1...3–2

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October 18, 2005

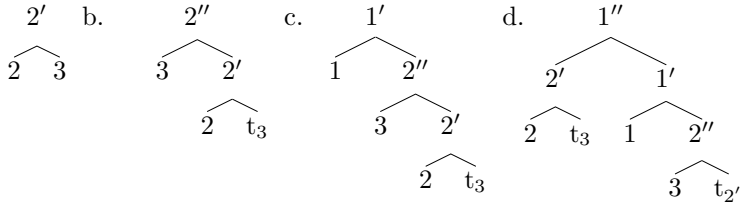
1 Introduction

In mainstream generative work, three main movement types have been recognized, namely A-movement, $\overline{\text{A}}$-movement, and head movement (cf. e.g. Rizzi 1990). A-movement only affects argument-like XPs, generally DPs, and may be related to the case system and/or the subject condition (the EPP, cf. Chomsky 1982:10, Svenonius 2002). $\overline{\text{A}}$-movement is connected to discourse-informational systems and affects a slightly wider range of XPs, essentially those which can be predicated over (Svenonius 1994, Chapter 1). The properties of head-movement have been inferred from the behavior of verb movement to T (Emonds 1976, Koopman 1984, Pollock 1989) or to C (den Besten 1981, Travis 1984, Platzack 1986) and various patterns of incorporation (Baker 1988) and concatenative inflection (Belletti 1990).

Highly significant recent developments, however, challenge this picture. In the wake of increasing simplification of the base phrase structure rules (Kayne 1994, Chomsky 1995, Brody 1997), movement-based analyses (or their equivalents) have been developed for a wide variety of word-order phenomena. In particular, the Antisymmetry program launched by Kayne (1994) has led to an explosion of work in which surface word order is derived through a sequence of steps that do not resemble A, $\overline{\text{A}}$, or head movement (Aboh 1998, Koopman and Szabolcsi 2000, and various papers in Svenonius 2000a, for example).

One important type of movement in this new breed of analyses is *Remnant movement*, which is the movement of a constituent containing a trace (Müller 1998). When Remnant movement crosses the element that is coindexed with that trace, then the original order is restored; Remnant movement therefore can have the effect of allowing a closely-knit sequence to be disrupted by an element which is merged later, as illustrated in (1).

(1) a. $2'$ b. $2''$ c. $1'$ d. $1''$



The pattern of movement seen here is reminiscent of that of classic head-movement, illustrated in (2) with Norwegian, where the main verb crosses both the subject and the adverb in the main clause, compared to the embedded clause position.

(2) a. ...at Jens ikke forstår oppgaven.
that Jens not understand the.assignment
'...that Jens doesn't understand the assignment'
b. Da forstår Jens ikke oppgaven.
then understand Jens not the.assignment
'Then Jens doesn't understand the assignment' (Norwegian)

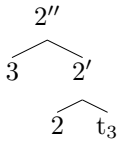
Counting the adverb as '1,' the main verb as '2,' and the object as '3,' the surface order in (2b) is 2-1-3. Another example of 2-1-3 order in Norwegian can be easily seen in embedded clauses like that in (3), where low adverbs like 'completely' precede high verbs such as modals.

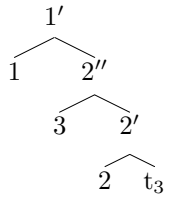
(3) ...at Jens helt må forstå oppgaven.
that Jens completely must understand the.assignment
'...that Jens must completely understand the assignment' (Norwegian)

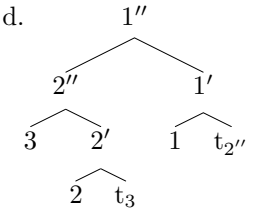
Here, taking the modal as '1,' the adverb as '2,' and the main verb as '3,' the surface order is again 2-1-3, but the adverb does not have the properties of a head. Nilsen (2003) and Bentzen (to appear) have developed a remnant movement account of Norwegian clause structure which captures the fact that Norwegian verb sequences follow all Mittelfelt material in embedded clause.

The other major type of movement which has figured heavily in recent analyses is *Roll-up movement* (Brody 1998), which is successive movement with pied-piping, leading to the reversal of the order as it would have been without movement, as illustrated in (4).

(4) a. 

b. 

c. 

d. 

For example, Aboh (1998) argues that the order Noun-Adjective-Determiner in Gungbe, as illustrated in (5a), is derived from an underlying Determiner-Adjective-Noun order, by a roll-up series of movements (he uses the term *snowballing*).

(5) a. távò xóxó lɔ́
table old DET
'the old table'

b. àgásá dàxó àtɔ̀n éhè lɔ́ lɛ́
crabs big three DEM DET NUM
'these three big crabs' (Gungbe)

The movements are obligatory, in that the normal order in the DP is as in (5a). Aboh presents several arguments against a head-final analysis, for example the larger noun phrase in (5b) is derived from an underlying order Determiner-Number-Numeral-Adjective-N; roll-up movement reverses the order of the last three elements, and then those four elements move as a cluster to the left of the determiner, preserving the left-right order of the determiner and the number element.[1] A head-final analysis would predict that the number element be to the left of the determiner (assuming that Aboh is correct in analyzing the Number head as lower in the hierarchical structure than the Determiner, a conclusion supported by cross-linguistic evidence, cf. §2.5 below).

Notice that the categories that are postulated to move in the above analyses of Norwegian and of Gungbe are not typical targets for A- and $\overline{\text{A}}$-movement; in fact, roll-up analyses and remnant analysis regularly move small subparts of noun phrases and clauses which can never be topicalized, questioned, moved to subject position, or the like.

Another way in which roll-up and remnant movement distinguish themselves from A- and $\overline{\text{A}}$-movements concerns the nature of the triggers for movement. For many cases of A- or $\overline{\text{A}}$-movement a plausible probe triggering the movement has been identified, for example finite T or [+WH] C. This is not the case for roll-up and remnant movement; heads are often postulated to trigger the movement, but only for theory-internal reasons, to adhere to the general expectation that movement is triggered by probes. Often roll-up and remnant movement have the character of being necessary to derive neutral or unmarked word order; this is generally not the case for $\overline{\text{A}}$-movement (though it often is for A-movement).

In this article, I examine neutral word order in several cases where something is understood about the cross-linguistic variation found; I find that in many cases of sequences of adjacent elements which are similar in some impressionistic way, the orders 1-2-3, 1-3-2, and 3-2-1 can be observed, to the exclusion of 2-1-3, 3-1-2, and 2-3-1 orders. I suggest that the roll-up (3-2-1) and partial roll-up or 'curl' (1-3-2) are characteristic of something like *cluster formation*, a tendency for language to forms clusters, while 2-1-3, 3-1-2, and 2-3-1 orders, I suggest, arise for other reasons; for example, 3-1-2 is typically the result of probe-driven movement, and 2-1-3 may arise when 1 and 3 are of the right sort to form a cluster.

I focus mainly on roll-up movement. The article is largely programmatic and sketches the phenomena in a somewhat descriptive way, to avoid reading too much theory into an matter which is quite unsettled. I believe that the patterns that emerge are striking and must be taken seriously.

[1] I return to the location of the demonstrative. Aboh places it below Number, assuming that it is involved in roll-up, but there is reason to think that it might actually be located to the left of the determiner, being crossed by the cluster.

2 Patterns in syntax

In this section, I examine the six possible orderings of sets of three hierarchically organized elements. I use '1' to represent the highest element in the hierarchy, '2' for the next highest, and '3' for the lowest in consideration at any given point (or '4,' for sequences of four elements). 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*) will be characterized as having 1-2-3 order for these three elements. A language with C-V-T (e.g. German, in *dass (es) regnen wird*) will be described as exhibiting 1-3-2 order, and a language with V-T-C (e.g. Japanese, *(ame ga) futte imasu to*) has 3-2-1.

As already indicated in the introduction, I will argue that these orders are profitably understood in terms of movement (cf. Kayne 1994), so that the German order is derived by moving V to the left of T, and the Japanese order is derived by moving the V-T complex to the left of C.

The logical possibilities are given labels as in (6).

(6)

a.	1-2-3	**Straight**
b.	1-3-2	**Curl**
c.	3-2-1	**Roll-up**
d.	3-1-2	**Long Extraction**
e.	2-3-1	**Constituent fronting**
f.	2-1-3	**Short Extraction**

All of these options exist in natural languages. For example, a simple *wh*-extraction in English like *What time will it start?* involves long extraction, 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 short extraction, 2-1-3 (where 2 is the modal *will* and 1 is the subject), among other orders.

But such an example involves $\overline{\text{A}}$-movement, which is not under consideration in this paper. As noted above, $\overline{\text{A}}$-movement targets relatively large constituents which have interpretations that are compatible with discourse-information content such as topicality. Even when it appears that $\overline{\text{A}}$-movement targets something smaller (as when only a *wh*-operator need be interpreted in C), an entire constituent is pied-piped. Similarly, A-movement involves constituents with certain specific properties, for example constituents which serve as arguments, binders, and recipients of case.

The movements under investigation here are different; I focus on what Greenberg (1966) called the base or neutral word order, and not on orders that carry special discourse-informational content. The 1-3-2 order of C, T, and V in a German embedded clause is neutral in this sense, as is the 3-2-1 order of a Japanese clause. The movements under investigation here are therefore obligatory in a sense that distinguishes them from scrambling, focus movement, topicalization, and so on.

Also as noted above, the constituents that undergo these movements are often not even available for the classic $\overline{\text{A}}$-movements. Although VP can sometimes be $\overline{\text{A}}$-moved, TP typically cannot, for example. If there are $\overline{\text{A}}$-attractors in the C-domain which target constituents that can serve as discourse referents, and which interact with information packaging, then what is being investigated here seems to be a distinct set of attractors which target a distinct class of constituents. They might have more in common with the A-movement system. A-movements (e.g. movement of the subject to SpecTP) tend to be obligatory in one language (e.g. English) and impossible in another (e.g. Irish). They do not tend to cross finite clause boundaries.

However, there are also some apparent differences between classic A-movement and the movements discussed here. Generally, roll-up movement organize constituents which can be said to belong to the same extended projection (in something like Grimshaw's 1991 sense), e.g. C, T, and V belong to the same extended projection, as do the elements in the Gungbe noun phrase examples in (5) above. Roll-up can be said to form clusters; for example verb-final constituents move to the left of verbs, and PP-final constituents move to the left of PPs (as will be seen in the following sections). Cluster formation does not seem to be a characteristic of A-movement.

I proceed by examining several case studies, each of which sheds light on some of the properties of roll-up movement. In §2.1, I point out that the different relation of the object to its selecting verb, compared with the relation of VP to its selecting auxiliary, can be understood in terms of category features. In §2.2, I show more evidence that category labels are relevant to roll-up structures. This suggests that roll-up structures interact with morphological feature attraction. I show how locality also plays a role and how adjacency is derived. In §2.3 and §2.4, I turn to a slightly different case of roll-up, that which derives ascending sequences of adverbs and prepositional phrases to the right. These constructions show additional facts about roll-up structures, for example the fact that positions cannot be skipped. In §2.5, Greenberg's Universal 20 about the order of constituents in DP is examined.

2.1 Aux-V-O

Roll-up orders can be discerned across extended projections, for example when a head-final DP precedes a head-final VP, but I conjecture that this does not typically involve the formation of a single large cluster, but of two separate ones.[2]

There is a strong correlation between V-O and Aux-V, that is, between having the unmarked order verb-object and having the unmarked order auxiliary-verb (Greenberg 1966, Dryer 1992), and a similarly strong correlation between O-V and V-Aux. Thus, taking Aux, V, and O as 1, 2, and 3, we have many 1-2-3 languages (English, for example) and many 3-2-1 languages (German, for

[2]It is obviously important to derive Bayer's (2001) correlation between C-T order and postverbal positioning of the CP, perhaps along the lines of Cinque 2005, but I will not address that further here.

example, in embedded clauses). There are also languages which have as their unmarked order 1-3-2 (Vata and Gbadi, as described by Koopman 1984, or German in main clauses).

If we search further, some additional orders can be found. For example, 3-1-2 (Dutch embedded clauses, when 1 is a modal; cf. Zwart 1996), and even 2-1-3 (e.g. Serbian, when there is no overt subject).

(7) a. dat Jan het boek kan lezen
that Jan the book can read
'that Jan can read the book' (Dutch)
b. Čitao je knigu
read AUX *book*
'I was reading a book' (Serbian)

I will argue below that V-Aux order in general is derived by movement of VP into a specifier to the left of Aux (following, e.g., Zwart 1997b). It seems that for this to happen *by roll-up movement*, material to the right of the verb must have left the verb phrase. That is, $\overline{\text{A}}$-movement may front a VP which contains complements to the right, as in the Norwegian example here.

(8) Lese boka kan han ikke.
read the.book can he not
'Read the book, he can't' (Norwegian)

In contrast to $\overline{\text{A}}$-movement, it is characteristic of roll-up movement that the mover not contain material to the right, and that adjuncts not intervene between the mover and the higher element which motivates the movement; i.e. roll-up movement of V to the left of Aux is cluster formation, and a cluster cannot be interrupted; the VP fronting seen in (8) is not cluster formation, and nor is placement of the object to the left of the verb in an O-V-Aux order; there is generally no requirement that the noun not include material to its right, and it may also precede low adverbs and other material in the Mittelfeld; in fact, it does so preferably, in many OV languages, illustrated here with German (adapted from Hinterhölzl 2000).

(9) weil Hans (??genau) den Plan (genau) ausführen muß
since Hans exactly the plan exactly execute must
'since Hans must execute the plan exactly'

Thus, the attractor for the object is independent of the order of V and Aux (as is already clear from Dutch); but the roll-up of V and Aux is sensitive to whether the object has been evacuated. Thus the first lesson about roll-up is that it interacts with other types of movement, suggesting that it suggesting that it should not be relegated to a separate 'module,' e.g. a phonological component.

The movement of the Serbian participle to the left of its auxiliary, presumably by remnant movement, can also be understood as a case of cluster formation; the relative rarity of the order V-Aux-O must be due to independent restrictions on the organization of the the O attractors and the Auxiliary.

I have not been able to find the order V-O-Aux as an unmarked order in any language, though Matthew Dryer reports (personal communication, 1998; cf. Svenonius 2000b:21, n. 5) that two Bongo-Bagirmi languages are listed in his database as VO but VAux, hence apparently either 2-3-1 or 2-1-3. Thus all or nearly all the possible orders are attested.

In summary, then the overwhelming majority of languages have either 1-2-3 or 3-2-1 for Aux-V-O, and of the other orders, only 1-3-2 is at all common. This same skewed distribution will recur many times in the sections to come, often because of cluster formation, either because 3 must be evacuated for 1 and 2 to form a cluster, as here, or because 1, 2, and 3 all form a cluster, as in the verb clusters discussed in the next section.

I return to the question of how to make sense of such systematic statistical tendencies in linguistic theory. At this point in time, however, I wish to head off a common attitude toward distributions of this type. It is frequently suggested that since the number of actually existing languages is very small compared with the number of possible human languages, and since there is no reason to think that the existing sample is representative in any way, linguistic theory should concentrate on defining the limits of variation, and must not build distributional patterns into the system. The reasoning is that, even if the Bongo-Bagirmi languages are the only ones in the world with V-O-Aux order, the theory must permit it alongside Aux-V-O and it is premature to speculate about its rarity. However, what I hope to show in this paper is that we have enough examples of the different patterns across construction types to begin to build the properties of roll-up movement and cluster formation into the theory of movement.

2.2 Verbal clusters

In the VO-type languages, sequences of auxiliaries are arranged from left to right in descending order; so that, for example, (10) and (11a) are modals of perfects, and (11b) is a perfect of a modal.

(10) I must have forgotten my keys.

(11) a. Jeg må ha glem-t nøklene.
*I must.*PRES *have.*INF *forget-*PTCPL *the.keys*
'I must have forgotten the keys'

b. Jeg har mått-et huske nøklene.
*I have.*PRES *must-*PTCPL *remember.*INF *the.keys*
'I have had to remember the keys' (Norwegian)

Thus, taking the higher auxiliary as 1, the second auxiliary as 2, and the main verb as 3, both English and Norwegian have 1-2-3. German has 3-2-1 in embedded clauses, and some OV languages have 1-3-2, e.g. German in main clauses. These orders are the most widely attested ones. A few examples from Swiss German are provided in (12), illustrating 1-2-3, 1-3-2, and 3-2-1 orders.

(12) a. das er wil chöne vorsinge
that he wants be.able sing

'that he wants to be able to sing'

b. das er wil vorsinge chöne
that he wants sing be.able
'that he wants to be able to sing'

c. das er vorsinge chöne wil
that he sing be.able wants
'that he wants to be able to sing' (Swiss German)

The fact that the same language allows all three orders here suggests that some of them might express some sort of marked information structure, in which case they should be set aside, to keep the methodology here consistent, but it is clear that for each of the straight, curl, and roll-up orders, there are many languages for which that order is the only one possible with neutral information packaging.

A fairly comprehensive list for Germanic is given in (13) (based on Wurmbrand 2004; to appear).

(13)
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

Some telling generalizations emerge. First of all, if a language is VO, then it will generally only allow 1-2-3. Beyond that, keep in mind that Dutch, Afrikaans, and West Flemish show a tendency toward 1-2-3 while German dialects and Frisian show a tendency for 3-2-1. Other orders can be characterized as deviations from these norms.

2.2.1 Participles vs. infinitives

A second generalization that emerges from Wurmbrand's overview is that participles are more likely to cross an auxiliary than are infinitives; e.g. Dutch tends to have the order 1-2 for modal plus infinitive but the order 2-1 for participle and 'have' or 'be'. Much variation is encountered, but there are dialects in which this pattern is fairly rigid (e.g. West Flemish), and the tendency is always in the same direction: if a language has 2-1 order, it has it for the participle-'have' combination (e.g. Wurmbrand reports Swiss dialects with both orders for the modal plus infinitive but a rigid 2-1 participle-'have' order, as well as Dutch dialects in which the participle-'have' order is variable but the modal must precede

the infinitive (1-2); she reports no dialects with the opposite tendencies).

(14) a. dat Jan het boek gelezen heeft
*that Jan the book read.*PTCPL$_2$ *has*$_1$
'that Jan has read the book'
b. dat Jan het boek kan lezen
that Jan the book can$_1$ *read*$_2$
'that Jan can read the book' (Dutch)

Participles also distinguish themselves from the infinitival complements of modals in exhibiting a possibility for long extraction, to derive 3-1-2 order. This is illustrated in (15) with Dutch, in which a participle may appear after, in the middle of, or before a modal-'have' sequence (Wurmbrand 2004).

(15) a. dat Marie het boek kan hebben gelezen
*that Marie the book can.*PRES$_1$ *have.*INF$_2$ *read.*PTCPL$_3$
'that Marie may have read the book'
b. dat Marie het boek kan gelezen hebben
*that Marie the book can.*PRES$_1$ *read.*PTCPL$_3$ *have.*INF$_2$
'that Marie may have read the book'
c. dat Marie het boek gelezen kan hebben
*that Marie the book read.*PTCPL$_3$ *can.*PRES$_1$ *have.*INF$_2$
'that Marie may have read the book'

Such options are impossible for sequences involving two modals, for which only 1-2-3 is possible in Dutch.

(16) a. dat Marie het boek zal kunnen lezen
*that Marie the book will.*PRES$_1$ *can.*INF$_2$ *read.*INF$_3$
'that Marie will be able to read the book'
b. *dat Marie het boek zal lezen kunnen
*that Marie the book will.*PRES$_1$ *read.*INF$_3$ *can.*INF$_2$
c. *dat Marie het boek lezen zal kunnen
*that Marie the book read.*INF$_3$ *will.*PRES$_1$ *can.*INF$_2$

One way to characterize this situation is to say that if an infinitive is attracted, then so is a participle. This suggests that (just as with objects) participles can be attracted by probes that distinguish them from other verb forms, while whatever causes infinitives to move (cluster formation, by hypothesis) is less discriminating, in that it will also affect participles. This may be related to the fact that participles are morphologically distinct from other verb forms, showing for example adjectival or nominal agreement inflection in many languages (note also that it is such a participle which undergoes short extraction in Slavic languages to derive the 2-1-3 order discussed above).

Note also that the perfect participle appears to have a relatively fixed place in the functional sequence, in the terms of Cinque (1999) below epistemic modality but above deontic modality, whereas it is impossible to place 'infinitive' in any particular place in the hierarchy (cf. (11a) vs. (11b)).

2.2.2 *Infinitivus pro participio*

The third group of generalizations concerns the *Infinitivus pro participio* or IPP phenomenon, in which a modal, embedded under 'have,' fails to show participial morphology, and surfaces in the infinitive (see e.g. Hinterhölzl 2000 for an analysis and references to previous literature).

The exact character of the IPP phenomenon varies a great deal from one language to the next. In Afrikaans and West Flemish, for example, it generally leads to 2-3-1 order, which is essentially what would be expected if 2 were a participial modal (because modals precede their complements, but participles are fronted). In Dutch, however, the IPP leads to 1-2-3 order, which is distinctly unlike a participial pattern (since participles typically front) and somewhat unlike a modal pattern (since modals optionally front). The case I want to focus on is similar, in that the IPP-headed constituent (the one headed by 2) fails to front, strikingly in the case of German because roll-up is otherwise so robust.

Thus, in German, both the standard and in various dialects, the IPP frequently surfaces with 1-3-2 order, in other words the curl, or only partial roll-up, as if the IPP fails to be attracted to the final step of movement, making it unlike both infinitive complements of modals and participial complements of 'have.' I give examples, from Wurmbrand (to appear), from German and Swiss German, though Swiss German allows many different orders.

(17) a. weil er es hat kaufen können
*because he it has.*PRES$_1$ *buy.*INF$_3$ *can.*IPP$_2$
'because he has been able to buy it' (German)

b. das de Jonas hät schwimme müese
*that the Jonas has*PRES$_1$ *swim.*INF$_3$ *must.*IPP$_2$
'that Jonas has had to swim' (Swiss German)

Hinterhölzl (2000) notes that those languages in which there is no correlate of the prefixal *ge-* in the formation of the perfect fail to show any IPP effect; thus e.g. Frisian, which has no prefix in the perfect, has 3-2-1 order for all sequences of three verbs, including perfects of modals.

The failure of a 3-2 sequence to front, in this case, suggests one of two things; either the IPP is not the right category to be attracted by the auxiliary 'have' (given the assumption that the complement of 'have' is subject to feature-driven movement and not to roll-up), or the IPP is too 'heavy' to be moved by a roll-up movement (given the characterization made above that complementless constituents are 'light'). Both may in fact be true. First of all, the IPP modal is clearly not participial, suggesting it is the wrong category to be attracted. Furthermore, if the modal below the perfective represents some limited degree of recursion, then it may be clauselike and therefore 'larger' than an ordinary participle (in terms of functional structure).

2.2.3 'to'

A slightly different case of 2-3-1 order is seen in modals which select complements with infinitival 'to' (German *zu*). What is most typical is that 'to' remains to the left of the embedded verb even if the whole complex moves to the left of the selecting modal, giving 2-3-1 (where 2 is *zu*).

(18) weil er sie nicht zu küssen wagte
*because he her not to$_2$ kiss.*INF$_3$ *dared.*PAST$_1$
'because he didn't dare to kiss her' (German)

In a few cases, another constituent may intervene between 'to' and the infinitive, in a curl order, as in the examples here (from Donaldson 1993 and Hinterhölzl 2000 (citing Haegeman)).

(19) a. Sy hoef nie die lig af te geskakel het nie.
*she need.*PRES$_1$ *not the light off to$_2$ turned.*PTCPL$_4$ *have.*INF$_3$ *not*
'She need not have turned the light off' (Afrikaans)
b. mee Valère te willen dienen boek kuopen een
*with Valère to$_1$ want.*IPP$_3$ *that book buy.*INF$_4$ *have.*INF$_2$
'with Valère having wanted to buy that book' (West Flemish)

Such cases show that there may be a landing site between 'to' and its complement, so that 'to' is not prefixal; and the German case above shows that the whole complement may move along with 'to'; but in no case does the complement of Germanic 'to' move to the left of 'to.' I suggest that this be understood in terms of the size of the units affected by roll-up; though they are relatively 'light,' they are not minimal units consisting of a single head. Rather, they are segments of an extended projection, just as with A- and $\overline{\text{A}}$-movement.

2.2.4 Adjacency

Though verb clusters often require strict adjacency, there are some exceptions, and they are quite revealing. In VO languages, adverbs and other material are frequently found interspersed between the auxiliaries or between an auxiliary and the main verb (though not always, cf. Norwegian, as mentioned above). In OV languages, an auxiliary tends to be adjacent to the verb (or to another auxiliary). This is largely true even when the order is AuxV, but it is absolute when the order is VAux.

Situations in which non-verbal material intervenes between two verbs in West Germanic embedded clauses are known in the literature as Verb Projection Raising. Apart from certain cases of IPP in West Flemish, in which a rather large curled constituent constituent fronts across 'have,' (see (20d) below, from Haegeman 2000), the attested patterns of verb projection raising all reduce to curls (examples from Wurmbrand to appear).

(20) a. dass er vor de Abreis no het soele Blueme guesse
that he before the departure still had$_1$ should$_2$ flowers water$_3$

'that he should have watered the flowers before his departure' (Swiss German)

b. daß er vor der Abreise noch hätte Blumen gießen sollen$_1$
that he before the departure still had$_1$ flowers water$_3$ should$_2$
'that he should have watered the flowers before his departure' (German)

c. Dink jy ek sal kan in Pretoria bly?
think you I will$_1$ be.able$_2$ in Pretoria stay$_3$
'Do you think I will be able to stay in Pretoria?' (Afrikaans)

d. da Valère willen Marie dienen boek geven eet
that Valère want$_2$ Marie that book give$_3$ has$_1$
'that Valère has wanted to give Marie that book' (West Flemish)

These patterns can be schematized as in (21).

(21) a. 1-2-X-3: Swiss German
b. 1-X-3-2: Standard German (also found in Swiss German)
c. 1-2-X-3: Afrikaans (also found in West Flemish)
d. 2-X-3-1: West Flemish

As Wurmbrand notes, X in these examples is typically 'small,' for example a bare noun or particle, or closely related to the main verb, for example an idiomatic PP. Full DPs typically must cross the highest verb and enter the Mittelfeld. If we take these small selected elements to be honorary members of the extended projection of the verb, then most of these examples can be characterized in terms of partial roll-up, what I have called curling (1-2-4-3 and 1-4-3-2; the latter is in fact a full roll-up of three elements below '1').

Reversed sequences of two auxiliaries are virtually always strictly adjacent; unattested are *3-X-2-1. *3-2-X-1, and *1-3-X-2, where X is an argument, secondary predicate, adverbial, or the like. These should be compared with the general rarity of 2-3-1 (e.g. of V-O-Aux), and of 2-1-3 (e.g. of V-Aux-O), i.e. they would either require X to be carried along by the preceding element (constituent fronting), or they would require the preceding element to have crossed X (long extraction).

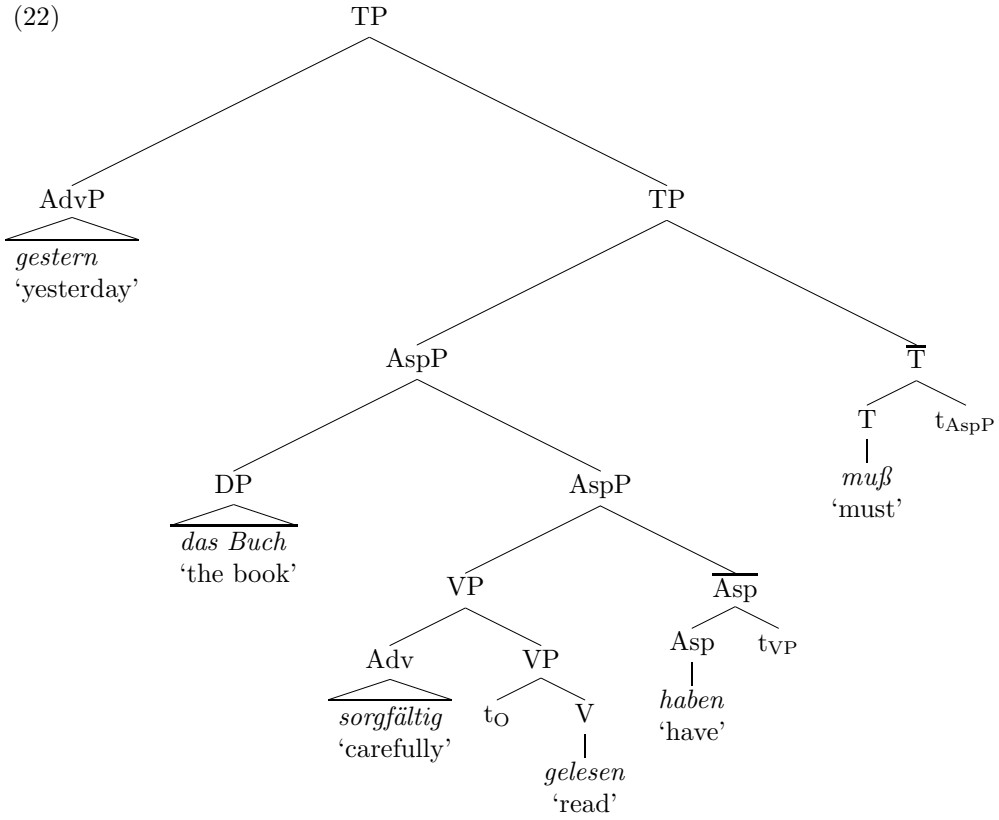
The situation could be schematized along the lines sketched in the tree below. Imagine a functional sequence of T-Asp-V corresponding to a surface order V-Asp-T (or V_3-Aux_2-Aux_1). Imagine that each of these heads attracts its complement to its specifier position, and that adverbs can adjoin to the left of maximal projections.[3] The object is typically outside VP, as diagnosed by low

[3]That adverbs can appear in left branches of rolled-up constituents is suggests by the Hungarian examples here, taken from Bartos (2004). Example (ia) shows that the manner adverb is preferably placed immediately to the left of the verb it modifies. (ib) shows that this is true also when the verb has 'rolled up' across its selecting auxiliary. (ic) shows that the adverb cannot be stranded or crossed.

(i) a. Most fogok akarni (?hangosan) kezdeni (hangosan) énekelni
now will$_1$ want$_2$ loudly begin$_3$ loudly sing$_4$
'Now I will want to begin to (loudly) sing'

adverbs, so I adjoin it to Asp.

(22)

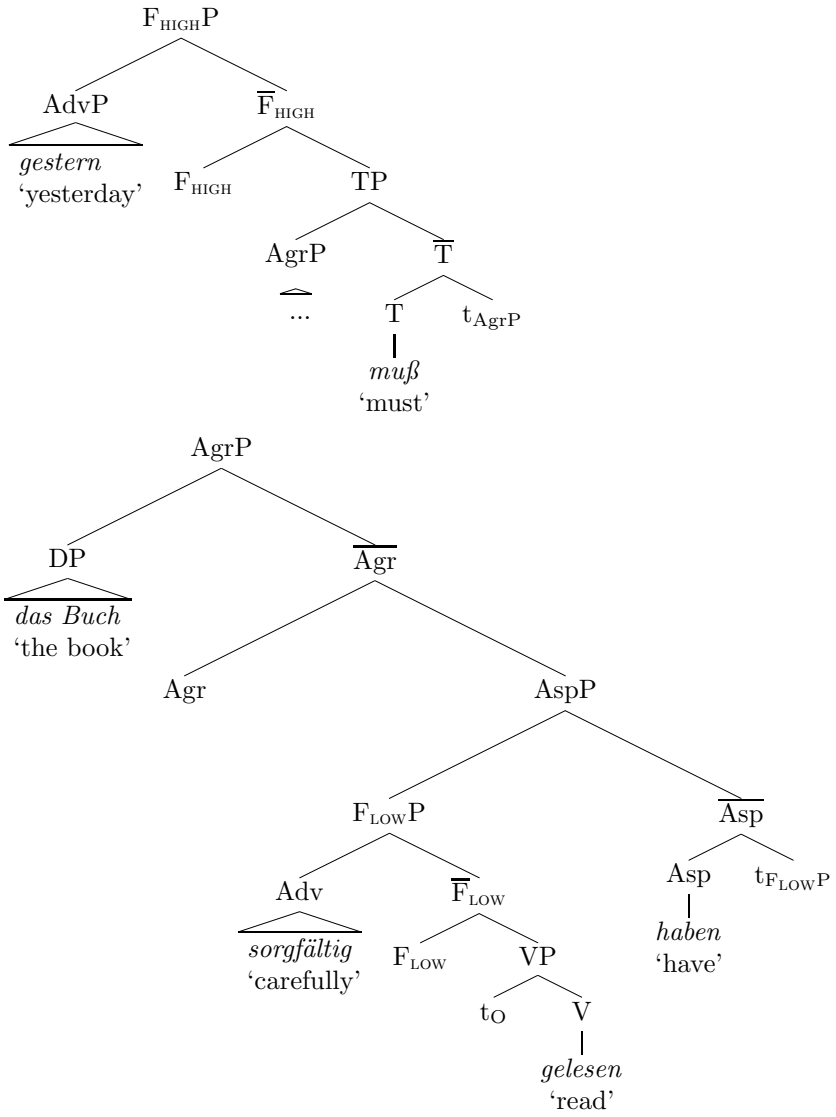


Utilizing a notational trick of distinguishing XP from $\overline{X}$, I can describe the adjacency facts (that the heads V-Aux cannot be separated by VP-internal material or adverbs) by saying that although adjunction is possible to XP (i.e. X with a filled 'specifier'), adjunction is not possible to $\overline{X}$. Of course, such a description begs the question of what a specifier is, and what the difference is between XP and $\overline{X}$. One possibility is that, as suggested by Kayne 1994, only one specifier is possible; the roll-up heads host extracted complements, as shown above, but there are other heads which license adjuncts, and do not trigger roll-up (this time I split the tree for reasons of space).

b. Most fogok akarni (hangosan) énekelni kezdeni
now will$_1$ want$_2$ loudly sing$_4$ begin$_3$
'Now I will want to begin to (loudly) sing'

c. Most fogok akarni énekelni (*hangosan) kezdeni (*hangosan)
now will$_1$ want$_2$ sing$_4$ loudly begin$_3$ loudly
'Now I will want to begin to sing' (Hungarian)

(23)



Now the generalizations could be stated as follows: Agr is a regular A-attractor of a familiar sort (similar to T, with its EPP feature). The verbal heads T, Asp, and possibly V could be said to attract their complements to specifier position.[4] The adjunct-introducing heads F_{LOW} and F_{HIGH} simply do not. Adjacency of the type noted above obtains whenever a sequence of heads in a projection line each has the property of attracting its own complement. Still, nothing obvious ensures that the very first head in such a sequence should have the property (e.g. why a verb followed by its own complement tends not to be attracted,

[4] Abels (2003) argues that a complement cannot move to the specifier of its selecting head. If that is correct, then these structures would have to contain additional material.

yielding a 2-3-1 pattern). This is essentially the problem of 'cluster formation'; our traditional ways of describing the properties of movement do not provide us with an easy characterization of the adjacency constraint on roll-up movement.

The strict adjacency of reversed sequences has sometimes been taken as an argument that they are derived by head movement. However, there are many problems for a head movement account, for example the problem that V2 would seem to require excorporation, and it seems likely that a different explanation will be necessary. Such an explanation is sketched in §3; it consists essentially in a remnant movement technology which forms clusters. The phenomenon of 'cluster formation' has been studied before, in the formation of clitic clusters (Franks and King 2000, Ch. 11), the formation of wh-clusters in multiple *wh*-fronting languages (Grewendorf 2001), and the formation of verb clusters (É. Kiss and van Riemsdijk 2004).

2.2.5 Summary of Auxiliary sequences

I briefly summarize the important findings from auxiliary sequences. First, the reversal of order appears to start from the bottom of the tree and move upwards; reversals tend only to occur at all in OV languages (those which systematically have V-final VPs), and 1-3-2 is far more common than 2-3-1 or 2-1-3 (see discussion on this point in Svenonius 2000b and Holmberg 2000). Second, long extraction is more likely when the extractee is easily distinguishable from the material it crosses in terms of categorial features, e.g. when the object raises across Aux and V in Dutch (to derive O-Aux-V, which is 3-1-2) or when a participle raises across a modal and 'have' (another 3-1-2 pattern). This might also be true of short extraction, but the only case I have examined is Serbian participle fronting; additional examples are studied in §3. Third, the *Infinitivus pro participio* effect leads to 1-3-2 order in German, unlike double modal sequences (which also have two infinitives in a row), apparently because the non-participial modal is the wrong type to be attracted by the auxiliary.

2.3 Adverbs

Cinque (1999) proposes a universal ordering of adverbs which appears to extend reasonably well to other languages; see Nilsen (1997) on Norwegian, Alexiadou (1997) on Greek, and Ernst (2002) on additional languages.

Some languages show something like a mirror image of the Cinque order, and some show something in between; Rackowski and Travis (2000) and Pearson (2000) show for Malagasy that, if the order of adverbs in Italian is represented as in (24), then that in Malagasy can be schematized as in (25) (orders must generally be determined pairwise, and sentences with very many adverbs are typically degraded).

(24) Italian adverb order (Cinque 1999)

1	2	3	4	5	6
generalemente	> *già*	> *più*	> *sempre*	> *complemente*	> *bene*

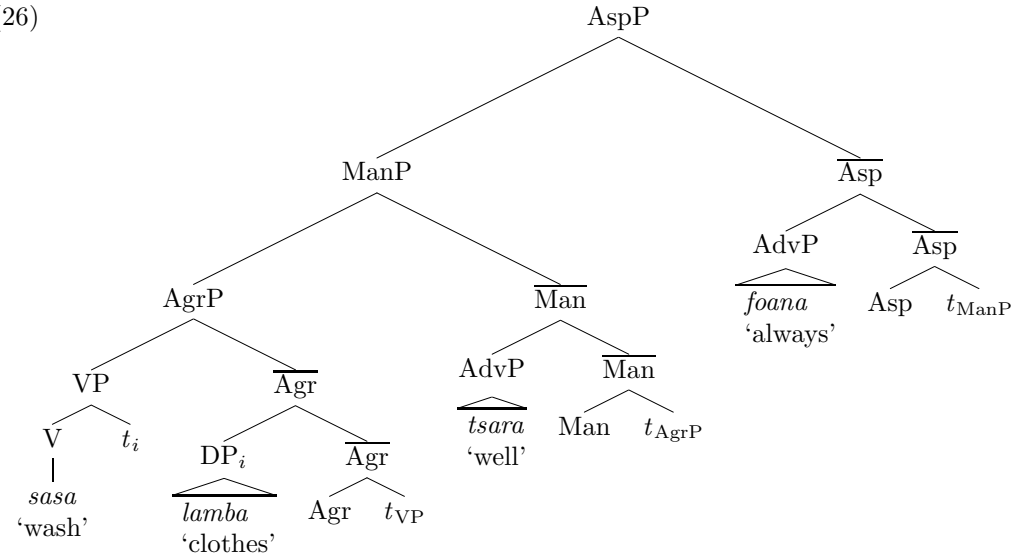
generally already anymore always completely well

(25) 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 low adverb, and 3 is the verb), as depicted in the tree in (26) from Pearson (2000).

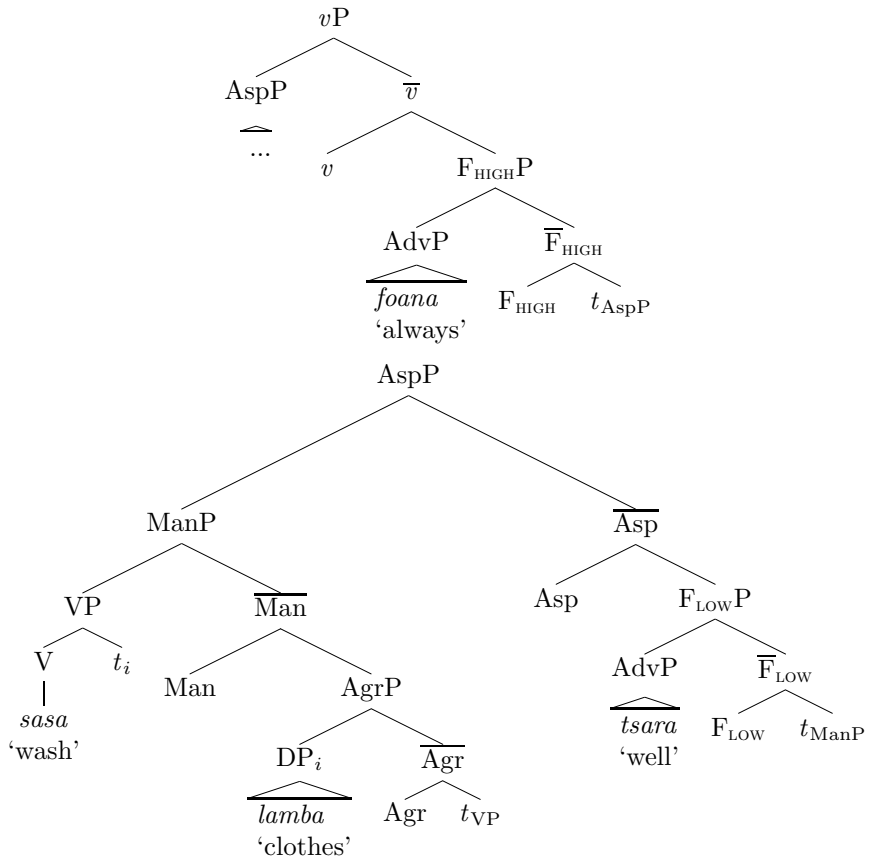
(26)



The pattern overall is fully consistent with the generalization made above that roll-up tends to start 'at the bottom' of the tree; as far as I know, no languages have been attested in which the low adverbs show a 1-2-3 order while the high adverbs are reversed.

Strikingly, however, there is another way in which this analysis seems to break radically with the other examples of roll-up examined above: in the derivation of verbal clusters, the roll-up order heads could never be separated by adverbial material. Clearly, there is something different about this situation. Empirically, the heads Man and Asp are empty. In terms of the theory, Pearson depicts the structure using multiple specifiers, which opens up the question of what order the specifiers adjoin in. In order to avoid that question, I postulated an F head to introduce adverbial modifiers. Consider what Pearson's tree looks like with the F heads inserted.

(27)



Clearly, if there were verbs in the heads called 'Asp' and 'Man' then they would be separated from the verb by intervening material, the situation that we did not observe in Germanic. The difference, structurally, is that here, the piece rolling up crosses a specifier, because its attracting probe is separated from it by an F projection, whereas in the trees sketched for Germanic verb clusters, the attracting heads attracted their own complements, and the F heads dominated the attractors rather than the attractees. It remains to be seen whether a principled correlation can be found between this difference and the overtness of the heads in question. Descriptively, one thing both structures have in common is that they arrange the tree so that similar-looking things are adjacent to each other. Thus, I conjecture, the movement can be said to be driven by cluster-formation; the adverbs form a cluster, and the VP is moved to the left in the same way that the German object is moved to the left, in effect to get it out of the way of the cluster.

2.4 PP modifiers

Koster (1974) observed a mirror effect involving Dutch PPs: Preverbal PPs in

Dutch mirror the order of postverbal PPs. Part of the pattern can be described straightforwardly in terms of the kind of roll-up just seen (except that it is optional). Here I give the orders 1-2-3-4 (4 being the verb), 1-2-4-3, 1-4-3-2, and 4-3-2-1 from Barbiers (1995:103).

(28) a. Hij is door 'n stuurfoot met en knal op het hek
he is through a steering.error$_1$ with a bang$_2$ on the fence$_3$
gestrand.
stranded$_4$

b. Hij is door 'n stuurfoot met en knal gestrand op het
he is through a steering.error$_1$ with a bang$_2$ stranded$_4$ on the
hek.
fence$_3$

c. Hij is door 'n stuurfoot gestrand op het hek met en
he is through a steering.error$_1$ stranded$_4$ on the fence$_3$ with a
knal.
bang$_2$

d. Hij is gestrand op het hek met en knal door 'n
he is stranded$_4$ on the fence$_3$ with a bang$_2$ through a
stuurfoot.
steering.error$_1$
'He got stranded on the fence with a bang due to a steering error'

These are the orders expected from roll-up, starting at the verb and moving leftward into specifiers across the PPs.

However, according to Koster, Constituent Fronting orders are also possible, though not Short or Long Extraction orders; this gives four additional possible orders (there are sixteen impossible ones):

(29) a. 1-3-4-2
b. 3-4-2-1
c. 2-3-4-1
d. 2-4-3-1

These cannot be derived by simple roll-up. The unexpected orders are given below.

(30) a. Hij is door 'n stuurfoot op het hek gestrand met en
he is through a steering.error$_1$ on the fence$_3$ stranded$_4$ with a
knal.
bang$_2$

b. Hij is op het hek gestrand met en knal door 'n
he is on the fence$_3$ stranded$_4$ with a bang$_2$ through a
stuurfoot.
steering.error$_1$

c. Hij is met en knal op het hek gestrand door 'n
he is with a bang$_2$ on the fence$_3$ stranded$_4$ through a
stuurfoot.
steering.error$_1$

d. Hij is met en knal gestrand door 'n stuurfoot op het
he is with a bang$_2$ stranded$_4$ through a steering.error$_1$ on the
hek.
fence$_3$

On either side of the verb, the relative order must be preserved. The correct results can be had in a roll-up model if constituent fronting is permitted, but not short or long extraction. The patterns in (29)/(30) are had as follows: 1-3-4-2 is constituent fronting of 3-4 across 2; 3-4-2-1 is constituent fronting of 3-4 across 2, followed by the roll-up of 3-4-2 across 1; 2-3-4-1 is constituent fronting of 2-3-4 across 1; and 2-4-3-1 is curling of 4 across 3, then constituent fronting of 2-3-4 across 1. All other movements are impossible.[5]

Notice that in the analyses of West Germanic and Malagasy given above, roll-up always involves constituent fronting. In Germanic, adverbs were attached to the tops of the constituents, winding up on the left, while in Malagasy, adverbs were attached to lower parts of the constituents and were passed by the roll-up constituents. It was important that Germanic adverb not be attached low in each constituent (otherwise they would be interspersed between auxiliaries) and in Malagasy it was important that low adverbs not be attached high in each constituent (otherwise they would be preverbal). In Dutch, then, it appears that PPs can either be high or low in each constituent. What is important is that two PPs cannot be attached low in the same constituent in the roll-up structure (otherwise left-right orders would be preserved postverbally), and that roll-up cannot skip steps (this is also generally true in West Germanic; skipping steps amounts to long extraction, a highly restricted option).

Cinque (2002) has proposed a roll-up model of PPs in English, to reconcile the binding effects noted by Barss and Lasnik (1986) (see also Larson 1988) with the constituency effects discussed by Pesetsky (1995) (see also Phillips 1996, Nilsen 1998, Lechner 2001). In English, since low PPs obligatorily appear to the right of VP, at least the lower stages of the roll-up can be assumed to be obligatory, and unlike Dutch, the PPs must be attached low in each constituent (like Malagasy adverbs), though adverbs which can be either to the left or right of VP can be assumed to be attached either high or low.

This example appears to be somewhat different from the others, in that complex and potentially right-branching material (inside the DPs) is contained within the units which are rolled up. However, in other ways the order of Dutch

[5]Barbiers (1995) has an account which works elegantly given some assumptions about the nature of covert and overt movement. On his account, the predicate moves directly into the specifier of each PP in a roll-up fashion, though Dutch freely spells out any step of the roll-up. The unexpected orders are pronounceable, on Barbiers' assumptions, because of the way spell-out allows intermediate steps of a derivation to be covert even when subsequent steps are 'overt' (in feeding PF).

PPs seems to be fully compatible with what we have already observed about cluster formation by roll-up movement.

2.5 Components of DP

Greenberg (1966) proposed *Universal 20*, as stated in (31).

(31) *Universal 20*: When any or all of the elements (demonstrative, numeral, and descriptive adjective) precede the noun, they are always found in that order. If they follow, the order is either the same or its exact opposite.

The reference to opposite order suggests immediately that we are looking at roll-up structures. Syntactic analysis of DPs in languages like English and Norwegian (cf. Abney 1987, Vangsnes 1999) clearly shows that the constituent structure is [Dem [Num [Adj [N]]]], so numbering these elements from one to four gives the orders in (32).

(32) a. Dem-Num-Adj-N (1-2-3-4) (most common)
b. N-Dem-Num-Adj (4-1-2-3) (unusual)
c. N-Adj-Num-Dem (4-3-2-1) (common)

Of course, 1-2-3-4 is simply a combination of different 1-2-3 orders (Dem Adj N, Num Adj N, Dem Adj Num, etc.) and similarly for the other orders; so 4-1-2-3 can be called a long extraction in the terms introduced earlier. Later work has determined that other orders are attested, and that the order in (32b) is actually rather unusual (Hawkins 1983, Dryer 1992, Cinque 2004).

Note that it is important that the 'straight' order is in fact Dem-Num-Adj-N. If the demonstrative originated low, as proposed by Brugè (2002), then we might expect the straight order to be the unattested Num-Adj-Dem-N, and the actually common order Dem-Num-Adj-N would be an unexpected 3-1-2-4 (long extraction, in which Dem crosses both Num and Adj), and N-Adj-Num-Dem would be 4-2-1-3 (a complex combination of movements, for example short extraction of 2 and long extraction of 4). Similarly, if Adj normally originated postnominally, as proposed by Larson (1991) (among others), then the most common orders would be the curl 1-2-4-3 and the unexpected 3-4-2-1 (constituent fronting of 3-4 across 2, followed by a step of roll-up). These considerations suggest either that Dem originates high, contra Brugè (2002), and Adj originates prenominally, contra Larson (1991), or that the straight order which forms the basis for the surface orders is not identical to an underlying base order (I return to this matter).[6]

[6] An interesting possibility is that languages vary according to where adjectives originate. This seems generally consistent with Rijkhoff's (2002) data, discussed immediately below, except that it predicts the existence of roll-up examples of the form Adj-N-Num-Dem and curls of the form Dem-Adj-N-Num, unattested in Rijkhoff's sample.

An interesting clue is provided by Germanic languages, in which prenominal adjectives may not have postnominal complements; *a voter angry at his representative* vs. *an angry (*at his representative) voter*. This sort of pattern would match the model if the adjective originated

Rijkhoff (2002) examines a larger and more balanced sample and finds a similar regularity with respect to the relative order of demonstrative, numeral, classifer, and noun as well as that of demonstrative, numeral, adjective, and noun. For 29 languages, he gives the relative order of the four elements named in Universal 20 as follows. In parentheses I illustrate how these would be derived using the movements discussed here (cf. Cinque 2004).

(33)
a. Dem-Num-Adj-N (13 languages) (1-2-3-4)
b. Dem-Num-N-Adj (3 languages) (1-2-4-3)
c. Dem-N-Adj-Num (2 languages) (1-4-3-2)
d. N-Adj-Num-Dem (3 languages) (4-3-2-1)
e. Num-Adj-N-Dem (1 language) (2-3-4-1; Constituent Fronting of [Num Adj N])
f. Num-N-Adj-Dem (7 languages) (2-4-3-1; Curling of 4, Constituent Fronting of [Num-N-Adj])

Essentially, the Straight order is the most common, and various stages of partial curling or complete Roll-up are also very common. The order in (33e) requires a constituent fronting, which is presumably feature-driven and not a matter of roll-up, but is manifested by only a single language in the sample (Berbice Dutch Creole).

The order in (33f) is very common in the sample, but cannot be simply derived if the four constituents have equal status. The curl order within the NumP, Num-N-Adj, is apparently constituent-fronted across Dem; it has in common with the Berbice Dutch Creole pattern in (33e) that it is NumP which undergoes constituent fronting.

This can be likened to the situation with 'to' in various West Germanic languages, which also failed to trigger a step of roll-up, but underwent constituent fronting. The pattern here shows that Num, like 'to,' has (at least in some languages) a distinct status in the sequence.[7] The numeral systems in these languages should be examined in order to determine whether they show any revealing morphosyntactic properties.

See also Cinque (2004) for discussion of the derivation of various unusual orders, and for discussion of how the model successfully predicts the scarcity of many unattested orders.

postnominally, i.e. underlying Dem-N-Adj surfaces as Dem-Adj-N, since some sort of head-adjacency is common in roll-up structures. But, as already noted, this would complicate the derivations of (33c) and (33d) above, if generalized.

[7]The seven languages manifesting (33f) in Rijkhoff's 2002 sample are Basque, Easter Island, Maori, Indonesian, Jacaltec, Welsh, Hmong Njua. Of these seven, five are V-initial languages; V-initial languages are strongly N-initial and thus might be expected to have roll-up in the noun phrase. See Koopman (2004) for a detailed roll-up analysis of noun phrases for V-initial languages.

3 Morphology and the Mirror Principle

Having established that roll-up structures are pervasive in syntax, but not absolute, I turn to morphology. The extent to which morphological structures manifest the patterns I have been discussing is a major point of contention. In this introductory section I briefly give some historical background, before moving on in the subsections to the case studies, which demonstrate that the straight, curl, and roll-up orders are as common in morphology as they are in syntax, and that the extractions and constituent fronting orders are uncommon but do exist. Furthermore, there are some indications that similar conditions obtain when the marked orders are encountered.

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 (34).

(34) *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 (35).

(35) *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 (35). 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.

3.1 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 (36a) (from Julien 2002:202), 1-3-2 as in (36b) (from Julien 2002:238), and 3-2-1 as in (36c) (from Brockaway

1979:179).

(36) 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 (2002, 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.[8]

In addition to confirming the observations of Bybee (1985) and Cinque (1999) that Tense is higher in the structure, and therefore further from the stem, than Asp, Julien (2002) also finds that the 1-3-2 pattern (T-V-Asp) is relatively common, while 2-3-1 (Asp-V-T) is rare. I briefly examine one such case (of Asp-V-T) more closely to give an idea of the sort of data that is involved.

In Russian, 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 (2004c) for a summary and references. There are various reasons (summarized in Svenonius 2004d) to believe that Russian prefixes are phrasal. Some originate inside VP, as secondary predicates, and some originate outside VP, as adverbial modifiers (see Svenonius 2004b for a detailed proposal and references). Thus, I argue for a 'clitic' analysis, in a sense, of the Russian prefixes, and argue that they are distinct categorially; they are not Asp heads, but PPs. This means that it would be a mistake to regard Russian *na-pisa-tj* ('PERF-write-INF') as an example of 2-3-1. However, only a fairly careful investigation, along with some theory-internal assumptions, led to this conclusion. On the face of it there are several examples of 2-3-1, and probably some of them should be analyzed as constituent fronting of an AspP across Tense. But the relative rarity of such cases is consistent with what we know about cluster formation, so far: the similarity of Tense and Aspect (like the similarity of two auxiliaries) should generally make it unlikely that an attractor above Tense will be able to attract Aspect across Tense; so only roll-up should be able to reverse their order, in the usual case.

[8] 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).

3.2 Deriving the different orders

Julien (2002) makes extensive use of head-movement in the derivation of head-initial orders, e.g. when a verb moves to Tense; this would be a case of 2-1-3, with 2 being the verb and 1 being tense. An important question is how much such movement there is. There are many examples of the form Aux-Infl V-Part, i.e. where an aspectual auxiliary carries infl[ectional] morphology, and the main verb carries some sort of part[icipial] morphology; but it is rarely clear in these cases where the various pieces are in a hierarchical structure. In particular, it is not clear whether Auxiliaries have any place in the hierarchy at all.

Consider the examples here from Northern Sámi and Norwegian.

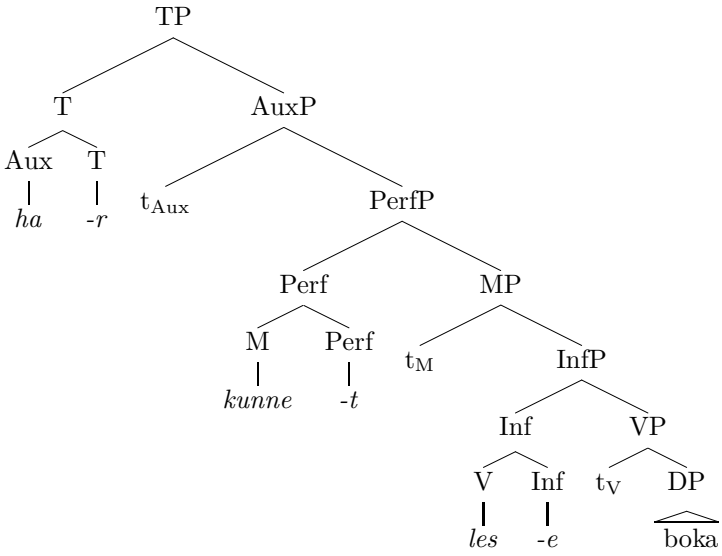
(37) a. Lea-n lea-maš jearra-min.
be-PRES.1s be-PERF ask-PROG
'I have been asking' (Northern Sámi, Nickel 1990:58)

b. Við gát-um les-ið bókina.
*we can.*PAST-1P *read-*PERF *the.book*
'We could read the book' (Icelandic)

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

Such patterns are quite common, and are taken by Julien (2002) to involve head movement. For example, in the sketched derivation below, there are two heads corresponding to each verbal element, a rootful mover (here, V, M, Aux) and a suffixal landing site (here, Inf, Perf, T).

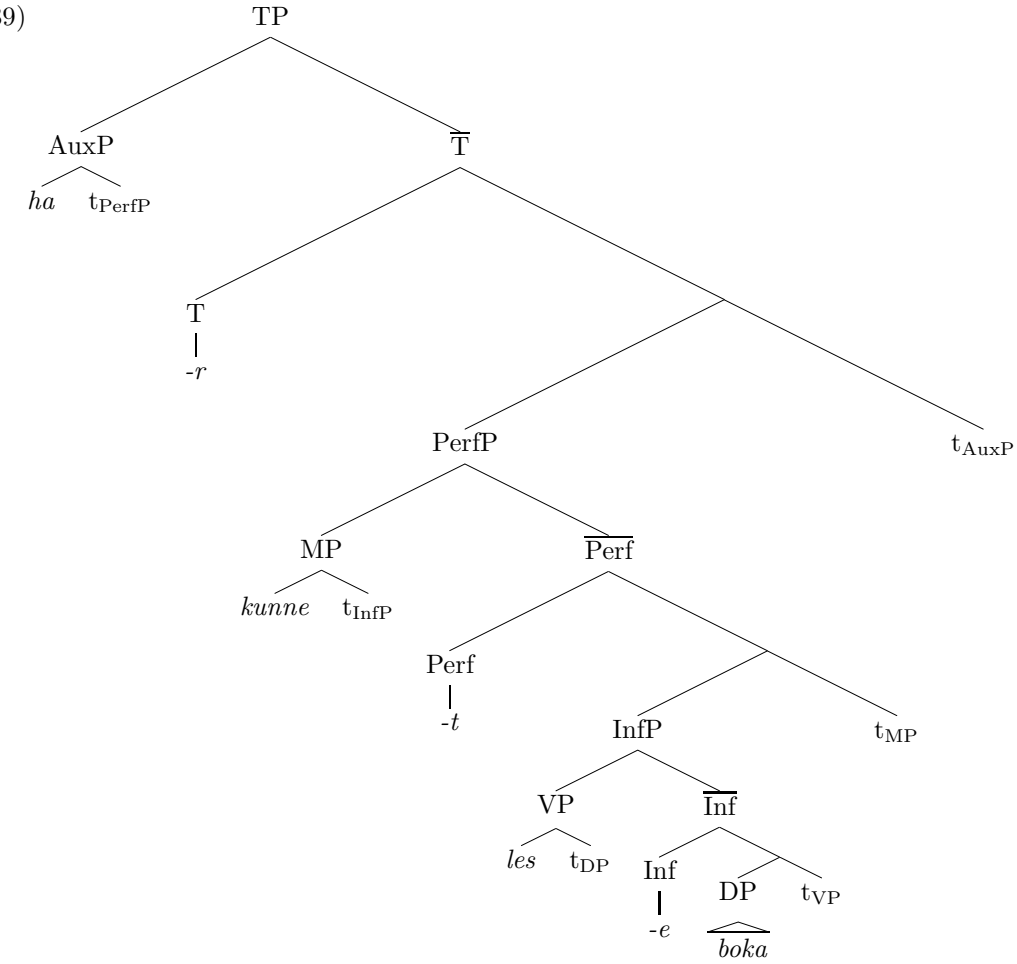
(38)



The remnant movement alternative requires a landing site for each landing category (and one for the object), above the head which selects it; to keep the tree

simple, I do not label the categories that provide these landing sites.[9]

(39)



See Nilsen (2003) and Bentzen (to appear) for independent arguments (from adverb placement) that the Norwegian clause requires multiple remnant movements.

Both of these analyses entail that the cases discussed of auxiliary order were actually more complex; for example, apparent 'short extraction' of Serbian participle 2 across auxiliary 1 (stranding the complement 3) really involved an inverted complex, since the Serbian participle is morphologically complex, and hence involved a kind of constituent fronting. It seems the only alternative is that the auxiliaries themselves are not in fact morphologically complex. For ex-

[9] Compare Brody 1998, 2000, where non-morphologically integrated complements always occupy specifier positions; Brody's system dispenses with the phrase movements indicated here by assuming a kind of head movement, by which e.g. the modal here can simply be spelled out in Perf, with the appropriate suffix.

ample, in English, modals do not appear to be suffixed at all, and the auxiliaries *have* and *be* are highly irregular; the same is true to some extent of Norwegian. In Northern Sámi, the morphology is regular, but auxiliary cannot be placed in the functional sequence, and that is possibly true of the participial morphology as well. Thus, there are non-movement analyses available in these cases as well.

Bartos (2004) provides two examples of 3-1-2 order in the verbal morphology of Hungarian, where the association of hierarchical positions with morphemes is somewhat clearer. The examples involve the scope of the past tense marker, *-t*, relative to conditional mood, *-na*, and to potential modality, *-hat*.

(40) 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)

Note that each form is ambiguous; both the 3-2-1 order and the 3-1-2 orders are possible; and an auxiliary stem is inserted in (40a) on either reading. Descriptively, it is as if the morphemes themselves have a preferred order, a phenomenon documented extensively for Bantu morphology by Hyman (2003). If the base order is COND-PAST-V in (40a), then V rolls up with PAST and the two cross COND, but if the base order is PAST-COND-V, then V moves all the way across the two of them. Similarly, if the interpretive order in (40a) is POT-PAST-V, then there is roll-up, but if PAST is higher than POT, then V crosses both, without disturbing their relative order.

Recall the patterns seen in verb clusters. 3-1-2 was highly restricted, but emerged in one type of situation (in Dutch, Afrikaans, and West Flemish): when 1 was a modal, 2 was a perfect auxiliary, and 3 was a participle. 3-1-2 resulted, I suggested, either because the participle could be attracted by attractors that distinguished it from the other verb forms or because the modal did not attract its complement (preferring to precede it, as it were), or both. The situation in Hungarian seems quite similar in essential respects: either there are attractors that pick out the verb specifically, and attract it to the left of the tense morpheme, or else the complement of the past morpheme generally does not roll up, or both.

3.3 Other verbal features: Cause

Another illustration of the way that morpheme ordering is similar to the patterns observed for syntactic cluster formation comes from pattern of causative morphemes. Nearly half of the languages in Julien's (2002) 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.[10]

(41) a. V+Caus+Asp+T (e.g. Mohawk, Turkish, Yidiɲ, 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 (6). 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 Long Extraction of V (V-T-Caus) or Short Extraction of Cause (Caus-T-V).[11] However, there are surprisingly many examples of the Constituent Fronting order (Caus-V-T); I counted at least eleven in Julien's sample.[12]

Thus it seems that Constituent Fronting of Caus-V across T is more common than Constituent Fronting of Asp-V across T. This suggests that there is a significant constituent boundary above Caus, below Asp. This constituent boundary has been argued independently to exist, in the literature on phases (Chomsky 2000, Chomsky 2001; see Svenonius 2004a for arguments specifically motivating the *v*P phase boundary). Like VPs headed by 'to' and NumPs headed by a numeral, the cause-initial *v*P is a point at which roll-up may stop, continuing in the next phase, for the creation of a 2-3-1 structure.

3.4 Mirror in Nominal morphology

Strong universal ordering tendencies have been manifest in the noun phrase since Greenberg's original (1966) 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 above in §2. 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 (I have included an example from Mandarin which may involve a demonstrative, rather than an article, but there are many examples with clearer examples of articles; cf. Dryer 1989b on the distinction).

[10]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 2002:348 for other abbreviations.

[11]Note, though, that a language like English, with an infinitive-taking causative verb, could be thought of as exhibiting caus-T-V.

[12]Six of them are identified as SOV (Walapai, Laz, Klamath, Mikir, Magi, and Abkhaz), and one as SOV/OSV (Warao). Of the remaining four examples, two are identified as possibly SVO (Sayula Popoluca and Jebero), one as SVO (Asheninca), and one as VSO (Karimojong).

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

b. o bi gotta
ART PL *tree*
'trees' (Galela, from Rijkhoff 2002:110)

c. nèi-xiē kǒuhào
that-PL *slogan*
'those slogans' (Mandarin, Li and Thompson 1981:112)

d. ha fanga pulu
INDEF PL *cow*
'some cows' (Tongan, Dryer 1989a:875)

In many cases, prenominal articles and plural markers are not strictly adjacent to the nouns (cf. Dryer 1989a), consistent with the 1...2...3 pattern seen elsewhere. Examples of 1...3–2 are also easy to find (English is an example).

(43) a. he pi' miš̃ ʔaHkš̃
the little boy PLUR
'the little boys' (Mixe, from Dryer 1989a:875)

b. à-jɤab-c°a
ART-*girl*-PL
'the girls' (Abkhaz, from Rijkhoff 2002:79)

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

Finally, there are many examples of 3–2–1.

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

b. säw-occ-u
man-PL-DEF
'the men' (Amharic)

c. hest-ar-nir
horse-PL-DEF
'the horses' (Icelandic)

In some cases articles are reported inside plural markers, for example Basque *gizon-a-k* 'man-DET-PL'; but it can be argued that the suffix is not really an article; it is used, for example, on nouns in existential contexts (examples from Hualde and Ortiz de Urbina 2003:120).

(45) a. Zigarro-a nahi dut.
cigarette-DET *want* AUX
'I want a cigarette'

b. Lekuederr-a-k daude Bizkaian.
beautiful.place-DET-PL *are* *Bizkaia*.LOC
'There are beautiful places in Bizkaia'

Thus it is plausible that the Basque suffix *-a* is not an article, but a different category.

The investigation here suggests a prediction. If examples of Pl-N-Art can be found, that is 2-3-1, they would suggest that Pl is contained within a domain analogous to *v*P, while Art is outside it. This domain boundary should be corroborated by independent evidence. On the other hand, if Pl-N-Art is not found, that would suggest that Art and Pl are treated the 'same' with respect to the roll-up structure. The absence of such a boundary should also be demonstrable independently.

3.5 Summary of morpheme ordering

In this sections, 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 Long and Short Extraction 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.

(46)

	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	common	rare	common	rare(?)
2–1...3	rare	rare	rare	rare

As I suggested above, the frequency of Constituent Fronting of CauseP across Tense and Aspect, and of TP across C, suggests a difference in the relationship of Caus to Asp and of Tense to C. These boundaries have been observed many times, in terms of the V-domain, the I-domain, and the C-domain (cf. e.g. Platzack 2000).

4 The Functional Sequence

In the previous two sections, I have made some observations regarding the nature of cluster formation, and claimed that they apply equally to syntax and to what is usually thought of as morphology. I am aware that there are arguments that morphology is different from syntax. To anticipate one of them, I argue in this section that agreement is not a reliable indicator of syntactic structure.

More generally in this section, I point out that the logic of cluster formation and roll-up movement actually allows us to identify certain categories, such as negation and agreement, as not having fixed locations in the functional hierarchy (what Starke 2004 calls the functional sequence, or FSEQ).

4.1 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 sample, we find suffixal negation within Aspect, between Aspect and Tense, or outside Tense.

(47) 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-'.

(48) 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).

4.2 Agreement

Another category which has proven challenging for an explication of FSEQ 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 (2002:249) 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 (49) is far more frequent than the pattern in (50).[13]

(49) Normal: Person precedes number
  a. Pers+Num+V: 9 languages
  b. Pers+V+Num: 39 languages

[13]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 (49) and (50) also holds of those 56 cases in which each morpheme expresses only person or only number.

c. V+Pers+Num: 22 languages

(50) Unusual: Number precedes person

a. Num+Pers+V: 1 language
b. Num+V+Pers: 1 language
c. V+Num+Pers: 8 languages

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 (49a) (1...2...3) and correctly predicts (49b) (1...3–2) to be common, but wrongly predicts (50c) (3–2–1) to be a more natural order, and more seriously, fails to explain why (49c) (3–1...2, Long Extraction) is so common.

Number above Person would get (49c) right, but wrongly predict (50a) and (50b).

There is one hazard in Trommer's methodology which might lead to underreporting of pattern (50c). Compare the Icelandic pattern for the verb *heyra* 'hear' (in the preterite) in (51), to that of the made-up language "Nicelandic."

(51) Icelandic preterite, weak verb

	Icelandic	Nicelandic
1sg	heyrði	heyrði
2sg	heyrðir	heyrði
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 unusual pattern (50c) (Icelandic was not in Trommer's sample). The made-up language Nicelandic is an example of the common pattern (49c). 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.

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 (49c), so it seems to be true that there is a left-right asymmetry here. In that case, not only can Person and Number not simply be located in the FSEQ, some other mechanism is necessary for describing the pattern in (49).

Another left-right order asymmetry is in the order of Subject and Object, crosslinguistically; SOV, SVO, and VSO are by far more common than any other word order; they all share that the Subject precedes the Object.

5 Conclusion

In this paper I have documented many examples of what might be thought of as the third major type of movement, after $\overline{\text{A}}$- and A-movement. In this I have followed Zwart 1997a, Hinterhölzl 1999, Hróarsdóttir (2000), Koopman and Szabolcsi (2000), and others who have explored 'remnant' movements in explaining word order phenomena; however, I have focused mainly on 'roll-up' or 'snowball' movements, which seem to be at least as pervasive in determining base word order.

I have also tracked certain categories which frequently surface as morphology, and have suggested that they exhibit the same patterns as the syntax. Specifically, 1...2...3, 1...3–2, and 3–2–1 orders are very common for sequences of three similar elements in the same extended projection, and occasionally also for sequences of three similar elements across an extended projection. Other orders are possible under certain circumstances: short extraction in case there is a boundary above '3,' constituent extraction in case there is a boundary above '2,' and long extraction in case '3' is distinct from 1 and 2 and is attracted by a probe.

The analysis of modifier placement, in which roll-up structures created strings of adverbs, PPs, or adjectives to the right of the head, is an important part of the picture in understanding morphology, since even complex heads quite commonly surface to the left of their arguments and modifiers (the pattern that led Julien to argue that head-movement is the typical strategy for inflection in VO languages).

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