Verb clusters in North Germanic: A Spanning analysis

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Abstract

Verbs in Norwegian and other North Germanic languages cluster at the left edge of the verb phrase, when V2 is controlled for. This clustering has the superficial appearance of "lowering" of auxiliaries (including modals) to be adjacent to the main verb. I propose a general account of the PF linearization of spans (head-chains) which handles the North Germanic cases, and extends readily to other cases beyond North Germanic. The mechanisms necessary for these cases treat phenomena that are problematic for an account in terms of head movement, and render head movement unnecessary even for more straightforward cases such as subject-aux inversion in English, V2 in Germanic, and French-style V-to-T.

1 The puzzle of the low auxiliary

Standard Norwegian auxiliaries (including modals) tend strongly to follow midfield adverbs, when V2 is controlled for (Bentzen 2007). As Bentzen reports, some speakers in some regions also allow an auxiliary to be separated from its nonfinite verbal complement, hence the percent sign in (1b). (Non-English examples in this paper are Norwegian unless indicated otherwise.)

(1) a. ettersom han snarest må melde seg
because he immediately must report REFL

'because he must immediately make himself known'

b. % ettersom han må snarest melde seg
because he must immediately report REFL

*Thanks to Kristine Bentzen for discussion, to audiences in Tromsø and Verona for feedback on oral presentations of this material, and to Terje Lohndal for comments on an earlier draft.

English is different, in that auxiliaries can freely be separated from each other and from the main verb by adverbs. As the examples in (2) indicate, there is some freedom of individual auxiliaries relative to individual adverbs (the order of adverbs relative to each other, however, is less free (cf. Cinque 1999), and the order of auxiliaries relative to each other is quite strict).

(2) a. because he immediately must report to the front desk

b. because he must immediately report to the front desk

Additional examples establish the same fact, that Norwegian auxiliaries follow adverbs in the middle field, regardless of their semantic scope. The combination of *må* 'must' and *allerede* 'already' in (3a) is understood with surface scope; since sixteen and seventeen year olds already are under the obligation to pay taxes (already > must), it is argued, they should also have the right to vote. In (3c), the scope is the inverse: in order to transfer credits to the degree program, applicants will have to already be enrolled, under the new proposal (must > already). The new proposal has not taken effect yet, so the surface scope reading would be false. The bad examples in (3b) and (3d) show that the modal cannot precede the adverb (when V2 is controlled for; the additional adverbs before the finite verb show that these clauses are not V2).

(3) a. 'already must', surface scope

De	mener	at	stemmeretten	burde	gis	til	16-	og
they	*feel*	*that*	*voting.right.*DEF	*ought*	*be.given*	*to*	*16-*	*and*

17-åringer,	som	jo	**allerede**	**må**	betale	skatt
17-year.olds	*as*	*after.all*	***already***	***must***	*pay*	*tax*

'They feel that voting rights should be given to 16- and 17-year olds, who after all already must pay taxes'

b. 'must already', inverse scope

*...som	jo	**må**	**allerede**	betale	skatt
as	*after.all*	***must***	***already***	*pay*	*tax*

c. 'already must', inverse scope

Nå	foreslås	det	at	søkere	uansett	**allerede**	**må**	være
now	*is.proposed*	*it*	*that*	*applicants*	*regardless*	***already***	***must***	*be*

tatt	opp	til	et	studieprogram	innen	de	søker	om	å	få
taken	*up*	*to*	*a*	*study.program*	*before*	*they*	*seek*	*if*	INF	*get*

overført	studiepoeng.
transferred	*credits*

'Now it is proposed that applicants must regardless already be admitted to a degree program before they apply for credit transfer'

d. 'must already', surface scope

*...at	søkere	uansett	**må**	**allerede**	være	tatt	opp ...
that	*applicants*	*regardless*	***must***	***already***	*be*	*taken*	*up*

In English, there are two tendencies which sometimes conflict: the tendency to favor the order auxiliary $\prec$ adverb, and the tendency to prefer surface scope. The two tendencies coincide in examples like (3c), so the order *must already be* is preferred, as reflected in the translation there. The two tendencies conflict in (3a), improving the acceptability of the auxiliary $\prec$ adverb alternative order there.

Below is another pair of examples showing the same thing for a different modal-adverb pair. In (4a), *alltid* 'always' scopes over *kan* 'can', because the fire chief always has the authority described. In (4c), the scope is inverse because the new possibility is for the screen to always be on (the screens have always had the possibility of being switched on, so the surface scope reading would not be news).

(4) a. 'always can', surface scope

Vi trenger ikke forklare hvorfor brannsjefen **alltid** **kan** forby
we need not explain why the.fire.chief ***always can*** *forbid*

åpen ild hvis det foreligger brannfare
open flame if it exists fire.danger

'We don't need to explain why the fire chief always can forbid open flames if there is a danger of fire'

b. 'can always', inverse scope

*. . . hvorfor brannsjefen **kan alltid** forby åpen ild . . .
why the.fire.chief ***can always*** *forbid open flame*

c. 'always can', inverse scope

Neste iPhone får en Apple Watch-aktig funksjon hvor skjermen
next iPhone gets an Apple Watch-like function where the.screen

(eller deler av den) **alltid** **kan** være påslått
or parts of it ***always can*** *be turned.on*

'the next iPhone will have an Apple Watch-like function where the screen (or parts of it) can always be on'

d. 'can always', surface scope

*. . . hvor skjermen . . . **kan alltid** være påslått
where the.screen ***can always*** *be turned.on*

As shown, the order auxiliary-adverb is not possible, when V2 is controlled for (here, by using an embedded question and a relative clause). In English, again, the surface scope order is possible, as indicated in the translations, and again, there may be a preference for modal-adverb order, the reverse of the Norwegian preference.

Swedish, Danish, and Icelandic are like Norwegian in this respect, in favoring the "low auxiliary" order when V2 is controlled for, so this represents a basic distinction between North Germanic on the one hand and English on the other.[1]

[1] Thanks to Björn Lundquist for discussion of Swedish, and to Sten Vikner and Ken Ramshøj Christensen for discussion of Danish.

The finite verb in Icelandic normally precedes midfield adverbials, but non-finite auxiliaries follow, and normally cannot be interrupted, as indicated in (5).

(5) a. Jón mun aldrei hafa lesið bókina.
*Jón will never have read.*PERF *the.book*

'Jón has apparently never read the book' (Icelandic, Thráinsson 2007, 58)

b. *Jón mun hafa aldrei lesið bókina.
*Jón will have never read.*PERF *the.book*

The modals and periphrastic tense and voice of North Germanic are structurally and semantically similar to those of English, for example only the highest verb is finite, and the form of each lower verb is dictated by the next verb up: the auxiliary 'have' combines with a participle, the passive auxiliary combines with the same participle (with limited exceptions), and the modals combine with infinitives, just as in English (one difference is that the modals can be non-finite in North Germanic, but not in English).

Here is an example, from Nilsen (2003), with a modal combining with the perfect and the periphrastic passive, in which all auxiliaries follow all midfield adverbs.

(6) at det ikke lenger alltid helt kunne ha blitt ordnet
that it not any.more always completely could have been fixed

'that it couldn't any longer have always been completely fixed' (Norwegian, Nilsen 2003)

In an English example with a similar number of auxiliaries, the further *completely* is separated from *fixed*, the worse the example, as impressionistically indicated in (7).

(7) a. The radio could have been completely fixed.
b. ? The radio could have completely been fixed.
c. *? The radio could completely have been fixed.
d. * The radio completely could have been fixed.

There is often some flexibility in the placement adverbs relative to auxiliaries in English, as long as their order relative to each other is maintained.

(8) a. It could no longer have always been completely fixed.
b. It no longer could have always been completely fixed.
c. It could no longer always have been completely fixed.
d. It no longer could always have been completely fixed.
e. *It could always no longer have been completely fixed.

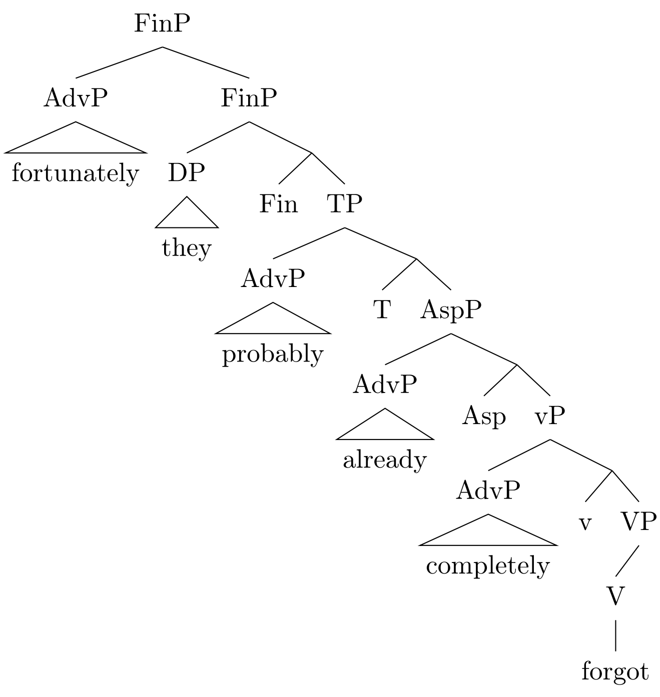
Like the verbal inflections, the North Germanic adverbs are also comparable to their English counterparts, for example showing similar ordering restrictions (Nilsen 1997 on Norwegian, Beijer 2005 on Swedish, Jónsson 2002 on Icelandic), so we would expect the underlying order of Merge of the various elements to be very similar.

For further discussion of the limited freedom of positioning of adverbs in English, see for example Cinque (1999, 2004); Ernst (2002); Edelstein (2012), and references there. In addition to this limited freedom, verbs sometimes 'move' across adverbs but without changing scope (in fact, verb movement never affects scope, Haegeman and van Riemsdijk 1986; and I will argue that it is not actually movement).

Thus, the linear order of the North Germanic middle field is something of a puzzle. I will refer to the puzzle as the puzzle of the low auxiliary.

Even a simple clause appears to have layers of structure which provide distinct positions, or at least minimal heights, for speaker-oriented adverbs, temporal and modal adverbs, and manner and degree adverbs, as sketched in (9). Without at least a few layers, it is very hard to explain the strict ordering effects observed (see Cinque 1999 and Ernst 2002 for discussion).[2]

(9)



I will assume that a finite declarative clause in English or Norwegian normally includes several distinct layers, as illustrated in (9), but also that some

[2]Though it is possible that projections collapse when not needed, and expand when needed for specifiers and adjunction sites, it is not clear what predictions are made by assuming so.

clauses contain additional layers for periphrastic modality (Mod), aspect (in particular the perfect, which combines with the auxiliary *have*, Aux_{Perf}), or voice (passive, which also takes an auxiliary). See for example Ramchand and Svenonius (2014) and Wiltschko (2014) for arguments that an Asp[ect] projection is always present, Adger (2007) on Fin[iteness], Alexiadou et al. (2015) on v and Voice.[3]

Norwegian modals can be subordinate to perfect aspect (*har måttet gjøre* 'has had to do', *har kunnet bli* 'has been able to become'), and can also be superordinate to the perfect (*må ha gjort* 'must have done', *kan ha blitt* 'can have become'), so Norwegian modals can appear above or below Asp in a diagram like (9). This will account for the two interpretations seen in (3) and (4) even if the positions for the adverbs *allerede* 'already' and *alltid* 'always' are fixed at the AspP level (alternatively, or in addition, it is possible that one or both of these adverbs can be merged in more than one possible position).

Though verb movement is a standard way of understanding cross-linguistic variation, the puzzle of the low auxiliary does not easily admit to a verb-movement based solution, for the simple reason that verb movement moves verbs upward, whereas the problem is that the verbs surface as if they were lower than expected.

It is possible that adverbs in North Germanic are systematically adjoined higher than their English counterparts, but the question would be why. I will pursue a different kind of explanation, one which allows English and North Germanic adverbs to be merged into their scope positions.

In Icelandic, the finite verb surfaces in a functional position (Fin, according to Wiklund et al. 2007), to the left of midfield adverbs, as seen in (5) for an auxiliary and illustrated in (10a) for a main verb, but in English and the mainland Scandinavian languages it does not, as illustrated in (10b–10c) (using embedded questions in (10a) and (10b) to exclude V2).

(10) a. Ég veit af hverju Hedda kaupir oft skó.
I know of why Hedda buys often shoes

'I know why Hedda often buys shoes' (Icelandic, from Wiklund et al. 2007, 215)

b. Jeg vet hvorfor Hedda ofte kjøper sko.
I know why Hedda often buys shoes

'I know why Hedda often buys shoes' (Norwegian, ibid.)

c. I know why Heather often buys shoes.

[3]Legate (2003) argues specifically that there is a "v" projection even in unaccusatives, whereas Alexiadou et al. (2015) propose that Voice is absent from unaccusatives. For this reason, I use "v" as the label for the category marking the left edge of the verb phrase, and I omit Voice from the trees because it does not play a role for the phenomena discussed in this paper.

Bobaljik and Thráinsson (1998) and Adger (2003) develop analyses of English inflection which allow inflections, but not words, to lower in limited circumstances. These mechanisms will not cover the North Germanic cases of low auxiliaries since entire inflected words, and sometimes more than one word, appear after middle field adverbs. For example, it is fairly clear that *helt* 'completely' in Nilsen's example in (6) modifies the degree to which *ordnet* 'fixed' applies to the theme, so it could be expected to Merge with VP, inside at least the perfect and modal operators, but it is preferred at the left edge of all the verbs (or, in a V2 context, to the left of the nonfinite sequence, as in the Icelandic example in (5)).

My solution to the puzzle of the low auxiliary, still in purely descriptive terms, will be to say that the various verbal elements in a clause form a CLUSTER in North Germanic, but not in English, where a cluster is a sequence that cannot be interrupted by (phrasal) adjuncts.[4] Verb clusters are well-known from the other West Germanic languages, where they appear at the right edge of the verb phrase, rather than at the left edge, as in North Germanic.

(11) a. weil er sie gesehen haben muss
because he her seen have must

'because he must have seen her' (Standard German, 321 order)

b. wil er si mues gsee ha
because he her must seen have

'because he must have seen her' (Swiss German, 132 order; Wurmbrand 2017)

These sequences of verbs are clusters because, outside of V2 contexts, the adjacency of the verbal elements is strict; no arguments or adjuncts can intervene between verbs in a cluster.

In this paper I propose a unified solution which maximizes the similarity of the base structures in North Germanic, English, and the other West Germanic languages, and pins the difference on the interaction with a parameterized syntactic feature with a PF process of linearization.

Nilsen (2003) and Bentzen (2005, 2007) analyzed the puzzle of the low auxiliary as involving a syntactic verb cluster. In the proposal presented here, the cluster is not a traditional syntactic constituent, but a part of a span. In the present analysis, the proposed cluster could be called a PF cluster, but the clustering effect is caused by the distribution of features which are present in the syntax, so it is not a purely PF account.

[4] I add the restriction "phrasal" because there are some cases where a part of a cluster might be analyzed as a clitic-like adjunct, for example in Norwegian *har gjen-erobret* 'has re-conquered', where *gjen-* 're-' might be analyzed as a clitic adjunct inside a cluster.

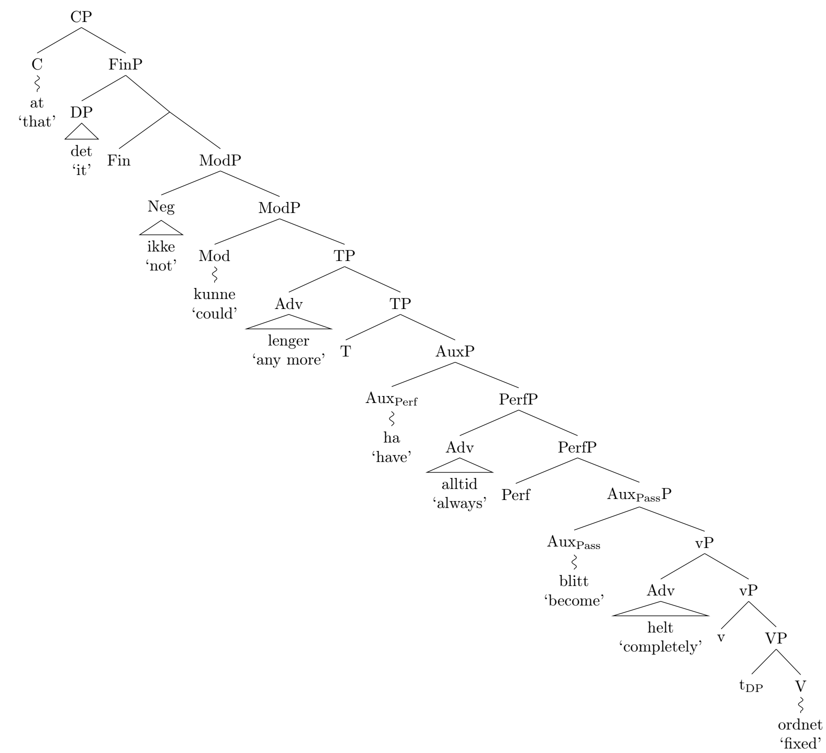
2 The solution, in a nutshell

The solution I develop here to the puzzle of the low auxiliary in North Germanic relies on mechanisms which are independently motivated in a span-based approach to spell out, "Spanning". The approach to spell-out known as 'Spanning' has emerged from work such as Brody (2000a,b); Son and Svenonius (2008); Ramchand (2008a); Abels and Muriungi (2008); Adger et al. (2009); Svenonius (2012); Bye and Svenonius (2012); Ramchand (2012); Anderssen (2012); Merchant (2015), inter alios. Like Distributed Morphology (DM, Halle and Marantz 1993) and Nanosyntax (Baunaz and Lander, 2018), Spanning is syntax-based and realizational (using late insertion), but unlike standard DM and Nanosyntax, morphophonological exponents correspond not to syntactic heads, terminal nodes, X^0's, or syntactic constituents, but to syntactic *spans*. Otherwise, Spanning is not intrinsically incompatible with either DM or Nanosyntax and either of those frameworks can be adapted to span-based spell-out (and sometimes are; e.g., Dékány (2011) implements spanning in a Nanosyntactic framework, while Haugen and Siddiqi (2016) implement spanning in a DM framework).

In Spanning, a sequence of categories arranged in a head-complement relation is called a span. If T^0 takes vP as its complement, and v^0 takes VP as its complement, then V-v-T is a span, and so are V-v and v-T (and each head by itself constitutes a 'trivial span'). As originally proposed by Brody (2000b), certain heads bear a feature "@" which designates them as loci for linearization in the span. For example, in Icelandic, an inflectional head Fin above the attachment sites of midfield adverbials bears @, so the verbal word linearizes there. In English, inflectional heads above the attachment sites of midfield adverbials lack @, but a head v in the verb phrase bears it, so the verb linearizes there.

Consider the tree diagram in (12) for the clause in (6), and based on the analysis in Nilsen (2003). Here, adverbs are depicted in positions in which they could be interpreted (but the surface word order is not depicted, nor is the morphological incorporation of V and v, $\mathrm{Aux}_{\mathrm{Pass}}$ and Perf, $\mathrm{Aux}_{\mathrm{Perf}}$ and T, or Mod and Fin).

(12)



This is similar to the surface order in English (see the translation in (6)). Minor flexibility in the word order in English could either be because there is some flexibility in attachment sites of the adverbs (Ernst, 2002), or because there are some additional heads providing optional surface positions for the various auxiliaries (as in Cinque 1999, but modeled here without head movement), or both.

Brody (2000b) proposed for verb clusters in Hungarian that the verbal words in a span linearized at a single point, which he designated with a feature "@" on the node determining the point of linearization. Extending that proposal to Norwegian, I suggest that there is a feature @ on v (or Voice), and not on any of the other heads in the verbal span in (12). This causes all of the verbal words to linearize there.

English is distinguished from Norwegian in having an additional @ in the span for each additional auxilary (meaning modals, perfect *have*, and progressive and passive *be*). Each of the periphrastic heads is stored in the English lexicon with @, unlike the case in North Germanic.

The feature @ is present in the syntax but its main effects are realized at PF, at spell-out. Spell-out associates phonological material with spans, and also linearizes that phonological material relative to the phrasal dependents of the span. The linearization procedure is governed mainly by the distribution of @.

West Germanic other than English is the same as North Germanic in this respect except that the West Germanic cluster linearizes at the right edge of the verb phrase while the North Germanic verb cluster linearizes at the left edge. Following Brody, this simply means that the spell-out point @ is on V in continental West Germanic, rather than v. I return to this matter in the penultimate section.

In Hungarian, the clusters described by Brody appear to be located at the left edge of the verb phrase like in Norwegian, as illustrated in (13), though focus movement can cause the object to appear to the left (not shown). Unlike the case in North Germanic, however, the words are in reverse ('roll-up') order, with the higher verbal words to the right of the lower ones, as in German (the inseparable cluster here is *szét sedni akarni* 'apart-take-want'; it does not include the finite verb *fogom* '[I] will', from which it can be separated by material not included in the verbal span).

(13) Nem fogom szét sedni akarni a rádiót.
not *will.1*SG *apart* *take.*INF *want.*INF *the* *radio*

'I will not want to take apart the radio' (Hungarian, Koopman and Szabolcsi 2000, 18)

I will return to how to handle the variability in the linearization of words within the cluster.

3 The analysis

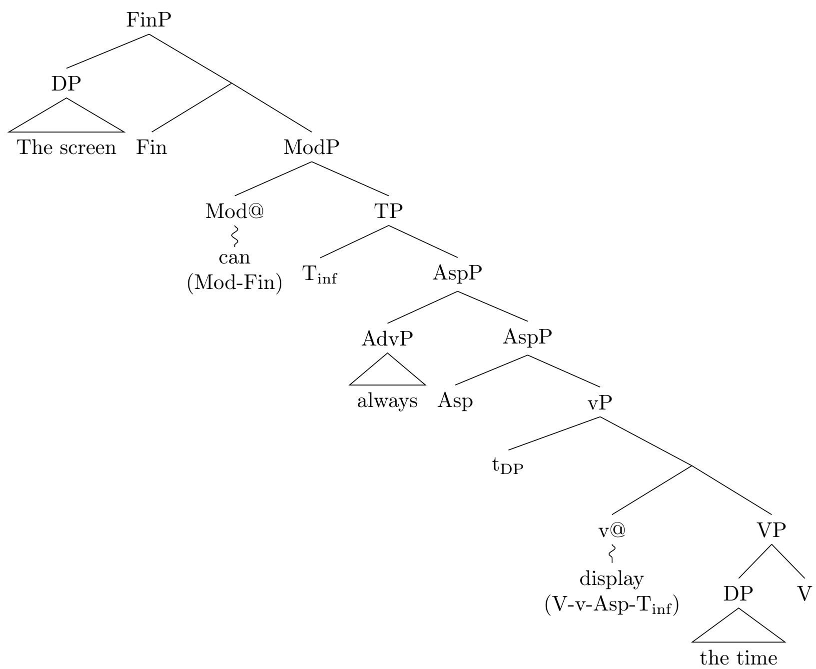
In section §2, I outlined the solution to the puzzle of the low auxiliary by suggesting that the North Germanic periphrastic verb forms lack independent linearization sites, with the result that all verbs cluster together at the position of the lexical verb. In this section, I present the details of the theoretical assumptions which allow a formal analysis.

3.1 The effect of @

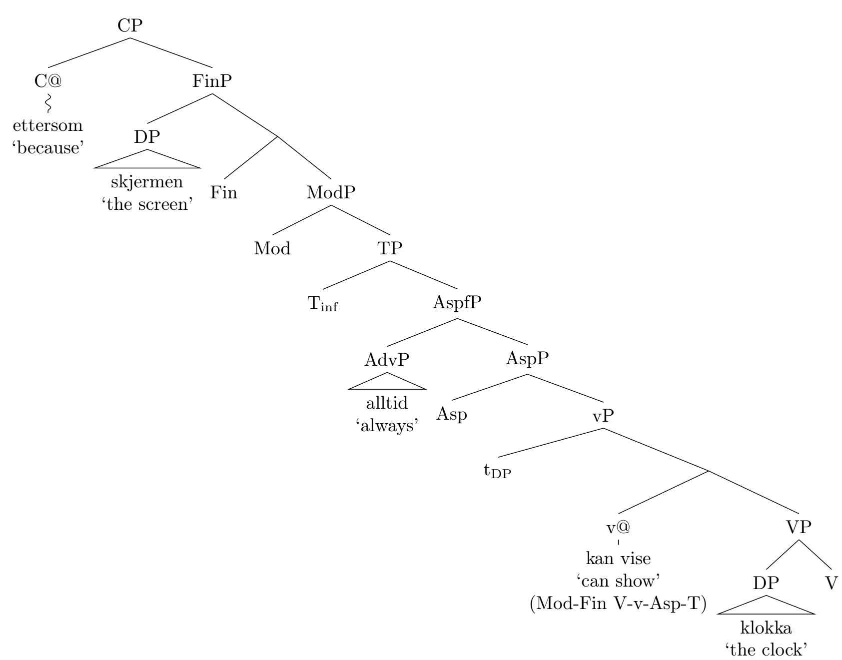
Suppose that modals are a category Mod which combines with an infinitival T, T_{inf}, essentially as depicted in (12), and suppose that in English, Mod has @, but in Norwegian, Mod lacks @. Now consider the two trees (keep in mind that the Norwegian tree here is an embedded clause, without V2; in a matrix clause, there would be an additional head (Top[ic]) above Fin which would cause the finite verb *kan* 'can' to linearize in second position).[5]

[5]This particular example would be unaffected if T_{inf} and Asp were fused into a single category, responsible for the infinitival morphology of the main verb, with the adverb adjoined to it.

(14)



(15)



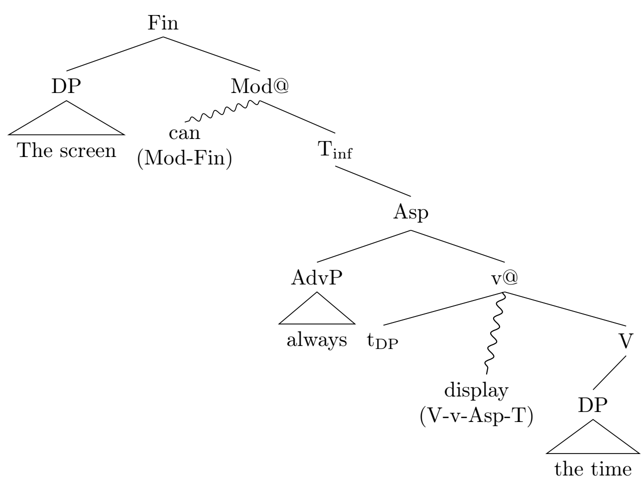
Triangles in these trees are specifiers and adjuncts which are phrasal dependents of the verbal span, not heads in it. They are linearized according to their syntactic position, to the left of other material expressed in their hosts.[6] Within each specifier and adjunct there are nodes with @ (not shown), to determine linearization internal to the phrase.

Squiggly lines are not syntactic dependencies, but simply indicate the linearization of the exponents of a span relative to the specifiers and adjuncts (adopting the convention from Bye and Svenonius (2012)).

I am assuming the equivalent of V-to-v movement for both languages, and I am assuming that the direct object of transitive verbs, including 'eat', occupies the specifier of V.

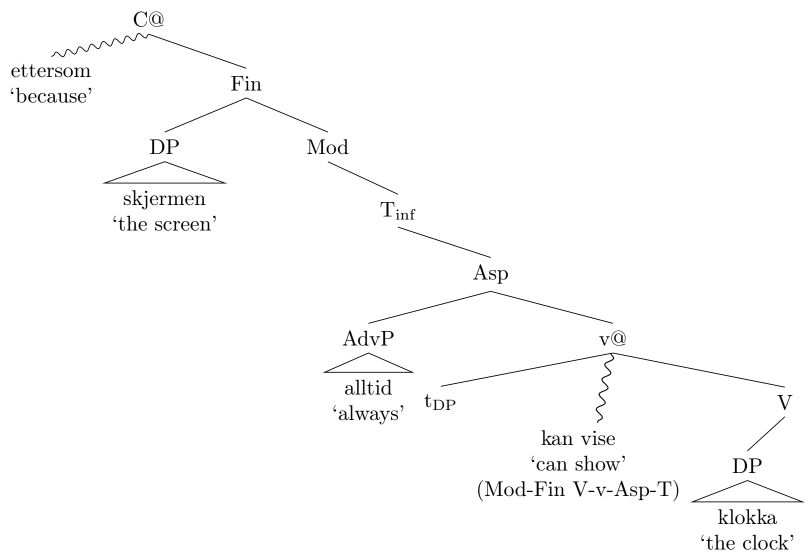
As pointed out by Brody (2000a), traditional tree representations like those in (14–15) contain several redundant nodes. Left branches represent specifiers and adjuncts, and right branches represent complements. Preserving that convention, the head and the nodes it projects can be collapsed into a single symbol, as in the following 'telescoped' trees.

(16)



[6] I will not deal with right adjuncts in this paper. See Kayne (1994) for one theory of them.

(17)



These telescoped trees reflect the derivation economically by showing the dependencies which are created, without redundantly also indicating each layer of projection. Since intermediate projections do not behave as constituents, for example in that they cannot move, this mode of representation is perspicuous. This is especially true once head movement is eliminated. In that case, the only projection that can move is the maximal projection, and that is the only one with a syntactic label in these diagrams.

Note that the binarity of Merge is not compromised; the squiggly lines are not syntactic but simply indicate visually where the exponents will linearize at Spell-Out.

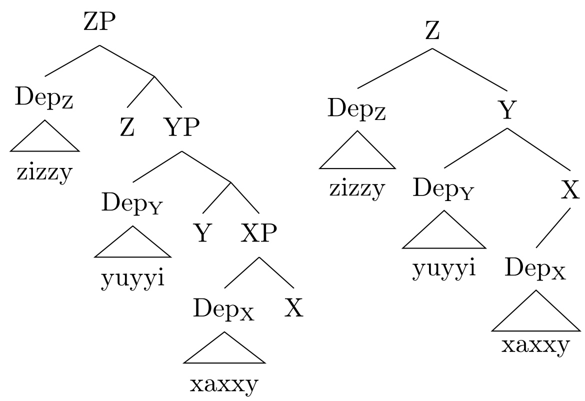
We could indicate the distinction between specifiers and adjuncts in the trees by adding the features which introduce the specifiers, e.g., [*u*D] on V, v, and T, or alternatively theta roles and Case.

The trees in (16–17) have the advantage of displaying the span directly, without redundancy, as it can be read directly from the bottom right node upward: V-v-Asp-T-Mod-Fin-C in (17).

3.2 Learning the distribution of @

The distribution of @ varies crosslinguistically so it must be learned. The location of @ in a language is learned on the basis of word order; if a word *x-y-z* corresponding to an extended projection Z > Y > X is pronounced to the left of phrasal dependents of Y, then the language must have @ higher than Y, i.e., in Z. If it is pronounced to the right of phrasal dependents of X, it must have @ in X. And finally, if it is pronounced between phrasal dependents of Y and phrasal dependents of X, then it must have @ in Y. Here the telescoped tree is presented to the right of the legacy tree.

(18)



If the learner hears the string in (19a) with the analysis in (18), the learner can posit @ on Z, and so on.

(19) a. *zizzy xyz yuyyi xaxxy*: Z@
b. *zizzy yuyyi xyz xaxxy*: Y@
c. *zizzy yuyyi xaxxy xyz*: X@

For example, if *can* is understood to express a category Mod in the span, and *always* is understood to express a left adjunct to its complement, then the order *can* ≺ *always* motivates @ on Mod. The order *alltid* 'alltid' ≺ *kan* 'can' in the Norwegian embedded clause, on the other hand, constitutes evidence against there being @ in Mod in Norwegian.

If adverbs can appear higher than the positions in which they are interpreted, this will complicate the learning process, but it can be assumed that the dominant surface word order determines the primary parameter settings. In this way, Norwegian learners will learn that there is no @ lexically associated with modals, while English learners will learn that there is one.

3.3 The distribution of [w]

I have not yet said anything about where and how the span is divided into words. In some languages, words are often large and spell out entire extended projections, while in other languages extended projections are broken up into smaller words. Learners have to identify categories which form the boundaries of domains for lexical insertion, which I will assume they do by marking those categories with a feature.

Svenonius (2016) proposes a feature [w] (mnemonic for 'word') on a head which is at the top of a span that spells out as a prosodic word. Capitalizing on the 'Mirror' fact that languages tend to map spans to words from the bottom up, with the bottom of the span forming the beginning of the word and the top of the span forming the end, the exponent corresponding to the head bearing [w] will be word-final. For example, if the English participial suffix *-en* in participles like *given*, *taken*, *eaten*, *grown*, and *seen* is analyzed as a category Part[iciple], then learners may infer that Part bears [w] on the basis of the fact that *-en* is word-final.

Learners use word prosody to help identify word boundaries (Christophe et al. 2003) and use function words to identify the category of phrases (Christophe et al. 2008). I assume that prosodic word boundaries are a by-product of cyclic word production, so that identifying prosodic word boundaries means identifying domains of word formation, by which I mean mainly lexical insertion plus regular phonology (Bye and Svenonius 2012; Bermúdez-Otero 2012).

It is a robust result of child language acquisition research that in languages where there is a correlation between inflection and position, children recognize this early. For example, in Norwegian main clauses, there is a fairly strong correlation between finite tense inflection and verb $\prec$ adverb order, and between lack of finite tense inflection and adverb $\prec$ verb order. And indeed, Westergaard (2009) shows that at the two-word stage, Norwegian children consistently produce tensed verbs before adverbs (e.g., *går ikke* 'goes not') and infinitives after adverbs (*ikke gå* 'not go'). In the present framework, that suggests that children by the age of two are attending closely to the distribution of [w] as well as @.[7]

3.4 The distribution of @ in English

In addition, as observed above, in English every auxiliary is separable from every other auxiliary and from the main verb. Adverbs can appear in between each pair of verbs. As soon as a learner hears an adverb separating two words in the same span, the learner knows that there are two heads with @, one below the adverb and one above. In cases where the adverb data does not uniquely determine a solution, there may be default strategies for positing the location of @, for example to assume that it is low (giving head-final structures) or to assume that it is on the head with [w] (giving the results like those of the 'rich agreement hypothesis', which links overt inflection with head movement; cf. Koeneman and Zeijlstra 2014). Different strategies may be implemented by different languages.

For English, there appears to be a pattern such that @ is on the higher of the two items introduced in each periphrastic construction. Thus, a modal, Mod@, is paired with an infinitival tense, T[w]; in the perfect, Aux_{perf}@ is paired with Perf[w], and so on. The rules governing the construction of extended projections must ensure that if there is a modal, there is also an infinitival T, in English; this can be accomplished through selection or some other means.

[7] In the analysis I will present, the V2 head is Top which has @ but not [w], while the finite tense head is Fin which has [w] but not @; so an early child hypothesis that there is a single head C with both @ and [w] in Norwegian would have to be revised as the embedded word order is learned; instead, there is a span Fin[w]-Top@ in main clauses, and another span Fin[w]-C@ in subordinate clauses, where a subordinating complementizer linearizes in C. Interestingly, a suitable formulation of Kayne's (2005) 'one feature one head' principle could forbid a head from bearing both @ and [w], thereby virtually forcing the right result.

(20) Here, $\rightarrow$ can be read as 'projects to' (English specific)

a. $\text{Voice}_{\text{pass}}$[w] $\rightarrow$ Aux_{pass}@

b. Prog[w] $\rightarrow$ Aux_{prog}@

c. Perf[w] $\rightarrow$ Aux_{perf}@

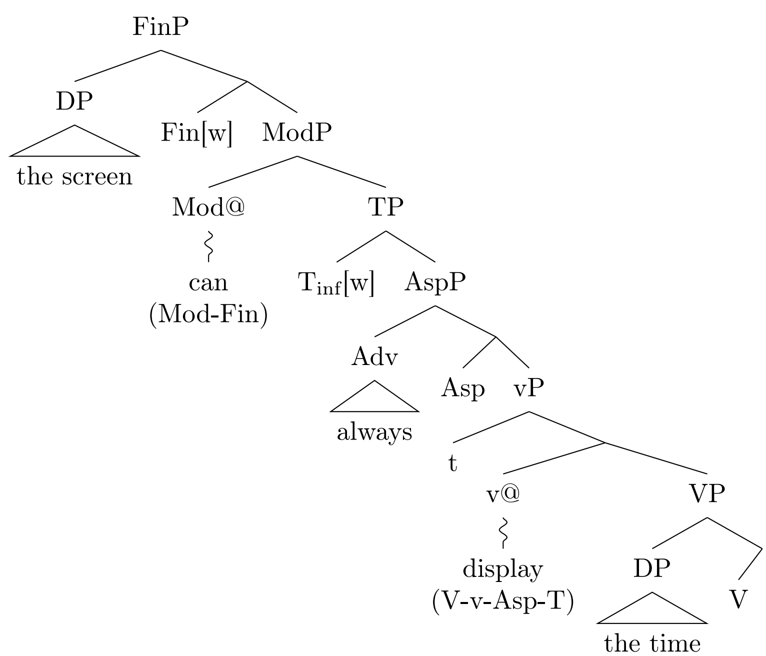
d. T_{inf}[w] $\rightarrow$ Mod@

Here is a (partial) Hierarchy of Projections or HoP for English, with linearization points marked. Active Voice would occupy the same position as passive Voice but would lack [w], and would not project to an auxiliary. In the absence of Mod, English has T without [w].

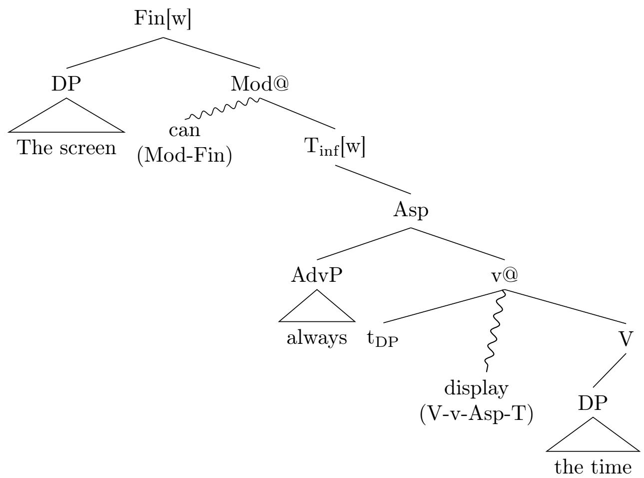
(21) Fin[w] > Mod@ > T_{inf}[w] > Aux_{Perf}@ > Perf[w] > Aux_{Prog}@ > Prog[w] > Aux_{Pass}@ > $\text{Voice}_{\text{Pass}}$[w] > v@ > V

The tree in (14) is repeated in (22), but this time with the [w] features indicated on Fin and T_{inf}. As before, a telescoped tree follows the legacy tree, but now with its own number, as the trees are too large to be placed side by side. An optional higher @, allowing auxiliaries to surface higher, is not shown here, but is discussed below.

(22)



(23)

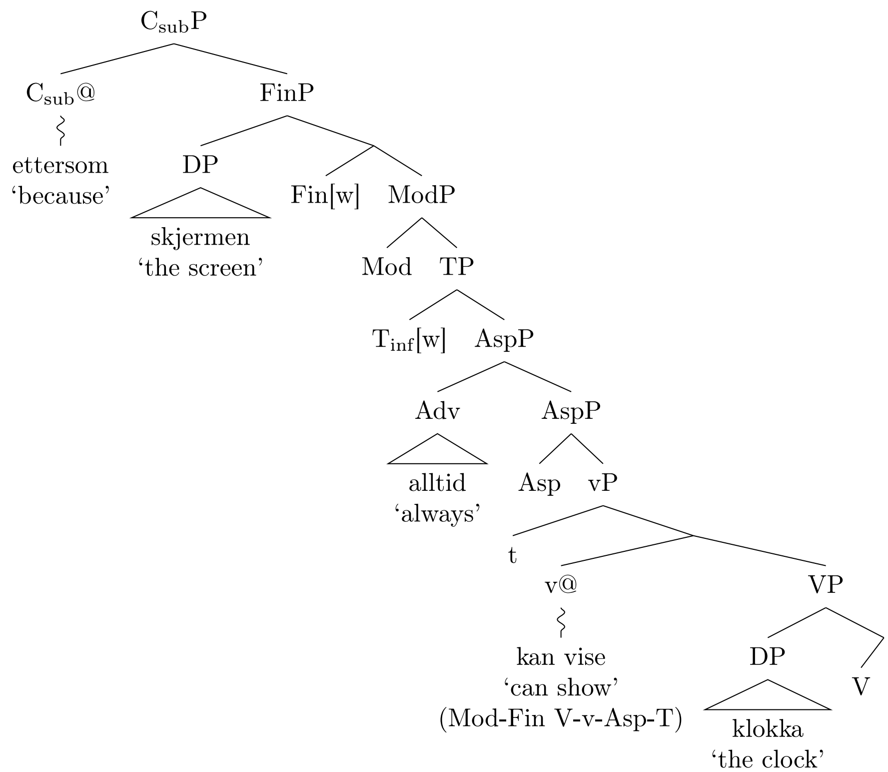


The heads with [w] features split the maximal span into two [w]-spans, Mod-Fin and V-v-Asp-T, spelling out at the nodes with @, namely Mod@ and v@, as *can* and *display* respectively.

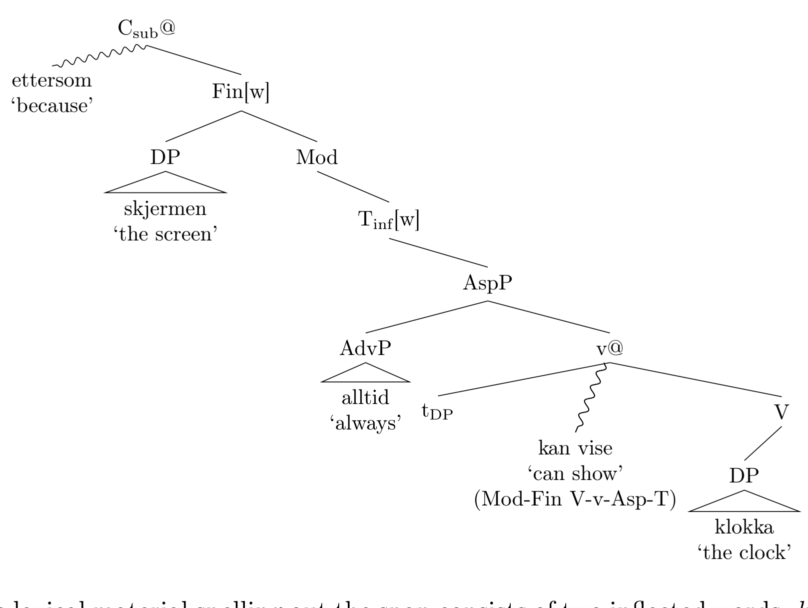
3.5 The distribution of @ in Norwegian

Because Norwegian verbal inflectional morphology is similar to that of English, the distribution of [w] in Norwegian will be approximately the same as in English, appearing in Fin, because finite verbs are words, and also in $\text{Voice}_{\text{Pass}}$, Perf, and T_{inf}, when present, because those are the categories of nonfinite words. However, the distribution of @ in the Norwegian clause is different from that of English, and varies across Norwegian dialects. Continuing to control for V2, I include a C node in (24) to make clear that it is an embedded clause. Note that the subordinating C node also has @, because a complementizer linearizes there. The crucial difference between this embedded Norwegian clause and the English clause in (22) is that here there is no @ in Mod here.

(24)



(25)



The lexical material spelling out the span consists of two inflected words, *kan* and *vise*, and one function word, *ettersom*; yet for these three words, there are only two linearization points. It stands to reason that *ettersom*, which lexicalizes C, should also linearize there, and it stands to reason that *vise* should linearize at v, since it contains v. But the modal auxiliary *kan* does not have its own linearization point, and in effect it cliticizes to another word in its extended projection, forming a cluster.

The fact that Mod cliticizes to the main verb, rather than to the complementizer, and that it linearizes to the left of the main verb, rather than to the right, are not guaranteed by any UG principle. The spell-out mechanism must develop an algorithm for linearizing the material that the syntax generates, but UG does not dictate how it does that. The algorithm which is developed will be constrained by computational factors, which are universal, but will also be influenced by contingent factors having to do with the history of the language, including language-specific prosodic considerations.

Bentzen (2007) identifies three varieties of Norwegian, which she calls EN (Eastern Norwegian, including Oslo and approximating the standard described here up to now), TrNN (Tromsø Norwegian, spoken in Tromsø in the north, population ca. 60,000), and ReNN (Regional Northern Norwegian, spoken in parts of Northern Norway which are not as densely populated as Tromsø).

According to Bentzen, EN is as I have described Norwegian so far, with all verbs clustering at v.[8] TrNN, however, allows finite auxiliaries to appear before aspectual adverbs such as *allerede* 'already' and *ofte* 'often', but not before higher adverbs including *heldigvis* 'fortunately'. In the terms of the current analysis, this could suggest that finite T in TrNN (that is, T immediately below Fin) optionally bears @ when it is in the w-span of a modal or auxiliary (in effect, in that case, it would also be adjacent to Mod or Aux). An adverb like 'fortunately' will attach at or higher than T, and continue to precede an auxiliary linearized there, but an adverb like 'already' may attach lower, and be preceded by the finite auxiliary.

This is reminiscent of the English pattern as I have described it, since the higher @ is restricted to auxiliaries, but it is also different since it only applies to finite auxiliaries (optional @ is in finite T in TrNN, so it will not affect a non-finite 'have' below a modal, for example, while English has @ in the perfect Aux, which is present regardless of whether Aux is finite). In English, however, auxiliaries can also precede higher adverbs like *fortunately*; so English has an additional possibility of a higher @, perhaps in Fin (I return to this below).

The third Norwegian variety that Bentzen describes, ReNN, has two additional possibilities. First of all, non-finite auxiliaries may precede low adverbs, so this suggests @ in the Aux heads introduced in the non-finite tenses, as in English, but only optionally. But in addition, finite main verbs can also precede low adverbs. This suggests optional @ in finite T with no condition that it be

[8]Faarlund et al. (1997, 901), a reference grammar, notes that the passive auxiliary may be separated from the passive participle by low adverbs which presumably are attached to vP or VoiceP (as in *er blitt strengt oppdradd* 'has been strictly raised' or *er blitt omhyggelig vurdert* 'has been painstakingly evaluated'), suggesting that even in EN, the passive auxiliary may have its own @; higher auxiliaries will then cluster there, as in these examples with the perfect.

restricted to auxiliaries.[9]

3.6 A Linearization Algorithm

Linearization of words in a span can be stated algorithmically or else modeled using an Optimality-theoretic framework, in either case referring only to surface properties of the derived structure after syntax.

To see what the constraints are, order in matrix clauses must be considered. Matrix clauses are V2, so there is a head, Top[ic], which attracts a topical XP to the first position and has @, causing linearization of the highest word (w-span) there.[10]

(26) Da har hesten allerede spist havren.
then has the.horse already eaten the.oat

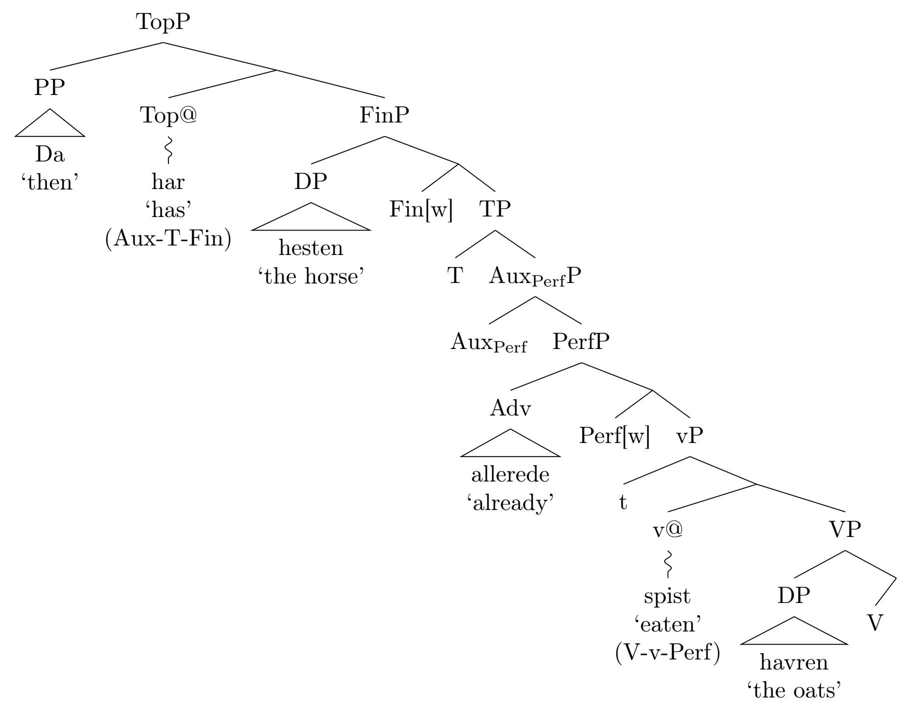
'Then the horse has already eaten the oats'

---

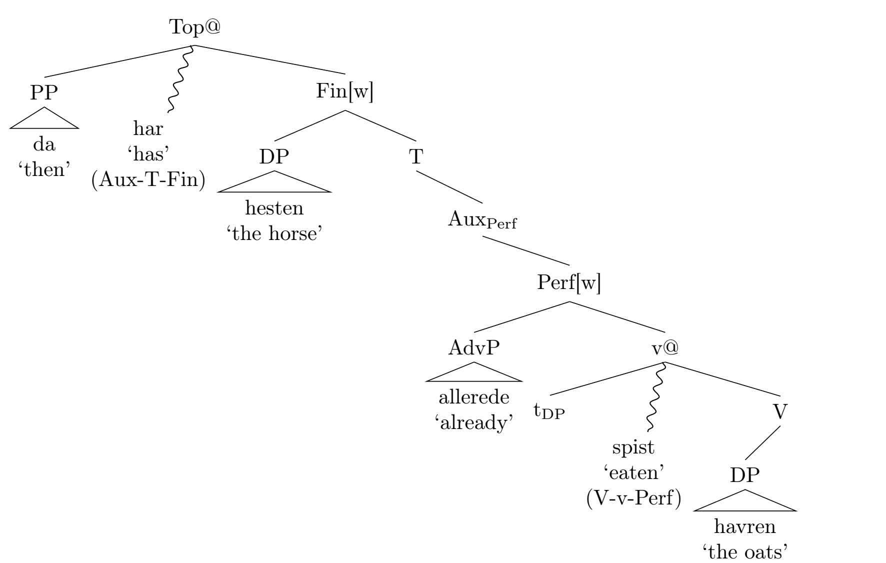
[9] So far unexplained on my account is why what Bentzen describes as short verb movement in TrNN and ReNN cannot cross negation. It can be described if T@ and Aux@ are incompatible with negation in Norwegian, but if this is the right description then it awaits explanation. Bentzen also observes that the optional verb movements in TrNN and ReNN fail to cross certain quantificational adverbs such as *alltid* 'always' and *aldri* 'never'. Possibly, these are adjoined to TP and so precede verbs linearized at T. Alternatively, there is some connection to Polarity, as suggested by Nilsen (2003), who argues that adverb ordering is significantly affected by polarity sensitivity. A polarity head Pol may interact with certain adverbs and also be the locus of optional @.

[10] Note that there is no exponent of Top; the word *har* ends at Fin[w]. This is consistent with the fact that no Norwegian verb has a special form in clauses with Top.

(27)



(28)

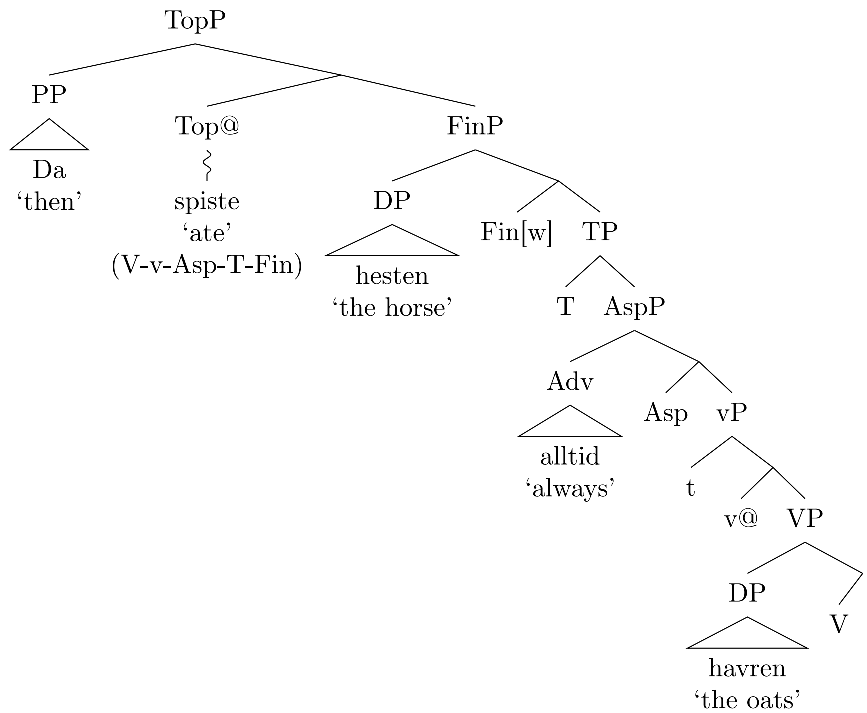


If the verb is simple, then it linearizes in Top and nothing linearizes in v.

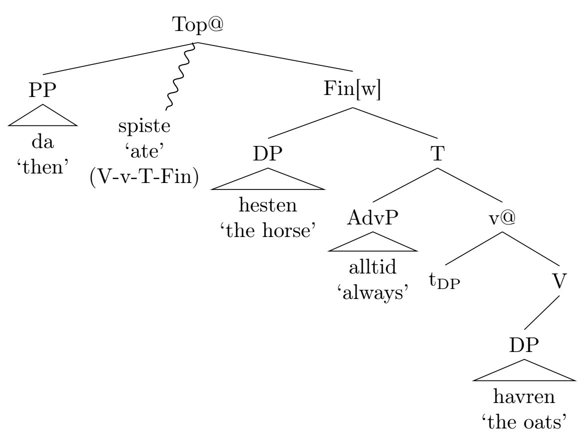
(29) Da spiste hesten alltid havren.
then ate the.horse always the.oat

‘Then the horse always ate the oats’

(30)



(31)



This shows that the linearization principles for the Norwegian clause prioritize linearizing some material in Top@ over linearizing any material in v@.

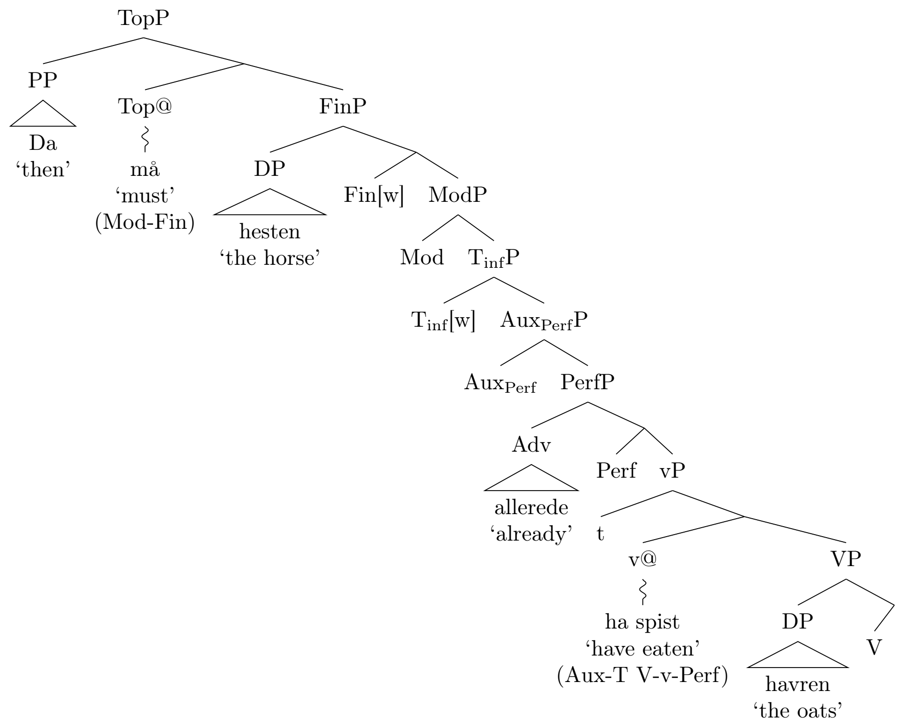
We can also consider a structure with a second auxiliary verb, illustrating with a modal.

(32)

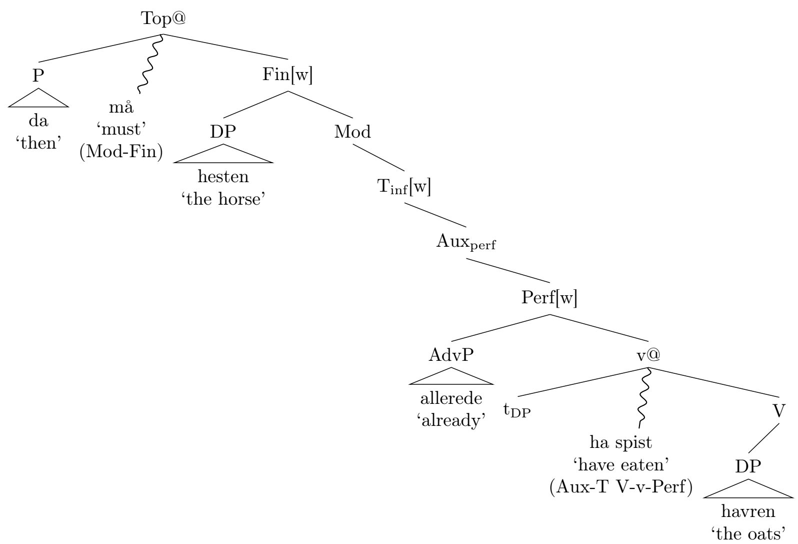
Da	må	hesten	allerede	ha	spist	havren.
then	*must*	*the.horse*	*already*	*have*	*eaten*	*the.oat*

‘Then the horse must have already eaten the oats’

(33)



(34)



What we see here is that once the necessity of linearizing something in Top has been fulfilled, additional material is linearized at the low linearization point, in v. The w-span of an auxiliary is simply Aux-T-Fin or Mod-Fin,[11] and does not include either of the linearization points.

The linearization procedure in Norwegian might include something like the following.

(35) a. Parse the maximal span into w-spans. Associate exponents within each w-span (each w-span corresponds to a morphological word; morphological words cannot be divided)[12]

b. Linearize the nearest word at the leftmost @ in the span ("Fill leftmost")

c. Linearize each (remaining) word at the @ it contains, if any ("Containment")

d. Linearize each (remaining) word at the @ to its right ("Lowering")

e. Linearize each (remaining) word at the nearest @ ("Sweeping up")

This could be formulated as a procedure, or a set of ranked constraints. It gets the correct results in the cases that have been discussed so far. The "Fill leftmost" statement in (35b) ensures that V2 is prioritized over spelling out a main verb in situ. The "Containment" statement in (35c) describes the main

[11] Actually, root modals, like non-modal auxiliaries, are also presumably embedded below a T node (Ramchand, 2018), which I have omitted for perspicuity; in my diagrams, the T dominating a root modal can be assumed to be fused with Fin.

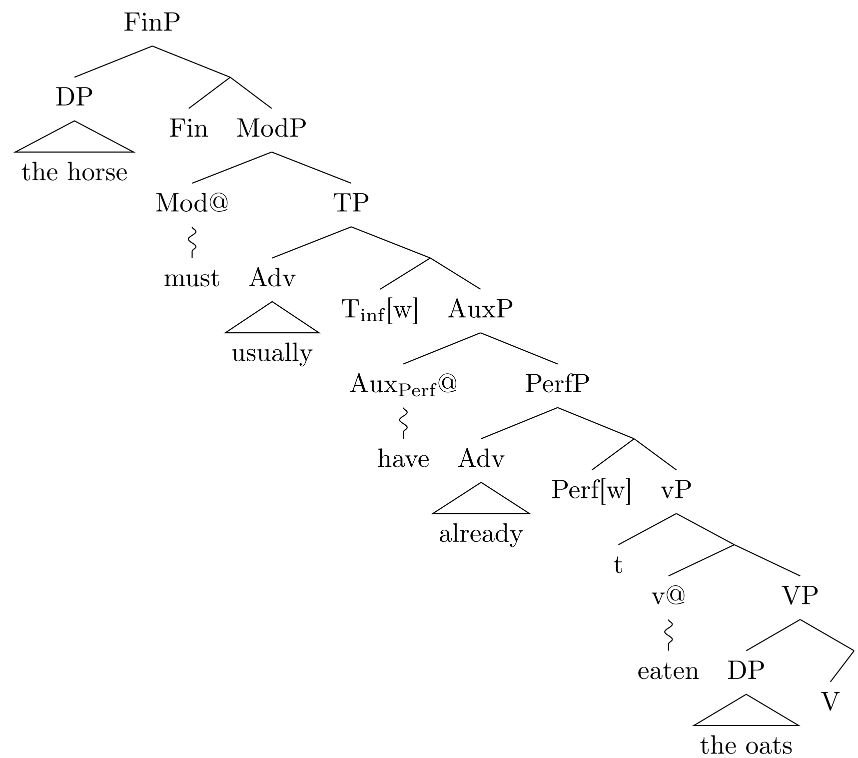
[12] Word formation is cyclic, cf. Bermúdez-Otero (2011) and references there. In case a w-span without @ is contained in a left branch of another w-span, a compound is formed, and the inner w-span is presumably lexicalized first.

verb, which spells out in situ if it can without violating "Fill leftmost" in (35b). The "Lowering" statement in (35d) ensures that any auxiliaries in between the two positions will associate rightward. The final statement (35e), "Sweeping up", ensures that verb-phrase internal particles without an independent linearization point are linearized, in this case at the v head (Swedish verb particles form part of the verbal cluster, on this analysis, just like their German counterparts; Norwegian ones may, but optionally have their own @).

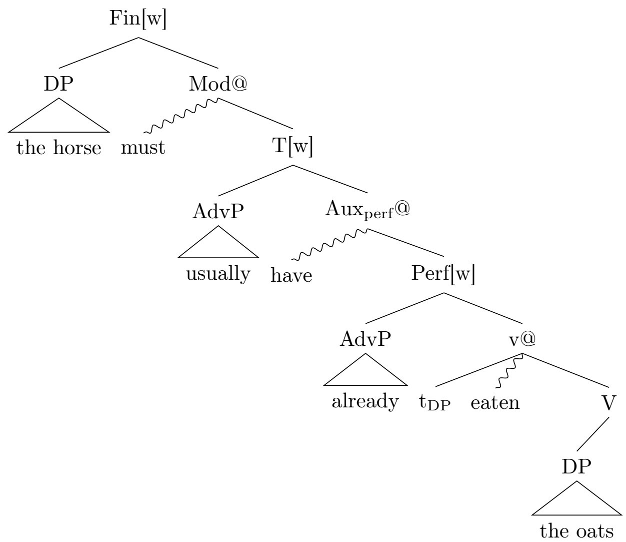
Consider a comparable English clause (I have added an additional adverb to underscore the fact that there are no clusters; if the Norwegian examples had contained another adverb, it would also have appeared to the left of the auxiliaries, as predicted by the analysis: *ettersom hesten vanligvis allerede må ha spist havren* 'because the horse usually already must have eaten the oats').

(36) The horse must usually have already eaten the oats.

(37)



(38)



Here, as already noted, Mod and Aux are introduced with @. The w-spans are Mod@-Fin[w], Aux@-T[w], and V-v@-Perf[w], so the linearization algorithm for Norwegian will work for the English data discussed so far as well. In fact, the 'fill leftmost' clause (35b) and the 'lowering' clause (35d) are not needed, because every word associates at an @ which it contains, in accordance with the containment clause (35c).

Note that the distribution of @ on categories is not limited to the main spine of the clause. Each adjunct and specifier consists of a span, and contains @ somewhere determining where its lexical word or words will linearize within the phrase. If an adjunct or specifier does not contain @ somewhere, it will cliticize to the material in the span containing it. Again, there may be language-specific constraints governing how this occurs.

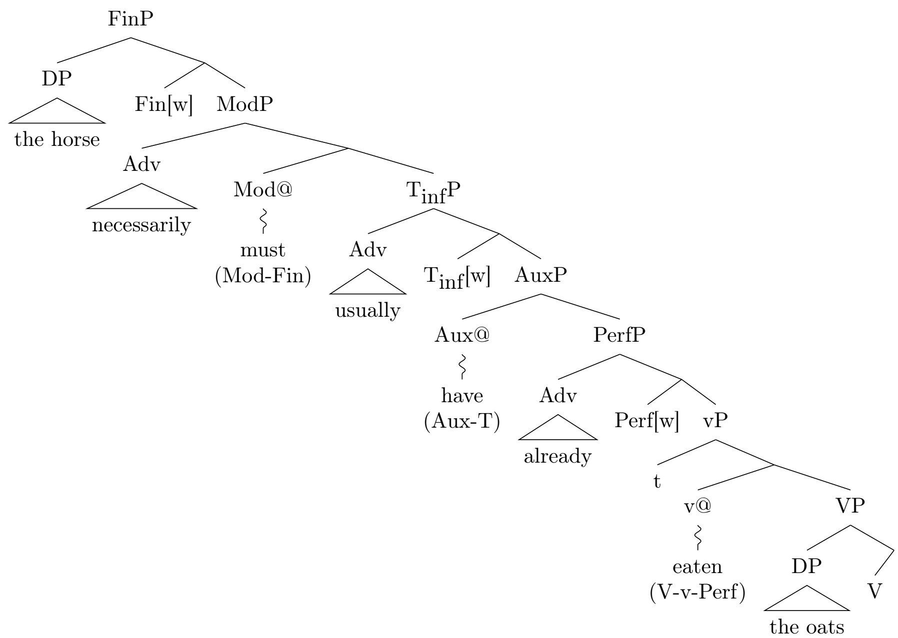
3.7 Variable order

it has been argued that adverbs are sometimes located above the positions in which they are interpreted, in a position c-commanding the category with which they are semantically combined, within a certain domain (Edelstein 2012 and references there), sometimes with additional constraints (e.g., Ernst 2002). For example, a certain class of adverb might adjoin either to Aux$_{\text{Perf}}$ or to Perf, with the result that it can either precede or follow the perfect auxiliary linearized in Aux$_{\text{Perf}}$. This provides one degree of flexibility in adverb-auxiliary order.

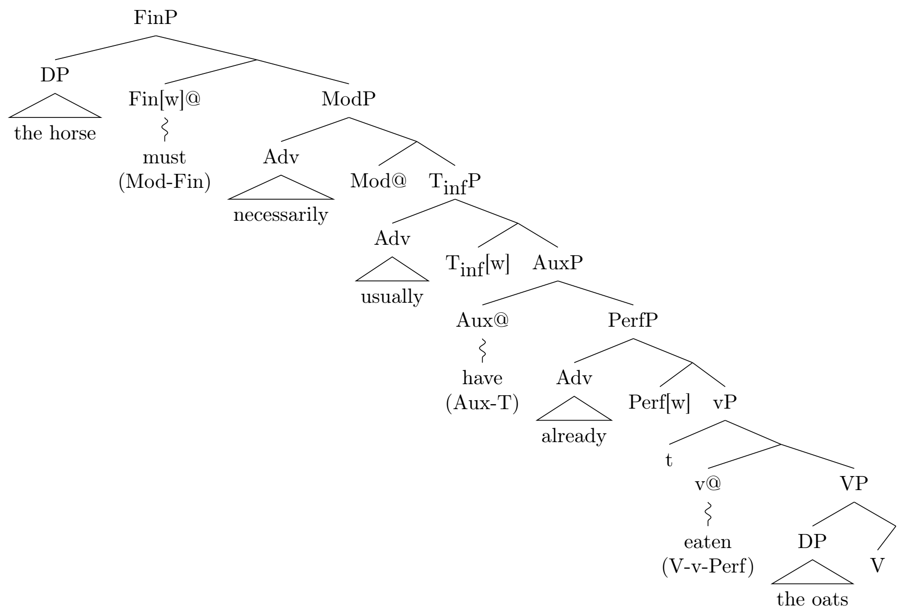
Another source of variable order, following the line of Cinque (1999) and Cinque (2004), is due to variable positioning of auxiliaries, which I analyze in terms of the distribution of @, the feature which controls where words spell out among the specifiers and adjuncts which are dependent on a span. Separate principles account for linearization of exponents within a word, when a word consists of multiple morphemes. This means that if there are more nodes with

@ than there are words, some of the nodes with @ will not be manifested. In the English example in (36), the modal *must* spells out the span Mod@-Fin[w], at Mod@, as dictated by @. In this position, it will follow an adjunct to ModP. If the lexicon also includes a variant of Fin with @ (Fin@) which could alternatively be merged with Mod instead of the @-less Fin, then the syntax could generate the span Mod@-Fin[w]@. In that case, the linearization algorithm in (35) would spell out the modal *must* in Fin, since the algorithm stipulates that the leftmost @ in the span is filled first. The modal *must* would thereby precede adjuncts to ModP, and nothing would linearize at Mod@, as illustrated in (39-40). This would provide an additional degree of flexibility of word order.

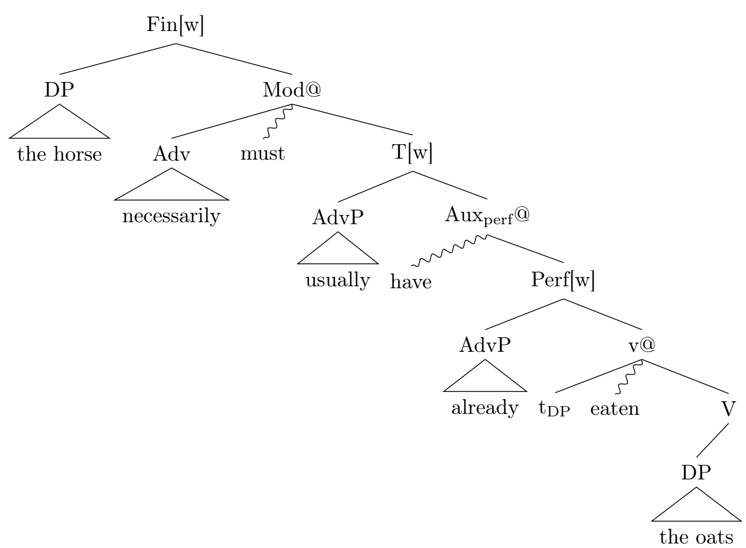
(39) Option with Fin (that is, Fin without @): *must* linearizes after an adjunct to ModP



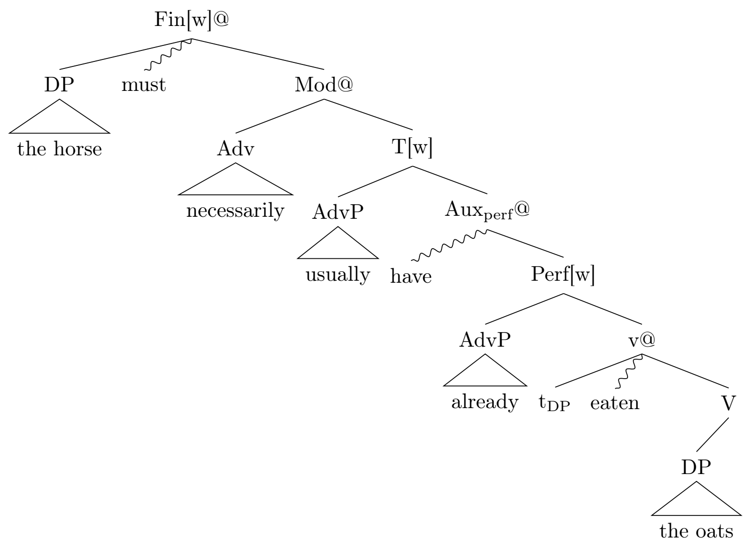
(40) Option with Fin@: *must* linearizes before an adjunct to ModP



(41) Telescoped tree for option with Fin (no @): *must* linearizes after an adjunct to ModP



(42) Telescoped tree for option with Fin@: *must* linearizes before an adjunct to ModP



This account correctly predicts that English auxiliaries can precede higher adverbs like *fortunately* (e.g., in *They have fortunately not called back*), if those can be adjoined below Fin. However, optional Fin@ would have to be prevented from attracting main verbs, since they cannot precede adverbs in English (recall from the discussion of ReNN that ReNN has optional T@, and does allow main verbs to cross aspectual adverbs). One possibility is to modify the English version of the linearization algorithm in (35) to prioritize having a word in v, so that a word will only linearize in T if it is left over after a word is linearized in v. Another possibility is that @ percolates or is copied to Fin specifically from auxiliary verbs, essentially a syntactic solution.

3.8 Section summary

The analysis of standard Norwegian (represented by Eastern Norwegian in Bentzen's (2007) survey), standing in as a representative for North Germanic more generally, is that there is a linearization point @ in the V2 position (Top) in V2 clauses and another at the left edge of the verb phrase, in the head I have called v; only this lower point is available for verbs in embedded clauses, which causes them to form a PF cluster there.[13]

English periphrastic tenses and modalities and voice each introduce a head with an @ in addition to a head with a [w]. The head with a [w] is what causes there to be a word boundary, and the head with the @ ensures that the extra word will be able to linearize independently. In North Germanic, in contrast,

[13]But see note 8 on the possibility of @ on the passive auxiliary.

each periphrastic construction adds only [w], not @, and so although there are multiple words, they cannot linearize independently.

I showed how the overall framework handles V2, and also how the distribution of @ and [w] in each language might be learned. I also discussed dialectal variation in North Germanic, where some dialects of Norwegian optionally have @ in Aux, and some optionally have @ in T.

4 Clusters in other VO languages

The possibility that verb clusters are found in head-initial configurations is not often discussed. However, I believe that the phenomenon may be common.

In Spanish, the perfect auxiliary is obligatorily adjacent to the following participle, as illustrated in (43).[14]

(43) a. Juan ha leído frecuentemente el diario.
Juan has read frequently the newspaper

'Juan has frequently read the newspaper' (Spanish, Zagona 2002)

b. *Juan ha frecuentemente leído el diario.
Juan has frequently read the newspaper

Here, in contrast to Norwegian, the auxiliary-verb sequence precedes the adverb, as if the participle had raised across the adverb by simple head-movement. Simple raising of the participle across the position of *frecuentemente* 'frequently' to an Asp position, however, would fail to explain the fact that there are no adverbs which can adjoin to AspP and thereby intervene between the landing site of the participle and the selecting auxiliary.

In this light, consider the progressive exemplified in (44a). Here, the adverb *probablemente* 'probably' adjoins to some projection between the linearization site of the auxiliary (perhaps $\mathrm{Aux}_{\mathrm{prog}}$@, or T) and the linearization site of the participle (perhaps v@). This shows us that the Spanish progressive has two linearization sites.

In (44b–44c), it can be seen that the perfect auxiliary, lacking a distinct linearization site, linearizes together with the nearest verb, in this case the progressive auxiliary.

(44) a. Maria estaba probablemente leyendo ese libro
Maria was probably reading that book

b. El libro había sido probablemente prohibido por la censura
the book had been probably banned by the censors

c. *El libro había probablemente sido prohibido por la censura
the book had probably been banned by the censors

[14] Thanks to Antonio Fábregas for discussion of Spanish.

Since the distribution of [w] and @ are associated with lexical entries, this kind of variation by category is expected, in which some periphrastic categories form clusters but others don't, within a language.

The so-called "long head movement" phenomenon (Rivero 1991) observed in some languages might be a case of verb clustering. Long verb movement typically manifests itself in the appearance of a non-finite lexical verb appearing left-adjacent to a finite auxiliary, as in the Breton examples in (45).

(45) a. Hadet neus hon familh ar gwinizh.
*planted.*PTCPL *have.*3 *our family the wheat*

'Our family has planted wheat' (Breton, Schafer 1997, 197)

b. Lennet en deus Yann al levr.
*read.*PTCPL 3SG *has Yann the book*

'Yann has read the book' (Breton, Borsley et al. 1996)

Here, the cluster shows reverse order, as in German clusters.[15]

The Bulgarian example in (46a) shows a cluster of a participle and an auxiliary at the left edge of the clause, again with (partially) reversed word order; and the example in (46b) shows a cluster with two auxiliaries in addition to the main verb.[16]

(46) a. Pročel bjax knigata.
*read.*PTCPL *had.*1SG *the.book*

'I had read the book' (Bulgarian, Rivero 1991, 378)

b. Gledali biha bili decata film.
watched would been the.kids movie

'The kids would have watched a movie' (Bulgarian, Harizanov 2019)

In the Bantu languages, the inflectional material preceding the verb stem shows certain morphological and phonological independence in many cases (e.g., in Shona, Myers 1987), but is obligatorily adjacent to it. For example, Pietraszko (2018) argues that the verbal complex in the Ndebele example in (47) consists of two words, as indicated by the orthographic space. Evidence comes from

[15] In addition, there is a pronominal clitic between the participle and the auxiliary in (45b). Following Svenonius (2016), clitics are specifiers which lack an independent @, causing them to be linearized in the span that dominates them. See Borsley and Rivero (1994) for discussion of clitic placement in "long head movement" contexts as a diagnostic distinguishing it from incorporation.

[16] Harizanov (2019: 12) challenges the claim that a long head-moved participle must be adjacent to an auxiliary in Bulgarian, providing examples in which the lexical verb is separated from the finite auxiliary by a modal particle *maj* 'probably' or a parenthetical. Regarding *maj*, I would explore the possibility that it can have a clitic status, or else that it can be a head in the extended projection of the verb, before giving up the cluster analysis. Regarding parentheticals, I imagine that there are circumstances under which they may disrupt clusters but to explore that is beyond the scope of this article.

the possibility of coordination of just the second part, a prosodic minimality requirement on the second part, and other observations.

(47) U-za-be u-bal-a.
2SG-FUT-AUX 2SG-*read*-FV

'You will be reading'

Despite the evidence that the sequence consists of two words, it is apparently obligatorily contiguous, with no reported examples showing the two parts of the verb being separated. A possible explanation in line with the current proposal is that the verbal elements in such constructions form a cluster. On Pietraszko's analysis, a complex interplay of morphological operations including Fission and multiple steps of Post-syntactic Lowering are applied. On the spanning account developed here, such devices are not needed. Evidence of two words is evidence of two nodes with [w], and obligatory adjacency indicates that there is a single node with @ in the span.

5 Comparison with an alternative

Arregi and Pietraszko (2021) propose an alternative to the Spanning account of North Germanic verb positioning sketched in Svenonius (2016). They propose a mechanism which copies morphological features from heads and merges them together, creating recursive structures which resemble those created by Merge in the syntax, but without the syntactic features. They then propose some linearization principles governing where these recursive morphological structure spell out. The linearization principles and features serve the same role as the @ property of the Spanning account (as they note).

The system they propose is designed to capture the formation of complex heads, for example it is meant to handle the lowering of tense to the verb in English. It would need to be augmented with the equivalent of [w], in order to distinguish between words and clusters.

The system I propose here can claim the advantage of not introducing a new structure-building device. The structure which is the input to lexical insertion is created by ordinary syntactic Merge. No additional combinatoric engine is needed.

6 Additional observations

6.1 Null complementizers and @ in C

In German, there tends to be a reasonably strict complementarity between an overt complementizer and a finite verb in second position, motivating an analysis of V2 as V to C. In North Germanic, however, the complementarity is not as strict. As in German, embedded clauses are typically not V2, and typically have overt complementizers, but there are failures of complementarity in both directions: an embedded clause can be V2 with an overt complementizer, as illustrated in (48a), and an embedded clause can fail to be V2 without an overt complementizer, as illustrated in (48b).

(48) a. Han trudde at neste år kom ikkje prisane til å stige
he believed that next year came not the.prices to INF *rise*

'He didn't think that next year, prices would rise'

b. Han trudde (at) prisane ikkje kom til å stige neste år.
he believed that the.prices not came to INF *rise next year*

'He didn't think (that) prices would rise next year' (Faarlund et al. 1997, 984; Nynorsk orthography)

The fact that Norwegian (and its cousins) can embed a V2 clause below a complementizer is easily described by distinguishing the subordinate complementizer $\mathrm{C}_{\mathrm{sub}}$ from the V2 projection Top, as I have done (cf. (25), with $\mathrm{C}_{\mathrm{sub}}$, and (28), (31), and (34), with Top). $\mathrm{C}_{\mathrm{sub}}$ can optionally either take Top or Fin as a complement; if it takes Top, there is embedded V2, and if it takes Fin, there is not, because Top bears @ and Fin does not.

The possibility of omitting the finite complementizer *at* is more interesting, in a sense, for the analysis presented here, because it raises the question of why the finite verb does not linearize in the empty C position.

The absence of an overt complementizer might signal the absence of $\mathrm{C}_{\mathrm{sub}}$, as on Doherty's (1994) analysis of English. Doherty's analysis transfers fairly straightforwardly to Norwegian, since the conditions for complementizer omission are similar in the two languages. In general, omission of English *that* or Norwegian *at* is possible when the finite complement clause immediately follows a bridge-type verb which selects it, as in (48b) where *at* immediately follows the selecting bridge verb *trudde* 'thought' (note too that many Norwegian speakers have a *that-t* effect like the one found in English, with subject extraction being conditioned by omission of the overt complementizer; cf. Lohndal 2009).

Alternatively, there might be a variant of finite $\mathrm{C}_{\mathrm{sub}}$ which is phonologically null and lacks @.

A third possibility would be that $\mathrm{C}_{\mathrm{sub}}$ is always present in subordinate clauses and always bears @, but that the 'leftmost' requirement in (35b) is satisfied somehow, for example because a null exponent of $\mathrm{C}_{\mathrm{sub}}$ is visible to the linearization algorithm. This would be expected if it were deleted late in the derivation of the PF surface form.

6.2 Order within the cluster

In North Germanic, clusters strictly show the 'straight' order seen in English, in which each verbal word precedes the verbal words which are lower than it in the structure. This is also the order observed in Spanish. In German, order is normally the reverse, in what is known as 'roll-up' order, but there is a great deal of variation among the West Germanic languages, with Dutch often preferring the 'straight' order in a cluster even though it is right-peripheral in the verb phrase (see e.g., Wurmbrand 2006, 2017; Abels 2016).

It is not surprising that languages do not all have exactly the same solution to linearizing elements. Even though there is a preference for suffixing, there are many prefixes in the world's languages. There are head-initial projections and head-final projections. Something which appears to be extremely infrequent, however, is to find reverse order of heads (as in German *gesehen hat* 'seen has') but without obligatory adjacency; if the elements spell out words in a span in reverse order, they normally cannot be separated by optional adjuncts or even arguments, unless they are clitics (cf. Breton (45b)). This is more or less the 'Final over final constraint' (Biberauer et al. 2014).

There are various approaches to the general patterns of word order, and I will not be able to review them here. I will simply offer a technical solution which works for the well-known cases, and defer a more thorough treatment for a future paper. I repeat the linearization algorithm from (35) here as (49), with an amendment in (49d) for handling German.

(49) a. Parse the maximal span into w-spans. Associate exponents within each w-span (each w-span corresponds to a morphological word; morphological words cannot be separated)

b. Linearize the nearest word at the leftmost @ in the span ("Fill leftmost")

c. Linearize each (remaining) word at the @ it contains, if any ("Containment")

d. Linearize each (remaining) word at the @ to its right ("Lowering") (for VAux: and to the right; "Lowering to the right")

e. Linearize each (remaining) word at the nearest @ ("Sweeping up")

Standard German uses the VAux option for all clusters, as seen in the German example in (11a). Many West Germanic varieties use it only for perfect auxiliaries (Wurmbrand 2005). For example, in the Swiss German pattern exemplified in (11b), the VAux option in (49d) would apply to *ha* 'have', placing it to the right of the lower verb, but not to the modal *mues* 'must', which is placed to the left of the cluster, giving *mues gsee ha*, literally 'must seen have'.[17]

The model here predicts that phrasal true complements to V (that is, those which are not specifiers) would linearize to its right, even in head-final languages like German—for example finite clauses, following Haider (1997) (see Ramchand (2008b) for some discussion of what kinds of internal arguments might be true

[17] What is known as Long Head Movement (LHM), as discussed in §4, does not involve lowering, so requires a different statement. For example, the Bulgarian example in (46b) exhibits 3-1-2 order at a high position, so instead of (49d) there might be a statement for Bulgarian along the lines of "Linearize each (remaining) word at the @ to its left, and for lexical verbs, to the left", applying to the lexical verb when (49c) fails to cover it because of an optionally missing @ in some lower head such as v or Asp.

complements, as opposed to specifiers; she calls them 'rhematic' complements, and in this model they would formally be part of the span so would be included in the cluster if they lack their own @).

Another possibility which might be considered is that some languages could make use of a variant of @, @R, which causes words to spell out at the right periphery of a phrase. Unlike the solution with @ in V, this would not predict that true complements with @ would follow the verb (so German finite clauses would have to be extraposed). It could easily handle cases where a rightward head shows signs of having raised, as on Koizumi's (2000) analysis of Japanese and Mathew's (2015) analysis of Malayalam. The trouble is that @R threatens to overgenerate, for example easily allowing VOAux order (e.g., with @R in T but not on any lower heads), or VAdvAux order, which are basically unattested (see Biberauer et al. 2014). So if @R exists, its distribution, and perhaps that of right adjuncts, must be heavily constrained.

The solution I have adopted from Brody, that head-final structures have low @, has the advantage of not easily deriving VOAux or VAdvAux orders. A low @ in a w-span corresponding to an auxiliary does not place it after the main verb; only a cluster does that. So in my proposal, the only sources of VAux order, if Aux is a word, are VP movement to the left of Aux and clustering. Only VP movement could derive VAdvAux or VOAux orders. If VP movement is highly constrained, the right results can be achieved.

7 Conclusion

I set out to account for the puzzle that North Germanic auxiliaries appear lower than expected. I have suggested that this is because they form a cluster, and have suggested that clusters are something that happens when an extended projection provides fewer linearization points than there are morphological words.

The Spanning framework for spell-out is a natural fit for analyzing this problem because of the way it dissociates linearization from word formation.

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