The fundamental left-right asymmetry in the Germanic verb cluster

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Abstract

In recent years, G. Cinque has observed an asymmetry in the possible ordering of dependents of a lexical head before versus after the head. A reflection on some of the concepts needed to develop Cinque's ideas into a theory of neutral word order reveals that dependents need to treated separately by class. The resulting system is applied to the problem of word order in the Germanic verb cluster. It is shown that there is an extremely close match between theoretically derived expectations for clusters made up of auxiliaries, modals, causative 'let', a main verb, and verbal particles. The facts point to the action of Cinque's fundamental left-right asymmetry in language in the realm of the verb cluster. At the same time, not all verb clusters fall under Cinque's generalization, which, therefore, argues against treating all cases of restructuring uniformly.
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1 Introduction

An ultimate theory of the syntax of natural languages must contain a theory of word order, specifically, of linguistically possible and impossible hierarchy-order relations. Cinque 2005 presents a theory in this sense of neutral, unmarked word orders within the extended projection of the noun (DP). The theory is descriptively extremely successful in that, among the elements it applies to, it allows the neutral word orders within DP that are actually attested and disallows those that

are not.[1] The theory is also explanatory in the sense of Chomsky 1965: variation is confined strictly to readily observable ordering properties which can be used straightforwardly to set parameters (see Abels 2015 for discussion). Cinque's model of neutral word order in the DP is therefore a promising blueprint for a general theory of neutral word order. This paper discusses the concepts needed to generalize Cinque's theory and situates word order variation in the Germanic verb cluster in the context of a Cinque-style general theory of neutral word order.

Abels and Neeleman 2012b show that, although Cinque's theory is formulated assuming Kayne's (1994) Linear Correspondence Axiom and a cartographic perspective on structures, it effectively relies on the following assumptions: the hierarchy of nominal modifiers is universally fixed; phrase structures obey the non-tangling condition; movements deriving neutral orders within DP end in positions strictly c-commanding their traces, are leftward, and affect only constituents containing the lexical noun. This is a promising blueprint for a general theory of unmarked word order because it allows for a straightforward generalization as follows: Phrase structure obeys the non-tangling condition; movements deriving unmarked word order within the extended projection of a lexical head L end in positions strictly c-commanding the trace, are leftward, and affect only constituents containing L.[2] The specific hierarchical arrangement of elements remains the only parochial assumption within the theory. Once the hierarchical arrangement is known, there is a prediction about the possible and impossible orders of elements. While it may seem obvious how to go from here to a general theory of unmarked word order, section 2 will show that, in this overly simplistic form, the theory is too strong and that satellites of a of a head need to be grouped into distinct classes to be able to generalize Cinque's basic insight in a descriptively adequate and theoretically pleasing way. We can then profitably apply the class-based theory to verb clusters.

Verb clusters were chosen as the target of analysis here for a number of reasons. First, they present a genuine problem of word order; there is a bewildering variability in cluster orders across the germanic languages and dialects while the meaning expressed is constant. Second, the data are very rich and well documented (Barbiers, Auwera, et al. 2008; Dubenion-Smith 2010; Eroms, Röder, and Spannbauer-Pollmann 2006; Kaufmann 2007; Louden 2011; Patocka 1997; Seiler 2004; Wurmbrand 2006, to appear). The close relatedness of the germanic languages simplifies the analytic task, since far fewer potentially interfering differences between the languages and dialects need to be controlled than is the case in a typological study like Cinque's. Third, the traditional analysis of verb clusters in West Germanic assumes that clause union or restructuring is a precondition for verb

[1] Dryer, 2009 disputes this. See Cinque, 2014b for a convincing empirical rebuttal.

[2] Many of these assumptions are fairly commonly held assumptions in syntactic theory anyway.

cluster formation so that all verbs in a cluster are within the same CP. CPs are usually viewed as the maximally extended projection of lexical verbs; just like the DPs, studied by Cinque, are the maximally extended projection of lexical nouns. Finally, verb clusters have eluded a proper theoretical understanding despite the intensive scrutiny they have received (see Wurmbrand 2006, to appear), which means that any constraints on the analysis of verb clusters we may derive from more general theoretical considerations will place welcome boundary conditions on our theorizing about clusters.

Successful integration of verb clusters (or a coherent subset of them) into a general theory of word order along the lines sketched above would, concretely, shed light on the following vexed problems. Wurmbrand, 2006, to appear shows that the question of what moves in cluster formation and in which direction is far from settled. If it can be shown that (a coherent subset of) verb clusters with neutral word order fall under a theory that disallows rightward movement and movement of a constituent excluding the lexical head, as I will argue is the case, then neutral cluster orders must be derived without recourse to those devices. A second long-standing problem (see Cinque 2006b; Öhlschläger 1989; Reis 2001; Wurmbrand 1998 a.o.) concerns the lexical versus functional nature of the verbs involved in restructuring and verb clusters. For an item to fall under the general theory of word order suggested by Cinque's work, that item has to be functional. We will see that this is true for auxiliaries and modals, which must therefore be categorized as functional, while perception verbs, verbs of motion, phase verbs and other clustering verbs come out as lexical.[3]

The rest of the paper is structured as follows. The next section contains the conceptual heart of the paper. It goes over Cinque's generalization concerning pre-head vs. post-head asymmetries and introduces Abels and Neeleman's version of Cinque's theory of Greenberg's Universal 20. Echoing a point made repeatedly in commentary on Cinque 1999 (Bobaljik 1999; Nilsen 2003; Svenonius 2002), I show that Cinque's generalization is false as formulated and leads to paradoxes. The problem is traced to a failure to relativize the generalization according to morphosyntactic classes. A suitable reformulation is attempted. Section 3 evaluates the resulting theory against data from three-verb clusters and concludes that clusters made up of auxiliaries, modals, causatives, and a single lexical verb neatly fit into the theory, while clusters involving an expanded set of verbs do not. The section also suggests integrating separable prefixes into the system. Section 4 expands the empirical investigation to four element clusters made up of auxiliaries, modals, causatives, and a lexical verb. The data lend further support to the the-

[3]Verb clusters are famously recursive (Huybregts 1976; Shieber 1985). A full integration of all clusters into Cinque's theory would thus have undermined the commonly held, essentially cartographic, view of an extended projection as a linear sequence. This challenge is avoided because the verbs in question are not categorized as functional.

ory. Section 5 concludes with a discussion of the findings and the prospects of and challenges for a general theory of unmarked word order.

2 Elements of a universal theory of neutral word order

2.1 The fundamental left-right asymmetry

Example (1) is a simplified illustration of the content of Greenberg's (1963) universal 20, which Cinque's theory of word order takes as its starting point. There are four elements here: the noun (N), a descriptive adjective (A), a numeral (Num), and a demonstrative (Dem). They are shown in four (of the 24 logically possible) orders; three of these are attested as the neutral word order in some languages, the forth, marked with an asterisk, is not.

(1) a. Dem Num A N
b. N A Num Dem
c. N Dem Num A
d. *A Num Dem N

Though inaccurate in some of its details, Greenberg's formulation of the word order universal[4] contains the crucial observation that there is a linear asymmetry. Generalizing from the particular categories, we might say that N is the lexical head of its extended projection and that adjectives, numerals, and demonstratives are, for lack of a better term, satellites of the lexical head within its extended projection. Put in these terms, Greenberg's observation says that satellites preceding the lexical head come in a cross-linguistically fixed neutral order while the neutral order allows for cross-linguistic variation when the satellites follow the lexical head. As is easy to verify using partial DP ellipsis as a diagnostic, the pre-head order directly reflects the hierarchical organization of the satellites in that satellites further to the left are hierarchically higher than and c-command those further to the right (Abels 2015).

Cinque, 2009 contains the observation in a general form, abstracting away from specific categories. He discusses fair number of cases that answer to the description of rigid ordering of satellites (S_1–S_3 in (2)) before the lexical head (L_4 in (2)) and variable ordering after it.

(2) a. S_1 S_2 S_3 L_4

[4]Universal 20: When any or all of the items (demonstrative, numeral, and descriptive adjective) precede the noun, they are always found in that order. If they follow, the order is either the same or its exact opposite (Greenberg 1963, p. 87).

b. L_4 S_3 S_2 S_1
c. L_4 S_1 S_2 S_3
d. *S_3 S_2 S_1 L_4

With the noun as the lexical head, Cinque recapitulates in detail the discussion Universal 20 from from Cinque 2005. He suggests that if we take S_1–S_3 to be attributive adjectives of size, color, and nationality, respectively, the same patterns obtains and that the same is true if we take directional prepositions and locative prepositions to be S_1 and S_2. He shows that we can also take the verb to be the relevant lexical head. In this realm he recapitulates in detail the discussion from Cinque 2014a[5], where mood, tense, and aspect function as S_1–S_3. He briefly suggests that the ordering of circumstantial PPs of time (S_1), place (S_2), and manner (S_3) follow the same pattern and that the same result obtains if we take S_1–S_3 to be adverbs (using 'no longer', 'always', and 'completely'). Without going into further detail but citing research on verb clusters, he suggests that "auxiliary and restructuring (or clause union) verbs (Cinque 2006b)" form part of the same pattern with respect to the lexical verb (Cinque 2009, p. 168). That is, he takes auxiliary and restructuring verbs to represent the lexical verb's satellites, calling all of them uniformly 'aux' in the one structure provided. Clause union and restructuring will be studied in detail in this paper.

All of the above cases, Cinque suggests, give rise to the pattern in (2) and should be given the same account: The elements called the satellites here are treated as functional heads or their specifiers which, in accord with Cinque's cartographic outloook, are assumed to occupy fixed positions in a cross-linguistically rigid underlying hierarchy which directly produces the order in (2a). The remaining possible orders are derived through movement operations while the impossible ones are excluded through (simple) constraints imposed on such movements.

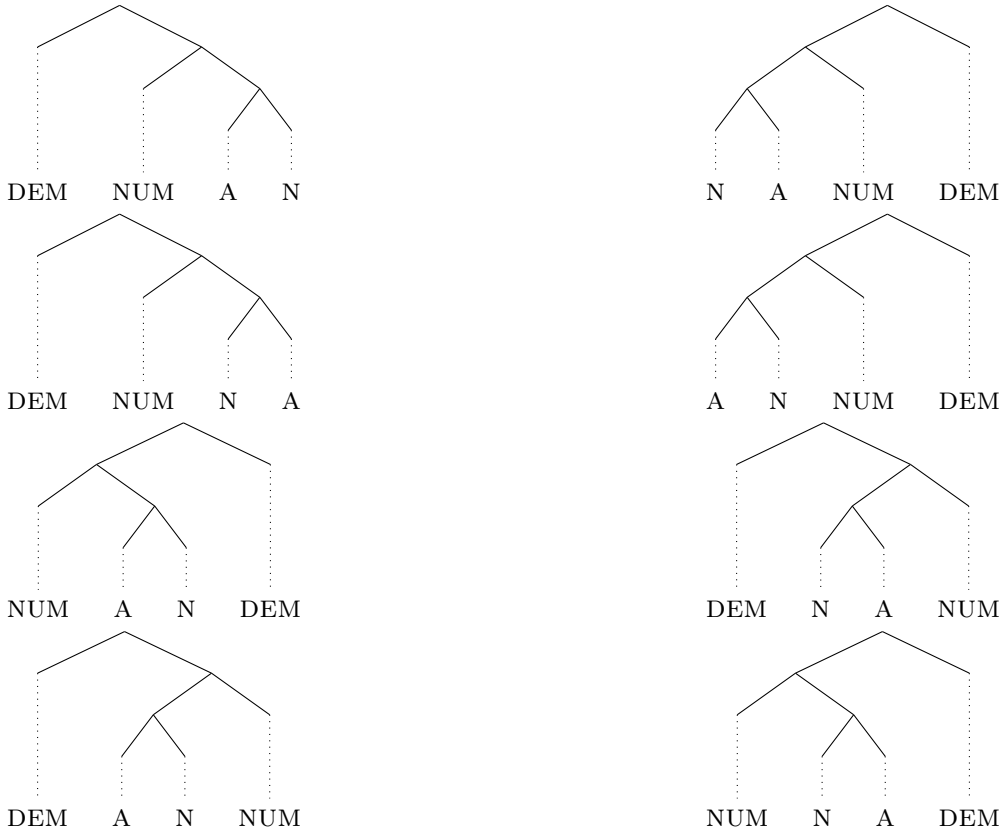
Although in his account of Universal 20 and its exceptions Cinque adopts Kayne's (1994) Linear Correspondence Axiom, which necessitates specific assumptions about the X-bar theoretic status and syntax of what are assumed to be functional heads and phrasal modifiers, Abels and Neeleman 2012b have shown that the account follows already from the following substantially weaker assumptions: (i) The underlying hierarchical arrangement of demonstrative, numeral, descriptive adjective, and noun within the extended projection of the noun is fixed in such a way that the demonstrative c-commands the remaining three elements, the numeral c-commands the adjective and the noun, and the adjective c-commands the noun. (ii) Phrase structure obeys the non-tangling condition. (iii) All movement involved in deriving unmarked word orders must move a constituent containing the lexical head. (iv) All such movements land in a position within the extended

[5]Cinque 2014a was originally written and published as a working paper in 2006.

projection of the noun so that the moved element strictly c-commands (in the sense of sister containment) the launching site of movement.[6] And (v), all such movements must be leftward.[7]

The first two assumptions allow the generation of eight orders, all of which are simply alternate linearizations of the same underlying hierarchical structure.

(3)

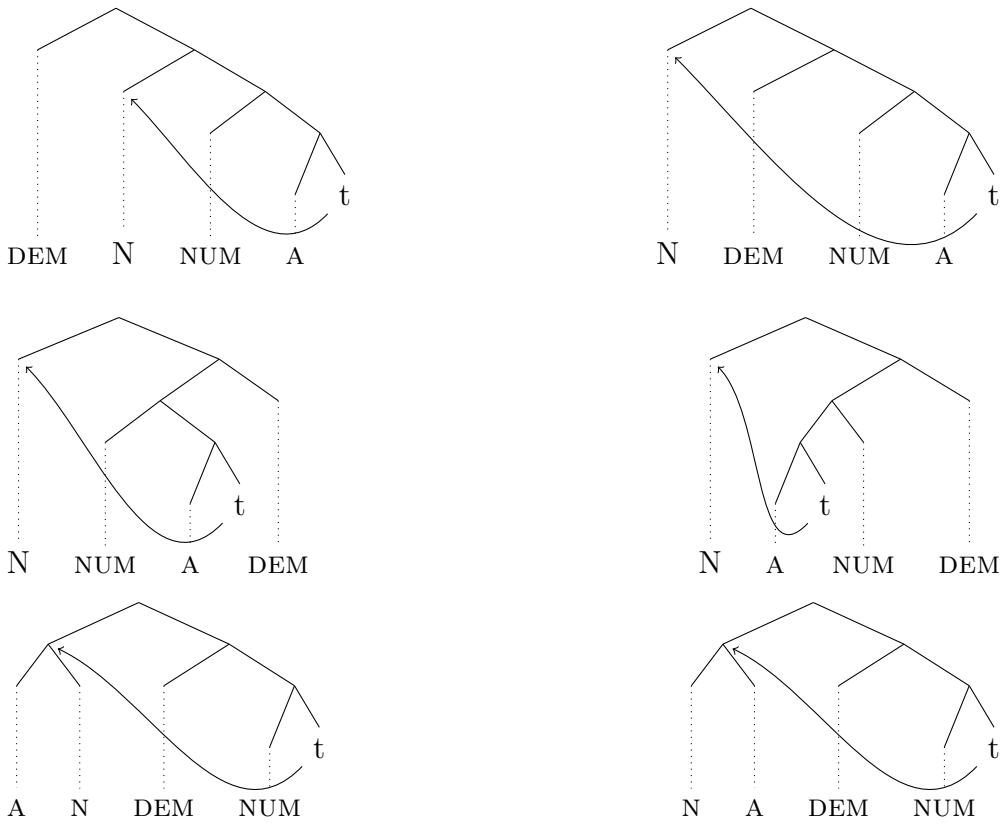


The orders given in (1a) and (1b) are amongst the eight orders above. The remaining six are also attested as the unmarked orders in the languages of the world. The constrained set of movement operations allowed by assumptions (iii)–(v) add the possibility of a further six orders, all of which are, again, attested.

[6]This condition might follow independently from Chomsky's (1995) Extension Condition or from the Inclusiveness Condition, as in Neeleman and van de Koot 2002.

[7]See Abels and Neeleman 2012a for discussion of whether this condition needs to be imposed within the grammar or follows from processing considerations.

(4)

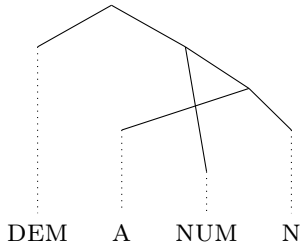


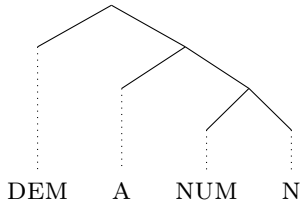
This brings the total of attested orders to 14 out of the logically possible 4!=24. The system allows no further order to be derived and it therefore explains the fact that the remaining 10 orders do not occur as the unmarked order.[8]

Consider for example the order DEM A NUM N. It is not attested as an unmarked order according to Cinque 2005 (see footnote 1) and it is disallowed by Greenberg's formulation of universal 20. That it cannot be derived in the system outlined above becomes obvious by considering the fact that (3) shows all the possible orders generated without movement. The target order DEM A NUM Nis not among the eight shown in (3). Thus, in order to derive it without movement, either the non-tangling condition would have to be violated or the underlying hierarchy altered:

[8]Somali has the pairwise orders N DEM, N A, NUM N, the triples N DEM A, NUM N A, and—surprisingly—NUM DEM N. All four elements give rise to the order NUM DEM N A(Adam 2012). The correct analysis for this pattern is not clear. It may be that numerals are essentially nouns in the language or that demonstratives have an independent second position requirement that is driving the pattern.

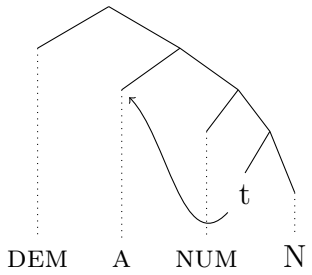
(5)

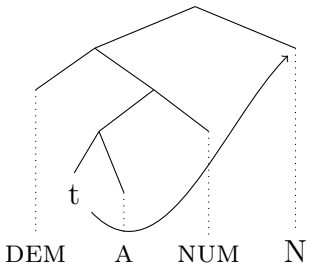




Alternatively, DEM A NUM Ncould be movement derived, as illustrated in the following structures, the first of which violates condition (iii) and the second of which violates condition (v).

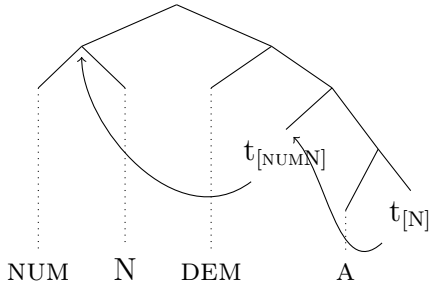
(6)





A maybe more interesting case is presented by the order NUM N DEM A, which is allowed under Greenberg's formulation of Universal 20 but is in fact unattested and correctly ruled out by the theory. This order has an obvious derivation violating the c-command condition (iv) and nothing else.

(7)



Under this derivation depicted below, N first moves to NUM in what looks like a head-adjunction pattern, and then pied-pipes NUM around DEM in the second step of movement.[9]

[9]For details on how the remaining orders are excluded, the reader is referred to Abels and Neeleman 2012b; Cinque 2005.

2.2 It's a class society

In order to arrive at a more general theory of neutral word order from the above sketch of Abels and Neeleman's rendition of Cinque's account of Universal 20 and its exceptions, we need to extract the distinctions and operative concepts from this theory. The most fundamental distinction is that between the lexical head and its satellites. The distinction was needed to formulate the generalization and recurs in the theory as the ban against moving constituents not containing the lexical head. The second crucial ingredient is the notion of a syntactic hierarchy in which all satellites c-command the lexical head and are in asymmetric c-command relations with each other. For the head-final order, asymmetric c-command dictates order directly; but the hierarchy is crucially involved in constraining all directly generated orders, (3), and in the statement of what can and cannot move. In fact, given a a lexical head with a number of satellites whose underlying hierarchical arrangement is known, we can easily compute whether a particular linear sequencing of these elements is or is not compatible with the theory. This point will become important below. When Cinque speaks of functional heads and modifiers 'associated' with a lexical head, he implicitly invokes a domain, which I have equated with the lexical head's extended projection. It is the domain property that explains why 'the happy students from these countries' with the order A_{happy} $\text{DEM}_{\text{these}}$ $\text{N}_{\text{countries}}$ does not violate Universal 20: the adjective does not belong to the same domain as the demonstrative. While this is fairly obvious so far, we also need to figure out what the relevant class of satellites is. Cinque 2009, p. 165 himself says that his "article discusses a pervasive left-right asymmetry found in the order of modifiers and functional heads associated with distinct lexical heads." Modifiers and functional heads mainly exclude arguments. The following moves are implicit here: first, satellites are partitioned into classes; second, it is claimed that there are two relevant classes, one made up of modifiers and functional heads and one of the rest (arguments); third, it is suggested that modifiers and functional heads do and arguments do not fall under Cinque's generalization. This section investigates these claims. While the partitioning of satellites into classes seems to be necessary, the remaining two claims do not survive scrutiny.

As we just saw, Cinque's formulation in terms of modifiers and functional heads excludes one important class of a head's satellites: the arguments. While Cinque does not discuss this explicitly, there are theoretical and empirical grounds for excluding arguments. On the theoretical side, there is, of course, a well-established analytic tradition invoking movement of arguments without the lexical head to position them relative to the head and other elements in the head's extended projection (passive subject, unaccusative subjects, VP-internal subject hypothesis, raising of agents and patients in event nominals,…). Such analyses are incompatible with the restriction that in the derivation of neutral word order nothing moves

except as part of a constituent containing the lexical head.

In addition to these analytic considerations, there are also empirical reasons to exclude arguments. By a number of well-established tests, arguments underlying occupy a position in the immediate vicinity of the lexical head. For objects this is the complement position. A standard argument for this analysis is based on examples like the one in (8).

(8) a. Das Buch lesen hätte er nicht sollen.
the book read had he not should
He shouldn't have read the book.

b. Bestätigen, dass Fritz schwimmen kann, musst du mindestens
certify that Fritz swim can must you at.least
können
can
You must at least be able to certify that Fritz can swim.

The examples show that the object (a DP in (8a) and a CP in (8b)) can be topicalized together with the lexical verb to the exclusion of the modals. Against the background of the V2 property of German, this justifies a hierarchical arrangement whereby the object is more closely related to the verb than the non-finite modal ('sollen' in (8a) and 'können' in (8b)), which, in turn, is more closely associated with the verb than the finite verb ('hätte' in (8a) and 'musst' in (8b)): [$\text{Aux}_1^{+\text{fin}}$ [$\text{modal}_2^{\text{fin}}$ [(DP_3) V_4 (CP_3)]]]. Now observe the positioning of the DP and CP arguments of the same verbs in the following examples, which represent neutral word order:

(9) a. … dass er das Buch nicht hätte lesen sollen.
that he the book not had read should
…that he shouldn't have read the book

b. … dass du mindestens bestätigen können musst, dass Fritz
that you at.least certify can must that Fritz
schwimmen kann
swim can
…that you must at least be able to certify that Fritz can swim

According to the hierarchy of satellites given above, (9a) represents the order S_3 S_1 L_4 S_2 and (9b) – the order L_4 S_2 S_1 S_3. Neither can be derived in Cinque's 2005 and Abels and Neeleman's 2012 system. The examples in (9) would necessitate hierarchical positions for the DP and CP objects that are above the finite verb, contradicting the conclusion reached on the basis of (8).[10]

[10]Similar issues arise within DP. See Adger, 2013; Belk and Neeleman, 2015.

Empirically it is therefore clear that auxiliaries and arguments need to be placed in different classes. Cinque achieves this by removing arguments from the system completely.

The discussion above has shown that in order to be descriptively adequate, the theory must distinguish between different classes of satellites. We also saw that Cinque, implicitly, makes a two-way distinction between functional heads and modifiers on the one hand and arguments on the other hand. This is a natural move given Cinque's cartographic outlook on syntax. All functional heads are assumed to be arranged in a universally fixed sequence and all modifiers are introduced as specifier of such (often abstract) heads. However, the attentive reader will no doubt have noticed that the classes of elements used by Cinque to exemplify the generalization were much smaller and seemed very homogenous: For the most part, the illustrations pick out morphosyntactically coherent classes such as adverbs, PPs, and auxiliaries. The expectation of the theory is that there should be no interesting interactions between these classes — all are functional heads or their specifiers after all. Mixing the smaller classes used for illustrative purposes should therefore be innocuous. Given that the main focus of this paper is on the verb cluster, we will briefly look at interactions between the positioning of various cluster-forming verbs and other elements used by Cinque to illustrate his generalization. We will discover that mixing morphosyntactic classes is not innocuous.

Recall that Cinque 2009 mentions both auxiliary verbs and adverbs to illustrate his generalization. Both occur, as heads and modifiers, respectively, in the extended projection of the verb. We should therefore be able to put them in a single hierarchy. Any such attempt predicts that the relative order of auxiliaries and adverbs to the left of the lexical head is fixed. This prediction, it turns out, runs into serious problems. The standard German VP-topicalization example in (10a) indicates that the manner adverb 'beautifully' forms a constituent with the verb to the exclusion of the modal and the auxiliary. The same conclusion is suggested by the Zürich German example in (10b) (Martin Salzmann, p.c.), where the auxiliary, modal, and adverb precede the verb in that order. However, both the standard German (10c) and the standard Dutch (10d) (Ad Neeleman, p.c.) require the adverb to be hierarchically higher than the auxiliary.

(10) a. Schön singen hat er früher können
beautifully sing has he formerly can
He formerly used to be able to sing beautifully.

b. dass er früener hät chöne schöön singe
the he formerly has can beautifully sing
that he used to be able to sing beautifully

c. dass er früher schön hat singen können
that he formerly beautifully has sing can
d. dat hij vroeger prachtig heeft kunnen zingen
that he formerly beautifully has can sing

The problem we run into here is reminiscent of difficulties for Cinque's 1999 attempt to integrate adverbs and auxiliaries into a single linear hierarchy pointed out in Bobaljik 1999; Nilsen 2003; Svenonius 2002.[11]

What we observed in the previous paragraph concerning adverbs carries over to PPs. They are mentioned along with auxiliaries by Cinque as illustrative of his generalization. By cartographic reasoning, it should be possible to integrate both classes into a single hierarchy. We therefore expect a consistent relative order of auxiliaries and PPs to the left of the lexical head and this ordering must reflect the unique hierarchy. This expectation is not met.

(11) a. In jedem Saal singen hat er früher können.
in every hall sing has he formerly can
He used to be able to sing in the concert hall.
b. dass er früener hät chöne i jedem Saal singe
that he formerly has can in every hall sing
that he used to be able to sing in every (concert) hall
c. dass er früher in jedem Saal hat singen können
that he formerly in every hall has sing can
d. dat hij vroeger in elke zaal heeft kunnen zingen
that he formerly in every hall has can sing

As before, the topicalization data from standard German, (11a), suggests attaching the PP to VP below the modals. Zürich German, (11b), confirms this structure. But the standard German, (11c), and standard Dutch, (11d), examples suggest attaching the PP above the modal and the auxiliary. The situation is overall similar to that observed in Bobaljik 1999; Nilsen 2003; Svenonius 2002: When the morphosyntactic classes are looked at in isolation, they organize themselves into a neat hierarchy. The model leads to paradoxes when we try to integrate the classes with each other.

A more systematic study would investigate further across-class orderings. Such a study would also need to evaluate empirically how the various within-class orders

[11]The argument given here is quite different in its details from those in Bobaljik 1999; Nilsen 2003; Svenonius 2002, because the assumptions about what can move and how are very different when we compare Cinque 1999 with Cinque 2005, 2009. Also, the current argument involves unmarked word orders, while no such constraint was required for the arguments in Bobaljik 1999; Nilsen 2003; Svenonius 2002.

interact with each other.[12] I will not undertake this task here, instead confining myself to the conclusion that Cinque's generalization about word order relative to the lexical head is well supported within a given class but runs into severe trouble when data mixing classes is taken into account.

With the insight that Cinque's generalization must be restricted to coherent classes in the background, we can speculate that Cinque's exclusion of arguments might have been premature. Consider the relative ordering of subject, object, and verb. According to WALS (Haspelmath et al. 2005) of the six logically possible orders SOV, SVO, and VSO are common. VOS is rare, OVS extremely rare, and OSV is virtually unattested. If we take the underlying hierarchy to be [S [O V]] with S and O satellites of the lexical verb, we would expect five orders to be possible and one to be impossible: OSV. The data generally go in the right direction, though languages with reported OSV order would need to be investigated carefully to see whether, for example, S and O are members of the same or of different classes in these languages. If one were a DP and the other a PP, for example, we might expect the possibility of OSV orders. Pearson 2000 reports that when we look at double object constructions across languages, there is only one unmarked order in OV languages and two in VO languages.

(12) a. IO DO V
b. V IO DO
c. V DO IO
d. *DO IO V

This generalization holds only when both objects are morphosyntactically similar, that is, in double object constructions rather than *to*-datives. Assuming the underlying hierarchy to be [IO [DO V]], the reportedly impossible order is theoretically disallowed. Once we restrict our attention to morphosyntactically similarly represented arguments, it seems possible that even arguments might fall under Cinque's generalization after all.

2.3 A formulation

The discussion in the previous subsection has shown that Cinque's word order generalization must be relativized to different classes of satellites. Cinque's own theory recognizes this necessity, implicitly, but only introduces two different classes: arguments and everything else. We have seen that this theoretical move is problematic,

[12] Bobaljik 1999 likens the interaction of the auxiliary and the adverb classes to a shuffling together of two decks of cards. Each deck preserves its relative order but with no pre-established order across decks. This may be an apt description of what happens before the lexical head across classes, but things are bound to be more complex in the more variable post-head domain.

because it does not eliminate incorrect (paradoxical) cross-category interactions; smaller categories are necessary. We have also seen the conclusions concerning arguments might be rash. They might yet turn out to be internally more well-behaved and not to warrant exclusion.

We can now give a provisional statement of the theory as follows. Let L_n be a lexical head and $S_{1...n-1}$ dependents of L_n such that

- all s_i are members of the same morphosyntactic class
- all s_i occur in the extended projection of L_n
- for all pairs S_j, S_{j+1}, S_j is hierarchically more prominent (scope, constituency, selection, government,...) than S_{j+1}

then possible neutral orders of S_1 ...S_{n-1} L_n are all those orders given by flexibly linearizing structure [S_1 [S_2 ...[S_{n-1} L_n] ...]] without violating the non-tangling condition and by moving L_n or constituents containing L_n to strictly c-commanding positions and to the left.

The number of possible orders thus generable is given by the following formula:

(13) $$f(0) = 1$$
$$f(n) = \sum_{i=1}^{n} f(i-1)f(n-i)$$

Zero elements can be ordered in one way. One element can be ordered in one way. Two elements can be ordered in two ways, three elements – in five, four – in fourteen, and 10 in 16,796 ways. The number of orders admissible by this theory grows very fast (faster than e^n) but still much more slowly than the space of logically possible orders ($n!$), which amounts to 39,916,800 when n=10.

3 Three-element clusters

As explained in the introduction, verb clusters were chosen for this study because they present a long-standing problem of word order. Verb clusters involve non-finite embedding with clause-union effects. These effects are often modeled using the assumption that the restructured infinitives are somehow deficient or incomplete (not full CPs) and might therefore be taken to form a single extended projection. This would allow us to treat them in terms of the theory formulated at the end of the last section. The investigation promises to turn up evidence that bears on the following questions: Does restructuring/clause union go hand in hand with the word order restrictions from the general theory of unmarked word order? If not, is there a type of (a degree of) restructuring that does? Can all restructuring verbs be viewed as non-lexical, that is, as functional satellites of the

most deeply embedded lexical verb of the cluster? If not, which ones can?

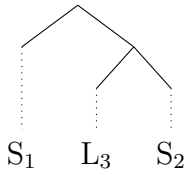
The formulation of the the theory at the end of the last section allows us to check whether the order of a given set of elements falls within the theoretically available range, as long as we know what the hierarchical arrangement of the elements is. We expect it to fall within this range, if these elements are satellites of the same lexical head and are members of the same class. For the initial exploration of verb clusters in the first part of this section, I will remain agnostic on the issue of what counts as a satellite and what counts as a separate lexical head, though cases of clear clause-level complementation that show no signs of clause union, restructuring, or coherence will be excluded from the start. Such structures pattern with example (9b). The verbs in such structures are not satellites of each other and CPs are in a class different from verbs. I will initially assume that verbs, lexical or otherwise, are all members of the same class. The question of (underlying) hierarchical organization of the verbs is usually not contentious. I will follow the general assumption that a verbs needs to c-command another to determine its form,[13] that the relative scope of verbs is another diagnostic for hierarchical arrangement, as is the ability of a particular group of verbs to appear in the prefield position, before the finite verb, in a verb-second clause. The finite verb, if there is one, is always the highest. These diagnostics generally give the same results and I am not aware of any serious disagreements about this in the literature.[14] I will follow common practice (going back to Bech) and number the verbs by hierarchical prominence. Thus, the English example 'that he might$_1$ have$_2$ been$_3$ seen$_4$' exhibits the 1-2-3-4 order. Its German counterpart 'dass er gesehen$_4$ worden$_3$ sein$_2$ könnte$_1$' – the opposite 4-3-2-1 order.

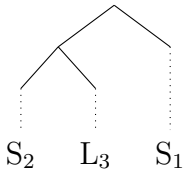
We will now look at three-verb clusters. For such clusters there are five theoretically expected orders and one which is ruled out. The underlying hierarchy can be linearized in the following four ways:

(14)

[13] What Bech, 1955 called status government.

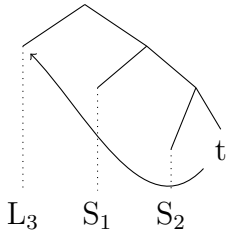
[14] This is not to say that the diagnostics always all agree. Heilmann 1999 claims that in the Swabian dialect of Stuttgart groups of verbs that are not underlyingly constituents can occupy the prefield position. Invariably, this requires contrast according to Heilmann's description. We can leave such cases to one side. Similarly, there are cases of displaced morphology (Comrie and Frauenfelder 1992; Salzmann 2014b; Vogel 2009) as well as cases where the morphology doesn't meet expectations based on hierarchical considerations (IPP, PPI, supine). These constructions have given rise to a vast literature, but the underlying hierarchy is never in serious doubt.





There is one additional order requiring movement.

(15)



The remaining logically possible order is 2-1-3. It cannot be generated as an unmarked order without violating some constraint of the theory.

3.1 2-1-3 in three-verb clusters

This subsection asks whether 2-1-3 cluster orders are attested in a way relevant to the theory. Discussion of all other orders is deferred to the next subsection, which will concentrate on three-verb clusters with auxiliaries, modals, and causatives. Orders other than 2-1-3 will be shown to be attested for the restricted set of restructuring verbs, they are therefore also attested in the unrestricted case. Here, we will discuss reported instances of 2-1-3 cluster orders.

The 2-1-3 cluster order comes up in a number of works as an alternate order. Schmid and Vogel 2004 give the 2-1-3 order in Aux_1 >Mod_2 >V clusters as a possible order under certain (different) focus conditions in the following varieties: Rheiderländer Platt spoken in eastern Frisia, St. Gallen Swiss German, the dialect of Meran. Relative to a given focus condition, 2-1-3 is never the only order, that is, it is never obligatory under any focus condition (Schmid and Vogel 2004, p. 238). There is no dialect in Schmid and Vogel's sample where 2-1-3 would be compatible with all focus conditions (Schmid and Vogel 2004, p. 238), though all dialects in Schmid and Vogel's sample have such orders. It seems safe to conclude that 2-1-3 is not unmarked in any of the dialects considered by Schmid and Vogel (for the cluster they elicited). Schmid and Vogel's attestations of 2-1-3 therefore do not counterexemplify the current theory. Similarly, 2-1-3 is given, but as a marked alternate order, for certain three-verb clusters in the Swabian dialect of Stuttgart in Heilmann 1999. Again, since 2-1-3 is is a marked alternate order, I do not consider the variety of Swabian documented by Heilman as a counterexample to

the theory. The logic extends to other reports of 2-1-3 as a marked alternate (see for example Schwalm, 2013).

The next type of example where we see 2-1-3 orders is illustrated with the West Frisian example below. The example shows an infinitival verb introduced by the cognate of 'to' to the right of the matrix verb. At the same time there is a clear indication that restructuring is happening, since the object of the most deeply embedded verb ('the book') appears to the left of the higher verb ('forbid').

(16) … dat er my dat boek ferbean hat te lêzen
that he me the book fofbidden has to read
that he has prohibited my reading the book Haan 2010b, 204 ex. 22c

Such examples are referred to in the literature as the third construction (Besten and Rutten 1989), remnant extraposition (Santorini and Kroch, 1991), or Linksverschachtelung (Kvam 1979, 1980). In West Frisian this particular order of verbs is obligatory (Haan 2010b).[15] The third construction shares word order amongst the verbs, lack of IPP effects, and presence of 'to' with clearly bi-clausal extraposition structures (Besten and Rutten 1989). On the other hand, placement of verbal dependents shows evidence of clause-union (see Beek, 2008; Wöllstein-Leisten, 2001; Wurmbrand, 2001 for detailed discussion). Such examples are clearly problematic from the perspective of the current theory.

A similar problematic case of 2-1-3 orders can be found in the Zürich German. Lötscher 1978 reports the possibility of 2-1-3 orders in combinations with an auxiliary as the highest, a benefactive verb, perception verb, or phase verb as the second member and a main verb as the third member of the cluster. The relevant structure is illustrated in (17) (M. Salzmann, p.c., based on Lötscher 1978, 3 fn 2).

(17) a. wo s mer s gschier {*hälffen | ghulffe} händ abwasche
where they me the dishes help helped have up.wash
when they helped me clean the dishes
b. wo s mer s gschier händ {hälffen | ghulffe} abwasche
where they me the dishes have help helped up.wash

As with the third construction above, the word order among the verbs and lack of IPP effect are reminiscent of clearly bi-clausal extraposition structures.[16] The

[15]The third construction in standard German always alternates with a 3-2-1 order (Reis and Sternefeld 2004; Wöllstein-Leisten 2001; Wurmbrand 2001). Similarly in standard Dutch, the third construction alternates between a 1-2-3 and a 2-1-3 order (Rutten 1991). The text only discusses the non-alternating 2-1-3 in West Frisian because it presents the clearest counterexample to theoretically derived expectations.

[16]The 2-1-3 order is illustrated with the verb 'help,' which has distinct forms for the infinitive and the participle. Most verbs that participate in this structure do not have a morphological

possibility of placing the most deeply embedded object in the matrix domain in (17), however, suggests clause union. Indeed, clause union is obligatory: (18) shows that weak pronouns must be placed in the matrix Mittelfeld (M. Salzmann, p.c.).

(18) wo s mer *(s) {ghulffe händ | händ ghulffe} (*s) abwasche
where they me it helped have have helped it up.wash
when they helped me clean it

Moreover, the most deeply embedded infinitive is bare, without 'to', which is usually (Bech 1955) taken as a sign of obligatory clause union.[17] Salzmann, 2013b claims that 2-1-3 and 1-2-3 orders are equally unmarked, which makes it difficult to write the 2-1-3 order off as an irrelevant, because marked, alternative order.[18] On balance, the examples from Zürich German seem to be a genuine case of an order that would not be expected if the benefactive, perception, and phase verbs involved are treated as a functional satellite of the main verb.

A related, even clearer case is presented by examples discussed in Schallert 2014. The examples again involve 2-1-3 orders with benefactives, perception verbs, and inchoatives as the second member and come from the dialects of the Austrian Vorarlberg and from Liechtenstein, which, like Zürich German, belong to the High Alemannic dialect group. While the 2-1-3 order is only an alternate order with benefactives and perception verbs, 2-1-3 is essentially obligatory with inchoatives. Like in Zürich German there are clear signs of clause union. Interestingly, there are a few varieties that differ from Zürich German further in that we find the IPP effect, at least when the main verb is intransitive (Schallert 2014, pp. 195–196):

(19) Si feand 's nüd gut, as ar aafango hat roucho
she found it not good that he begin.INF has smoke
She didn't like it that he has started smoking Schallert 2014, 229 ex. 355a

These are bona-fide examples of verb clusters with 2-1-3 order.

Louden 2011 shows that in current Pennsylvania Dutch the 2-1-3 order is possible and indeed obligatory in clusters with perception verbs, motion verbs,[19] and

distinction so that there is no direct morphological evidence for the presence or absence of the IPP effect.

[17]Salzmann, 2013a, 2014a,b convincingly argues against an extraposition analysis of these 2-1-3 clusters using the phenomenon of displaced *zu*.

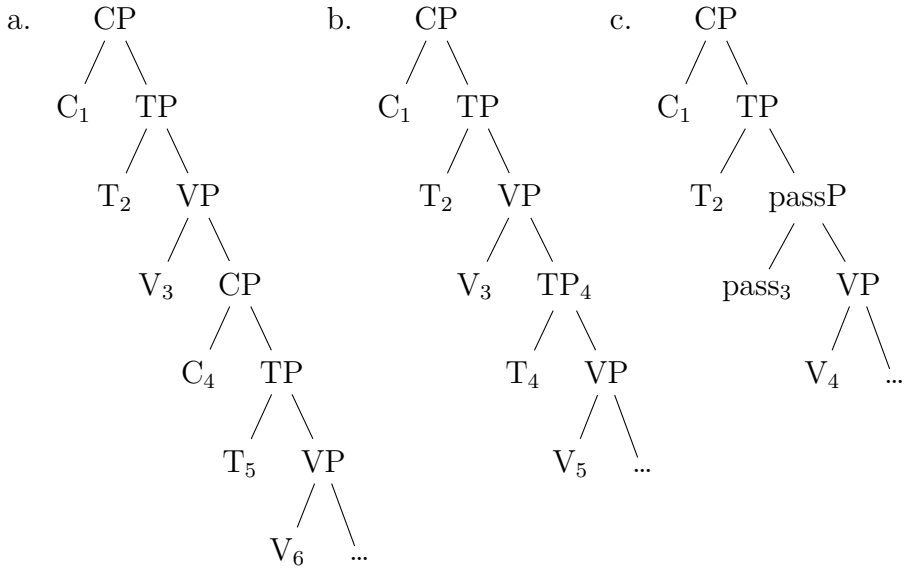
[18]Zwart 2007, discussing similar facts from Luxemburgish with a benefactive verb (citing Bruch, 1973 as the source of data) suggests that (i) the absence of the IPP effect might diagnose a third construction and that (ii) the third construction does not involve cluster formation. The issue is too complex to discuss in full here, but see Salzmann, 2013a, 2014a,b and Beek, 2008 for relevant discussion casting some doubt on Zwart's claims.

[19]Barbiers, Auwera, et al. 2008, map 18b gives the 2-1-3 order as the only order for 'is gone

benefactives as the second member, but not with modals, which exhibit obligatory 3-1-2 order. With causatives as the second member, we find alternation between 3-2-1 and 2-1-3 with a subtle distinction in meaning that Louden takes to indicate a lexical status of the causative when the order is 2-1-3 and a functional status when the order is 3-2-1. None of the verbs that appear in the 2-1-3 order exhibit IPP effects, which are restricted in modern Pennsylvania Dutch to modals. In earlier Pennsylvania Dutch, IPP effects were also, optionally, found with perception verbs and benefactives, which appeared in the 2-1-3 order. Again, the presence of the IPP effect in the older variety strongly suggests that we are dealing with bona fide examples of restructuring.[20]

The examples from West Frisian, Zürich German, the Vorarlberg and Liechtenstein, and Pennsylvania Dutch show that there are verb clusters where 2-1-3 is the unmarked or, indeed, the only order. If, as is commonly assumed, verb clustering requires clause union in some sense, then these data disprove Cinque's (2009, p. 168) conjecture that the linear order of (all) "auxiliary and restructuring (or clause union) verbs (Cinque 2006)" falls under Cinque's generalization. A moment's reflection shows, however, that there can be a number of senses of clause union which Cinque's formulation might be conflating. While it seems obvious that (20a) contains two clauses (two lexical verbs and two CPs) and that (20c) contains only a single clause (one lexical V and one CP), the situation is less clear for a structure like (20b), where there is only one CP but two lexical verbs.

(20)



While the structure in (20a) is fully recursive in that all functional categories

swimming' in the West Frisian variety spoken on Schiermonnikoog.

[20]Unfortunately, Louden 2011 does not discuss restructuring diagnostics systematically.

can be repeated, (20c) is non-recursive, and (20b) is partially recursive.[21] It is plausible to treat (20b) as a case of clause union in some sense, due to the lack of intervening CP. However, C_1, T_2, and V_3 should probably not be treated as functional satellites of V_5 in this structure. Instead, TP_4 is a verbal argument of V_3, that is, TP_4 is a satellite of V_3 rather than V_3 being a satellite of V_5 . Returning to our discussion of verb clusters, it is not at all clear that in the examples of 2-1-3 order discussed in this subsection only the lowest verb is lexical and the remaining verbs are its functional satellites. The class of verbs that appear in unmarked and/or obligatory 2-1-3 clusters as the second member are perception verbs, benefactives, inchoatives, motion verbs, and a large class of verbs involved in the third construction (see Beek 2008 for a list of standard Dutch verbs involved in the third construction). These are plausibly analyzed as lexical verbs rather than as functional satellites of the third member of the cluster. If so, these verbs induce clause union only in the sense of (20b) (see Wurmbrand 2001 contra Cinque 2006a) and are thus not counterexamples to the theory of neutral word order.

3.2 Three verb clusters with auxiliaries, modals, and causatives

In the previous subsection we considered possible verb cluster orders for three-verb clusters without putting further restrictions on the verbs involved. We found that there are instances where 2-1-3 is the unmarked or the only order, but we concluded that they may, nevertheless, not be counterexamples to the present theory of neutral word order, since in those cases it is dubious that V_1 and V_2 are satellites of V_3. In the present subsection, we will restrict our attention to a smaller class of cluster-forming verbs, namely the temporal, aspectual, and passive auxiliaries, the modal verbs (all of which have the morphological quirk of being preterite-presents in German), and the causative 'let' and its cognates. These verbs are in many ways the most central members of the cluster-forming verbs. In the varieties investigated here, modals, 'let,' and the future auxiliary always take bare infinitives without 'to' and the other auxiliaries take participles. Both are characteristic of verbs that undergo clause union obligatorily, while infinitives with 'zu' can go either way. The modals and 'let' are also the central verbs for the IPP effect, since, in a given variety, if any verbs show the IPP effect, the modals and 'let' do. And if any verbs obligatorily trigger IPP, they include the modals and 'let.'

For clusters made up of Aux_1, Mod_2, and V_3, all five theoretically expected orders are attested as neutral orders while 2-1-3 is completely absent as a neutral

[21] Recursivity distinguishes the structures only on the customary but not logically necessary assumption that extended functional projections are a linearly ordered set. The linearity assumption is fairly often violated in practice (see for example Belletti 2005; Jayaseelan 2001; Rizzi 1997).

order. Barbiers, 2005 reports that the translation of Standard Dutch (21) with 1-2-3 order into dialectal variants of Dutch, elicited as part of the SAND project, produced 2-3-1 and 3-2-1 variants in substantial numbers. The 1-3-2 order shows up in small numbers, but with a consistent geographical pattern. Barbiers assumes that it is a possible Dutch pattern for this combination of modals and auxiliaries. The remaining pattern (3-1-2) is virtually absent in the SAND data. Seiler, 2004 reports Swiss German data for the same type of sentences, (22), and finds the orders 1-2-3 and 3-1-2 to be clearly attested in his sample. For sentences of the type in (23), Patocka, 1997, p. 278 reports three possible orders in the Bavarian dialects of Austria: 1-3-2, 3-1-2, and 1-2-3. Standard German also has 1-3-2 as an unmarked order for Aux>Mod>V structures. Crucially, none of these authors report the 2-1-3 pattern to be possible.

(21) Dutch

Vertel maar niet wie zij had kunnen roepen.
tell just not who she had can.INF call.INF
Just don't say who she could have called. Barbiers, 2005, 237 ex. 3

(22) Swiss German

S Telefon hät grad glüütet, won=i han welle gaa
the phone has just rung when=I have wanted go
The phone just started to ring when I wanted to leave. Seiler, 2004, 372 ex. 6a

(23) dass er hat arbeiten müssen
that he has work must
that he has had to work Patocka, 1997, p. 278

These findings are consistent with Wurmbrand's (2004; to appear) assessment of the situation. For Aux_1 Mod_2 V_3 clusters she reports 1-2-3 order for Dutch and Swiss German, 1-3-2 orders for Standard German, the Allemanic Vorarlberg dialect, and certain Swiss German speakers, 3-1-2 orders for various German and Swiss German dialects, as well as the Allemanic Vorarlberg dialect, 2-3-1 orders for Afrikaans and, under certain circumstances West Flemish, 3-2-1 orders for some German dialects and the Allemanic Vorarlberg dialect, and no 2-1-3 orders.

Indeed, for each of these five orders there are dialects where the order is not only attested and unmarked but in fact obligatory. 1-2-3 is the only possible order in a large part of the area covered by the SAND project (Barbiers, Auwera, et al. 2008, 20a). 3-2-1 is obligatory for example in West Frisian (Haan 2010c; Barbiers, Auwera, et al. 2008, 20a). 1-3-2 appears to be obligatory in a number of the Dutch dialects where it occurs (Barbiers, Auwera, et al. 2008, 20a), it is the most unmarked order in standard German for such clusters (Bader and Schmid, 2009).

2-3-1 is the standard order in Afrikaans (Robbers 1997, p. 57) and a number of places West and South of Antwerp (Barbiers, Auwera, et al. 2008, 20a). 3-1-2 finally is obligatory in some Bavarian dialects (Eroms 2004; Eroms, Röder, and Spannbauer-Pollmann 2006, map 5), in Eastern Hessian (Schwalm 2013, 63 map 8), and in Pennsylvania Dutch (Louden 2011). 2-1-3 is never obligatory with Aux_1 Mod_2 V_3 clusters.

The remaining cluster types that can be constructed from auxiliaries, modals, the causative, and main verbs are the following: Mod_1 Aux_2 V_3, Mod_1 Mod_2 V_3, or Aux_1 Aux_2 V_3. They show less variability in ordering (Wurmbrand to appear, table 2 for an overview. Instead of all five orders that we found with Aux_1 Mod_2 V_3 clusters, there are only four orders. The absence of 2-1-3 is unsurprising at this point, but attestations of 2-3-1 as unmarked or obligatory are also missing.

The unexpected 2-1-3 order is not attested as an unmarked order for these types of clusters. When it is claimed to occur, it is a marked, alternative order (Heilmann 1999; Schmid and Vogel 2004). The only possible true exception that I am aware of comes from the following examples from Höhle 2006, p. 74.

(24) a. du hesds$_0$ jå li:wə los$_2$ khün$_1$ gəsai$_3$
you have.2ndSG.SBJV PRT rather let.INF canINF be.INF
you should have preferred to abstain from it attributed to Luthardt 1963, p. 370

b. iç håusn $_0$ los$_2$ khün$_1$ gəmåx$_3$
I have.him.it let.INF can.INF do.INF
I could make him do it.

(25) ich wü:ərən$_0$ ned hå:$_1$ laəs$_3$ kön$_2$ gəruf$_4$
I would.him not have.INF let.INF can.INF call.INF
I wouldn't have been able to have him called. attributed to Reichardt 1914, p. 207

The examples involve causative$_2$-modal$_1$-verb$_3$ and there are clear restructuring diagnostics present in the form of the positioning of weak pronouns. Unfortunately, Höhle's discussion of these examples, though noting that the order is unusual, doesn't make it clear whether this order alternates with others. I have not been able to consult Höhle's sources yet and have to set these examples aside pending further inquiry.[22]

[22]If the cases cited by Höhle turn out to surface in obligatory 2-1-3 order, a number of reactions are possible. 'Let' might not be treated as functional after all. Alternatively, we might conclude with Abels and Neeleman 2012a that rightward movement in the derivation of neutral word order is not ruled out categorically by the grammar but only disfavored due to parsing considerations, opening the door to the occasional counterexample.

For further comments, see the discussion of 2-1-4-3 orders in the low German of Lindhorst in the next section.

Overall then, when clusters are restricted to those consisting of auxiliaries, modals, causative 'let', and one main verb, we find strong support for the theory of unmarked word order from section 2.

3.3 Digression: verbal particles

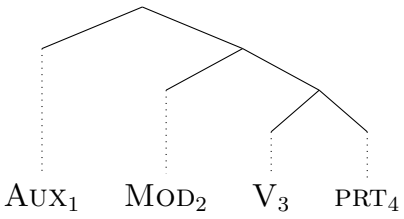
The evidence reviewed in the previous subsection suggests that auxiliaries, modals, and causative 'lassen' should count as functional satellites to the lexical verb. In section 2, we saw that adverbs and PPs as well as argumental DPs and CPs are members of a different class. The question then arises where verbal particles (also known as separable prefixes) fall. There are a number of analyses of particles (den Dikken 1992; Neeleman and Weerman 1993; Ramchand and Svenonius 2002) treating them as low heads in the clausal spine, lower than the lexical verb. Such treatments raise the possibility that particles, when present, might be the lowest verbal head in the clause, with the main verb and the auxiliaries as its satellites. This subsection briefly explores this possibility. The considerations of the next paragraph lend independent initial plausibility to such an approach.

Like verbs and auxiliaries and unlike arguments and adjuncts, separable prefixes cannot be scrambled. This generalization is natural, if we treat separable prefixes as verbal. Separable prefixes, unlike arguments and adjuncts, cannot be left behind in the middle field under partial VP-topicalization. If we treat the main verb as the separable prefix's satellite, then this observation falls together with the observation that auxiliaries and modals cannot be topicalized to the exclusion of the main verb. The impossibility of fronting auxiliaries and modals to the exclusion of the main verb and the main verb to the exclusion of the separable prefix do not fall together if we treat the separable prefix as a (low) satellite of the main verb. These considerations provide initial support for the idea explored below.

It should be noted first that construing the separable prefix as the true head and the main verb as its lowest verbal satellite does not change the predictions about expected relative orders of main verb, auxiliaries, and modals. This theoretical point is illustrated for Aux_1 Mod_2 V_3-particle_4 clusters in the structures below.

(26) a. Aux-Mod-V, particle variable

(i)



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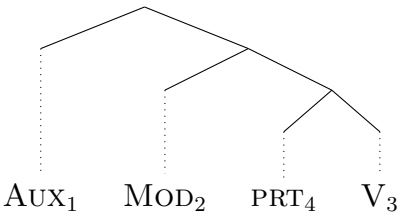
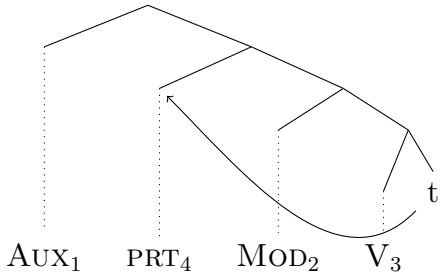
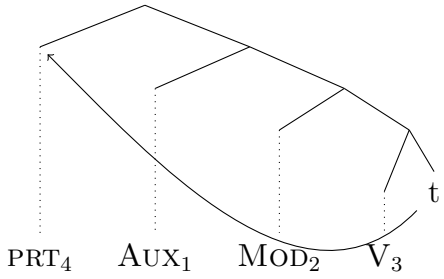


(iii)

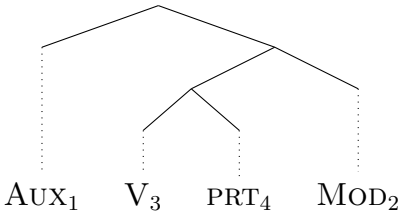


(iv)

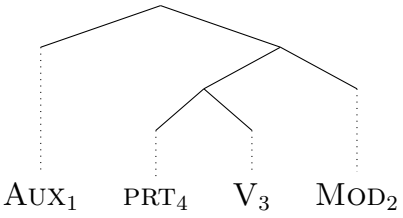


b. Aux-V-Mod, particle variable

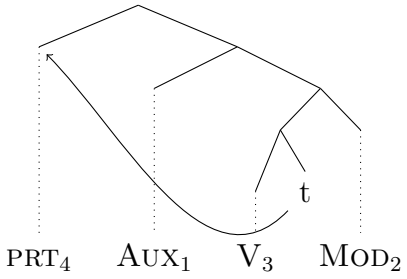
(i)



(ii)

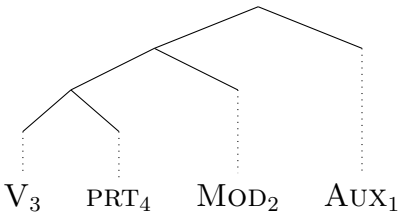


(iii)

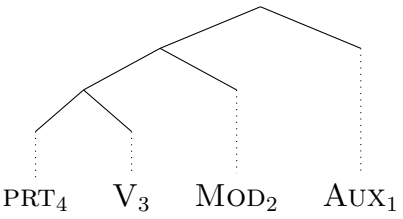


c. V-Mod-Aux, particle variable

(i)

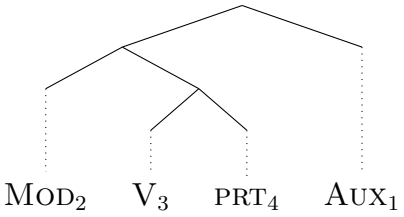


(ii)

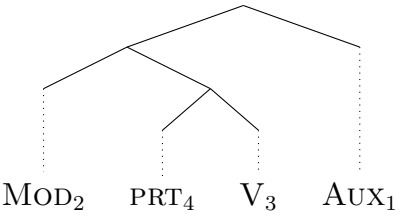


d. Mod-V-Aux, particle variable

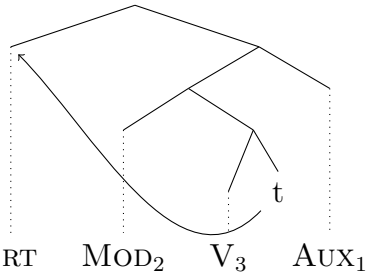
(i)



(ii)

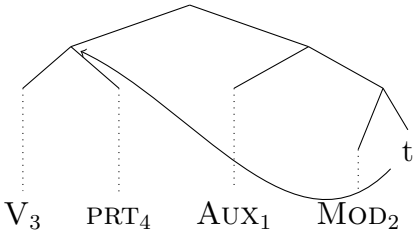


(iii)

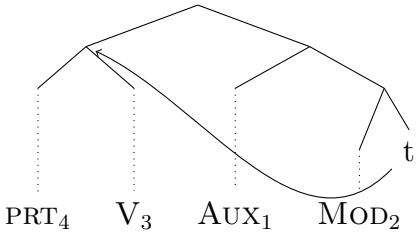


e. V-Aux-Mod, particle variable

(i)



(ii)



f. V-Aux-Mod cannot be derived

All 14 possible four-element structures have been given above. The five desired orders of Aux_1 Mod_2 V_3 remain derivable, the undersired one continues to be ruled out.

The structures above show that the suggested analysis of the particle predicts that the particle can never be to the right of an auxiliary or modal unless the verb is, too. But the converse need not hold: the particle may be to the left of the auxiliary or modal when the verb is further to the right. this prediction is correct and it captures an important generalization about particle placement in Germanic.

We now turn to the more fine-grained facts of particle placement in the verb cluster. In table 1, expected and attested orders are marked with a 'yes' followed by (a non-exhaustive sample of) the languages or dialects where the order is found. Expected but unattested orders are marked with '!,' and unexpected, unattested orders are marked with 'no.'

As can be seen, the theory from section 2 on its own is partly successful: none of the 10 excluded orders are attested.

However, the theory fails to predict a second generalization, which can be observed here. The particle follows the main verb only when the main verb follows all modals and auxiliaries. We can explain this pattern, following Abels 2013 as a prosodic effect. Abels shows that Wagner 2004, 2005 theory of of nuclear stress predicts that in 2-3-1 clusters the prosodic phrasing groups 3 and 1 into a single prosodic constituent to the exclusion of 2. This, of course, goes against the syntactic structure, which groups 2 and 3 to the exclusion of 1. Abels suggests that this mismatch makes the 2-3-1 order dispreferred because it is difficult to

parse and, hence, difficult to learn. All the theoretically expected but unattested orders (except for the 4-1-3-2, more on which below) give rise to the mismatch between syntax and prosody discussed by Abels. Their absence is therefore not entirely surprising.

The order 4-1-3-2 is expected but unattested. Koopman and Szabolcsi 2000 rule this order out categorically, but it is possible for some speakers as a marked alternative (J. van Craenenbroeck, A. Neeleman, L. Haegeman, L. Aelbrecht, p.c.) in Mod_1 Aux_2 V_3 prt_4 clusters.[23] If the parallel between the syntax of verb clusters and that of DPs that we are pursuing here is real, then it is not surprising that it is exactly the 4-1-3-2 order that remains unattested. In fact, the difficulty in attesting it can be taken as a further argument in support of the parallelism since in within the DP 4-1-3-2 orders are so rare that Cinque 2005, p. 320 described their crosslinguistic frequence as "very rare—possibly spurious. "

I conclude that important properties of separable prefixes follow from the assumption that they are the lexical head of the extended verbal projection, with the main verb as a satellite in the sense of the current theory. The theory of word order thus confirms those views of separable prefixes that take them to be low heads in the clausal spine.

[23] J. van Craenenbroeck suggests that there might be a variety where this order is default; the relevant maps in Barbiers, Auwera, et al. 2008 suggest Sint-Jozef-Olen (Antwerp), Mol (Antwerp) and Grote-Spouwen (Limburg, BE) as candidate locations because they are shown with obligatory 1-3-2 in Mod_1 Aux_2 V_3 clusters and obligatory particle float in "wants to eat up" or "should throw away."

Table 1: Summary of orders for separable prefixes

		expected	attested Prt = 4	
(26)ai	1-2-3-4	yes	yes	English, Danish, Swedisch, Norwegian…
(26)aii	1-2-4-3	yes	yes	Dutch[a]
(26)aiii	1-4-2-3	yes	yes	Dutch[b]
(26)aiv	4-1-2-3	yes	yes	Dutch[c]
	1-3-2-4	no	no	
(26)bi	1-3-4-2	yes	!	
(26)bii	1-4-3-2	yes	yes	Standard German
(26)biii	4-1-3-2	yes	!	
	3-2-1-4	no	no	
	3-2-4-1	no	no	
(26)ci	3-4-2-1	yes	!	
(26)cii	4-3-2-1	yes	yes	Standard German, Frisian
	2-3-1-4	no	no	
(26)di	2-3-4-1	yes	!	
(26)dii	2-4-3-1	yes	yes	West Flemish
(26)diii	4-2-3-1	yes	![d]	
	3-1-2-4	no	no	
	3-1-4-2	no	no	
(26)ei	3-4-1-2	yes	!	
(26)eii	4-3-1-2	yes	yes	Bavarian
	2-1-3-4	no	no	
	2-1-4-3	no	no	
	2-4-1-3	no	no	
	4-2-1-3	no	no	

[a] Obligatory in many Belgian varieties of Dutch (Barbiers and Bennis 2007, 31a).

[b] Obligatory in one variety of Dutch in the Netherlands (Barbiers and Bennis 2007, 31a).

[c] Obligatory in a number of varieties of Dutch in the Netherlands (Barbiers and Bennis 2007, 31a).

[d] We can construct the following grammatical Afrikaans example based on Robbers 1997, 61 ex. 40a

(i) dat hy hom weg laat gaan het
that he him away let go has
that he let him leave

but I exclude it here because it is a dispreferred alternative to the 2-4-3-1 order.

4 Word order in four-element clusters

This section turns to neutral word orders in clusters consisting of four elements, where the satellites are restricted to being auxiliaries, modals, and causative 'lassen.' Table 2 summarizes the data. The first column represents the order, the second indicates whether the particular order is expected under the theory from section 2. The next two column repeats information from table 1 about clusters with separable prefixes. The remaining columns deal with verb clusters where the lowest element is a main verb and the three satellites are drawn from the set of auxiliaries, modals, and causative 'let.' Expected and attested orders are marked 'yes', unattested unexpected ones 'no.' The one expected but unattested order and the one unexcpected attested order are marked '!.' The next column shows whether a given order is only attested with 'let' as part of the sample. The final two columns give languages and references.

As can be seen, there is an extremely good match between theoretically derived expectations and attested facts. All but one of the expected orders are attested as unmarked orders and only one of the unexpected ones is. The following paragraphs give a bit more detail moving from clearly attested to unattested via a less secure gray area.

Table 2: Summary of orders for four-element clusters

	expected	attested		
		Prt=4	V=4	cause required
1-2-3-4	yes	yes	yes[a]	no
1-2-4-3	yes	yes	yes[b]	no
1-4-2-3	yes	yes	yes[c]	no
4-1-2-3	yes	yes	yes[c]	no
1-3-2-4	no	no	no[d]	
1-3-4-2	yes	!	yes[e]	no
1-4-3-2	yes	yes	yes[f]	no
4-1-3-2	yes	!	yes[g]	no
3-2-1-4	no	no	no	
3-2-4-1	no	no	no	
3-4-2-1	yes	!	yes[h]	yes
4-3-2-1	yes	yes	yes[i]	no
2-3-1-4	no	no	no	
2-3-4-1	yes	!	yes[j]	
2-4-3-1	yes	yes	![k]	
4-2-3-1	yes	!	yes[l]	yes
3-1-2-4	no	no	no	
3-1-4-2	no	no	no	
3-4-1-2	yes	!	yes[m]	yes
4-3-1-2	yes	yes	yes[n]	no
2-1-3-4	no	no	no	
2-1-4-3	no	no	![o]	no
2-4-1-3	no	no	no	
4-2-1-3	no	no	no[p]	

[a] Standard order in Enlish, Danish, Swedish, Norwegian, and Standard Dutch.

[b] Standard order for Mod_1 Mod_2 Aux_3 V_4 in Belgian Dutch (Besten, 1981, p. 6)

[c] Standard Dutch (Geerts et al., 1984, p. 600)

[d] Though see example (25) and its discussion above

[e] Mod_1 Aux_2 Mod_3 V_4 clusters in West Flemish (Haegeman 1998b, p. 277; den Dikken 1994, p. 83)

[f] Standard German in Aux_1 Mod_2 Aux_3 V_4 clusters (Bader and Schmid, 2009, p. 214), Stellingwerfs Mod_1 Mod_2 Aux_3 V_4 clusters (Zwart, 1995, p. 9)

[g] Afrikaans Mod_1 $Aux.perf_2$ $Aux.pass_3$ V_4 (Donaldson, 1993, 261 ex. 918)

[h] Zürich German $Aux.perf_1$ $Aux.pass_2$ let_3 V_4 (M. Salzmann, p.c.). The order alternates with 1-3-4-2 and 4-3-2-1 but in the latter case with the full participle of 'let.'

[i] Standard German Mod_1 $Aux.perf_2$ $Aux.pass_3$ V_4 clusters; West Frisian all clusters (Haan, 2010c)

[j] West Flemish Aux_1 Mod_2 Mod_3 V_4 clusters (L. Haegeman, p.c.).

[k] As an alternate in West Flemish $Aux.perf_1$ Mod_2 $Aux.pass_3$ V_4 clusters (L. Haegeman, p.c.)

[l] Standard German Mod_1 Aux_2 let_3 V_4 "Skandalkonstruktion" (Vogel, 2009)

[m] Afrikaans Mod_1 $Aux.pass_2$ let_3 V_4 (Robbers, 1997, 64 ex. 46)

[n] Standard German (Bader and Schmid, 2009, p. 214), Vorarlberg (Schallert, 2014)

[o] Lindhorst Low German (Bölsing, 2011) discussed below.

[p] Spontaneously, at low frequency, possibly as alternate, in Wurmbrand's 2004 study.

The simplest cases are represented by the ten orders which are expected, attested, and do not require causative 'let' to be attestable. The notes to the table give references to undisputed attestations of the orders as the only or as an unmarked order. The 2-3-4-1 order is not, as far as I know, attested in this sense in the literature, but it occurs in West Flemish Aux_1 Mod_2 Mod_3 V_4, in cases where the simpler cluster with a single modal would have 2-3-1 order. See Haegeman 1998a,b, 2001 for details on the form and placement of the auxiliary.

(27) West Flemish (L. Haegeman, p.c.)

dat Hans vu zen examen 100 woorden per minuut moeten keunen typen
that Hans for his exam 100 words per minute must can type
eet
has

that Hans must have been able to type 100 words per minute for the exam

Despite the lack of the kind of atlas data, which are available for three-element clusters, we already see a very good fit between predictions and data for four-element clusters here.

While the ten orders above are clearly attested as unmarked orders when we use the strictest criteria and include only auxiliaries and modals as satellites, the following five orders are expected under the theory but attested only if we broaden the database to include causatives and particles or admit orders that aren't clearly neutral. The order 3-4-2-1 is the order we find in Zürich German for Aux.perf_1 Aux.pass_2 let_3 V_4 clusters (M. Salzmann, p.c.), (28). The order alternates with 4-3-2-1 and 1-3-4-2 but then with the full participle of 'let.'

(28) Zürich German (M. Salzmann, p.c. – needs completion)

dass d Täsche la ligge worden isch
that the bag let lie become is

that the bag has been left lying

I am not aware of cases without 'let' where this is the unmarked order. The Standard German Mod_1 Aux_2 let_3 V_4 clusters dubbed the "Skandalkonstruktion" in Vogel, 2009 because of the unexpected order and the displaced morphology produces examples of the 4-2-3-1 order, but again only with 'let,' (29).

(29) Standard German "Skandalkonstruktion" Vogel, 2009

dass sie es sich entfernt haben lassen soll
that she it self removed have let should

that she is supposed to have had it removed

Finally, the 2-4-3-1 order is attested robustly in West Flemish when the lowest element is a particle, (30a), otherwise it is attested only as an alternate order in Aux.perf_1 Mod_2 Aux.pass_3 V_4 clusters in West Flemish, where it alternates with 1-2-4-3, 1-4-3-2, and 4-1-2-3 order, (30b).

(30) West Flemish (L. Haegeman, p.c.)

a. daj die boeken nie keunen mee-doen eet
that-you those books not can with-do have
that you could not take those books along with you

b. dat dienen boek moeten gelezen worden is
that this book must read become is
that this book has had to be read

For the remaining 10 orders the claim that they do not occur as neutral orders in clusters made up of auxiliaries, modals, 'let', main verbs, and particles is fairly unproblematic. Though Schönenberger 1995 does mention 2-1-3-4, 2-1-4-3, and 4-2-1-3 orders among a long list of other alternate word orders for Swiss German Aux_1 Mod_2 Mod_3 V_4 clusters, it is clear that these are highly marked. 4-2-1-3 orders also show up in Wurmbrand's (2004) elicitation study for Aux.fut_1 Aux.perf_2 Mod_3 V_4. In Wurmbrand's study, the order is found only in the Austrian dialect group, where it is with 10% of the total data the fourth most popular order. I will assume that 4-2-1-3 is not the (most) neutral order for the speakers who produced it, though the issue bears further investigation. The 1-3-4-2 order from example (25) was discussed above and has to be set aside for lack of further information.

This leaves the 2-1-4-3 order as the most problematic potential counterexample to the theory from section 2. The order is attested in Bölsing's 2011 grammar of the Low German dialect of Lindhorst in a number of very complex examples, where the rest of the description would have predicted 2-4-3-1 orders to surface. This itself is interesting and potentially significant, since 2-4-3-1 is the only expected order that is not clearly attested in my sample. Bölsing's examples are mostly main clauses so that the initial verbs are not part of the cluster. I will number these verbs '0.'

(31) hei werd_0 kont_2 hemn_1 mor'n $\text{ema}^{\text{a}}\text{t}_4$ hemn_3
he will could.SUP have.INF tomorrow mowed have.INF
he will have been able to have mowed tomorrow Bölsing, 2011, p. 211

In two- and three-element clusters, auxiliaries follow the participles and supines they govern. Modals precede the infinitives they govern. Three-element clusters

are well-behaved in the sense that they do not surface with 2-1-3 orders. In fact, The generalizations produce the otherwise rare 2-3-1 order in the future perfect of modals in main clauses:

(32) ek ni^{e}me an, hei werd$_0$ kont$_2$ gaut schl$_{\ddot{a}}$apen$_3$ hemn$_1$
I assume he will can good sleep have
I assume that he will have been able to sleep well Bölsing 2011, p. 215

The expected form for example (31) is therefore the following:

(33) hei werd$_0$ kont$_2$ mor'n ema^{a}t$_4$ hemn$_3$ hemn$_1$
he will could.SUP tomorrow mowed have.INF have.INF

This expected structure is disfavored for two reasons. First there is an immediate repetition of 'hemn', a kind of haplology that tends to be avoided. Indeed, Bölsing 2011, 217 fn 32 suggests that this repetition is the reason for the unusual order in a similar example. He fails to notice, however, that the order also appears in examples where repetition of 'hemn' is not the issue. Alas, Bölsing does not indicate whether the haplological form is possible as an alternative. The second reason why (33) is disfavored has to do with prosody. As reviewed briefly above, Abels, 2013 suggests that 2-3-1 orders are rare across dialects because they are prosodically phrased as 2 (3 1, that is, in such a way that the prosodic and the syntactic phrasing do not match. No other order expected under the current theory has this property.[24] There is a plausible causal link (misparsing causing difficulty in acquisition) between this prosody-syntax mismatch and the cross-dialect rarity. The expected 2-4-3-1 order in (33) would have the prosodic bracketing 2 (4 3 1, which again gives rise to a prosody-syntax mismatch. This is the second reason why (33) may be disfavored.

The haplology reasoning seems sound. Indeed, the dialect arguably has two ways to resolve the haplology. One is to shift from the expected order in (33) to the order in (31). The other is to syncopate one of the instances of the auxiliary. Bölsing 2011, pp. 210-211 observes that example (31) alternates with the following form.

(34) hei werd kont mor'n ema^{a}t hemn
he will could.SUP tomorrow mowed have.INF
he will have been able to have mowed tomorrow **Bölsing:2011**

What is puzzling about the form, though Bölsing never comments on this property, is the presence of both a verbal participle and the supine of a modal despite the

[24]The mismatch can be avoided just in case 2 cliticizes onto 3, which is what may be happening in examples like (28).

presence of only a single licensor of such forms, the final 'hemn.' We can derive (34) from (33) by syncopating one of the occurrences of the auxiliary and solve the problem of how to license both the participal and the supine. It should be noted that the dialect also allows minimally different forms with only the supine and only the participle. Both of them are glossed with the expected meaning involving a single perfect (either above or below the modal), while Bölsing is puzzled by the double perfect meaning of (34) in the absence of two perfect auxiliaries.

If this was the only problematic case from Lindhorster Platt, we could probably set example (31) as an alternative to the expected (33)—which is pronounced as (34)—and as irrelevant, qua alternative. However, the reasoning based on haplology does not carry over to the following examples, all of which are expected to show 2-(5-)4-3-1 order but are given by Bölsing with 2-1-(5-)4-3 order. The reasoning that disfavors the 2-(5-)4-3-1 on the grounds of a syntax-prosody mismatch does carry over, of course.

(35) a. dat Pä^{a}rd werd$_0$ kont$_2$ hemn$_1$ vand$_{ä}$age nich beschl$_{ä}$an$_4$ wi^{e}rn$_3$
the horse will can.SUP have.INF today shoee become.INF
The horse will not have been able to be shoed today Bölsing 2011, p. 216

b. dat Pä^{a}rd werd$_0$ scholt$_2$ hemn$_1$ vand$_{ä}$age beschl$_{ä}$an$_5$
the horse will must.SUP have.INF today shoed
wu^{e}rn$_4$ se^{i}n$_3$
become.SUP be.INF
The horse will have had to have been shoed today. Bölsing 2011, p. 216

c. dä^{i} W$_{ä}$agen werd$_0$ most$_2$ hemn$_1$ al längst estri^{e}ken$_4$
the car will must.SUP have.INF already longest painted
se^{i}n$_3$
be.INF
The car will have had to be painted a long time ago. Bölsing 2011, p. 217

d. dä^{i} W$_{ä}$agen werd$_0$ most$_2$ hemn$_1$ al längst estri^{e}ken$_5$
the car will must.SUP have.INF already longest painted
se^{i}n$_4$ [sic![25]] hemn$_3$
be.INF have.INF
The car will have had to have been painted a long time ago. Bölsing 2011, p. 217

[25]The infinitive of the passive auxiliary is clearly the wrong choice of form here, since the supine 'ese^{i}n' is required. The error seems to have been caused by Bölsing cutting and pasting. This, together with the fact that Bölsing marks this form as very rare, casts some doubt on the

There is no indication in Bölsing's discussion that these orders alternate, though the text does not exclude the possibility and the forms are introduced as 'rare' but 'possible in principle.'

I should point out another eccentricity of these facts. It is a fairly strong generalization (Haegeman and Riemsdijk 1986; Salzmann 2011) that in verb clusters non-verbal scope bearing elements like negation take scope over (not necessarily all) material to their right but not over material to their left. The Lindhorster forms under discussion here flout this generalization, as can be seen from the scope of negation in (35b), which may suggest that the problematically positioned supines are not at all part of the cluster. This idea is supported by the observation that the supines of the modal verbs seem to drift towards the Wackernagel position, preceding all other material in the middle field:

(36) Alse ek ümme halwig sesse noch niks harre klä^{i}pern hü^{e}r'n,
When I at half six still nothing had bang heard,
hawwe$_0$ kont$_1$ ek me^{i} gle^{i}k al wat denken$_2$.
had.1stSG can.SUP I me immediately PRT something think
When I still didn't hear any banging at half past five, I was immediately able to draw some conclusions.

The positioning of 'kont' ahead of the weak pronouns is very unusual and noteworthy here. Clearly, these examples merit further study. In particular the question whether the unexpected orders alternate with expected ones should be looked into. If not, this might indicate that the categorical ban on rightward movement embraced by Cinque should be replaced by a (strong) preference for leftward movement (of obligatory elements), as in Abels and Neeleman, 2012a. The position of the supine (and the auxiliary) in an apparent Wackernagel position together with the scope facts might suggest an altogether different approach, though, based on movement of the supine (see 8).

This concludes the discussion of the attested cluster orders with auxiliaries, modals, 'let', one main verb, and particles. The fit between theory and data is extremely good. The counterexample from Bölsing, 2011 might necessitate a weakening of the theory, though at this point the argument from these examples seems too weak to motivate a firm rejection of Cinque's strong, categorical version of the theory in favor of the version in Abels and Neeleman, 2012a.

reality of this particular data point.

5 Discussion

The first part of the paper has shown that a general theory of neutral word order implementing Cinque's generalization has great promise but needs to be based on classes of satellites. Cinque's own bi-partition of satellites into arguments versus everything else was shown to be too coarse; once the necessity of a more fine-grained classification of satellites is accepted, arguments might find their place in the theory after all. The next sections demonstrated that this general theory of unmarked word order describes the range of attested cluster orders of modals, auxiliaries, a main verb and verbal particles nearly perfectly; the inclusion of 'let' into the database increases the fit, though we noted problems with potentially unexpected orders, which might, ultimately, lead to the exclusion of them. Relevant cases need to be studied more closely. Verbs that appear in the third construction, perception verbs, benefactives, phase verbs, and motion verbs cannot be integrated as satellites of the lowest lexical verb, despite the fact that they show evidence of clause union. In terms of the lexical-functional dichotomy, we have strong evidence for treating auxiliaries, modals, and 'let' as functional satellites of the main verb; on the other hand, verbs appearing in the third construction, benefactives, phase verbs, etc. are not functional satellites of the most deeply embedded verb. The hypothesis that verbal particles are the lexical head of the clause is also strongly supported by the data; the gaps in the paradigm can be motivated on prosodic grounds (Abels, 2013).

Looked at from the perspective of verb clusters, we found that not all verb clusters fall under the theory of neutral word order from section 2. We provisionally traced this observation to the fact that not all members of the cluster are satellites of the most deeply embedded verbal head in the sense of the theory (or, less plausibly, they might members of distinct classes). The traditional diagnostics for clause union, which show clause union to accompany clustering, under the current view involve clause union not in the sense that all elements in the unioned clause become satellites of the most deeply embedded verb but in the sense that there is a continuous sequence of verbal projections without an intervening, closing-off CP level—a conclusion already suggested by the recursive properties of verb clusters (Huybregts, 1976; Shieber, 1985).

We have not considered the question here of how the ordering among satellites in different classes interacts. We know that they can be interspersed without forming a rigid single hierarchy (Bobaljik 1999; Nilsen 2003; Svenonius 2002). We also know that they can stack up on different sides of a head in classical nesting patterns and that two sets of satellites can stack up independently on the left in the cross-serial pattern. The cross-serial pattern might be a special (trivial) case of Bobaljik's 'shuffling together.' What interactions there are to the right of the lexical head is less clear. The order amongst satellites of the same class is more

flexible after the head but interactions between classes may be more restricted. This conjecture is supported by the compactness of verb clusters, a property which means that verb clusters may be interrupted by non-verbal material to the left of the head but not to its right (Bobaljik 2004 among others). Further, Abels, 2007 claims that the mirror image of the Swiss German and Dutch cross-serial pattern is never found, which again suggests an asymmetry in the interactions between orders. A systematic study of these questions and a general theoretical analysis do not exist.

It seems unlikely that a movement approach to cross-class interactions will give satisfactory results. We saw that, on the assumption that movement of a limited kind is implicated in generating within-class orders, paradoxes arises for across-class orders. Moreover, the reordering that we find, for example in dialects with verb projection raising, do not have the usual properties of movement (see Salzmann 2011). At the same time, it is not obvious how to generalize existing non-movement accounts, which typically involve the upward inheritance of theta-grids, to optional modifiers. A deeper rethinking of structure-building operations will likely be necessary.

In this paper, I have highlighted some of the concepts involved in Cinque's theory of Universal 20. It was shown that Cinque's approach carries the promise of providing a genuine theory of word order, since most of the concepts generalize easily and with encouraging results. However, we did see that a classification of satellites is crucial for the theory (reinforcing conclusions in Bobaljik 1999; Nilsen 2003; Svenonius 2002) but left the details to future work. Verb clusters were investigated as a particularly recalcitrant test case. The investigation yields interesting conclusions about the contentious classification of modals and verbal particles. With these conclusions held firm, we discover that verb clusters made up of auxiliaries, modals, 'let', a main verb, and verbal particles obey Cinque's generalization. Ultimately, this investigation should contribute to an ultimate theory of neutral word order both empirically and theoretically.

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