1...3–2

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1 Introduction

This paper is about basic word order, morphology, and their relationship to movement. I examine some cross-linguistically pervasive word-order tendencies, in which the hierarchical structure is reflected in left-to-right order (1-2-3) or right-to-left order (3-2-1) or in a mix of the two (1-3-2). I show that for a wide variety of constructions in a wide variety of languages, there are basic asymmetries in these patterns, for example the relative scarcity of 2-3-1 orders and the tendency for right-to-left orders (2-1 and 3-2) to involve obligatory adjacency: optional adjoined material may intervene in left-right orders, but not in right-left orders, so that for example an adjunct X may appear in the pattern 1-X-3-2 but not in *1-3-X-2; hence the title of the paper, 1...3-2.

There are different ways to try to capture these ordering patterns; I explore one way, which is to extend the Minimalist theory of phrasal movement, involving probes and goals and feature-checking. This necessitates the introduction of strong features to drive overt movement, and sometimes the postulation of null functional heads to bear those features. I suggest that there are some positive consequences to these results, as opposed to the alternatives. One such positive consequence is a set of correct predictions about word-order typology, especially in conjunction with observed patterns of morphology.

1.1 Phrase Structure and Movement

Mainstream work has long recognized three types of movement, namely A-movement, $\overline{\text{A}}$-movement, and head-movement (cf. e.g. Rizzi 1990). Recent developments, however, have seen an increasing simplification of the base phrase structure rules (Kayne 1994, Chomsky 1995, Brody 1997) and, concomitantly, an increasing reliance on movement to derive basic word orders. The relationship of these movements to classical A, $\overline{\text{A}}$, and head-movement has generally remained unclear.

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For example, the basic word order of Dutch embedded clauses in many cases involves O-Aux-V, as illustrated in (1); if the base-generation rules are maximally simple, then the object is underlyingly adjacent to its selecting verb, so something has moved.[1]

(1) ...dat Jan het boek kan lezen
that Jan the book can read
'...that Jan can read the book' (Dutch)

Another example which raises related questions for the canonical analyses of movement is that given in (2).

(2) ...at Jens helt må forstå oppgaven
that Jens completely must understand the.assignment
'...that Jens must completely understand the assignment' (Norwegian)

Here, the adverb *helt* 'completely' modifies the VP 'understand the assignment,' and does not include the modal *må* 'must' within its scope; but it precedes the modal. An analysis which moves the adverb to the left from an English-like position would not clearly fall into the classical typology of movements.[2]

In fact, if the core empirical claims of Kayne (1994) are correct, then there are no specifiers, adjuncts, or heads to the right; this has led to a great number of analyses postulating remnant and roll-up movements which are not clearly A, $\overline{\text{A}}$, or head-movements. For example, the German V-Aux order in (3) must involve VP-movement to the left of the auxiliary.

(3) ...weil er das Buch gekauft hat
because he the book bought has
'...because he has bought the book' (German)

Here I will suggest that a Minimalist theory of movement can elegantly handle all of these cases, given one simple assumption: there are licensing probes for selectional features which are postulated by the learner in cases where canonical positions involve surface adjacency of a functional head and the head of its selected complement. That is, a learner exposed to a string X-Y will under certain conditions assume a strong feature on a head F which ensures surface adjacency of X and Y in canonical configurations (or in some cases a pair of functional heads F and G). The strong feature will then always be present, even if X or Y happens to be null, and may have discernable effects on word order. This is importantly different from a surface adjacency constraint on X and Y. The natural assumption, then, is that learners are not at liberty to postulate surface adjacency constraints; apparent surface adjacency constraints are always the result of overt feature-checking. I return to the question of where adjacency

[1] Cf. Evers (1975), Haegeman and van Riemsdijk (1986) for early analyses in terms of verb movement; see Koster (1994), Zwart (1996; 1997), Koopman and Szabolcsi (2000) for antisymmetric analyses involving DP-movement; see É. Kiss and van Riemsdijk (2004) or Wurmbrand (to appear) for an overview and additional references.

[2] See Nilsen (2003) and Bentzen (2005), discussed in more detail in §4.2 below.

holds in §5.

1.2 An itemization of orderings

Given any three hierarchically ordered elements, where '1' is the highest and '3' the lowest, there are six logically possible orderings. For example, C[omplementizer] universally dominates T[ense], and T universally dominates V[erb], within a single clause, so that a language exhibiting C-T-V order (as in English *that (it) will rain*) can be characterized as exhibiting 1-2-3 order for these three elements (but without obligatory adjacency, so that one could also write 1...2...3). A language like German has 1-3-2 (or 1...3-2; *dass (es) regnen wird* 'that (it) rain will'), and a language like Japanese has 3-2-1 (*(ame ga) fu-ru to* '(rain NOM fall-NONPAST C').

The logical possibilities are given labels as in (4).

(4)
a.	1-2-3	**Straight**
b.	1-3-2	**Curl**
c.	3-2-1	**Roll-up**
d.	3-1-2	**Skipping**
e.	2-3-1	**Constituent Fronting** or **Sinking**
f.	2-1-3	**Hopping**

All of these options exist in natural languages. For example, a simple *wh*-extraction in English like *What time will it start?* involves all at once Skipping, 3-1-2 (3 being the *wh*-expression, and 1-2 being *it start*); Constituent Fronting, 2-3-1 (where 2-3 is *what time* and 1 is any of the elements crossed); and Hopping, 2-1-3 (where 2 is the modal *will* and 1 is the subject), among other orders.

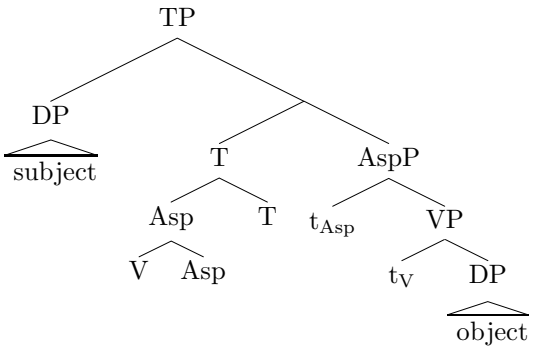
However, these examples involve $\overline{\text{A}}$-movement, which is not the focus in this paper. I focus here on what Greenberg (1963) called basic or 'dominant' word orders, the most information-neutral word orders. When these are examined carefully, certain patterns emerge in which the Straight, Curl, and Roll-up orders have a special status.

1.3 Suffixes and Head Movement

It is widely assumed that suffixal morphology may attach to a verb through head-movement (see Julien 2002b, ch. 2 for extensive discussion).[3] Such movement leaves unaltered the relative order of other material in the clause; hence a language in which the verb moves to T would have the basic order VO if the object is licensed lower than T, as illustrated in (5).

[3]Head-movement has come under great scrutiny recently; see e.g. Koopman and Szabolcsi (2000), Mahajan (2003) for discussion. I will return to alternatives in §1.7 below.

(5)



Other assumptions about morphology make different predictions concerning basic word order. Bobaljik (1995; 2003) argues that morphology can be realized on an adjacent head (by morphological merger, cf. Embick and Noyer this volume), where Asp and V would be adjacent without movement in a tree like the one underlying (5), but T and V would not. On Bobaljik's proposal, suffixal Asp would not require V-movement, but suffixal T would be possible only after movement at least to Asp.

Adger (2003:170) suggests that English verbal inflection is the realization on a low head (v) of inflectional features which are checked by an Agree operation. The effects are broadly compatible with the empirical motivations behind Bobaljik's proposal: If the agreeing features are subject to locality, so that, for example, tense features cannot be checked on V across an intervening aspectual node, then Bobaljik's results are preserved, in that a verb will not be able to bear both T and Asp suffixes without movement. The idea that verbal inflectional features can be instantiated under an Agree relation is strongly supported by the study in Wiklund (2005) of tense and aspect copying constructions in Swedish. She shows that a tense or aspect feature can be copied from one verb to the next, but never across an intervening verb which does not share the same tense or aspect feature, as shown in (6), from Wiklund (2005:29) (using her abbreviations, 'PPC' for past participle and 'INF' for infinitive).

(6) a. Han hade velat hinna komma hit.
*he had wanted.*PPC *manage.*INF *come.*INF *here*
'He had wanted to manage to come here'

b. Han hade velat hunnit komma hit.
*he had wanted.*PPC *managed.*PPC *come.*INF *here*

c. Han hade velat hunnit kommit hit.
*he had wanted.*PPC *managed.*PPC *come.*PPC *here*

d. *Han hade velat hunna kommit hit.
*he had wanted.*PPC *manage.*INF *come.*PPC *here*

Each of these examples means the same thing; the participial morphology only reflects a single perfect operator, even when it is repeated on two or three heads. Despite such examples, I assume that morphemes are normally direct reflections of the functors that they reveal to be present; evidence is provided throughout

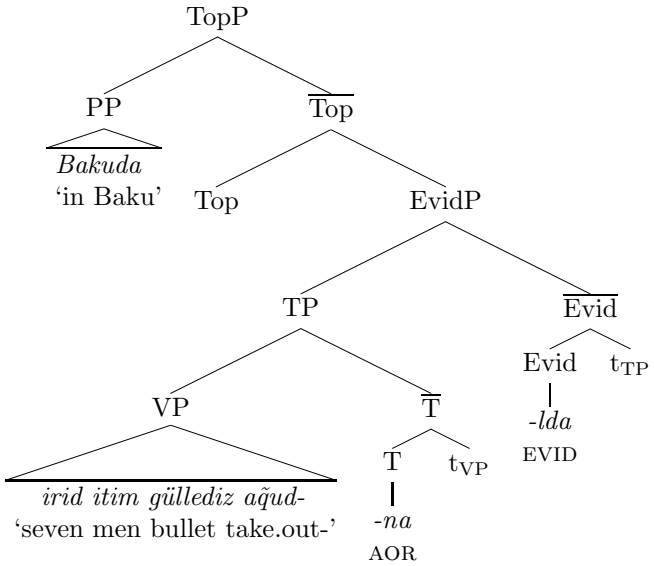
this paper. However, examples like (6) suggest that other options are possible, in morphology, and at times in what follows I will suggest that something like Agree (or morphological merger) is responsible for morphological marking on a head, as it apparently is in (6b–c), at least.

1.4 Suffixes in OV languages

Julien (2000; 2001b; 2002b; this volume) and Holmberg (2000) propose phrasal movement analyses for certain cases of suffixal morphology, analyses which are only compatible with OV word order. Specifically, they argue that many cases of suffixation involve phrasal movement to the left of a functional head. For example, Julien's (2002b:116) analysis of the Lezgian sentence in (7) is depicted in (8).[4]

(7) Baku.d-a irid itim gülle.di-z aq̃ud-na-lda.
Baku-INESS *seven man.*ABS *bullet*-DAT *take.out*-AOR-EVID
'They say that in Baku seven men were shot'

(8)



The tense marker will be adjacent to the verb only if independent factors conspire to make the verb phrase head-final; thus, a language in which the object normally follows the verb in VP cannot avail itself of this option. Parallel considerations hold for the adjacency of the tense marker and the evidentiality marker.

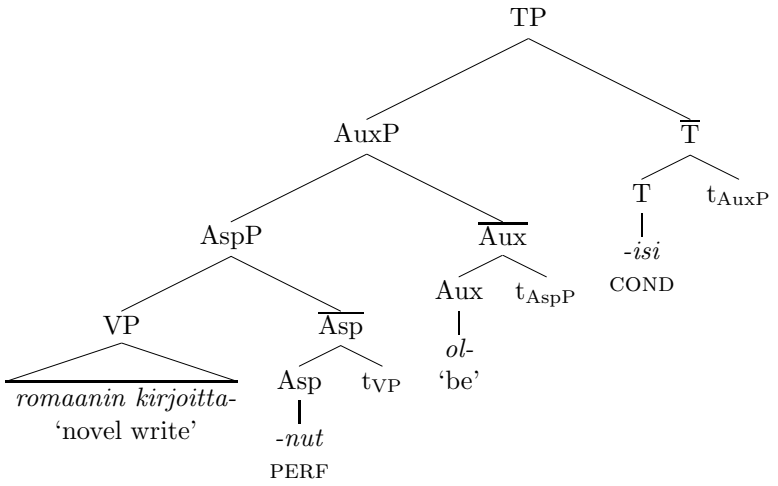
Similarly, in Holmberg's (2000) analysis of Finnish, auxiliaries may follow the verbs they select only if the verb phrase is verb-final, as illustrated in (10)

[4]Retaining Julien's glosses, which are retained from Haspelmath (1993:148), for INESS[ive], ABS[olutive], DAT[ive], AOR[ist], and EVID[ential].

for the sentence in (9) (from Holmberg 2000:141–142).[5]

(9) Milloin Jussi romaanin kirjoitta-nut ol-isi?
when *Jussi novel* *write*-PERF *be*-COND
'When would Jussi have written a novel?'

(10)



If the participial affix *-nut* must be adjacent to a verb, then a language will only have this sort of option if the object (and other material to the right of the verb) moves (or stays) out of the way. Alternatively, there might be a combination: head-movement, morphological merger, or feature-checking to combine the inflectional suffixes with the verbal stems, but phrasal movement to place the inflected verbs to the left of their auxiliaries.

Here I develop a related account. However, note that the adjacency condition between an auxiliary and its complement is not absolute; it is disrupted by V2, for example, or by VP-fronting. This motivates a kind of feature-checking analysis over a morphological analysis, at least for the auxiliaries. Surface adjacency is important at least as the cue that checking is overt. Otherwise, in a language like English, where an auxiliary is regularly non-adjacent to the verb at the surface (whenever there is an adverb in between), checking between the verb and the auxiliary might be considered to be covert.

These selectional feature checking movements can then be largely unified with classical A-movement; for example, only a verb with the right morphosyntactic features can be attracted, and only the nearest such verb can be attracted. Differences between checking of selectional features and classical A-movement, I suggest, have to do with differences between case and tense/aspect features. For example, in a sequence of auxiliaries, each can be considered to check the morphosyntactic features of its verbal complement, leading to a strict locality in which no verb crosses two auxiliaries; but a DP object might find its case-licenser relatively high up in the Mittelfelt (cf. Haeberli 2002), in which case it

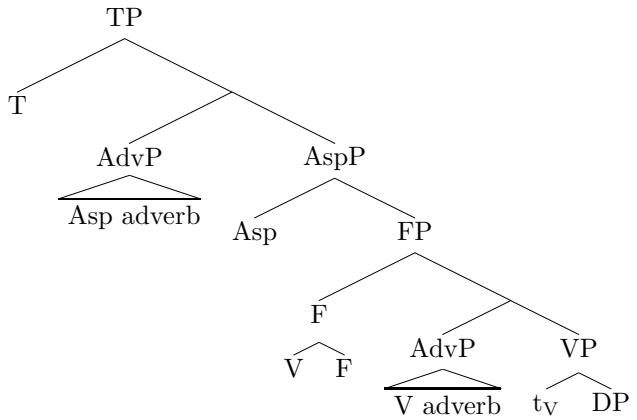
[5]Glossing the tense/mood and participial suffixes with COND[itional] and PERF[ective], respectively; cf. Holmberg et al. (1993).

might cross several auxiliaries to get there.

1.5 Prefixes and VO

If a language has a functional head that is proclitic to the verb (suppose for the moment that that simply means 'left-adjacent'), and if it has adverbs or other material which merge in the functional space between the prefix and the verb, then it must develop strategies to get the verb past that material. One possibility would be head-movement to a position just below the functional head in question. For example, if an aspectual head were prefixal, this might motivate a functional head F attracting the verb, as illustrated in (11); the Asp-V sequence would not be a constituent, and could not head-move further. The label 'Asp adverb' is meant to suggest 'adverb which must merge above Asp, in the space between Asp and T'; similarly for 'V adverb.'

(11)



If right-adjunction is not an option for head-movement, then sequences of more than one prefix would have to be combined through phrasal movement. For example, F in (11) might attract the whole VP, and then another functional head below T could attract the AspP.

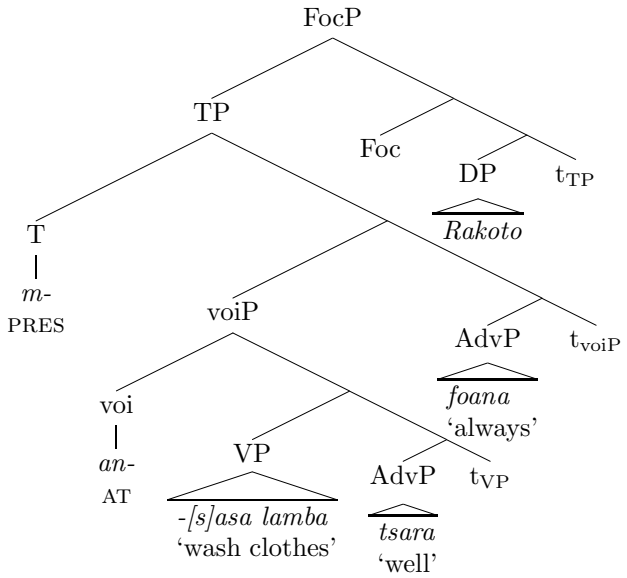
On independent grounds, Rackowski and Travis (2000) and Pearson (2000) propose analyses of Malagasy clause structure in which phrasal projections of the verb move leftward, as sketched in (13) for the sentence in (12); Malagasy has prefixal morphology, so these movements might actually be motivated, at least ontogenetically, by the prefixes.[6]

(12) M-an-asa lamba tsara foana Rakoto.
PRES-AT-*wash clothes well always Rakoto*

[6]The verb *sasa* 'wash' is prefixed by a prefix *an-* which indicates that the topic is an agent (cf. Guilfoyle et al. 1992, Travis 2000), hence the gloss 'AT,' and by an inflectional prefix *m-*, which I gloss 'PRES' for 'present,' following Keenan (2000). The assumptions made here about the exact position of the adverbs can be questioned; what is important is that each verbal head becomes adjacent to the one below it, without changing relative order with it, by virtue of the F heads (not depicted) below the verbal heads.

'Rakoto always washes clothes well' (Malagasy, Rackowski and Travis 2000:120)

(13)



The idea here is that the prefixal morphology signals to the learner that there are functional heads below the prefixes, attracting the selected feature. I have not depicted the heads responsible for movement. They would be 'strong' heads of the sort standardly assumed to force overt movement. They would attract the categorial feature selected for. The strong value of the head I have labeled 'Foc' does not seem to be associated with a prefix and therefore falls outside the discussion.

As Rackowski and Travis and Pearson note, higher adverbs such as 'generally' and 'already' precede the verbal complex and show left-right order, with the higher preceding the less high. If the order of adverbs in Italian is represented as in (14), then that in Malagasy can be schematized as in (15) (orders must generally be determined pairwise, and sentences with very many adverbs are typically degraded).

(14) Italian adverb order (Cinque 1999)

1		2		3		4		5		6
generalemente	>	*già*	>	*più*	>	*sempre*	>	*complemente*	>	*bene*
generally		already		anymore		always		completely		well

(15) Malagasy adverb order (Pearson 2000, Rackowski and Travis 2000)

1		2		6		5		4		3
matetika	>	*efa*	>	*V*	<	*tsara*	<	*tanteraka*	<	*foana*	<	*intsony*
generally		already		well		completely		always		anymore

Clearly, this represents the three most common orders, 1-2-3 (if only the highest part of the sequence is considered), 3-2-1 (if only the lowest part is considered) and 1-3-2 (a sequence in which 1 is a high adverb, 2 is a medium-level adverb, and 3 is a low adverb). On the analysis here, the adverb sequences are epiphenomenal, the result of feature-checking-driven movement of verbal projections. Not every finite Malagasy verb has two overt prefixes; since the adverb orders remain the same even when the inflectional morphology is null, it must be assumed that the language learner sets the value of the functional heads (F's below voice and Tense, in the depiction in (13)); in other words, movement is not driven directly by the prefixes, but the prefixes might provide cues to the learner that strong attracting heads are present (cf. Bobaljik 2003 for recent discussion of this matter).

Note that I have postulated just two functional projections in the middle field in Malagasy, whereas (15) identifies four adverbs in that same region. My analysis, as it stands, would predict that if two adverbs occurred in the same region, for example between V and voice, then they should not be reordered. That is not how the facts have been reported, though orders were, as noted above, always tested pairwise.[7] If ordering is strictly reversed postverbally, then either there are additional 'strong' functional heads, unseen (as assumed by Pearson and Rackowski and Travis), or else the adverbs themselves motivate order-reversing movements.[8]

1.6 Typological patterns

The account makes certain successful typological predictions along the lines pioneered by Marit Julien. First, take the correlation between the order of auxiliaries and verbs with the order of verb and object (Greenberg's 1963:85 *Universal 16*): the auxiliary precedes the verb in VO languages, and follows it in OV languages (see Dryer 1992:100 for support from a larger sample). If the only factors at play in determining basic order are the location of licensing positions, and if the default is AuxVO, then only overt checking of V against Aux under adjacency will lead to VAux order, and this can only happen in a language that is OV. Rare examples of OAuxV will be discussed below.

As Julien (2002b) argues, the sort of account of inflectional morphology outlined above makes some further predictions not made by other accounts. For example, free tense and aspect particles which do not require verbal adjacency strongly tend to be preverbal (Julien 2002b:109).

If suffixes can be attached either by head-movement or phrasal movement, then suffixal languages might be VO or OV. But if a language has prefixal tense or aspect morphology, then there are limits to what head-movement can do, as

[7] There seems to be some variability in exactly where adverbs attach, cf. Ernst (2002), Svenonius (2002). If there is a preference for at most one adverb in each space, then the most natural order for any pair of adverbs might be the reverse one, even if there are only two movements.

[8] It should be noted that Malagasy does employ suffixes, and a more complete account would have to handle these as well.

outlined above; and phrasal movement will only be possible if each V-projection moving is head-initial. This will tend strongly to favor VO languages, another fact which is borne out by the statistical data. For example, a search in the *World Atlas of Language Structures* (Haspelmath et al. 2005) indicates that 82% of the world's OV languages have exclusively suffixal tense and aspect marking, while only 31% of the world's VO languages do; the rest have particles, prefixes, tone, or some mixture, for example both prefixes and suffixes. This is shown in the table in (16).[9]

(16)

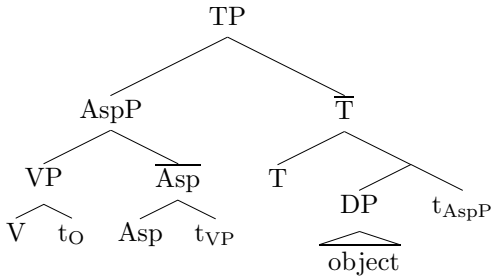
	Verb before object		Object before Verb	
Suffixes	135	(31%)	414	(82%)
Prefixes	115	(26%)	23	(4.5%)
No affixes	96	(22%)	33	(6.5%)
Tone	7	(2%)	2	(<0.5%)
Mixed	83	(19%)	35	(7%)
Total	436		507	

The derivations outlined above predict that prefixal tense and aspect morphology could be combined with OV order if a language had a licensing position for the object which was higher than tense, and otherwise looked like Malagasy. This is rare; I conjecture that it is because objects are not normally licensed higher than tense. More discussion of object licensing positions follows in the next subsection.

1.7 Phrasal movement, suffixes, and VO

I have shown how phrasal movement for the checking of selectional features under adjacency can lead to suffixes in OV languages and prefixes in VO languages. As noted, Julien and Holmberg assume that head-movement is an important mechanism in deriving suffixal morphology in VO languages. However, phrasal movement analyses are certainly possible for suffixal morphology in VO languages. Suppose, for example, that there is a licensing position for the object somewhere above an aspectual head but below a tense head. If VP moves to the left of Asp and AspP moves to the left of T, then T and Asp will be suffixal, and the resultant word order will be VO.

(17)

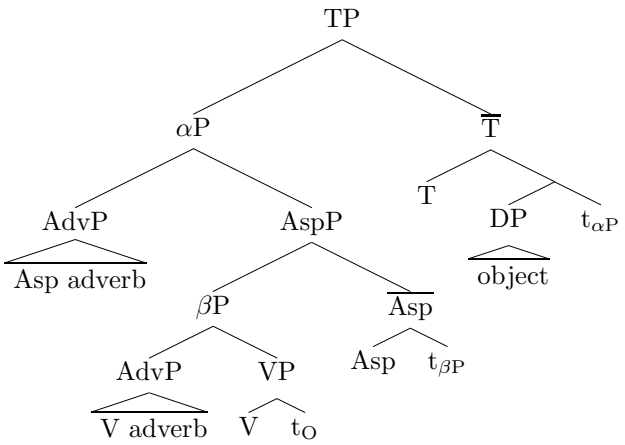


[9] I have omitted from the calculations another 70 languages which were listed as having no dominant order of verb and object. See also the figures in Julien (2002b:106–110).

If a prefixing language had a licensing position for the object between T and Asp, the object would prevent adjacency of the T to its selected head, in any transitive clause. So on the plausible assumption that there are no licensing positions for objects higher than T, languages with prefixal T are correctly predicted to be VO.

Of course, additional movements can be assumed, allowing additional word orders (cf. Koopman and Szabolcsi 2000).[10] I will discuss some such cases below. But if additional movements come at a cost, for example in being difficult to learn, then languages employing them are predicted to be rare. In the simplest case, the projections moving in (17) will be relatively large. Consider the same structure, but with adverbs above V and Asp. αP and βP are labels for whatever constituent includes the adverb and the verbal projection.

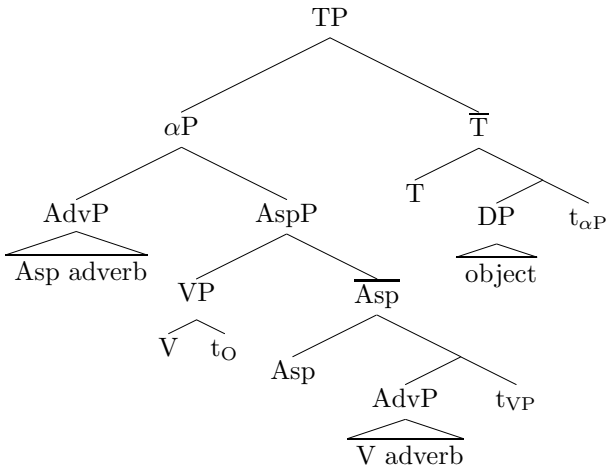
(18)



Had there only been one step of movement, then a larger or smaller V projection might have moved. But if a first step in which a smaller projection of V is moved is followed by a second step, then the lower adverb would be stranded below Asp, making it impossible for Asp to be adjacent to T. This is illustrated in (19), presumably an impossible structure (corresponding to an unattested language with an aspectual suffix on the verb and a postverbal tense particle which can be separated from the verb by adverbs).

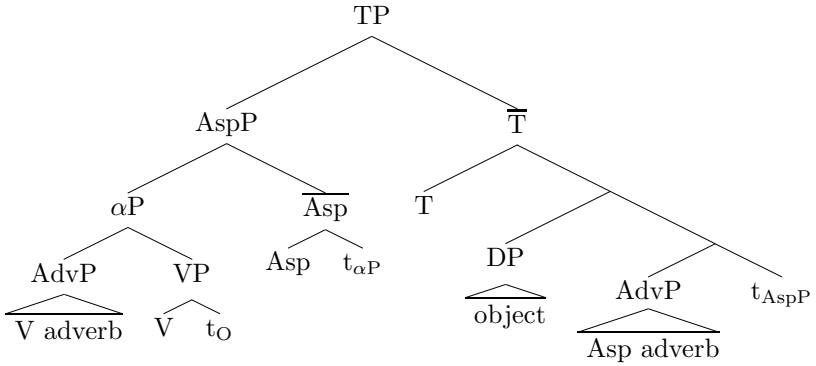
[10] Assuming Koopman and Szabolcsi's assumption that movement from within a specifier is impossible, plus the Extension Condition (Chomsky 1993), there would be an additional trace of the object in (17), between AspP and $\overline{\text{Asp}}$. This is also true of (18).

(19)



A language which chose the option of attracting a small VP to Asp would have to have an additional step of movement to remove the adverb if it were to also suffix T by phrasal movement. The opposite set of choices, however, would not lead to such complications: suppose a large projection of V moves, but a small projection of Asp:

(20)



This would lead to a VO structure in which certain Mittelfelt adverbs were VP-final (something along the lines of *completely read the book already*). Again, depending on what projections move for morphological reasons, adverbs may become reordered as a side-effect, just as was seen above for the prefixal case. Here, the 3-2-1 order of V-Asp-T derives a 1-3-2 order of the adverbs: T-adverb (not shown), V-adverb, Asp-adverb (as in *probably completely read the book already*). Just as with Malagasy, adverb orderings in these structures tend to show the characteristic 1-2-3, 1-3-2, 3-2-1 orders, but as a side-effect of the movement of verbal projections for licensing.

1.8 Directionality and Headedness

The idea so far is that there are two different ways in which a language can overtly check selectional features. Consider a simple example: in English, a modal requires an infinitive complement, while the auxiliary *have* requires a participial complement; and this requirement extends across intervening material.

(21) a. They must occasionally notice.
b. They have occasionally noticed.

By assumption, adverbs merge in the positions in which they are interpreted, and in projections with their own categorial features (Cinque 1999). By assumption, the auxiliary in each case must check selectional features on its complement (cf. Svenonius 1994). In English, we might assume that this happens by Agree, or at LF. But what I am proposing here is that languages may check selectional features overtly in either of two ways: One, they have a strong head F which attracts the category selected. This head is below the overt functor, prefix, or auxiliary that does the selecting. Adjacency between the prefix and the selected category follows only when the selected category happens not to have a filled specifier. Two, they attract a larger category to the left of the functor, suffix, or auxiliary that does the selecting. This only happens when the rightmost element in the constituent moved bears the morphosyntactic feature selected for, so that the selector and the selectee wind up adjacent to each other. I discuss the nature of the adjacency requirement further in §5.

An analysis which rejects Kayne (1994) makes predictions different from those made here. For the German case sketched above, verbs could be claimed to be head-final; and for the Malagasy case, the adverbs could be claimed to be adjoined on the right. But I will show how the observed asymmetries of adjacency requirements follow from a movement account.

Of course, an analysis with right-headed projections could be combined with adjacency statements, but it would remain a mystery why V-Aux, but not Aux-V, is universally subject to an adjacency requirement.[11]

On the account here, adjacency is the acquisitional cue for strong features leading to overt movement, and only movement leads to obligatory adjacency. V-Aux can *only* be derived by movement, whereas Aux-V could arise either from no movement, or from VP movement to immediately below the Aux.

Furthermore, a directionality-of-headedness analysis does not predict the Norwegian pattern, but it is straightforwardly predicted by the analysis here as a combination of the kind of checker needed for head-final languages and the kind of checker needed for prefixal languages.

[11] See Svenonius 2000 and Holmberg 2000 for discussion of the fact that there seem to be virtually no V-O-Aux languages, and virtually no languages in which V-Aux can be interrupted by adjuncts. Furthermore, in languages which allow multiple orders, Aux-V can be interrupted but not V-Aux. This is even true during tumultuous periods of language change; Hróarsdóttir (2000a;b) documents the change from OV to VO in the history of Icelandic and finds attested all possible combinations of V, O, and Aux except V-O-Aux.

More specifically, given that a functional head, to ensure adjacency with its selected complement, may either have a strong feature or have a feature-checking head immediately below, as sketched in the preceding subsections, the possibility emerges that a language might have both. This, I argue in §4.2, can lead to 'Constituent Fronting' or 'Sinking' sequences like those seen in Norwegian (cf. example (2) above). The motivation for the learner would be Aux-V sequences as are typical of VO languages, but with low adjuncts to the left of the auxiliary, unlike the Malagasy case.

2 Morphology and the Mirror Principle

Much of the discussion above presupposes that we can confidently identify individual morphemes with specific positions in the functional structure of the clause, as argued by Cinque (1999). In this section I review the evidence that such assumptions are well-founded.

The Mirror Principle has its origin in Baker (1985), where it was argued that a wide range of morphological facts suggested a syntactic solution. Baker's formulation of the Mirror Principle was as stated in (22).

(22) *The Mirror Principle*
Morphological derivations must directly reflect syntactic derivations (and vice versa) (Baker 1985:375)

More recent work has generally identified the Mirror Principle with the idea that a morphological structure of the form X-Y-Z, where X is a head and Y and Z are suffixes, corresponds to a syntactic structure in which X is the complement of Y and Y the complement of Z (e.g. Belletti 1990 on V-T-Agr motivating a tree in which Agr dominates T). Brody (2000) states the idea as in (23).

(23) *The Mirror Hypothesis*
In syntactic representations, complementation expresses morphological structure:
X is the complement of Y only if Y-X form a morphological unit—a word. (Brody 2000:29)

The usual assumption is that there are complements which are not morphologically incorporated, that is, most people would have left out the word *only* from (23). Brody assumes that a non-incorporated dependent is always part of a specifier of some projection.

In any case, some version of Mirror is widely assumed. In this section I review some of its strengths and limitations.

2.1 Tense and Aspect

The languages of the world present a rich array of temporal and aspectual operators which comport themselves in revealingly orderly patterns (cf. Bybee

1985). This is plainly seen when expressions of Tense (T), such as future, present, or past, combine with expressions of aspect (Asp), such as perfective, imperfective, progressive, durative, or habitual; if T is numbered 1, Asp 2, and the verb 3, we see the patterns 1-2-3 as in (24a) (from Julien 2002b:202), 1-3-2 as in (24b) (from Julien 2002b:238), and 3-2-1 as in (24c) (from Brockaway 1979:179).

(24) a. n-kà-láá-boomba
1sS-FUT-PROG-*work*
'I'll be working tomorrow' (Chibemba, Cinque 1999 (citing Givón))

b. a wa kap-a tun.
he PAST *cut*-IMPF *field*
'He was cutting a field' (Berbice Dutch Creole)

c. ni-k-kak-to-s
1sS-3sO-*hear*-DUR-FUT
'I will be hearing it' (North Puebla Nahuatl)

Julien (2002b, Appendix 2) lists morpheme and function word order for 530 languages, organized into 280 different genera. Of those, 63 languages belonging to 47 genera are indicated as having both Tense and Aspect suffixes (counting 'Perf[ective]' as Aspect and 'Fut[ure]' as Tense). In all but three cases, Aspect is closer to the stem than Tense.[12]

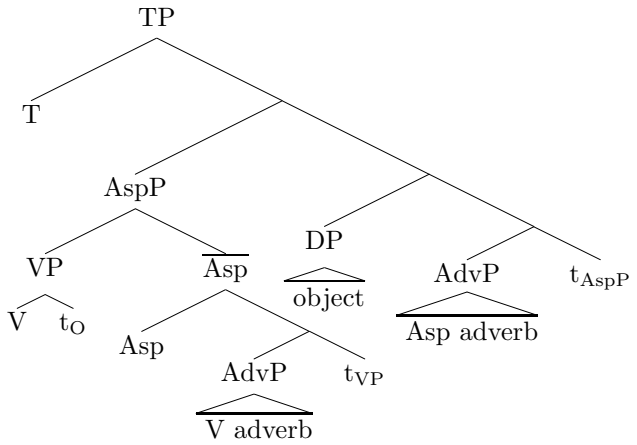
This strongly confirms the observations of Bybee (1985) and Cinque (1999) regarding the rigid ordering of morphemes. For present purposes it is immaterial whether the rigid order reflects an irreduceable syntactic template or independently motivated semantic compositionality, as long as it is recognized that the morphemes reflect syntactic positions. A morphological treatment of word structure which does not directly interact with syntax/semantics cannot explain these facts.

Going beyond the observations of Cinque and Bybee and others, Julien (2002b) also finds that the 1-3-2 pattern (T-V-Asp) is relatively common, while 2-3-1 (Asp-V-T) is rare.

1...3-2 (without adjacency of tense and the verb) is straightforwardly derived by movement of a verb-final projection to the left of Asp. The complex consisting of V and Asp might then also move to a position below T. Assuming that obligatory movement of clausal projections is driven by selectional features, and movement to the right of a selecting head is always by categorial selection, it would be AspP which moved to the position immediately below T, even though this does not lead to T-Asp adjacency in this case, since T is only adjacent to V; see the diagram in (25) (as with previous examples, an intermediate trace of the object would be necessary between AspP and $\overline{\text{Asp}}$ if extraction from within a specifier is not permitted; see note 10).

[12] Julien examines the putative counterexamples and concludes that they have been misanalyzed, and do not constitute real counterexamples. Cf. also the discussion of Athabaskan in Speas (1991), Hale (1997), Rice (2000).

(25)

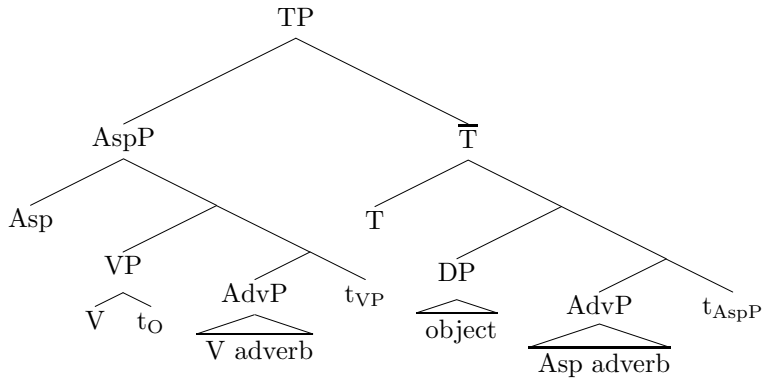


This structure would derive a 1-3-2 order for T-V-Asp, and a 1-3-2 order for T adverb (not shown), V adverb, Asp adverb. Apart from different possible positions for the object, no other combination of licensing movements would give the desired T-V-Asp adjacency. The surface adjacency of the [V-Asp] complex to T could be considered a sufficient cue that selectional features of T are checked overtly.

The assumptions made here can also explain Julien's observation that 2-3-1 order (Asp-V-T) is rare. First of all, it would involve a 2-3 complex moving across 1; by assumption, checking of selectional features to the left is under adjacency, and a [2-3] complex to the left of 1 does not strictly satisfy adjacency of 1 with its selected category, 2. Further evidence for the strictness of left-adjacency of a selected complement, compared with right-adjacency, is discussed below.

Furthermore, even if it were assumed that adjacency to the [2-3] complex could satisfy T's checking requirements, further complications will be introduced by any V-adverbs the language might have. Assuming that the 2-3 complex is formed by V movement to the right of Asp, the first step of movement must be of a relatively small constituent, excluding all complements and adverbs. The second movement will almost surely necessitate an additional step of remnant movement: if a V-adverb is stranded by VP-movement, as in (26), then it will intervene between V and T, so that T will not be adjacent to the [2-3] complex; if the adverb had been carried along in the first step, then it would have disrupted Asp-V adjacency.

(26)



Thus, if basic word order is generally driven by checking of basic morphosyntactic features in the two ways discussed here, then Asp-V-T orders will be rare because they require movements that are not straightforwardly driven by such features (especially if the language has any overt material that merges between Asp and V).[13]

2.2 3-1-2: Skipping

There are occasional cases where a position appears to be skipped, leading to 3-1-2 order ('Skipping' in the terms of (4)). Bartos (2004) provides two examples of 3-1-2 order in the verbal morphology of Hungarian. The examples involve the scope of a past or anterior marker, *-t*, relative to conditional mood, *-na*, and to potential modality, *-hat*.

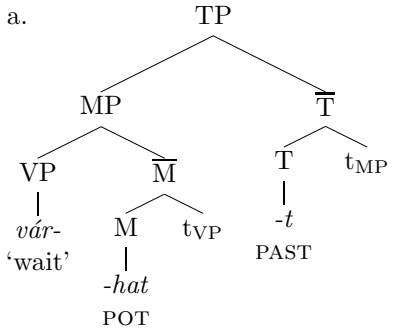
(27) a. Vár-t-am vol-na.
wait-PAST-1SG AUX-COND
'I would have waited' (M > T) or 'I wished to wait' (T > M)

b. Vár-hat-t-ak.
wait-POT-PAST-3PL
'They were allowed to wait' (T > Mod) or 'They may (possibly) have waited' (Mod > T) (Hungarian, Bartos 2004:396)

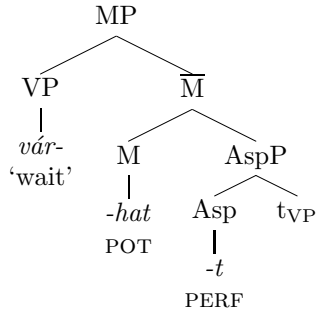
Each form is ambiguous, so that both the 3-2-1 order and the 3-1-2 order are possible. The phonological form is invariant; an auxiliary stem is inserted in (27a) on either reading. Schematically, the second example might be sketched as follows.

[13] Russian is a language which appears to have the order Asp-V-T. Tense is suffixal (*pisu* '[I] write (present),' *pisal* 'wrote') but prefixes correlate strongly with perfectivity (*pisatj* 'write (imperfective, infinitive),' *napisatj* 'write (perfective, infinitive).' See Svenonius (2004b;c) for a detailed analysis in which the aspectual prefix is phrasal, and each movement is motivated by an independently necessary feature.

(28) a.



b.



When tense is interpreted inside modality, I label it 'Asp'; the point is that in the second construction, corresponding to the reading 'they may have waited,' the verb has apparently been attracted by T, which selects Asp rather than V directly (though the verb could have moved first to SpecAspP). This could not be a case of selectional feature checking. In fact, it might even be said to violate locality, if the AspP is of the right category to be an intervener between M and V. Possibly, the syntactic structure is a perfect Roll-up, and a metathesis occurs at some morphophonological level.

Descriptively, it is as if the morphemes themselves have a preferred order, a phenomenon documented for several cases of Bantu morphology by Hyman (2003). Supporting the metathesis idea is the fact that in some of Hyman's cases, the misplaced morpheme is repeated, appearing both in its Mirror position and in its 'preferred' position, though only interpreted once. In any case, such examples of 3-1-2 order are relatively rare among sequences of selecting heads, and simple rules for deriving basic orders should not derive them.

More common cases of 3-1-2 occur when arguments of a verb move to a position to the left of a low auxiliary, as for example in Dutch OAuxV order; I will assume licensing positions for complements in the Mittelfelt along the lines of Zwart (1997) (see Haegeman 2000 for arguments that in some cases, a larger constituent moves across the verb, carrying various material along with licensing positions internal to that constituent).

2.3 2-1-3: Hopping

Auxiliaries are elements associated with tense, mood, or aspect, without the lexical content of main verbs but bearing verbal morphology (Steele 1978; 1981). Auxiliaries in V-Aux order pose no new problems for the ordering of morphemes, since they are almost always suffixal, leading to 3-2-1 orders (e.g. V-Aux-T; cf. the Finnish example in (9)). Auxiliaries in Aux-V order, with suffixes, however, constitute cases of 2-1-3 order, if the auxiliary originates below the inflection it bears. Consider the Aux-V sequences in English (29a) or Northern Sámi (29b).

(29) a. We ha-d be-en ask-ing.
I have-PAST *be*-PERF *ask*-PROG

b. Le-i-mme lea-maš jearra-min.
be-PAST-2DU *be*-PERF *ask*-PROG
'We (two) had been asking' (Northern Sámi, Nickel 1990:58)

This is the order that was called 'Hopping' in (4), after Affix Hopping (as the analysis of English auxiliaries in Chomsky 1957 has come to be known). With relatively contentless auxiliaries like 'have' and 'be' in (29), one might assume that they are not ordered in the underlying sequence below their inflection,[14] but at least modal auxiliaries do seem to exhibit 2-1-3 order. Consider for example the Norwegian examples in (30), especially the last one which displays an inflected modal.

(30) a. Vi les-er boka.
we read-PRES *the.book*
'We read the book'
b. Vi ha-r les-t boka.
we have-PRES *read*-PERF *the.book*
'We have read the book'
c. Vi ha-r kunne-t les-e boka.
we have-PRES *be.able*-PERF *read*-INF *the.book*
'We have been able to read the book' (Norwegian)

However, there are other possible interpretations of the morphology even here. For one thing, at most one affix appears on the modal; for another, the modal paradigm is irregular. Even worse, it is not entirely clear where the semantic contribution of the perfective is introduced in the tree; perfective in Norwegian is expressed by a combination of 'have' and the participle, and the participle is also used in the passive. Thus, it is difficult to be confident that the modal in (30) has really moved to the left of a perfective head.

A less problematic case can be found in Northern Sámi, as exemplified in (31). The modal *dáidit* (epistemic possibility) is completely regular. Forms with and without auxiliaries are given to show that the same verbal morphology appears on the modal as on the main verb.[15]

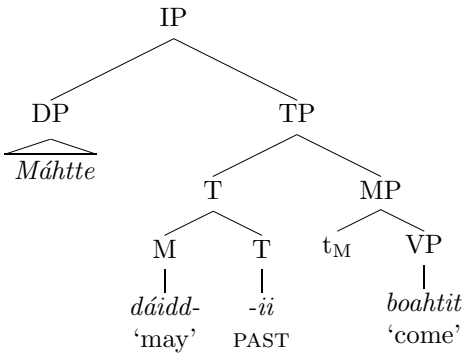
(31) a. Moai boð-ii-me.
we.DUAL *come*-PAST-1DU
'We (two) came'
b. Moai dáidd-ii-me boaht-it.
we.DUAL *may*-PAST-1DU *come*-INF
'It would have been possible for us (two) to come' (Northern Sámi)

[14] See Julien (2001a; 2002a) on the relationship of auxiliary 'have' to the functional structure.

[15] The stem change in the Northern Sámi verb *boaht-∼boð-* in 'come' is regular consonant gradation, and occurs in the modal as well: *dáid-∼dáidd-*; cf. Svenonius (2005) for a detailed analysis. For arguments that *dáidit* is a modal verb, see Magga (1982); he prefers the participial form on the main verb (cf. his p. 75), but some other speakers accept the infinitive, as indicated here (thanks to Inger Anne Gaup and Kristine Bentzen for assistance).

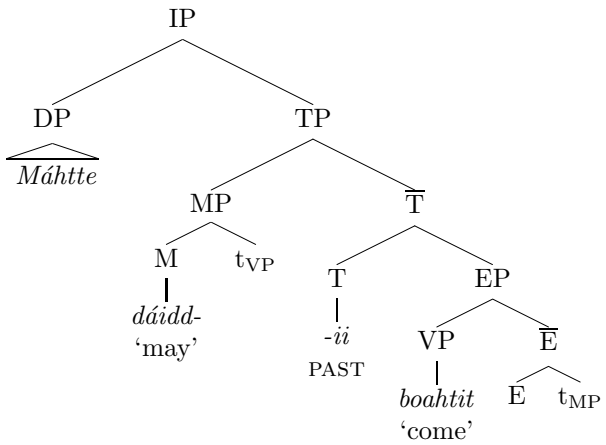
At least this example, then, appears to involve at least one case of 2-1-3, or Hopping (and possibly two, if the infinitive ending on the main verb also projects). The head-movement analysis of this is sketched in (32). I use a third person singular subject (a name) in the tree, to avoid the complication of agreement, which is discussed further in §3.2.

(32)



Pending the analysis of agreement, even this much morphology might be handled without movement in one of the ways discussed in §1.3 above. But if the crucial step of combining the modal with the aspectual suffix is a case of phrasal movement, rather than morphology or head movement, this would entail a step of 'evacuation,' in which the complement of the modal is first lifted to a position just below that of the perfective suffix.[16]

(33)



Here, I have labeled the evacuator for the ModalP 'E,' for Evacuator (compare Koopman and Szabolcsi's 2000 'stacking position' L). Any functional head that has such an E immediately below it will be able to suffix to a lower projection that it specifically attracts, as long as E attracts the complement category

[16]Compare Brody (1998; 2000), where non-morphologically integrated complements always occupy specifier positions, but where head-movement is mimicked by rules of morphological spell-out.

of that lower head. In essence, it makes sense to think of a functional head like this one as consisting of two parts, here T and E. This is what has come to be known as a 'Remnant movement' analysis, and can be thought of, in the derivation of 2-1-3 order, as an alternative to head movement. I will return to Remnant movement analyses in §4.2.[17]

But now there is a puzzle. Julien (2002b) assumes that prefixal morphology, in general, is just a matter of functional heads in situ, interpreted as prefixes. Given the possibilities for head movement, or its equivalent, the question arises why her survey turned up (virtually) no examples of Asp-T-V order. Another way of phrasing the question would be to ask, why are auxiliaries like the Northern Sámi one not interpreted as prefixes? I propose an answer below.

2.4 Other verbal features: Cause

Further confirmation for the Mirror Principle comes from patterns of causative morphemes. Nearly half of the languages in Julien's (2002b) Appendix with V-Asp-T morphology (29 of 63) explicitly identify a Causative morpheme between the root and the Aspect suffix: V-Caus-Asp-T, and none have a Causative suffix after Asp or T.[18]

(34) a. V+Caus+Asp+T (e.g. Mohawk, Turkish, Yidiŋ, Eastern Pomo, Guaraní, Georgian, ...)
b. *V+Asp+Caus+T (none)
c. *V+Asp+T+Caus (none)

Thus, even if the apparent T > Asp order were simply a matter of labeling (i.e. subordinate Tense is labeled 'Aspect'), the Asp > Caus order could not be.

An interesting wrinkle appears if we consider the relative order of V, Caus, and T or Asp with respect to the six orders given in (4). As expected, the orders 1-2-3, 1-3-2, and 3-2-1 are common enough. Nor is it surprising that we do not find any examples of Skipping of V (V-T-Caus) or Hopping of Cause (Caus-T-V).[19] However, there are surprisingly many examples of the Constituent Fronting order (Caus-V-T); I counted at least eleven in Julien's sample.

A possible factor leading to Caus-V-T order would be that the causative morpheme typically introduces an argument, an agent or causer, in its specifier. If each head has at most one specifier (Kayne 1994), then a causative head which introduced an agent could not also check selectional features on a complement. If Cause is a subtype of category V, however, a higher T or Asp node which checks V features could attract it. Furthermore, an attracting head

[17] See also Müller (1998) for discussion of the formal properties of Remnant movement.

[18] There is a partial counterexample in Zuni, which Julien lists as having Aspectual morphemes before and after Caus; the full morpheme order she lists is:
OPl+Appl+SPl+V+Neg+Asp+Caus+Asp+SPl+T/M
T/M is a fused Tense-Mood morpheme, cf. Julien 2002b:348 for other abbreviations.

[19] A language like English, with an infinitive-taking causative verb (*make*), could be thought of as exhibiting Caus-T...V, or 2-1-3 (Hopping). On an analysis along the lines of Cinque's (2004) approach to Italian restructuring, this would be parallel to examples with auxiliaries.

which required adjacency to a verbal complement would become adjacent to a verb after attracting the 2-3 sequence.

Another potential factor may be that there is a significant constituent boundary above Caus, below Asp, namely the *v*P phase (Chomsky 2000, Chomsky 2001; see Svenonius 2004a for arguments specifically motivating the *v*P phase boundary). For example, the opacity of the phase might lead to selectional features being invisible to further checking from outside.

2.5 Mirror in Nominal morphology

Strong universal ordering tendencies have been manifest in the noun phrase since Greenberg's original (1963) observations; compare Hawkins (1983) and Dryer's (1992) larger surveys, or Rijkhoff (2002) for a recent confirmation of, for example, the order Demonstrative > Numeral > Adjective > Noun, discussed below. What has not been discussed in as much detail is the fact that those categories which often arise as bound morphemes can be shown to exhibit mirror effects.

For example, examining articles and plural markers, the order Art > Pl > N is easy to discern (cf. Dryer 1989 on the distinction between determiners and demonstratives); typical orders are 1-2-3, 1-3-2, and 3-2-1.

(35) a. hun-lii-štaan
DEF-PL-*armadillo*
'the armadillos' (Misantla Totonac, from MacKay 1999:312)

b. in coyō-meh
the coyote-PL
'the coyotes' (Nahuatl, cf. Andrews 1975)

c. dàr-ì-dé
gun-PL-DEF
'the guns' (Kotoko)

There are occasional cases of other orders as well, but they are rare, as predicted by this model (see **?** for discussion).

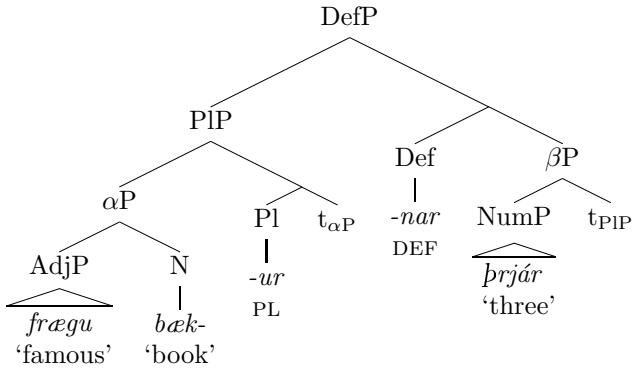
Dependents in the noun phrase, especially numerals and adjectives, can also be shown to fall into patterns reminiscent of the situation discussed above for adverbs in the clause. Greenberg's (1963) *Universal 20* identifies the basic order Demonstrative-Numeral-Adjective-Noun, and further work has shown that these elements order themselves along the lines expected by a roll-up analysis of word order (see Hawkins 1983, Dryer 1992 for the typological facts, Cinque 2005, **?** for the roll-up analysis).

As an example, consider the fact that in Icelandic, an overt demonstrative gives rise to the 'Straight' Dem-Num-Adj-N order, while a definite noun phrase with a numeral but no demonstrative shows a Constituent Fronting order Adj-N-Dem, with roll-up of the plural and definite suffixes (Sigurðsson 1992, Vangsnes 1999).

(36) a. þessar þrjár frægu bæk-ur
these three famous book-PL
'three three famous books'
b. frægu bæk-ur-nar þrjár
famous book-PL-DEF *three*
'the three famous books'

This is what would be expected if Pl attracts a large constituent, for checking of the N under adjacency, and Def attracts a relatively small constituent, perhaps even the PlP itself, as illustrated in (37). The fact that the movement only occurs in the presence of the definite suffix suggests that they are connected, as on this analysis.

(37)



Compare the analysis in §1.7 above of a VO language in which a large constituent is attracted by Asp, but a small one by T, depicted in (20). There, Asp-adverbs were postverbal, like the numeral here being postnominal, while V-adverbs were preverbal, akin to the preverbal adjective here.

2.6 C, T, and the verb

A final example of ordering that can be mentioned here is the ordering of relatively high functional structure in the clause, relative to the medium and low elements. For example, complementizers tend strongly to be initial in Aux-V languages (C...T...V, or 1...2...3), and tend (more weakly) to be final in V-Aux languages (V-T-C, or 3-2-1), as illustrated in (38c) with Japanese. Initial complementizers are also possible in V-Aux languages (C...V-T, or 1...3-2), as illustrated with German in (38b).

(38) a. ...that it will rain
b. ...dass es regnen wird
that it rain will
'...that it will rain' (German)
c. ...ame ga fu-ru to
rain NOM *fall*-NONPAST *C*
'...that it will rain' (Japanese)

Head-final complementizers are extremely rare in languages that are not head-final in the V and T domains.

Question markers also give clues as to the location of the C-domain. In head-final sequences, they do not intervene between T or Asp and the verb, but appear furthest out from the stem (labeling them 'C_Q' here, assuming them to reflect a part of the C domain). (This observation draws again on Julien 2002b.)

(39) a. V+Asp+T+C_Q (e.g. Dongolese Nubian, Asmat, Aguaruna, Laz, Warao, Burmese, ...)
b. *V+Asp+C_Q+T (none)
c. *V+C_Q+Asp+T (none)

This is consistent with the hierarchy of functional projections, C-T-Asp-V, and suggests that TP may front across C, in order to achieve T-C adjacency.

However, as Julien (2002b:172) points out, it is not completely uncommon to find question particles following an otherwise head-initial verb phrase, as illustrated in (40). Such languages manifest the order 2-3-1, assuming that the question particles are underlyingly higher in the clause than tense.

(40) a. Ko ɔ yɔ rʌ-pɔl rʌmu a?
what s/he do the-rope yours Q
'What did s/he do to your rope?' (Temne, Sullay Kanu, p.c.)
b. Khay lɔt hə Səgòn ʔə?
he go to Saigon Q
'Is he going to Saigon?' (Sre, Julien 2002b:172)
c. Ni neng xie Zhongguo zi ma?
you can write Chinese character Q
'Can you write Chinese characters?' (Mandarin Chinese, Li and Thompson 1981:547)

This appears to be more common than VOAux order, suggesting that Constituent Fronting of TP across C is more common than Constituent Fronting of VP across Aux. The movement does not seem to derive adjacency of anything in particular and is therefore not accounted for by the mechanisms discussed here.

2.7 Summary of morpheme ordering

In this section, I have shown that there is very strong support for a T > Asp > V hierarchy, and for widespread Curling and Rolling-up of these elements, with far less Skipping, Hopping, and Constituent Fronting. The same is generally true for C > T > Asp > Cause > V and for Art > Pl > N. Negation and universal quantification are manifested in many different places in the clausal structure, and Agreement appears to behave somewhat differently from the semantically interpretable categories, as I discuss below.

(41)

	C - T - V	T - Asp - V	T - Cause - V	Art - Pl - N
1–2–3	typical	typical	typical	typical
1–3–2	typical	typical	typical	typical
3–2–1	typical	typical	typical	typical
3–1–2	rare	rare	rare	rare
2–3–1	occasional	rare	occasional	rare(?)
2–1–3	rare	rare	rare	rare

I have suggested that the patterns can largely be explained in terms of checking of selectional features: either by attraction of the selected category to a position immediately below the selecting head, or by adjacency to the left. The learner posits whatever strong features are needed to ensure that one of these two configurations obtains; in nearly all the cases discussed, there were plausible analyses in terms of a single strong feature.

Some examples of Curl and Roll-up orders, for example those among modifiers, were explained as epiphenomenal, a side-effect of the way the functional projections roll up.

Examples of Skipping, Hopping, and Constituent Fronting are all exceptional and require additional assumptions. For example, Hopping was seen to require an E projection below the selecting head, to evacuate the target of movement. Such structures are therefore correctly expected to be rare. Skipping and Constituent Fronting structures are typical of $\overline{\text{A}}$ attraction and of case-licensing; thus they may in general involve categories that have a more complex semantic interpretation and which can enter into argumental or quantificational relations, in addition to simple selectional feature-checking.

3 Neg and Agr in the Functional Sequence

I have focused on the selectional relationships among overt morphemes in the clause which express modal, temporal, and aspectual notions, and suggested that they enter into selectional relations which ignore intervening phrasal elements such as adverbs. Negation is another overt morpheme in the clause which plays an important role and is very salient, but I argue here (in agreement with Julien and Cinque) that the position of negation varies so much across languages that it is not a good indicator of syntactic structure in broad, cross-linguistic surveys such as this one.

I also show (again following in essence the conclusions of previous work such as that of Julien and Cinque) that agreement is not a good indicator of clause structure, when working with patterns of data across many languages.

Agreement and negation may have fixed positions in the clause structure in an individual language, but unlike the rigid order of Tense over Aspect, they do not have a cross-linguistically stable position in the hierarchy of functional projections, or what Starke (2004) calls f_{seq}, the functional sequence.

3.1 Negation

Orders of T-Asp-V, T-Caus-V, and so on were demonstrated above to show great cross-linguistic regularities. Negation provides a startlingly different picture. In Julien's (2002b) sample, we find suffixal negation within Aspect, between Aspect and Tense, or outside Tense.

(42) a. V+Neg+Asp+T (e.g. Guraní, Turkish, Nivkh, Zuni, Mikir, ...)
b. V+Asp+Neg+T (e.g. Aguaruna, Dongolese Nubian, Garo, Haruai, ...)
c. V+Asp+T+Neg (Warao)

Suffixal examples of Negation outside Tense are relatively scarce in the sample. This might suggest that, as with the few cases of Aspect outside Tense, the examples bear closer scrutiny. However, pre-verbal Negation is very commonly outside Tense, whether as a prefix, an auxiliary, or a particle, in stark contrast to preverbal Aspect.

Zanuttini (1997), examining the location of negation words in Romance languages, finds the same striking range of variation, ultimately postulating four distinct Negation heads in the clausal structure. Cinque (1999) also fails to find any system in the location of Negation: "the evidence points to the possibility of generating a NegP on top of every adverb-related functional projection, even simultaneously, up to a certain point" (Cinque 1999:126).

This suggests that unlike Force, Tense, Aspect, and Cause, the category Negation is not a fixed part of the functional sequence. The idea would be that Negation may be part of an operator which applies to Tense, or to Aspect, or even to the Event below the Aspect. Ramchand (2004) proposes just such an account for Bengali; there, two different negation markers appear, one which is only compatible with perfective aspect, and another which is used everywhere else. Ramchand proposes that the two Negations are different kinds of operators, and shows that they give rise to subtly different effects.

A similar situation can be observed in certain Northern Swedish dialects, where the prefixal negation *o-* can be used in the perfect tense only (as noted in Marklund 1976). In Standard Swedish, *o-* appears productively on adjectives; therefore I gloss it 'un-'.

(43) a. I hæ inte skrive breve.
I have not written the.letter
'I have not written the letter'
b. I hæ o-skrive breve.
I have un-written the.letter
'I have not written the letter yet' (Northern Swedish; Skellefteå dialect)

The meaning of these two variants is subtly different; the prefixal form can only be used if there is a reasonable expectation that the event will occur, or if it is conventional that it should occur, as suggested by 'yet' in the translation.

This is consistent with the prefixal negation actually being interpreted in the aspectual system, where it is expressed.

Another candidate for a feature of heads which is not ordered in a universal functional sequence is Universal Quantification. Universal Quantification appears to be a component of the meaning of various elements in the nominal domain, such as *each*, *every*, and *all*, but also of various adverbs such as *always* and *necessarily* and modals like *must*. Just as with Negation, the elements which include Universal Quantification as part of their meaning are ordered by other factors; so that the temporal adverbial *always* is located as a temporal adverbial, and the modal *must* will be located according to whether it is a universal quantification over possibilities (epistemic modality, relatively high) or obligations (deontic modality, relatively low).

3.2 Agreement

Another category which has proven challenging for an explication of f_{seq} is that of agreement. As with negation, we find agreement suffixes inside aspect, between aspect and tense, and outside tense; in fact, there are far more examples of each, as affixal agreement is far more common than affixal negation. The usual position for subject agreement is outside tense, but this is only a tendency; for instance, for suffixal tense and agreement, Julien (2002b:249) counts 64 languages with V-T-SAgr and 16 languages with V-SAgr-T order.

It may be that as with negation, the different patterns will turn out to have subtly different effects; for example, if agreement outside tense correlates with a specificity requirement on subjects, and agreement inside tense does not. However, I know of no evidence that this is the case.

One detailed study has shown something quite different: Trommer (2003) examined one hundred languages in which it is possible to discern separate morphemes for subject person agreement and subject number agreement. He found a strong tendency for person to *precede* number; in other words the pattern in (44) is far more frequent than the pattern in (45).[20]

(44) Normal: Person precedes number
- a. Pers+Num+V: 9 languages
- b. Pers+V+Num: 39 languages
- c. V+Pers+Num: 22 languages

(45) Unusual: Number precedes person
- a. Num+Pers+V: 1 language
- b. Num+V+Pers: 1 language
- c. V+Num+Pers: 8 languages

[20] In 24 cases in Trommer's sample, a language has one morpheme which solely identifies either person or number, and another which combines both features. For example, Nahuatl verbs sport a person-number prefix and, if the subject is plural, a plural suffix; Trommer counted such examples as Pers+V+Num, on the grounds that the suffix is solely number. However, he also shows that the pattern seen in (44) and (45) also holds of those 56 cases in which each morpheme expresses only person or only number.

Trommer examines the counterexamples and suggests that at least in most cases, there are mitigating factors (e.g. the number suffix is not really number, but a distributive marker; or the agreement affix has some special properties). The pattern cannot straightforwardly be accounted for by a Mirror Principle type approach. Pers > Num > V would yield (44a) (1-2-3) and correctly predicts (44b) (1-3-2) to be common, but wrongly predicts (45c) (3-2-1) to be a more natural order, and more seriously, fails to explain why (44c) (3-1-2, Skipping) is so common. Number above Person would get (44c) right, but wrongly predict (45a) and (45b).

There is one hazard in Trommer's methodology which might lead to underreporting of pattern (45c). Compare the Icelandic pattern for the verb *heyra* 'hear' (in the preterite) in (46), to that of the made-up language "Nicelandic."

(46) Icelandic preterite, weak verb

	Icelandic	Nicelandic
1sg	heyrði	heyrði
2sg	heyrðir	heyrðri
3sg	heyrði	heyrði
1pl	heyrðum	heyrðmu
2pl	heyrðuð	heyrððu
3pl	heyrðu	heyrðu
	'hear'	'hear'

The real Icelandic paradigm, if parsed into V-T-Num-Pers/Num, is an example of the somewhat unusual pattern (45c) (Icelandic was not in Trommer's sample). The made-up language Nicelandic is an example of the common pattern (44c). I wonder, though, if a grammar-writer is not more likely to parse an example like Nicelandic into two agreement suffixes, because the final number morpheme is salient, whereas in the Icelandic example, it is easier to regard the whole sequence after tense as a single Pers/Num portmanteau. That is, the pattern in (44c) might *seem* more common than the one in (45c) because grammar-writers identify it more frequently.

In any case, such underreporting, if it has occurred, is unlikely to account for the whole of Trommer's observation, and leaves unaffected the surprising commonness of (44b), so it seems to be true that there is a left-right asymmetry here.

In one sense the result is completely expected on the approach taken here. Reordering of clausal constituents is driven largely by issues of formal licensing. Different modal and temporal functors license each other, but the relatonship of these functors to arguments and to agreement is very different.

Another left-right order asymmetry is in the order of subject and object agreement: subject agreement is more likely, crosslinguistically, to precede object agreement, though not to the same extent that subjects tend to precede objects, as illustrated in the table below with data from Haspelmath et al. (2005).[21]

[21] The main criterion used in Haspelmath et al. (2005) for identifying Subject and Object

(47)

Subject and Object			Agreement affixes		
S before O	1017	(83%)	S before O	96	(56%)
O before S	39	(3%)	O before S	57	(33%)
both possible	172	(14%)	both possible	19	(11%)
Total	1228		Total	172	

To conclude this section, the position of agreement morphology or of negation does not seem to give the same sort of direct evidence for clause structure that the position of functor morphemes expressing causation, tense, aspect, modality, and other concepts.

4 Verb Clusters

The general pattern for verbal clusters is generally adequately described as Curling and Rolling up of a universal hierarchy of functional heads along the lines of Cinque (1999). A few cases of Hopping, Skipping, and Constituent Fronting are encountered.

The overall pattern for Germanic languages is neatly summed up in Wurmbrand (2004; to appear), roughly as given in (48). Some OV languages have 1-3-2 (examples are provided in this section). Straight, Roll-up, and Curl orders are the most widely attested ones for sequences of verbs.

(48)
a. 1-2-3: Very widespread: Afrikaans, Dutch, Swiss German, West Flemish, usually only if 2 is Modal; English, Mainland Scandinavian, Faroese, Icelandic
b. 1-3-2: Common: Various German and Austrian dialects; Afrikaans and Dutch if 2 is Auxiliary 'have'
c. 3-2-1: Typical for OV: Standard German, Frisian, various Swiss, Austrian, and German dialects
d. 3-1-2: Very restricted: Dutch, Afrikaans, West Flemish if 1 is Modal and 2 is non-modal Auxiliary; some other dialects in other situations
e. 2-3-1: Very restricted: Afrikaans and West Flemish in *Infinitivus pro participio* context
f. 2-1-3: Unattested

The similarity to morphological patterns is apparent. As shown in §2, the general pattern for morphological exponents of modality, tense, and aspect abides quite strictly by the Mirror Principle; Straight, Curl, and Roll-up orders are by far the most common, and unusual Hopping, Skipping, and Constituent-Fronting orders indicate more complex derivations. A few cases of Hopping,

is thematic role; in fact, the agreement map there is actually labeled in terms of A[gent] and P[atient] agreement, which I have changed here to S and O simply for consistency with the labels for word order, which use the traditional S and O. There is data in the Atlas on S/O order for many more languages than there is on S/O agreement; furthermore, the figures in the right half of the table here omit another 187 languages which do not simultaneously express both S and O agreement on the verb and 20 languages with 'fused' S and O agreement.

Skipping, and Constituent Fronting were encountered. In those cases, it was suggested that factors other than the simple requirements of categorial feature-checking must be at play.

In this section, I show how verb clusters shed some additional light on the mechanisms responsible for word order variation.

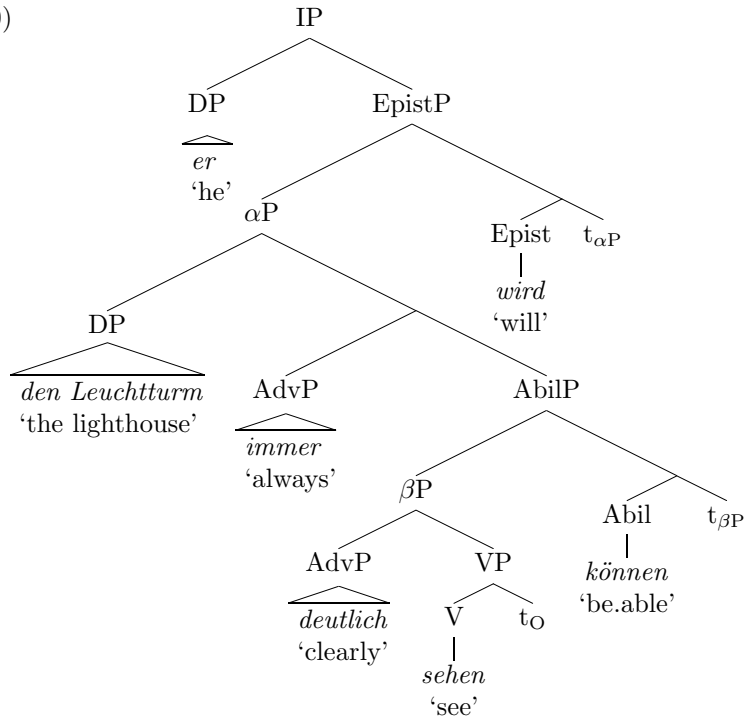
4.1 3-2-1 Verb clusters

OV languages tend to have V-Aux order, as noted. Sequences of two auxiliaries give rise to 3-2-1 order, for examples like the German one in (49).

(49) ...weil er den Leuchtturm immer deutlich sehen können wird
because he the lighthouse always clearly see be.able will
'...because he will always be able to clearly see the lighthouse' (German)

All else being equal, this 3-2-1 order should be the result of verbal projections moving leftward for checking under adjacency of their selectional features.[22] If a language can have such sequences, then there must not be material stranded after the first movement; such material would block adjacency after the second step of movement. For example, the clause in (49) might be assumed to have a structure like that displayed in (50).

(50)



[22] See Hinterhölzl (1997; 1999; 2000) for detailed phrasal movement analyses of German verb clusters and clausal complementation structures.

Note that the checking relation, by hypothesis, is between *wird* (which I label 'Epist' above, for 'Epistemic modal') and its infinitive complement (here headed by *können*, which I label 'Abil' here, for 'Ability modal'); but what is attracted is a much larger structure, the complement of *wird* itself. The same is true of the attraction of the infinitive verb *sehen* by the ability modal; I label it 'βP,' just to have a label. If the modals attracted the infinitive-headed projections, then the adverbs would be stranded to the right; for instance, *sehen* would leave *deutlich* 'clearly' to the right of *können*, and *können* would leave *immer* 'always' (along with *deutlich*) to the right of *wird*. The movements indicated here either mean that an attacted infinitive pied-pipes the adverbial material above it, or that attractors in German specifically target the complement of the modal.

This structure, like a head-final one (assuming object movement to the left), displays the constituency sketched in (51).

(51) ...weil er den Leuchtturm immer deutlich sehen können wird
because he the lighthouse [always [[clearly see] be.able]] will

Constituency tests confirm that this constituency is indeed natural (though there are other possibilities as well, including a lower position for the object, if indefinite, and certain alternative positions for the adverbs).[23]

(52) a. Deutlich sehen wird er den Leuchtturm nicht unbedingt immer
clearly see will he the lighthouse not necessarily always
können.
be.able
'To clearly see the lighthouse, he will not necessarily always be able'

b. Immer deutlich sehen können wird er den Leuchtturm nicht
always clearly see be.able will he the lighthouse not
unbedingt.
necessarily
'Always clearly be able to see the lighthouse, he won't necessarily' (German)

Thus, although other analyses are certainly possible, a fairly straightforward analysis is available in terms of movement to basic positions of licensing under adjacency, which are directly motivated on the basis of easily perceptible evidence, if something like Kayne's (1994) LCA holds. In the next sections I turn to some more complex cases.

[23] For example, *immer* 'always' may attach lower, and thereby front with *sehen*, stranding *können* (*Immer deutlich sehen wird er ....*), but then with a different meaning, one in which 'always' is interpreted inside the scope of *können*. Thanks to Klaus Abels for discussion of the German data.

4.2 Sinking: The surprisingly low '1'

Note that the above analysis presupposes that all VP-internal material is independently moved leftward, by overt licensing requirements (as in Zwart 1997). If the language has no adverbial material that would naturally appear between V and Aux, then the only difference between overt checking of the verb's selectional features and covert checking would be the difference between VAux and AuxV order. In other words, if something occurred to prevent overt checking from occurring, the word order might not turn out appreciably differently. Consider, in this light, the *Infinitivus pro participio* (IPP) construction in the German example in (53): the modal resists participial morphology, and also fails to move to the left of the participle-seeking auxiliary.

(53) ...daß er vor der Abreise die Blumen noch hätte gießen sollen
that he before the departure the flowers still had$_1$ water$_3$ should$_2$
'...that he had still been supposed to water the flowers before leaving'

Here, the object is in a higher licensing position for independent reasons. Thus, it is not immediately clear whether the complement of 'have' has moved at all. In fact, certain 'small' elements occasionally do surface between the auxiliary and the main verb in this construction, in the so-called 'Verb projection raising' construction (example from Wurmbrand to appear).

(54) ...daß er vor der Abreise noch hätte Blumen gießen sollen
that he before the departure still had$_1$ flowers water$_3$ should$_2$
'...that he had still been supposed to water the flowers before leaving'

As Wurmbrand notes, only 'small' complements can appear this low; the object here can be thought of as a part of a predicate, 'to do flower-watering.' An object with any modifier, or one which is referential, would move to a higher licensing position, as in (53) above.

If the IPP complement of the auxiliary did not move at all, then the prediction would be that any adverb which is lower than tense should intervene between 'have' and the main verb. VP-modifying adverbs such as *vorsichtig* 'carefully,' may occur to the right of the first auxiliary, with or without the object also remaining there.

(55) a. ...daß er vor der Abreise die Blumen hätte vorsichtig gießen
that he before the departure the flowers had$_1$ carefully water$_3$
sollen
should$_2$
'...that he had still been supposed to carefully water the flowers before leaving'

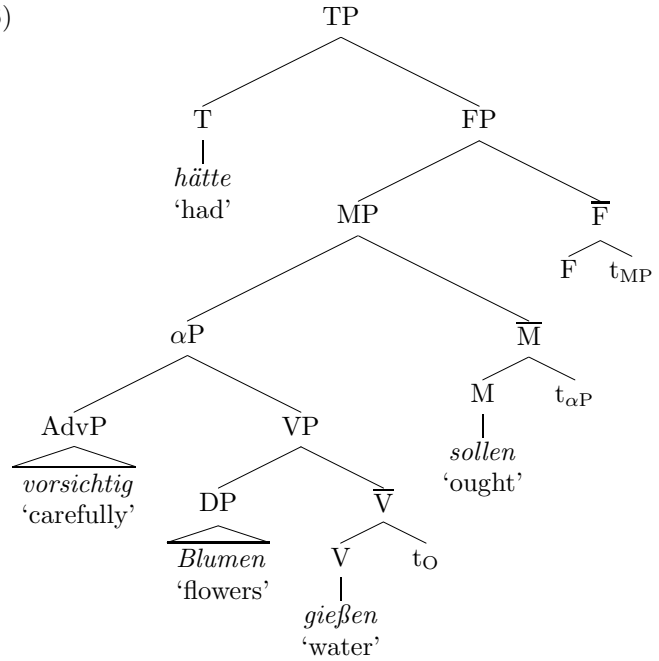
b. ...daß er vor der Abreise hätte vorsichtig Blumen gießen
that he before the departure had$_1$ carefully flowers water$_3$
sollen
should$_2$
'...that he had still been supposed to carefully water the flowers

before leaving'

In cases like this, we may conclude that there is no surface adjacency constraint on the auxiliary 'have' and the VP following it. Mostly, the verb-cluster effect here comes from the adjacency of the main verb and the modal, facilitated by the fact that this OV language has relatively high licensing positions for VP-internal material.

However, there are reasons to believe that the complement of 'have' is not simply in situ. Consider the assumption made earlier that licensing positions for objects are not ordinarily above T. Here, the neutral licensing position for a full DP object is to the left of the finite auxiliary. Furthermore, various Mittelfelt adverbs do show up before *hätte* 'have,' for example *noch* 'still' in Wurmbrand's original example in (54). If *noch* is merged between the modal *sollen* 'ought' and the tense, as would be appropriate for its interpretation, then it would follow 'have'; and if the projection of the modal moved to a position right after 'have,' then *noch* would either be carried along (intervening) or stranded (to the right of the modal). To help see this, I provide a partial structure in (56); neither of the two plausible merge positions for the temporal adverb are possible, in terms of linear order.[24] The adverb, like a full DP object, must move to the left of 'have.'

(56)



What is attracted by F, the functional head just below the auxiliary, is the category selected by the auxiliary. This predicts that the only material that can

[24]The two positions would be those structurally between *sollen* and *vorsichtig*: above the trace of α, to the right of *sollen*, or inside αP, to the left of *vorsichtig*.

intervene linearly between 1 (*hätte*) and 2 (*sollen*) is material in the specifier of 2.

The prohibition here of Asp adverbs is not an isolated fact about IPP; 1-3-2 and 1-2-3 orders in verb clusters in OV languages show a stricter adjacency than would have been expected on an account in which the complement of the highest auxiliary did not move at all. In many cases, adverbs precede the highest auxiliary, even relatively low 'verb phrase' adverbs. Consider the Dutch example in (57), in which a modal is '1' in a Straight order, and is preceded by an adverb over which it takes scope.[25]

(57) ...omdat Jan het probleem helemaal moet hebben begrepen.
because Jan the problem completely must$_1$ have$_2$ understood$_3$
'...because Jan must have completely understood the problem'

The adverb *helemaal* 'completely' modifies the degree of understanding, not the degree of modal necessity (compare the Norwegian example in (2), nearly identical except for VO order). In a language like English, which does not overtly form verb clusters, this relationship is seen directly, as the modal precedes the adverb. In Dutch, however, adverbs necessarily precede the verbal cluster. Thus we can infer that a licensing movement has taken place, removing a constituent containing the adverb from the space to the right of the modal. Descriptively, the phenomenon can be called 'Sinking' (cf. (4)), as the modal Sinks below adverbs which start out below it, giving 2-3-1 order in case of two adverbs 2 and 3, if the modal is 1.

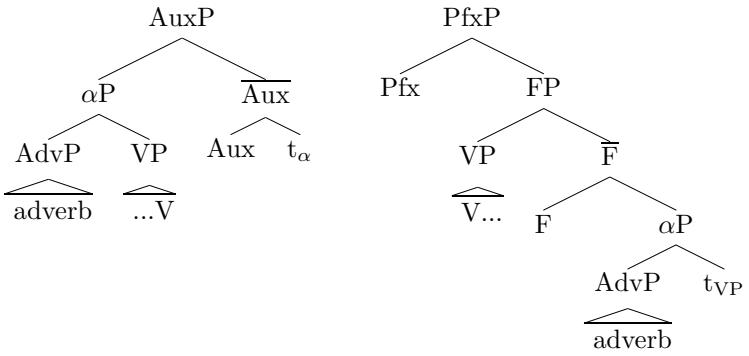
The German case of 3-2-1 depicted in (50) suggested that functional heads can attract their complement category, even when that is not the category singled out for selectional feature-checking; for instance, in the German example, the higher modal which was to check an infinitive verb had to attract 'αP,' and the lower modal attracted 'βP.' I left it open there whether that was a case of pied-piping (i.e. an infinitive is attracted, but αP is carried along) or whether it was a case of attraction of the complement of a particular category (i.e. the complement of the epistemic modal is targeted for movement). In the Dutch situation, only the latter option makes sense. That is, what is needed for the Dutch case is a combination of something like Malagasy, in which the selected category moves to a space below the selecting head, plus something like German, where a complement of a designated category is targeted for movement.

Here is a schematic of the Malagasy and German cases, letting 'F' be a category that attracts VP to a space below the prefixal head.[26]

(58) a. German Modal/Auxiliary b. Malagasy prefix

[25] Thanks to Marleen van de Vate for assistance with the Dutch examples.

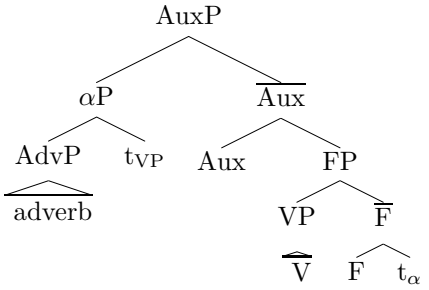
[26] The German auxiliary checks participial features under adjacency. Modals which do not have participial forms (probably because deontic modality is higher than perfectivity in the functional sequence, cf. Cinque 1999) cannot satisfy this requirement. Recall that I suggested above that German has adopted a Malagasy-like solution for selectional feature-checking in IPP: an F head which attracts the MP, headed by the modal.



Abels (2003) argues that a head cannot attract its own complement to its specifier. If that is correct, then each example of the German type must be complex, involving a head G which attracts α dominating some other head which has α as a complement.[27]

Here is the combination of the two, which is necessary to explain the placement of Dutch modals (and Norwegian auxiliaries in general, as argued by Nilsen 2003 and Bentzen 2005; see example (2) above).

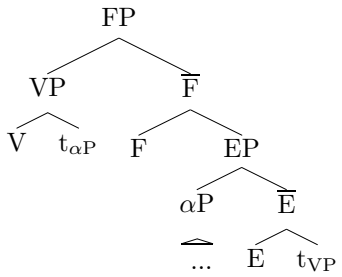
(59) Dutch modal/Norwegian Auxiliary (Sinking)



The tree in (59) represents of course another 'remnant movement' situation, one slightly different from the one presented in §2.3 as an alternative to head movement. That structure, schematically, looked as follows, where F is the suffixal head and E is the Evacuator, attracting the complement of V (labeled 'αP').

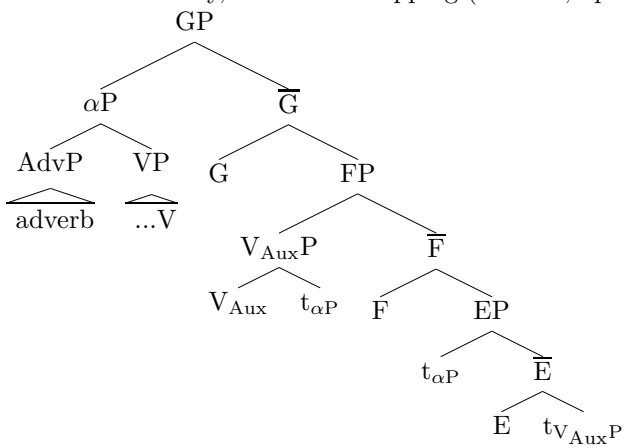
(60) Affix-Hopping structure (N. Sámi past tense)

[27] The only complication would be for my explanation of prefixal causative morphemes in 2-3-1 orders, where I suggested that they might not attract their VP complements because they already had a filled specifier. On this new line of thinking, they would have to lack G projections, which would not obviously follow from anything.



In a V-Aux language with Affix Hopping on auxiliaries, a structure like the one in (60) would be combined with the structure in (58). Suppose that (61) is the structure for the Finnish auxiliary *ol-isi* from Holmberg's (10). The stem of the auxiliary is labeled here as 'V$_{\text{Aux}}$,' and the inflectional suffix on it is F. The head G is the head motivated by adjacency of V to the auxiliary (optional in Finnish), and the head E is the evacuator, motivated by the affixal nature of F.[28]

(61) Head-final auxiliary, with Affix-Hopping (Finnish, optionally)



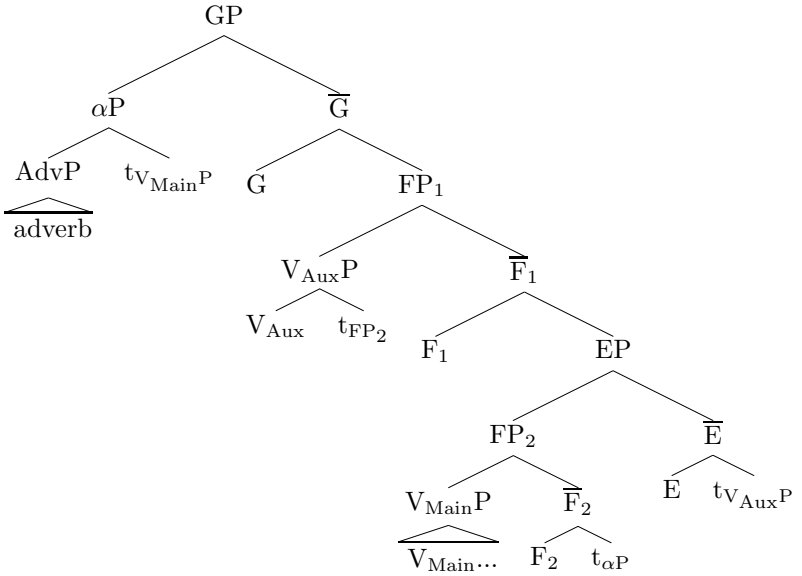
That is, the auxiliary here is decomposed into G–F–E–V$_{\text{Aux}}$. In a sense, F–E is the affix, for example the tense operator which attracts a verbal element and the evacuator which attracts the complement of that verbal element, while G...V$_{\text{Aux}}$ is the stem of the auxiliary, for example a modal operator or predicate plus the G which attracts the complement of V$_{\text{Aux}}$. The sequence might be bundled together like an idiom, possibly leading to morphological and semantic idiosyncracies.

If Norwegian and Dutch auxiliaries involve Affix Hopping, then the affix-hopping structure with F–E–V$_{\text{Aux}}$ in (60) should also replace 'Aux' in the diagram in (59), as indicated below. Dutch and Norwegian differ in whether the

[28]The analyses in Koopman and Szabolcsi (2000) and Bentzen (2005) posit similar structures, but in which the constituent moving to SpecGP would be EP, rather than its dependent αP. That assumption could also be made here. I have depicted the specifier of EP as being extracted to increase parallelism with the structure in (62).

licensing position for objects is in VP (in Norwegian) or higher up, in αP (in Dutch).

(62) Sinking head-initial auxiliary, with Affix-Hopping



The F–E–V_{Aux} sequences are only necessary if the auxiliaries really consist of two syntactic parts, F (the inflectional suffix) and V_{Aux} (the stem of the auxiliary); otherwise the auxiliaries are syntactically particles and can be represented as a single head, as before (recall also that to allow head-movement, or some equivalent, would also render the F_1–E–V_{Aux} structure unnecessary). Recall that the F_2 below V_{Aux} ensures that V_{Aux} is adjacent to V_{Main}; the whole hierarchy, without movement, is G–F_1–E–V_{Aux}–F_2, dominating an αP which contains the main verb phrase. I will suggest it is not a possible structure.

The Aux-V structure in (62) introduces two locality problems which do not arise in the V-Aux counterpart in (61). First, the higher F, which attracts a verbal stem, must attract V_{Aux} across the V_{Main}P in the Spec of the lower FP_2. V_{Main} is the right category to combine with a tense affix, and so might function as a defective intervener, depending on what other assumptions are made. Second, and more seriously, G must extract αP from within FP_2. Up until now, I have assumed that G simply took the largest complement possible below the selecting head; here, it would have to target a specific category within a specifier. Mechanically, the problem can be alleviated by postulating an intermediate G projection between E and V_{Aux}, as a "stacking position" for αP, but unlike other G projections this one could not be motivated by surface adjacency.

On the assumption that the extraction of αP depicted in (62) is impossible, and that the extra G projection necessary to enable it is unlearnable, I conclude that Norwegian and Dutch auxiliaries cannot involve an Affix Hopping complex; and furthermore that no language with Affix Hopping in auxiliaries will have

adverbial Sinking of the type seen in Norwegian and Dutch.

This will also explain the problem raised in §2.3, of why there are no Asp-T-V languages. It is now explained, because the complexity of the Hopping structure needed to derive Asp-T order cannot be combined with the Sinking structure needed to make that [Asp-T] sequence strictly adjacent to V. Thus, 2-1-3 sequences of T, Asp, and V will show a 2-1...3 pattern, and be analyzed as auxiliaries. This furthermore resolves the puzzle that there are no Caus-T-V languages, and no Caus-Asp-T languages. The movement of Caus across Asp or T makes it impossible to guarantee adjacency of the [Caus-T] complex to V, so they will not be analyzed as 2-1-3 prefixal structures.

To avoid structures with two specifiers, I postulated G projections in case a morphologically complex head attracted a complement to its left. I will henceforth refer to the kind of selectional feature that attracts a large complement to the left as a G-feature, whether that implies a distinct G head or not.

The G feature in German was postulated by the learner, I argued, in case a selected head (for example a non-finite main verb) was immediately adjacent to its selector (in this case an auxiliary) in the basic order in the input data. The question therefore arises whether the same properties hold of the G feature in the Norwegian and Dutch case (depicted in (59) with a simple auxiliary). Because of the F projections which attract the verbs, the αP attracted by G in the Norwegian and Dutch case will only contain material merged between the auxiliary and the verb, in general adverbs. These do not take complements; thus it might be held that G in Dutch and Norwegian requires adjacency to an adverb. There are two complications; one is the question of where adjunct PPs are merged,[29] since they can be preverbal but are not head-final, and the other is what happens if there are no adverbs. I leave these problems unresolved for now; see Bentzen (2005).

To sum up, attraction is always of specific categories, and one of the main relations deriving basic word order is the selection relation. There are F heads, normally placed immediately below the position in which the selecting head is pronounced, and normally attracting the selected category itself; and there are G features, which are normally on or immediately above the position in which a selecting head is pronounced, and which typically attract a much larger category, but one which consistently ends with the selected category. The 'Evacuator' E does not seem to have this property, and was only postulated in cases which could otherwise have been handled by head movement.

Functional elements can now be thought of as consisting of several parts each. Some of the examples of functional elements postulated here include the following. F's are subscripted with the category they attract: F_V attracts V, $F_{V_{Aux}}$ attracts V_{Aux}. Adjacency of prefixes follows from the fact that the attracted category is normally head-initial.

(63) a. Aux (preverbal auxiliary particle (English modals))

[29] See Barbiers (1995) for an analysis of PP placement in Dutch; see Schweikert (2005) on the positioning of PPs in the German clause.

b. Aux–F_V (clustering pre-verbal auxiliary particle (Malagasy prefixes))
c. G–Aux–F_V (Sinking pre-verbal auxiliary particle (Norwegian and Dutch pre-V auxiliaries))

(64) a. F_V–E (verbal suffix (e.g. past tense in Sámi))
b. $F_{V_{Aux}}$–E–V_{Aux} (Pre-verbal inflected auxiliary (Sámi modal verbs))

(65) a. G–Aux (post-verbal auxiliary particle (Lezgian suffixes))
b. G–$F_{V_{Aux}}$–E–V_{Aux} (post-verbal inflected auxiliary (possibly, Finnish auxiliaries))

The assumption has been that patterns of adjacency provide cues to the learner regarding which selectional features are checked overtly (possibly, the default assumption is that all are checked overtly, and non-adjacency is the cue that they are not).

5 Adjacency

So far, I have assumed that G features attract a particular category, and that adjacency is the result of independent factors, a conspiracy as it were of strong features. The German IPP case seemed to provide strong confirmation for that assumption. Given that most material would be drawn up above the highest auxiliary in most cases, there seems to be ample evidence for the learner for MP attraction to an F just below the auxiliary 'have,' leading to 1-3-2 order. Just in case VP-internal material is exceptionally left behind in the lowest verbal projection, adjacency is foiled, but checking is successful.

However, there are indications that this is not the whole story. For one thing, verb projection raising cases show elements intervening between unreversed elements, never between reversed ones (see examples in Wurmbrand to appear). It is as if the adjacency induced by F is less strict than the adjacency induced by G. Here I provide an example of the strictness of this kind of adjacency and an interpretation of it.

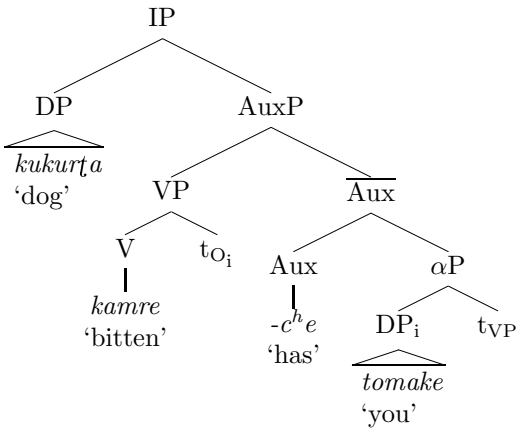
Bayer et al. (2005) show that certain complements in Bengali can be either pre- or post-verbal, for example the pronominal object in the embedded clause in (66).[30]

(66) a. Ami ʃune-c^{h}ilam paʃer baɽir kukurʈa tomake kamre-c^{h}e.
I heard-have [next house dog you bitten-has]
'I heard the next door neighbor's dog has bitten you'
b. Ami ʃune-c^{h}ilam paʃer baɽir kukurʈa kamre-c^{h}e tomake.
I heard-have [next house dog bitten-has you]
'I heard the next door neighbor's dog has bitten you'

[30]To simplify the gloss, I have ignored the case markers (genitive on 'next' and 'door,' accusative on 'you,' a classifier-determiner on 'dog'). Brackets in the gloss mark the embedded clause boundary. I set aside the question of whether the auxiliaries involve Affix Hopping.

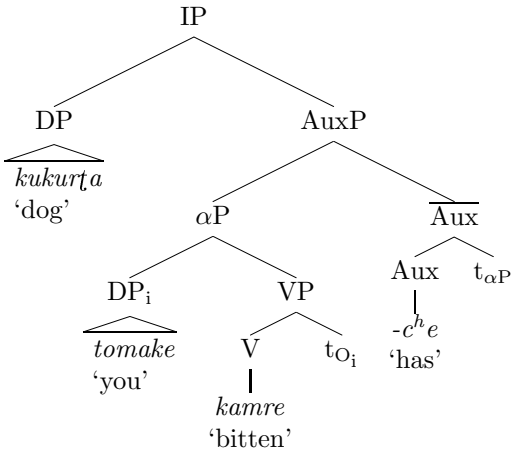
The V-Aux order could mean either of two things: F-features on the Aux, attracting the VP, or G features on Aux, attracting the entire complement of Aux. The object-final order would be the result of the first choice, as displayed in (67) (there might be an E projection below Aux, but it would not change the word order, assuming a licensing position for the object above the verb, in αP).

(67)



The second option, the G feature, would attract the entire complement of the auxiliary, as shown in (68).

(68)



Bayer et al. (2005) also show that clausal complements in Bengali can be pre- or post-verbal.

(69) a. Ami ʃune-c^{h}ilam paʃer baɽir kukurʈa tomake kamre-c^{h}e.
I heard-have [next house dog you bitten-has]
'I heard the next door neighbor's dog has bitten you'

b. Ami paʃer baɽir kukurʈa tomake kamre-c^{h}e ʃune-c^{h}ilam.
I [next house dog you bitten-has] heard-have
'I heard the next door neighbor's dog has bitten you'

Since this kind of clausal complement is normally V-final, suppose that there is enough evidence from V-V adjacency for speakers to assume a G feature on the verb meaning 'hear' (though only optionally, a potential problem for the learnability of the feature). Suppose, then, that 'hear' attracts IP, its complement. Given that IP is usually V-final, this would usually lead to V-V adjacency. But the examples in (66) show that some IPs are not V-final. The account developed so far would predict that these IPs should nonetheless be attracted when G features on V are strong. However, the object-final clause is not permitted preverbally (examples again from Bayer et al. 2005).

(70) a. Ami paʃer baɽir kukurʈa tomake kamre-c^{h}e ʃune-c^{h}ilam.
I [next house dog you bitten-has] heard-have
'I heard the next door's dog has bitten you'

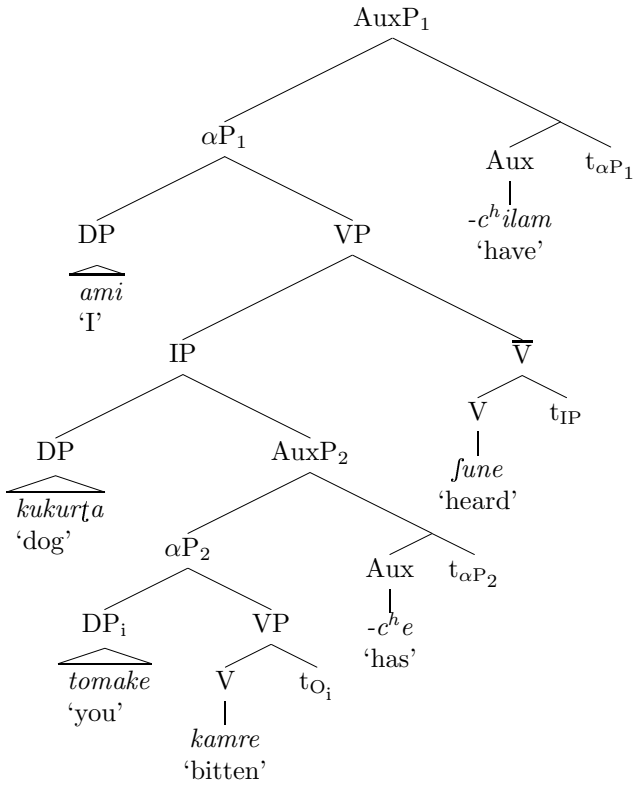
b. *Ami paʃer baɽir kukurʈa kamre-c^{h}e tomake ʃune-c^{h}ilam.
I [next house dog bitten-has you] heard-have

Assuming Cyclicity,[31] movement in the embedded clause takes place before movement in the main clause. If movement is driven by attraction of features, then G attracts some feature, α; movement itself cannot be driven by the need for adjacency. However, on a copy theory of movement (or a multidominance theory), the position in which the object is pronounced might be a matter of linearization of phonological structure; in any case, it seems to be the surface non-adjacency of the two verbs which makes (70b) bad.

The acceptable structure is sketched in (71); G features on both auxiliaries attract α, a complement below the auxiliary; G on the verb 'hear' attracts IP, the complement of V (in this way, 'hear' behaves like an auxiliary). I have included the subject inside αP just to show that additional material could be there; in fact the main clause subject probably moves outside αP.

[31] See Chomsky (1965:134), Chomsky (1973:273), or Chomsky (1993:22) for the version known as the Extension Condition.

(71)



The obligatory adjacency here of V and V is typical of inverse structures. It is not explained by simply saying that G attracts α. Interestingly, it is precisely when the heads in the complement have G features that the matrix verb may have G features. This suggests an alternative approach to the adjacency constraint: perhaps G features percolate, and the feature attracted by G is always G. This would require a G to be inserted at the very bottom somehow; suppose for the sake of argument that there is a G feature on 'bitten' here. Then, if the G option is chosen for the embedded auxiliary (as opposed to the option of attracting VP, stranding the object), then there is a G feature on the auxiliary. If this percolates to IP, then if the verb 'hear' has G features, it can attract IP. If IP has no G features (because the embedded Aux attracted VP rather than αP), then selecting the G option for 'hear' will not lead to a convergent derivation.

Bayer et al. (2005) also show similar examples from German: certain PPs can be postverbal, but not in a complement which is preverbal.

(72) a. Ich habe ihn aufgefordert sich zu entscheiden dafür.
*I have him asked [*RFX *to decide for.it]*
'I have asked him to decide on it'

b. Ich habe ihn sich dafür zu entscheiden aufgefordert.
*I have him [*RFX *for.it to decide] asked*

'I have asked him to decide on it'

c. *Ich habe ihn sich zu entscheiden dafür aufgefordert.
I have him [RFX to decide for.it] asked

The situation is very similar to the Bengali one: a Roll-up structure must not be interrupted. Again, we could suppose that German has two options in the most deeply embedded VP: distinct licensing positions for the different arguments, or a G feature which moves the entire verbal complement to the left. If the latter option is chosen, the VP has G features, and G features percolate up to the top of the embedded clause, where they can be attracted by a G feature on the matrix verb.

Such structures give important clues to the nature of adjacency and to the nature of the G features forcing movement. Additional examples must be studied in depth to resolve the issues raised here.

6 Conclusion

In this article, I have discussed basic word order patterns, and their relationship to basic patterns of morphology. Based on the Antisymmetry hypothesis of Kayne (1994) and the functional hierarchy of Cinque (1999), combined with the syntactic approach to word-structure-building of Julien (2002b), an interesting picture emerges in which many functional heads consist of several pieces, including three important types. F is an attractor for a particular category, which may or may not be morphologically overt. It always attracts categories to its specifier, so when it is overt, it may appear as a suffix or enclitic. The existence of strong functional categories which attract specific categories to their specifiers is a very general assumption and nothing new here.

In addition to functional heads of the F type, I was also led to postulate features of type G, which have the property that they attract one category (usually one quite close by) but require linear adjacency with another category, one which can be embedded inside the moved phrase and at its right edge. These are unusual assumptions and raise interesting questions about the role that adjacency can play in the grammar.

Finally, I have postulated on a couple of occasions elements which I have labeled E, attractors of convenience which eliminate complement material in order to allow Affix Hopping to occur; these do not seem to consistently display adjacency properties of the type manifested by G heads, but nor is it clear that they consistenly attract a particular category the way the F heads do. There are so few clear examples that it is difficult to know whether E can be collapsed with either of F or G. The examples which have been postulated of E have been phonologically null. Both overt and covert F have been postulated. For G, I have sometimes depicted G as phonologically overt, attracting α directly to its specifier, and other times depicted it as systematically null, an extra head immediately dominating the auxiliary or other head-final projection. The choice between these two is not clear at this point.

What I hope to have shown is that a movement approach to basic word order can be explanatory. The problem with movement approaches is overgeneration; Koopman and Szabolcsi (2000) make a number of suggestions regarding how to constrain movement, and I here offer some modifications and alternatives.

A central constraint assumed here has been that each feature postulated should have clear motivation from the input to the learner. V-Aux adjacency is the cue for G, and Aux-V adjacency the cue for F (or, failure of Aux-V adjacency is the cue that F can be checked by Agree).

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