

Universal 20 and Antisymmetry: The Nominal-Internal Order in Korean Sign Language*

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Jo, Jinwoo. (2025). Universal 20 and antisymmetry: The nominal-internal order in Korean Sign Language. *The Linguistic Association of Korea Journal*, 33(2), 75-99. In this paper, I attempt to evaluate previous analyses of word order of demonstrative, numeral, adjective, and noun, through an informal questionnaire survey for native signers of Korean Sign Language. The previous analyses make different predictions about the acceptability of five nominal-internal orders, and the survey has asked the participants to provide judgments of the sentences containing noun phrases with the five orders. The results of the survey suggest that an analysis of nominal-internal order does not require the view that phrases have the specifier-head-complement branching order, and that movements producing unmarked nominal-internal orders target a constituent containing N as well as occur only to the left. The results also indicate that noun phrases in signed languages are hierarchically structured even though they show variable word order. The conclusion in the paper once again demonstrates the possibility that investigation of signed languages may help to refine our understanding of linguistic universals.

Key Words: word order, noun phrase, Universal 20, antisymmetry, Korean Sign Language

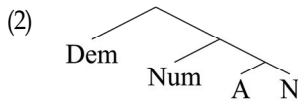
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1. Introduction

The word order of the elements demonstrative (Dem), numeral (Num), adjective (A), and noun (N) within the nominal domain has been claimed to be subject to certain (possibly universal) syntactic constraints. In Korean, for example, when Dem, Num, and A appear in the prenominal position, they must occur in the order ‘Dem > Num > A’ and all the other orders are ungrammatical as illustrated below.¹⁾

- (1) a. *ku twu say kenmwul* (Dem Num A N) (Korean; An, 2014)
 the two new building
 ‘the two new buildings’
 b. **ku say twu kenmul* (Dem A Num N)
 c. **twu ku say kenmwul* (Num Dem A N)
 d. **twu say ku kenmwul* (Num A Dem N)
 e. **say ku twu kenmwul* (A Dem Num N)
 f. **say twu ku kenmwul* (A Num Dem N)

The solely permitted order in (1a) may be taken to reflect the hierarchical order of Dem, Num, A, and N in the nominal projection schematized in (2).



A structure like (2) is generally assumed to be (one of) the base structure(s) of a nominal projection (Cinque, 2005; Abels and Neeleman, 2009, 2012; Georgi and Müller, 2010; Bruening, 2018). So, if the structure in (2) is base-generated in Korean, the examples in

1) As noted by An (2014), such a restriction on the prenominal order of Dem, Num, and A in Korean appears to hold only when these elements are monosyllabic and of native Korean origin. Elements that are semantically similar to those in (1) may be ordered rather freely as in, e.g., *ku saylowu-n twu-chay-uy kenmwul* (Dem > A > Num > N). Note, however, that even though word order is relatively free when the nominal-internal elements in question are not monosyllabic native-Korean words, they are still restricted to occur prenominally: e.g., **ku twu-chay-uy kenmwul saylowu-n* (Dem > Num > N > A), with the exception of the numeral accompanied by a classifier, which may occur in the postnominal position as in *ku saylowu-n kenmwul twu-chay* (Dem > A > N > Num).

(1) may be considered to indicate that the elements Dem, Num, and A in Korean are not allowed to undergo movement within the nominal projection.

Not only in Korean but in many other languages as well, word order is not free within the nominal domain, and there have been many attempts to account for the possible and impossible orders of the nominal-internal elements across different languages. Greenberg (1963), for instance, proposes a cross-linguistic generalization which states that Dem, Num, and A must occur in that order when they precede N, but they may occur either in that order or in the reversed order when they follow N. Greenberg's generalization predicts that of the 24 logically possible orders of Dem, Num, A, and N, only 12 orders would be attested in the world's languages. Cinque (2005), however, notes that of the 24 possible orders of the nominal-internal elements, 14 orders have been actually attested, pointing out that Greenberg's generalization is both too permissive and too restrictive. According to Cinque, one order ('Num > N > Dem > A') that is predicted to be attested by Greenberg's generalization has not been attested, while three orders ('N > Dem > A > Num', 'N > Num > A > Dem', and 'N > A > Dem > Num') that are predicted not to be attested by Greenberg's generalization have been actually attested. Cinque proposes that the attested and unattested nominal-internal orders can be successfully accounted for within the antisymmetry hypothesis of Kayne (1994), if the universal hierarchical order of Dem, Num, A, and N is 'Dem > Num > A > N' along the lines of (2) above (In this paper, I will use '>' to indicate c-command as opposed to '>' which is used to indicate precedence). Cinque assumes, adopting the antisymmetry hypothesis, that phrases uniformly have the specifier-head-complement branching order, and a structure that produces the order 'Dem > Num > A > N' is universally the base structure for a nominal projection. He then shows that all the other attested orders (but not the unattested ones) can be derived through movement operations constrained in various ways (e.g., relevant movements should target a constituent containing N and can only occur to the left).

Abels and Neeleman (2009, 2012) point out that the attested and unattested nominal-internal orders may as well be accounted for without resorting to the antisymmetry hypothesis. They show that eight out of the 14 attested orders can be base-generated conforming to the underlying hierarchy 'Dem > Num > A > N', if (contra the antisymmetry hypothesis) base-generated projections are either right-branching or left-branching. They also show that the remaining six attested orders can be exclusively derived through movement operations, again constrained in various ways

(including the requirements that relevant movements target a constituent containing N and occur only to the left). All in all, Abels and Neeleman show that exactly the same set of nominal-internal orders reported by Cinque (2005) as attested can be derived without the antisymmetry hypothesis, and in the sense that it does without extra assumptions from the antisymmetry hypothesis, Abels and Neeleman's analysis may be taken to be simpler than Cinque's and thus, according to Abels and Neeleman, preferable.

Bruening (2018) notes that there might be an even simpler analysis of nominal-internal word order, in which the assumption made by both Cinque's (2005) and Abels and Neeleman's (2009, 2012) analyses is dispensed with, namely, the assumption that all relevant movements target a constituent containing N. The only constraint that is stipulated by Bruening to account for the typology of nominal-internal order is that only rightward movement of Dem, Num, and/or A can produce an unmarked word order in the nominal projection. What is worth noting about Bruening's analysis is that it allows a slightly different set of nominal-internal orders from the 14 orders permitted by Cinque's and Abels and Neeleman's analyses (or the 12 orders permitted by Greenberg's generalization, for that matter): Bruening's analysis predicts two more orders ('Num > N > Dem > A' and 'N > Num > Dem > A') to be possible in addition to the 14 orders predicted by Cinque's and Abels and Neeleman's analyses.

Notice that the analyses introduced above predict different sets of nominal-internal orders to be possible in the world's languages. Greenberg's (1963) generalization allows 12 orders to occur within the nominal domain, while Cinque's (2005) and Abels and Neeleman's (2009, 2012) analyses allow 14. And yet, Bruening's (2018) analysis predicts that 16 orders would be found in the world's languages. In this preliminary study, I attempt to examine the different predictions of these analyses by exploring nominal-internal orders in the signed language used by the Deaf community in Korea, i.e., Korean Sign Language (KSL), focusing on the orders whose possibility is predicted differently by the previous studies, i.e., 'Num > N > Dem > A', 'N > Dem > A > Num', 'N > Num > A > Dem', 'N > A > Dem > Num', and 'N > Num > Dem > A'.

Signed languages are known to exhibit a high degree of word order flexibility not only in the clausal domain (Tervoort, 1968; Liddell, 1980; Petronio, 1991; Bouchard and Dubuisson, 1995; Fischer, 2008; Leeson and Saeed, 2012) but also in the nominal domain (Tang and Sze, 2002; Zhang, 2007; Neidle and Nash, 2012; Jieqiong and Tang, 2020). The flexibility of word order has led some researchers to claim that signed languages do not have basic word order and thus are not hierarchically structured (e.g., Bouchard and

Dubuisson, 1995). Many researchers, however, have shown that signed languages, just as spoken languages, are hierarchically structured at the clausal level as well as at the nominal level. One of the studies that is particularly relevant to the current study is Zhang (2007), which shows that word order within the nominal domain in Taiwan Sign Language (TSL) is flexible but only within the scope of Greenberg's generalization. The fact that nominal-internal orders in TSL are restricted in the same way as they are in spoken languages suggests, according to Zhang, that the nominal in signed languages is hierarchically structured just as its counterpart in spoken languages is. Similar observations have been made by Jieqiong and Tang (2020) on Hong Kong Sign Language (HKSL): they have shown that word order possibilities in the nominal domain in HKSL do not deviate from the 14 attested orders reported by Cinque (2005) and Abels and Neeleman (2009, 2012). Basically the same conclusion has been reached by Mantovan and Geraci (2017) on nominal-internal word order in Italian Sign Language (LIS; acronym from *Lingua Italiana dei Segni*).

So, the flexibility of nominal-internal word order in different signed languages has been shown to be in compliance with the observations made by the previous studies on nominal-internal word order in spoken languages. As far as I am aware, however, it has not been attempted to evaluate the different predictions of the previous studies using the word order patterns found in a signed language. As has been shown several times, signed languages as a type of natural language adopting the modality sharply different from spoken languages may offer important insights in the search for linguistic universals: e.g., wh-movement and the directionality of a specifier (see Petronio and Lillo-Martin, 1997, and Neidle et al., 2000, among others, for discussion). So, examination of the word order patterns in KSL could well provide yet another opportunity to evaluate the crosslinguistic generalizations proposed by Greenberg (1963), Cinque (2005), Abels and Neeleman (2009, 2012), and Bruening (2018) noted above. In this paper, I show that it in fact does. Specifically, I suggest, basing on the results of a brief survey conducted for native KSL signers on nominal-internal order, that Abels and Neeleman's analysis is most adequate for the explanation of the nominal-internal word order in KSL. The conclusion of the paper, if it is on the right track, suggests that as Abels and Neeleman claim (i) word order in the nominal domain does not necessarily indicate that the syntax is antisymmetric (pace Cinque) and (ii) movement within the nominal domain must target a subtree containing N and can only occur to the left (pace Bruening).

The paper is organized as follows. In section 2, I introduce the different previous

studies on nominal-internal order in more detail. In section 3, I report the results of the survey for native signers of KSL, and argue that they are most compatible with the analysis proposed by Abels and Neeleman (2009, 2012). Finally, in section 4, I present brief concluding remarks.

2. Different Accounts of Nominal–Internal Word Order

Greenberg (1963), basing on a sample of 30 spoken languages, proposes a series of cross-linguistic generalizations, one of which is what he calls Universal 20. Greenberg’s Universal 20, shown in (3), is a generalization intended to account for the order of Dem, Num, A, and N within the nominal projection in the world’s languages.

- (3) When any or all of the items (demonstrative, numeral, and descriptive adjective) precede the noun, they are always found in that order. If they follow, the order is either the same or its exact opposite.

According to Universal 20 in (3), of the 24 orders in which Dem, Num, A, and N can be arranged in the noun phrase, only 12 orders should be attested in the languages of the world. The prediction of Universal 20 is illustrated in Table 1. In the table, all logically available orders of Dem, Num, A, and N are categorized into four columns according to the position of the noun (i.e., ‘noun final’, ‘noun third’, ‘noun second’, and ‘noun first’), and the orders that are predicted not to be possible are indicated by ×.

Table 1. Possible and impossible orders predicted by Greenberg (1963)

	I. Noun final	II. Noun third	III. Noun second	IV. Noun first
a.	Dem Num A N	Dem Num N A	Dem N Num A	N Dem Num A
b.	×Dem A Num N	Dem A N Num	Dem N A Num	×N Dem A Num
c.	×Num A Dem N	Num A N Dem	Num N A Dem	×N Num A Dem
d.	×A Num Dem N	×A Num N Dem	A N Num Dem	N A Num Dem
e.	×A Dem Num N	×A Dem N Num	A N Dem Num	×N A Dem Num
f.	×Num Dem A N	×Num Dem N A	Num N Dem A	×N Num Dem A

According to Greenberg, the orders marked by $\times$ in Table 1 are all in violation of Universal 20 in one way or another, and hence must not be allowed. The order 'A > Num > N > Dem' in (II-d), for instance, is predicted to be impossible, because A and Num are both in the prenominal position but A is preceding, not following, Num against the relative order 'Dem > Num > A'. The order 'N > Num > Dem > A' in (IV-f) is also predicted not to be possible, because the three elements Dem, Num, and A, all of which occur after the noun, respects neither 'Dem > Num > A' nor its mirror image 'A > Num > Dem'.

Cinque (2005), however, points out that the number of nominal-internal orders that have been actually attested is 14, not 12. The attested and unattested orders of the nominal-internal elements claimed by Cinque are presented in Table 2. As before, the orders that are claimed not to be attested by Cinque are indicated by $\times$. The orders whose availability is claimed to be different from Universal 20 are bold-faced and highlighted in gray. So, according to Cinque, Greenberg's generalization must not be entirely adequate in that it not only admits an order that has not been actually attested, i.e., (III-f), but it also excludes orders that have been actually attested, i.e., (IV-b), (IV-c), and (IV-e).

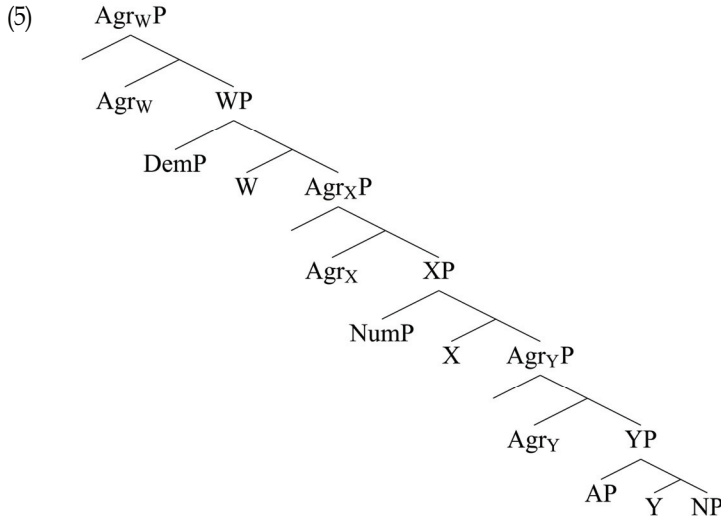
Table 2. Possible and impossible orders predicted by Cinque (2005)

	I. Noun final	II. Noun third	III. Noun second	IV. Noun first
a.	Dem Num A N	Dem Num N A	Dem N Num A	N Dem Num A
b.	$\times$ Dem A Num N	Dem A N Num	Dem N A Num	N Dem A Num
c.	$\times$ Num A Dem N	Num A N Dem	Num N A Dem	N Num A Dem
d.	$\times$ A Num Dem N	$\times$ A Num N Dem	A N Num Dem	N A Num Dem
e.	$\times$ A Dem Num N	$\times$ A Dem N Num	A N Dem Num	N A Dem Num
f.	$\times$ Num Dem A N	$\times$ Num Dem N A	$\times$ Num N Dem A	$\times$ N Num Dem A

Cinque (2005) argues that the attested and unattested orders presented in Table 2 can be given a structural account within the antisymmetry hypothesis of Kayne (1994). In particular, he proposes that all the 14 attested orders can be derived, to the exclusion of the 10 unattested orders, if we assume the conditions shown in (4). Note that the condition in (4d) in conjunction with the condition in (4e) requires movement to occur only to the left.

- (4) a. The nominal projection consists of the heads Agr_W , W , Agr_X , X , Agr_Y , Y , and N .
 b. The underlying hierarchy of the heads constituting the nominal projection is $\text{Agr}_W > W > \text{Agr}_X > X > \text{Agr}_Y > Y > N$, where W hosts DemP in its specifier, X hosts NumP in its specifier, and Y hosts AP in its specifier.
 c. All relevant movements must target a constituent containing N .
 d. All movements target a c-commanding position.
 e. All projections in natural language follow the template in which the specifier occurs to the left of the head while the complement occurs to the right of the head.

According to (4), the order 'Dem > Num > A > N' is generated by the base structure shown in (5), while all the other 13 attested orders are generated through movements applied in various ways (although restricted by the conditions in (4c-d)).



More specifically, the attested orders in Table 2 can be taken to be generated along the following lines.

- (6) a. Base generation (the structure in (5)): (I-a) Dem > Num > A > N
 b. From the structure for (6a), move NP...

- i. to Spec,Agr_YP: (II-a) Dem > Num > N > A
- ii. to Spec,Agr_XP: (III-a) Dem > N > Num > A
- iii. to Spec,Agr_WP: (IV-a) N > Dem > Num > A
- c. From the structure for (6a), move Agr_YP...
 - i. to Spec,Agr_XP: (II-b) Dem > A > N > Num
 - ii. to Spec,Agr_WP: (III-e) A > N > Dem > Num
- d. From the structure for (6a), move Agr_XP to Spec,Agr_WP:
(II-c) Num > A > N > Dem
- e. From (6b-i), move Agr_YP...
 - i. to Spec,Agr_XP: (III-b) Dem > N > A > Num
 - ii. to Spec,Agr_WP: (IV-e) N > A > Dem > Num
- f. From the structure for (6b-i), move Agr_XP to Spec,Agr_WP:
(III-c) Num > N > A > Dem
- g. From the structure for (6b-ii), move Agr_XP to Spec,Agr_WP:
(IV-c) N > Num > A > Dem
- h. From the structure for (6c-i), move Agr_XP to Spec,Agr_WP:
(III-d) A > N > Num > Dem
- i. From the structure for (6e-i), move...
 - i. Agr_XP to Spec,Agr_WP: (IV-d) N > A > Num > Dem
 - ii. NP to Spec,Agr_WP: (IV-b) N > Dem > A > Num

All of the orders indicated to be unattested in Table 2 cannot be derived in any way without violating one or more of the conditions presented in (4) (in order to derive (III-f) in Table 2, for example, it is necessary to move a non-constituent or a constituent that does not contain N), and thus, according to Cinque, they must not be allowed in the grammar of any language.

One of the contributions of Cinque's (2005) analysis is that it may be considered to provide support for the antisymmetry hypothesis of Kayne (1994). Kayne claims that all phrases in natural language follow the universal template illustrated in (4e), while all orders that are deviant from that order are derived through constituent movement. As it shows that the typology of nominal-internal word order can be successfully accounted for within the antisymmetry hypothesis, Cinque's analysis seems to provide yet another empirical case indicating that the antisymmetry hypothesis is on the right track.

Abels and Neeleman (2009, 2012), however, contend that the set of 14 attested orders

reported by Cinque (2005) does not necessarily provide evidence for the antisymmetric view, because it may as well be accounted for without the assumption that phrases have the specifier-head-complement branching order. Specifically, Abels and Neeleman point out that the relevant data can be represented in a different way that would bring out a symmetry, which is obscured in Table 2. Abels and Neeleman's representation of the data is shown in Table 3. In the table, the 24 logically available orders are categorized into two parts consisting of symmetric and asymmetric pairs, and each part has two columns in which the orders in each row are mirror images of each other. Notably, the symmetric part of the table consists of pairs of orders which are either both attested or both unattested, whereas the asymmetric part of the table consists of pairs which have one attested and one unattested orders.

Table 3. Abels and Neeleman's (2012) representation of possible and impossible orders

Symmetric pairs		Asymmetric pairs	
I	II	III	IV
a. Dem Num A N	N A Num Dem	Dem N Num A	×A Num N Dem
b. Dem Num N A	A N Num Dem	N Dem Num A	×A Num Dem N
c. Dem A N Num	Num N A Dem	A N Dem Num	×Num Dem N A
d. Dem N A Num	Num A N Dem	N Num A Dem	×Dem A Num N
e. ×A Dem Num N	×N Num Dem A	N Dem A Num	×Num A Dem N
f. ×A Dem N Num	×Num N Dem A	N A Dem Num	×Num Dem A N

Based on the reorganized data in Table 3, Abels and Neeleman (2009, 2012) suggest that the attested orders in the symmetric part of the table are all base-generated, while the attested orders in the asymmetric part of the table are all derived through movement. The conditions responsible for the typological patterns of nominal-internal word order that Abels and Neeleman suggest are presented below.

- (7) a. The underlying hierarchy of Dem, Num, A, and N in the extended nominal projection is $\text{Dem} > \text{Num} > \text{A} > \text{N}$.
- b. All relevant movements move a subtree containing N.
- c. All movements target a c-commanding position.
- d. All movements are to the left.

The conditions shown in (7) appear to have basically the same derivational architecture as the conditions proposed by Cinque (2005) presented in (4), as both sets of conditions assume the same underlying hierarchy of Dem, Num, A, and N, they both assume that movements move a constituent containing N and target a c-commanding position, and they both take movements to occur only to the left. As for the assumption of leftward movement, it is derived in Cinque's analysis from the interaction between the c-command requirement on movement (the condition in (4d)) and the antisymmetry hypothesis (the condition in (4e)) along with the various functional projections within the nominal domain (the condition in (4a)), whereas it is simply stated as an independent condition in Abels and Neeleman's analysis. That said, the essential difference between Cinque's and Abels and Neeleman's analyses is that the former, which adopts the antisymmetry hypothesis, only allows a single order to be base-generated, whereas the latter, which does not adopt the antisymmetry hypothesis, allows more than one order to be base-generated as long as it conforms to the underlying hierarchy of the relevant elements shown in (7a). The orders in the symmetric part of Table 3 can in fact be all base-generated in compliance with the underlying hierarchy as illustrated in (8).

(8) Base-generated orders:

- | | |
|--------------------------|---------------------------|
| (Ia:) [Dem [Num [A N]]] | (Ib:) [Dem [Num [N A]]] |
| (Ic:) [Dem [[A N] Num]] | (Id:) [Dem [[N A] Num]] |
| (IIa:) [[[N A] Num] Dem] | (IIb:) [[[A N] Num] Dem] |
| (IIc:) [[Num [N A]] Dem] | (IIId:) [[Num [A N]] Dem] |

As for the possible orders in the asymmetric part of the table, Abels and Neeleman show that they can be derived along the following lines.

(9) Orders derived through movement:

- a. Move N from (Ia):

(IIIa:) [Dem [N [Num [A t _N]]]]
(IIIb:) [N [Dem [Num [A t _N]]]]
- b. Move [A N] from (Ia):

(IIIc:) [[A N] [Dem [Num t _[A N]]]]
--
- c. Move N from (IIId):

(IIId:) [[N [Num [A t _N]]] Dem]

- d. Move N from (Id):
(IIIe:) [N [Dem [[t_N A] Num]]]
- e. Move [N A] from (Ib):
(IIIf:) [[N A] [Dem [Num t_[N A]]]]

In Abels and Neeleman's analysis, just as in Cinque's analysis, all the orders that are indicated to be unattested in Table 3 cannot be derived without violating one or more conditions presented in (7) (to derive (II-f) in Table 3, for instance, rightward movement or movement of a constituent that does not contain N is required). So, Abels and Neeleman's analysis can derive all and only the attested orders, without incorrectly deriving any of the unattested orders, and importantly, it can do so without the assumption that phrases have the specifier-head-complement branching order. As it can account for the same set of data without the extra assumption about the specifier-head-complement branching order (as well as the assumption about multiple functional projections whose sole purpose seems to be to provide landing sites for nominal-internal movements), Abels and Neeleman's analysis may be considered to be methodologically more economical than Cinque's, and hence is preferable.

Bruening (2018) points out that there might be an even simpler analysis of the typology of nominal-internal word order. As noted above, both the analyses proposed by Cinque (2005) and Abels and Neeleman (2009, 2012) assume that movements target a constituent containing N and occur only to the left (whether it is derived or stated outright). Bruening suggests that if relevant movements, i.e., movements that generate unmarked word orders, are to the right rather than to the left, the assumption that movements target a constituent containing N can be discarded with, having only the three conditions shown below responsible for the typological patterns of nominal-internal word order.

- (10) a. The underlying hierarchy of Dem, Num, A, and N in the nominal projection is
Dem > Num > A > N.
- b. All movements target a c-commanding position.
- c. Only rightward movement of Dem, Num, and A can produce an unmarked word order.

Note that the condition in (10a) is shared by all approaches to nominal-internal order

since Cinque's analysis; the condition in (10b) is assumed by virtually all approaches to syntactic movement. So, the hallmark of Bruening's analysis is the condition in (10c).

Bruening (2018) assumes that nominals are projections of head nouns (rather than projections of determiners, for instance; see Bruening, 2009, and Bruening, Dinh, and Kim, 2018 for discussion). Under this assumption, head movement of N must not be possible within a nominal projection because there is no place for the head noun to move into (the entire phrase is the projection of the noun itself). Also, according to Bruening, the requirement that movements target a constituent containing N is not only "rather strange" (Georgi and Müller, 2010) but also incorrectly rules out an order that has been reported to be attested ('Num > N > Dem > A'; see below), and thus must not be adequate. What these mean is that the orders that are not base-generated must be derived through movement of Dem, Num, and/or A to the right; hence, the condition in (10c).

The generalization suggested by Bruening (2018) is that if the base order of the nominal-internal elements Dem, Num, and A is 'Dem > Num > A', these elements have to respect the base order when they occur to the left of N, but they do not have to respect the base order when they occur to the right of N, which is somewhat reminiscent of Greenberg's (1963) Universal 20 although not exactly the same. The representation of the possible and impossible orders of the nominal-internal elements according to Bruening's generalization is shown in Table 4. Note in Table 4 that the two orders highlighted in gray and indicated by × in parentheses (i.e., 'N > Num > Dem > A' in (II-g) and 'Num > N > Dem > A' in (II-h)) are predicted to be possible by Bruening's generalization, while they are claimed to be impossible by Cinque (2005) as well as Abels and Neeleman (2009, 2012).²⁾

2) As for the order in (II-h), Bruening notes, citing Cinque (2005, footnote 26), that it has been actually attested in Kilivila. In the article that Bruening cites, Cinque in fact reports, citing Senft (1986), that the order in question has been attested in Kilivila. Cinque, however, points out that the order 'Dem > Num > A > N' has also been attested in that language along with the order in (II-h), and he suggests that the order in question has a structure where A is a relative clause modifying the phrase consisting of Num, N, and Dem. So, the order in (II-h) is not considered by Cinque as an attested basic word order. As for the order in (II-g), Bruening raises the possibility that it is simply an accidental gap, that is, the order can in principle be generated by the grammar but happens not to exist (or has not yet been found) in the world's languages.

Table 4. Possible and impossible orders predicted by Bruening (2018)

	I. Base-generated	II. Reordering on Right	III. Reordering on Left
a.	Dem Num A N	Dem N Num A	×A Num N Dem
b.	Dem Num N A	N Dem Num A	×A Num Dem N
c.	Dem A N Num	A N Dem Num	×Num Dem N A
d.	Dem N A Num	N Num A Dem	×Dem A Num N
e.	N A Num Dem	N Dem A Num	×Num A Dem N
f.	A N Num Dem	N A Dem Num	×Num Dem A N
g.	Num N A Dem	(×)N Num Dem A	×A Dem Num N
h.	Num A N Dem	(×)Num N Dem A	×A Dem N Num

Now, according to Bruening (2018), the orders in column I of Table 4 are all base-generated in the same way as suggested by Abels and Neeleman (2009, 2012) illustrated in (8) above. As for the orders in column II of the table, they may be generated by moving Dem, Num, and/or A to the right from a base-generated structure. The following illustrate how these orders may be generated from the base-generated structure for (1a). Note that, as Bruening points out, using a different base structure as a starting point does not add additional possibilities: since only rightward movement of Dem, Num, and/or A is allowed, the order on the left of N cannot change, and any order is allowed on the right of N.

(11) Orders in column II derived through rightward movement:

- (a): [[[Dem [t_{Num} [t_A N]]] Num] A]
- (b): [[[[t_{Dem} [t_{Num} [t_A N]]] Dem] Num] A]
- (c): [[[t_{Dem} [t_{Num} [A N]]] Dem] Num]
- (d): [[[[t_{Dem} [t_{Num} [t_A N]]] Num] A] Dem]
- (e): [[[[t_{Dem} [t_{Num} [t_A N]]] Dem] A] Num]
- (f): [[[[t_{Dem} [t_{Num} [t_A N]]] A] Dem] Num]
- (g): [[[[t_{Dem} [t_{Num} [t_A N]]] Num] Dem] A]
- (h): [[[t_{Dem} [Num [t_A N]]] Dem] A]

As for the impossible orders listed in column III of Table 4, they contain nominal-internal elements that do not respect the base order ‘Dem > Num > A’ on the left of N. For any of these orders to be generated, leftward movement must be involved; therefore, according to Bruening’s analysis, they must not be allowed.

To summarize so far, Greenberg (1963), Cinque (2005), Abels and Neeleman (2009, 2012), and Bruening (2018) have proposed different accounts for the typological patterns of word order in the nominal domain. Although the four analyses have been developed based on the orders that have been attested in the world's languages, they can also be taken to make different predictions about which nominal-internal orders may or may never be further found in the world's languages. In particular, they make different predictions about the possibilities of five nominal-internal orders, i.e., 'Num > N > Dem > A', 'N > Dem > A > Num', 'N > Num > A > Dem', 'N > A > Dem > Num', and 'N > Num > Dem > A'. The predictions of the four analyses are summarized in Table 5.

Table 5. Different predictions of Greenberg (1963), Cinque (2005), Abels and Neeleman (2009, 2012), and Bruening (2018)

Order	Greenberg	Cinque	Abels/Neeleman	Bruening
Num N Dem A	Possible	Impossible	Impossible	Possible
N Dem A Num	Impossible	Possible	Possible	Possible
N Num A Dem	Impossible	Possible	Possible	Possible
N A Dem Num	Impossible	Possible	Possible	Possible
N A Dem Num	Impossible	Possible	Possible	Possible
N Num Dem A	Impossible	Impossible	Impossible	Possible

Note that the different predictions shown in Table 5 stem from different views on linguistic universals. Greenberg (1963) takes the view that word order of the nominal-internal elements Dem, Num, and A behave differently according to their linear position with respect to N. Cinque (2005), on the other hand, attempts to give a structural account of the typology of nominal-internal word order, assuming that movements target a subtree containing N and, by adopting the antisymmetric view of the syntax, deriving the constraint that movements occur only to the left. Abels and Neeleman (2009, 2012) and Bruening (2018) also give a structural account of the nominal-internal orders, but they differ from Cinque's analysis as well as from each other in that they both reject the antisymmetric view but the former maintains the key assumptions about movement (i.e., movements target a subtree containing N and occur only to the left), while the latter does not. According to Bruening, rightward movement of Dem, Num, and/or A, not leftward movement of a constituent containing N, is what is responsible for the derivations of unmarked nominal-internal orders.

3. Nominal–Internal Word Order in KSL

The quest for linguistic universals responsible for the typology of nominal-internal word order, sketched in section 2, has been pursued on the basis of spoken languages. Since Stokoe (1960), however, signed languages have been considered to be natural languages which share essential properties with spoken languages at every level of the grammar. If linguistic universals reside in the grammar of any natural language, and signed languages are natural languages, then the search for linguistic universals must include discussion of the patterns in signed languages as well as in spoken languages.

In fact, there have been studies of signed languages which have interesting implications for linguistic universals (Petronio and Lillo-Martin, 1997; Neidle et al., 2000; Cecchetto, 2012; etc.). There have been a few discussions about nominal-internal word order in that respect. As noted in section 1, Zhang (2007), Mantovan and Geraci (2017), and Jieqiong and Tang (2020) have shown that word order within the nominal domain is variable in signed languages but only within the sphere of the generalizations proposed by Greenberg (1963), or Cinque (2005) and Abels and Neeleman (2009, 2012). As far as I am aware, however, none of the previous studies has attempted to ‘evaluate’ the different analyses of nominal-internal word order put forward on the basis of spoken languages.

In this preliminary study, I entertain the possibility of whether signed languages can in fact help discriminate different analyses of nominal-internal word order, through an informal questionnaire survey for native signers of KSL on the acceptability of the five orders noted in Table 5 in section 2 whose possibilities are predicted differently by Greenberg (1963), Cinque (2005), Abels and Neeleman (2009, 2012), and Bruening (2018). Specifically, I constructed, with the help of two KSL interpreters and two native signers of KSL, two sets of KSL examples which involve noun phrases with the five orders in question. The two sets of examples are presented in (14) and (15), where the word order involved in each example is presented in parentheses. The examples in (14) are intended to mean ‘I want to buy these three big dolls’, and the examples in (15) ‘I want to buy these two purple pens’.

(14) Example set #1

- a. IX_i BUY WANT WHAT, THREE DOLL IX_a BIG (Num N Dem A)
- b. IX_i BUY WANT WHAT, DOLL IX_a BIG THREE (N Dem A Num)
- c. IX_i BUY WANT WHAT, DOLL THREE BIG IX_a (N Num A Dem)

- d. IX₁ BUY WANT WHAT, DOLL BIG IX_a THREE (N A Dem Num)
 - e. IX₁ BUY WANT WHAT, DOLL THREE IX_a BIG (N Num Dem A)
- (15) Example set #2
- a. IX₁ BUY WANT WHAT, TWO PEN IX_a PURPLE (Num N Dem A)
 - b. IX₁ BUY WANT WHAT, PEN IX_a PURPLE TWO (N Dem A Num)
 - c. IX₁ BUY WANT WHAT, PEN TWO PURPLE IX_a (N Num A Dem)
 - d. IX₁ BUY WANT WHAT, PEN PURPLE IX_a TWO (N A Dem Num)
 - e. IX₁ BUY WANT WHAT, PEN TWO IX_a PURPLE (N Num Dem A)

Each of the sentences in (14)-(15) then was produced by a KSL interpreter and was recorded to be used in the online survey created in Google Forms. In the survey, the participants were asked to watch each of the sentences produced by the interpreter and determine if it was 'good', 'bad', or 'neither'. The link to the online survey was sent to 16 native signers of KSL through the Jeonju and Mokpo office of the Korea Association of the Deaf. Of the responses from the 16 signers, responses from the signers who have acquired KSL significantly late in life and/or who have used KSL for the period of less than 20 years were excluded. As a result, responses from eight native signers were considered for analysis. Of the eight signers whose responses were considered for analysis, four acquired KSL before 10 years of age, three between 11 and 20 years of age, and one between 21 and 30 years of age; and all eight signers have used KSL on a daily basis for over 20 years. The results of the survey are summarized in Table 6, where the answer 'good' was calculated as 3 points, the answer 'bad' was calculated as 1 point, and the answer 'neither' was calculated as 2 points.

Table 6. Results

	Order at issue	Example set #1	Example set #2	Overall
a.	Num N Dem A	1.75	2	1.875
b.	N Dem A Num	2.25	2.625	2.4375
c.	N Num A Dem	2	2.375	2.1875
d.	N A Dem Num	2.625	2.75	2.6875
e.	N Num Dem A	1.625	1.375	1.5

The results in Table 6 have some interesting implications for the putative universals responsible for the typology of nominal-internal word order. First of all, note in the table

that the scores of the orders in (a) and (e) are below 2, whereas the scores of the orders in (b), (c), and (d) are above 2. Interpreting these results contrastively, they may be taken to indicate that the participants perceived the orders in (a) and (e) as more ungrammatical than grammatical, while they perceived the orders in (b), (c), and (d) as more grammatical than ungrammatical. Such results are in line with Cinque's (2005) and Abels and Neeleman's (2009, 2012) analyses, but not with Greenberg's (1963) or Bruening's (2018) analysis. As shown in Table 5 in the previous section, Cinque's and Abels and Neeleman's analyses correctly predict that the orders in (a) and (e) are not possible, while the orders in (b), (c), and (d) are possible. Greenberg's generalization, on the other hand, incorrectly predicts that the order in (a) is possible while the rest of the orders in (b)-(e) are not. Bruening's analysis is not readily compatible with the results above, either, since it predicts that all the orders in (a)-(e) are possible. The results in Table 6, therefore, may indicate that Cinque's and Abels and Neeleman's analyses are more adequate than Greenberg's or Bruening's analysis.

As noted earlier, Bruening (2018) claims, citing Cinque (2005), that the order in (a) in Table 6 is attested in Kilivila, although Cinque himself presumes that the order involves a relative clause and thus does not constitute an attested basic word order. The fact that the order is judged as degraded even in a language with relatively free word order suggests that Cinque's assumption might be correct after all, that is, the order in (a) might not be possible as an unmarked word order. Bruening also suggests that the order in (e) can in principle be generated by the grammar but happens not to exist in the world's languages. The low score of that order in Table 6 also indicates that Bruening's claim might not be correct: again, even in a language with variable word order, the order is judged as degraded. In short, the orders in (a) and (e) are the ones that are added by Bruening to the set of 14 attested orders originally claimed by Cinque (2005) as well as by Abels and Neeleman (2009, 2012), and both orders are judged degraded by the native signers of KSL. Importantly, the two orders in question can be generated according to Bruening's analysis because in his analysis relevant movements are viewed to target Dem, Num, and/or A and occur to the right. If, as Cinque, and Abels and Neeleman, assume, relevant movements target a constituent containing N and occur to the left, the orders in (a) and (e) should never be possible. So, the results in Table 6 can be seen to indicate that movements target a constituent containing N and occur to the left.

As just discussed, the degraded judgments of the orders in (a) and (e), as compared

to the judgments of the orders in (b), (c), and (d), indicate that Cinque's (2005) and Abels and Neeleman's (2009, 2012) analyses might be more adequate than Greenberg's (1963) or Bruening's (2018) analysis. Focusing on the orders in (b), (c), and (d), the results in Table 6 appear to further suggest that Abels and Neeleman's analysis could be more adequate than Greenberg's, Bruening's, or Cinque's analysis.

As noted above, the orders in (b), (c), and (d) are all scored above 2 (while the others are scored below 2), which suggests that the native signers of KSL perceived the relevant examples as more grammatical than ungrammatical. This means that Greenberg's (1963) analysis is not tenable in that the three orders are all in violation of Universal 20, and thus according to Greenberg, are expected to be degraded, contrary to the results of the survey. In other words, when two or more of the elements Dem, Num, and A occur to the right of N, they do not have to respect either 'Dem > Num > A' or its mirror image 'A > Num > Dem', contra Universal 20. This has already been pointed out by Cinque (2005), Abels and Neeleman (2009, 2012), and Bruening (2018) based on the patterns found in spoken languages. Now, upon closer inspection of the scores of the orders in question, it appears that the native signers perceive the orders in (b) and (d) relatively more acceptable than the order in (c). The difference between the two may help distinguish between Cinque's, Abels and Neeleman's, and Bruening's analyses, all of which predict the three orders in question are possible.

First of all, according to Bruening (2018), the three orders in (b), (c), and (d) in Table 6 can all be derived by moving Dem, Num, and A to the right as illustrated in (16).

(16) a. Derivation of order (b):

[[[[t_{Dem} [t_{Num} [t_A N]]] Dem] A] Num]

b. Derivation of order (c):

[[[[t_{Dem} [t_{Num} [t_A N]]] Num] A] Dem]

c. Derivation of order (d):

[[[[t_{Dem} [t_{Num} [t_A N]]] A] Dem] Num]

In (16), it seems that there is no notable difference in the ways that the orders in (b), (c), and (d) are derived. So, the potential difference between the orders in (b) and (d), on the one hand, and the order in (c), on the other, would be rather difficult to be accounted for by Bruening's analysis.

In the case of Cinque (2005), on the other hand, the order in (b) and the orders in

(c) and (d) involve different derivational processes. More specifically, according to Cinque, the orders in question are derived as illustrated in (17)-(19). Here, for space reasons, only the output order of each derivational stage is given.

(17) Derivation of order (b):

- i. Base structure: Dem > Num > A > N
- ii. Movement of N: Dem > Num > N > A
- iii. Movement of [N A]: Dem > N > A > Num
- iv. Movement of N: N > Dem > A > Num

(18) Derivation of order (c):

- i. Base structure: Dem > Num > A > N
- ii. Movement of N: Dem > Num > N > A
- iii. Movement of [N A]: N > A > Dem > Num

(19) Derivation of order (d):

- i. Base structure: Dem > Num > A > N
- ii. Movement of N: Dem > N > Num > A
- iii. Movement of [N Num A]: N > Num > A > Dem

What is worth noting about the derivation of the order in (b) illustrated in (17) is the nature of movement of N in (17iv). Here, N moves to the initial position of the phrase from the structure for (17iii), and notably, the structure for (17iii) is the result of moving the constituent [N A]. That is, movement of N indicated in (17iv) is the kind of process in which a constituent is extracted out of a constituent that has already been moved. Such a process is in violation of the freezing principle (Ross, 1967), which states that a constituent becomes an island for extraction when that constituent has undergone syntactic movement. Turning to the other orders, the derivations of the orders in (c) and (d) illustrated in (18) and (19), respectively, involve a process called roll-up movement. In the case of the order in (c) illustrated in (18), N first moves to the position before A, and the resulting constituent [N A] in turn moves to the position before Dem; and in the case of the order in (d) illustrated in (19), N first moves to the position before Num, and the resulting constituent [N Num A] in turn moves to the position before Dem.

The freezing principle is a constraint that has been widely accepted in the literature, and violating the principle is generally assumed to lead to ungrammaticality. On the other hand, roll-up movement is often acknowledged as a legitimate syntactic process

even though it complicates the grammar somewhat. At any rate, the assumption that the order in (b) and the orders in (c)-(d) involve different grammatical processes leads to the expectation that there might be some difference in acceptability between the two. However, the results indicate that the native signers perceive some difference in acceptability between the order in (c) and the orders in (b) and (d), not between the order in (b) and the orders in (c) and (d). If as Cinque (2005) assumes extraction out of a moved constituent and roll-up movement are equally legitimate grammatical processes, it is expected that there should be no difference in acceptability between the tree orders in question. If either extraction out of a moved constituent or roll-up movement is any less legitimate than the other, some difference in acceptability between (b) and (c)-(d) is expected. But difference is observed between the order in (c) and the orders in (b) and (d). Cinque's analysis thus is not readily compatible with the results shown in Table 6.

Finally, according to Abels and Neeleman (2009, 2012), the orders in (b), (c), and (d) are derived along the following lines.

(20) Derivation of order (b):

- i. Base structure: Dem > N > A > Num
- ii. Movement of N: N > Dem > A > Num

(21) Derivation of order (c):

- i. Base structure: Num > N > A > Dem
- ii. Movement of N: N > Num > A > Dem

(22) Derivation of order (d):

- i. Base structure: Dem > Num > N > A
- ii. Movement of [N A]: N > A > Dem > Num

Bruening (2018) and Cinque (2005) derive the different orders in (b), (c), and (d) by means of movement. That is, the three orders are all derived in these analysis from a same base structure by applying movement in different ways. In the case of Abels and Neeleman, on the other hand, the different orders are partially because they start from different base structures. As illustrated in (20)-(22), base structures for the three orders are already different and from there movement of N or a constituent containing N to the left brings about the different results. Importantly, in (20i) and (22i), Dem branches out to the left of N, whereas in (21i), Dem branches out to the right of N. So, unlike the analyses of Bruening and Cinque, in Abels and Neeleman's analysis, there is a way to account for

the difference in acceptability between the orders in (b), (c), and (d): if it is assumed that KSL prefers a base structure where Dem is left-branching, then, the order in (c) must be less acceptable than the orders in (b) and (d) as the former starts from a base structure where Dem branches to the right of N while the latter do not. Note that the order in (c) can never be derived from a base structure where Dem branches to the left of N. If it does, movement of a non-constituent or movement of a constituent that does not contain N must be involved to derive the order in question.

To sum up, the results presented in Table 6 are most compatible with the analysis proposed by Abels and Neeleman (2009, 2012) in the sense that it not only can account for the degraded judgments of the orders in (a) and (e) but also provides a way to capture the difference in acceptability between the order in (c) and the orders in (b) and (d). The distinguishing features of Abels and Neeleman's analysis different from the others are that it (i) gives a structural account of nominal-internal word order, (ii) without resorting to the antisymmetry hypothesis, (iii) while still assuming that relevant movements target a constituent containing N and occur only to the left. The results of the survey for native signers of KSL appear to suggest that these might actually be how languages work in general.

4. Conclusion

In this paper, I have attempted to evaluate previous analyses of the word order of the elements Dem, Num, A, and N in the nominal domain, through an informal questionnaire survey for native signers of KSL. The results of the survey seemed to indicate that Abels and Neeleman's (2009, 2012) analysis is most compatible with the judgments provided by the signers, which could mean that the patterns of nominal-internal word order does not require the antisymmetry hypothesis, *pace* Cinque (2005), and movements producing unmarked nominal-internal orders target a subtree containing N and occur only to the left, *pace* Bruening (2018). The results also suggested that noun phrases in signed languages are hierarchically structured even though they show variable word order just as Zhang (2007) and others have argued. The results could hardly be accounted for by Greenberg's (1963) Universal 20 which provides a generalization of the patterns of nominal-internal word order on the basis of linear positions of Dem, Num, and A with respect to N. The conclusion drawn in the paper is

hardly conclusive but only suggestive, as the survey was conducted in a simplified manner rather than in a statistically rigorous way. The current study, however, has shown that investigating nominal-internal orders in a signed language may contribute to the debate revolving around the antisymmetry of syntax, and more generally, it has once again shown that studying signed languages can be fruitful in the investigation of linguistic universals. A more comprehensive study of the nominal-internal order in KSL and its implication for linguistic universals is left to future research.

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