1-1-1996

Korean Prosodic Domains and Phrase Structure

Chung-hye Han
chunghye@sfu.ca

Korean Prosodic Domains and Phrase Structure

Korean Prosodic Domains and Phrase Structure

Chung-hye Han

1.   Introduction

Selkirk (1986) argues for the existence of a level, which she calls P-structure, that mediates between syntactic structure and phonetic representation. She claims that this P-structure is made of prosodic structures which are hierarchically ordered. That is, a phonological representation consists of a hierarchy of prosodic constituents or categories. From the bottom-up, the hierarchy consists of syllable, foot, phonological word, phonological phrase, intonational phrase, and utterance. These categories may be determined by syntactic structure, although they may not be isomorphic to syntactic constituents. The importance of prosodic structure comes from the fact that postlexical rules (which are the subject of sentence phonology) applies within certain prosodic domains. For instance, Chi Mwi:ni Vowel Shortening applies within the domain of phonological phrase, and French liaison applies within the domain of phonological word.
    The two representative approaches to deriving prosodic domains are relation-based approach and end-based approach. In a relation-based approach, the prosodic domains of rules are defined by referring to syntactic relations of the sentence. In direct relation-based approach, the domains are directly expressed in syntactic terms such as 'c-command' to which the phonological rule refers (Kaisse 1985). In indirect relation-based approach, domains can be defined syntactically, with phonological rules referring only to these domains. That is, a phonological rule itself does not care about the syntax, but syntactic relations are taken into account in deriving the prosodic domains of the rule (Nespor & Vogel 1986). Notions such as head- complement, adjacency and linear order are used to derive the domains. In end-based approach, domains are derived by just referring to the left or right edges and projection levels (XP, or X) of syntactic constituents, without paying attention to their relation to other constituents (Selkirk 1986). The parametric difference in the derivation of prosodic domain is determined by the difference in the setting for the category and the setting for right or left end. In general, left-headed languages tend to have right end setting, and right-headed languages tend to have left end setting.
    In this paper, I consider a postlexical rule in Korean which voices unaspirated untensed stops that occur between voiced segments. I refer to this rule as Stop Voicing Rule. I present the relevant data in section 2, and I review two approaches (relation and end-based approach) in determining the prosodic domain for this rule in sections 3 and 4. In determining the prosodic domain for this rule, Cho (1987) rejects end-based approach and argues that relation-based approach is superior in predicting the correct domain. However, Silva (1989) argues that end-based approach can predict the correct domain in a much simpler way without any stipulations by means of adopting the notion of minor phrasing. In section 5, I reject both Cho and Silva's approach and in section 6, I show that a small but necessary modification to the syntactic analysis makes possible a simple and straightforward account of p-phrase formation by means of end-based approach.

2.   Stop Voicing Rule

Korean has a postlexical rule which voices an unaspirated and untensed consonant if it occurs between voiced segments. I refer to this rule as Stop Voicing.[1] Cho (1990) formulates the rule as follows:

(1) [-cont, -asp, -tense] ---> [+voice] / [+voice] __ [+voice]

Silva (1989) formulates the same rule as follows:

(2) [-son, -cont, -spr glottis, -const glottis] ---> [+vd] / [+vd] __ [+vd]

Stop Voicing applies in underived as well as in derived environments, and it is a structure changing rule. Korean stops are contrastive in aspiration, and tenseness, but they are not contrastive in voicing. Thus, Korean doesn't have voiced stops in the underlying representation. Voiced stops are only derived by the rule. The following table summarizes the phonemic inventory of stops in Korean:

	labial	alveolar	alv-pal	velar
plain stop	p	t	c	k
aspirated stop	p^h	t^h	c^h	k^h
tensed stop	p'	t'	c'	k'

The Stop Voicing applies across word boundaries as well as within words. However, there are word boundaries that block the application of the rule. This provides an evidence that there exists a prosodic domain within which the rule applies, and this prosodic domain corresponds to a phonological phrase.
    Cho (1990) presents the data that is crucial in determining the prosodic domain of the application of Stop Voicing. The data show that the rule applies within a phonological word, within NP, and within VP that is constituted with an object NP and a V, or two Vs:

(3) phonological word
    [$_N$ apeci] ---> abeji
    (father)

(4) Determiner-Noun
    [$_{NP}$ [$_{DET}$ ki] [$_N$ cip]] ---> kijip
    (that house)

(5) Adjective-Noun
    [$_{NP}$ [$_{ADJ}$ motin] [$_N$ kilim]] ---> modin girim
    (every picture)

---

[1] Cho (1987) calls the rule that voices unaspirated untensed stops Obstruent Voicing Rule. But the name of the rule is misleading since fricatives don't undergo the voicing rule although they are also obstruents. Thus, I will call this rule Stop Voicing Rule.

(6) Possessive Noun-Noun
    [$_{NP}$ [$_{NP}$ Suni-iy] [$_N$ cip]] ---> Suniiy jip
    (Suni's house)

(7) Object-Verb
    [$_{VP}$ [$_{NP}$ kilim-il] [$_V$ pota]] ---> kirimil boda
           picture-Acc look
    (look at the picture)

(8) Verb-Verb
    [$_{VP}$ [$_V$ cap-a] [$_V$ pota]] ---> caba boda
         hold   try
    (try holding)

     The following data show the environment in which the application of Stop Voicing is blocked. It is blocked across an NP and a VP, across two NPs, and across an NP and an AdvP:

(9) Subject-Verb
    [$_{IP}$ [$_{NP}$ kæ-ka] [$_{VP}$ canta]] ---> kæga/canda
         dog-Nom   sleep
    (The dog is sleeping)

(10) Subject-Object
    [$_{IP}$ [$_{NP}$ kæ-ka] [$_{VP}$ [$_{NP}$ pap-il] [$_V$ makninta]]]
         dog-Nom   rice-Acc   eat
    ---> kæga/pabil mənninda
    (the dog is eating rice)

(11) Object-Object
    [$_{VP}$ [$_{NP}$ ai-eke] [$_{NP}$ kwaca-lil] [$_V$ cunta]]
           baby-to   cookie-Acc   give
    ---> aiege/kwajaril junda
    (He gives a candy to the child)

(12) NP-conj-NP
    [$_{NP}$ [$_{NP}$ horaŋi-wa] [$_{NP}$ koyaŋi]] ---> horaŋiwa/ koyaŋi
         tiger-and   cat
    (the tiger and the cat)

(13) Subject-Sentential Adverb-Verb
    [$_{IP}$ [$_{NP}$ Suni-ka] [$_{ADVP}$ kithikhake] [$_{VP}$ [$_{NP}$ cip-e] [$_V$ kass-ta]]]
         Suni-Nom   good   home-to go
    ---> suniga/kithikhage/cibe gatt'a
    (It was good that Suni went home)

The data show that there are word boundaries that block the application of Stop Voicing. This fact provides evidence that the rule is restricted to a particular prosodic domain.

3. Cho (1987, 1990)'s Phonological Phrasing

The above data seem to support end-based approach in deriving the phonological phrasing for SV in Korean. It seems that the phonological phrasing is determined by only looking at the left edge of maximal projections:

(14) $_{XP}$ [

However, Cho rejects the end-based approach to prosodic domain creation because it predicts the wrong phonological phrasing in relative clauses, as shown in the following data (Cho 1987):

(15) a. Syntactic Bracketing

        [[[sənsæŋnim-k'esə [[haksæŋ-eke] cusin]]kilim-il] po-ass-ta]
           teacher-Nom   student-to give   picture-Acc see-past
        (He saw the picture that the teacher gave to the student.)
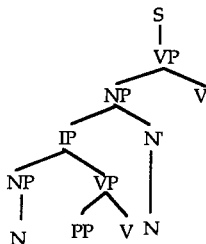
   b. Phonological Bracketing

        [F sənsæŋnimk'esə] [F haksæŋeke jusin] [F kilimil boatt'a]

The end-based approach predicts wrong phonological phrasing. It predicts the following p-phrasing:

(16) * [Φ sənsæŋnimk'esə] [Φ haksæŋeke jusin gilimil boatt'a]

The incorrect p-phrasing results in incorrect surface representation. That is, [gilimil] is wrongly derived instead of the correct form [kilimil].

In order to account for p-phrasing in relative clauses, Cho (1987) adopts a slightly modified version of the relation-based approach. She proposes the following rule of p-phrase formation: [2]

(17) Korean p-phrase formation

Apply the following rules cyclically to all maximal projections, proceeding from the bottom up.
a. In [...... Y" X], where X is the head of X" and Y" is an adjacent complement, the sequence Y" X forms a P-phrase.
b. All P-words unaffected by (a) form P-phrases.

Cho's p-phrase fomration rule does seem to make the correct predictions in deriving the p-phrase for Stop Voicing. However, one can't help wondering that there must be a simpler way of deriving the prosodic domain for Stop Voicing.

4.　Silva (1989)'s Phonological Phrasing

Silva (1989) argues that Cho's rejection of end-based approach to phonological phrasing is too premature. He proposes that if one adopts the notion of minor phrasing, one can make a correct prediction in deriving the phonological phrases for SV.
In determining Japanese p-phrasing for the initial lowering of pitch-accent, Selkirk and Tateish (1988b) have argued that the domain of this rule is minor phrases. These minor phrases are derived from major phrases. They argue that while Japanese major phrases are derived by marking the left-end of maximal projections, minor phrases are derived to contain at most one accented prosodic word therein. Thus, while major phrase formation is determined by direct mapping from syntax, minor phrase formation is totally determined by phonology. That is, in the case of Japanese, minor phrase formation is constrained by the number of accented elements that can occur within the phrase.

---

[2]　After considering the interaction between p-phrasing and focus words, Cho proposed her final version of Korean p-phrase formation as follows:

> Apply the following rules cyclically to all maximal projections, proceeding from the bottom up. At any given stage (a) applies before (b). Let the maximal projection under consideration on a given cycle be M.
> a. If M branches, combine the head of M into a phonological phrase with all adjacent unphrased material, up to and including the closest XP, or if no such phrase is present, the left edge of M.
> b. Phrase any focused word with the next word, unless that word is already phrased.
> After (a) and (b) have applied in all possible environments, (c) applies.
> c. Unphrased word form phonological phrases of their own.

However, since I will only consider normal declarative sentences without any focused words in this squib, p-phrase formation formulated in Cho (1987) will only be considered. I have decided to omit Cho(1990)'s data which contains focused elements since focus introduces some complications in determining p-phrasing. Focus elements are usually realized with a high pitch, and this change in pitch contributes in changing p-phrasing. The point I will make in this squib will not be affected by the omission of the data that contains focused elements.

Following Selkirk and Tateishi (1988b), Silva (1989) uses the notion of major phrase for deriving the regular phonological phrase, and the notion of minor phrase for deriving the domain of Stop Voicing. He claims that Korean forms major phrases by marking the left edge of maximal projections, and minor phrases are formed by joining the phonological words within a major phrase into binary branching structures from left to right. The domain for Stop Voicing is the minor phrase:

(18) Korean P-phrase formation
Major Phrase : XP [
Minor Phrase: Binary branching from left to right

Silva's minor phrase predicts the correct domain and correct surface representation concerning Stop Voicing. When determining the domain for Stop Voicing in (15a), major phrase is derived first, and then minor phrase is derived following the p-phrase formation in (18):

(19)   a. Major Phrasing:
          [F sənsæŋnimk'esə [F haksæŋeke cusin kilimil poatt'a]
     b. Minor Phrasing:
          [F sənsæŋnimk'esə] [F haksæŋeke cusin] [F kilimil poatt'a]
     c. Surface Representation:
          [sənsæŋnimk'esə] [haksæŋege jusin] [kilimil boatt'a]

Thus, with the use of the notion of minor phrasing, Silva's modified version of end-based approach predicts the correct p-phrasing for SV.

5.   Against Cho (1987, 1990), and Silva (1989)

Since all the other data are perfectly accounted for by means of the end-based approach, the only reason for Cho to adopt the relation-based approach is found in relative clauses. However, one set of data which appear to constitute counterexamples doesn't necessarily provide enough evidence to prefer relation-based approach to end-based approach. In order to account for the p-phrasing in relative clauses, Cho slightly modifies the standard relation-based approach which are used to derive p-phrasing for other languages. Besides using the notion of adjacency, and head-complement relation, she has to adopt the notion of cyclic application of her p-phrase formation rule. This results in needless complication of the formulation. Furthermore, cyclic application of p-phrase formation rule seems to be too language-specific. It just doesn't seem to be attested in other languages.
     Silva also has to modify the original version of end-based approach to account for the p-phrasing in relative clauses. He adopts the notion of minor phrasing to derive the correct prosodic domain for Stop Voicing. However, where does minor phrasing fit in the prosodic hierarchy proposed by Selkirk (1986)? Since it is based on major phrasing, it must be ordered higher than the regular p-phrases. But this would result in a violation of hierarchical arrangement of prosodic categories:

(20)   (   ) Utt
              (   )(   ) IPh
              (   )(   )(   )(   )(   )(   ) MinorP
              (   )(   )(   )(   ) PPh (MajorP) [3]

        Furthermore, Silva's formulation predicts incorrect p-phrasing for the NP which consists of an adverb, an adjective and a noun (as Silva himself notes):

(21) acwu cohin kilim
      very good picture

      [Φ ajwu johin gilim]

    * [Φ ajwu johin] [F kilim]

Silva's formulation with minor phrasing predicts two prosodic domains for (21), but it should actually have only one domain:

(22)

                                NP
                             ╱   ╲
                           AP   N'
                         ╱   ╲   │
                      AdvP   A'   │
                        │   │   │
                      Adv   A   N
      Major phrase: [   ]
    * Minor phrase: [   ][   ]

        Besides, how does intonational phrase have access to p-phrases to derive the correct bracketing if minor phrases intervene? And is existence of minor phrase attested in other languages (besides Japanese) as well? All these questions must be addressed if the notion of minor phrase is to be supported theoretically as well as empirically.

6.   A Proposal: an End-based Approach

Instead of modifying the standard relation-based approach and the standard end-based approach in order to account for the p-phrasing of relative clauses, I propose that we modify the structure of relative clauses adopted by both Cho and Silva. They assume that the structure of (15a) (repeated here) is as follows:

---

[3] I omitted the prosodic categories such as phonological words, syllables and feet from the representation since they are irrelevant to the point I am making here.

(15) a. Syntactic Bracketing

   [[[sənsæŋnim-k'esə [[haksæŋ-eke] cusin]]kɨlim-ɨl] po-ass-ta]
    teacher-Nom student-to give picture-Acc see-past
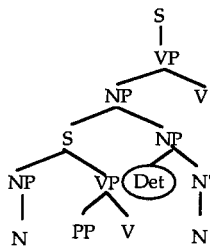   (He saw the picture that the teacher gave to the student.)
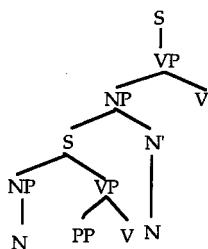
They assume that the category of the head noun in the complex noun phrase is N.
However, there are reasons to believe that it is actually NP. The head noun can be
preceded by a determiner or an adjective:

(23) a. [[[sənsæŋnim-k'esə [[haksæŋ-eke] cusin]] kɨ kɨlim-ɨl] po-ass-ta]
     teacher-Nom student-to give that picture-Acc see-past

  b. [[[sənsæŋnim-k'esə [[haksæŋ-eke] cusin]]kɨn kɨlim-ɨl] po-ass-ta]
    teacher-Nom student-to give big picture-Acc see-past

If the category of the head noun is N, then there is no way to account for the fact that it
can be preceded by a determiner or an adjective. But if its category is NP, a determiner
or an adjective can be placed in the [SPEC, NP] position:

(24)

In English, the modified noun in a relative clause must be preceded by a determiner:

(25) He saw <u>the</u> picture that the teacher gave to the students.

Since English is a left-headed language, there is no need to assume that the category of the head noun in a relative clause is NP in order to account for the positioning of determiner:
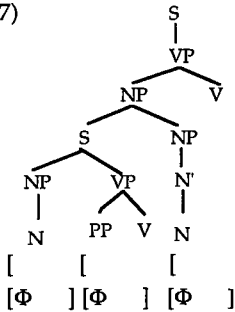
(26)

```
              NP
            /    \
          Det     N'
           |     /  \
          the   N    CP
                |    /\
```
picture   that the teacher gave to the students
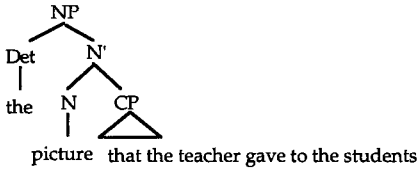
But for right-headed languages like Korean, the category of the head noun in a relative clause must be NP in order to account for the occurrence of a determiner or adjectives just before the head noun.

If we change the category of the head noun of the relative clauses in Korean to a maximal projection, correct p-phrasing for Stop Voicing can be derived with standard end-based approach. We can simply say that p-phrases are derived by just marking the left edge of maximal projections without referring to minor phrasing. For instance, the correct p-phrases are derived in (15a) with the following structure:

(27)

```
                      S
                      |
                      VP
                    /    \
                  NP      V
                /   \
               S     NP
              / \     |
            NP   VP   N'
             |   /\   |
             N  PP V  N
             [   [    [
            [Φ  ][Φ  ] [Φ   ]
```

Even in (21) (repreated here), correct p-phrasing can be derived:

(21) acwu cohin kilim
      very   good   picture
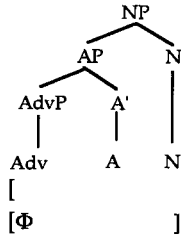
Just marking the left edge of a maximal projection derives only one p-phrase as expected.

    With the modified syntactic analysis for relative clauses, direct mapping from syntax to prosodic domain is possible using a simple end-based approach for all types of sentences in Korean .

7.   Conclusion

    I have argued against both Cho (1987, 1990)'s modified relation-based approach with the notion of cyclic application and Silva (1989)'s modified end-based approach with the notion of minor phrasing in deriving p-phrasing for Stop Voicing. Instead, I have proposed that correct p-phrasing can be derived if we modify the standardly assumed structure for relative clauses. I have presented the syntactic motivation for this proposal and shown that the modified structure derives the correct p-phrasing. Since relative clause constructions were the only motivation for Cho and Silva's complicated p-phrasing formation rules, they no longer have any concrete evidence that supports their formulations. With the modified structure for relative clauses, the p-phrasing for all the data considered in this paper can be derived by just marking the left end of maximal projections. The analysis given here shows that a more accurate syntactic representation yields a simpler phonological analysis.

References

Cho, Y-M Y. (1987). Phrasal Phonology of Korean. *Harvard Studies in Korean Linguistics II*, (eds) by S. Kuno, I-H Lee, J. Whitman, S-Y Bak, and Y-S Kang. Cambridge, MA: Department of Linguistics, Harvard University.

______ . (1990). Syntax and Phrasing in Korean. *The Phonology-Syntax Connection.* (eds) by S. Inkelas and D. Zec. Chicago: University of Chicago Press.

Kaisse, E. M. (1985). *Connected Speech: the Interaction of Syntax and Phonology.* New York: Academic Press.

Nespor, M. & I. Vogel (1986). *Prosodic Phonology*. Dordrecht: Foris.
Selkirk, E. (1986). On Derived Domains in Sentence Phonology. *Phonology Yearbook 3*, 371-405.
Selkirk, E. & K. Tateishi. (1988b). Constraints on Minor Phrase Formation in Japanese. Proceedings of CLS 24, pp. 316-336.
Silva, D. J. (1989). Determining the Domain for Intervocalic Stop Voicing in Korean. *Harvard Studies in Korean Linguistics III*. (eds) by S. Kuno et al. Cambridge, MA: Department of Linguistics, Harvard University.