existence; Finding the regularity in what may look so hopelessly irregular is indeed one of the important objectives of scientific investigation, but describing them as exceptions in the corner of the grammar makes the impression that they have somehow received proper treatment, which could discourage any further investigation of the matter.

one says that the phonological problems that theoretically arise in association with the form $w\check{a}$ or $c\check{a}$ are solvable in a psychologically real analysis, without allowing abstract underlying forms. That is when one often cannot but assume ad hoc structures or unmotivated processes to do the duties that an abstract underlying form could carry out naturally. This paper has been written to show that such ad hoc approaches in phonological analysis are best to be avoided.

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