

Cyclic Linearization and Asymmetry in Scrambling

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1. Outlook

Goals of the paper:

- **To discuss** a certain asymmetry between scrambling of external vs. internal arguments in Korean. Old puzzles concerning floating quantifiers are revisited.
- **To propose** that scrambling does not occur randomly, but strictly constrained by a PF-Syntax Interface Condition, *Cyclic Linearization* (Fox and Pesetsky 2003).
- **Implications.**
 - (i) A subject may undergo scrambling, contrary to some assumptions in the literature (cf. Saito 1985, Hoji 1985).
 - (ii) Scrambling is restricted by the core property of cyclic Spell-out as much as Object Shift in Scandinavian languages.
 - (iii) Holmberg's Generalization, as captured by Fox & Pesetsky (2003), is not a language-specific constraint, but rather a universal principle that may extend to SOV scrambling languages.

2. Puzzles

Korean is a SOV scrambling language. Quantity of a noun (mass or count) is expressed by a Numeral Quantifier (NQ) followed by a classifier (CL). NQ can be floated.

- (1) **Haksayng sey-myeng**
 Student 3-CL_{people}
 'three students'

2.1 Subject vs. Object Asymmetry in Scrambling

- (2) **A Subject Puzzle.** (Haig 1980, Kuroda 1983, Saito 1985, Miyagawa 1989, Lee 1993, Fujita 1994, among others)
- As illustrated in (3a), the subject may intervene between the object and the object-oriented NQ (NQ_{obj}).
 - However, the object may not intervene between the subject and the subject-oriented NQ (NQ_{subj}), as in (3b). If the subject is able to scramble over the scrambled object, we expect that the subject would license the subject-oriented NQ (NQ_{subj}), contrary to facts.

- (3) a.
$$\begin{array}{c} \downarrow \\ [O \quad S \quad t_o \quad \text{NQ}_{obj} \quad V] \\ \text{Maykcwu-lul}_i \quad \text{John-i} \quad t_i \quad \text{sey-pyeng} \quad \text{masi-ess-ta} \\ \text{Beer-Acc} \quad \text{John-Nom} \quad \text{three-CL}_{\text{bottle}} \quad \text{drink-Past-Dec} \\ \text{'John drank three bottles of beer'} \end{array}$$
- b.
$$\begin{array}{c} * [S \quad O \quad t_s \quad \text{NQ}_{subj} \quad t_o \quad V] \\ \uparrow \\ * \text{Haksayng-tul-i}_i \quad \text{maykcwu-lul}_j \quad t_i \quad \text{sey-myeng} \quad t_j \quad \text{masi-ess-ta} \\ \text{Student-PL-Nom} \quad \text{beer-Acc} \quad \text{three-CL}_{\text{person}} \quad \text{drink-Past-Dec} \\ \text{'Three students drank beer.'} \end{array}$$

- (4) **Saito (1985).** Assume that a subject never undergoes scrambling.¹

2.2. However, a subject does scramble!

- (5) Saito (1985) claims that the subject cannot undergo scrambling because its trace cannot be lexically-governed by the verb. Given the vP-internal subject hypothesis, however, it is not obvious why a subject cannot undergo scrambling.²
- $$[_{IP} \text{Subj}_j \quad [_{vP} \text{Obj}_i \quad [_{vP} t_j \text{NQ}_{subj} \quad [_{VP} t_i \quad V]]]]$$
- (6) As shown in (7), an embedded subject may scramble over a matrix subject unless parsing difficulty arises: **clause-external scrambling of a subject is possible** (Lee 1992, Lee 1993, Sohn 1995, but see also Saito 1985).
- (7)
$$\begin{array}{c} \downarrow \\ \text{John-i}_i \quad [na-nun \quad [t_i \text{Mary-lul} \quad \text{ttayli-ess-ta-ko}] \quad \text{sayngkakha-n-ta}] \\ \text{John-Nom} \quad \text{I-Top} \quad t \quad \text{Mary-Acc} \quad \text{hit-Past-Dec-C} \quad \text{think-Pres-Dec} \\ \text{'John, I think that } _ \text{ hit Mary.'} \end{array}$$
- (8) Ko (2003a): **CP-internal scrambling of a subject is also possible over high adverbs** such as *amato* 'probably', *pwunmeyngghi* 'evidently', and *way* 'why' (see also Miyagawa 1989, and Fujita 1994, and see the appendix in this handout).

- a. **A subject-oriented floating quantifier can be licensed across *pwunmeyngghi*.**

$$\begin{array}{c} \downarrow \\ [S \quad \text{adv} \quad t_s \quad \text{NQ}_{subj} \quad O \quad V] \\ \text{Haksayng-tul-i}_i \quad \text{pwunmeyngghi} \quad t_i \quad \text{sey-myeng} \quad \text{maykcwu-lul}_j \quad \text{masi-ess-ta} \\ \text{Student-PL-Nom} \quad \text{evidently} \quad t_i \quad \text{3-CL}_{\text{people}} \quad \text{beer-Acc} \quad \text{drink-Past-Dec} \\ \text{'Evidently, three students drank beer.'} \end{array}$$

- b. **An object-oriented floating quantifier can be licensed across *pwunmeyngghi*.**

$$\begin{array}{c} \downarrow \\ [O \quad \text{adv} \quad S \quad t_o \quad \text{NQ}_{obj} \quad V] \\ \text{Maykcwu-lul}_i \quad \text{pwunmeyngghi} \quad \text{John-i} \quad t_i \quad \text{sey-pyeng} \quad \text{masi-ess-ta} \\ \text{Beer-Acc} \quad \text{evidently} \quad \text{John-Nom} \quad \text{three-CL}_{\text{bottle}} \quad \text{drink-Past-Dec} \\ \text{'Evidently, John drank three bottles of beer'} \end{array}$$

- (9) **Importantly, however, the Subject Puzzle still remains as a problem.**

$$\begin{array}{c} *? \downarrow \\ *? [S \quad \text{adv} \quad O \quad t_s \quad \text{NQ}_{subj} \quad t_o \quad V] \\ *? \text{Haksayng-tul-i}_i \quad \text{pwunmeyngghi} \quad \text{maykcwu-lul}_j \quad t_i \quad \text{sey-myeng} \quad t_j \quad \text{masi-ess-ta} \\ \text{Student-PL-Nom} \quad \text{evidently} \quad \text{beer-Acc} \quad \text{three-CL}_{\text{person}} \quad \text{drink-Past-Dec} \\ \text{'Evidently, three students drank beer.'} \end{array}$$

- (10) **Question.**
 If the subject is able to undergo scrambling, why does the *Subject Puzzle* exist?

¹ Hoji (1985) also assumes that a subject cannot undergo scrambling, based on the fact that Japanese show scope rigidity between a subject and an unscrambled object. I will not discuss scope rigidity in this paper.

² I thank Mamoru Saito for pointing out this problem.

3. Proposal

- **Scrambling in Korean is constrained by a PF-Syntax Interface Condition, Cyclic Linearization.**

(11) Cyclic Linearization (Fox and Pesetsky 2003)³

- a. Certain syntactic domains created in a derivation are *Spell-out* Domains (i.e. *Linearize* applies to them). These may correspond to Chomsky's notion of *phase*.

NB. Unlike Chomsky (1999), Fox and Pesetsky's (2003) system assumes that both *Spec* and *Complement* of the head of the Spell-out domain are shipped to PF at each cycle of Spell-out.

- b. The linear ordering of syntactic units is affected by Merge and Move *within* a Spell-out Domain, but is fixed once and for all at the end of each Spell-out Domain.

- (12) a. [_{VP} X Y]: X<Y (X precedes Y)
 b. [_{CP} Z [_{VP} X Y]]: Z<X<Y
 c. [_{CP} X₁ Z [_{VP} t₁ Y]]: X<Z<Y
 d. [_{CP} Y₁ Z [_{VP} X t₁]]: Y<Z<X

- (13) a. [_{VP} Y [_{VP} X t₁]]: Y<X
 b. [_{CP} Y₁ Z [_{VP} t₁ [_{VP} X t₁]]]: Y<Z<X

- (14) Fox and Pesetsky (2003, p.2): *Object Shift in Scandinavian* (Holmberg 1999) is possible only when elements that preceded the object in VP still precede the object after it has shifted, as a consequence of other movement operations. [Cf. similar proposals by Müller 2001, Sells 2001, Williams 2002, among others.]

- | | |
|--|---|
| a. Jag kysste henne inte [_{VP} t _v t _o]
I kissed her not | a'. (*Jag kysste inte henne.
I kissed not her |
| b. *Jag har henne inte [_{VP} kysst t _o].
I have her not kissed | b'. Jag har inte kysst henne.
I have not kissed her |
| c. *...att jag henne inte [_{VP} kysste t _o].
...that I her not kissed | c'. ...att jag inte kysste henne.
...that I not kissed her |

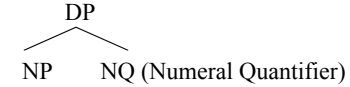
(15) Theoretical Background

- a. vP and CP are the Spell-out Domains (*phases*) in Korean (Chomsky 1999).
 b. XP in(side) [Spec, α P] cannot move to [Spec, α P] of the same head α .⁴

³ See Fox and Pesetsky (2003) for other empirical consequences of this proposal.

⁴ There are several possible reasons why (14b) may hold. First, there is no trigger/attractor/probe for this extremely local movement. Second, we have reasons to block merging an XP twice to the same head (Torrego and Pesetsky 2002). (cf. Richards (2001) and Takahashi (2003) for some potentially opposing considerations)

- c. NP and NQ are merged as sisters (Kamio 1983, Sportiche 1988, Giusi 1990, Slonsky 1991, Merchant 1996, Kawashima 1998; cf. Williams 1982, Miyagawa 1989, Ishii 1998 for the non-constituent approaches).



- NP-coordination (16) and pseudo-cleft test (17) provide independent evidence that NP and NQ form a constituent⁵.

- (16) a. John-i [chayk-ul **sey-kwon**] **hako** [notu-lul **twu-kwon**] sassta
 John-Nom book-Acc three-CL and note-Acc two-CL bought
 'John bought three books and two notebooks'
 b. *John-i [chayk-ul ecey] **hako** [notu-lul onul] sassta
 John-Nom book-Acc yesterday and note-Acc today bought
 'John bought books yesterday and notebooks today'

- (17) a. John-i san-kes-un [chayk-ul **sey-kwon**] ita
 J-Nom buy-thing-Top book three-CL copula
 'It is three books that John bought'
 b. *John-i san-kes-un [chayk-ul **ecey**] ita
 J-Nom buy-thing Top book yesterday copula
 'It is books yesterday that John bought'

NB) I note that Case-marked NQs (e.g. *sey myeng-i* 'three CL-Nom' and universal Floating Quantifiers (e.g. *motwu* 'all') in Korean behave differently from Caseless NQs in many ways. I argue that this is due to the fact that they do not form a constituent in the base structure, in contrast to Caseless NQs in (15)c. See Ko (2003b) for details.

4. Scrambling Paradigms

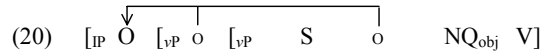
4.1 Object Scrambling

- (18) [_{VP} S O NQ_{obj} V]
 John-i maykcwu-lul sey-pyeng masi-ess-ta
 John-Nom beer-Acc three-CL_{Bottle} drink-Past-Q

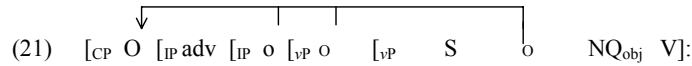
- (19) [_{VP} O [_{VP} S O NQ_{obj} V]]
 Maykcwu-lul_i John-i t_i sey-pyeng masi-ess-ta
 Beer-Acc John-Nom three-CL_{Bottle} drink-Past-Q

- a. The object scrambles to the edge of vP
 b. **Linearize vP: O<S, O<NQ_{obj}, O<V, S<NQ_{obj}, S<V**
 [NB. Small letters in the diagram indicate traces]

⁵ Kamio 1983, Ueda 1990, Koizumi 1995, Kawashima 1998, and Yoon 2003 for the motivation of this test.



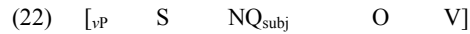
- Successive cyclic object scrambling from the vP edge to IP (Mahajan 1990, Satio 1992, Sohn 1995, Miyagawa 1997)



Maykcwu-lul_i *pwunmeyngghi* John-i _{ti} sey-pyeng masi-ess-ta
 Beer-Acc evidently John-Nom three-CL_{Bottle} drink-Past-Q
 ‘Evidently, John drank three bottles of beer.’

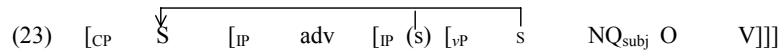
- [Unimportant ordering statements are omitted for ease of presentation]
- Linearize CP:** Ordering statement $O < adv, O < S, O < V, O < NQ_{obj}, S < V$
 - No ordering contradictions between the vP domain and the CP domain!**

4.2 Subject Scrambling



Haksayng-tul-i sey-myeng maykcwu-lul masi-ess-ta
 Student-Pl-Nom 3-CL beer-Acc drink-Past-Q

- The subject in [Spec,vP] cannot move to the edge of [Spec,vP]
- Linearize vP:** $S < NQ_{subj}, S < O, S < V, NQ_{subj} < V, O < V$

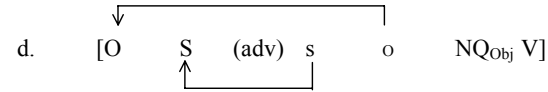
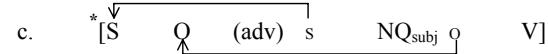
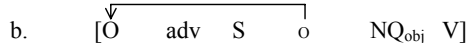
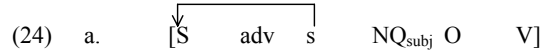


Haksayng-tul-i pwunmeyngghi _{ti} **sey-myeng** maykcwu-lul masi-ess-ta
 Student-Pl-Nom evidently three-CL_{person} beer-Acc drink-Past-Dec
 ‘(Evidently) three students drank beer.’

- Linearize CP:** $S < adv, S < NQ_{subj}, S < V, NQ_{subj} < V$
- No ordering contradictions!**

The fact that the subject can license NQ_{subj} across adverbs is correctly predicted in this approach (cf. Saito 1985).

4.3 Multiple scrambling

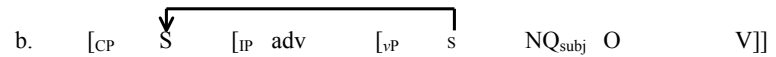


Case 1: When the object does not undergo scrambling within the vP domain
 [Intermediate movement from SpecvP to SpecIP is omitted for the ease of presentation]

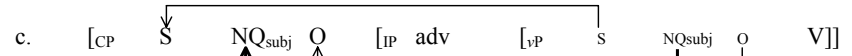
(25) Result: **O cannot intervene between S and NQ_{subj} .**



- **Linearize vP:** $S < NQ_{subj}, S < O, S < V, NQ_{subj} < O, NQ_{subj} < V, O < V$

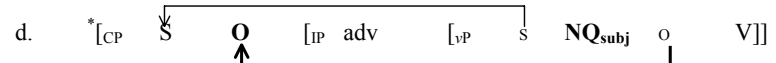


- Subject Scrambling: no ordering contradiction



- NQ_{subj} /Object multiple Scrambling (tucking in).
- **Linearize CP:** No ordering contradiction between O and NQ_{subj}
 - $S < O, S < adv, S < NQ_{subj}, S < V$
 - $NQ_{subj} < O, NQ_{subj} < adv$
 - $O < adv, O < V$

Compare this with the following ill-formed construction:

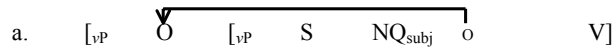


- Object Scrambling over *adv*
- **Linearize CP: Ordering contradiction between O and NQ_{subj} !**
 - $S < O, S < adv, S < NQ_{subj}, S < V$
 - $O < adv, O < NQ_{subj}, O < V$

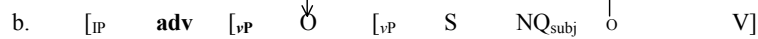
➤ **Result: an object may not intervene between S and NQ_{subj} .** Whenever O moves out of the vP domain, NQ_{subj} should move over O to preserve the ordering statement of the vP domain.

Case 2: When the object undergoes scrambling within the vP-domain

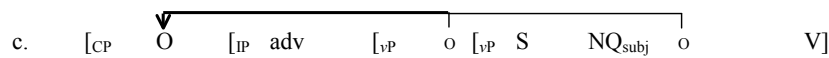
(26) **Result:** Again, O cannot intervene between S and NQ_{subj}.



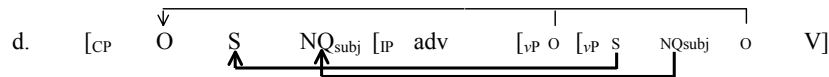
- **Linearize vP:** O<S, O<NQ_{subj}, O<V, S<NQ_{subj}, S<V, NQ_{subj}<V



- Merge *adv*.

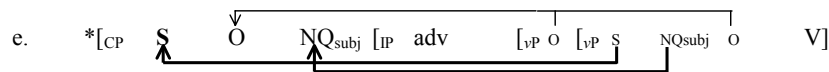


- The object scrambles over the adverb.
- S/NQ_{subj} scrambling is now possible only when it does not end up preceding O, since the previous application of Linearize established the orderings [O<S, O<NQ_{subj}].

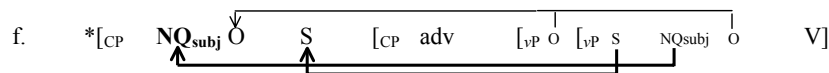


- **Linearize CP:**
 - O<S, O<NQ_{subj}, O<adv, O<V
 - S<NQ_{subj}, NQ_{subj}<adv,
 - NQ_{subj}<V

Compare this with other ill-formed constructions:



- **Linearize CP:** S<O: ordering contradiction!



- **Linearize CP:**
 - NQ_{subj}<O: ordering contradiction!
 - NQ_{subj}<S: ordering contradiction!

➤ **Result: an object cannot intervene between S and NQ_{subj}.**

5. Summary and Implications

News. A subject does undergo scrambling and license NQ_{subj} (cf. Saito 1985). However, there exist **systematic asymmetries between external vs. internal arguments** in the licensing of NQ.

Proposal. Scrambling in Korean is subject to the **PF-Syntax Interface Condition, Cyclic Linearization** argued by Fox and Pesetsky (2003).

Analysis. O cannot intervene between S and NQ_{subj} due to the Linearization principle. If O precedes S, it should precede NQ_{subj}, too. If O follows S, it should follow NQ_{subj}. By contrast, S may intervene between O and NQ_{obj} — because O may undergo order-shifting scrambling *within* the vP (before Linearize applies to the vP).

Implications. 1) A subject does undergo scrambling (cf. Saito 1985): The Linearization approach explains the subject vs. object asymmetry without stipulating that a subject cannot undergo scrambling, extending the empirical coverage.
 2) Scrambling in Korean does not randomly occur, but obeys the core property of cyclic spell-out, i.e. the Linearization principle.
 3) The cross-linguistic parallelism between Object Shift in Scandinavian languages and scrambling in Korean is captured under this analysis.

Consequence. This paper provides further empirical evidence for the thesis that *the architecture of the grammar requires Linearization in phonology to be cyclically determined at syntax*, in the spirit of Chomsky (1999).

Appendix.

1. High vs. low adverbs

(27) **Prediction:** Any elements (including IO, PP, and adjunct) within the vP would behave the same way as an object with respect to the Linearization. Furthermore, we predict the asymmetry between high vs. low adverbs.

(28) High adverbs: externally-merged above vP (e.g. epistemic adv.).
 Low adverbs: externally-merged within vP, below subject (e.g. manner adv.)

- a. **Prediction 1: A high adverb may intervene between the subject and the NQ_{subj}:** [S₁ H_{adv} [vP t₁ NQ_{subj} O V]:
 Movement of the subject adds new ordering, but no contradiction!
- b. **Prediction 2: A low adverb may not intervene between the subject and the NQ_{subj}** for the same reason that an object cannot intervene between the subject and the NQ_{subj}.

(29) **The predictions are borne out:**

- a. *S {manner, instrumental, resultatives } NQ_{subj} ...
 b. S {sentential (e.g. *certainly, probably, evidently*), temporal (e.g. *yesterday*), locative, speaker-oriented (e.g. *to my surprise*), subject-oriented adv. (e.g. *cleverly, stupidly, rudely*)} NQ_{subj} ...

(30) **Low adverbs cannot intervene between S and NQ_{subj} while high adverbs can:**

- a. **Haksayng-tul-i** amato **sey-myeng** kong-ul pat-ass-ulkes-ita
 Student-PL-Nom probably 3-CL ball-Acc receive-Past-likely-Dec
 ‘Probably, three students received a ball’
 b. ***Haksayng-tul-i** yakwu.glove-lo **sey-myeng** kong-ul pat-ass-ta
 Student-PL-Nom baseball.glove-with 3-CL ball-Acc received
 ‘Three students received a ball with a baseball glove’

(31) **The object does *not* show such difference in licensing NQ_{obj}:**

- a. **Kong-ul** haksayng-tul-i amato **sey-kay** pat-ass-ulkes-ita
 Ball-Acc student-PI-Nom probably 3-CL_{thing} receive-Past-likely-Dec
 ‘Probably, students received three balls’
 b. **Kong-ul** haksangtul-i yakwu.glove-lo **sey-kay** pat-ass-ta
 Ball-Acc student-Nom baseball.glove-with 3-CL_{thing} received
 ‘Students received three balls with a baseball glove’

2. Interactions between NQ licensing and Argument Structure

Miyagawa (1989) Types of VP-structure affecting the licensing of NQ_{subj}.

(32) **A passive subject and NQ_{subj} may be separated by an agentive by-phrase**

Ecey, **catongcha-ga** totwuk-eykey **twu-tay** pwuswu-eci-ess-ta
 yesterday, car-Nom thief-Dat 2-CL break-Pass-Past-Dec
 ‘Yesterday, two cars were broken by a thief’

(33) **An unaccusative subject and NQ_{subj} may be separated by a PP.**

Koyangi-ka i-pyeng-ulo **sey-mari** cwu-ess-ta
 Cat-Nom this disease-by three-CL die-Past-Dec
 ‘Three cats died from this disease’

(34) **An unergative (intransitive) subject and NQ_{subj} may not be separated by a PP.**

***Haksayng-tul-i** [caki-uy ton-ulo] **twu-myeng** cenhwaha-yess-ta
 Student-PI-Nom self’s money-by 2-CL telephone-Past-Dec
 ‘Two students telephoned with their own money’

Analysis under the Linearization approach

(35) **The passive/unaccusative subject** originates within the VP (not in [Spec,vP]). Thus, it may undergo movement from VP to the edge of vP (or TP), and end up with being separated from NQ by a PP within the vP (*Linearize vP*: S<PP<NQ_{subj}).

- a. [_{vP} ADV [_{VP} S NQ_{subj} V]
 b. [_{vP} S ADV [_{VP} s NQ_{subj} V]

Linearize vP (if you assume vP in Passive or Unaccusative, otherwise skip linearization in vP): S<ADV<NQ_{subj}<V

Importantly, S can be re-merged in a position higher than ADV within the vP.

(36) **In contrast, the unergative subject** originates in [Spec,vP]. Consequently, both S and NQ_{subj} should precede (or follow) the PP within the vP. For linearization purposes, PP behaves like the object in a transitive sentences, with the result that PP cannot intervene between subject and NQ_{subj} (*Linearize vP*: S<NQ_{subj}<PP).

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