Noun-Verb Asymmetries in Korean Phonology

Jiwon Yun
Cornell University

1. Noun-Verb Asymmetries in Korean

Asymmetries between verbal and nominal inflections are widely observed in Korean phonology (Y. Lee 2001, E. Kang 2004, Ko 2006, among others). For example, Korean has various phonological processes to avoid vowel hiatus, such as glide formation, /ɨ/-deletion, and vowel coalescence, but such processes are not observed in nominal inflections:

(1) Verbal inflection (data from Ko 2006)
      (a: glide formation, b: /ɨ/-deletion, c: vowel coalescence)
      a. /kali + ə/   [ka.li.ə] ~ **[ka.lyə]**   'to cover' + infinitive suffix
      b. /kip'ɨ + ə/   *[ki.p'ɨ.ə] **[ki.p'ə]**   'to be happy' + infinitive suffix
      c. /po + i + ta/   [po.i.ta] ~ **[pœ.ta]**[1]   'to see' + causative + declarative suffix

(2) Nominal inflection
      a. /tali + esə/   [ta.li.e.sə]   ***[ta.lye.sə]**   'bridge' + locative particle
      b. /kɨ + eke/   [kɨ.e.ke]   ***[ke.ke]**   'he' + dative particle
      c. /co + ita/   [co.i.ta]   ***[cœ.ta]**   'millet' + copular particle

Also, processes due to the restrictions to coda position such as laryngeal feature neutralization and cluster simplification usually do not apply when the coda is followed by a vowel because the coda consonant can be syllabified in onset position, but in nominal inflection, those coda processes can optionally apply even when resyllabification is possible:

(3) Verbal inflection
      (a: laryngeal feature neutralization, b: cluster simplification)
      a. /kipʰ + ə/   [ki.pʰə]   ***[ki.pə]**   'to be deep' +infinitive suffix
      b. /əps + ə/   [əp.s'ə]   ***[ə.pə]**   'not to exist' + infinitive suffix

(4) Nominal inflection
      a. /mulɨpʰ + e/   [mu.lɨ.pʰe]   ~ **[mu.lɨ.pe]**   'knee' + locative particle
      b. /kaps + i/   [kap.s'i]   ~ **[ka.pi]**   'price' + nominative particle

In the above examples, only nominal inflection shows opacity (i.e. it resists general phonological processes (2) or allows additional phonological contrasts (4)). Thus previous approaches commonly assume that nouns have a special status in phonology and propose constraints that are only effective for evaluation of nouns so as to explain opacity in nominal inflection. Such constraints include Noun Faithfulness (Smith 2001), Prosodic Word Alignment (Y. Lee 2001), and Base-Output

[1] For simplicity, I will ignore allophone alternations in my presentation of data that do not affect the validity of arguments in this paper, such as intersonorant voicing.

Correspondence (Ko 2006):

(5) The assumptions in previous approaches to noun-verb asymmetries
    a. The Noun Faithfulness approach (Smith 2001):
       The category *noun* is phonologically a strong position, so the grammar includes noun-specific
       faithfulness constraints.
    b. The Prosodic approach (Y. Lee 2001, E. Kang 2004):
       Nouns are prosodic words. & The right edge of a prosodic word coincides with the right edge of
       a syllable.
    c. The Base-Output Correspondence approach (Ko 2006):
       Nouns have a Base (an isolation form), which is taken as a reference form in evaluation of
       output candidates.

    The assumption of the privileged status of nouns is, however, hard to maintain if there exists
another kind of noun-verb asymmetry where only verbs yield opaque results. The next section
presents such a new class of data.

2. New Data: Opacity in Verbal Inflection Only

    It is well known that the interaction of post-obstruent tensification (POT) and coda cluster
simplification (CCS) in Korean may result in opacity: tensification occurs even though its
environment disappears on the surface (Tak 1997, 2001, Sohn 1999, S. Lee 2002, among many
others). In (8a-c), the initial obstruent in the second morpheme is tensified even though a lateral does
not make the following lax obstruent tense, as in (8d).

(6) Post-Obstruent Tensification (POT):
    Lax obstruents (/p/, /t/, /k/, /c/, /s/) become tense when they follow other obstruents.
    a. /kuk + **p**ap/ → [kuk.**p'**ap]   'rice served in soup' ('soup' + 'rice')
    b. /nɨc + **c**am/ → [nɨt.**c'**am]   'oversleeping' ('late' + 'sleeping')
    c. /ip + **t**o/   → [ip.**t'**o]   'mouth' + particle 'also'

(7) Coda Cluster Simplification (CCS):
    Consonant clusters in coda position are reduced to a single consonant.
    a. /ka**ps**/ → [ka**p**]   'price'
    b. /mo**ks**/ → [mo**k**]   'share'
    c. /sa**lm**/ → [sa**m**]   'life'

(8) Opaque results from the interaction of POT and CCS
    a. /halt^h + **t**a/ → [hal.**t'**a]   'to lick' + declarative suffix
    b. /palp + **k**o/ → [pal.**k'**o]   'to tread on' + conjunctive suffix
    c. /ilk + **s**o/   → [il.**s'**o]   'to read' + declarative suffix
cf. d. /kal + **t**a/   → [kal.**t**a]   'to grind' + declarative suffix

    However, previous works have overlooked that nouns yield transparent results in the same
phonological environment.

(9) Transparent results in nominal inflection
    a. /jətəlp + **k**wa/   →   [jə.təl.**k**wa]   'eight' + conjunctive particle
    b. /talk + **p**ut^hə/   →   [tal.**p**u.t^hə]   'chicken' + particle ('from') (in Kyungsang Korean)

    It seems obvious that an adequate solution to explain all kinds of data related to the interaction of
POT and CCS should refer to morphological categories such as nouns and verbs. However, none of
the previous approaches to noun-verb asymmetries can explain this kind of example because they can
only explain the opacity exclusively observed in nominal inflection and do not provide any

mechanism to account for the opaque outputs that only occurs in verbal inflection. The fact that we can find examples of opacity specific to verbal inflections as well as those specific to nominal inflections indicates that just adding category-specific constraints to a strictly parallel OT grammar does not provide a solution to the entire range of noun-verb asymmetries.

3. Possible Solutions

My proposal to find an adequate explanation for all the noun-verb asymmetries presented in the previous sections is that the syntactic and morphological difference between nouns and verbs affects their inflectional phonology. This section provides two possible solutions in which this morpho-syntactic consideration is incorporated.

3.1. Stratal OT

One way to add a derivational flavor to an OT grammar is to assume that the grammar is composed of serially ordered levels and each level has its own ranking of constraints. Following this line of approach, I proposed that verbal inflection takes place at the stem level, whereas nominal inflection occurs at the word level in Yun (2008), adopting the three-strata model in Kiparsky (2000). In this model, the three strata correspond to the stem, word, and post-lexical (phrasal) levels, respectively, of Lexical Phonology.
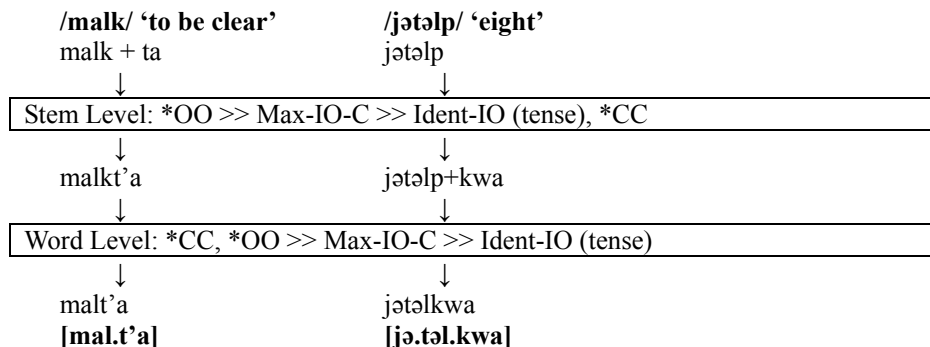
The proposal of the Stratal OT approach echoes traditional Korean grammar, in which verb stems are not regarded to function as a word unless they combine with suffixes (I. Lee 1997). The fact that only noun stems can constitute words by themselves supports the idea that post-nominal particles are attached to noun stems at the word level, whereas verbal suffixes are attached to verb stems at the stem level:

(10) Stratal OT
  a. Verbal Inflection: [Vstem]$_{Stem}$] suffix]$_{Stem}$]$_{Word}$
  b. Nominal Inflection: [Nstem]$_{Stem}$]$_{Word}$] particle]$_{Word}$

The following diagram illustrates how the Stratal OT approach predicts the correct output in both verbal and nominal inflections. Since CCS applies only at the word level due to the ranking [*CC >> Max-IO-C], the obstruent in the coda position can induce POT at the stem level, where it is not yet deleted. Thus POT is observed in verbal inflection, which takes place at the stem level, but not in nominal inflection, which takes place at the word level.

(11) Stratal OT

/malk/ 'to be clear'	**/jətəlp/ 'eight'**
malk + ta	jətəlp
↓	↓

Stem Level: *OO >> Max-IO-C >> Ident-IO (tense), *CC

↓	↓
malkt'a	jətəlp+kwa
↓	↓

Word Level: *CC, *OO >> Max-IO-C >> Ident-IO (tense)

↓	↓
malt'a	jətəlkwa
[mal.t'a]	**[jə.təl.kwa]**

  *CC: No consonant clusters in coda position
  *OO: No lax obstruent sequences

3.2. Cyclic OT

Another way to get the same derivational effects without introducing modularity to OT is to

assume cyclic constraint evaluation.[3] Suppose that phonological processes apply in a cyclic fashion but that the verb stem is are not a cyclic domain. Then only noun stems can change their form before inflection and it might block some processes that otherwise would have applied in the next cycle where inflectional morphemes are attached to the stems.

(12) Cyclic OT
    a. Verbal Inflection: [verb + suffix]
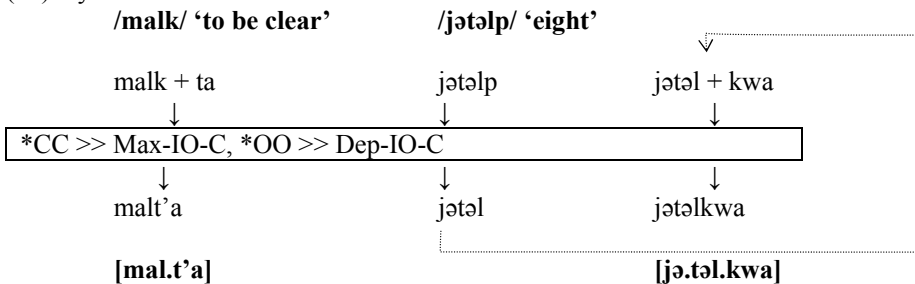   b. Nominal Inflection: [[noun] particle]

Notice, however, that this line of approach does not allow opacity in verbal inflection. In fact, to apply this approach to the puzzle of the interaction of POT and CCS, we still need to account for the source of the opaque application of POT independently. One of the previous approaches to the opacity problem is Lee (2002), which proposes that if we assume that tense obstruents in Korean are actually geminates, the apparent opaque application of POT becomes transparent. In the following tableau, the candidate [mal.t'a] is optimal because it is more faithful to the input than the otherwise optimal candidate [mal.ta] in that it preserves more consonants after cluster simplification:

(13) Geminate approach (S. Lee 2002)

/malk + ta/		*CC	Max-IO-C	*OO	Dep-IO-C
a.	malk.ta	*!		*	
b.	malk.t'a	*!			*
c.	mal.ta		*!		
d. ☞	mal.t'a				
e.	mal.ta		*!		

The problem with this approach is it cannot predict that POT does not apply in the same environment in nominal inflection. The idea here is to add the assumptions of the Geminate approach to the mono-stratal cyclic OT. The following diagram shows how this hybrid approach explains the noun-verb asymmetry with respect to the opacity in POT. The Geminate approach predicts the opaque output in verbal inflection as seen above. In nominal inflection, CCS occurs on the first cycle and the post-nominal particle is added after the coda obstruent is deleted, so POT does not occur.

(14) Cyclic OT + Geminate

    /malk/ 'to be clear'   **/jətəlp/ 'eight'**

        malk + ta   jətəlp   jətəl + kwa
        ↓   ↓   ↓

[*CC >> Max-IO-C, *OO >> Dep-IO-C]

        ↓   ↓   ↓
        malt'a   jətəl   jətəlkwa

    [mal.t'a]   **[jə.təl.kwa]**

4. Evidences for the Stratal OT approach

Since both the Stratal OT approach and the Cyclic OT approach provide accounts for the present asymmetry, we need to determine if both of them can apply to other kinds of noun-verb asymmetries as well. The investigation presented in this section shows that the Stratal OT approach can provide a unified account for all the other data, while the Cyclic OT approach cannot.
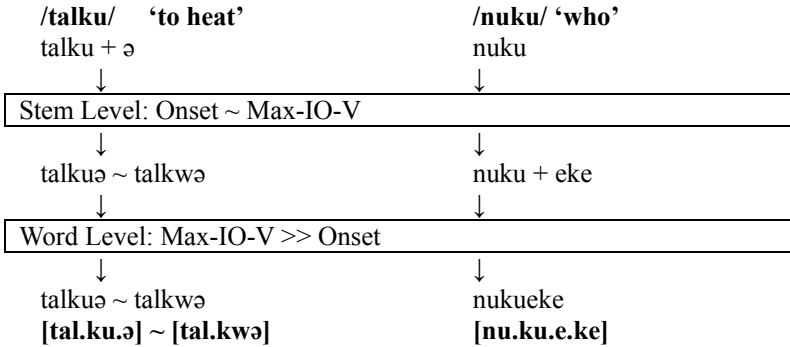
4.1. Underapplication in Nominal Inflection

The underapplication of vowel hiatus resolution processes in nominal inflection can be easily

---

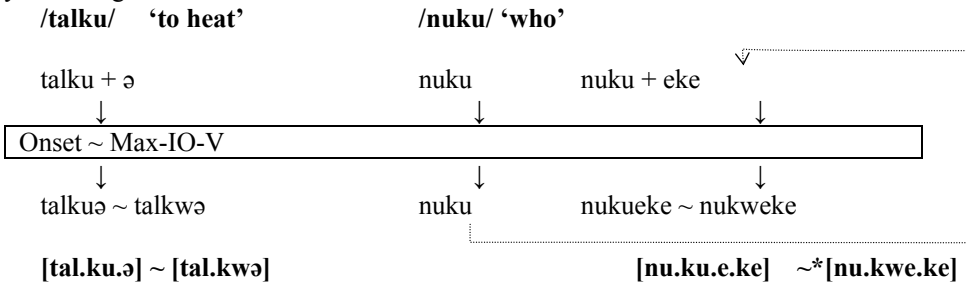[3] I thank Michael Wagner for suggesting this option.

explained by the Stratal OT approach if we simply assume that those processes only apply at the stem level. Since the Stratal OT approach assumes that nominal inflection takes place at the word level, the stem level processes consequently do not apply in nominal inflection. For instance, optional glide formation in verbal inflection is explained because the stem level includes the free ranking Onset ~ Max-IO-V.

(15) Stratal OT

/talku/   'to heat'   **/nuku/ 'who'**

talku + ə   nuku

↓   ↓

Stem Level: Onset ~ Max-IO-V

↓   ↓

talkuə ~ talkwə   nuku + eke

↓   ↓

Word Level: Max-IO-V >> Onset

↓   ↓

talkuə ~ talkwə   nukueke
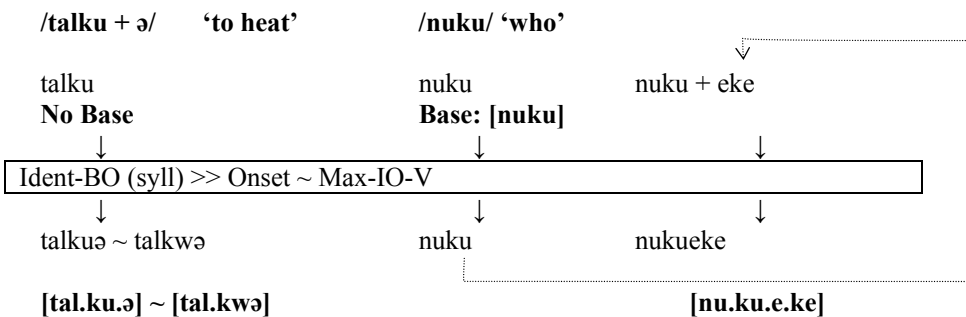
[tal.ku.ə] ~ [tal.kwə]   **[nu.ku.e.ke]**

On the other hand, the Cyclic OT approach by itself cannot explain the underapplication of those processes in nominal inflection because the cyclic application of the processes does not make any difference from their non-cyclic application. Thus, the Cyclic OT approach predicts the same results for both verbal and nominal inflections.

(16) Cyclic OT: glide formation

/talku/   'to heat'   **/nuku/ 'who'**

talku + ə   nuku   nuku + eke

↓   ↓   ↓

Onset ~ Max-IO-V

↓   ↓   ↓

talkuə ~ talkwə   nuku   nukueke ~ nukweke

[tal.ku.ə] ~ [tal.kwə]   **[nu.ku.e.ke]   ~*[nu.kwe.ke]**

To get the correct result, the Cyclic OT approach needs some independent mechanism to explain the noun-verb asymmetry, such as Base-Output Correspondence constraints (Ko 2006). In the following diagram, [nu.kwe.ke] is ruled out because of the constraint Ident-BO (syll) that requires that the specification for the feature [syllabic] on the segments in the Base [nu.ku] must be preserved in their output correspondents.

(17) Cyclic OT + BOC

/talku + ə/   'to heat'   **/nuku/ 'who'**

talku   nuku   nuku + eke
No Base   **Base: [nuku]**

↓   ↓   ↓

Ident-BO (syll) >> Onset ~ Max-IO-V

↓   ↓   ↓

talkuə ~ talkwə   nuku   nukueke

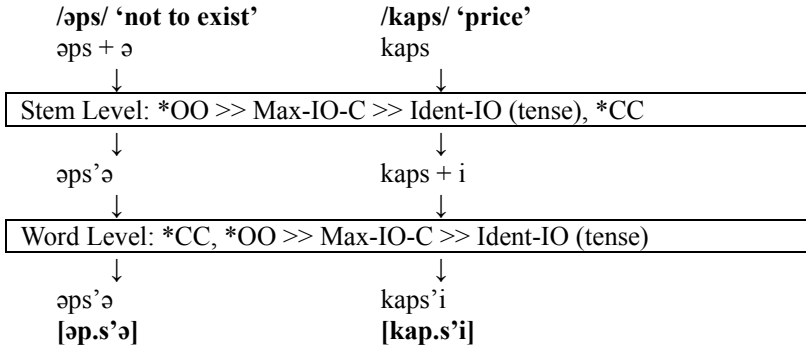**[tal.ku.ə] ~ [tal.kwə]**   **[nu.ku.e.ke]**
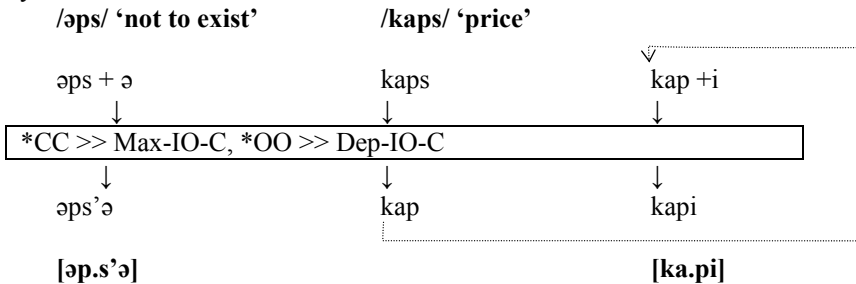
4.2. Overapplication in Nominal Inflection

So far, the problem with the Cyclic OT approach seems to be that it requires us to appeal to additional theories because cyclicity alone cannot account for the entire range of asymmetries between nominal and verbal inflection. However, a more crucial problem is that it cannot make correct prediction for some data.

Recall that restrictions to coda position such as laryngeal feature neutralization and cluster simplification can overapply only in nominal inflection as seen in (3) and (4). In fact, both Stratal OT and Cyclic OT fail to predict the optional nature of the overapplication of CCS in nominal inflection: Stratal OT predicts no overapplication, whereas Cyclic OT yield overapplied results only.
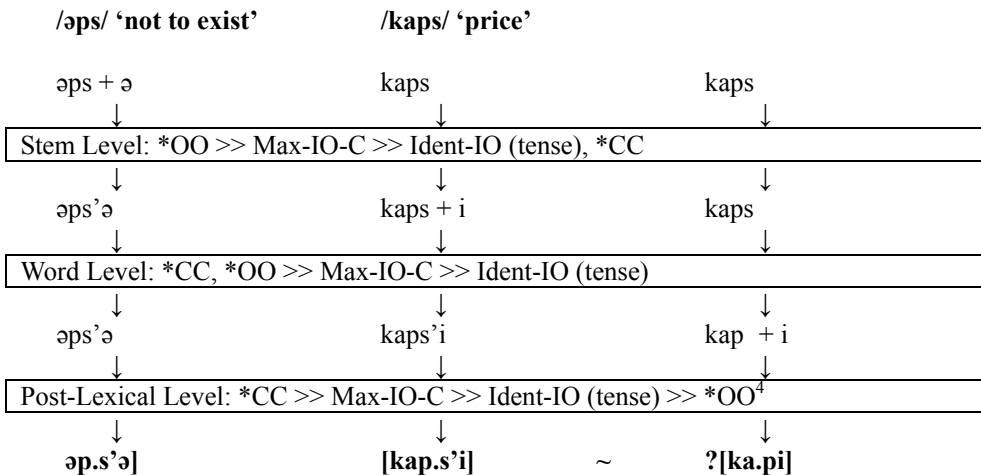
(18) Stratal OT

/əps/ 'not to exist'   **/kaps/ 'price'**
əps + ə   kaps
↓   ↓

| Stem Level: *OO >> Max-IO-C >> Ident-IO (tense), *CC |

↓   ↓
əps'ə   kaps + i
↓   ↓

| Word Level: *CC, *OO >> Max-IO-C >> Ident-IO (tense) |

↓   ↓
əps'ə   kaps'i
[əp.s'ə]   **[kap.s'i]**

(19) Cyclic OT

/əps/ 'not to exist'   **/kaps/ 'price'**

əps + ə   kaps   kap +i
↓   ↓   ↓

| *CC >> Max-IO-C, *OO >> Dep-IO-C |

↓   ↓   ↓
əps'ə   kap   kapi

[əp.s'ə]   **[ka.pi]**

I propose that the apparent overapplication of CCS before a vowel occurs when the post-nominal particle is attached at the post-lexical level instead of at the word level. Nominal inflection is not expected at the post-lexical level, which seems to be related to the fact that the overapplication of CCS is only found in casual speech and generally regarded as substandard.

(20) Stratal OT

/əps/ 'not to exist'   **/kaps/ 'price'**

əps + ə   kaps   kaps
↓   ↓   ↓

| Stem Level: *OO >> Max-IO-C >> Ident-IO (tense), *CC |

↓   ↓   ↓
əps'ə   kaps + i   kaps
↓   ↓   ↓

| Word Level: *CC, *OO >> Max-IO-C >> Ident-IO (tense) |

↓   ↓   ↓
əps'ə   kaps'i   kap + i
↓   ↓   ↓

| Post-Lexical Level: *CC >> Max-IO-C >> Ident-IO (tense) >> *OO[4] |

↓   ↓   ↓
əp.s'ə]   **[kap.s'i]**   ~   **?[ka.pi]**

This argument is supported by the fact that CCS before a vowel is indeed obligatory when a phrase boundary intervenes between the coda consonant and the vowel, as shown in (21b).

(21) a.   Kilɨm-**kaps-i**   ollas'əyo.
           gas-price-NOM   rose
           'Gas prices rose.'
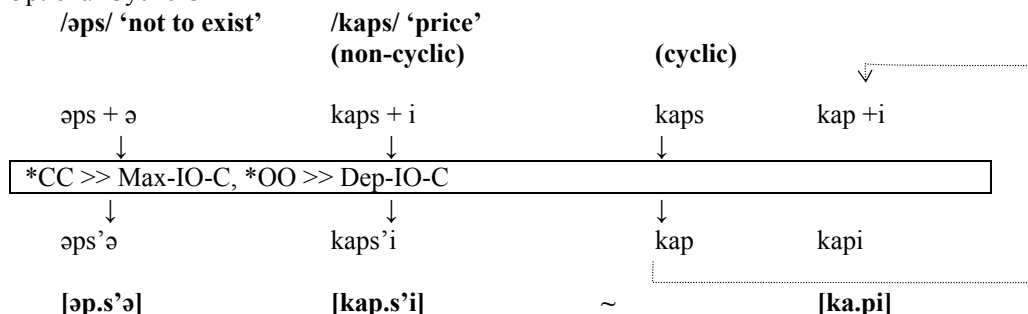
           /kaps/ + /i/   →   [kap.si] ~ [ka.pi]

      b.   Kilɨm-**kaps**   **iri**   cuseyo.
           gas-price   here   pay
           'Please pay gas fee here.'

           /kaps/ + /ili/   →   *[kap.si.li] ~ [ka.pi.li]

However, it is hard to find a way to accommodate the optional overapplication of coda processes in nominal inflections in the Cyclic OT. Unlike the case of vowel hiatus resolution processes, adding BOC constraints does not help in this case because conceptually the output of the first cycle and the Base must have the same form so there is no way to implement optionality. In (19), for instance, the segment *s* does not exist either in the input [kap] to the second cycle or in the Base [kap], it is impossible for the output to have a correspondence to that segment.

A possible way to maintain the Cyclic OT is to assume that optional cyclicity for nominal inflection. That is, for the speakers who pronounce /kap.si/ as [kap.s'i], a noun stem is not a cyclic domain. If post-nominal particles can attach to the noun stem either before or after the phonological cycle has applied to the noun stem, we can explain the optional application of certain processes in nominal inflection.
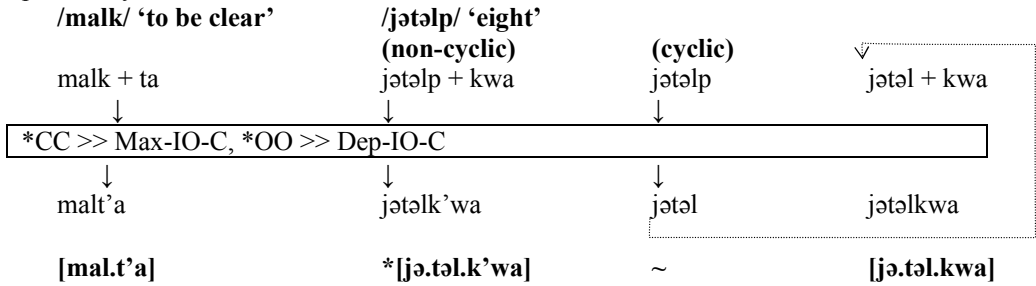
(22) Optional Cyclic OT

/əps/ 'not to exist'	/kaps/ 'price' (non-cyclic)	(cyclic)	
əps + ə	kaps + i	kaps	kap +i
↓	↓	↓	

*CC >> Max-IO-C, *OO >> Dep-IO-C

↓	↓	↓	
əps'ə	kaps'i	kap	kapi
[əp.s'ə]	**[kap.s'i]**	~	**[ka.pi]**

However, this assumption causes another problem with the previous data. Let us return to the case where the coda clusters are followed by a consonant in (14). Making the cyclic application of the constraints optional results in predicting an additional output in nominal inflection, which never appears on the surface.
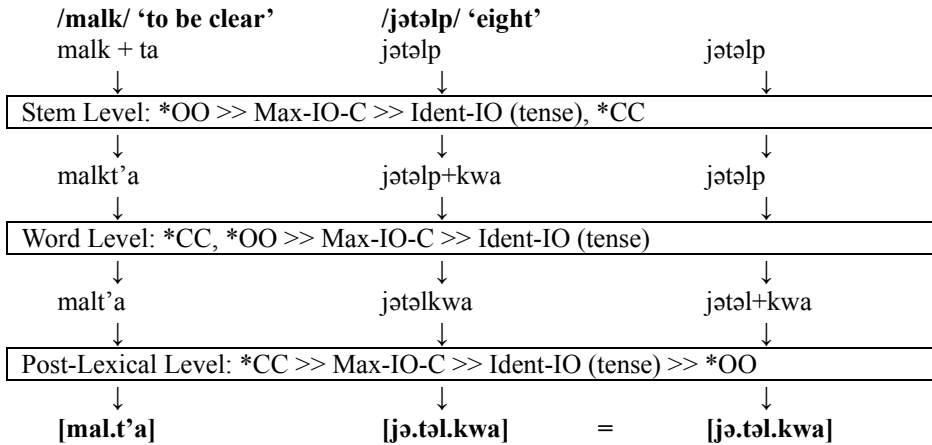
---

[4] Note that the post-lexical level has its own, different constraint ranking. For example, POT does not occur at this level due to the rank Ident-IO (tense) >> *OO.

(23) Optional Cyclic OT

/malk/ 'to be clear'	/jətəlp/ 'eight'		
	(non-cyclic)	**(cyclic)**	∨
malk + ta	jətəlp + kwa	jətəlp	jətəl + kwa
↓	↓	↓	

*CC >> Max-IO-C, *OO >> Dep-IO-C

↓	↓	↓	↓
malt'a	jətəlk'wa	jətəl	jətəlkwa
[mal.t'a]	***[jə.təl.k'wa]**	~	**[jə.təl.kwa]**

On the other hand, the assumption that post-nominal particles can attach to the noun at the post-lexical level does not cause this kind of problem because it does not predict a different result from the case when the particles attach to the noun stem at the word level:

(24) Stratal OT

/malk/ 'to be clear'	/jətəlp/ 'eight'	
malk + ta	jətəlp	jətəlp
↓	↓	↓

Stem Level: *OO >> Max-IO-C >> Ident-IO (tense), *CC

↓	↓	↓
malkt'a	jətəlp+kwa	jətəlp
↓	↓	↓

Word Level: *CC, *OO >> Max-IO-C >> Ident-IO (tense)

↓	↓	↓
malt'a	jətəlkwa	jətəl+kwa
↓	↓	↓

Post-Lexical Level: *CC >> Max-IO-C >> Ident-IO (tense) >> *OO

↓	↓	↓
[mal.t'a]	**[jə.təl.kwa]** =	**[jə.təl.kwa]**

4.3. Transparent Applications within Nominal Stems

Further evidence for the stratal OT approach comes from seemingly exceptional data. According to the Stratal OT approach proposed in this paper, the apparent asymmetry between nouns and verb is not caused by an inherent phonological difference between nouns and verbs but rather is related to the fact that they undergo inflection at different levels, where constraints are ranked differently. If this approach is on the right track, it is expected that nouns and verbs will behave in the same way when they undergo processes at the same level.

The following examples illustrate that the expectation is bourn out. We have seen that vowel hiatus resolution processes only apply in verbal inflection. However, the following examples show that this asymmetry is not exactly a 'noun-verb asymmetry' because the same processes can occur within noun stems.

(25) Vowel hiatus resolutions within noun stems (data from Ko 2006)

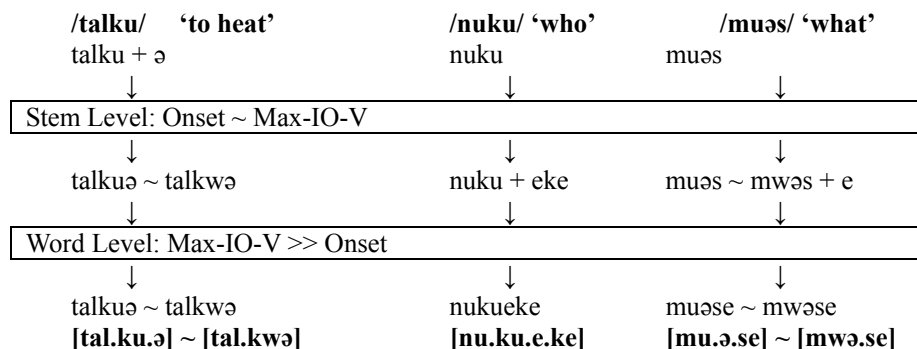 (a: glide formation, b: /ɨ/-deletion, c: vowel coalescence)

a. /muət/	[muət] ~	**[mwət]**	'what'
b. /taɨm/	[taɨm] ~	**[tam]**	'next'
c. /ai/	[ai] ~	**[ɛ]**	'child'

Though this kind of example causes empirical or conceptual problems with previous studies of noun-

verb asymmetry,[5] the Stratal OT approach provides a simple and unified account for all the examples since the assumption we already made in the section 4.1. that vowel hiatus resolution processes are stem-level processes holds here again:

(26) Stratal OT

/talku/	**'to heat'**	**/nuku/ 'who'**	**/muəs/ 'what'**
talku + ə		nuku	muəs
↓		↓	↓

Stem Level: Onset ~ Max-IO-V

↓		↓	↓
talkuə ~ talkwə		nuku + eke	muəs ~ mwəs + e
↓		↓	↓

Word Level: Max-IO-V >> Onset

↓		↓	↓
talkuə ~ talkwə		nukueke	muəse ~ mwəse
[tal.ku.ə] ~ [tal.kwə]		**[nu.ku.e.ke]**	**[mu.ə.se] ~ [mwə.se]**

5. Conclusion

In this paper, I described a new class of noun-verb asymmetry with respect to phonological opacity that is not explained by adding category-specific constraints to strictly parallel OT, and proposed that the Stratal OT approach can account for this new data as well as various kinds of other noun-verb asymmetries in Korean phonology. The Stratal OT approach shows conceptual and empirical advantages since it incorporates derivational effects as well as morphological insights into an OT grammar.

References

Baker, Mark (1985) "The Mirror Principle and Morphosyntactic Explanation", *Linguistic Inquiry* 16: 373-415.

Cho, Young-mee Yu and Sharon Inkelas (1994) "Post-Obstruent Tensification in Korean and Geminate Inalterability" In: Y.-K. Kim-Renaud, ed., *Theoretical Issues in Korean Linguistics:* 45-60. CSLI, Stanford.

Kang, Eungyeong (2004) *Edge-Demarcation in Phonology*, Ph.D. dissertation, Cornell University.

Kiparsky, Paul (2000) "Opacity and Cyclicity", *The Linguistic Review* 17: 351-367.

Ko, Heejeong (2006) "Base-Output Correspondence in Korean Nominal Inflection", *Journal of East Asian Linguistics* 15-3: 195-243.

Lee, Iksop, Sang-Oak Lee and Wan Chae (1997) *The Korean Language*, Seoul: Singu Munhwasa. [In Korean]

Lee, Shinsook (2002) "A Constraint-based Approach to the Opacity between Consonant Cluster Simplification and Tensification in Korean", *Japanese/Korean Linguistics*, 11:289-302.

Lee, Yongsung (2001) "The Noun-Verb Asymmetry in Korean Phonology", *Studies in Phonetics, Phonology, and Morphology* 7: 375-397.

McCarthy, John (1998) "Sympathy and phonological opacity", Ms., University of Massachusetts, Amherst. [ROA-252, http://ruccs.rutgers.edu/roa.html]

Smith, Jennifer (2001) "Lexical Category and Phonological Contrast" in PETL 6: *Proceedings of the Workshop on the Lexicon in Phonetics and Phonology*, 61-72.

Sohn, Ho-Min (1999) *The Korean Language*, Cambridge University Press.

Tak, Jin-Young (2001) "Opacity in Korean: A Sympathy Approach", *Korean Journal of Linguistics* 26-3:587-602.

Yun, Jiwon (2008) "A Stratal OT Approach to a Noun-Verb Asymmetry with respect to Opacity in Korean", paper presented at the 32nd Penn Linguistics Colloquium, University of Pennsylvania, 2008.

---

[5] The BOC approach (Ko 2006) explains this by the argument that the Base is not determined yet in the evaluation of non-derived (bare) nouns. However, this argument introduces a certain kind of unexpected serialism to OT.

Proceedings of the 27th West Coast Conference on Formal Linguistics

edited by Natasha Abner and Jason Bishop

Cascadilla Proceedings Project   Somerville, MA   2008

Ordering information

Orders for the library binding edition are handled by Cascadilla Press.
To place an order, go to www.lingref.com or contact:

Cascadilla Press, P.O. Box 440355, Somerville, MA 02144, USA
phone: 1-617-776-2370, fax: 1-617-776-2271, e-mail: sales@cascadilla.com

Web access and citation information

This entire proceedings can also be viewed on the web at www.lingref.com. Each paper has a unique document # which can be added to citations to facilitate access. The document # should not replace the full citation.

This paper can be cited as:

Yun, Jiwon. 2008. Noun-Verb Asymmetries in Korean Phonology. In *Proceedings of the 27th West Coast Conference on Formal Linguistics*, ed. Natasha Abner and Jason Bishop, 449-457. Somerville, MA: Cascadilla Proceedings Project.

or:

Yun, Jiwon. 2008. Noun-Verb Asymmetries in Korean Phonology. In *Proceedings of the 27th West Coast Conference on Formal Linguistics*, ed. Natasha Abner and Jason Bishop, 449-457. Somerville, MA: Cascadilla Proceedings Project. www.lingref.com, document #1861.