LEXICALLY MARKED AND UNMARKED HIGH VOCOIDS IN KOREAN: EVIDENCE FROM GLIDE FORMATION IN VERBS

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1. INTRODUCTION

Some phonologists such as Guerssel (1986) and Harris and Kaisse (1999) among others claim that there is lexical distinction between high vocoids (i.e., [+high, -consonantal] segments in underlying representation); some are marked for syllabicity in underlying representation whereas others are unmarked. In this paper I show that Korean supports this claim. The lexically marked ones are always realized as high vowels. The unmarked ones are realized as both high vowels and glides within a syllable; when they are sonority peaks within a syllable, or cannot be incorporated into a permissible diphthong, they are realized as high vowels; otherwise, they are realized as glides within a syllable[1]. I provide evidence for this from stem-final high vocoids in verbs.

The following sections discuss Korean high vocoids first, then move on to those of Spanish and Berber among others to show that the marked and unmarked high vocoids are observed cross-linguistically.

2. HIGH FRONT VOCOIDS

In this section I show that there is lexical distinction for syllabicity between high front vocoids; the lexically marked ones are always realized as [i], hence occur under nucleus within a syllable, whereas the unmarked ones surface as both [i] and [j], hence occur under either nucleus or onset. I show that the surface realization of the unmarked high vocoids depends on syllable structure.

2.1 Lexical Distinction between High Front Vocoids

Consider the following high vowels and glides found in verbs, where /əs*/[2] and /ta/ are a past tense and a declarative suffix, respectively[3]:

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[1] The maximal type of syllable in Korean is $[(C)[(G)V]_N(C)]_\sigma$ where 'G' and 'N' stand for a glide and a nucleus, respectively. See Yun (2001a, 2001b) for details.

[2] The /s*/, a voiceless alveolar fortis fricative, in the past tense morpheme /əs*/ becomes [t] in coda position via the well-known coda neutralization in Korean phonology: /t, tʰ, t*, s, s*, t͡ʃ, t͡ʃʰ, t͡ʃ*, h/ become [t] in coda position. There are two allomorphs of past tense suffixes in Korean: /əs*/ and /as*/. The so-called light vowels /i, ɨ, u, e, ə/ are followed by a light vowel /ə/ whereas the so-called dark vowels /o, a/ by a dark vowel /a/; for instance, [t͡ʃʰu.ət.ta] 'gave' vs. [s*o.at.ta] 'shot'. See Sohn (1987) and Lee (1993) among others for details.

[3] The syllable boundary is indicated by a dot in this paper.

(1) High Front Vocoids[4]
a. Syllable-peak

   [t͡ʃʰi.ta] 'run over'   [t͡ʃʰi.ət.ta] 'ran over'   *[t͡ʃʰjət.ta]

   [pi.ta] 'is empty'   [pi.ət.ta] 'was empty'   *[pjət.ta]

   [p*i.ta] 'sprain'   [p*i.ət.ta] 'sprained'   *[p*jət.ta]

   [pʰi.ta] 'bloom'   [pʰi.ət.ta] 'bloomed'   *[pʰj.ət.ta]

b. Non-peak

   [t͡ʃʰi.ta] 'hit'   [t͡ʃʰjət.ta] 'hit (PAST)'   *[t͡ʃʰi.ət.ta]

   [t͡ʃi.ta] 'lose'   [t͡ʃjət.ta] 'lost'   *[t͡ʃi.ət.ta]

   [t͡ʃ*i.ta] 'boil'   [t͡ʃ*jət.ta] 'boiled'   *[t͡ʃ*i.ət.ta]

   [pʰi.ta] 'straighten'   [pʰjət.ta] 'straightened'   *[pʰi.ət.ta]

As shown in the above examples, there are two surface realizations of high front vocoids: [i] and [j]. Consider, for instance, [t͡ʃʰi.ət.ta] 'ran over' and [t͡ʃʰjət.ta] 'hit (PAST)'. The declarative forms of these words are the same (i.e., [t͡ʃʰi.ta]). However, when a vowel-initial suffix /əs*/ follows their stems, the stem-final vocoids are realized as [i] and [j], respectively. They both occur in the same segmental context and before the same morpheme (i.e., the past tense morpheme /əs*/ (→ [ət])), hence they are not in complementary distribution. This is not a case of free variation (e.g., [t͡ʃʰi.ət.ta] 'ran over', not *[t͡ʃʰjət.ta]). Nonetheless, they are realized as either a sonority-peak segment (i.e., [i]) or a non-peak segment (i.e., [j]) within a syllable. Therefore, I conclude that they are underlyingly different segments; one is lexically marked for syllabicity (e.g., [t͡ʃʰi.ət.ta] 'ran over') whereas the other is not (e.g., [t͡ʃʰjət.ta] 'hit (PAST)'). Following Harris and Kaisse's (1999) notations (for Spanish), I will use /i./ for the high front vocoids lexically marked for syllabicity and /i/ for the ones lexically unmarked for syllabicity. In the following I provide the underlying forms of the stems in the above examples using this notation:

(2) Underlying Forms
a. Marked for Syllabicity

   /t͡ʃʰi./ 'to run over'   /pi./ 'to be empty'

   /p*i./ 'to sprain'   /pʰi./ 'to bloom'

b. Unmarked for Syllabicity

   /t͡ʃʰi/ 'to hit'   /t͡ʃi/ 'to lose'

   /t͡ʃ*i/ 'to boil'   /pʰi/ 'to straighten'

     In Korean, most stem-final high front vocoids in verbs are the unmarked kind. Marked ones are rare. Among the total of 428 words found in a Korean verbal dictionary (Hong, 1997) that have stem-final high front vocoids, I observe that 422 words have unmarked high front vocoids whereas the remaining six words have marked ones.

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[4] The following examples are transcribed based on normal speech rate. In fast speech, but not in normal speech, they are heard as the starred examples, for instance, [pjət.ta], [pʰjət.ta], etc. This is the so-called optional glide formation in Korean phonology, which will be discussed later. In the case of the examples with word-initial palatal affricates, they are heard as [t͡ʃʰət.ta], [t͡ʃət.ta], etc. due to the similar places of articulation of [t͡ʃ] and [j]. Some Korean phonologists such as Ahn (1988), Kang (1987), Han (1990) among others observe that vowels are lengthened (via compensatory lengthening) when they undergo optional glide formation in fast speech, hence, for instance, [pjə:t.ta] and [pʰjə:t.ta] (not *[pjət.ta] and *[pʰjət.ta]). However, the vowel length distinction has been lost in many dialects of Korean. Only southern dialects such as the Kyungsang and Chulla dialects still retain it. This does not affect the analysis I am developing. Therefore, I disregard vowel length distinction in this paper.

Since the two kinds of high vocoids are underlyingly contrastive, they may have different characteristics. In the following sections I show that the marked ones undergo optional glide formation in fast speech whereas the unmarked ones undergo obligatory glide formation regardless of speech rate.

2.2 High Front Vocoids Lexically Unmarked for Syllabicity

High front vocoids lexically unmarked for syllabicity obligatorily undergo glide formation when they are not sonority peaks within a syllable. Consider the following examples:

(3) Obligatory Glide Formation for Unmarked High Front Vocoids

a. /moi + ta/ → [mo.i.ta] 'gather'   *[moj.ta]
   /moi + əs* + ta/ → [mo.jət.ta] 'gathered'   *[mo.i.ət.ta]

b. /umt͡ʃiki + ta/ → [um.t͡ʃi.ki.ta] 'move'
   /umt͡ʃiki + əs* + ta/ → [um.t͡ʃi.kjət.ta] 'moved'   *[um.t͡ʃi.ki.ət.ta]

c. /salpʰi + ta/ → [sal.pʰi.ta] 'watch'
   /salpʰi + əs* + ta/ → [σαλ.πHφ↔τ.τα] 'watched'   *[σαλ.πHι.↔τ.τα]

d. /təti + ta/ → [tə.ti.ta] 'is slow'
   /təti + əs* + ta/ → [τ↔.τφ↔τ.τα] 'was slow'   *[τ↔.τι.↔τ.τα]

e. /t͡ʃəmi + ta/ → [t͡ʃə.mi.ta] 'slice'
   /t͡ʃəmi + əs* + ta/ → [t͡ʃə.mjət.ta] 'sliced'   *[t͡ʃə.mi.ət.ta]

f. /maŋsəli + ta/ → [maŋ.sə.ri.ta][5] 'hesitate'
   /maŋsəli + əs* + ta/ → [maŋ.sə.rjət.ta] 'hesitated'   *[maŋ.sə.ri.ət.ta]

Falling diphthongs are not possible in Korean (e.g., *[moj.ta])[6]. The unmarked high front vocoid /i/ is realized as a high front vowel [i] when it cannot be incorporated as an onset or an onglide (e.g., [mo.i.ta]) or when it is a sonority peak within a syllable (e.g., [t͡ʃə.mi.ta]), hence occurs under nucleus; whereas it obligatorily becomes a glide [j] when it is a non-peak segment within a syllable, that is, when it is followed by a non-high vowel (e.g., [mo.jət.ta], [t͡ʃə.mjət.ta]). The following are the syllable structures for [mo.i.ta], [mo.jət.ta], [t͡ʃə.mi.ta], and [t͡ʃə.mjət.ta].
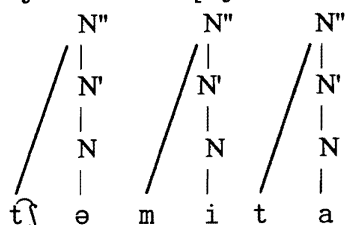
(4) Syllable Structure of High Front Vocoids Unmarked for Syllabicity

a. /moi + ta/ → [mo.i.ta]   b. /moi + əs* + ta/ → [mo.jət.ta]

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[5] [r] is an allophone of /l/ in Korean. See Kim-Renaud (1974), Kim and Kim (1991), and Yun (2001a) among others for details.

[6] Actually there is one falling diphthong /ɨi/ (→ [ɨj]) in Korean. However, Korean is currently losing this. It is typically monophthongized to [ɨ] word-initially (e.g., /ɨisa/ →[ɨ.sa] 'medical doctor'), [i] morpheme-finally (e.g., /t͡ʃuɨi + lɨl/ → [t͡ʃu.i.rɨl] 'caution (ACCUSATIVE)'), and [e] word-finally (e.g., /uri + ɨi/ → [uri.e] 'our'). This does not affect the analysis I am proposing. So I will not investigate it.

c. /t͡ʃəmi + ta/ → [t͡ʃə.mi.ta]

```
        N"      N"      N"
        |       |       |
     /  N'   /  N'   /  N'
    /   |   /   |   /   |
   /    N  /    N  /    N
  /     | /     | /     |
 t͡ʃ     ə  m    i  t    a
```

d. /t͡ʃəmi + əs* + ta/ → [t͡ʃə.mjət.ta]

```
        N"         N"         N"
       /|         /|         /|
      / N'       / N'       / N'
     /  |       /  |  \    /  |
    /   N      /   N   \  /   N
   /    |     /   /|    \/    |
  t͡ʃ    ə    m   j ə    t     a
```
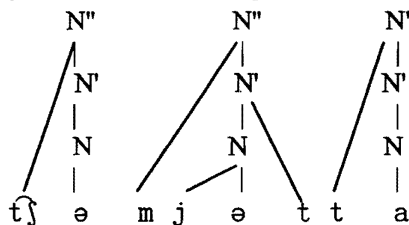
As shown above, the unmarked high front vocoid /i/ is realized as both [i] and [j] depending on the syllable structure. The [i] occurs under nucleus whereas the [j] occurs under either nucleus or onset. In previous research (Yun 2001a, 2001b) I claim that syllable-initial glides are onset segments whereas glides after a tautosyllabic consonant form a complex nucleus with the following vowel[7]. Since the surface realizations of the unmarked high front vocoid /i/ depends on syllable structure, the feature [syllabic] is not needed since it is predictable from the syllable structure.

The redundancy of the feature [syllabic] is also claimed, based on observations in many languages, by Kaye and Lowenstamm (1981), Selkirk (1982), Steriade (1982), Guerssel (1986), Hall (1990), Harris and Kaisse (1999), among others.

2.3 High Front Vocoids Lexically Marked for Syllabicity

High front vocoids lexically marked for syllabicity (i.e., /i./) optionally undergo glide formation in fast speech. The optional glide formation has been observed by some researchers such as Ahn (1988), Kang (1987), Han (1990) among others[8]. Consider the following examples:

(5) Optional Glide Formation
a. /ki. + ta/ → [ki.ta] 'crawl'
  /ki. + əs* + ta/ → [ki.ət.ta] ~ [kjət.ta] ~ [ki.jət.ta] 'crawled'
b. /pi. + ta/ → [pi.ta] 'is empty'
  /pi. + əs* + ta/ → [pi.ət.ta] ~ [pjət.ta] ~ [pi.jət.ta][9] 'was empty'

As shown above, the surface forms alternate between [i] and [j]. Perhaps the above examples are realized as [ki.ət.ta] and [pi.ət.ta] in the initial syllabification. Then, in fast speech, they are resyllabified by optionally undergoing glide formation (i.e., [kjət.ta] and [pjət.ta]). Or, they undergo glide epenthesis (i.e., [ki.jət.ta] and [pi.jət.ta]) to avoid hiatus. Adopting Harris and Kaisse's (1999:139) 'Prevocalic Denuclearization' for Spanish high vowels, I assume that the high front vowel loses its syllabicity and is reincorporated into a syllable with the following vowel. I modify their formula and name it 'Optional Glide Formation' in the following:

(6) Optional Glide Formation[10]

```
   N       N                    N
   |       |          β         |
  [i]   [-high]   →   [i]     [-high]
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[7] Harris and Kaisse (1999) argue for the same dual status of Spanish glides within a syllable.

[8] But they do not observe that glide formation is related to syllable structure.

[9] The above-mentioned researchers do not mention the glide epenthesis in this case. But native speakers of Korean including me do optionally say, for instance, [pi.jət.ta].

[10] In Harris and Kaisse's study, this rule is originally used to explain the behavior of unstressed high vowels adjacent to other vowels. I disregard stress for the analysis I am proposing currently since Korean is not generally thought to be a stress language.

As they propose, when the nucleus is delinked, the constituency of a syllable is destroyed since the head of the syllable is the nucleus. Then the segments delinked by the above rule are resyllabified with the adjacent segments.

In the following I provide the derivational steps. Following Harris and Kaisse's notation (1999:133), the high front vocoid /i./ is marked as 'a syllable head (N) in underlying representation'. That is, the notation /i./ is substituted by the /i/ with an N as shown in the following:

(7) Derivation of the High Front Vocoid /i/ Lexically Marked for Syllabicity

$$
\begin{array}{c}
N \\
| \\
\text{Underlying Representation:} \qquad /ki + \text{əs}^* + ta/
\end{array}
$$

Syllabification:

Optional Glide Formation/
Glide Epenthesis:
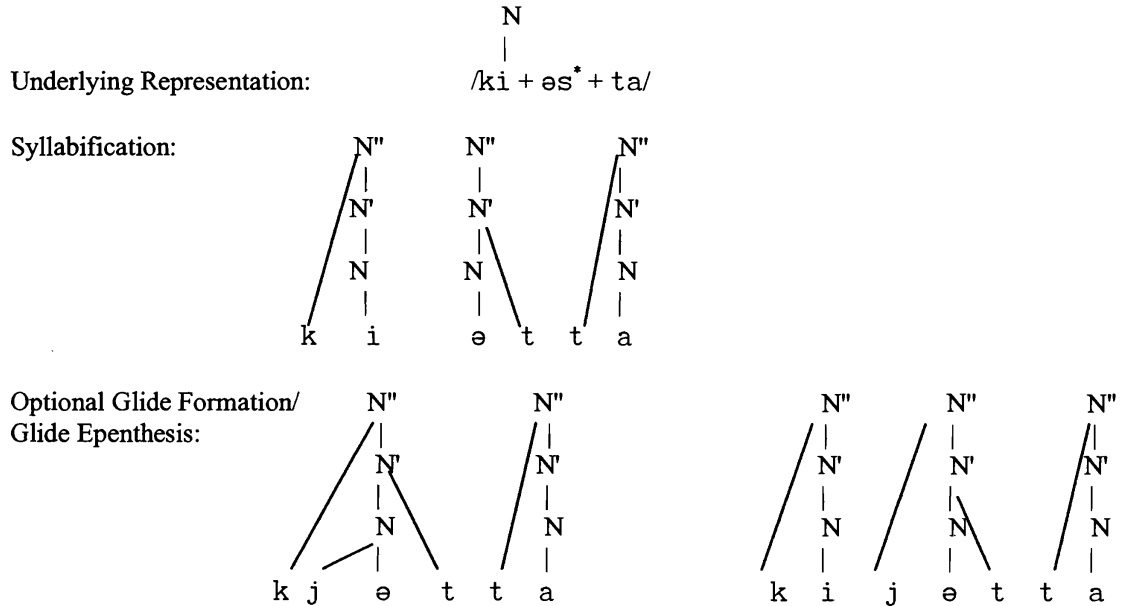
3. HIGH BACK VOCOIDS

High back vocoids (i.e., [+ high, +back, - consonantal] in underlying representation) pattern slightly differently from high front vocoids; lexically marked ones (i.e., /u./) are not found at all to my knowledge. I found 78 words in the Korean verbal dictionary (Hong, 1997) that have stem-final high back vocoids. I observe that all of them are not marked for syllabicity.

As we saw for the unmarked /i/, the surface realization of the unmarked /u/ depends on syllable structure. Consider the following examples:

(8) High Back Vocoids Lexically Unmarked for Syllabicity
a. /peu + ta/ → [pe.u.ta] 'learn'   *[pew.ta]
   /peu + əs* + ta/ → [pe.wət.ta] 'learned'   *[pe.u.ət.ta]
b. /s*au + ta/ → [s*a.u.ta] 'fight'   *[s*aw.ta]
   /s*au + əs* + ta/ → [s*a.wət.ta] 'fought'   *[s*a.u.ət.ta]

As I mentioned earlier, Korean does not allow off-glides (e.g., *[pew.ta]). The unmarked /u/ surfaces as [u] when it cannot be incorporated as an onset or an onglide (e.g., [pe.u.ta]), hence it occurs under nucleus. It obligatorily becomes a glide [w] when it is not a sonority peak (e.g., [pe.wət.ta], not *[pe.u.ət.ta]) within a syllable, that is, when it is followed by a non-high vowel within a syllable.

However, the unmarked /u/ has two surface realizations in C __ V environment. Consider the following

examples:

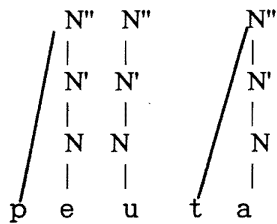(9) Two Optional Surface Variants of the Unmarked /ɯ/

a. /t͡ʃu + ta/ → [t͡ʃu.ta] 'give'   /t͡ʃu + əs* + ta/ → [t͡ʃu.ət.ta] ~ [t͡ʃwət.ta] 'gave'

b. /tu + ta/ → [tu.ta] 'put'   /tu + əs* + ta/ → [tu.ət.ta] ~ [twət.ta] 'put (PAST)'

As we saw for the unmarked /ɨ/, the unmarked /ɯ/ surfaces as [u] when it is a sonority peak within a syllable (e.g., [tu.ta]), hence it occurs under nucleus. But the syllabification rule for /ɯ/ in C __ V environment has two optional variants, i.e., [u] and [w] (e.g., [tu.ət.ta] ~ [twət.ta]). They are in free variation. It is not a matter of speech rate. Since its surface forms are not contrastive, there is no need to mark it in underlying representation.
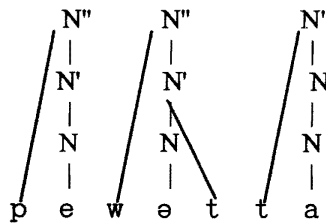
As I claim in my previous research (Yun 2001a, 2001b), syllable-initial glides are onset segments whereas glides in C __ V environment within a syllable are nuclear segments. The following are the syllable structures for [pe.u.ta], [pe.wət.ta], [tu.ət.ta] and [twət.ta]:

(10) Syllable Structure of High Back Vocoids Unmarked for Syllabicity

a. /peu + ta/ → [pe.u.ta]

```
   N"  N"      N"
   |   |      /|
   N'  N'     N'
   |   |      |
   N   N      N
   |   |      |
   p   e   u  t   a
```

b. /peu + əs* + ta/ → [pe.wət.ta]

```
       N"     N"      N"
       |      |       |
       N'     N'      N'
       |      /\      |
       N      N       N
       |      |       |
       p   e  w  ə  t  t   a
```

c. /tu + əs* + ta/ → [tu.ət.ta]

```
       N"     N"      N"
       |      |       |
       N'     N'      N'
       |      \       |
       N      N       N
       |      |       |
       t   u  ə  t    t   a
```
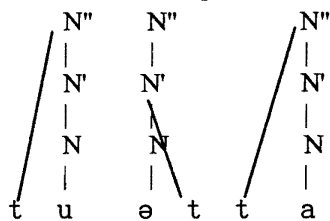
d. /tu + əs* + ta/ → [twət.ta]
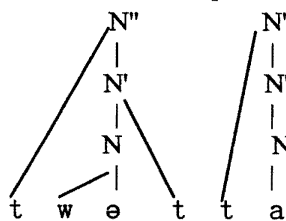
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       N"             N"
       |              |
       N'             N'
       |              |
       N              N
       |              |
       t   w  ə    t  t   a
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Since the surface realization of /ɯ/ depends on syllable structure, the feature [syllabic] is not needed as I mentioned before.

Although the unmarked /ɯ/ in C __ V environment within a syllable has two surface variants regardless of speech rate, native speakers of Korean prefer the [CwV(C)]$_\sigma$ forms to the [Cu.V(C)] forms. Consider the following examples:

(11)   *Preferred*   *Not Preferred*

a. [pu.su.ət.ta] ~ [pu.swət.ta] 'smashed'

b. [kɨ.man.tu.ət.ta] ~ [kɨ.man.twət.ta] 'stopped'

c. [pa.k*ʋ.ət.ta] ~ [pa.k*wət.ta] 'changed'

d. [mat.t͡ʃʰu.ət.ta] ~ [mat.t͡ʃʰwət.ta] 'adjusted'

e. [ta.ru.ət.ta] ~ [ta.rwət.ta] 'handled'

f. [na.nu.ət.ta] ~ [na.nwət.ta] 'divided'

The judgment of native speakers of Korean agrees on the use of both of the alternate forms shown above. However, when I consulted with many native speakers of Korean, they identified the examples with the stem-final [u] (e.g.,

[pu.su.ət.ta]) as old forms and told me that they did not use them usually regardless of speech rate. This suggests that the syllabification rule for /u/ is changing to be like that of /i/. That is, it is becoming obligatorily a glide in C __ V environment.

Among the 78 words with stem-final high back vocoids I found in the Korean verbal dictionary (Hong, 1997), 55 of them have the /u/ in C __ V environment within a syllable. I observe that 51 words of them behave like the examples in (11). Most of the native speakers of Korean that I consulted with consider that the remaining four words as shown in (9) may be equally acceptable but they still prefer [CwV(C)]σ (e.g., [t͡ʃwət.ta]) to [Cu.V(C)] forms (e.g., [t͡ʃu.ət.ta]). This shows the cross-linguistically observed property of syllables; onsetless syllables are marked. Thus, for instance, [pu.swət.ta] is preferred to [pu.su.ət.ta], which has an onsetless syllable. This also explains the obligatory glide formation of, for instance, [pe.wət.ta], not *[pe.u.ət.ta], which would have even two onsetless syllables if it were acceptable. The following summarizes this observation:

(12) Native Speakers' Judgment of Onsetless Syllables

Number of Onsetless Syllables	Examples	Native Speakers' Judgment
0	[pe.wət.ta], [pu.swət.ta]	Definitely Acceptable
1	[pu.su.ət.ta]	OK but Not Preferred
2	*[pe.u.ət.ta]	Not Acceptable

4. LEXICALLY MARKED AND UNMARKED VOCOIDS /o./ and /o/ IN KOREAN

In this section I discuss the mid back vocoids /o./ and /o/ in Korean. The behavior of the unmarked /o/ resembles that of the unmarked /u/. That is, it surfaces as [o] when it is a sonority peak within a syllable, otherwise, as [w]. It also has alternate surface forms [o] and [w] when it occurs in C __ V environment within a syllable. Consider the following examples:

(13) Mid Back Vocoids Lexically Unmarked for Syllabicity
a. /o + ta/ → [o.ta] 'come' /o + as* + ta/ → [wat.ta] 'came' *[o.at.ta]
b. /po + ta/ → [po.ta] 'see' /po + as*+ ta/ → [po.at.ta] ~ [pwat.ta] 'saw'
  /s*o + ta/ → [s*o.ta] 'shoot' /s*o + as* + ta/ → [s*o.at.ta] ~ [s*wat.ta] 'shot'

As shown above, the unmarked /o/ is realized as [o] when it is a sonority peak within a syllable (e.g., [o.ta], [s*o.ta]), hence it occurs under nucleus. It obligatorily becomes [w] when it is not a sonority peak within a syllable (e.g., [wat.ta], not *[o.at.ta]), that is, when it is followed by a low vowel, hence it occurs under onset. As in the case of the /u/, the syllabification rule for /o/ in C __ V environment has two optional variants, i.e., [o] and [w] (e.g., [s*o.at.ta] ~ [s*wat.ta]). They are in free variation. It is not a matter of speech rate. Since its surface forms are predictable, there is no need to mark it in underlying representation.

I found 32 words in the Korean verbal dictionary (Hong, 1997) that have stem-final mid back vocoids. Among them, I observe that 31 words have unmarked /o/. Native speakers of Korean do not consider that one of the alternate forms as shown above sounds older than the other. They both are equally acceptable.

However, there is one word that has a mid back vocoid lexically marked for syllabicity (i.e., /o./). I show it in the following:

(14) Mid Back Vocoid Lexically Marked for Syllabicity
a. /t͡ʃ*o. + ta/ → [t͡ʃ*o.ta] 'peck'
b. /t͡ʃ*o. + as* + ta/ → [t͡ʃ*o.at.ta] 'pecked' *[t͡ʃ*wat.ta]

As shown above, the /o./ is always realized as [o] regardless of speech rate and surrounding environment. It is not a matter of free variation (i.e., *[t͡ʃ*wat.ta]). Therefore, it contrasts in underlying representation. It patterns slightly differently from the marked /i./ since it never undergoes optional glide formation in fast speech.

The following summarizes the lexically marked and unmarked vocoids in verb stems and their surface realizations within a syllable, where DECL. stands for declarative forms:

(15) Underlying Forms of High Vocoids and their Surface Forms

Underlying Forms	Surface Forms within a Syllable		
	Onset Glide (i.e., [G[V]$_N$(C)]$_\sigma$)	Nuclear Glide (i.e., [C[GV]$_N$(C)]$_\sigma$)	Nuclear Vowel (i.e., [C[V]$_N$(C)]$_\sigma$)
/i/	[ko.jət.ta] 'gathered'	[maŋ.sə.rjət.ta] 'hesitated'	[maŋ.sə.ri.ta] 'hesitate (DECL.)'
/u/	[pe.wət.ta] 'learned'	[twət.ta] 'put (PAST)'	[tu.ət.ta] 'put (PAST)'
/i./	------	[kjət.ta] 'crawled'	[ki.ət.ta] 'crawled'
/u./	------	------	------
/o/	[wat.ta] 'came'	[pwat.ta] 'saw'	[po.at.ta] 'saw'
/o./	------	------	[t͡ʃ*o.at.ta] 'pecked'

Note that the marked vocoids (i.e., /i./ and /o./) are always nuclear segments whereas the unmarked vocoids (i.e., /i/, /u/, and /o/) are either onset or nuclear segments depending on their positions within a syllable.

5. CROSS-LINGUISTIC OBSERVATION FOR LEXICALLY MARKED AND UNMARKED HIGH VOCOIDS

Not only Korean but also other languages show the distinction between lexically marked and unmarked high vocoids. In this section I cite the research done for Spanish and Berber glides and high vowels to show that the current analysis for high vocoids is cross-linguistically observed. That is, they may be underlyingly the same segments, but also there are two types of underlying high vocoids, namely, those marked and unmarked for syllabicity. I cite Harris and Kaisse (1999) for Spanish cases, then move on to Guerssel (1986) for Berber cases.

5.1 High Vocoids Lexically Marked and Unmarked for Syllabicity in Spanish

Spanish also has lexically marked and unmarked high vocoids investigated by Hualde (1994) and Harris and Kaisse (1999), among others. In this section I summarize Harris and Kaisse's (1999) work. All of the data and most arguments in this section are from Harris and Kaisse (1999). They provide examples from standard Castilian, where syllable boundaries are indicated by dots, and the orthographic <h> is silent   (p. 123):

(16) a. [i]   [j]

      vac[i.á]ba   's/he emptied'   vic[já]ba 's/he vitiated'

      d[i.á]blo   'devil'   bon[já]to 'sweet potato'

   b. [u]   [w]

      z[u.á]vo   'Zouave'   s[wá]ve   'smoothe'

      <h>[u.í]da 'flight'   c[wí]da   's/he cares'

The high vowels [i, u] and glides [j, w] are not in complementary distribution. For instance, they both can occur

before a stressed vowel as shown above. Segmental context and morphological context do not determine surface realizations of these high vocoids. Harris and Kaisse claim that they are underlyingly contrastive. That is, the syllabicity of the high vowels in the above examples are lexically marked whereas the glides are derived from high vocoids lexically unmarked for syllabicity, hence they are realized as glides when there are more sonorous vocoids available for syllable peaks (pp. 123-124).

Syllabic vowels [i, u] in hiatus illustrate lexically marked high vowels as shown in the above examples. Harris and Kaisse use /i./ and /u./ to indicate high vowels lexically marked for syllabicity; /i/ and /u/ to indicate high vowels lexically unmarked for syllabicity. The following examples illustrate this (p. 124):

(17) a. Lexically Unmarked   b. Lexically Marked

/i/   /i./

p/i/so → p[í].so   <h>/i.a/to → <h>[i.á].to

bon/ia/to → bo.n[já].to

/u/   /u./

p/u/so → p[ú].so   z/u.a/vo → z[u.á].vo

s/ua/ve → s[wá].ve

It is well known that stress assignment follows syllabification. Therefore, the high vowels and the glides in the above examples are syllabified before stress assignment. Based on this observation Harris and Kaisse conclude that they are lexically determined. Words with lexically unmarked high vocoids outnumber lexically marked ones (p. 185).

5.2   High Vocoids Lexically Marked and Unmarked for Syllabicity in Berber

High vocoids in the Ait Seghrouchen dialect of Berber, spoken in the Middle Atlas Mountains of Morocco, also show the same properties that are found in Korean and Spanish. That is, glides and high vowels may be underlyingly the same, and there is lexical distinction between high vocoids. In this section I cite Guerssel (1986). All of the data and most arguments in this section are from his work. He provides the following examples (p. 4):

(18) Lexically Marked and Unmarked High Vowels in Berber

a. [təssu] 'she made a bed'   [təssu-j-aχ] 'she made us a bed'   not *[təsswax]

   [təssu] 'she made drink'   [təssw-aχ] 'she made us drink'   not *[təssuyaχ]

b. [turi] 'she wrote'   [turi-j-aχ] 'she wrote us'   not *[turjaχ]

   [tuli] 'she ascended'   [tul-j-aχ] 'she ascended for us'   not *[tulijaχ]

As shown above, high vowels show two different kinds of behavior when they are followed by other vowels. Consider, for instance, [təssu] 'she made a bed' vs. [təssu] 'she made drink'. When they are followed by a vowel-initial suffix [aχ], the stem-final vocoid in the former is realized as [u] with the [j] epenthesis to avoid hiatus, and the one in the latter as [w] (p.4). Guerssel concludes that the distinctions are lexically determined; one of these is marked in underlying representation for syllabicity, and the other is not. The unmarked ones are realized as a vowel when they are not adjacent to other vowels, and as glides otherwise; the marked ones are always realized as high vowels.

6.   ANOTHER APPROACH: MORAIC THEORY

Han (1990) claims that short stem-final high vowels and mid back vowels in verbs are underlyingly non-moraic, and they undergo obligatory glide formation (e.g., /moi + əs* + ta/ → [mo.jət.ta] 'gathered') between vowels; however, long stem-final vowels in verbs are underlyingly moraic, and they undergo optional glide formation (e.g., /kʼuː + əs* + ta/ 'dreamed' → [kʼu.ət.ta] → [kʼwəːt.ta]). She assumes that the long

stem-final high vowel obligatorily undergoes shortening when it is followed by a vowel-initial suffix, then undergoes optional glide formation (e.g., /k*uː + əs* + ta/ 'dreamed' → [k*uː.ət.ta] → [k*u.ət.ta] → [k*wəːt.ta]), whereas the short stem-final high vowel does not (e.g., /ki + əs* + ta/ 'crawled' → [ki.ət.ta] → [kjəːt.ta]).

Her explanation of glide formation does not agree with my analysis in essentials, in addition to the fact that we use different approaches. I assume that there are no underlying high and mid back vowels (i.e., */i/, */u/, */o/). Rather, there are [+/- high, +/- back, - consonantal] segments either marked or unmarked for syllabicity. I have claimed that the marked ones are always realized as vowels whereas the surface forms of the unmarked ones depend on syllable structure. However, she assumes that there are underlying vowels, for instance, a moraic /iː/ and a non-moraic /i/. She explains the surface forms of the underlying vowels using glide formation without considering syllable structure; she simply assumes that underlying stem-final high and mid back vowels in verbs obligatorily become glides between vowels, and optionally become glides between a consonant and a non-high vowel.

Harris and Kaisse (1999:133) also mention that Hualde (1994, for Spanish) and Pulleyblank (1994, for Yoruba) claim that vowels are underlyingly moraic segments, but glides are not. Harris and Kaisse argue that stress assignment is closely related to glides within syllable rhymes. For instance, a syllable-initial glide (e.g., $[jV]_\sigma$) is a weightless segment (i.e., not moraic) since it is an onset segment (i.e., outside a rhyme) whereas a glide after a tautosyllabic segment (e.g., $[CjV]_\sigma$) has weight (i.e., moraic) since it is a nuclear segment. That is, the moraic status of glides is determined depending on their position within a syllable, but is not distinctive in underlying representation. Based on this, Harris and Kaisse argue that Hualde and Pulleyblank's approaches are ad hoc because they must make underlyingly non-moraic glides moraic at later stage in the derivation.

7. CONCLUSION

In this paper I have discussed two types of high vocoids. One is lexically marked for syllabicity. It is always realized as a high vowel, hence occurs under nucleus (e.g., [ki.ət.ta] 'crawled'); it can also form a complex nucleus with the following vowel by optional glide formation (i.e., resyllabification) in fast speech and becomes a glide (e.g., [kjət.ta] 'crawled'). In previous research (Yun 2001a, 2001b), I claim that syllable-initial glides are onset segments, whereas glides after a tautosyllabic consonant are nuclear segments. In any case, marked ones are always nuclear segments.

The high vocoid lexically unmarked for syllabicity is realized as a high vowel when it is a sonority peak within a syllable (e.g., [maŋ.sə.ri.ta] 'hesitate'), or when it cannot be incorporated as an onset or an onglide (e.g., [pe.u.ta] 'learn', not *[pew.ta]). If it is not a sonority peak within a syllable, that is, when it is followed by a non-high vowel, which is available for nucleus, it is realized as a glide (e.g., [maŋ.sə.rjət.ta] 'hesitated', [pe.wət.ta] 'learned').

In Korean the mid-back vocoids also pattern with high back vocoids. There are lexically marked (i.e., /o./) and unmarked ones (i.e., /o/). They also pattern with the high vocoids.

It is not only in Korean but also in other languages that there is lexical distinction between underlying high vocoids. This is cross-linguistically observed. I have cited examples from Spanish and Berber. And also the feature [syllabic] is not needed as claimed by many researchers based on observation in other languages since high vowels and glides are derived from unmarked high vocoids and their surface forms are predictable depending on the syllable structure.

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