Two Types of Numeral Quantifiers

Keun Young Shin

Hanyang University (kyshin@hanyang.ac.kr)

I. Introduction

● Prenominal vs. Postnominal Quantifier Constructions

(1)　　a. Cheli-ka　　　[**twu kwen-**uy　　chayk]-ul　　　　ilk-ess-ta
　　　　　Cheli-Nom　　[2 CL-Gen　　　　book]-Acc　　　　read-Pst-Dec

　　　　b. Cheli-ka　　　[chayk　　　**twu kwen**]-ul　　　　ilk-ess-ta
　　　　　Cheli-Nom　　[book　　　2　　CL]-Acc　　　　read-Pst-Dec
　　　　　'Cheli read two books.'

● Goals of the paper

- To show that prenominal and postnominal quantifier constructions have differences which cannot be accounted for under the movement, uniform, approach
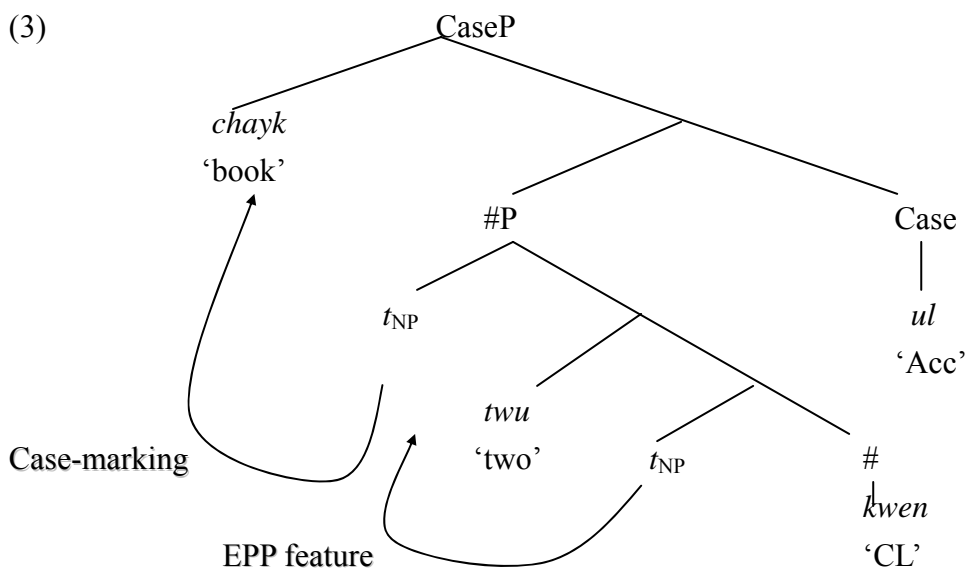- To propose a new analysis for prenominal and postnominal quantifier constructions

II. Previous Studies: Uniform Approaches

● **Claim 1**: The postnominal quantifier construction is derived from the prenominal quantifier construction by moving NP to Spec of DP (W Chae 1983; Y-H Kim 1983; Nakanishi 2004 among others).
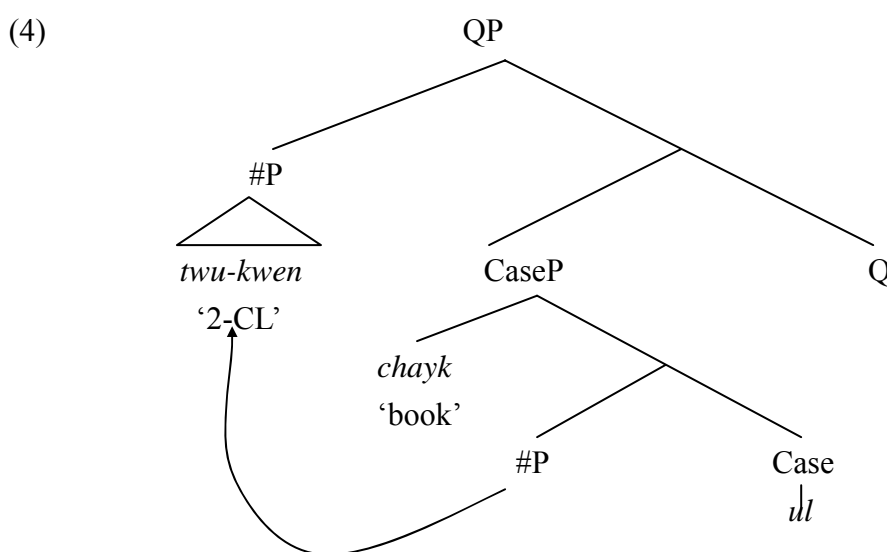
(2)
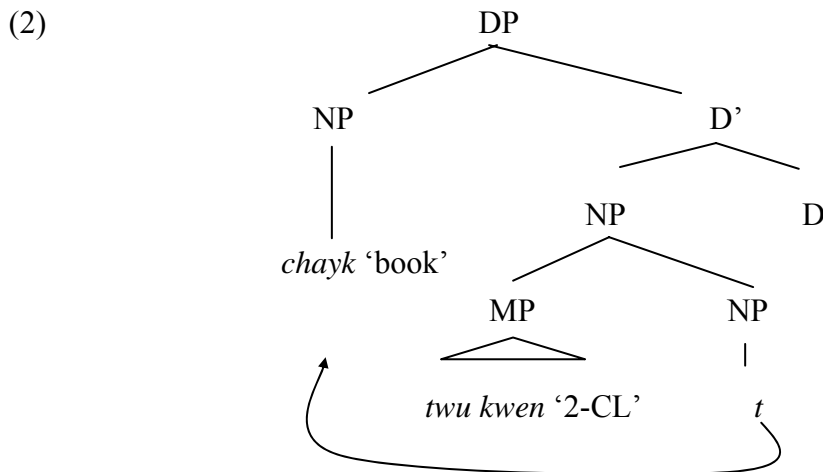
● **Claim 2**: The prenominal quantifier construction is derived from the postnominal quantifier construction (Watanabe 2006)

In the postnominal quantifier construction, the NP is raised to second Spec of #P for an EPP feature that the # head has, and the NP undergoes another movement to Spec of CaseP for case-checking.

(3)

CaseP
- *chayk* 'book'
- #P
  - t_{NP}
  - *twu* 'two'
  - t_{NP}
  - # *kwen* 'CL'
- Case
  - *ul* 'Acc'

Case-marking

EPP feature

The prenominal quantifier construction is derived by raising #P to Spec of QP where quantifiers other than a numeral quantifier are assumed to be base-generated.

(4)

QP
- #P
  - *twu-kwen* '2-CL'
- CaseP
  - *chayk* 'book'
  - #P
  - Case
    - *ul*
- Q

III. Shortcomings

● Prenominal and postnominal quantifier constructions are different in terms of selectional restrictions: a verb may impose its selectional restrictions on the classifier in postnominal quantifier constructions (K Shin 2006, 2008)

(5) a. ?? Cheli-ka   [twu   congci-uy   kancang]-ul   kkayttuli-ess-ta
        Cheli-Nom [2   CL(bowl)-Gen   soy sauce]-Acc   break-Pst-Dec

    b.   Cheli-ka   [kancang   twu   congci]-lul   kkayttuli-ess-ta
        Cheli-Nom   [soy sauce   2   CL(bowl)]-Acc   break-Pst-Dec
        'Cheli broke two bowls of soy sauce.'

(6) a. ?? Cheli-ka   [twu   calwu-uy   ssal]-ul   ccic-ess-ta
        Cheli-Nom   [2   CL(sack)-Gen   rice]-Acc   tear-Pst-Dec

    b.   Cheli-ka   [ssal   twu   calwu]-lul   ccic-ess-ta
        Cheli-Nom   [rice   2   CL(sack)]-Acc   tear-Pst-Dec
        'Cheli tore two sacks of rice.'

● Proper names or pronouns (= DPs) can appear in the position of the associated nominal in postnominal quantifier constructions, but not in prenominal quantifier constructions.

(7) a. * na-nun [twu myeng-uy   [Cheli-wa   Mini]]-lul   man-ass-ta
        I-Top   [2   CL-Gen   [Cheli-Conj. Mini]]-Acc   meet-Pst-Dec

    b.   na-nun   [[Cheli-wa   Mini]   twu myeng]-ul   man-ass-ta
        I-Top   [[Cheli-Conj. Mini]   2   CL]-Acc   meet-Pst-Dec
        'I met the two of Cheli and Mini.'

(8) a. * [twu   wuli]-ka   ku il-ul   hay-ss-ta
        [2   us]-Nom   that work-Acc   do-Pst-Dec

    b.   [wuli   twul]-i   ku il-ul   hay-ss-ta
        [us   2]-Nom   that work-Acc   do-Pst-Dec
        'The two of us did that work.'

- Some measure phrases such as *osip tossi* '50 degree-Celsius' and *selun sal* '30 year-old' can occur only in prenominal quantifier constructions.

(9) a. [osip   tossi (-uy)   mwul]-ul   khep-ey   nehe-la
        [50   degree(-Gen)   water]-Acc   cup-Loc   put-Imp

   b. *[mwul   osip   tossi   ]-lul   khep-ey   nehe-la
       [water   50   degree]-Acc   cup-Loc   put-Imp
       'Pour 50 degree water in the basket.'

(10) a. Cheli-nun   [ilhun sal(-uy)   halmeni   ]-lul   man-ass-ta
         Cheli-Top   [80   age(-Gen) grandmother]-Acc   meet-Pst-Dec

    b. * Cheli-nun   [halmeni   ilhun sal]-lul   man-ass-ta
         Cheli-Top   [grandmother   80   age]-Acc   meet-Pst-Dec
          'Cheli met an 80-year-old grandmother.'

IV. The Monotonicity Constraint

- The same semantic restriction is observed in Japanese and German (Nakanishi 2003, 2004).

(11) a.   [san-do-no   mizu]-ga   tukue-nouede   kobore-ta (koto)
          [three-degree-Gen   water]-Nom   table-on   spill-Pst

    b. *   [Mizu   san-do]-ga   tukue-nouede   kobore-ta (koto)
           [water   three-degree]-Nom   table-on   spill-Pst
           'Three degree water spilled on the table.'

(12) a.   Hans   hat   [dreigradiges   Wasser]   getrunken
          Hans   has   [three-degree   water]   drunk
           'Hans drank three-degree water'

    b. *Hans   hat   [drei   Grad   Wasser]   getrunken
          Hans   has   [three   degree   water]   drunk
           '(lit.) Hans drank three degrees of water.'   (Nakanishi 2004: 50 & 65)

- This crosslinguistic semantic constraint on quantifier constructions is known as "THE MONOTONICITY CONSTRAINT", which was originally proposed to account for restrictions on measure phrases in different types of English measure constructions. (Krifka 1989, 1998; Schwarzschild 2002, 2006)

(13)   100 degree-Celsius water, 18-carat gold, one-liter bottle
    Cf. *100 degree-Celsius of water, *18-carat of gold, *one liter of bottle

(14)   three liters of water , 5 pounds of apples, two bottles of wine

- The Monotonicity Constraint: a measure function is monotonic if the denotation of the noun has a part-whole structure and "it tracks part-whole relations" (Schwarzschild 2002, 2006).

> Monotonicity   (defined in terms of divisivity):
>
> A measure function μ is monotonic on ⟦NP⟧   iff:
> For every x, y such that   ⟦NP⟧(x) is a proper subpart of   ⟦NP⟧(y),
> if α and β are intervals of a scale such that α ($\mu(x)$) and β ($\mu(y)$), then $\alpha < \beta$

  ➢ Korean postnominal/floating quantifier constructions require monotonicity, while prenominal quantifier constructions are immune to the monotonicity constraint.
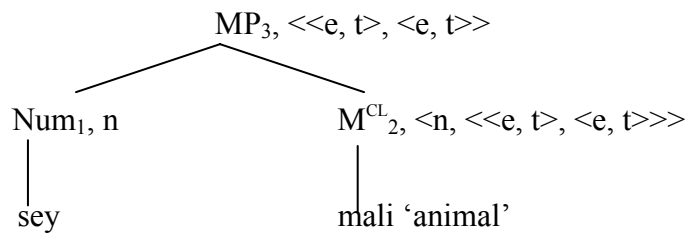
Summary:

- The postnominal quantifier serves as a lexical head of the quantified nominal expression, on which the verb imposes its selectional restrictions.
- The postnominal quantifier combines with DP.
- the postnominal quantifier is only compatible with the measure phrase of which property can be interpreted as monotonic with respect to the part-whole structure of the denotation of the associated noun.

IV. PROPOSAL

- The prenominal numeral quantifier is an NP modifier where as the postnominal quantifier takes the associated DP as its argument and forces a monotonic reading.
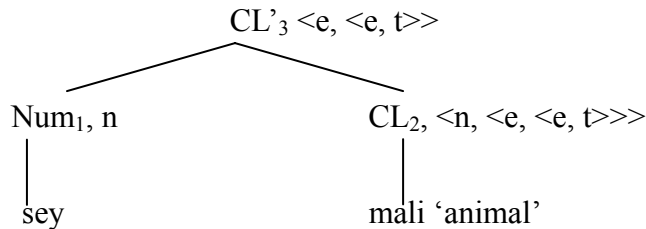
- Prenominal Quantifier

(15) ⟦n-CL ⟧   = $\lambda P\lambda x[P(x) \wedge \#(x) = n]$

         (Where $\#(x) = n$: x is an individual sum consisting of n atoms)

$$MP_3, \langle\langle e, t\rangle, \langle e, t\rangle\rangle$$

```
              MP₃, <<e, t>, <e, t>>
             /                    \
      Num₁, n              M^CL₂, <n, <<e, t>, <e, t>>>
        |                          |
       sey                    mali 'animal'
```

1. ⟦ sey⟧   =   3
2. ⟦ mali ⟧   = $\lambda n \, \lambda P\lambda x \, [P(x) \wedge \text{ANIMAL}(x) = n]$
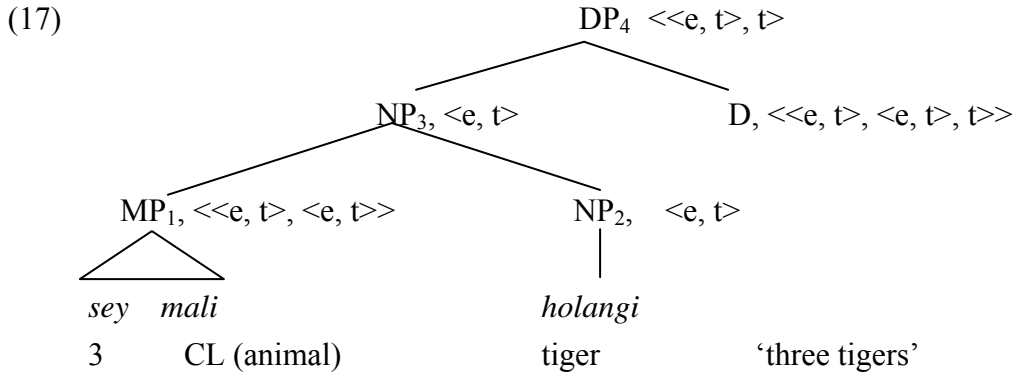3. ⟦sey mali ⟧   = $\lambda P\lambda x \, [P(x) \wedge \text{ANIMAL}(x) = 3]$

- Postnominal Quantifier

(16) ⟦n-CL ⟧   = $\lambda x \lambda y \, [\,\#^R (y, x) = n]$ $(= \lambda \, x\lambda y \, [y \leq x \wedge \#(y) = n]\,)$

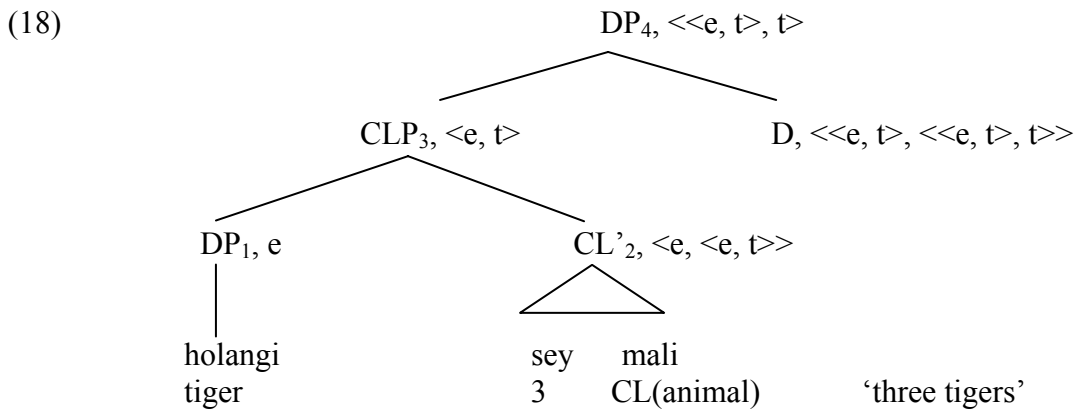   (Where '$y \leq x$: y is an individual part or material part of x')

```
              CL'₃ <e, <e, t>>
             /                 \
      Num₁, n              CL₂, <n, <e, <e, t>>>
        |                       |
       sey                 mali 'animal'
```

1. ⟦ sey ⟧   'three'   =   3
2. ⟦ mali ⟧   'CL (animal)'   = $\lambda n \, \lambda x \, \lambda y \, [\, y \leq x \wedge \text{ANIMAL}(y) = n]$
3. ⟦ sey mali ⟧   '3-CL(animals)'   = $\lambda x \, \lambda y \, [\, y \leq x \wedge \text{ANIMAL}(y) = 3]$

- For example,

(17)

$$DP_4 \;\; <<e, t>, t>$$

$$NP_3, <e, t>$$

$$D, <<e, t>, <e, t>, t>>$$

$$MP_1, <<e, t>, <e, t>>$$

$$NP_2, \;\; <e, t>$$

sey   mali

holangi

3   CL (animal)

tiger   'three tigers'

1 ⟦ holangi⟧   = λx [TIGER(x)]

2 ⟦sey mali ⟧   = $\lambda P\lambda x$ [P(x) $\wedge$ ANIMAL(x) =3]

3 ⟦ sey mali   holangi ⟧ = λx[TIGER(x) $\wedge$ ANIMAL(x) =3]

4 ⟦ sey mali   holangi ⟧ = $\lambda Q\exists x$[TIGER(x) $\wedge$ ANIMAL(x) =3$\wedge$ Q(x)]

(18)

$$DP_4, <<e, t>, t>$$

$$CLP_3, <e, t>$$

$$D, <<e, t>, <<e, t>, t>>$$

$$DP_1, e$$

$$CL'_2, <e, <e, t>>$$

holangi

sey   mali

tiger

3   CL(animal)   'three tigers'

1. ⟦ tiger ⟧ = $^\cap$ TIGER

2. ⟦ sey mali ⟧ = $\lambda x \lambda y$ [$y \leq x \wedge$ ANIMAL(y) =3]

3. ⟦ holangi sey mali ⟧ = λy [$y \leq {}^\cap$ TIGER $\wedge$ ANIMAL(y) =3]

4. ⟦ holangi sey mali ⟧ = $\lambda Q\exists y$ [$y \leq {}^\cap$ TIGER $\wedge$ ANIMAL(y) =3 $\wedge$ Q(y)]

V. PREDICTIONS

- The monotonicity constraint can be captured by the proposed analysis.
    - Korean/Japanese prenominal quantifier constructions are exempt from the monotonicity constraint since the measure noun is not required to express a part-whole relation. The contrast between (9a) and (9b) is due to the fact that *tossi* 'degree' is not translated as a predicate which can take the associated nominal and change it to denote its subpart that is specifically measured.

(19) 〚 osip tossi 〛   = $\lambda P \lambda x[P(x) \wedge \text{TEMPERATURE-DEGREE}(x) = 50]$

Postnominal quantifier constructions are subject to the monotonicity constraint because of the semantics of the classifier which tracks a part-whole structure.

> A measure function is monotonic if the semantics of a given measure noun establishes a part-whole relation: i.e., $\lambda n \lambda x \lambda y\ [\ y \leq x \wedge \#(y) = n]$

- Given that the postnominal quantifier is an subcategorized argument of a verb, the proposed analysis can explain (5) and (6) by the semantic ambiguity of the classifiers: for example, the postnominal classifier *congci* 'bowl' has two interpretations.

(20) Cheli-ka [kancang twu congci]-lul   kkayttuli / mek-ess-ta
      Cheli-Nom [soy sauce 2   CL(bowl)]-Acc   break   / eat-Pst-Dec
      'Cheli broke/ate two bowls of soy sauce.'

(21) a. $\lambda n\ \lambda x\ \lambda y\ [\text{BOWL}^{R}_{\text{LIQ}}\ (y,\ x) = n]$: liquid contained in a bottle
       b. $\lambda n\ \lambda x\ \lambda y\ [\text{BOWL}^{R}_{\text{CON}}\ (y,\ x) = n]$: a container for liquid

Prenominal vs. postnominal quantifiers:

(22) a. 〚 kancang   twu congci〛   = $\lambda y[\text{BOWL}^{R}_{\text{CON}}\ (y,\ \text{SOY SAUCE}') = 2]$
     b. 〚 twu congci-uy   kancang〛   = $\lambda x[\text{SOY SAUCE}(x) \wedge \text{BOWL}(x) = 2 \wedge P(x)]$

- How about the following contrast?

(23) a. ?? Cheli-ka   ecey   [yel cang-uy   soselchayk]-ul   ilkessta
           Cheli-Nom   yesterday   [10 page-Gennovel   ]-Acc   read

   b.   Cheli-ka   ecey   [soselchayk   yel chang]-ul   ilkessta
           Cheli-Nom   yesterday   [novel   10   page   ]-Acc   read
           'Cheli read 10 pages of the novel.'

➔The ungrammaticality of (23a) is due to that the prenominal quantifier is interpreted as the NP modifier:

(24)   NP

         MP   NP

      yel   cang   soselchayk
      10   CL (page)   novel   '10-page novel'
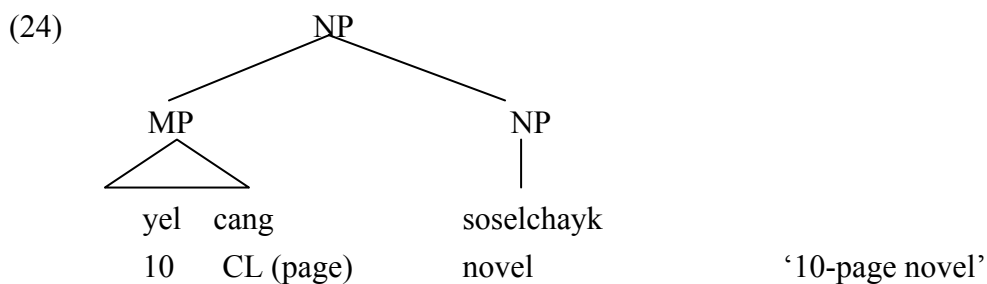
⟦ yel cang⟧   '10-CL(page)'   = $\lambda P \lambda x$ [P(x) $\wedge$ PAGE (x) = 10]
⟦ soselchayk⟧ ' novel'   = λx [NOVEL (x)]
⟦ yel cang –uy soselchayk⟧   = λx [NOVEL (x) $\wedge$ PAGE (x) = 10]

Cf. ⟦soselchayk yel chang ⟧ = λy[$y \leq$ NOVEL' $\wedge$ PAGE (y) = 10]

This analysis can also predict the contrast between (23a) and the following sentence (25) where the associated noun 'novel' in (23a) is replaced by *pyenci* 'letter'.

(25)   Cheli-ka   ecey   [yel cang-uy   (kin) pyenci]-lul   ss-ess-ta
      Cheli-Nom   yesterday   [10 page-Gen (long) letter]-Acc   write-Pst-Dec

VI. CONCLUSION

Prenominal and postnominal quantifier constructions have different semantic and syntactic structures. Prenominal quantifier is an NP modifier, while the postnominal quantifier is a head taking the associated DP as its argument.

REFERENCES

Chae, W. 1983. [Kwuke swusa mich swulayngkwu-uy wyuhyengcek kochal]. *Language Research* 19.

Kim, Young-Hee. 1983. Syntax of Korean Numeral Phrases [hankwuke seymswuthhwa kwumwun-uy thongsalon], Yonsei University.

Krifka, Manfred. 1989. Nominal Reference, Temporal Constitution and Quantification in Event Semantics. In *Semantics and Contextual Expressions*, ed. R. Bartsch, van Benthem, J. and P. Emde Boas. Dordrecht Foris.

Krifka, Manfred. 1998. The origins of telicity. In *Events and Grammar*, ed. S. Rothstein, 197-235. Dordrecht: Kluwer Academic Publishers.

Lønning, J. T. 1987. Mass terms and quantification. *Linguistics and philosophy* 10:1-52.

Nakanishi, Kimiko. 2003. Semantics of Measure Phrases. *The Proceedings of the 33rd Conference of the North East Linguistic Society*:225-244.

Nakanishi, Kimiko. 2004. *Domains of Measurement: Formal Properties of Non-Split/Split Quantifier Constructions.* Doctoral Dissertation. University of Pennsylvania.

Schwarzschild, Roger. 2002. The grammar of measurement. Paper presented at *Proceedings of Semantics and Linguistics Theory XII*, Ithaca, NY.

Schwarzschild, Roger. 2006. The Role of Dimensions in the Syntax of Noun Phrases. *Syntax* 9.1: 67-110.

Shin, Keun Young. 2006. Non-case-marked Floating Quantifiers. *Harvard Studies in Korean Linguistics* 11:751-763.

Shin, Keun Young. 2008. Quantified Noun Phrases in a Head-Final Language. In Elfer, Emily and Martin Walkow (eds.) *NELS 37: Proceedings of the 37th Meeting of the Northeast Linguistics Society* Volume 2.

Watanabe, Arika. 2006. Functional projections of nominals in Japanese: Syntax of classifiers. *Natural Language & Linguistic Theory* 24:241-306.