

Linear Asymmetries and the LCA

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Abstract. Kayne (1994) was instrumental in putting linear asymmetries on the generative research agenda. His Linear Correspondence Axiom is seen as a restrictive, conceptually attractive proposal supported by a wealth of empirical evidence. In this paper, we take issue with this assessment. (i) We show that for every structure that violates the LCA, there is an LCA-compatible counterpart, including rightward movement structures and structures with rightward specifiers. (ii) We discuss Cinque's (2005) LCA-based analysis of word order in the extended nominal projection, demonstrating that the data in fact do not support any hypothesis stronger than a ban on rightward movement. (iii) We demonstrate that claims to the effect that central properties of phrase structure (such as headedness and the single-specifier restriction) follow from the LCA are incorrect. (iv) We show that the LCA is toothless without a restrictive theory of movement, but that it can only be reconciled with the data in the absence of such a theory.

1. Introduction

Although our understanding of the hierarchical properties of syntactic representations has increased over the last half a century, linear asymmetries persistently elude proper analysis.

One such asymmetry involves movement: rightward movement is much more restricted than leftward movement (see Ross 1967, Perlmutter 1983, Bach 1971). There are, for example, verb-second languages but no languages in which the verb has to surface in the penultimate position (see Kayne 1994:50).

A second asymmetry has to do with OV and VO languages. These should be simple mirror images, but the expected symmetry is broken in a number of ways: (i) the linear order of arguments is often the same rather than inverted (see Neeleman & Weerman 1999 and the papers in Svenonius 2000, among others), (ii) there appear to be no OV languages without scrambling, although there are scrambling and nonscrambling VO languages (see van Riemsdijk & Corver 1997), and (iii) head finality in the verbal domain appears to entail clustering of verbs, although there are clustering and nonclustering VO languages (for related discussion, see Haegeman & van Riemsdijk 1986, Svenonius 2007, Koopman & Szabolcsi 2000). For further instances of linear asymmetries in language, we refer the reader to Greenberg 1963; Kayne 1994, 2005; and Cinque 1996, to appear.

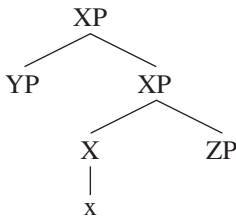
It is not surprising that the problem of linear asymmetry has resisted analysis. In order to solve any of the puzzles above, there must be some component of the

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grammar that refers to linear order. However, it has been part of the generative research program to remove linear statements from the theory of syntax. Thus, traditional generative syntax has no tools to analyze linear asymmetries (see Cinque 1996).

Kayne's (1994) Linear Correspondence Axiom (LCA) was considered a break through in syntactic theory because it seemed to address exactly the issue raised above. Work in the Kaynean tradition claims that all phrases in natural language follow the template in (1). We refer to this claim as the specifier-head-complement hypothesis (SHCH). Because the SHCH ties syntactic structure to a specific linear realization, it provides a foothold for syntactic accounts of linear asymmetries.

(1) The specifier head-complement template



One apparent consequence of the SHCH is that movement must be leftward. The template in (1) implies that going right is going down, but movement goes up; thus, rightward movement is excluded. This has a clear bearing on some of the puzzles mentioned earlier.¹

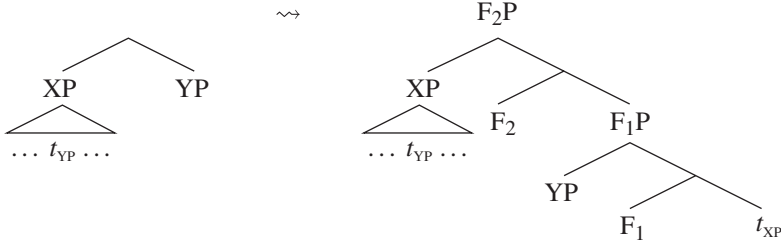
We can describe the content of any theory in terms of what it forbids. Thus, a theory of word order has more content the more word-order patterns it rules out. If it does not disallow any pattern, it cannot clash with the data and consequently cannot be said to have any content. Given the extreme restrictions on the shape of projections, Kayne's theory of *phrase structure* held the initial promise of leading to a highly contentful theory of *word order*, as there are so many structures that it forbids.

Of course, a restrictive theory of the internal make up of XPs is not by itself a theory of word order. Two further components are necessary: a restrictive theory of movement and a restrictive theory of the location of particular XPs in the base structure. To deal with the latter issue, work in the Kaynean tradition usually assumes some version of a fixed hierarchy of functional heads (Larson 1988, Pollock 1989, Rizzi 1997, Cinque 1999). Additionally, a restrictive theory of movement is necessary. In the absence of such a theory, all orders that are not SHCH-compatible as base-generated orders can be derived by movement.

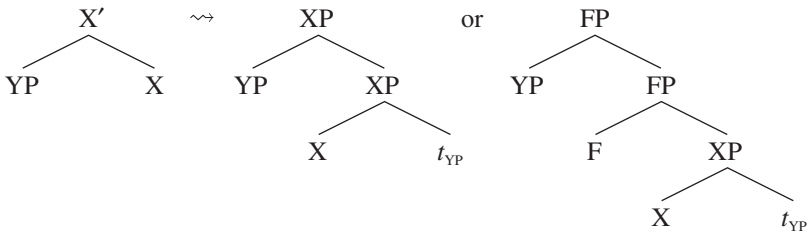
¹ We distinguish between the LCA and the SHCH, even though the latter is generally taken to be a corollary of the LCA. We do so because the SHCH actually does not follow from the LCA. We will show in section 4 that the two are logically independent.

The trees in (2)—on the additional assumption that F_1 and F_2 are silent—illustrate that rightward movement (i.e., gap-before-filler order) is compatible with the SHCH, given a permissive theory of (remnant) movement. The trees in (3) show that structures with rightward heads are SHCH-compatible, and that in (4) shows the same for structures with rightward specifiers or adjuncts—assuming again that F_1 and F_2 are silent.

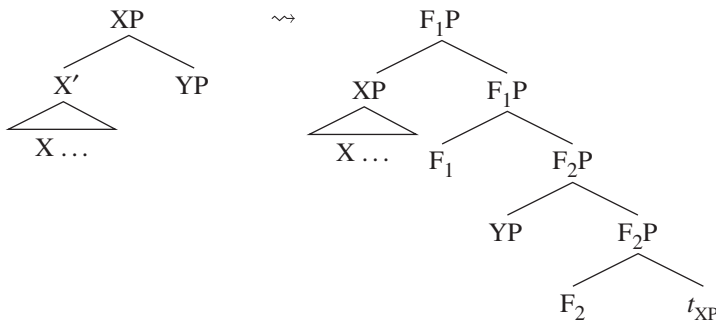
(2) Rightward movement: t_{YP} precedes YP



(3) Rightward heads: The complement YP precedes the selecting head X



(4) Rightward specifiers/adjuncts: The adjunct/specifier, YP, follows X



This shows that, absent a restrictive theory of movement, all orders banned under the SHCH can be brought back in. Therefore, again absent a constrained theory of movement, the SHCH does not entail a theory of word order that is more restrictive than that entailed by the traditional view of phrase structure, which allows rightward heads, rightward specifiers and adjuncts, and rightward movement.

The importance of constraints on movement in deriving linear asymmetries is frequently mentioned in publications that adopt the SHCH.² But despite this expressed awareness of the matter, work in the Kaynean tradition typically does not attempt to give explicit, general restrictions on movement.³ Therefore, claims about word order in the antisymmetric tradition often remain promissory notes issued on the basis of an increasingly elusive theory of movement.

To our minds there is one notable exception: Cinque's (2005) analysis of Greenberg's (1963) Universal 20 and its exceptions marries an antisymmetric phrase structure with a universally fixed hierarchical ordering of elements and, crucially, an explicit theory of movement in the noun phrase. As a consequence, Cinque's proposal is highly contentful (it rules out all unattested word orders), while not being obviously false (it rules in all attested orders). It thus provides a rare test case for the merits of the SHCH.

It is for this reason that most of this paper is devoted to an evaluation of Cinque's account of word order in the noun phrase. In particular, we compare his analysis with an alternative that jettisons the SHCH but maintains that movement is exclusively leftward. The two theories, which are described in sections 2 and 3, give rise to the same typology.

The comparison between these theories proceeds in two steps. First we discuss a claimed conceptual advantage of an LCA-based theory—namely, that it not only derives the ban on rightward movement but also explains a substantial part of X'-theory. In section 4 we show this claim to be false.

In section 5, finally, we compare Cinque's theory and the alternative that we propose on the basis of data not previously considered in this connection. In particular, we show that our proposal is compatible with independently motivated restrictions on movement that cannot be maintained if the SHCH is adopted. Thus giving up the SHCH in fact allows us to move closer to an adequate theory of linear asymmetries.

2. Cinque's Theory

An important early generalization concerning word order in the noun phrase goes back to Greenberg (1963), whose Universal 20 (p. 87) states that “[w]hen 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

² For example, in his discussion of relative clauses in Turkic, Kayne notes that a particular conclusion derivable from the SHCH only holds “assuming restrictions on phrasal movements of Agr that I won't try to spell out here” (Kayne 2005:219). Similarly, Kayne (1994:140 n. 8) notes that his account of the nonexistence of languages that have obligatory verb movement to the penultimate position requires “rul[ing] out derivations involving leftward movement of the finite verb to C⁰, followed by leftward movement only in root contexts of IP to Spec,CP.” (This derivation only gives rise to verb-last in root contexts, but something like it must presumably be part of any analysis of inverse verb-second.)

³ Quite the opposite is in fact the case. A lot of work adopting the SHCH came to reject previously held constraints on movement. For example, Zwart (1994) gives up Shortest Steps (and by implication Relativized Minimality). Koopman & Szabolcsi (2000) present analyses that necessarily violate Müller's (1998) generalization according to which remnant movement and remnant-creating movement cannot be of the same type (see Abels 2007). Finally, Condition-on-Extraction-Domain effects (Cattell 1976, Huang 1982, Kayne 1983, Chomsky 1986, Cinque 1990) do not appear to have a natural place in an SHCH-compatible theory.

opposite.” On the basis of careful typological work (by himself, Hawkins, Rijkhoff, Lu, Dryer, and others), Cinque argues that of the twenty-four logically possible orders of demonstrative, (descriptive) adjective, numeral, and noun, only fourteen are attested as unmarked word orders in some natural language. If Cinque’s characterization of the data is correct, Greenberg’s original formulation is both too permissive and too restrictive (at least on the interpretation proposed by Hawkins). In Table 1 we repeat Cinque’s findings in tabular form. The table is organized as follows: Shaded cells in the table represent unattested word orders, all other cells contain attested orders.⁴ What unifies the orders in each column is the position of the noun; as we go through the table from left to right, the number of elements following the noun increases.

What Table 1 brings out, then, is that more orders are attested postnominally than are attested prenominally. This generalization was already at the core of Greenberg’s original formulation of the universal.

In understanding the empirical claims, it is crucial to appreciate that—in slight contrast to Cinque, who sets aside marked word orders in the better known languages but includes alternative word orders in less well known languages—we will be dealing only with unmarked word orders.⁵ When the noun phrase has an unusual information structure, this may result in otherwise unacceptable permutations (see Cinque 2005:315–316, n. 2 for comment). Beyond permutations driven by information structure, orders unattested as unmarked appear in isolated domains. In English, for example, there is a limited set of structures in which adjectives precede prenominal numerals, apparently contradicting Table 1, column I, row b (for short, T1.I.b). This order seems to be exclusive to adjectives accompanied by a degree expression, such as the superlative marker in (5). That degree expressions permit leftward shift is also apparent from the data in (6).

- (5) a. *(the) most interesting five books (that John has read)
- b. *(the) highest three mountains

Table 1. Unattested (grey) and attested orders of demonstrative, (descriptive) adjective, numeral, and noun (Cinque 2005)

	I Noun final	II Noun third	III Noun second	IV Noun first
a.	Dem ₁ Num ₂ A ₃ N ₄	Dem ₁ Num ₂ N ₄ A ₃	Dem ₁ N ₄ Num ₂ A ₃	N ₄ Dem ₁ Num ₂ A ₃
b.	Dem ₁ A ₃ Num ₂ N ₄	Dem ₁ A ₃ N ₄ Num ₂	Dem ₁ N ₄ A ₃ Num ₂	N ₄ Dem ₁ A ₃ Num ₂
c.	Num ₂ A ₃ Dem ₁ N ₄	Num ₂ A ₃ N ₄ Dem ₁	Num ₂ N ₄ A ₃ Dem ₁	N ₄ Num ₂ A ₃ Dem ₁
d.	A ₃ Num ₂ Dem ₁ N ₄	A ₃ Num ₂ N ₄ Dem ₁	A ₃ N ₄ Num ₂ Dem ₁	N ₄ A ₃ Num ₂ Dem ₁
e.	A ₃ Dem ₁ Num ₂ N ₄	A ₃ Dem ₁ N ₄ Num ₂	A ₃ N ₄ Dem ₁ Num ₂	N ₄ A ₃ Dem ₁ Num ₂
f.	Num ₂ Dem ₁ A ₃ N ₄	Num ₂ Dem ₁ N ₄ A ₃	Num ₂ N ₄ Dem ₁ A ₃	N ₄ Num ₂ Dem ₁ A ₃

⁴ For reasons of space we cannot include discussion of the relative frequencies of these orders. The issue of frequency was addressed in some detail in an earlier draft of this paper, Abels & Neeleman 2006–2007 (version 2), where we show that the frequency data favor neither Cinque’s LCA-based theory nor the one developed here in section 3.

⁵ See for example Dryer 2007: sec. 2 for discussion on how to identify unmarked orders.

- (6) a. (*a) so fierce *(a) battle
 b. (*a) how big *(a) mess

The scope of Cinque's generalizations must of course be restricted in order to accommodate examples like (5). However, the theory remains testable, given that exceptions of this type have a precisely definable profile. As mentioned, adjectives without degree expression cannot precede numerals and in none of the marked orders in (5) and (6) can the determiner be omitted.⁶

A further clarification concerns the border between attested and unattested orders. Not all attested orders are equally frequent. At the tail end of the range, there are orders found in only a handful of languages. N-Dem-A-Num is found as the unmarked order only in Pitjantjatjara (Eckert & Hudson 1988, Bowe 1990) and Nkore-Kiga (Taylor 1985), and in a few other languages as an alternative order. On the other hand, there is at least one order classified as unattested but actually found, albeit in only a single language. According to Bakker & Papen (1996) and Rosen (2003), Num-Dem-N-A is the unmarked order in Michif. We follow Cinque in accepting the N-Dem-A-Num order as attested and setting aside the Michif order. We will return to the N-Dem-A-Num order in subsection 5.2.

The idealizations made here might seem questionable to some (see, e.g., Steedman 2006), and it is not inconceivable that some of them are wrong. However, if the typology in Table 1 falls, so does any conceivable argument for the SHCH built on it. In section 3 we investigate the logic of the situation on the assumption that Cinque's characterization of the data is correct. We show that even if it is correct, no direct argument for the SHCH flows from it.

The main theoretical contribution of Cinque's paper consists in a demonstration that the assumptions given below generate the fourteen attested orders while excluding the ten unattested ones. Notice that among Cinque's assumptions we find conditions on movement, assumptions about hierarchical orders of elements in the base, as well as the SHCH.

- (7) a. The underlying hierarchy in the extended projection of the noun is $\text{Agr}_w \succ \text{W} \succ \text{Agr}_X \succ \text{X} \succ \text{Agr}_Y \succ \text{Y} \succ \text{N}$, where \succ indicates c-command and where Y hosts AP in its specifier, X hosts NumP in its specifier and W hosts DemP in its specifier;
 b. all (relevant) movements move a subtree containing N;
 c. all movements target a c-commanding position;
 d. all projections are modelled on the template in (1).

⁶ Similar considerations arise for other languages. Czech, for example, allows Num-Dem-A-N orders but only on a partitive reading of the Dem-A-N sequence (P. Caha, V. Prochaskova, p.c.); Turkish allows displacement of adjectives not only internally to the noun phrase but into the dominating verbal structure (Kornfilt 2003). The examples given by Kornfilt suggest that here, too, the adjective must be accompanied by a degree expression, a conjecture that is confirmed by native speakers (N. & S. Sener, p.c.).

order, namely the one in T1.IV.e. If Agr_XP moves to Spec,Agr_WP, NP can surface in either Spec,Agr_XP or Spec,Agr_YP; both derivations are new and give rise to the orders in T1.IV.c and T1.III.c, respectively.

The final admissible derivation in Cinque’s system is one in which Agr_YP moves to Spec,Agr_XP and is subsequently stranded by NP movement to Spec,Agr_WP. This derives T1.IV.b:

$$(11) [_{Agr_W P} NP [_{Agr_W [_{WP} DemP [W [_{Agr_X P} [_{Agr_Y P} t_{NP} [_{Agr_Y [_{YP} AP [Y t_{NP}]]]]]]]] [_{Agr_X [_{XP} NumP [X t_{Agr_Y P}]]]]]]]]]$$

This exhausts the orders that can be derived in Cinque’s theory. Consider why. It follows from the assumptions in (7) that all material preceding the noun must come in the base order, essentially because all other orders violate (7b), the condition that moved constituents must contain the noun. This excludes the unattested noun-final orders, as well as the orders in T1.II.d–f. Finally, the orders in T1.III–IV.f are ruled out, because their derivation, if otherwise compatible with the constraints in (7), requires movement of a nonconstituent. Any constituent that contains N and Num also contains A. Therefore there is no way of shifting Num and N to a position preceding Dem while stranding A in a position following Dem.

3. An Alternative

The results described in the previous section make a significant contribution to our understanding of the syntax of the extended nominal projection. However, we do not think that they provide evidence for the SHCH.

Although Cinque’s account capitalizes on the asymmetry inherent in Greenberg’s formulation of the Universal 20, there is another way of representing the same data that reveals a symmetry, which was obscured in Table 1. Consider Table 2. As before, unattested orders are shaded. The table is divided into two parts, each of which has two columns. The orders in those two columns are mirror images of each other; so T2.I.a and T2.II.a form a symmetric pair and so do T2.III.a and T2.IV.a. The members of the pairs in the symmetric part of the table are either both attested or both

Table 2. Unattested (grey) and attested orders of demonstrative, (descriptive) adjective, numeral, and noun (alternative analysis)

		Symmetry		Asymmetry	
		I	II	III	IV
a.	Dem ₁ Num ₂ A ₃ N ₄	N ₄ A ₃ Num ₂ Dem ₁	Dem ₁ N ₄ Num ₂ A ₃	A ₃ Num ₂ N ₄ Dem ₁	
b.	Dem ₁ Num ₂ N ₄ A ₃	A ₃ N ₄ Num ₂ Dem ₁	N ₄ Dem ₁ Num ₂ A ₃	A ₃ Num ₂ Dem ₁ N ₄	
c.	Dem ₁ A ₃ N ₄ Num ₂	Num ₂ N ₄ A ₃ Dem ₁	A ₃ N ₄ Dem ₁ Num ₂	Num ₂ Dem ₁ N ₄ A ₃	
d.	Dem ₁ N ₄ A ₃ Num ₂	Num ₂ A ₃ N ₄ Dem ₁	N ₄ Num ₂ A ₃ Dem ₁	Dem ₁ A ₃ Num ₂ N ₄	
e.	A ₃ Dem ₁ Num ₂ N ₄	N ₄ Num ₂ Dem ₁ A ₃	N ₄ Dem ₁ A ₃ Num ₂	Num ₂ A ₃ Dem ₁ N ₄	
f.	A ₃ Dem ₁ N ₄ Num ₂	Num ₂ N ₄ Dem ₁ A ₃	N ₄ A ₃ Dem ₁ Num ₂	Num ₂ Dem ₁ A ₃ N ₄	

unattested, whereas the pairs in the asymmetric part of the table have one attested and one unattested member.

There is a simple generalization that determines whether a pair of orders appears in the symmetric or asymmetric part of the table. Recall that preminally only one order of modifiers is possible: Dem-Num-A. Let us call this for now the straight order. To determine whether a pair belongs into the asymmetric part of the table, we need to look at the postnominal order of modifiers. If any two postnominal modifiers appear in the straight order and the order is attested, then its mirror image is unattested.

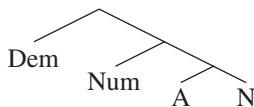
The fact that there is a simple generalization over the asymmetric pairs suggests to us that we should look for an analysis that is part-symmetric and part-asymmetric. Thus, we propose that the grammatical members of the asymmetric pairs are all generated by movement whereas the grammatical members of the symmetrical pairs are base generated. In particular, we show that the typological pattern can be derived from the assumptions in (12) (a conclusion similar to the one drawn in Ackema & Neeleman’s [2002] reaction to Cinque 1996). The first three of these are identical or equivalent to the first three assumptions made by Cinque. (Of course, Cinque’s underlying structures have a fixed linear order, but this is a consequence of the SHCH, and therefore does not distinguish (7a) from (12a).) The fourth assumption replaces the SHCH. Taken in isolation, it is weaker than its competitor because it limits the linear asymmetry of syntax to movement. But as we will argue, the overall theory built on (12) is actually more restrictive.

- (12) a. The underlying hierarchy of Dem, Num, A, and N in the extended nominal projection is $\text{Dem} \succ \text{Num} \succ \text{A} \succ \text{N}$, where \succ indicates c-command;
- b. all (relevant) movements move a subtree containing N;⁸
- c. all movements target a c-commanding position;
- d. all movements are to the left.

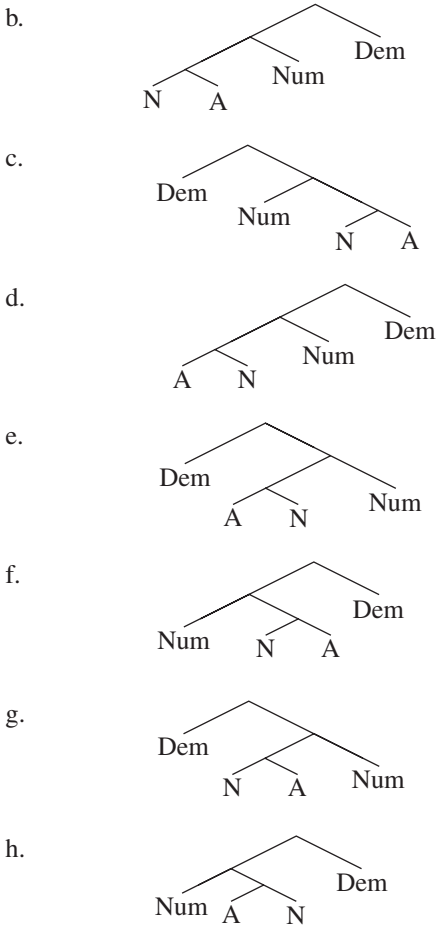
If the SHCH is abandoned in favor of (12d), we can base-generate eight of the fourteen attested linear strings, simply by allowing crosslinguistic variation in the linearization of sister nodes in the hierarchical structure described by (12a) (seven of these orders are derived through movement in Cinque’s system). These eight orders are the grammatical members of the symmetrical pairs in Table 2:

- (13) Base-generable structures according to (12)

a.



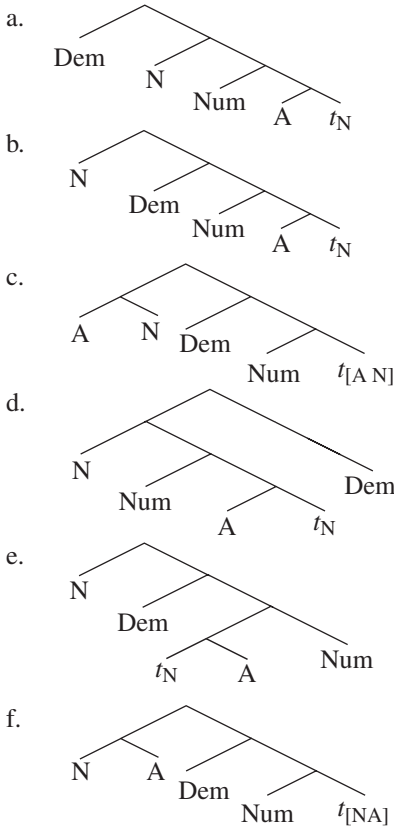
⁸ See Georgi & Müller 2010 and Steddy & Samek-Lodovici 2011 for discussion and possible explanations of this restriction.



In these trees, the nonterminals in the extended projection of the noun are left unlabeled and the demonstrative, numeral and adjective are not introduced by dedicated functional heads. This is because nothing in our argument in this part of the paper hinges on the label of the nodes in the extended projection of the noun or the inventory of functional heads (we return to this issue later). The same is true of further structure that one might deem necessary for a proper account of nominal syntax, such as the agreement heads proposed by Cinque.

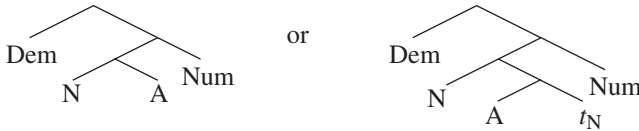
The remaining six attested orders are derived by leftward movement of a constituent containing the noun, as shown in (14). These are exactly the grammatical members of the asymmetric pairs in Table 2.

(14) Movement-derived structures according to (12)



There are other derivations involving movement, but these do not yield additional linear strings. For example, T2.I.d can be base-generated (as above) or derived from T2.I.c by short movement of N, as in (15).

(15) Multiple structures for a single string



The ungrammaticlicity of the ten unattested orders follows in essentially the same way as in Cinque’s system. This is very clear in the case of noun-final structures. Given that movement is uniformly leftward and must affect constituents containing the noun, noun-final orders must be base-generated. But among the base-generated structures, all of which are given in (13), only (13a) is noun-final. Therefore, any permutation of Dem, Num, and A is ruled out in noun-final structures.

This reasoning carries over to all prenominal material. Because movement always involves the noun, moving one nominal modifier across a second implies that the noun will also precede that second modifier; therefore, movement cannot change the order of prenominal modifiers.

Finally, the orders T2.II.e–f are excluded because their derivation can only satisfy the constraints in (12) if a nonconstituent is moved. Given that any constituent that contains N and Num also contains A, there is no way of shifting Num and N to a position preceding Dem without taking A along.

We conclude that in order to derive the word-order typology in Tables 1 and 2, it suffices to limit the asymmetry of syntax to movement (movement is leftward). The stronger assumption that phrase structure theory itself is asymmetric (the SHCH) is unwarranted, as it does not further limit the set of derivable strings.

There are other, more minor, assumptions that play no role in restricting the typology. These involve the number and the nature of landing sites for movement. We have already considered all the logically possible orders of the four relevant elements and have shown that only fourteen are derivable. The argumentation involved the direction of movement and restrictions on what constituents can move, but never the number of movement operations. Therefore, adding further landing sites cannot give rise to new well-formed strings.⁹ Suppose, for example, that any node in a base-generated tree admits free (possibly multiple) adjunction. Then, the conditions on movement in (12) still guarantee that the set of derivable orders is limited to those attested. Similarly, Cinque could either allow multiple specifiers in each functional projection¹⁰ or multiple Agr projections or both to freely host moved constituents.

The remaining assumptions, however, are crucial. Dropping any of them would make it possible to generate unattested word orders. Thus, relaxing (12a) would incorrectly allow prenominal material to appear in permuted orders, as illustrated in (16a).¹¹ The same problem arises if movement of constituents excluding the noun was allowed; the order Num-A-Dem-N could be derived either by separate movements of Num and A or by movement of N followed by remnant movement of the phrase containing Num, A, and the trace of the noun. This is illustrated in (16b). The c-command requirement on movement is well motivated on independent grounds. In the domain under discussion, revoking it would rule in the two orders N-Num-Dem-A and Num-N-Dem-A, as illustrated for the former in (16c). Most importantly for our present purposes, lifting the ban on rightward movement has the undesirable consequence of allowing scrambled noun-final orders (among other things). This is illustrated in (16d) for the order Num-A-Dem-N.

⁹ Formally, given the hierarchy and the conditions in (7) or (12), the set of fourteen strings representing attested orders is closed under permutation by movement.

¹⁰ For the question of the LCA-compatibility of multiple specifiers and adjuncts see Chomsky 1995b, Cinque 1996, and section 4 below.

¹¹ Incidentally, Brugè (2002) assumes that the structure in (16a) represents the underlying universal hierarchy and that demonstratives sometimes surface in this low underlying position. The discussion in the main text indicates that Brugè's hierarchy is incompatible with the crosslinguistic record.

- (16) a. Unattested: Num-A-Dem-N
 [Num [A [Dem N]]]
 b. Unattested: Num-A-Dem-N
 [Num [A [Dem [t_{Num} [t_A N]]]]] or
 [[Num [A t_N]] [Dem [N t_{Num} [A t_N]]]]
 c. Unattested: N-Num-Dem-A
 [Dem [Num [A N]]] \rightsquigarrow [Dem [[N Num] [A t_N]]]
 \rightsquigarrow [[N Num] [Dem [$t_{\text{N Num}}$] [A t_N]]]]
 d. Unattested: Num-A-Dem-N
 [[[Num [A t_N]] Dem] N]

Given that there is no empirical argument for the SHCH from word order, we must turn to other considerations to decide between the two theories. An initial suspicion that the LCA might be incorrect stems from the following consideration: By common assumption, symmetry comes for free. If nothing is added to the theories of phrase structure and movement, we expect pre-head orders and post-head orders to mirror each other perfectly. The problem that this paper opened with is that this is not always true. In order to deal with the existing asymmetries, additional stipulations are necessary. The additional stipulation that we have referred to as the SHCH is very wide ranging and has the peculiar consequence that where symmetry is found, it needs to be derived from an asymmetrical basis through movement. In the proposal outlined in this section on the other hand, the symmetry in Table 2 is taken at face value and explained directly in terms of the theory of phrase structure. This strikes us as a more satisfying explanation, as it based entirely on inescapable properties of the theory of syntax.

Our further evaluation of the two theories comes in two steps. First we consider the relation between Kayne's LCA and the SHCH. Then we turn to the question which of the theories holds out the promise of a more restrictive theory of movement.

4. The LCA and Phrase Structure Theory

It might seem at this point that the alternative proposed in section 3 is fundamentally disadvantaged when compared to Cinque's own. After all, his theory is based on the LCA, which is generally taken to derive both a restrictive theory of phrase structure and the ban against leftward movement. Our alternative on the other hand needs to stipulate the ban against leftward movement.¹² So it appears that there is a theoretical argument in favor of the LCA.

In this section we argue that on closer inspection this theoretical argument collapses. As we will show, the defining properties of the specifier-head-complement

¹² This seems to be in the background of footnote 5 in Cinque 2005:316–317, where an alternative theory to his with symmetric base generation is briefly considered and dismissed, because in such a theory “specific ad hoc principles would have to be introduced. The principled unavailability of such symmetric solutions is precisely one of the main consequences of Antisymmetry Theory (see Kayne 1994).”

template do not, in fact, follow from the LCA. The LCA only has the desired consequences if combined with a number of assumptions about phrase structure. These additional, independent assumptions are by and large equivalent to X'-theory. Therefore, although the LCA is *compatible* with common assumptions about phrase structure, it cannot be said to *derive* the theory of phrase structure.

The SHCH makes the claims in (17).

- (17) a. Every syntactic projection has a unique head whose category is inherited by all nodes within its projection that dominate it (endocentricity).
 b. No head combines with more than two phrasal categories within its projection (single specifier/adjunct restriction).
 c. If a head combines with two phrases within its projection, it is linearized between those two phrases and the structurally higher phrase precedes the structurally lower one (specifier-head-complement order).
 d. Projections are binary branching.

It is clear from Kayne 1994:131 that the theory of phrase structure embodied by the SHCH is intended to follow from the LCA: “What is primitive in UG is the LCA, from which follow familiar X-bar-theoretic properties. ...” The properties mentioned by Kayne include (17a)–(17c). Kayne himself does not argue that binary branching follows from the LCA (although he does list a range of special cases in which ternary branching is excluded: Kayne 1994:9, 117–118, 136, n. 28). In much of the subsequent literature, however, a derivation of the requirement of binary branching is included in the LCA’s achievements.¹³

In the following four sections we will consider each of the properties in (17) in turn and show that they do not logically follow from the LCA. As we will see, the main reasons why the LCA does not derive the SHCH is that the LCA relies on two ways of creating asymmetry—through geometry and through labeling—and that it does not entail a theory of the latter.

We are not the first to demonstrate that the LCA does not derive X'-theory (see Sternefeld 1994, Chametzky 2000, Guimaraes 2008). Indeed, as Chomsky (1995a:414) states: “[T]he derivation of these [stipulated X-bar theoretical properties] relies crucially not just on LCA, but on features of the standard X-bar theory....” The point bears repeating, as the supposed contribution of the LCA to the theory of phrase structure is still accepted uncritically in much of the literature.

4.1 *Endocentricity*

Consider, to begin with, the notion of headedness. In X'-theory and subsequent theories of phrase structure, the head of a phrase is defined in terms of labels. As Chametzky (2000:5) puts it: “X-Bar Theory is a theory of the what and why of the labelling of nodes in a phrase marker.” The head of a phrase is the category from which the phrase inherits its label.

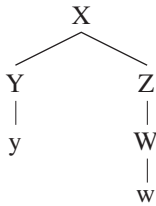
¹³ See, for example, Chametzky’s (2000:107–109) textbook on phrase structure.

Any proper *derivation* of headedness must therefore start out assuming that labeling is free and show that the relevant restrictions on labeling follow from other properties of the grammar. If Kayne is right in claiming that the LCA derives endocentricity, it must be the case that the LCA forces every category to dominate a single node from which it inherits its label. As pointed out already by Chomsky (1995a), the LCA tacitly assumes a theory of labeling instead of deriving it.

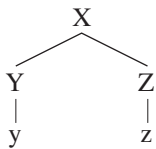
The definition of “head” employed by Kayne (1994:11) reads as follows: “Let us call a nonterminal that dominates no other nonterminal a *head*.” What Kayne claims in chapter 2 of his book is that it follows from the LCA that no head in this sense can have a head as its sister and that no nonhead in this sense can have a nonhead as its sister. In other words, although the structure in (18a) is licit, those in (18b)–(18c) are ruled out. The tree in (18b) is a structure with two Kaynean heads and (18c) is a structure with two Kaynean nonheads.¹⁴

(18) Geometry of headed, headless, and double-headed structures according to the LCA

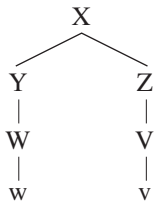
a.



b. *



c. *



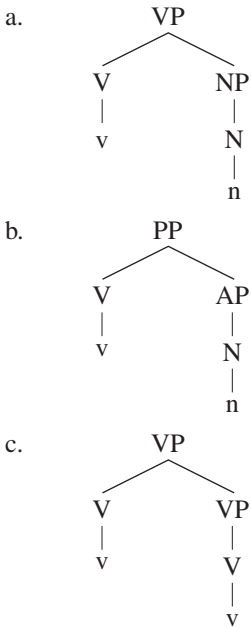
Kayne’s conclusion is purely geometrical; it has no bearing on the values of W–Z in the trees in (18).¹⁵ Consequently, the well-formed tree in (18a) can be specified in

¹⁴ We will follow a convention tacitly adopted by Kayne. If two nodes in a tree have different labels, they belong to different categories. For Kayne, this only becomes important after the category-segment distinction is introduced in chapter 3, but then it is crucial.

¹⁵ The claim that labels play *no* role needs to be modified slightly. In chapter 3 of the book Kayne introduces the notion of a segment. A segment is implicitly defined as a node with the same label as its mother or daughter. This requires the following modification of the claim in the text: The result depends in no way on the values of X, Y, Z, and W in the tree in (18a), as long as no mother-daughter pair shares the same label. See also note 14.

such a way that it meets the X'-theoretical requirement of endocentricity, (19a), but also in ways that violate endocentricity, as in (19b), where PP has no head,¹⁶ and (19c), where VP has two heads.¹⁷

(19) Headed, headless, and doubly headed structures allowed by the LCA



In sum, the LCA captures the geometry of headedness but not the associated labeling. This implies that the common notion of headedness, which combines the two, is not a corollary of the LCA (see also Sternefeld 1994, Chomsky 1995b, and Chametzky 2000).

The fact that the LCA does not give us a theory of labeling has consequences beyond the issue of headedness. It implies, as we will now explain, that the ban on multiple specifiers/adjuncts cannot be derived.

4.2 The Single-Specifier/Adjunct Restriction

The starting point for Kayne’s argument that the LCA rules out multiple specifiers (that is, structures like (21a)) is the definition of c-command given in (20). On this

¹⁶ Kayne’s (1994:41) treatment of *ouvre-boîte* invokes the structure [_N [_V ouvre] [_{NP} [_N boîte]]], which is indeed not headed in the X'-theoretical sense.

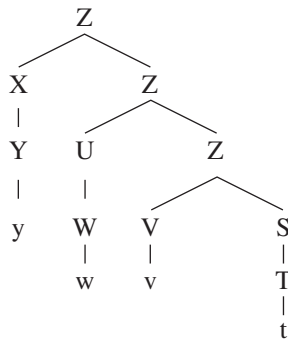
¹⁷ Kayne (1994:31–32) suggests that the structure in (19c) can occur only if X is the root of the tree. This turns out to be an error because X can easily be the daughter of a nonbranching node U, which is fully embeddable (Guimaraes 2008:(3)). As we will see in subsection 4.2, Kayne’s claim rests on tacit assumptions about the number of bar levels allowed (Chomsky 1995a:414–415); these do not follow from the LCA.

definition, (21a) is ruled out by the LCA, because X asymmetrically c-commands W, whereas U asymmetrically c-commands Y. This means that the terminals under X must precede the terminals under W, whereas the terminals under U must precede those under Y. As it is impossible to satisfy both requirements, the structure is ungrammatical.¹⁸

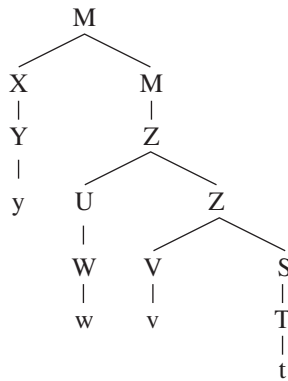
(20) X c-commands Y iff X and Y are categories and X excludes Y and every category that dominates X dominates Y. (Kayne 1994:18)

(21) An LCA-incompatible and some LCA-compatible multiple-specifier structures

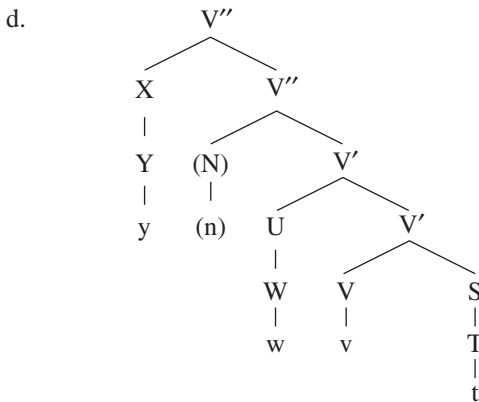
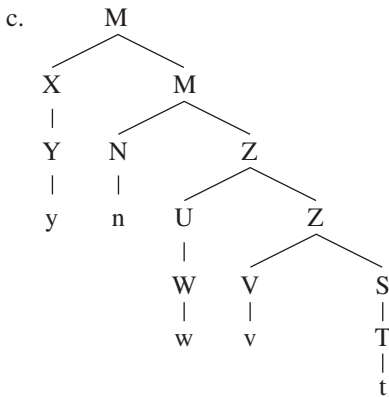
a. *



b.



¹⁸ Cinque (1996:450, n. 8) points out that this discussion of (21a) hinges on a technical detail in the definition of c-command and that (21a) could be allowed if c-command were defined as follows: “X c-commands Y iff X and Y are categories and X excludes Y and every *segment* that dominates X dominates Y.”



The contradictory ordering restrictions that hold of (21a) obtain because the nodes immediately dominating X, U, and V have the same label. But as we have seen, the LCA does not give us a theory of labeling. If specifiers and adjuncts are defined as categories whose mother and sister are nonheads that have the same label, we can construct two LCA-compatible geometries that contain more than one specifier. These are given in (21b) and (21c).

The first is LCA-compatible because U no longer c-commands Y, which implies that one of the contradictory ordering statements no longer holds, either. The geometry of the structure in (21c) is compatible with two relevant labelings. In the most obvious one, V projects to Z and N projects to M. However, given that the LCA does not provide us with a theory of labeling, we can instantiate (21c) as a structure in which V projects (in two steps) all the way to the root, (21d). The same labeling of nodes is possible for the structure in (21b), which leads to (21d) with N omitted. In both cases we end up with one projecting head is combined with two specifiers/adjuncts (see also Guimaraes 2008).

Our conclusion is that the LCA does not rule out structures containing multiple specifiers/adjuncts. If we want to use the LCA to rule out such structures, it must be combined with a specific theory of projection that limits the number of levels to two.

But this implies that this aspect of X' -theory cannot itself be derived from the LCA (see the discussion at Chomsky 1995a:415). As a matter of fact, a restriction to two bar levels is tacitly adopted in Kayne 1994 (where projection is relevant, nodes are labeled either X or XP, where X represents the category and 'P' is a diacritic symbol equivalent to a bar-level distinction). There is, however, nothing in the book that explains why there should be only one such diacritic.

Two remarks are in order. First, one could consider ruling out the structure in (21b) on the grounds that it contains a unary-branching (label-changing) substructure (the lower instance of M only dominates Z). If this were possible, it would not affect the logic of our argument because the LCA by itself does not rule out unary branching. Therefore an additional restriction on phrase structure would have to be added to the theory. Moreover, nonbranching projection is crucially appealed to in Kayne's treatment of headedness (compare (18a) and (18b) above), which implies that it might in fact be impossible to go down this route.¹⁹

Second, one could consider ruling out the structure in (21c) on the grounds that it contains an element that does not project but is a head geometrically, namely N. We do agree that the status of N is peculiar, but ruling it out requires that an additional restriction is imposed on phrase structure, linking head status in the geometric sense with projection. As this restriction does not follow from the LCA, we reach the same conclusion as before: the LCA does not derive phrase structure theory but instead presupposes a specific version of it.

To sum up, what (21b)–(21d) demonstrate is that even if we grant headedness in the X' -theoretic sense, the LCA only derives the ban on multiple specifiers given the additional assumption that there are exactly two bar levels: X and XP. But this assumption itself does not follow from the LCA. All the LCA derives is that per bar level, there can be only a single specifier/adjunct.²⁰

4.3 Specifier-Head-Complement Order

We now turn to generalization (17c), which says that if a head combines with two phrases within its projection, it is linearized between those two phrases and the structurally higher phrase precedes the structurally lower one (specifier-

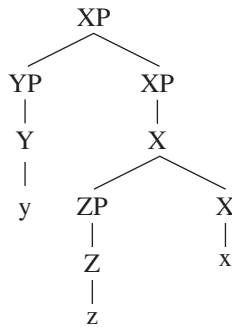
¹⁹ In connection to this, we should perhaps point out that Chomsky (1995a) rules out vacuous projection but does not provide a solution for the problems this causes for LCA-style linearization.

²⁰ Even this is not completely true. Kayne (1994:31–32) argues that adjunction of a head (in his sense) to a nonhead (in his sense) is only allowed under very special circumstances, essentially at the root of the tree (see his sect. 4.3). However, Guimaraes (2008:(3)–(4)) shows that this claim is too strong and that the LCA allows heads as adjuncts to nonheads as long as the adjoined-to category projects vacuously.

head-complement order). The results of the previous section already demonstrate that this generalization does not follow from the LCA. If multiple specifiers/adjuncts are allowed, it is possible to generate structures in which a head combines with two phrases within its projection and is linearized following both of them.²¹

Even if we restrict the number of bar levels to two (X and XP) and thereby rule out the structures discussed in the previous section, the LCA still allows generating head-final phrases containing two maximal projections. The crucial structures involve adjunction to heads, which is permitted under the LCA. Even though the standard case involves adjunction of heads to heads, nothing rules out the structure in (22), in which a *phrase* is adjoined to a head.²²

(22) A base-generated head-final structure allowed by the LCA



Thus, the LCA on its own does not give rise to a strict ordering of a head and the first phrase it combines with. Phrasal adjunction to heads is ruled out in the presence of a phrasal daughter of the lower segment of XP, but in the absence of such a constituent, the LCA allows it. Of course, one could rule out structures like (22) by adopting a separate ban on adjunction of phrases to heads, but this only reinforces the conclusion that the LCA by itself does not derive the basic order of elements stated in the SHCH.

4.4 Binary Branching

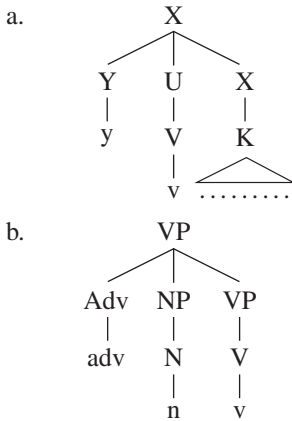
It is often assumed that the LCA rules out ternary branching structures, even though Kayne never makes any claim to this effect. Indeed, there are LCA-compatible

²¹ The fact that the LCA does not limit the number of specifiers/adjuncts is not insignificant for an additional reason: It shows to be incorrect a claim made at the very beginning of Kayne's book (p. xiv–xv) and repeated in footnotes 14 (p. 141) and 22 (p. 143). Kayne argues that the LCA predicts that there can be no language in which every head in every phrase is final. This is because head-finality can only be derived through movement. The ban on multiple specifiers limits the number of potential landing sites to one per phrase. Given that elements like subjects, indirect objects, and modifiers are base generated as specifiers/adjuncts, there will always be fewer landing sites than there are complements, no matter how many functional heads are assumed. Therefore, at least some heads must precede their complements. This argumentation collapses if phrases can have multiple specifiers/adjuncts.

²² In fact, this property of the LCA is exploited by Sternefeld (1994) to reconcile an SOV analysis of German with the strictures imposed by Kayne's theory.

ternary-branching structures. The general scheme that characterizes such structures is given in (23a). One concrete instantiation can be seen in (23b), where an unergative verb simultaneously combines with its subject and a bare adverbial. Of course, there are many other instantiations of the abstract scheme.

(23) LCA-compatible ternary branching structures



To see that the LCA does not rule out (23b), consider what c-command relations hold in this structure. On the definition employed by Kayne, the category Adv asymmetrically c-commands categories N and V, while NP asymmetrically c-commands V. The categories Adv and NP irrelevantly c-command each other, and the two-segment category VP does not exclude any of the material, hence it does not c-command any nodes. Thus, the LCA dictates that adv precedes n and v, and that n precedes v. These ordering restrictions are not contradictory, and hence (23b) converges as adv-n-v.

Notice that in the general scheme in (23a) a head (Y) is adjoined to a phrase (X). An anonymous reviewer suggests that as a consequence of this, the problem posed by the scheme in (23a) is negligible in practice. Kayne argues that adjunction of a head to a phrase is limited to structures in which the phrase in question is the root of the tree, which would imply that structures like (23a) cannot be embedded. However, as Guimaraes (2008) points out, if X is the single daughter of a node Y, embedding of Y will not lead to violations of the LCA.

4.5 Back to the Ban on Rightward Movement

From the above discussion we may conclude that the LCA does not derive the SHCH. To derive the SHCH from the LCA, one must presuppose endocentricity, a limitation on the number of bar levels, a ban on adjunction of phrases to heads, and a ban on ternary-branching structures. As already pointed out by Chomsky (1995a), these additional assumptions are tantamount to a fairly standard version of X'-theory.

There is a clear diagnosis as to why the LCA cannot derive the SHCH. At the outset of his monograph, Kayne considers a version of the LCA that is based purely on geometry: nodes that have no daughters must precede nodes that do have daughters. The simplex/complex distinction is used as a symmetry breaker to order heads before complements. However, a version of the LCA based exclusively on the simplex/complex distinction also rules out structures in which two simplex nodes combine as well as those where two complex nodes do; see (18). Such junctures exist and Kayne is therefore forced to introduce a second way of breaking symmetry, namely through labeling. Labeling makes it possible to distinguish categories from segments, and additional assumptions about c-command then allow adjunction of complex nodes to other complex nodes (specifiers/adjuncts) and of simplex nodes to other simplex nodes (head adjunction). What we have shown in this section is that the two ways of breaking symmetry (through geometry and through labeling) interact in ways that admit more structures than intended, mainly because the LCA imposes no restrictions on labeling.

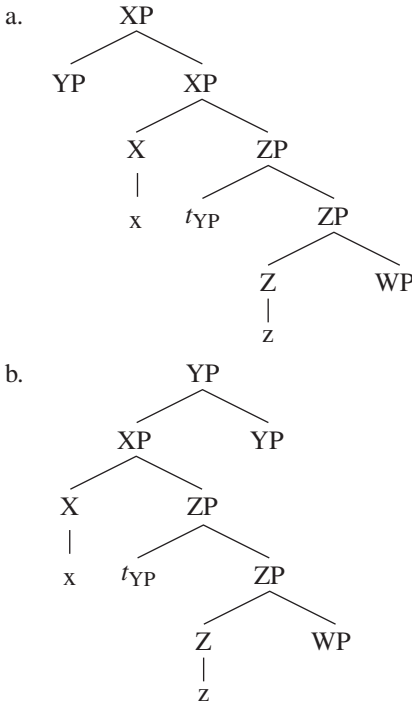
Our discussion was motivated by the notion that the LCA unifies the theory of phrase structure with the ban on rightward movement, whereas the alternative pursued here needs separate statements of phrase structure theory and the ban on rightward movement. This argument cannot be upheld, given that the LCA in fact needs to be supplemented by an independent theory of phrase structure in order to derive the SHCH. As a result there is no conceptual argument that distinguishes the LCA from a direct ban on rightward movement.

In fact, it turns out that the LCA also cannot derive the ban on rightward movement without further assumptions. The structures in (24) show why. The direction of movement in these structures depends on whether the target of movement or the moving category projects. If the target of movement projects, the LCA requires movement to be leftward, as in (24a); if the moving category projects, the LCA requires movement to be rightward, as in (24b).²³ Therefore the LCA cannot block rightward movement unless it bans projection of a moving category. It is an open question whether such a ban can be motivated given the growing body of work relying on projection after movement (see Georgi & Müller 2010 for a proposal about reprojection in the noun phrase and fn. 2 of that paper for references to numerous other applications of the idea of reprojection). But quite apart from that, the necessity to add another phrase-structural restriction to the system, necessary to rule out rightward movement, further undermines the conceptual argument for the LCA.²⁴

²³ A reviewer wonders whether YP in (24b) can be embedded. It turns out that it can be embedded freely without violating the LCA.

²⁴ The argument presented here is based on the assumption that movement is subject to the extension condition. Alternatively, one could assume that movement must target a c-commanding position. This would rule out the rightward movement structure in (24b), because the lower segment of YP does not c-command its trace. However, given the definition of c-command on which the LCA relies, the c-command condition would incorrectly rule in movement to the specifier of a specifier. If both the extension condition and the c-command condition are adopted, the empirical effects of the c-command condition are limited to ruling out rightward movement.

(24) LCA compatible leftward and rightward movement structures



5. Comparing the Two Theories

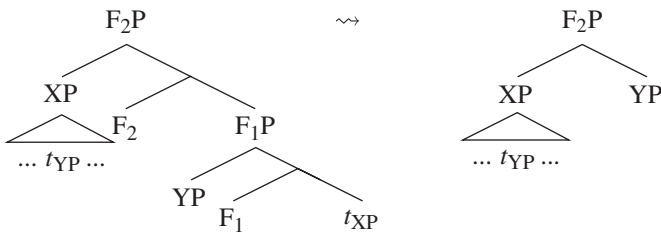
In section 3 we showed that the SHCH makes no relevant contribution in deriving Universal 20 and its exceptions: all unattested word orders can be ruled out by a fixed hierarchy of merger and conditions on movement. So, at this point we have two theories that are equivalent in their weak generative capacity. It is not clear, however, that the two theories are equivalent in any stronger sense. We will explore this issue by asking two questions. (i) Do the structural differences between the two theories favor Cinque’s account over our alternative? (ii) Do the “extra” movements necessary to achieve compatibility with the SHCH require a qualitative extension (that is, a weakening) of movement theory compared to our alternative. The answers are “no” and “probably”, respectively.

5.1 Constituency and C-Command

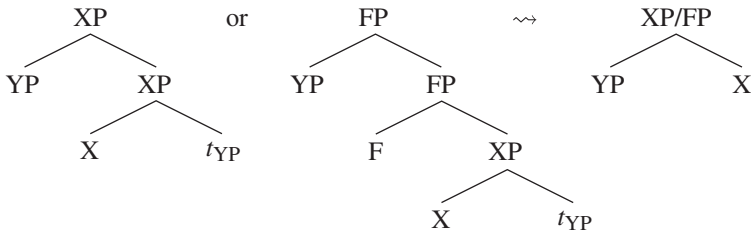
Recall that for every representation ruled out by the SHCH there is an SHCH-compatible structure that yields the same string. Although the trees erected over that string seem very different, they share a number of properties. If we consider the overt material and traces in a traditional representation and compare how those are grouped together under the SHCH, we find that gross constituency is identical. This becomes

obvious if we remove from the SHCH-compatible representations in (2), (3), and (4) all material forced by the SHCH (that is, functional heads and traces of short movement). The trees involved in this exercise are given in (25)–(27). The dominance relations between the nodes that survive this “shrinking” are identical to those in the input tree (technically speaking, the input and output trees are homomorphic for dominance). The shrunken output trees, moreover, have the same shape as the traditional trees in 2, 3, and 4 (technically speaking, the trees in the two sets are isomorphic). This fact should dissuade proponents of the LCA from arguing against the theory of section 3 on the basis of constituency: the theories are simply too similar to be distinguishable in this respect.

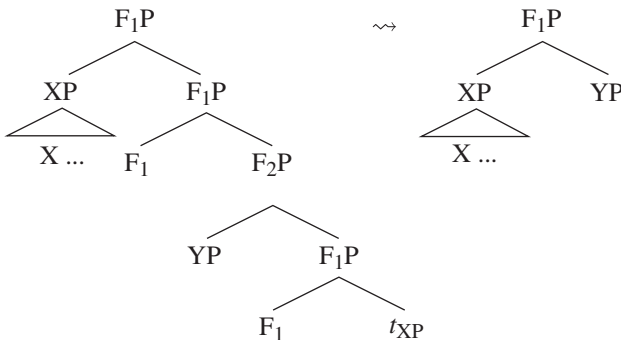
(25) Shrinking gap-filler structures



(26) Shrinking complement-head structures



(27) Shrinking head-specifier structures



We illustrate this point for two Cinquean derivations, the one that gives rise to the N-A-Num-Dem order and the one that produces N-Dem-A-Num (see Figures 1

and 2). We have resized the shrunken trees to fit those proposed by Cinque, which are set in light gray in the background. The trees in the foreground arise by repeated mechanical application of the procedure sketched in (25)–(27). They have the same shape as the representations we assigned to the N-A-Num-Dem and N-Dem-A-Num

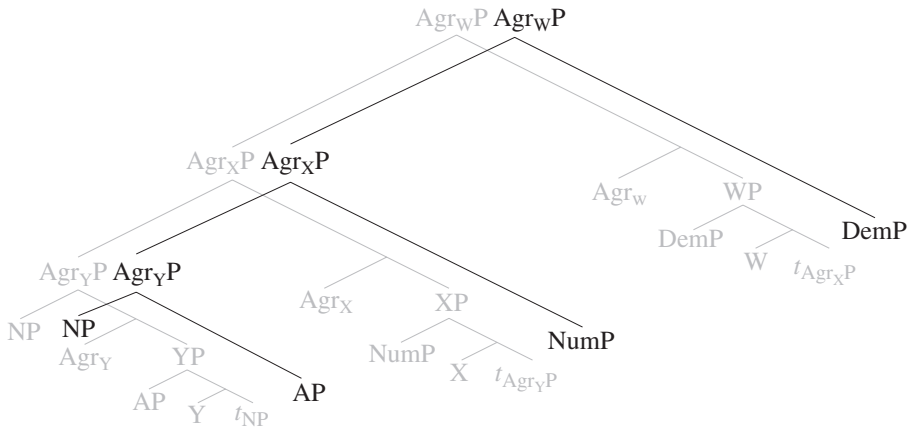


Figure 1. Illustration of the identical gross constituency of the SHCH-based analysis of the N-A-Num-Dem order (shaded) and its shrunken counterpart (solid)

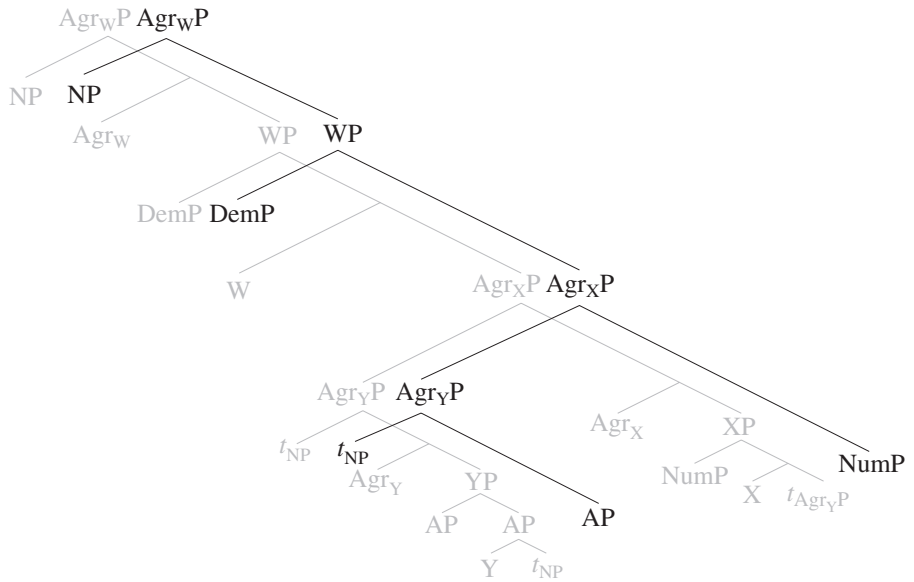


Figure 2. Illustration of the identical gross constituency of the SHCH-based analysis of the N-Dem-A-Num order (shaded) and its shrunken counterpart (solid)

orders in (13b) and (14e). As we demonstrated in Abels & Neeleman 2009, this correspondence holds of the representations we assigned to all of the attested orders.

It would be wrong to conclude from this that traditional theories and theories based on the SHCH are notational variants. The extra material (heads and traces) present in SHCH-compatible representations is not without consequences. For one thing, it leads to contrasts in the set of *c*-command relationships accrued in the course of the derivation. In our representation for the N-A-Num-Dem order, each element *c*-commands everything to its left.²⁵ In Cinque's representation the same *c*-command relations hold in the base structure (i.e., under reconstruction). However, these *c*-command relations are destroyed by the movements that guarantee SHCH-compatibility. Moreover, on the definition of *c*-command employed by Kayne, the movements that create roll-up structures give rise to additional *c*-command relations absent in traditional analyses.

Let us briefly consider these issues, starting with *c*-command relations created by movement. As discussed above, Kayne's (1994) LCA employs a definition of *c*-command that distinguishes between segments and categories and that is designed to allow adjuncts (which include specifiers) to *c*-command out of the category they are adjoined to. The implication for a structure like that in Figure 1 is that NP will *c*-command AP, NumP, and DemP in the surface representation. This property is shared with other noun-initial structures but absent when the noun is final. Therefore, the antisymmetric view takes N-A-Num-Dem to form a natural class with, say, N-Dem-Num-A, but not with Dem-Num-A-N, given that in the latter NP does not *c*-command the elements that accompany it. In contrast, the traditional view groups Dem-Num-A-N together with N-A-Num-Dem (in neither order does NP *c*-command its modifiers) and sets these orders apart from N-Dem-Num-A, in which the noun's *c*-command domain is expanded by movement.

Movement also destroys *c*-command relations. Consequently, certain *c*-command relations preserved throughout the derivation in our theory are destroyed in SHCH-based accounts. Whenever a pair of items does not appear in the canonical Dem-Num-A-N order, Cinque's analysis predicts that in the surface representation the element merged later fails to *c*-command the element merged earlier. For a large class of cases, this is not true of our alternative, simply because no movement takes place. For example, in the N-A-Num-Dem order all original *c*-command relations have been destroyed on Cinque's analysis, whereas in our account surface *c*-command follows the hierarchy of merger.

Testing these contrasting characteristics is not a trivial matter, but one could imagine that removing *c*-command relations removes interveners that would otherwise lead to a violation of relativized minimality (along the lines of Collins's [2005] approach to raising in English) and that adding *c*-command relations might add interveners. Similar predictions can potentially be derived from other phenomena sensitive to *c*-command, such as the licensing of negative polarity items, scope, or binding. We are not aware of any effects of this type, but it seems to us that the burden of proof is on proponents of the SHCH, who should be committed to showing

²⁵ Notice that N also *c*-commands A. We abstract away from this slight complication.

that the additional material and operations required for SHCH-compatibility have testable consequences.

In the nominal domain, the destruction of *c*-command relations through SHCH-related movement is limited to specifiers/adjuncts. Beyond the noun phrase, however, we find similar effects with complements. If we compare the representations in (3), the head *c*-commands the complement throughout the derivation in the traditional head-final tree but not in its antisymmetric counterparts. There, the head *c*-commands its complement only in the underlying structure. The lack of surface *c*-command gives rise to the expectation that the scopal properties of head-initial and head-final structures should differ radically. The opposite prediction is made under the traditional theory of phrase structure, as both orders have identical hierarchical structures. As far as we know, the scope of modal verbs in head-final structures is as predicted by the traditional analysis: modals further to the right take scope over modals further to the left. The SHCH appears to make the wrong prediction. There are obvious ways of removing this prediction from the theory,²⁶ but the price one pays for this is one of decreased testability.

Of course, proponents of the SHCH should try to *increase* the testability of their theory. The most obvious way of doing this would be to establish a firm link between the movements required for SHCH-compatibility and other phenomena. Agreement, for example, has been linked to uncontroversial cases of movement in Romance past participle constructions and Arabic subject fronting (see Kayne 1989; Aoun, Benmamoun & Sportiche 1994). In view of this, one could attempt to correlate the relevant movements with agreement in the noun phrase. The hypothetical correlation is incorrect, as agreement is found in uncontroversially base-generated structures (such as the German noun phrase). The point, however, is not that this putative prediction is wrong; the point is that we are not aware of any attempts to derive predictions of this type from the SHCH.

5.2 Restrictions on Movement

So far we have argued that there is no particular advantage in adopting the SHCH. There is what seems to us to be an important disadvantage, however: The movements required to reconcile the SHCH with the attested word orders stand in the way of a restrictive theory of movement. The issue is not one of the number of movements required; rather, it resides in the types of movement that must be allowed. The problem manifests itself in at least three ways, each associated with a different type of movement employed by Cinque. The movements in question are the very local movement that derives roll-up structures, movements that separate adjectives (not discussed so far), and the movement of NP in (11), which strands pied-piped material in an intermediate position. We discuss these in turn.

²⁶ One could for example stipulate that roll-up movements—unlike some other movements—obligatorily reconstruct for scope.

5.2.1 *Antilocality*

Very local movement is problematic in the light of Fukui 1993; Saito & Murasugi 1999; Bošković 1997; Abels 2003a,b; and Boeckx 2008. Those works advance an antilocality condition on movement according to which no complement can recombine through movement with a projection of its selecting head.²⁷ Abels (2003b) argues that this condition has the following rationale: A head and its complement are in a local relation in the base structure (they c-command each other). No different relation is established by recombining the complement with a projection of the head. Therefore, there can be no trigger of such local recombination.

For any category that permits extraction only through an escape hatch, antilocality predicts that the complement of that category will resist movement. For example, there is good evidence that extraction from CP must proceed through Spec,CP. Therefore, the complement of C⁰ should be unextractable. Indeed, fronting of IP seems to be impossible (as stated in Den Dikken's [1987] IP Immobility Principle; see also Wurmbrand 2004). This is striking, given that extraction out of IP is possible:

- (28) a. What do you think that Mary has read?
 b. Nobody thought that anything would happen.
 c. That anything would happen, nobody thought.
 d. *Anything would happen, nobody thought that.

The pattern recurs in a number of environments. Thus, preposition stranding is blocked in languages in which movement out of PP needs to proceed through Spec,PP. In contrast, movement out of the complement of PP is unproblematic. Similarly, VP can never strand the phase head *v*, although extraction out of VP is, of course, allowed. (These two cases are discussed at length in Abels 2003b.) There are other categories that arguably require extraction through an escape hatch and that display the same behavior. In English, NP cannot move and leave behind the determiner, but extraction from NP is unproblematic. More strikingly, perhaps, English has two types of degree expression: one a functional head selecting AP; the other a modifier that adjoins to a variety of categories, including AP (see Neeleman et al. 2004). Stranding of modifying degree expressions is possible, but movement of AP stranding a degree head is ungrammatical. Extraction out of AP is fine in both structures. We list the structures to be ruled out by antilocality in (29a–e).

- (29) a. *[_{CP} IP [C *t*_{IP}]]
 b. *[_{PP} DP [P *t*_{DP}]]
 c. *[_{VP} VP [*v* *t*_{VP}]]
 d. *[_{DP} NP [D *t*_{NP}]]
 e. *[_{DegP} AP [Deg *t*_{AP}]]
 f. [_{XP} α [X [_{YP...} *t*_{α...}]]]
 where X ranges over C, P, *v*, D, and Deg.

²⁷ Grohmann (2003) suggests an even more radical antilocality constraint. Kayne (2005:272, 331) also assumes that the "complement of a given head H can never move to the Spec of H."

The structures discussed so far are head-initial, but the same pattern is found with complements that precede the head. Thus, the IP Immobility Principle also applies to Japanese, Korean, and Turkish, and the ban on preposition stranding is as common with postpositions as it is with prepositions. Needless to say, extraction from IP and from the complement of postpositions is unproblematic (see Sener 2006 for an illustration based on Turkish postpositions). The set of structures that violate antilocality should therefore be extended with those in (30a–e).

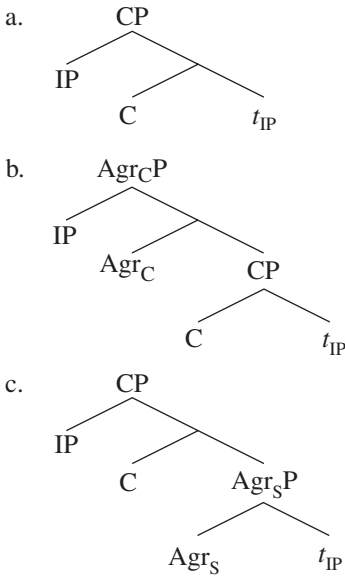
- (30) a. $*[{}_{CP} IP [t_{IP} C]]$
 b. $*[{}_{PP} DP [t_{DP} P]]$
 c. $*[{}_{VP} VP [t_{VP} v]]$
 d. $*[{}_{DP} NP [t_{NP} D]]$
 e. $*[{}_{DegP} AP [t_{AP} Deg]]$
 f. $[{}_{XP} \alpha [[{}_{YP} \dots t_{\alpha} \dots] X]]$
 where X ranges over C, P, v, D, and Deg.

As far as we can tell, the antilocality constraint on movement must remain toothless in theories that assume syntax to be antisymmetric. To account for clause-final complementizers, antisymmetric theories must adopt one of the structures in (31). The problem with (31a) (suggested in Kayne (1994)) is that it violates the antilocality condition. Obviously, giving up this condition destroys our account of the immobility of IP and other restrictions mentioned earlier. If the antilocality thesis is maintained, (31a) must be restricted in favor of either (31b) or (31c) (see Koopman 2005 and Kornfilt 2000a,b). In the structure in (31b) the escape hatch for extraction from the CP-domain must be Spec, Agr_CP, rather than Spec,CP. This has the unfortunate consequence that the account of IP's immobility is lost. The structure in (31c) adheres to the standard assumption that Spec,CP is the escape hatch and allows movement to this position without violating antilocality. But from Spec,CP further movement of IP ought to be possible, in violation of the IP Immobility Principle. Thus, in SHCH-based theories the antilocality constraint must either be abandoned or be voided of its empirical content.²⁸

²⁸ Proponents of antisymmetry face an additional question in this area. Kayne (1994) cites lack of obligatory *wh*-movement in complementizer-final languages as possible evidence for (31a). However, if (31b) is adopted, there is an additional potential position following IP and preceding C⁰. If that position were used for *wh*-movement, head-final languages would have rightward *wh*-movement. Thus, the question must be answered why Spec,CP is systematically empty.

In Kayne 1999, 2004, a different account of head-finality is proposed (see Borsley 2001 for discussion). Certain prepositions and complementizers are assumed to be merged in a VP-external position and combined with their apparent complements through movement; this makes the proposal substantially similar to (31c) and vulnerable to the same objections. Along the way, a number of remnant movements occur. We leave it to proponents of such analyses to demonstrate how the IP Immobility Principle, the ban against P-stranding, and the word-order typology in the NP can be made to follow. As they stand, these proposals are not sufficiently worked out to allow evaluation.

(31) Three ways of deriving final complementizers under the SHCH



Essentially the same paradoxical situation presents itself in the case of unstrandable postpositions and other heads that cannot be separated from their complements.

5.2.2 *A-over-A effects*

We now turn to a second restriction on movement that, on our analysis, constrains the orders of elements within the noun phrase, but that fails to impose a similar restriction under the SHCH. The empirical basis of our argument is the traditional observation that crosslinguistically a sequence of descriptive adjectives can be interrupted by the noun but not by numerals or demonstratives.

We show that this restriction can be derived from Attract Closest, on the assumption that stacked adjectives are accommodated by multiple adjunction to NP: in an adjunction structure the various segments of the complex category hosting the adjectives have identical feature specifications, and therefore Attract Closest blocks movement of all but the highest segment. This insight cannot be captured under the SHCH because the adjective-hosting functional heads (and their associated Agr projections) cannot be assigned identical feature specifications.

We begin by considering the empirical evidence supporting the claim that adjectival sequences cannot be interrupted by numerals and demonstratives. We then spell out our account of the data in terms of Attract Closest. Finally, we explain why this account does not permit an SHCH-compatible translation.

The claim that the adjectival sequence cannot be interrupted is implicit in traditional grammar, which treats adjectives as a unified category. If a language is described as having adjectives in a single position within the extended nominal

projection, what is meant is that all adjectives appear (stacked) in that position. This is also how Cinque's own description of the data in Table 1 is intended to be understood.

So, it is well accepted that adjectives tend to cluster together. The way to identify potential counterexamples is to consider languages for which multiple positions for adjectives have been reported. Not all of these are relevant, however. Spanish, for example, has two positions for adjectives, but because these are separated by the noun rather than by a numeral or demonstrative, they do not challenge the generalization. What we need to look at instead are languages for which two of the orders in Table 1 are claimed to be grammatical, such that (i) the positions of A in these orders are separated by Dem or Num, and (ii) the orders are otherwise identical. The relevant languages in Cinque's description are Manam (which is reported to allow N-A-Num-Dem and N-Num-A-Dem), Bai (reported to allow A-N-Dem-Num and N-Dem-Num-A), Lahu and Hualapai (reported to allow Dem-N-A-Num and Dem-N-Num-A), and Nkore-Kiga and Noni (reported to allow N-Dem-Num-A and N-Dem-A-Num). The mere existence of two orders is not enough to falsify our condition on movement, however. A genuine counterexample would require a neutral order that allowed the two adjectival positions to be filled simultaneously.

In fact, none of the sources cited by Cinque nor any of the additional literature that we have looked at gives any example of this type. For some of the languages mentioned above there is, in fact, reason to think that such examples do not exist. In Manam, for instance, it appears that stacking of adjectives is not allowed (F. Lichtenberk, p.c.). For Bai, it is striking that the N-Dem-Num-A order finds its sole support in Fitzgerald 1941. It is not mentioned at all in Wiersma 2003 nor, according to Dryer (2008), in Xu 1984. Wiersma and Xu only mention the order A-N-Dem-Num. We would speculate that the adjective-final order is not part of Bai grammar and only exists in the written language as a borrowing from Chinese (thanks to G. Wiersma for discussion). The identification of Lahu as a potential counterexample to the inseparability of adjectival sequences rests on a claim in Croft & Deligianni 2001, which is unreferenced and not supported by examples. The sources available to us—Telford 1938, Bradley 1979, and Dryer 2008—suggest that the orders attested for Lahu can be summarized by the following statement: <Dem>-A-N-A-Num-<Dem>.²⁹ There is no reason to think, then, that Lahu allows adjectival sequences to be interrupted by numerals or demonstratives. The final relevant language that we have information about is Nkore-Kiga (see Taylor 1985), discussed in some detail below. In this language adjectives following the numeral are either emphatic or reduced relative clauses. The only neutral adjectival position is the one

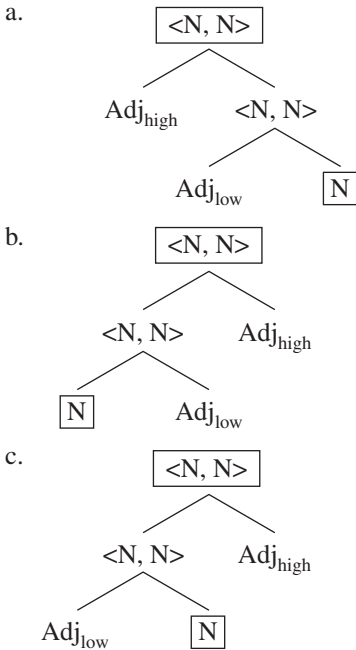
²⁹ We have no direct evidence bearing on the relative ordering of postnominal Dem with respect to numerals and adjectives. Telford 1938:15 contains examples like the following showing that adjectives precede numerals. This makes the given template the most conservative guess about Lahu word order.

(i) haw: aw_v ma: te^v hkeh:
 elephant PRT female one classifier
 'one female elephant'

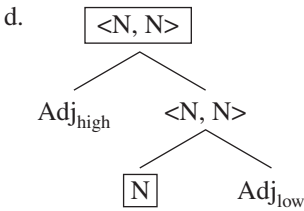
preceding the numeral; therefore, Nkore-Kiga is unlikely to allow interrupted sequences of nonemphatic adjectives. In sum, there seems to be solid empirical evidence for the generalization that no language allows adjectival sequences to be interrupted by material other than the noun.³⁰

We propose to capture this generalization by appealing to Attract Closest. There is a body of work that extends the effects of Attract Closest to the cases falling under Bresnan's (1976) relativized A-over-A condition. The basic idea is that if two nodes A and B have a feature attracted by a c-commanding head and A dominates B, then A is closer to the attracting head than B. Thus, movement of B is blocked (see Fitzpatrick 2002 for discussion and references). On a conservative view of the attachment site of adjectives, this is sufficient to explain the data. Consider the representations in (32), where the adjectives are represented as adjuncts, using the notation for adjunction from Chomsky 1995a.

(32) Adjunction structures for adjectives with attractable nodes framed



³⁰ Interestingly, in all languages in Cinque's sample where two alternative linear positions of the adjective are separated by material other than the noun, our proposal makes available an analysis that relies only on alternative linearization of numerals without recourse to optional pied-piping. The two most convincing cases are Manam and Noni (Hyman 1981), which display an alternation between N-A-Num-Dem and N-Num-A-Dem and between N-Dem-Num-A and N-Dem-A-Num, respectively. Both alternations can be derived by linearizing Num either to the left or the right of its sister in a configuration where the noun has moved. The only alternation in Cinque's sample that cannot be captured in this way is the one reported for Bai, but as indicated above, one of the alternative orders is likely to be spurious.



In the spirit of our proposal, these structures are identical in terms of hierarchical relationships. Assuming that linearization statements may vary per type of adjective (see section 5.3 for discussion), this gives us four possible base orders for a structure in which a noun is accompanied by two adjectives. Notice that in (32c) and (32d) the noun can intervene between the two adjectives that modify it. However, there are no base-generated structures in which a numeral or demonstrative separates the sequence of adjectives, because they are attached higher than all the adjectives.

By hypothesis, all nodes labeled <N, N> have identical feature specifications. Consequently, only the highest in a sequence of such nodes will be movable; movement of lower segments is blocked by Attract Closest. This means that it is impossible for a constituent containing the noun and the low adjective to move across a numeral or determiner, stranding the high adjective.^{31,32}

The inseparability of adjectival sequences cannot be captured by the SHCH. Given that this hypothesis rules out adjunction structures, stacking of adjectives must be analyzed in terms of a sequence of functional projections, each hosting an AP in its specifier. Cinque also assumes that every such functional projection is dominated by an Agr projection that provides a landing site for movement. It is a common assumption that the heads in a functional sequence are substantially different (see Cinque 1994, 1999, among others). If so, it is hard to use Attract Closest to rule out separation of adjectives by movement. What would be required is (i) that all functional projection hosting adjective share at least one feature (F₁) and (ii) that F₁ is the only feature ever attracted in the derivation of unmarked orders. Unfortunately, an account along these lines is no more than a description: All the heads in the functional sequence are taken to be distinct in their feature content, but it is stipulated that none of the features that distinguish the heads hosting adjectives (and their associated Agr projections) matters for the theory of movement. Notice that other modifiers *can* be separated by movement and the functional projections that host them must therefore be distinguished by attractable features. Thus, the proposal just sketched emulates adjunction in making exactly the

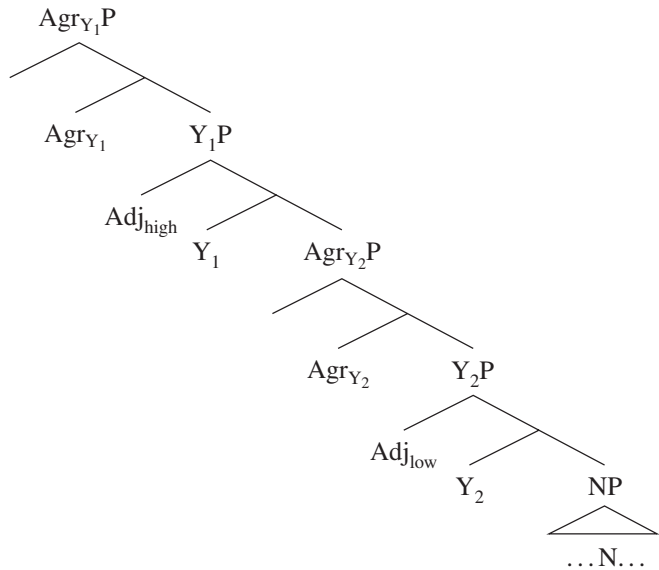
³¹ Movement of N alone can be allowed if N and <N, N> differ in feature content. This can be achieved in two ways: either adjunction is marked using X'-theoretical diacritics or the noun is merged with a functional head before any adjectives are attached. The adjectives are then adjuncts in the projection of this functional head.

³² It is possible for segments of a complex category to have different information-structural properties, which may explain why adjuncts may be stranded under VP-topicalization. Notice, however, that in the case at hand, we consider only unmarked orders; in other words, we abstract away from the effect of information structure.

functional projections hosting adjectives but no other functional projections indistinguishable for movement theory.

A proponent of the SHCH who wants to *explain* the inseparability of adjectival sequences must argue that all functional heads licensing APs in their specifiers have identical properties. Attract Closest then guarantees that no movement can separate adjectival sequences much the same way that it does under our proposal. Given that on Cinque’s assumptions every functional projection hosting an adjective is dominated by an Agr projection, the desired effect only obtains if all the Agr heads, too, are identical. The picture that emerges, then, is that stacking of adjectives must involve recursion of identical pairs of functional projections, one hosting the adjective and one allowing movement across it. In (33), Agr_{Y₁} and Agr_{Y₂} have the same properties, as do Y₁ and Y₂. Without this pairwise identity of functional projections, the inseparability of adjectival sequences cannot be explained.

(33) SHCH-compatible base structure for stacked adjectives



We will now demonstrate that there are distributional data that can only be captured if Agr_{Y₁} and Agr_{Y₂} have different properties. Our case is based on Spanish. In particular, we claim that the order in (34c) cannot be derived if Agr_{Y₁} and Agr_{Y₂} have identical properties.

- (34) a. una [[película antigua] fantástica]
 a film old fantastic
 ‘a wonderful old movie’

- b. una [[antigua película] fantástica]
 a old film fantastic
 c. una [fantástica [película antigua]]
 a fantastic film old

The examples in (34) show that adjectives may either precede or follow the noun in Spanish. In structures with several adjectives, pre- and post nominal adjectives can co-occur. (There is a condition that no more than one adjective precedes the noun; thus, *fantástica antigua película* is unacceptable. This does not affect our argumentation.) We can be confident about the bracketings in (34) because the adjective *fantástica* can only have an evaluative interpretation (“wonderful”) if it is outside the scope of *antigua* ‘old’; otherwise, it is interpreted as “fantastical”. For example, *una película fantástica antigua* ‘a film fantastic old’ means “an old fantastical movie” not “a wonderful old movie.”

The order in (34a) can be derived if Agr_{Y_1} and Agr_{Y_2} are identical and attract a feature shared by NP and Agr_{Y_P} . This property will force movement of NP into the specifier of $\text{Agr}_{Y_2}P$ and, by Attract Closest, movement of $\text{Agr}_{Y_2}P$ into the specifier of $\text{Agr}_{Y_1}P$.

The order in (34b) can be derived if Agr_{Y_1} and Agr_{Y_2} are identical and attract a feature of Agr_Y not shared by N. The specifier of $\text{Agr}_{Y_2}P$ remains empty as there is nothing in its c-command domain that it attracts. Agr_{Y_1} , however, finds $\text{Agr}_{Y_2}P$ in its c-command and triggers movement of the latter into its specifier.³³

Crucially, the order in (34c) cannot be derived on a uniform specification of Agr_{Y_1} and Agr_{Y_2} . To explain the fact that *película* precedes *antigua*, it must be the case that Agr_{Y_2} attracts a feature present in NP. The feature attracted may be shared by NP and Agr_Y , as assumed in the discussion of (34a), or it may be unique to NP. If Agr_{Y_1} and Agr_{Y_2} have identical properties, the former option would lead movement of $\text{Agr}_{Y_2}P$ into the specifier of $\text{Agr}_{Y_1}P$ (i.e., to the order in (34a)), whereas the latter option would lead to subsequent movement of NP to the specifier of $\text{Agr}_{Y_1}P$ (i.e., to the order *película fantástica antigua*, which is ungrammatical on the relevant reading). The order in (34c) can only be derived if Agr_{Y_1} attracts neither NP nor $\text{Agr}_{Y_2}P$. But this means that it must be different from $\text{Agr}_{Y_2}P$.

We conclude that the pairwise identity of functional projections hosting stacked adjectives is incompatible with the Spanish data. However, giving up the assumption of pairwise identity must lead to a collapse of any attempt to develop an SHCH-compatible explanation of the inseparability of adjectival sequences from Attract Closest.

5.2.3 Stranding of pied-piped material

The third restriction on movement we discuss concerns movement out of moved categories. The literature contains a number of proposals that rule out or limit stranding in intermediate positions. The strictest condition proposed in this domain is

³³ For the sake of the argument we ignore the complication that an attracting head (Agr_{Y_2}) must be allowed to survive in a structure where there is nothing for it to attract.

known as the freezing principle (Ross 1967, Wexler & Culicover 1980, Browning 1991, Collins 1994). It simply states that if a category moves, it becomes an island for extraction. There are many counterexamples to the freezing principle (Chomsky 1986, Kayne 1994, Abels 2007, Müller 2009), but there is evidence that a weaker principle does hold.

The formulation of this weaker principle requires that we introduce some terminology. In cases where a complex phrase moves, we call the element carrying the features that trigger a particular movement the *pied-piper* and the material moved along the *pied-pipees*. The principle we have in mind bans a moving element from pied-piping certain material on an initial step of movement and then stranding it in an intermediate position. In other words, pied-pipers can never shed their pied-pipees.

There is ample evidence for this principle. Postal (1972) observed that prepositions pied-piped under *wh*-movement cannot be stranded in intermediate positions, as shown in (35).³⁴ Movement under relative-clause formation is subject to the same restriction, as (36) illustrates.

- (35) a. [_{PP} With which friend] did you say _{t_{PP}} that Mary went to the movies
 {t{PP}}?
- b. [_{DP} Which friend] did you say _{t_{DP}} that Mary went to the movies with
 {t{DP}}?
- c. *_{[DP} Which friend] did you say [_{PP} with _{t_{DP}}] that Mary went to the
 movies _{t_{PP}}?
- (36) a. the famous rock [_{DP} pictures of which] I think _{t_{DP}} that Bill must have
 seen _{t_{DP}} before
- b. the famous rock [_{DP} which] I think _{t_{DP}} that Bill must have seen pictures
 of _{t_{DP}} before
- c. *the famous rock [_{DP} which] I think [_{DP} pictures of _{t_{DP}}] that Bill must
 have seen _{t_{DP}} before

We may take the noun to be the target of all movements that derive unmarked orders in the extended nominal projection, and construe movements of larger chunks of structure as instances of pied-piping. Cinque is quite explicit about this; indeed, it is hard to see what else could explain why movement is limited to subtrees containing the noun. With this in mind, consider again the structure in (11), in which material pied-piped by an initial step of movement (of Agr_YP to Spec, Agr_XP) is subsequently stranded (by movement of NP to Spec, Agr_WP). The obvious problem with this derivation is that it violates the constraint introduced above, which is not true of our more conservative analysis of the N-Dem-A-Num order. This, then, is a third

³⁴ Du Plessis (1977) claims that such derivations exist in Afrikaans, but the analysis is dubious according to Den Besten (2010), who analyzes the relevant data as involving parentheticals. Den Besten suggests that Du Plessis's analysis cannot account for the position of the verb in the examples involving putative intermediate stranding.

example of the SHCH clashing with an independently motivated restriction on movement.³⁵

Readers familiar with Cinque's paper may think that the problem is less serious than we suggest. After all, Cinque classifies the order that requires intermediate stranding (N-Dem-A-Num) as attested but possibly spurious. In view of this, we will take a closer look at the languages that display it: Pitjantjatjara, Nkore-Kiga, Noni, and Kĩitharaka. The latter two have the relevant order as an alternate to N-Dem-Num-A, which suggests that we should put these languages to one side. Bowe (1990: 29–54, 111, 146–150) claims that in Pitjantjatjara the order in question is the only admissible one. She does not illustrate this claim, but in Eckert & Hudson's (1988) textbook on Pitjantjatjara examples like those in (37) can be found. The morpheme glossed SubjT is an ergative case marker appearing at the end of a subject DP and repeated in case of apposition, as shown in (37c). Therefore, material to the left of this morpheme can safely be taken to belong to a single extended nominal projection. The examples in (37a) and (37b) establish the suborders N-Dem-A and N-A-Num, respectively. An example of the N-Dem-A-Num can be found in (37c), on the reasonable assumption that *many* behaves like a numeral. (Eckert & Hudson ([1988:130–134]) treat numerals and quantifiers as adjectives of quantity and give a single rule for positioning them among the nominal modifiers.)³⁶

- (37) a. Tjitji pala tjukutjuku -ngku -ni ungu.
 child that small -SubjT -me gave
 'That small child there gave (it) to me.' (Eckert & Hudson 1988:89)
- b. Kulata wara kutjara nyara mantjila!
 spear long two yonder get
 'Get the two long spears over there!' (Eckert & Hudson 1988:132)
- c. Tjitji tjuta -ngku katingu, tjitji panya pulka tjuta -ngku.
 child many -SubjT took child that.known big many -SubjT
 'The children took it, you know those big children.'
 (Eckert & Hudson 1988:139)

In conclusion, the existence of the N-Dem-A-Num order seems well motivated for Pitjantjatjara.

The last language mentioned by Cinque as having the N-Dem-A-Num order is Nkore-Kiga. This language has been studied even less than Pitjantjatjara, but it potentially provides an additional argument for the necessity of the stranding derivation within the antisymmetric framework. There appears to be only one source,

³⁵ Some analyses of quantifier float assume stranding of pied-piped material. Sportiche (1988), in particular, argues that quantifier and DP are generated as a constituent and that the quantifier can be stranded, not only in its base position but in any A-position through which the DP passes. However, there are several alternative accounts of quantifier float. Bošković's (2004) proposal comes very close to Sportiche's without allowing stranding of pied-piped material. Other authors have argued that floating quantifiers are base-generated as adverbs, rather than as part of the associated DP (see, for instance, Bobaljik 1995 and Janke & Neeleman 2012).

³⁶ The morphemes analyzed as demonstratives can stand alone. They are therefore not clitics and hence not subject to special ordering restrictions.

Taylor (1985), to which all claims about Nkore-Kiga can be traced.³⁷ Taylor (p. 55) characterizes word order in the Nkore-Kiga noun phrase as follows (we omit categories not relevant to the present discussion).

- (38) noun – demonstrative adjectives – pure adjectives/appositives – quantifiers – verbal adjectives

Some of the suborders mentioned in (38) are illustrated in the following example. (We have adjusted Taylor's gloss to do justice to the morphological complexity of the pure adjective *ekihango* and the verbal adjective *ekirikutukura*. We have also added *red* to the translation.)

- (39) ekitabó kyawe ekyo eki- hango ekimwe eki- riku- tukura
 book your that 7- large one 7- partic.contin- be.red
 ekiri aha meeza nikyo
 which.is on table itself
 'that selfsame single large red book of yours on the table'

Taylor's (p. 55) discussion of the order in the noun phrase clearly suggests that the order in (38) is the neutral order. It is not "rigidly adhered to," but it is "preferred." Taylor (p. 75) further explains that for pure adjectives the alternate N-Dem-Num-A serves to emphasize these elements. This order is therefore marked, and hence irrelevant to our concerns. Thus, as in the case of Pitjantjatjara, there is good evidence that N-Dem-A-Num is the neutral word order in Nkore-Kiga.

Of potentially great importance is Taylor's class of verbal adjectives, characterized as "stative verbs, which assume relative participial forms when used attributively and which are marked for one of two aspectual distinctions" (see Rijkhoff 1990:18). This characterization suggests that verbal adjectives might be taken to be reduced relative clauses (reduced in comparison to full relative clauses, which can be tensed).

Cinque notes in several places that reduced relative clauses occupy a position above numerals. If so, the Nkore-Kiga data provide an additional argument for the necessity of stranding derivations of the type in (11). To generate the observed word order, NP would have to roll up around A, Num, and the verbal adjective before being subextracted to its final position in front of Dem. No intermediate stranding is necessary under our account.

A similar argument might be based on the example from Moro in (40) (taken from Dryer 2007:39). The order of multiple adjectives has been observed to yield to a generalization reminiscent of Universal 20. Plank (2003:11–12), for example, claims that in prenominal position size adjectives predominantly precede color adjective, although after the noun both orders are found. This suggests the hierarchy $A_{\text{size}} > A_{\text{color}} > N$ (see Cinque 1994:96, Lu 1998:65, and d Scott 2002:114; see also Truswell

³⁷ Cinque bases his claims about Nkore-Kiga on Dryer (2007) and Lu (1998). Dryer (2007) cites Taylor (1985) as his source and Lu (1998) cites Rijkhoff (1990), who in turn cites Taylor (1985).

2009). If this is correct, an antisymmetric analysis of example (40) would require roll-up movement around the adjectives, followed by subsequent stranding.

- (40) maj- anda ildi irəjin l- amənu l- ogra
 man- PL this:NC₁₀.PL three:NC₁₀.PL NC₁₀.PL- black NC₁₀.PL- big
 these three big black men

There can be little doubt, then, that the SHCH necessitates stranding in intermediate positions. We may therefore conclude that on an SHCH-based approach to word order in the noun phrase, the ban on stranding of pied-piped material cannot be upheld, which leaves the data in (35) and (36) without an account. (Notice that this implies that the freezing principle and the CED must also be abandoned.)

Removing the ban on stranding of pied-piped material gives rise to some orders with peculiar properties. To see this, consider the representations in (41), in which adjectives are “peeled off” in subsequent steps of movement.

- (41) a. [NP [Dem [[_X A_{low} t_{NP}] Num [A_{high} t_X]]]]
 b. [[_Y NP A_{low}] [Dem [[_X A_{middle} t_Y] Num [A_{high} t_X]]]]

As is widely accepted, adjectives are part of a hierarchy that determines in what order they are combined with the noun phrase (Cinque 1994, Scott 2002, Valois 2006, Truswell 2009). The adjective that is left behind in (41a) must be combined with the noun phrase later than the adjective that is pied-piped. Therefore, if we consider the relative order of the adjectives in (41), the structures seem rightward ascending, but if we consider the relative order of Dem and Num, the structures seem rightward descending. It is possible to include a third adjective that is moved along with the NP on the final step of movement, as in (41b). This adjective would be yet lower on the adjectival hierarchy than the one that surfaces between Dem and Num.

Notice that the possibility of generating interspersed ascending and descending structures is not limited to the case at hand; for any five functional categories (numbered 1 to 5 from top to bottom) combined with a lexical head, L, a similar derivation leading to the order L-5-1-4-2-3 is available.³⁸ Our own theory makes this structure unavailable, because it violates the ban on stranding in intermediate positions.

To the best of our knowledge, there are no examples of this kind of interspersal of ascending and descending structure, whether in the nominal domain or elsewhere.

To sum up, we have argued in section 5.1 that there is no independent evidence for the additional structure required for SHCH-compatibility in Cinque’s analysis of the noun phrase. We have also demonstrated that the SHCH leads to an undesirable qualitative extension of the theory of movement with regard to antilocality, Attract Closest, and the ban on stranding of pied-piped material (which is itself implied both by the freezing principle and by the CED).

³⁸ Indeed, this possibility is exploited by Caha (2009); yet, the relevant orders do not surface in any of his examples.

5.3. *Loose Ends*

The two loose ends that we discuss in this subsection have to do with aspects of the research program inspired by the SHCH that our theory forces us to abandon. The first concerns the hypothesis that the hierarchical order of modifiers reduces to local selection between functional heads. We have to abandon this hypothesis because we treat adjectival modifiers as adjoined to NP. Therefore, there are no functional heads that act as hosts and regulate adjectival order through local selection. The second has to do with the linearization of syntactic structures, which can no longer be treated as an automatic reflex of asymmetric c-command. We discuss these two issues in turn.

There is already some work suggesting that the role of the functional heads in explaining hierarchical effects is somewhat superficial. Starke (2004) observes that on standard assumptions about projection and specifier-head agreement the information in the relevant functional head is present not only in the head itself but also in its specifier and in the spine of the tree (the set of nodes consisting of the lexical head and all nodes connecting it to the top node in its extended projection). A simplification of the standard theory can therefore be achieved by formulating the “functional sequence” as a restriction on the order in which information is introduced in the spine of the tree. If we allow specifiers to project, Starke argues, we can abandon the various functional heads hosting modifiers as well as the specifier-head agreement mechanism, while maintaining an outlook on hierarchical ordering equivalent to the theory based on local selection. An obvious alternative to this is to abandon projection from specifiers as well and to reformulate the functional sequence as a condition on the information contained in the sisters of nodes that make up the spine. On this view, order reduces to local c-command rather than local selection.

On the assumption that c-command determines scope, our suggested reformulation of the functional sequence is equivalent to a statement about local scope taking. What is attractive about this view is that scope is already part of linguistic theory. What is unattractive is that *local* scope is not. This suggests that one might try to capture the effects of the functional sequence purely in terms of regular scope, giving up the special notion of local scope. There is some evidence suggesting that this hypothesis is on the right track. First, as discussed in detail by Nilsen (2004), the idea of ordering through local selection predicts that the order of modifiers is transitive, although in fact there are examples of transitivity failures. Crucially, these can be captured in terms of the scopal properties of the modifiers involved. Second, the idea of a functional sequence is relativized to extended projections (for discussion, see Biskup 2010): a new functional sequence is started when an extended projection is merged with a lexical head. This would lead one to expect that there will not be any ordering effects across the boundaries of extended projections, contrary to fact. Cinque (1999:94–95) observes that within the extended verbal projection *no longer* is attached higher than *already*. Abels (2003b:109) gives the following examples to demonstrate that similar ordering effects are found even if the two adverbs are located in different extended projections:

- (42) a. It is already the case that he no longer goes to school.
 b. *It is no longer the case that he already goes to school.

Of course, it is often the case that no adverbial ordering effects are found across clauses; what is special about the examples in (42) is the fact that the higher predicate merely asserts the truth of its complement.

A similar case can be constructed in the nominal domain. As is well known, there is a certain class of constructions, exemplified by the gerund in English, in which hierarchical ordering effects span the lower verbal part and the higher nominal part of the structure (Jackendoff 1977 and much subsequent work; for a detailed recent study, see Borsley & Kornfilt 1999). For example, *continuous* is attached higher in the extended verbal projection than *fast*. This restriction carries over to nominalizations in Dutch, irrespective of whether they are realized as adverbs in the verbal part of the nominalization or adjectives in the nominal part. (The latter are unambiguously identified by a declensional schwa, see Bennis & Wehrmann 1990.)

- (43) a. het de voordeur voortdurend snel schuren
 the the front-door constantly quickly sanding
 ‘the constant quick sanding of the front-door’
- b. *het de voordeur snel voortdurend schuren
 the the front-door quickly constantly sanding
- c. het voortdurend-e snell-e de voordeur schuren
 the constant-DECL quick-DECL the front-door sanding
- d. *het snell-e voortdurend-e de voordeur schuren
 the quick-DECL constant-DECL the front-door sanding
- e. het voortdurend-e de voordeur snel schuren
 the constant-DECL the front-door quickly sanding
- f. *het snell-e de voordeur voortdurend schuren
 the quick-DECL the front-door constantly sanding

If the hierarchical ordering of the modifiers is determined by scope, there is a simple account for the data in (43): As the nominalizing head makes no relevant semantic contribution, the relative order of modifiers is unaffected by its presence or absence. However, if hierarchical ordering effects are a consequence of local selection, an account of the data in (43) must rely on a conspiracy theory. First of all, there must be a close match between nominal and verbal functional sequences, such that heads in one have identifiable correspondents in the other. Second, there must be a series of nominalizing heads such that each has a position in the nominal functional sequence that corresponds to the position in the verbal functional sequence of the category it selects. Given that nominalization can take place quite freely, there must be such a category-changing head for every level of the verbal functional sequence. Nothing in the theory of selection links the properties of the selecting head to the properties of the selected category. Therefore, this arrangement would be an accident.

In conclusion, it is true that our theory forces us to give up the idea that hierarchical ordering effects reduce to local selection, but there is evidence that this is necessary anyway.

We now turn to the second outstanding matter. On our proposal syntactic trees must be linearized through ordering statements that apply to local treelets consisting of a mother node and its daughters. For example, to linearize AP with respect to NP, a parameter of the following form is required (for similar proposals see Richards 2004, Fox & Pesetsky 2005, Kremers 2009).

(44) In the structure [_{NP} AP NP], order AP before/after NP.

We assume that ordering statements like (44) can mention properties of all three nodes in a binary-branching treelet.

This view differs from some preceding work in generative grammar. For example, early versions of X'-theory linearized structures per bar level but were insensitive to category (Lehmann 1973, Vennemann 1974). Later versions admitted sensitivity to the category of the head in order to allow for languages with mixed headedness. What these proposals have in common is that they refer to the mother node and its head daughter in formulating linearization statements. Additionally, there is work going back at least to Gazdar & Pullum 1981 and Gazdar et al. 1985, according to which linearization takes into account the category of both head and nonhead daughters in a local treelet. Finally, Falk (1983) combines these two strands of work and proposes that linearization rules must be sensitive to properties of the mother as well as those of its head and nonhead daughters. We accept this conclusion, with the proviso that, unlike Falk and much work in GPSG and HPSG, we assume phrase structure to be binary branching.

Part of the evidence supporting a system of linearization that can mention all three nodes in a binary branching treelet involves the placement of degree expressions in English. Consider the following paradigm.

- (45) a. more intelligent
 b. *intelligent more
 c. *enough intelligent
 d. intelligent enough

Neeleman et al. (2004) argue that *intelligent* is the projecting category in the structures in (45). This implies that in order to distinguish (45a,b) from (45c,d), the linearization rules must make reference to properties of nonhead daughters (in the case at hand, the properties of *more* vs. *enough*).³⁹ Of course, it could be that the degree expressions are the projecting category in (45), in which case the data given so far could be handled by linearization statements that mention properties of the head only: *more* would precede and *enough* would follow its complement. On this alternative view, however, it is still necessary for linearization rules to refer to properties of nonheads, as *enough* can precede prepositional phrases, as (46) shows.

³⁹ Notice that the reasoning does not change if *more* and *enough* are construed as the specifiers of an abstract degree head, because *more* would have to be a leftward and *enough* a rightward specifier.

- (46) a. enough into syntax
 b. into syntax enough

A system of linearization that allows reference to all three nodes in a binary branching treelet has considerably more points of variation than the versions of X'-theory mentioned earlier, but no more than the proposals based on the SHCH. For example, our proposal must allow specific ordering statements for Num and its sister, whereas in Cinque's proposal Agr_γP in (8) moves or fails to move to the specifier of Agr_XP (in overt syntax). Our proposal thus shares with SHCH-based work not only the necessity of referring to labels of nonterminal nodes but also the number of points of variation that must be assumed.⁴⁰

As an illustration, consider the placement of adjectives in Romance. In French and other Romance languages, there are adjectives that can only occur on one side of the noun whereas others are ordered more freely. Given that we argued that all adjectives are adjuncts to NP, we must capture the different behavior of the Romance adjectives by referring in the ordering statement to the class of the adjective, as that is the only information that distinguishes the treelets containing an adjectival modifier. In an SHCH-based system, it is unnecessary to refer to properties of the adjective in these cases, because the relevant parameters are expressed, as exemplified earlier, in terms of the agreement projections that dominate the functional projections in whose specifier the modifiers reside. In Cinque's analysis of the noun phrase, for example, movement parameters determining word order refer to the noun and the amount of material it pied-pipes. The patterns of adjectival placement in Romance must therefore be captured in terms of the functional structure that can or must be pied-piped by the noun. There is no direct reference to the adjective, nor can there be, because the adjective does not play any role in triggering the various movement processes that Cinque's analysis relies on. However, the points of variation allowed are identical.

The ability or inability to refer directly to properties of the modifier does matter for the generalizations that can be expressed under the proposal advanced here and its SHCH-based competitors. Suppose that a particular modifying function can be fulfilled by constituents that belong to different syntactic categories. In such a situation, our proposal allows ordering statements that generalize over the syntactic category rather than the semantic class of the modifier, but the SHCH-based theory does not. It would predict constituents with the same semantic functions to be ordered identically.⁴¹ A similar conclusion holds when we consider a situation in which two constituents belong to the same syntactic category but fulfill different semantic

⁴⁰ The fact that our theory makes available a large number of points of variation does not mean that every child acquiring every language has to access all of these points. It is more likely that more specific ordering statements are generated only when the data a child is confronted with cannot be captured by a more general ordering statement. The number of linear statements in the grammar can further be limited by allowing competition between them regulated by the elsewhere condition (for recent discussion, see Emonds 2009).

⁴¹ We are aware that variation in the order of different categories with the same semantic function can be captured under the SHCH by assigning them different (derived) positions (see, for example, Zwart's [1997] discussion of DP vs. CP complements in Dutch). This does not affect our claim that different categories in the same position cannot be linearized differently.

functions. On our proposal, it is possible that the linearization of the structure is sensitive to syntactic category, so that the relevant constituents are ordered by the same rule. This is impossible under the SHCH, because different semantic functions are expressed through different functional projections and it is these functional projections that determine order.

In fact, generalizations of the type that cannot be expressed under SHCH may exist. In Dutch, as in English, a number of different adverbial and argumental functions can be realized either as a PP or as an adverbial phrase or DP. Cutting across these functions is the generalization that prepositional phrases can appear either pre- or postverbally (Koster 1974, 2000; Barbiers 1995; Ackema & Neeleman 2002), whereas adverbs and DPs are rigidly preverbal. We take the existence of such generalizations to be further indication that the proposals defended here may be on the right track.⁴²

6. Concluding Remarks

Two main conclusions can be drawn from the discussion in this paper. First, the claim that base-generated structures follow the SHCH (which is usually taken to follow from Kayne's [1994] Linear Correspondence Axiom) is empirically vacuous, at least within the nominal domain: Given the assumptions shared by antisymmetric theories and the theory advanced here, adding the SHCH to the system does not give rise to testable predictions. This is because the structures allowed by Cinque's (2005) LCA-based theory are identical in gross constituency to those generated by our more conservative alternative. Although we cannot demonstrate this here, this conclusion holds more generally of competing symmetric and SHCH-based analyses.

Second, to capture the typological patterns uncovered by Cinque, (certain types of) movement must be exclusively leftward. Although a ban on rightward movement was originally argued to follow from the LCA, we have shown that, in fact, it does not. Every rightward-movement structure can be paired with an LCA-compatible remnant-movement structure that shares its gross constituency.

These conclusions lead us to reject the LCA, especially in view of evidence that the LCA stands in the way of a restrictive theory of movement. However, whether we reject the LCA or not, the question presents itself why movement in the nominal domain should be leftward.

We do not think that a syntactic explanation can be given, mainly because there is little if any evidence that linear order plays a role in syntax. We therefore believe that an explanation should be sought in a component of the language faculty for which left–right asymmetries are independently motivated. One possibility is to develop an account that relies on the linearization of syntactic structures at PF.⁴³

⁴² Two qualifications are in order. First, Barbiers (1995) argues that there are no properly argumental PPs in Dutch. Second, resultative PPs must precede the verb (or its trace).

⁴³ Several authors have adopted the LCA but reinterpreted it as rule of linearization that operates at the PF interface (see Chomsky 1995a, Nunes 2004, Epstein et al. 1998, Moro 1997). It is possible that a weaker version of these theories covering only the case of movement can be developed.

The formulation of the required rule depends on what theory of movement is adopted. On a theory exploiting a mechanism like the slash-feature in HPSG and GPSG, the rule is trivial: Junctures in which a movement dependency is resolved (i.e., where one of the daughters is the filler) are linearized with the category looking for a filler rightmost. Under theories without slashed categories some complications arise, because neither the moved category nor the category moved out of wear this information on their sleeves. It would take us too far afield to discuss how this issue can be resolved.

Another possibility would be to attribute asymmetries in movement to the parser. This is the line taken in Ackema & Neeleman 2002 and developed in different terms in Abels & Neeleman 2006–2007 (see also Kremers 2009). The basis for a parsing approach to linear asymmetries in movement is the fact that the parser needs to recover hierarchical structures from input strings that are presented to it incrementally. In other words, there is an inherent asymmetry in the parsing process: bits of the input presented to the parser earlier on are associated with a structure before substrings presented later.

This inherent asymmetry has important consequences for how movement is parsed. Crucially, traces are copies of their antecedents.⁴⁴ This implies that the parser cannot insert a “trace”, unless it has previously identified an antecedent (the category that provides the original for the copy). This implication of the copy theory of movement is known in the literature as the filler-driven strategy to the resolution of movement dependencies: the parsing of movement dependencies requires the identification of a category as having moved prior to the insertion of a copy (see Frazier 1987, 1993; Frazier & Flores d’Arcais 1989; Gibson 1998)).

It follows from this that leftward and rightward movement are different with respect to parsing. If the filler precedes the gap, the copy can be inserted as the representation is being built. If the filler follows the gap, on the other hand, the copy must be inserted in an already existing representation. Under certain circumstances this is hard or impossible, because the representation to which the parser has committed would have to be altered considerably in order to accommodate the copy. Abels & Neeleman (2006–2007, version 1) show that exactly this situation obtains in case an incomplete extended projection moves rightward. This matches the profile of movement that must be excluded in the extended nominal projection.⁴⁵

The asymmetry of syntax is located in movement rather than phrase structure. The asymmetry of movement may be located in syntax-external systems.

⁴⁴ Any implementation of this idea will suffice. Traces can be complete copies (Chomsky 1993), partial copies (Neeleman & van de Koot 2010), or identical to their antecedent (as in the multidominance theory of movement; see Gärtner 2002). We speak of copies here for simplicity only.

⁴⁵ As discussed earlier, even if movement were exclusively leftward, remnant movement can create structures in which a gap precedes the associated filler. Such structures should be parsable, and indeed it can be shown that the same set of principles that rule out rightward movement of the head in the extended nominal projection allow insertion of copies in constituents that have undergone remnant movement. We develop this argument in work in progress, where we also show that certain restrictions on remnant movement that have escaped syntactic analysis fall out from the principles of parsing that we adopt.

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