A Correspondence Approach to Glide Formation

in Korean*

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This paper proposes two types of glide formation in Korean, obligatory and optional ones. Following H. S. Kang(1998), obligatory glide formation is an instance of IO-correspondence and optional glide formation, that of OO-correspondence. The formal speech form may have the casual speech form to avoid vowel hiatus. The constraint responsible for glide formation is Onset. The difference between the formal speech form and the casual speech form is constraint ranking between *CG and Onset.

1. Introduction

When a verb stem-final vowel *o/u, i* in Korean is followed by a vowel-initial suffix *ə/a*, the verb stem-final vowel may become a glide *w, y*, as shown in (1):

(1)　　　　　　formal speech form casual speech form
　　a. /k'u + ə/ 　→　 [k'uə] ~ [k'wəː] 'to borrow (money)'
　　b. /ki + ə/ 　→　 [kiə] ~ [kyəː] 'to crawl'
　　c. /o + a/ 　→　 *[oa] ~ [wa] 'to come'

This was analyzed as a strategy to avoid vowel hiatus by H. B. Choi(1971), W. Huh(1965) and Kim-Renaud (1982). The explanation of glide formation has been different from theory to theory. Within the framework of SPE, B. G. Lee(1978), J. W. Yu(1985), and Kim-Renaud (1973) proposed the glide formation rule. S. K. Kang(1992), Y. S. Lee(1993) analyzed it as delinking of moras under moraic analysis. Y. S. Lee(1996, 1997) and O. Kang(1997) proposed an IO-correspondence to glide formation. Their analysis of optional glide formation is based on the tied ranking between constraints. However, H. S. Kang (1998) differentiated obligatory glide formation as IO-correspondence and optional glide formation as OO-correspondence.

In this paper I will analyze optional glide formation in Korean verbs as a casual speech form. A vowel hiatus context found in the formal speech form is eliminated either by vowel coalescence as in (2a) or by vowel elision as shown in (2b):

(2) a. /sə+iu/ 　　　→　 [seu] 　　　　　'to let ... stand'
　　/ča + iu/ 　　→　 [čɛu] 　　　　　'to let a child go to sleep'

b. /s'ɨ+ ə/ → [s'ə], *[s'ɨə] 'to write'
/ka+ɨmyən/ → [ka.myən], *[ka.ɨ.myən] 'if go'

In this paper, first, I will argue that the constraint responsible for glide formation is Onset; second, constraint reranking predicts different outputs for the formal speech form and the casual speech form or between standard Korean and other dialects.

2. Correspondence Theory

Glide formation will be analyzed under Correspondence Theory. McCarthy and Prince(1993 et seq.) posit correspondence mapping between two given strings:

(3) Correspondence Theory(McCarthy and Prince 1995)
Given two strings S_1 and S_2, correspondence is a relation $\mathcal{R}$ from the elements
of S_1 to those S_2. Segments α (an element of S_1) and β (an element of S_2) are
referred to as correspondents of one another when $\alpha \mathcal{R} \beta$.

The theory in (3) requires mutual correspondence between S_1 and S_2. Correspondence identity is regulated by faithfulness constraints in (4).

(4) Faithfulness Constraints
MAX: every segment in S_1 has a correspondent in S_2.
DEP: every segment in S_2 has a correspondence in S_1.
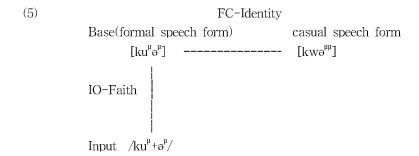IDENT(μ): mora associations in S_1 should be the same as those in S_2.
MAX(μ): every mora in S_1 has a correspondent in S_2.

where S_1 is the input, base, and S_2 is the output, shortened word.

At first correspondence identity was limited to the relation between the input and output as (IO-correspondence). Recently it has been extended to explain the relation between the base and the reduplicant (McCarthy and Prince 1995) and between the base and the truncated form(Benua 1995) as output-to-output(OO-correspondence).

Identity of the pairs of IO-correspondence and OO-correspondence is regulated by parallel but distinct sets of faithfulness constraints (MAX-IO, MAX-FC, DEP-IO, DEP-FC, IDENT-IO(μ), IDENT-FC(μ), MAX-IO(μ), MAX-FC(μ), etc.), which will be referred to as IO-Faith and FC-Identity.

Along these lines, I assume that the formal speech form in Korean verbs is an output related to the input by IO-correspondence while the casual speech form is also another output related to the formal speech form by OO-correspondence. The lines in (5) represent correspondence relations.

(5)   FC-Identity

          Base(formal speech form)   casual speech form
              $[ku^\mu ə^\mu]$ -------------- $[kwə^{\mu\mu}]$
                      ┊
          IO-Faith   ┊
                      ┊
                      ┊
          Input $/ku^\mu + ə^\mu/$

As shown in (5), the formal speech form and the casual speech form are separate, prosodified outputs. A vowel hiatus found in formal speech disappears by glide formation of the stem-final vowel in casual speech.

The constraint responsible for casual speech forms is Onset:

(6) Onset: syllables must have onset.

Casual speech forms reflect the fact that syllables tend to have onset. Glide formation in (5) satisfies Onset, but it violates *CG.

In section 4 I will consider how constraints are reordered in the formal speech form and in the casual speech form.

3. Constraints Related to Syllabification in Korean

Let us first consider constraints related to syllable structure in Korean. In this paper I follow the assumption that glides in Korean belong to the onset(C. K. Gim 1987; S. C. Ahn 1988). Only vowels in Korean are moraic so that long vowels are bimoraic.

(7) Syllable Structure Constraints
    a. Onset: syllables have onsets(Prince & Smolensky 1993).
    b. *CG: do not have the complex onset, Cw or Cy.
    c. *Tri-μ: Trimoraic syllables are not allowed.

Korean has several phonotactic constraints. First, the complex onset CG is not pronounced in Kyungsang dialect.

(8) Standard Korean   Kyungsang dialects   glossary
    a. p'yam   p'am   'cheek'
    b. k'wak   k'ak   'tightly'
    c. kyə   ke   'chaff'

This means that in Kyungsang dialect the phono-constraint *CG is ranked higher than MAX-IO, while in standard Korean it is reversed.

Second, Korean has a positional restriction on vowel length. Standard Korean allows long vowels only in word-initial position. Therefore, compensatory lengthening in the casual speech form is allowed only word-initially as shown in (1a)-(1b). If an underlyingly long vowel occurs

in non-initial position, it is shortened as shown in (9):

(9) a. /nuːn/ 'snow'   /hampak+nuːn/   → [hambaŋnun]
    b. /kuːl/ 'cave'   /t'aŋ+kuːl/   → [t'aŋk'ul]
    c. /noːl+ta/ 'play+Dec' /t'wi + noːl(ta)/ → [t'winolda]
    d. /mɛː+ta/ 'tie+Dec'   /əlk+ mɛ(ta)/   → [əŋmɛda]

This mora shortening is due to the constraint Align-$\sigma_{\mu\mu}$:

(10) Align-$\sigma_{\mu\mu}$(Y. S. Lee 1997)
     Heavy syllables are in the initial position of a PrWd.

Underlyingly long vowels in (9) cannot occur since Align-$\sigma_{\mu\mu}$ dominates MAX-IO(μ).

(11) Align-$\sigma_{\mu\mu}$ ≫ MAX-IO(μ)

Third, when a bimoraic verb stem-final vowel is followed by a vowel-initial suffix as shown in (12a), it gets shortened, while it is preserved when followed by a consonant-initial suffix in (12b). This was analyzed as a laxing rule by W. J. Kim(1972), and B. G. Lee(1976).

(12)   formal speech form casual speech form
    a. /k'oː + a/   →   [k'oa] ~ [k'waː] 'to twist'[1]
       /k'oː + ko/   →   [k'oːgo]   'to twist + Conn.'
    b. /s'uː + ə/   →   [s'uə] ~ [s'wəː] 'to cook soup'
       /s'uː + ko/   →   [s'uːgo]   'to cook soup + Conn'
    c. /piː + ə/   →   [piə]   ~ [pyəː]   'to blossom'
       /p'iː + ə/   →   [p'iə] ~ [p'yəː] 'to twist one's ankles'

Shortening of the mora in the formal speech form in (12a) is phonological.
Casali(1996) proposed a constraint, which disfavors phonetically long vowels in prevocalic position:

(13) Short(Casali 1996)
     Prevocalic vowels should not be bimoraic.

Thus, in (12a) shortening applies because Short dominates MAX-IO(μ).

(14) Phono-constraint ≫ IO-Faith
     Short ≫ MAX-IO(μ)

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[1] An anonymous reviewer pointed out to me that the long vowel in the input is questionable. For speakers who do not have long and short vowel distinction in the input, each input contains a short vowel:
    a. /k'o + a/   →   [k'oa] ~ [k'wa] (look at later in (20))
    b. /k'o + ko/   →   [k'ogo]
In this case the non-occurrence of long vowel in the output is due to the phono-constraint No-long V. No-long V dominates MAX-IO(μ).

Based on the constraints mentioned in this section, I will investigate glide formation in Korean verbs in next section.

4. Glide Formation and Compensatory Lengthening

4.1. Optional Glide Formation

The following words show alternating outputs. One is formed in formal speech and the other, in casual speech. The second case is what has been called optional glide formation.

Let us first look at the case. In addition to formal speech forms, a monosyllabic stem-final vowel u/o may surface as w, when followed by a vowel-initial suffix ∂/a as shown in (15a). By the same token, the stem-final i may surface as y, as shown in (15b).

(15) a.　　　formal speech form casual speech form

/k'u + ə/	→	[k'uə]	~	[k'wəː]	'to loan (money)'
/tu + ə/	→	[tuə]	~	[twəː]	'to place (something where)'
/po + a/	→	[poa]	~	[pwaː]	'to look at'
/o + a/	→	[wa]	~	*[waː]	'to come'

b.

/ki + ə/	→	[kiə]	~	[kyəː]	'to crawl'
/t'i + ə/	→	[t'iə]	~	[t'yəː]	'to wear a belt'
/si + ə/	→	[siə]	~	[ʃyəː]	'to be sour'
/i + ə/	→	[iə]	~	[yəː]	'to carry ...... on one's head'

Formal speech forms in (15) are realized by IO-correspondence. In (16b) o in the input does not have a correspondent in the output so that it violates MAX-IO and MAX-IO(μ). An insertion of a new segment in (16c) violates the highest DEP-IO. The suboptimal (16d), which has a complex onset, is ruled out since it violates *CG. The candidate (16a), which violates Onset once, is optimal.

(16) formal speech form:　　*CG ≫ Onset

Input: /po$^{\mu}$+a$^{\mu}$/	a. MAX-IO b. DEP-IO	*CG	a. Onset b. IDENT-IO(μ)	MAX-IO(μ)
☞ a. .po$^{\mu}$a$^{\mu}$.			a. *	
b. .pa$^{\mu}$.	a. *!			*
c. .po$^{\mu}$.□a$^{\mu}$.	b. *!			
d. .pwa$^{\mu\mu}$.		*!	b. **(w, aː)	

Comparing (16a) and (16d), a violation of *CG is fatal than that of Onset. That means in careful speech pronunciation of onset cluster is less harmonious than that of onsetless syllable. This implies that *CG dominates Onset in I-O correspondence.

(17) Formal speech form:　　*CG ≫ Onset

The formal speech form in (16a) /po$^{\mu}$a$^{\mu}$/ is shortened to /pwa$^{\mu\mu}$/ in casual speech as OO-correspondence. Glide formation of the stem-final vowel is motivated to avoid vowel hiatus. This means IDENT-BS(μ) is dominated by Onset in shortening. Contrary to (17), the ranking

between Onset and *CG is reversed in casual speech forms.

(18) Casual speech form: Onset ≫ *CG

Let us see how constraints are reranked in (19) for casual speech forms. In (19a) Onset is violated. The vowel *o* in (19b) does not have any correspondent in the casual speech form, violating MAX-FC and MAX-FC(μ). An insertion of a new segment in the casual speech form in (19c) is ruled out by DEP-FC. To eliminate (19e) from the optimal output, MAX-FC(μ) must dominate IDENT-FC(μ).

(19) Casual speech form: Onset ≫ MAX-FC(μ) ≫ *CG, IDENT-FC(μ)

Base: /po$^\mu$a$^\mu$/	a. MAX-FC b. DEP-FC	Onset	MAX-FC(μ)	a. *CG b. IDENT-FC(μ)
a. .po$^\mu$.a$^\mu$.		*!		
b. .pa$^\mu$.	a. *!			
c. .po$^\mu$.□a$^\mu$.	b. *!			
☞d. .pwa$^{\mu\mu}$.				a.* b.**(w,a:)
e. .pwa$^\mu$.			*!	a.* b.*(w)

Here, (19d) is the most harmonious than any other candidates. The violation of *CG and IDENT-FC(μ) can be neglected since they are ranked lower than Onset.

Next, let us look at monosyllabic verb stems, which end in a bimoraic vowel.

(20)   formal speech form   casual speech form

/ko:+a/ → [koa]   ~   [kwa:]   'to be beautiful'

/pi:+ə/ → [piə]   ~   [pyə:]   'to blossom'

/p'i:+ə/ → [p'iə] ~   [p'yə:]   'to twist one's ankles'

The formal speech form of /ko:+a/ may have the following candidates. The candidate (21a) is ruled out by the highest constraint Short since the long vowel *o* is followed by the short vowel *a*. The candidate (21b) violates *CG, IDENT-IO(μ) and MAX-IO(μ). The candidate (21d) is filtered out by Align-σ$_{\mu\mu}$. This shows that Align-σ$_{\mu\mu}$ dominates MAX-IO(μ). The candidates (21e) and (21f) are filtered out by MAX-IO and DEP-IO, respectively. In sum, (21c) is selected as optimal.

(21) formal speech form: Align-σ$_{\mu\mu}$, Short ≫ MAX-IO(μ)

Input: /ko$^{\mu\mu}$+a$^\mu$/	a. Align-σ$_{\mu\mu}$ b. Short	a. MAX-IO b .DEP-IO	*CG	a. Onset b. IDENT-IO(μ)	MAX-IO(μ)
a. .ko$^{\mu\mu}$.a$^\mu$.	b. *!			a. *	
b. .kwa$^{\mu\mu}$.			*!	b. **(w, a:)	*
☞ c. .ko$^\mu$.a$^\mu$				a. * b. *(o)	*
d. .ko$^\mu$.a$^{\mu\mu}$.	a. *!			a.* b.**(o, a:)	
e. .ko$^{\mu\mu}$._.		a. *!			*
f. .ko$^{\mu\mu}$.□a$^\mu$.	b. *!				

The formal speech form ko$^\mu$a$^\mu$ may undergo shortening by OO-correspondence. Most notably (22b) is ruled out since it violates Onset. The form (22a), which violates *CG and IDENT-FC(μ) is selected as optimal.

(22) FC-Identity: casual speech form

Base: /ko$^\mu$a$^\mu$/	a. MAX-FC b. DEP-FC	Onset	MAX-FC(μ)	a. *CG b. IDENT-FC(μ)
☞ a. .kwa$^{\mu\mu}$.				a.* b.**(w,aː)
b. .ko$^\mu$.a$^\mu$.		*!		
c. .ko$^\mu$._.	a. *!		*	
d .ko$^\mu$.□a$^\mu$.	b. *!			
e. .kwa$^\mu$.			*!	a. * b. *(w)

Let us take a look at optional glide formation of disyllabic verb stems. Note that compensatory lengthening only applies to the first syllable of the casual speech form. It does not apply to the non-initial syllable of the casual speech form as shown in (23):

(23)   formal speech form casual speech form

/kak'u+ə/ → [kak'uə] ∼ [kak'wə], *[kak'wəː]   'to decorate'

/nanu+ə/ → [nanuə] ∼ [nanwə], *[nanwəː]   'to devide'

/čɨlki+ə/ → [čɨlgiə] ∼ [čɨlgyə], *[čɨlgyəː]   'to enjoy'

/pumpi+ə/ → [pumbiə] ∼ [pumbyə],*[pumbyəː]   'to be crowded'

The candidate (24b) is filtered out by the phono-constraint Align-σ$_{\mu\mu}$. This suggests that MAX-IO(μ) is dominated by Align-σ$_{\mu\mu}$. The candidate (24c) violates *CG, IDENT-IO(μ) and MAX-IO(μ). The candidate (24d), where the vowel *u* does not have a correspondent in the output, is ruled out by MAX-IO. Therefore, (24a) is the winner.

(24) IO-Faithfulness(formal speech form): Align-σ$_{\mu\mu}$ ≫ MAX-IO(μ)

Input: /ka$^\mu$k'u$^\mu$+ə$^\mu$/	Align-σ$_{\mu\mu}$	MAX-IO	*CG	a. Onset b. IDENT-IO(μ)	MAX-IO(μ)
☞a. .ka$^\mu$.k'u$^\mu$.ə$^\mu$.				a. *	
b. .ka$^\mu$.k'wə$^{\mu\mu}$.	*!		*	b.**(w, əː)	
c. .ka$^\mu$.k'wə$^\mu$.			*!	b.*(w)	*
d. .ka$^\mu$.k'_ə$^\mu$.		*!			*

The formal speech form (24a) may have a casual speech form. The candidate (25a) is ruled out by Onset. The form (25b), which violates MAX-FC(μ), *CG, IDENT-FC(μ), is optimal. Here, (25b) is harmonious than (25c) since (25c) violates the highest constraint Align-σμμ.

(25) OO-Identity(casual speech form): Onset ≫ MAX-FC(μ) ≫ *CG

Base: /kaʰk˙uʰəʰ/	Align-σ_μμ	Onset	MAX-FC(μ)	a. *CG b. IDENT-FC(μ)
a. .kaʰ.k˙uʰ.əʰ.		*!		
☞b. .kaʰ.k'wəʰ.			*	a.* b. *(w)
c. .kaʰ.k'wəᵘᵘ.	*!			a.* b.**(w, əː)

We have seen that disyllabic verb stems show the same constraint ranking for IO and OO-correspondence as monosyllabic verb stems.

Unlike standard Korean, in Yŏsu dialect complementary lengthening applies every syllable in the casual speech form(Se-Kwan Ki 1997).

(26)   formal speech form casual speech form

/čitalli+ə/   →   [čittaliə] ~ [čitallyəː]   'to wait'

/kalčʰi+ə/   →   [kalčʰiə] ~ [kalčʰyəː]   'to teach'

/kalli+ə/   →   [kalliə] ~ [kalliː]   'to divorce'

I claim that in Yŏsu dialect MAX-FC(μ) and MAX-FC should be ranked as the highest constraint. Furthermore, MAX-FC(μ) dominates Align-σ_μμ to guarantee complementary lengthening in any syllable of the casual speech form. Then, the candidate (27b) is the optimal output.

(27) MAX-FC, MAX-FC(μ) ≫ Align-σ_μμ

Base: /kaʰllkiʰəʰ/	a. MAX-FC b. MAX-FC(μ)	Onset	a. *CG b. IDENT-FC(μ)	Align σ_μμ
a. kaʰlliʰəʰ		*!		
☞b. kaʰllyəᵘᵘ			a. * b. **(y,əː)	*
c. kaʰllyəʰ	b. *!		a. * b. *(y)	

With respect to complementary lengthening, standard Korean and Yŏsu dialect show different constraint ranking between MAX-FC(μ) and Align-σ_μμ. In standard Korean Align-σ_μμ dominates MAX-FC(μ) while in Yŏsu dialect it is reversed.

4.2. Obligatory Glide Formation(OGF)

In this section I will consider obligatory glide formation in Korean verbs. As shown in (28), Korean verbs do not allow a sequence of two onsetless syllables. Therefore, less sonorous vowel o/u, i obligatorily becomes a glide w, y if it is followed by more sonorous vowel ə/a.

(28) a. /meu + ə/   →   *[meuə], [mewə], *[mwəː] 'to be spicy'

       b. /s'au + ə/   →   *[s'auə], [s'awə] *[s'wəː] 'to fight'

       c. /o + a/   →   *[oa],   [wa]   'to come'

       d. /moi+ a/   →   *[moiə], [moyə], *[myəː] 'to gather'

The data (28) show only one output per each word, which is a result of IO-correspondence. Note

that obligatory glide formation does not undergo optional glide formation as shown above since each syllable in the output has an onset. This means that there is no OO-correspondence for obligatory glide formation.

In (29a) the Onset constraint is violated twice. In (29b) glide formation of u into w satisfies the constraint Onset, violating IDENT-IO(μ) and MAX-IO(μ). The form in (29f) violates IDENT-IO(μ) twice. Considering (29b) and (29f), MAX-IO(μ) is dominated by IDENT-IO(μ). The optimal output is (29b), which has onset in each syllable and does not violate Align-σ$_{\mu\mu}$ but violates MAX-IO(μ).

(29) Onset, IDENT-IO(μ) ≫ MAX-IO(μ)

Input: /me$^{\mu}$u$^{\mu}$+ə$^{\mu}$/	Align-σ$_{\mu\mu}$	a. MAX-IO b. DEP-IO	a. Onset b. IDENT-IO(μ)	MAX-IO(μ)
a. .me$^{\mu}$.u$^{\mu}$.ə$^{\mu}$.			a. **!	
☞b. .me$^{\mu}$.wə$^{\mu}$.			b. *(w)	*
c. .me$^{\mu}$.wə$^{\mu\mu}$.	*!		b. **(w, ə:)	*
d. .me$^{\mu}$._ə$^{\mu}$.		a. *!	a. *	*
e. .me$^{\mu}$.u$^{\mu}$.□ə$^{\mu}$.		b. *!		
f. .me$^{\mu\mu}$.wə$^{\mu}$.			b. **(e:, w)!	

In section 4 I have discussed obligatory glide formation and optional glide formation at different level. For both cases, the optimal candidate is selected due to the constraint Onset. The formal speech form is produced by IO-correspondence and the casual speech form is done by OO-correspondence if vowel hiatus occurs.[2] For casual speech forms Onset dominates *CG and IDENT-FC(μ), whereas for formal speech forms and obligatory glide formation *CG dominates Onset and IDENT-IO(μ). The constraint ranking for standard Korean and Yŏsu dialect are summarized below.

(30) a. formal speech form (obligatory GF) in Standard Korean
  Align-σ$_{\mu\mu}$, Short ≫ MAX-IO, DEP-IO≫ *CG ≫ Onset, IDENT-IO(μ) ≫ MAX-IO(μ)
  b. casual speech form (optional GF) in Standard Korean
  Align-σ$_{\mu\mu}$, Short ≫ MAX-FC, DEP-FC ≫ Onset ≫MAX-FC(μ) ≫ *CG, IDENT-FC(μ)
  c. casual speech form in Yŏsu dialect
  MAX-FC, MAX-FC(μ)≫ Onset≫ *CG, IDENT-FC(μ) ≫ Align-σ$_{\mu\mu}$

5. Residual Problems

Finally, let us consider residual problems, which cannot be handled by the glide formation discussed so far.

First, an alveopalatal $\check{c}$ draws a special attention. In standard Korean stem-final vowel i cannot become a glide y if the onset is an alveopalatal $\check{c}$. This means the onset cluster $\check{c}y$ is not allowed in the output. Furthermore, compensatory lengthening does not apply to casual speech forms in the columns C and D of (31):

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[2] H. S. Kang(1998) claims that the difference may be achieved by *Struc(σ)$_{cas}$, functioning as the 'casual speech morpheme'. I don't agree with her at this point.

(31)   A   B   C   D
  a. /či+ə/   → [čiə]   ~ [čə], *[čyəː], *[čəː],   'carry on the back'
  b. /č'i+ə/ → [č'iə] ~ [č'ə], *[č'yəː], *[č'əː], 'to steam'
  c. /čʰi+ə/ → [čʰiə] ~ [čʰə], *[čʰyəː], *[čʰəː], 'to run over'
  d. /kači+ə/ → [kaǰiə] ~ [kaǰə],*[kaǰyəː],*[kaǰəː], 'to have'

The non-occurrence of *čy* in casual speech forms in (31C) can be explained by the OCP effect. Assuming that both *č* and *y* have the feature [+palatal], *čy* on the onset is prohibited by OCP[+palatal]. This is due to the following constraint ranking:

(32) OCP[+palatal] ≫ MAX-FC

Let us look at candidates for the formal speech form /či+ə/. For the formal speech form the non-occurrence of the onset cluster *čy* in (33d) can be explained by *CG. The candidate (33c) is ruled out by MAX-IO. Since Onset and IDENT-IO(μ) are tied-ranked, (33a) and (33b) would be winners. However, the optimal form is (33a).

(33) formal speech form:

Input: /čiᵘ+əᵘ/	MAX-IO	*CG	a. Onset b. IDENT-IO(μ)	MAX-IO(μ)
☞ a. .čiᵘ.əᵘ.			a. *	
b. .čəᵘᵘ.			b. *(əː)	
c. .čəᵘ.	*!			*
d. .čyəᵘᵘ.		*!		

A vowel hiatus in the formal speech form čiᵘəᵘ disappears in the casual speech form. The candidate (34b) is excluded from the optimal output since OCP[+pal] dominates MAX-FC in OO-correspondence. Following constraint ranking (30b), (34c) would be optimal. However, winner is (34d).

(34) casual speech form: OCP[+pal] ≫ MAX-FC

Base: /čiᵘəᵘ/	OCP[+pal]	MAX-FC	Onset	MAX-FC(μ)	a. *CG b. IDENT-FC(μ)
a. .čiᵘ.əᵘ.			*!		
b. .čyəᵘᵘ.	*!				a.* b. **(y, əː)
☞ c. .čəᵘᵘ.					b. *(əː)
d. .čəᵘ.		*!		*	

Since the constraint ranking (30) cannot predict the optimal outputs in (33) and (34), we have to think about another way.

First, the constraint Uniformity is responsible for the non-occurrence of compensatory lengthening for casual speech forms in (31D)

(35) Uniformity(No Coalescence, McCarthy and Prince 1993)

No element of S_2 has multiple correspondents in S_1.

For any x, y $\in S_1$ and z $\in S_2$, if x Я z and y Я z, then x=y.

Compensatory lengthening is blocked if Uniformity dominates MAX(µ).

Second, for the casual speech form in (31B) the stem-final i is deleted instead of the suffix-initial ə. Thus, the constraint MAX needs to be elaborated. The relevant constraints for this is given below.[2]

(36)

a. MAX(F. ms): every segment in a monosegmental morpheme S_1 has a correspondent in S_2.

b. MAX(F. lex): every segment in a lexical word or morpheme S_1 has a correspondent in S_2.

With constraints (34) and (35), let us reanalyzed (33) and (34). When MAX(ə, ms)-IO and MAX(i, lex)-IO are tied-ranked, both segments are realized. Therefore, (37a) is optimal.

(37) formal speech form: MAX(i, lex)-IO, MAX(ə, ms)-IO ≫ Uniformity

Input: /čiʲᵘ+əʲᵘ/	a. MAX(ə, ms)-IO b. MAX(i, lex)-IO	a. Onset b. IDENT-IO(µ) c. Uniformity	MAX-IO(µ)
☞a. .čiʲᵘ.əʲᵘ.		a. *	
b. .čəʲᵘᵘ.	b. *!	b. *(əː) c. *!	
c. .čəʲᵘ.	b. *!		*
d. .čiʲᵘ.	a. *!		*

Since the formal speech form čiʲᵘəʲᵘ shows vowel hiatus, it undergoes shortening. Deletion of /i/ in (38d) is preferred over that of /ə/ in (38e) since MAX(ə, ms)-FC dominates MAX(i, lex)-FC. Therefore, (38d) is the optimal output.

(38) OCP[+pal] ≫ MAX(ə, ms)-FC ≫ Onset ≫ Uniformity ≫ MAX(i, lex)-FC

Base: /čiʲᵘəʲᵘ/	OCP[+pal]	MAX(ə,ms)-FC	Onset	a *CG b. IDENT-FC(µ) c. Uniformity	a. MAX(i,lex)-FC b. MAX-FC(µ)
a. .čiʲᵘ.əʲᵘ.			*!		
b. .čyəʲᵘᵘ.	*!			a.* b.**(y, əː)	
c. .čəʲᵘᵘ.				b. *(əː)! c. *	a. *
☞d. .čəʲᵘ.					a. * b. *
e. .čiʲᵘ.		*!			b. *

Contrary to standard Korean in (38), Chindo dialect(H. S. Kang 1995), one of Chŏlla dialects, is interesting. In casual speech the onset cluster čʰy is prefectly pronounced and compensatory lengthening applies in any syllable of the word, as shown in (39):

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[2] Casali(1996) proposed the following constraints for this.

Parse(F. ms) Parse F in a monosegmental morpheme. F: feature, segment

Parse(F, lex) Parse F in a lexical word or morpheme.

(39)　　　　　formal speech form　casual speech form

/čʰi + ə/　→　[čʰiə]　~　[čʰyəː]　'to be hit by car'

/kočʰi + ə/　→　[kočʰiə]　~　[kočʰyəː]　'to correct'

/kalčʰi + ə/　→　[kalčʰiə]　~　[kalčʰyəː]　'to teach'

In Chindo dialect, OCP[+pal] is the lowest constraint, which is dominated by MAX-FC(μ) for the casual speech form. Compensatory lengthening applies in any syllable, which means MAX-FC(μ) dominates Uniformity. Therefore, the optimal output for the casual speech form is (40c).

(40) MAX-FC(μ) ≫ Uniformity

MAX-FC ≫ OCP[+pal]

Base: /čiᵘəᵘ/	a .MAX-FC b. MAX-FC(μ)	Onset	a *CG b. IDENT-FC(μ)	a. OCP[+pal] b. Uniformity
a. .čiᵘ.əᵘ.		*!		
☞ b. .čyəᵘᵘ.			a.* b.**(y,əː)	a. * b. *
c. .čyəᵘ.	b. *!		a.* b. *(y)	a. *
d. .čəᵘᵘ.	a. *!			b. *
e. .čəᵘ.	a. *! b. *	*		

Second, /i + ə/ 'carry something on one's head' and /o + a/ 'to come' show different constraint ranking in Standard Korean. As for /o+a/, it has only one output [wa] as a result of obligatory glide formation. The candidate (41b) violates IDENT-IO(μ) and Uniformity. The form (41c) is out since it violates Onset twice, and hence (41a) is optimal.

(41)

Input: /oᵘ+aᵘ/	MAX-IO	a. Onset b. IDENT-IO(μ) c. Uniformity	MAX-IO(μ)
☞ a. .waᵘ.		b.*(w)	*
b. .waᵘᵘ.		b.**!(w,aː) c.*	
c. .oᵘaᵘ.		a.**	

Contrary to (41), /i+ə/ has two outputs.[3] Following the constraint ranking in (41), (42c) would be the optimal output for the formal speech form. If (42c) were the optimal output, it would not undergo shortening any more.

(42) Onset, IDENT-IO(μ), Uniformity ≫ MAX-IO(μ)

Input: /iᵘ+əᵘ/	MAX-IO	a Onset b. IDENT-IO(μ) c. Uniformity	MAX-IO(μ)
a. .iᵘəᵘ.		a. **	
b. .yəᵘᵘ.		b. **!(y, əː) c.*	
☞ c. .yəᵘ.		b. *(y)	*

---

[3] Some people don't pronounce [iə]. Since a few women carry things over their head these days, /i+ə/ is rarely used in colloquial speech.

To predict the correct outputs, I claim that in this particular word MAX and MAX(μ) should be ranked as the highest constraints like Chindo dialect as shown in (40).[4]

(43) MAX-IO, MAX-IO(μ) ≫ Onset, IDENT-IO(μ), Uniformity

Input: /ï^{μ}+ə^{μ}/	a. MAX-IO b. MAX-IO(μ)	a. Onset b. IDENT-IO(μ) c. Uniformity
☞a. .ï^{μ}.ə^{μ}.		a. **
b. .yə^{μμ}.		b. **!(y, əː) c. *
c. .yə^{μ}.	b. *!	b. *(y)

Then, the casual speech form is also nicely explained as shown in (44).

(44) MAX-FC, MAX-FC(μ) ≫ Onset ≫ IDENT-FC(μ)

Base: /ï^{μ}ə^{μ}/	a. MAX-FC b. MAX-FC(μ)	Onset	a. IDENT-FC(μ) b. Uniformity
a. .ï^{μ}.ə^{μ}.		**!	
☞b. .yə^{μμ}.		*	a. **(y, əː) b. *
c. .yə^{μ}.	b. *!	*	a. *(y)

6. Conclusion

In this paper, I have shown two types of glide formation in Korean. The relevant constraint for glide formation is Onset. If there is vowel hiatus in the formal speech form, it undergoes optional glide formation in casual speech. Therefore, we have two outputs. However, obligatory glide formation does not undergo optional glide formation since vowel hiatus is not found in the output.

The constraint reranking predicts different outputs. When *CG dominates Onset, we have the formal speech form and obligatory glide formation as IO-correspondence. On the other hand, when Onset dominates *CG, we have optional glide formation as OO-correspondence. The occurrence and non-occurrence of compensatory lengthening from dialect to dialect is due to the dominance between MAX-FC(μ) and Align-σ$_{μμ}$. In Chindo dialect MAX-FC(μ) dominates Align-σ$_{μμ}$ and hence, compensatory lengthening applies to any syllable of the word. In standard Korean Align-σ$_{μμ}$ dominates MAX-FC(μ), and therefore, compensatory lengthening only applies only to the first syllable of the word.

[4.] An anonymous reviewer suggested to me that the input would be /yi+ə/ in (42). At first glance this analysis looked simpler than mine: with the input /yi+ə/ MAX-IO is violated once for both the full form [ɨ ə] and the shortened form [yə]. However, I do not accept this abstract analysis since /yi/ is not an underlying diphthong in Korean.

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