Chapter 4: Phrasal displacement

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Chapter 4: Phrasal displacement in the clause

1 Outline of chapter

In this chapter, we aim to continue our account of word order in a simple clause in English, now considering the merge of arguments and adjuncts. At the same time we extend the feature theory and features needed in the MSyn system to obtain 'displacement' of a phrase, leaving the LF intact. Whereas Chapter 3 discussed displacement as the LF-preserving residue of 'head movement' under Agree (feature percolation and unification), this chapter discusses the displacement which is the LF-preserving residue of 'phrasal movement' under Agree. We first give a brief overview of how the grammar works, as argued for in chapters two and three.

The skeleton of a clause is generated by the successive merge under Functor First of LF items drawn from the lexicon.[1] The lexicon contains entries for lexemes, which are triples of features: LF, category, and an MSyn (morphosyntactic feature) set. Also part of the lexicon in the broad sense is the mapping (MS→PF) from the MSyn bundle at a terminal to PF (i.e. paradigm content).[2] The strategy is to begin with LF for some subpart of clausal structure, and then consider for a particular language the MSyn options required for the lexical items involved in order to obtain the PF appropriate for the LF. The MSyn system can be responsible not only for PF realisation of an item in its LF merge position, but, as we saw in Chapter 3, for the displacement known as 'head movement', where this is interpreted as the PF realisation of MSyn features canonically associated with one lexeme at the LF position of some other lexeme. This is regulated by percolation of underdetermined features, followed by unification. Duplicate features are removed during the MF-PF mapping by 'Prune', (which determines whether a morphosyntactic feature set at a terminal is to be left unpronounced because it is a 'copy').

In this chapter, we show that variants of the feature system involved in head movement can account for phrasal displacement. We argue that the SVO order of English is derived from the LoT/LF order SOV by phrasal displacement, where the displacement of the verb alone is a special case. No item other than a binder such as a DNP or an operator such as an adjunct (e.g. an adverb) can be merged preceding a verb-headed phrase at LF in the clausal spine, so these are the only cases to be considered. We investigate the MSyn features inducing this displacement.[3]

As observed in chapter 2, the use of Functor First alone gives partially incorrect PF for English. We argued that this should be remedied by requiring that displacement affect PF only: that is, LF is never affected. The features and computations needed for the displacement that falls under 'head movement', have already been discussed in Chapter 3; the topic of this chapter is 'phrasal movement'. We discuss the major demands for phrasal displacements in simple Functor First structures, exploring how they can be identified and characterised in a way that captures the right generalisations. To obtain the proper PF, the duplicate copies of phrases which are subject to 'displacement' will be subject to Phrasal Prune, comparable to Prune for Head movement, but taking place later.

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[1] Recollect that the 'Functor' in a merge is that item whose selection is discharged by the second item, its Argument. It may be relational (i.e. 'lexical' in standard terminology).

[2] The MS of a suitable phrase is the list of the MS of its terminal MSyn bundles after the second copies have been deleted under 'Prune', as in Chapter 3.

[3] Later, we consider also the Event binder, and the Tense operator. Other operators include Pol heads, and complex adjuncts including adverbial phrases, and adjuncts introduced by two-place operator heads such as 'IF', and the conjunct head '∧'.

In section 2, we concentrate first on simplified transitive and ditransitive clauses, with no quantifier scope switches. We note that there are combinators involved in all merges. The 'head-initial' PF ordering for English is decomposed into Functor First at LF, together with MSyn-licensed displacement to the various combinator positions in VP. We make explicit a set of MSyn specifications for various combinators which will obtain the PF orders permitted in English. Low adverbs are discussed in section 2.3. In section 3, the specification is generalised to cover quantifier scope switch, and is then restricted to disallow unwanted word orders. The trusting reader may omit the argumentation here.

As illustrated in Chapter 3 the starting point for our account of PF displacement is that it can occur only if there is a demand, and that this demand is due to the effect of morphosyntactic features. This much is standard in the Minimalist program, but our feature descriptions and some of the displacements argued for are not standard. Differences in the required displacements arise largely from our assumption of Functor First at LF, with no LF elements being displaced. Further, the features are regulated under merge and unification, rather than by 'search' (whether upwards or downwards) as in a Probe-Goal model of Agree.[4] The unification rules are as discussed in Chapter 3 (the specification is given in example 74).

Features that regulate displacement and agreement must relate two phrases, perhaps heads. Features generally, but not always, emanate from heads, which have just two classificatory properties — word-class and their category. The head itself has an MSyn word name, giving rise to attribute–value pairs, such as <VERB: *WRITE*> (the canonic MSyn of the lexeme), and it is associated with a further feature, by default, the category V/D/D. Arguably, following the minimalist strategy, this should be all that is utilised for regulating the relations above. In chapter 3, we have shown that the use of such features, in particular diploids subject to checking under Agree, is sufficient to account for the displacement known as 'head movement'. We will argue now that this is also sufficient for phrasal displacement. The difference lies in the fact that head-movement uses word-class where phrasal displacement may utilise category. As before, where possible we abstract away from many features (including those related to worlds and times and person, number, case and gender). Most of our discussion concerns English.

Chomsky (2010:54) takes displacement to be accounted for by 'Internal Merge', where this "yields discourse-related properties such as topic and distinctions of old/new information, also scope and other non-argument semantic properties." We separate out the semantic effects, which enter directly into logical inference, from discourse related 'displacement' properties, which enter into pragmatic processing. The latter displacements result from 'Agree', driven, as we argue, solely by feature transmission

[4] Chomsky 2000a:122, 2001, and subsequently. See Pesetsky & Torrego 2006, and Chapter 3 section 4.1 for references and for discussion.

under Merge and unification. The reader should continue to bear in mind that this PF displacement cannot by its nature affect the LF, so inasmuch as it has any interpretive effects, these can only arise either from features assigned to a dedicated head (for say New Topic), or pragmatically. It follows that apparent displacement with LF effects must be re-interpreted as induced directly by (external) Merge, usually by exploiting possibilities made available by the choice of combinator. The notion 'Internal Merge' is then otiose. We will be working within the feature model we have been exploring, which has no stipulated 'probe-goal' asymmetry, and where any c-command relations observed can only be the result of merge rules, not stipulations.

Any stipulated MSyn feature amounts to a claim about possible parametric variation. Only the form of the permitted features, and their merge rules, belong to UG.

2 Phrasal displacement in the simple VP

2.1 Predictions of Functor First

In Chapter 2, it was seen that in a simple English clause, a displacement of the verb upward across the object was needed to obtain the surface order 'SVO' from the LF order 'SOV'. A look at simple clauses in English reveals that the displacements required are not confined to that of the verb across the object. We have rejected the use of backward combinators, so the burden of accounting for the order falls on the Morphosyntactic system. We look here at the range of related displacements, for which we need to determine how the item subject to displacement is identified, and the identity of the related displacement position. Then we need to ensure that the appropriate MSyn feature checking can take place, to value any underdetermined features.

From the simplest sentences, we see that what is displaced may be a phrase, not just a head.

(1) a AN CAT AN MOUSE $[\text{CAUGHT}]_{V/D/D}$

b A cat *caught* a mouse ~~caught~~

c * A cat a mouse caught

d * Caught a cat a mouse

e * Caught a mouse a cat

(2) a ∃ JOHN HIS BOOK $[\text{PICK}_{V/D/D/P}\ \text{UP}]_{V/D/D}$

b John *picked* his book [~~pick~~ up]

c John [*picked up*] his book ~~pick up~~

Suppose that such examples result from parametric choices which, for English, are set on the basis of the simplest data, arising from examples with LFs like those in (1) or (2), elaborated with the required combinators and other heads such as Tense as necessary. The first task is to identify the relevant displacement position, which we take to correspond to some phonologically empty head. The second task is to set up partially underdetermined features so that the required unification to value these features may take place, along much the same lines as for the displacement of heads discussed in Chapter 3. These requirements will be stated in a general, underdetermined, form. That is, *pace* Tomasello (2000a, 2000b), it seems unlikely that the child would start listing individual verbs that are displaced, before constructing some general rule. See Smith (2005) ch.9.

Do we expect to need both head movement and phrasal displacement, to account for (1b) and (2b) vs. (2c)? The answer from acquisition, as well as from simplicity, should be 'no'. Examples like that in (2c) are accessible early (Snyder & Stromswold 1997).[5] The displacement of a head alone may be seen as the displacement of a minimal phrase. The example in (1c) shows that displacement of some phrase (perhaps minimal) **must** occur, where the appropriate conditions are met.[6] Displacement across the object is obligatory; displacement across the subject is ungrammatical, whether of the verb alone, (1d), or of the verb together with the object (1e).

As with the displacement of a verb to an inflectional head (e.g. in the English passive, discussed in Chapter 3, section 2.2), we take the specification of displacement to be obtained via MSyn features. The MS of a phrase is defined recursively on the basis of the MSyn features values under unification; the recursive steps are applied as often as necessary to reach items which can be accepted by the MS→PF mapping (typically, words). We will argue that there are two cycles of 'displacement and Prune, and MS→PF mapping': first for heads, and second for phrases.

There are three questions that need to be answered before we can specify what features make some displacement obligatory: what phrases may be displaced, how they should be characterised, and where they are displaced to.

The answers to these three questions are of the following shape: The displacement position is a combinator (which never has its own PF); the displaced phrase is one whose

[5] Mean age 2:2.7 for production of 'verb-NP-particle', and 2:5.7 for 'verb-particle-NP'.

[6] Though implemented differently here, the displacement then is that of 'Light Predicate Raising' (Larson 1988), or the 'movement of verbal chunks' discussed by Belletti and Rizzi (2012). See also Johnson 1991 for discussion of similar data, and related problems.

category and PF are accessible to the combinator on one of its operands; and the relevant feature demanding displacement is an MSyn feature associated with the combinator . This last will result from a parametric choice for the language in question. We will end up with five rules for English assigning such MSyn features to combinators (listed together in section 4).

With respect to examples like that in (1), the displacement can be characterised in terms of which arguments require displacement of their operand, or in terms of what moves. The first suggests that objects induce displacement, but subjects do not; the second suggests that transitive VPs must be displaced, but intransitive VPs should not be. For examples like those in (2), the first hypothesis is manifestly inadequate, accounting only for (2c). We therefore discuss the first only very briefly, until it becomes essential (sections 3.2.3 and 3.4)), although it would be adequate for much of the data the child can use. For the second, we pursue first a version of Larson's 1988 'Light Predicate Raising'.

2.2 Displacement for intransitive and transitive clauses

Larson (1988:349) describes a phrase capable of being displaced to the position before the object as being 'syntactically reconstrued as a complex lexical category — in effect a complex transitive verb'. There are at first glance several alternative MSyn characterisations that might license this. The phrase to be displaced in (1) and (2) might be characterised as one which contains the relevant VERB; or the word-name VERB might be attached to the phrase to render it eligible for displacement. Or it might be characterised as having the category of some simplex VERB, or by its goal V category. Of these, only category is already available for phrases.[7] But in CCG notation, not every local goal V category will identify a verbal projection; and a low adverb of category (V/D/D)/(V/D/D) will not serve, as witness (3).

(3) *John *finely* the chives ~~finely~~ chopped up

The category has in fact to be one that some simplex verb might have (as suggested by Larson's analysis): in this case, *chopped up* is an item with category V/D/D, and the simplex transitive verb with LF CHOP also has category V/D/D. Note that we are omitting selections for temporal intervals, and the Tense head, until these becomes relevant; in acquisition, the child presumably does not make any such selection to begin with. A listing of eligible categories is unlikely if a generalisation can be made. We will show that the relevant category is implicit in the category of the attracting head, and that this automatically excludes adjuncts. Category, then, is going to be the natural MSyn property

[7] It was because Larson 1988 (pp 348; 346) lacked the labels for categories and types that align category and 'theta role' selections, that he had to resort to 'reconstrual' of a V′ projection as a V projection.

by which the phrase being displaced is identified. We also need something which will ultimately yield the PF of the phrase. This could be the MS of the phrase (a sequence of MSyn feature sets, one for each of the original terminals of the phrase (see Chapter 3, §4.2.3, example (42), for a reminder)), or the PF. We will argue for the latter.

Again, given the commitment to MSyn for licensing the displacement, the displacement host position can only be that of some head already given by the grammar. We begin with the simplest clauses, where we argue that in a transitive clause, there is always displacement to the position of the combinator merging the object (i.e. the combinator involved in the discharge of selection 2). That there is at least a combinator **B** follows from a fact that we have been ignoring, that every verb makes a temporal selection, and that some temporal selection is carried up the clause to C by **B**. There will also be a selection for possible worlds, likewise carried up the tree. Since these extra selections are ubiquitous, but not of primary interest here, we will continue to ignore them, so that it will be the identity combinator **I** we show in any immediately relevant combinator positions.

Consider then a simple transitive clause as in (4), where (4a) gives the LF.

(4) a **I** [**I** ∃ JOHN] **I** PAST **I** POS **I** [AN DOG] SEE

b John saw a dog

The displacement of the verb in simple clauses such as (4) must be to one of the heads in the clausal spine. Nothing inside the object DNP would be able to attract a verb, since it appears before the object DNP. If the child already understands that the verb bears Tense information, then displacement to this head might be considered. However, this can be discarded on the basis of examples like (2c), with phrasal displacement of *pick up*. Now, the assumption made by the child should be that the displacement is minimal — it is to the rightmost combinator position, the one merging the object noun phrase.

Inserting a temporal adverb such as *OFTEN*, which falls below Tense (Chapter 3 § 4.2.1), confirms that this is the correct option for English. Here and below, we omit the combinators related to a proper name and the subject merge, where not relevant (compare (5a) to (4a)).

(5) a ∃ JOHN [**I** PAST [$_{V/D}$ **I** OFTEN [$_{V/D}$ **I** [AN NEWSPAPER] BUY]]]

b John often bought a newspaper

c *John bought often a newspaper

Using a low modal and Pol NEG (where negation has scope over the modal) demonstrates that the displacement position is below any AUX position:

(6) a ∃ LUCY [PRES [NOT [$_{V/D}$ CAN [$_{V/D}$ **I** [AN ICE-CREAM] EAT]]]]

b Lucy cannot eat an ice-cream

From (5) and (6), it is clear that in English, the displacement position of the verb is immediately above the object noun phrase, below auxiliaries and Pol. The combinator discharging selection 2 gives the correct position.[8] Heads such as Tense and Pol are then irrelevant, and are generally omitted in the examples below.

Returning now to the simple transitive, the relevant part of the LF is as in (7a):

(7) a [$_{V/D}$ **I** [AN DOG]$_{(V/D)/(V/D/D)}$ SEE$_{V/D/D}$]

b category of **I**: ((V/D) / (V/D/D)) / ((V/D)/(V/D/D))

The combinator shown has the category ((V/D) / (V/D/D)) / ((V/D)/(V/D/D)). This is the category of an item whose outermost selection is for something of category ((V/D)/(V/D/D)) (the object noun phrase), and whose next selection is for something of category V/D/D (the transitive verb), and yielding something with the category of an intransitive verb phrase, V/D, whose only selection is for D. The MSyn features attracting the verb to the combinator should be predictable either from this category, or from existing MSyn features on one of the operands of the combinator. Consider the operand categories. Here, the two selections underlined are those relevant in this merge. We see that attracting to the combinator something with the category of the outermost selection would be trivial (vacuous), but attracting something with the penultimate category gives the right result. This suggests that more generally, a combinator that has a category that can be analysed as X/Y/Z may have an MSyn feature attracting the relevant features of an item with category Y. The first question is: which features of the phrase with this category are involved in inducing the displacement? There are two possibilities: the MSyn features of the kind used for heads, or PF features. There are reasons for choosing PF features. First, 'Light Predicate Raising' ('scrambling' or 'heavy noun phrase shift') may depend on phonological weight, which cannot be read off MSyn features. Second, the choice of PF features avoids further embedding one kind of MSyn feature inside another, to obtain the MSyn of a phrase. Lastly, the MSyn choice is probably unworkable, because of interference between phrasal displacement and head movement. We assume then that phrasal displacement takes place after all the head-related MSyn features of terminals in the relevant subtrees are determinate, and have been mapped to a PF representation. For the tree here, this means after Tense has been merged, to value the inflectional feature on the verb. It remains to be seen what other processes, such as Prune, have taken place.

[8] There is an obvious resemblance between this suggestion and Koopman and Szabolcsi's (2000: ch.4) 'XP+' idea for a phrasal displacement position.

We assume that as with head-displacement, phrasal displacement operates via unification to transmit MSyn information from one place to another. The preliminary version of the MSyn specification for displacement to the object combinator will be as in (8), where <PF: *u*> is some output delivered by the MSyn system of Chapter Three, restricted to be associated with some item of category V/D/D. The category is given an attribute 'CATGY' to preserve the <attribute: value> format of features.

(8) If **I** has category (V/D) / (V/D/D) / ((V/D)/(V/D/D)),
then **I** has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*>>

The PF feature of a phrase is an ordered set whose elements are read off in order from the PF features of the terminals of the phrase. Notice that the antecedent in this conditional is neutral as between the two characterisations suggested in section 2.1. The consequent is the same in both cases. We can formulate the first characterisation as in (9).

(9) If **I** has category X/Y/Z, and Z = (V/D)/(V/D/D),
then **I** has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*>>

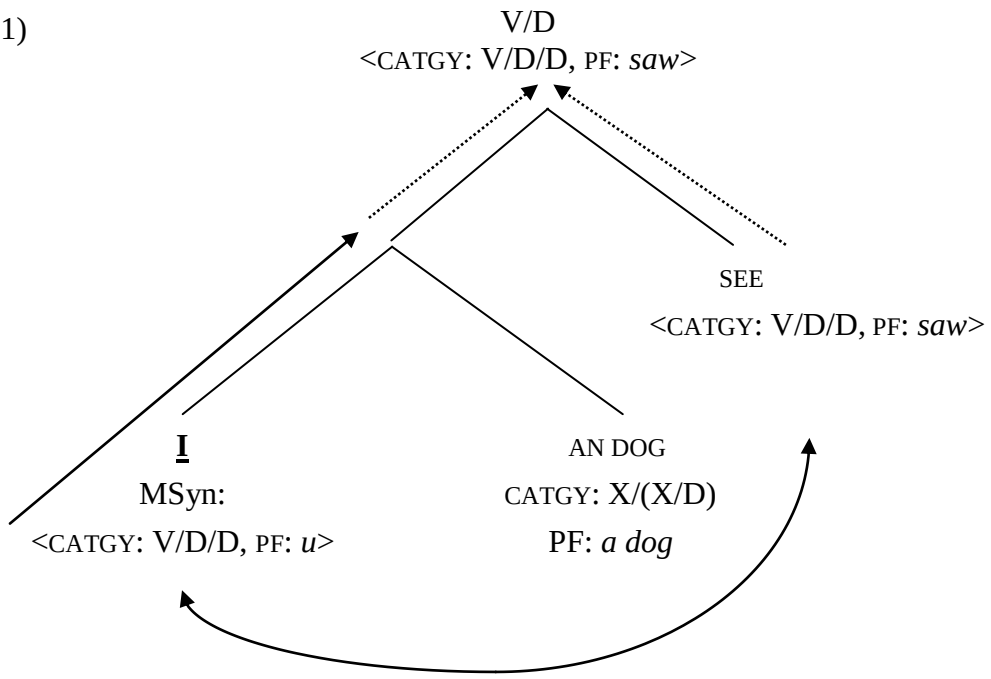
For the second characterisation, we should rather formulate it as in (10):

(10) If **I** has category X/Y/X and Y = V/D/D
then **I** has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*>>

However, so as not to jump to conclusions without argument, we will use the forms as in (8) for the moment. For (4), the MSyn features of Chapter Three will yield the PF *saw*, associated with the category V/D/D, at the position of SEE. It is assumed that these features may be assembled as a phrasal MSyn diploid <<CATGY: V/D/D>, <PF: *saw*>>, as shown, instead of as two independent features.[9] The underdetermined phrasal feature on **I** will percolate, as shown in (11). After the first step of the percolation, shown in a continuous arrow, it is sister to SEE and its features, so that unification may take place under Merge. The result is registered at the mother node, as indicated by the dotted line arrow.

[9] This should possibly be the structure throughout, but it is easier to consider the rules for categories and PF independently as required. We have shown an ordered diploid, though the attributes are such that the two internal features cannot be confused, on the assumption that this overall < attribute: value> format aids processing.

(11)



When the downward unification takes place, the diploid at **I** will acquire the value <CATGY: V/D/D, PF: *saw* >. At some point, Phrasal Prune must eliminate duplicates: for any pair of phrasal MSyn features related under unification, only the linearly first will be subject to Spell Out with an overt PF, parallel to the condition for Head Movement. The Spell Out of the MSyn features at **I** will be *saw*, and under SEE, will be null. This will have the desired effect of 'displacing' the verb to the **I** combinator position, for (7).

Instead of a minimal phrase of category V/D/D, SEE, there might be a more complex phrase. Consider (12a) from Johnson 1997. To account for the reading where Jill left two thirds of the questions unanswered, the negation must fall below the LF of two of the questions, as in (12b). Assuming the specifications in (9) or (10) above, the relevant categories for displacement must be as shown. Material in italics is treated as unanalysed, and given in the surface PF order.

(12) a Jill didn't answer two thirds of the questions on the exam.

b [**I** [*two thirds of the questions*]$_{(V/D/D)/(V/D)}$ [[DO NOT] ANSWER]]$_{V/D/D}$]

It follows that the Polarity head cannot have its own goal category.

Next consider a ditransitive, such as that in (13).[10] The identity element ID is the LF of the lexeme *TO1*, which is a one-place operator invisible for scope (as shown by its lack of

[10] Recollect from Chapter 2 that some PREP items are semantically identity operators. Their syntactic purpose and function is discussed in section 3.2.3 below.

effect in the bound variable reading of (41) below). The order in (13b) is the default; that in (13c) is marked, and is referred to as the LPR ('Light Predicate Raising') order.

(13) a ∃ JOHN PAST **I** [*a book about fleas*] **I** [ID MARY] SHOW

b John showed a book about fleas to Mary

c John showed to Mary a book about fleas[11]

In the unmarked order, the verb alone may be displaced to the object combinator, as in (13b). But the verb has category V/D/D/D, rather than the V/D/D specified in (8) above for the MSyn of the object combinator. Further, it is too deeply embedded to be in a sisterhood relation to the percolating MSyn of the object combinator. The first problem can be dealt with straightforwardly. It will become clear below that any verb of category V/D/D/X can be displaced alone to the object combinator position. This option may simply be listed alongside the specification given in (8), as in (14a) below. But the embedding problem is only soluble if the relevant phrasal MSyn feature on the verb percolates higher. This general problem will arise in one of two ways: there is a third selection for the verb, for example an indirect object or a CP complement, or there is a low adverb (see section 2.3). Now if we turn to (13c), we observe that the verb must have been displaced to the **I** combinator of the **indirect** object, to give the PF *showed to Mary* under the object combinator. From the diagram in (15), it can be seen that this displacement, if obligatory, would give MSyn features accessible for displacement to the object combinator not only for the phrase *showed to Mary* but for the phrase *showed* alone. The displacement to the indirect object combinator must then be obligatory — the simplest option in any case. Its specification is given in (14b).

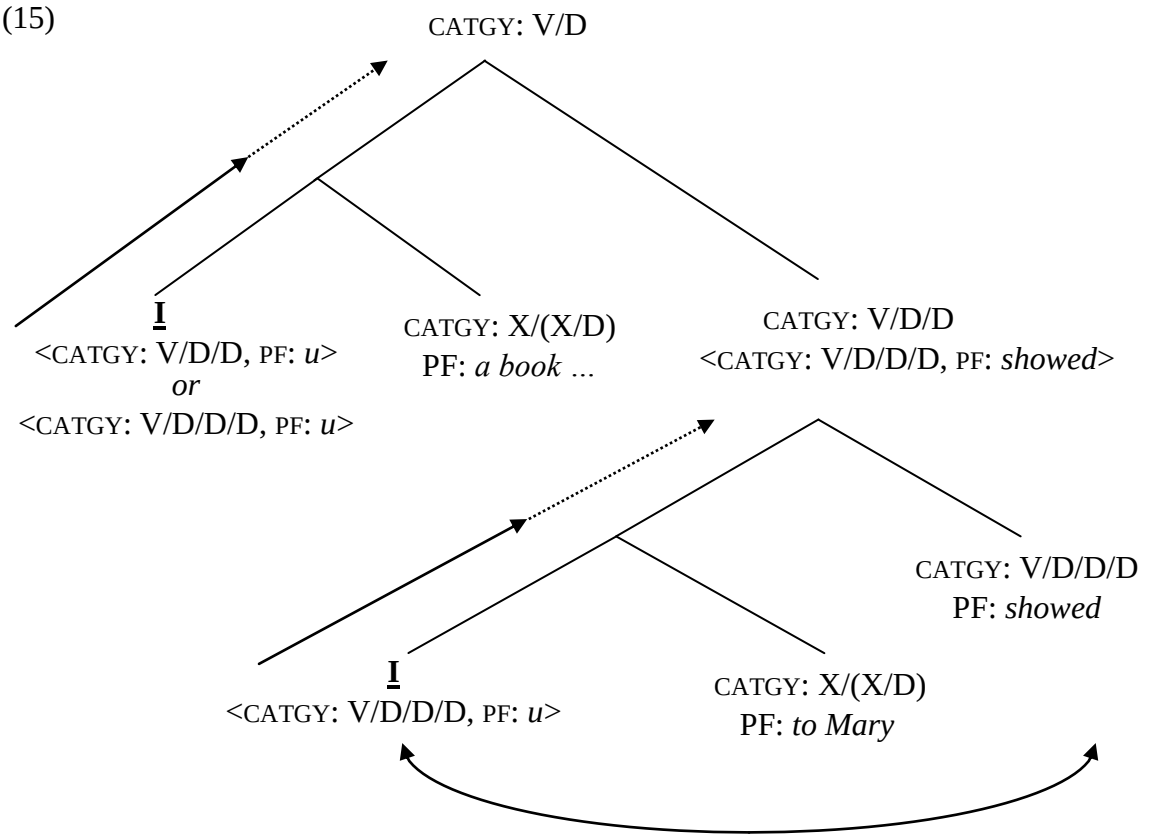
(14) a If **I** has category (V/D) / (V/D/D) / ((V/D)/(V/D/D)),
then **I** has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*> >
or **I** has an MSyn feature set <<CATGY: V/D/D/D>, <PF: *u*> >

b If **I** has category (V/D/D) / (V/D/D/D) / ((V/D/D)/(V/D/D/D)),
then **I** has an MSyn feature set <<CATGY: V/D/D/D>, <PF: *u*> >

These specification, like others that will follow, will be subject to generalisation later, with the final version appearing in §3.

[11] For Double Object structures see Chapter 7.

(15)



The left hand item in the lower ‘ ᐱ ’ is the indirect object combinator **I**. It has the category (V/D/D)/(V/D/D/D)/(X/(X/D), where X instantiates (V/D/D). It may attract a phrase of the category of its innermost selection, V/D/D/D, so it is given the MSyn feature set shown. After this percolates one step, it is sister to the verb, and when this is seen as a single member phrase, with an MSyn feature {CATGY: V/D/D/D, PF: *showed*}, unification may take place. The result is recorded on the mother node above (as the lower feature set). This mother node has category V/D/D, since the DNP with PF *to Mary* has discharged one D selection. It further has an overall MSYN given by the MSYN features of its terminal nodes.

Now consider the object combinator **I** in the upper ‘ ᐱ ’. As suggested above, this has one of two alternant specifications for the attraction of some verbal phrase, as shown under the combinator in (15). After one percolation step, either of these will be sister to a node with which it can unify. One of these specifications is that for the whole phrase, with CATGY: V/D/D; the other is the MSyn checking feature resulting from the displacement of the verb to the lower combinator. The choice is syntactically free. The first choice gives the phrasal displacement version, (13c), and the other, the unmarked

version of (13b) — shown here as (16a, b) where items displaced to combinator positions are shown in bold.[12]

(16) a John [**showed** a book about fleas [~~**showed**~~ to Mary ~~showed~~]]

b John [**showed to Mary** Ø] a book about fleas [~~**showed** to Mary~~ ~~showed~~]]

Phrasal Prune will operate differentially, depending on which specification is chosen at the object combinator. Suppose the choice at the object combinator is for a phrase of category V/D/D. The MSyn diploid at the object combinator will be as in (17), where the relevant value of <PF: *u*> cannot properly be determined until Phrasal Prune has operated on the PF of the phrase of category V/D/D.

(17) <CATGY: V/D/D, PF: *u* >

We conclude that Phrasal Prune must take place inside the V/D/D phrase before further displacement. This respects the checking, and assigns null PF to the second copy of the verb shown, that of the category V/D/D/D. That is, Phrasal Prune operates as soon as possible, bottom up. When this has taken place, MSyn checking feature under V/D/D will be as in (18):

(18) <CATGY: V/D/D, PF: <*showed, to, Mary, Ø* >

This will unify with that under the object combinator, after which Phrasal Prune will again take place. The final PF of the V/D phrase will then correctly be that in (19):

(19) PF: <*showed, to, Mary, Ø, a, book, about, fleas, Ø*>

We assume here that any intonational information based on the internal phrasing will have been encoded prior to transfer to PF, so that no indication of structure needs to be preserved.[13] If it makes no contribution, the null phonology will presumably be pruned.

Suppose instead the choice at the object combinator is for a phrase of category V/D/D/D. As above, the PF under the V/D/D/D head will be subject to Phrasal Prune when the V/D/D phrase is constructed. But Agree with the MSyn under the object combinator head still takes place using the MSyn checking feature {CATGY: V/D/D/D, PF: *showed*} at the V/D/D head; and this is linked by Agree to the checking feature under the indirect object combinator head, containing the same PF. Phrasal Prune then will give

[12] A string of the form **X₁** *a* **X₂** *b* **X₃** *c d*, gives PF '*a b c d*' if there are no displacements. Where for each combinator, the maximal phrasal displacement allowed applies, the resulting string will have the PF order '*d c b a*'. That is, it induces 'roll-up', otherwise known as 'snowballing' (Aboh 2004), Barbiers 2013:919.

[13] That is, we assume that there is some system of cumulatively assigning stress and intonation during merge, modulated by constituents marked at LF for information structure role, contrast etc., for example as in Steedman 2007, 2013; Neeleman and Reinhart 1998; Samek-Lodovici 2009.

null phonology to the PF feature in the diploid under the indirect object combinator head, since this is linearly second. The string of terminal PFs will then correctly be as in (20):

(20) <*showed, a, book, Ø, to Mary, Ø*>

Thus the specifications and MSyn features produce correct results for both possible word orders.

All of the clauses considered have been active. Consider then the examples in (21). It is straightforward to show that passive *by*-phrases are introduced by an identity operator, which is transparent for scope purposes like the *to* of a ditransitive.[14] For convenience in processing, we simply put in the PF *to*, in (21b).

(21) a The rubbish was picked up by the children

b *The rubbish was picked by the children up

(22) [**R** [**A** [*by* THE CHILDREN] [**A** PASS [**X** UP2 PICK]$_{V/D/D}$]$_{V/D/D/P}$]$_{V/D/D}$ **D-trace**]$_{V/D}$

Recollect from Chapter 3 that the arity operator PASS and the verb are in a head-checking relation, with the default effect that the verb's MS together with the inflection from PASS is realised at the PASS position at PF. The combinator **A** merging the phrase *by the children* will attract the PF of either the whole of its second merged operand, or of any suitable phrase with features on this operand. But because of PASS, none of the features relating to the **X** constituent are available, so that the former option must be taken, in line with (21).

Narrow syntax does not determine how to choose between any options made available by the MSyn specifications. If purely syntactic considerations drove the displacement, then it would always be just the verb that was split (this causes least disturbance to the LF order). The considerations which are relevant for choosing between the sort of displacements that are consistent with the MSyn specifications are of at least two kinds (Arnold et al. 2000, Wasow 2001, Wasow and Arnold 2003). First, there are those pertaining to Information Structure (see also Steedman 2000b, 2007, 2013). For English, these include a preference for new or focussed constituents to be placed later in the clause. Second, there are those pertaining to processing. These include a preference for 'heavy' or complex constituents to be pronounced later in the clause. The relevant units may and must include prosodic phrases. What these have in common is that by ensuring that they are later in the clause, the speaker marks them for the hearer as requiring special attention. Other considerations may be purely stylistic, such as the ban on stranded

[14] In *Some book was enjoyed by each boy*, EACH BOY may have wide scope over SOME BOOK, just as in *John gave some book to each boy.*

prepositions in formal English, or arrangements maximising euphony. But any of these considerations can be accommodated only where there is optionality, as here.[15]

We will see below that the specification must be radically generalised, but we first show that mild generalisations allow correct results for low adverbs.

2.3 Some adverbs

2.3.1 Low adjuncts

Consider next a low adjunct. Some manner adverbs obligatorily scope below the direct object: those which specify properties of the object in some way — their semantic type requires a selection discharged by the direct object (selection 2 of the matrix verb). They are incompatible with verbs not offering a suitable target for the second selection of the adverb. Such an adverb must have category (V/D/D)/(V/D/D), if it is an operator.[16] One such is *HARD* (as an adverb, in the sense of the action's being hard work), where the anomalous examples in (23) contrast with the grammatical examples in (24 b, c).[17]

(23) a #John slept very hard

b #John ate his food very hard

(24) a ∃ JOHN [**I** [THE MIXTURE] [**X** [VERY HARD] BEAT]]

b John beat very hard both the batter and the sauce

c John beat the mixture very hard

d * John very hard beat the batter and the sauce

We have labelled the second combinator shown '**X**' for convenience: it is actually **I**. For (24b), we see that the PF of BEAT must be displaced to **X**, and then the PF of the phrase headed by **X** must be displaced to **I**. The categorial specifications of the combinators are given in (25). For (24c), the verb alone is displaced across the object.

The categorial specification of **X** is shown in (25).

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[15] Samek-Lodovici 2009; Bobalijk and Wurmbrand 2012; Neeleman & Kucerova 2012.

[16] In the next chapter, we argue that this category may be obtained by covert conjunction, with the adverb being a relational category, but the additional structure is irrelevant here. It cannot be a Raising/Control item, by the argument relating to VIGOROUSLY in the next subsection.

[17] Another is COMPLETELY, in the sense relating to the extent of the object (where (23b) is not anomalous, but *John completely ate his food* is unacceptable). There is a higher adverb with the same PF, but different meaning, as in *John completely forgot to feed the cat*.

(25) If **X** has category: ((V/D/D) / (V/D/D)) / ((V/D/D)/(V/D/D))
then **X** has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*> >

We already have the specification for displacements to the object combinator in (14), repeated here as (26), with (26a) being the relevant one.

(26) a If **I** has category (V/D) / (V/D/D) / ((V/D)/(V/D/D)),
then **I** has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*> >
or **I** has an MSyn feature set <<CATGY: V/D/D/D>, <PF: *u*> >

b If **I** has category (V/D/D) / (V/D/D/D) / ((V/D/D)/(V/D/D/D)),
then **I** has an MSyn feature set <<CATGY: V/D/D/D>, <PF: *u*> >

The outermost selection corresponds to the first-merged operand. For the combinator **I**, this is the category of a DNP, as in the earlier examples, with the checking features as shown in (26a). But for the combinator **X**, it is (V/D/D)/(V/D/D). The next selection, for the second-merged operand, is an item of category V/D/D in both cases. It is the second-merged operand of each combinator which is displaced to the combinator, for (24b), as required by the specification given in (25), and the topmost option given in (26a). Again, to obtain the PF order in (24c), the MSyn feature for the phrase containing the verb alone must be present at the second operand of the first combinator, entailing that even in this instance, the displacement of the verb to **X** is obligatory. Mutatis mutandis, the picture for the two orders will be just as in (15). Since adjuncts and DNPs are the only items that can merge by **I** to the left of a verbal projection and within a verbal projection, we have sufficient specifications for the items considered so far.

We show in the following sections that further combinators which are the locus of verbal displacement need not be **I**.

2.3.2 Some further adjuncts

In section 2.3.1 we discussed low adverbs — those that necessarily relate to selection 2, and must therefore be merged below the object DNP. We argued that these attracted a verbal projection to their merging combinator. In contrast, high speaker-orientated and epistemic adverbs like *unfortunately* and *probably* may be merged above the subject, and do not attract any verbal projection to their combinator position. These adverbs may alternatively be merged below the subject, using a composing combinator, where again, no verbal projection is attracted. Such adverbs have the simplified type <t, t>.

(27) a Unfortunately, Trisha can't come

b Trisha unfortunately can't come

c Trisha can't come, unfortunately (only with comma intonation, for focus)

At least some adverbs canonically merged in positions between these extremes attract verbal projections to their combinator. Consider the distribution of VIGOROUSLY.

(28) a #Vigorously, John stirred the sauce (only with topicalisation or contrastively)

b John vigorously stirred the sauce

c John stirred the sauce vigorously

d John stirred vigorously both the batter and the sauce

This distribution contrasts with that for HARD in (29)

(29) a # Hard, John beat the mixture (only contrastively)

b * John hard beat the mixture

c John beat the mixture hard

d John beat hard both the batter and the sauce

The adverb VIGOROUSLY is an agent-oriented manner adverb pertaining to an activity. These facts will be encoded in its Meaning Postulates. The adverb is not available with unaccusatives, as expected, accounting for (30a). However, no object is required, as witness (30b).

(30) a *John fell vigorously

b John ran vigorously

The adverb then must be merged below the agent argument, but may be merged above the object argument. This is what we see in (28b), contrasting with (29b) where HARD pertains also to the effect on the object, so needs to be merged below this too.

The adverb VIGOROUSLY will have a type <<e, t>, <e, t>> if treated as an operator, but a type <e, <t, t>> if treated as a raising/control item, with category (V/D)/(V/D) or V/D/V accordingly. Either will ensure that it is merged above a verb, and below the argument discharging the final selection of the operand/complement verb phrase. But a raising/control verb is always kept in its Functor First position preceding its complement verbal projection (see further in section 3.1). It follows that the adverb must be an operator.[18] Its adverbial status will be given by its canonic MSyn, <ADVERB: *VIGOROUSLY*>.

If the adverb is merged in its canonic position above the object combinator, then the rules in (26) predict correctly that no displacement is induced, as in (28b). If however it is

[18] Some languages do have verbs (perhaps auxiliaries) with adverb-like meanings. In Nupe, *dàdà* (‘quick’), *paká* (‘on time’), *ye* (‘again’), are all verbal, taking subjunctive morphology in appropriate contexts (Smith 1967:9f.,32, 1970:331).

merged lower, by **B**, then it will be adjoined to a category V/D/D, so that if the restriction to the combinator **I** is lifted, allowing **B**, it falls under clause (a) of (26). This will permit (28c) or (28d).

An adverb like CAREFULLY may be merged even lower, with a ditransitive head as its operand, as in (31a). Only the lowest merge of the adverb can lead to the PF order in (31b).

(31) a [THE CHILD [**I** THE PLATE … [**I** TO HIS MOTHER [$\mathbf{B}^2$ CAREFULLY PASS]]]

b The child passed carefully to his mother the plate of tarts he had cooked

We see then that displacement of the V/D/D/P verb may be to the combinator merging the adjunct, as well as to a DNP combinator, justifying the generalisation in (26b). The adjunct has category (V/D)/(V/D), so the combinator involved here is $\mathbf{B}^2$ (i.e. **B B**). The required displacements for low-merged high or medial adverbs do not fall under the specification in (25), but all the adjunct-triggered displacements fall under the generalisation as in (32):

(32) If $\mathbf{B}^n$ has category (V/D/D) / (V/D/D) / (X/X),
then $\mathbf{B}^n$ has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*> >

Under CCG, any phrase of an adjunct category that is permitted to adjoin to a verbal projection will merge in the same positions as an adverb, though relative heaviness may preclude some combinations.

We mention here another low adverb, *EVENLY*, because its distribution is not fully accounted for under the assumptions here. This adverb differs from *HARD* in that it has resultative effects.

(33) a #John entered the room evenly

b #John ate his food evenly

Consider then (ii):

(34) a ∃ JOHN **I** [*the bread*] [**X** EVENLY SLICE]

b John sliced the bread evenly

c John sliced evenly both the bread and the cake

d %John evenly sliced both the bread and the cake

The PF orders in (34 b, c) are as predicted if some item of category V/V/D is displaced to the object combinator **I**. We note however that (34 d) is acceptable to some speakers. It is not clear at this point what the explanation should be, though it might depend on the LF alternants discussed in Chapter 5.

2.4 Displacement with other internal selections of the verb

We saw above from how the MSyn features work that if, as in English, it is always possible for a bare verb to be attracted to the object combinator position, then an argument or adjunct to the verb merged below the object must attract the bare verb to its merging combinator. We exemplify with some further cases in (35) to (41), where material in italics is unanalysed and given in the surface PF order.

Consider first the structure in (35a) (where *to* can be ignored, as a PREP1 item, and **X** is in fact **I**). There are two possible surface orders, as in (35 b, c). We might expect that these could be obtained from (35a).

(35) a ∃ JOHN [**I** [*to* HIS WIFE] [**X** EXPLAINED [*that the child had seemed hungry*]]]

b John explained that the child had seemed hungry to his wife[19]

c John explained to his wife that the child had seemed hungry

d **I** ∃ JOHN [**X** [**B** [*to* HIS WIFE] EXPLAINED]] [*that the child had seemed hungry*]]]

There is no problem with (35c) — all that is required is that the **I** combinator attract the PF of its second operand, that headed by **X**. But the default order in (35b) cannot be obtained from this. Even if the verb *EXPLAINED* were displaced to the combinator **X**, its relevant features would appear only on the mother of **X** and EXPLAINED, which is not high enough to be accessible to the **I** combinator. In order to obtain the unmarked order in (35b), the LF has rather to be as in (35d) (where the rearrangement of the merges has no effect on scope). Here, *EXPLAINED* may be attracted to the object combinator **B**, since its features will be accessible, to give (35).[20]

We note that string-vacuous displacement to the combinator shown as **X** could be induced without changing the word order. We assume that features inducing this extra displacement would not be postulated unless doing so simplified the overall rules.

Parallel arguments apply to other structures where the LF type is <t, <e, <e, t>>>.

(36) a ∃ JOHN **I** ∃ MARY [**I** PERSUADED [*that it would rain*]]

b John [persuaded that it would rain] [not only the players but the organisers too]

c ∃ JOHN [**I** [**B** ∃ MARY PERSUADED]] [*that it would rain*]]

d John [persuaded] Mary that it would rain

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[19] This sentence has an irrelevant intrusive extra interpretation.

[20] We note that neither structure gives the two internal arguments together as a constituent, as would be required for coordination of two such constituents. To obtain this, either type lifting of the CP, or ellipsis of the verb in a second conjunct, would be required. We set aside this problem.

We find the displacement in (36b) acceptable. What this shows is that Ross's (1975: 288) "Fat things to the outside" is not obligatory, but is modified by other possibly conflicting considerations. In this instance, the desideratum put forward by Ross is in conflict at least with the desideratum to leave items in their LF order if possible. We take it then that nothing rules out (36b), but that the gain in putting focus final is counterbalanced by the awkwardness of displacing a heavy constituent leftwards.

The LF PERSUADE is also associated with a Control verb, as in (37), which has a category V/D/D/V, with its selection 3 argument merged by **R**. As expected, either the head, of category V/D/D/V, or a larger phrase, of category V/D/D may be displaced to the object combinator. In (37b) and below we substitute a heavy phrase for a lighter argument for plausibility.

(37) a ∃ JOHN [**I** ∃ MARY [**R** PERSUADED$_{V/D/D/V}$ [TO LEAVE]$_{V/D}$]$_{V/D/D}$]$_{V/D}$

b John [persuaded to leave] both Mary and her mother [21]

c ∃ JOHN [**I** [**B** ∃ MARY [**R** PERSUADED$_{V/D/D/V}$]$_{V/D/D(V/D)}$]$_{V/D/(V/D)}$] [TO LEAVE]$_{V/D}$]$_{V/D}$

d John [persuaded] Mary to leave

The re-bracketting induced by using **B** in (37c) is only licit if **R** is included in **B**'s second operand, as shown. This has the effect of preserving the control semantics, as required (see chapter 6).

Similar displacements are exhibited with Raising verbs:

(38) a ∃ JOHN **I** ∃ MARY [**R** CONSIDER$_{V/D/D/A}$ [PRETTY]$_{A/D}$]$_{V/D/D}$

b John [considers pretty] both Mary and her mother

c ∃ JOHN [**I** [**B** ∃ MARY [**R** CONSIDER$_{V/D/D/(A/D)}$] $_{V/D/(A/D)}$] [PRETTY]$_{A/D}$]$_{V/D}$

d John [considers] Mary pretty

Next, consider a third selection discharged by a PP, as in (39). One possible analysis is that the PP has category P/D, and acts like a control complement in assigning its external role to the direct object argument, using **R**, as well as acting to discharge a <t> selection of the verb.[22] Then the verb has category V/D/D/P, and the analysis is parallel to the examples above.

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[21] One necessary property of this analysis is that the phrase [**R** PERSUADED [TO LEAVE]] as it occurs in say (37) has both an LF and an MS (to give the PF).

[22] Another possibility is that the preposition is an operator, turning its sole argument from an entity to a location or path.

(39) a ∃ JOHN [**I** [HIS CAMERA] [**R** PUT [*into the box*]]]

b John [put into the box] both his camera and its lenses

c ∃ JOHN [[**B** [HIS CAMERA] [**R** PUT]] [*into the box*]]]

d John [put] his camera into the box

Note that in none of these examples is displacement to **R** ever required.

Finally, consider a ditransitive structure where there is a fixed preposition marking selection 3 of the verb. In section 2.2, the arguments in such examples were merged in their canonic LF order. Because the verb is displaced to the combinator position across the argument with which it is first merged, its PF features will be high enough to allow displacement across the second argument merged, giving the two PF orders in (40). This holds even if the arguments are merged in the non-canonic scope-switched order, as in (41). Here, scope reversal of two quantified internal arguments is obtained simply by merging the direct object with the verb first, with **B**, as in (41a) below, in contrast to the canonic LF order in (40). By using bound variable pronouns, the LF scope order may be determined by the reader/hearer from the PF. It can be seen that PF displacement is available for such a structure just as it is for the canonic merge.

(40) a [THE HEADMISTRESS] **I** [EACH …PHONE…] **I** [*to* ITS OWNER] RETURNED

b The headmistress returned [*each mobile phone*] [to *its* owner]

c The headmistress returned [to its owner] [each of the mobile phones confiscated earlier]

(41) a [THE HEAD] **I** [*to* EACH GIRL] **B** [HER MOBILE PHONE …] RETURNED

b The headmaster returned [to *each girl*] [*her* mobile phone and earrings]

c %The head returned [*her* mobile phone] [to *each girl* who came to his office][23]

d The head gave [a punishment] [to *each girl* who was sent to his office]

Because of the bound variable dependencies of the pronouns on the EACH phrase, the LFs for the (b) and (c) clauses must be as shown in the (a) specification, as must (d) for its most natural interpretation. From the (b) PFs, it can be seen that one possibility is for the verb to appear at the combinator of the penultimate argument merged, not only when this is an object, but when this is an indirect object. From the (c) specifications, it can be seen that a phrase can be merged at this position.

We see from the examples above that the displacements across direct and indirect objects appear to be indifferent to the actual combinator, with at least **B** instead of **I** in example (41). Suppose then that we set up the features so that the first operand of some combinator is a DNP of general category Y/(Y/D), allowing any D selection to be discharged, as in (42).

(42) a If **I** is of category (V/D) / (V/D/D) / (Y/(Y/D)) ,
then **I** has an MSyn feature <CATGY: V/D/D, PF: *u*>

b If **X** is of category (V/D/Z) / (V/D/D/Z) / (Y/(Y/D)),
then **X** has an MSyn feature <CATGY: V/D/D/Z, PF: *u*>

The underspecified mother means for instance that in (42b), either the direct object, or, if Z is D, the indirect object, could be the one discharged under this merge, since the

[23] Some speakers do not obtain this reading. With scrambling too, the canonic order is thought to be unambiguous, while the scrambled order is thought to be ambiguous. For discussion of the '3/4 signature', see Bobaljik and Wurmbrand 2008, Bobaljik and Wurmbrand 2012, who also argue for an 'LF first' approach. Under the explanations we offer, the fourth structure is possible in principle (which explains the acceptability to some speakers, including the authors), but may be pragmatically inaccessible to the hearer. For the PF order of (40c) and (41b), there is a signal in the PF order that some non-standard operation has taken place; for (41c), there is none. The motivation for (41c) should be to obtain the desired scope i.e. LF, and presumably, to put a 'heavy' phrase towards the end. Since this latter is stylistic, it might be sacrificed for ease of interpretation. But *each* generally has wide scope relative to some other constituent, and (41d) is possibly acceptable to most people, so the problem with (c) may well be to do with an individual's acceptability conditions for bound variable pronouns (see Barker 2012 for a rejection of surface c-command, and Bobaljik and Wurmbrand 2012 for a proposal about similar effects in German and Japanese). We assume tentatively that some account of the variant acceptability of (41c) is possible without further syntactic constraints being imposed and without appeal to type shifting the verb.

combinator **X** may be **I** or **B**. Further, where Z is the category of a CP or an XP, as in examples (36) to (39), there will correctly be displacement of the verb induced, to the combinator **I** or **B** as appropriate.

The specifications in (42) subsume the specifications in (14)/(26). We need in addition (32) of section 2.3, repeated here as (43). This took care of the appropriate displacements round low adjuncts (including medial and high adjuncts merged low).

(43) If **B**$^{\mathbf{n}}$ has category (V/D/D) / (V/D/D) / (X/X),
then **B**$^{\mathbf{n}}$ has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*> >

So far so good, but there are problems. First, one would hope that the whole set of entries could be unified under a broader generalisation. Second, we see in the next section that the displacements permitted under (42) and (43) are indeed too restrictive, but that, not unexpectedly, lifting the restriction requires an additional constraint to rule out untoward consequences. Third, we have deliberately omitted scope switch involving the subject, because it causes distinct problems. We will consider this next, in section 3, where we also consider scope switch internal to a noun phrase (section 3.4).

3 Extending the parameter space and the coverage

3.1 First, generalise radically …

Given that in English, as in many languages, subjects precede their predicate phrase in a finite clause, there might seem nothing to say about phrasal displacement in relation to a subject DNP under Functor First. In a simple transitive clause, the subject combinator has V/D as its second operand, and displacement to the subject combinator is ungrammatical.

(44) a **I** JOHN [**I** PAST [THE DOG FEED]$_{V/D}$]$_{V/D}$
b * fed John the dog
c * fed the dog John

Displacement just to the combinator merging PAST would not result in ungrammatical PF orders, but its propriety cannot be ascertained here.

However, consider the situation which will arise if subject and object may be scope-switched by merging the subject DNP with **B**, before the object is merged. Nothing special needs to be said to permit this, so it must be assumed to be possible. Consider (45a). This has two readings. The relevant reading has the scope in (45c/c′), which is not entailed by the reading for (45b/b′). We show that even if we assume (as standardly) that finite clauses will be TPs, as in (45 b′, c′), we cannot encode the correct word-order facts. The Tense head is placed as high as possible but below the subject since this gives the

category contrast in (45b′) that discriminates by category the phrases to be displaced or not displaced (we still omit selection for Tense, here).

(45) a Most of our clients viewed two houses — the ones with temptingly low prices

b $[_{V}$ **I** [MOST ID OUR CLIENTS]] $[_{V/D}$ PAST $[_{V/D}$ **I** [TWO HOUSES]] $[_{V/D/\mathbf{D}}$ VIEW]]]]

c $[_{V}$ **I** [[TWO HOUSES]] $[_{V/\mathbf{D}}$ **B** [MOST ID OUR CLIENTS]] $[_{V/D/\mathbf{D}}$ PAST VIEW]]]

b′ $[_{T}$ **I** [MOST ID OUR CLIENTS] $[_{T/D}$ PAST $[_{V/D}$ **I** [TWO HOUSES]] $[_{V/D/\mathbf{D}}$ VIEW]]]]

c′ $[_{T}$ **I** [[TWO HOUSES]] $[_{T/\mathbf{D}}$ **B** [MOST ID OUR CLIENTS]] $[_{T/D/\mathbf{D}}$ $\text{PAST}_{T/V}$ $\text{VIEW}_{V/D/\mathbf{D}}$]]]

If we follow the rules of section 2 for phrasal displacement based on category, for (45c), we would expect that the only displacement would be of *viewed* to the combinator of MOST OF OUR CLIENTS. But this gives the wrong surface order, with the PF of the object DNP, *two houses*, remaining in front. We have marked the selection relating to the object in bold, above and below, to help the reader keep track. Suppose instead that PAST induced a change of goal category, yielding a T-headed phrase, as indicated in (45c′). Then the MSyn features would need to require displacement to the initial combinator **I**, where the second operand would have category T/D. But this will by hypothesis also be the category of the second operand of **I** when the first operand is a subject, as in (45b′) — and here, no displacement is required. We may continue to assume that Tense does not have its own goal category, so that all the displaced phrases have V as their goal. We conclude that potential displacement of verbal phrases must include those with category V/D. It follows that some other restriction ensures that subjects are initial in a tensed clause.

A similar situation arises with 'Right Node Raising', as seen in (46a).

(46) a John likes, but Mary dislikes, most fish

b [**I** [MOST FISH]$_{V/(V/D)}$ [[∧ [**B** JOHN LIKES]$_{V/\mathbf{D}}$] [*but* [**B** MARY DISLIKES] $_{V/\mathbf{D}}$]$_{V/\mathbf{D}}$]

Following Steedman 1985, we treat this using composition of the subject and the verb, but the Functor First order will be as sketched in (46b). We take *but*, like *and*, to be a marker, with LF ID, where both are associated with the Functor First conjunction head '∧'. The lexeme *BUT* associated with *but* has additional pragmatic effects (Blakemore 1987, 1989, 2002, Wilson and Sperber 1993, Carston 2002:160, §2.3.7).[24] For the proper word order, it is required that the whole of the conjunct phrase be displaced to the initial combinator **I**, which licenses the merge of the object, [MOST FISH]. Here too, a phrase of category V/D must be displaced to ensure an initial subject.

[24] The structures for coordination are discussed in more detail in Chapter 5.

What we have established here is that when a DNP is merged with some verbal projection, then the PF of some verbal phrase must be displaced to a combinator **I** or **B** position **except** when this combinator is that merging the subject.[25] For the more general case, we need to replace the informal notion 'subject' with a more specific criterion. In a finite clause, the subject must discharge the innermost selection (selection 1) of the verb or other relational head. If it discharges any other selection, this can only be because there has been some operation, such as Raising, promoting this other selection into selection 1. So there is a question as to how the subject vs. object is identified, when the options in (45) are considered. We know that the object must bind selection 2 of the lexical specification of the verb (or complex verb), but we cannot use this information directly, because it is not retained as merges of DNPs continue, when scope switch by composition is permitted. The same question arises for the selections 1 and 3 of a verb. We take up these requirements in section 3.2.

We can generalise everything we have said about verbal projections to other relational projections. Other relational predicates, APs, PPs, and NPs (A/D, P/D, and N/D respectively) are head initial. None of these have subjects licensed by Tense in English, and we take 'Small Clauses' to be rather a matter of 'Raising to Object', as indicated above (Chomsky 1955/75:479, Rosenbaum 1967, Postal 1974, Williams 1994b, Chapter R), so that they pattern much as in the control structure. This means that these other relational projections may be subsumed under the same MSyn displacement rule as for verbal projections. Suppose we postulate a set Rel, for the basic relational categories, and a category RelP for unsaturated phrases with Rel as a goal category. RelP can be defined recursively as in (47). The restriction to RelP such that at least one selection is made encodes Larson's 1988 suggestion that the phrases to be displaced in a simple finite clause are those with categories appropriate to some verb. But it also allows that the category might arise from discharging some selections made by a relational head in non-canonic order.

(47) (i) $X = A, N, V, \text{or } P \rightarrow X \subset Rel$ (i.e. $X \cup Rel = X$)

(ii) $X \subset Rel$ and $Y = Rel, Ev, D, T, \text{or } C \rightarrow X/Y \subset RelP$;

(iii) $X \subset RelP$, and $Rel, Ev, D, T, \text{or } C \rightarrow X/Y \subset RelP$

This covers all possible relational phrases (and none that might not be), corresponding to NP, AP, PP, VP, and their fully saturated congeners.

The idea is to set up a very general rule for displacement to a $\mathbf{B^n}$ combinator, and then add restrictions as required. The general rule for phrasal displacement may be stated as in (48), which subsumes those in (43 a, b), where Z is a DNP, but incorrectly for Z a subject DNP. It also subsumes the cases otherwise covered by (43 c), where an adjunct rather

[25] Recollect that displacement to **R** has already been excluded (section 2.4).

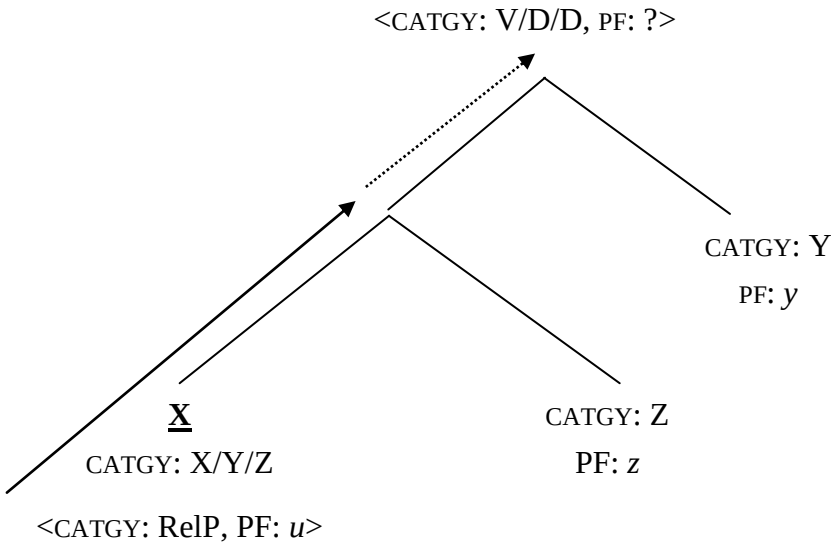
than a DNP is merged as the first operand of the combinator, but incorrectly for a high adjunct.

(48) **B^{n}** has category X/Y/Z, Y ∈ RelP → <CATGY: RelP, PF: *u*> ∈ MSyn: **X**

The restriction requiring the RelP to be Y ensures that the checking is local. Because of the locality induced, it might appear that the RelP in the feature could be instantiated by Y or Z, but not by any constituent internal to these; but this is not the case, as discussed in section 2.2. A suitable feature from checking internal to Y may be present on this node, as well as the one intrinsic to Y, and may be chosen to unify with the feature on **X**.

In a merge satisfying the antecedent condition in (48), suppose Y is a relational phrase and Z is a DNP or an adjunct, neither being a RelP. The checking feature on **X** will percolate as in (49). In either of these instances, **X** will have a relational goal category.[26]

(49)



From this, it will be seen that if Z is a RelP, the feature will unify with the information at the first node above **X**, under sisterhood. Since the checking feature will now be fully instantiated, it will not percolate further.

To this rule a further rule must be added: a condition ruling out displacement to the subject combinator or higher. As we have seen from examples above, and in particular (45), this cannot be a matter of category. It is necessary to exploit some other feature of the DNPs involved. We also need to allow high adjuncts to remain in situ.

[26] The category of a combinator is never RelP, so the canonic MSyn of the combinator cannot unify with the MSyn feature specified for displacement.

3.2 … and then restrict

3.2.1 Licensing subjects vs. objects

The task now is to give an account of the fact that in a language like English, the subject must be initial in a simple clause. There are two morphosyntactic options that may be exploited: MSyn checking features, or categorial selection. Both must depend on heads in the clausal spine that license the merge of associated arguments. These include finite Tense for subjects. But before considering the relevant MSyn features, let us consider why NL should have anything so apparently unnecessary.

If every D selection of a relational head had to be discharged immediately, there could be no control or raising to the subject or object position of a higher head, nor any use of relational phrases as predicates in modification. On the other hand, if selections could have immediate arguments or not at whim, with no contextual or PF reflex, parsing might well be too difficult. A compromise is called for.

The compromise involves **licensing** the merge of a binding DNP. Consider first the licensing option. Licensers must be available in a simple finite transitive clause. There must therefore be two operator heads used for this purpose. Canonically, finite Tense licenses a subject, with some lower head, usually taken to be some value of 'little v' or Voice licensing the direct object; we suggest rather that it is one value, '*EV*+', of the Event binder (whose properties we discuss in Chapter 5). If one of these heads is merged with a relational phrase making a D selection, then a local DNP becomes possible. If no such DNP-licensing head is merged, an immediate binding DNP is impossible, and the selection will need to be discharged in some other way (e.g. under Raising). If the head makes a third selection, some other licenser will be necessary: this is usually, and perhaps always, mediated by the relational head itself. We will argue below that a relational head in English can license a DNP only via a one-place preposition, PREP1. The required specification ensuring that subjects come first in the clause in English can then be stated as a condition requiring that a combinator with first operand a DNP checks the features of its first operand for an MSyn feature relating to the Licenser of the DNP. Here, we suppose also that there is a word-name 'LIC', for the possible Licensers of a DNP. In English this includes TENSE items, as specified in (57) below, and also *Ev*+ and certain PREP items, as indicated above. If the Licenser is a finite Tense item, then the DNP+Licenser phrase must have its PF attracted to the object-combinator position, (rather than as under the default, where the PF of some V projection is attracted). To spell this out, we need first to see how the licensing works.

We suggest that each D selection is adjacent to a Licenser selection, in the relational head category. This gives either (50a) or (50b):

(50) a V/T/D/Ev/D/P/D

b V/D/T/D/Ev/D/P

We will argue below that the correct ordering must be as in (50b).

Consider then a transitive verb with category as in (51), corresponding to (50b).

(51) transitive verb. CATGY: V/D/T/D/Ev type: <ev, <e, <int, <e, t>>>>

This ordering of selections gives rise to the expected canonic order if **I** is used for each merge:

(52) Subject Tense Event-binder Object Verb

But because all the items discharging the selections will be semantically functors over the verb, these functors (DNPs, Tense and Ev items) can be merged in any order, using $\mathbf{B^n}$ as necessary. The question then is how, for instance, the order in (53) is prevented, where 'subject' here means, 'binding selection 1 of the verb', and 'object', binding selection 2 of the verb.

(53) * Object Tense Event-binder Subject Verb

Given these heads, the connection between argument DNPs and their licensers must be restricted either by selection, or by using MSyn features. It is of course familiar that languages show evidence of Agree, in the form of morphological case appearing on the determiner, noun or DNP. But morphological case and syntactic Case may dissociate, so a separate account is needed (see for example Pesetsky and Torrego 2011 on Icelandic, Mahajan 2000 on Hindi).

The proposal is to induce a very local checking between the DNP and its Licenser, merging them together using **B**. This will prevent the licensers from being associated with the discharge of the wrong selection of the verb. This can be ensured by stipulating an MSyn feature checking for **B** on one of the items. We begin with Tense. We have been suppressing <int> selections for intervals, and the corresponding ubiquitous T selections, throughout. We must restore these here. where the Tense head in question has the properties in (54), and the related DNP (55). Tense is an operator of type <<int, t>, <int, t>>, as we argued in chapter 2 §14.2 — that is, all tenses are relative, rather than absolute (as in Reichenbach's 1947 system, which we adapt).

(54) Lexeme: α; CMSyn: <TENSE: *FIN*>; CATGY: (X/T)/(X/T); TYPE: <<int, t>, <int, t>>

(55) Lexeme: β; CATGY: Y/(Y/D); type <<e, *u*>,*u*>

These items may be merged by **B**, with the Tense head merged before the DNP, and Y unifying with X/T, or with the DNP merged before the Tense head, with X unifying with Y/D.

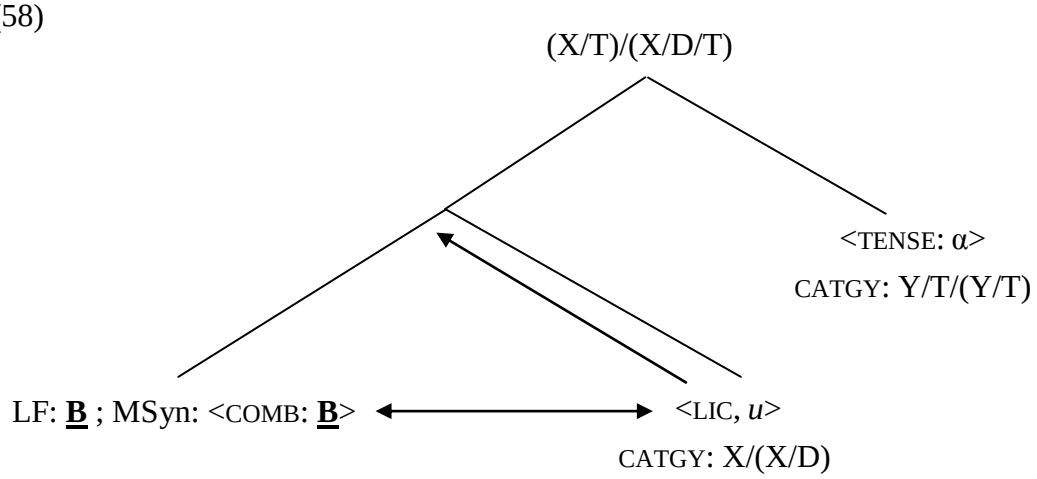
Now we exploit the LIC word class set up above. Suppose that a DNP also has an associated checking feature as in (56), where the information in (57) is available for English.[27]

(56) CATGY.α = X/(X/D) → <LIC: *u*> ∈ MSyn.α

(57) TENSE ⊂ LIC

For the T-licensed DNP, the only legitimate merge structure is as in (58).

(58)



The underdetermined feature for a Licenser on the DNP with category X/(X/D) can be discharged if some licenser is the **second** operand of some combinator, as in (58), since there is simple (non-mutual) checking, and only an underdetermined feature percolates. The result of the unification of the <LIC: *u*> and <TENSE: α> features will be recorded on the mother.[28] It is not necessary to stipulate the use of the combinator **B**, as only the appropriate $\mathbf{B^n}$ combinator can induce the required sisterhood for checking the percolating simple feature <LIC: *u*> (see Chapter 3, section 7).

Merge by **B** in the configuration above requires that Y=X/D. It follows that the mother has the category shown, where the subject selection occurs before the T selection that licenses it, in conformity with (50b), but not (50a). This can merge with a transitive verb of category V/D/T/D/Ev. The DNP has necessarily bound the D selection immediately preceding the T selection, that for the subject, as required for correctly being licensed by Tense.

---

[27] Recollect from Chapter 3 that generalisations over the lexicon may apply to phrases. The implication of (57) is that there is no non-finite Tense item. The specification could be replaced by <TENSE: *FIN*> ⊂ <LIC: *u*> if required.

[28] This would be relevant for morphological case parasitic on syntactic Case.

A typical phrase including a subject DNP and conforming to the conditions given is as in (59):

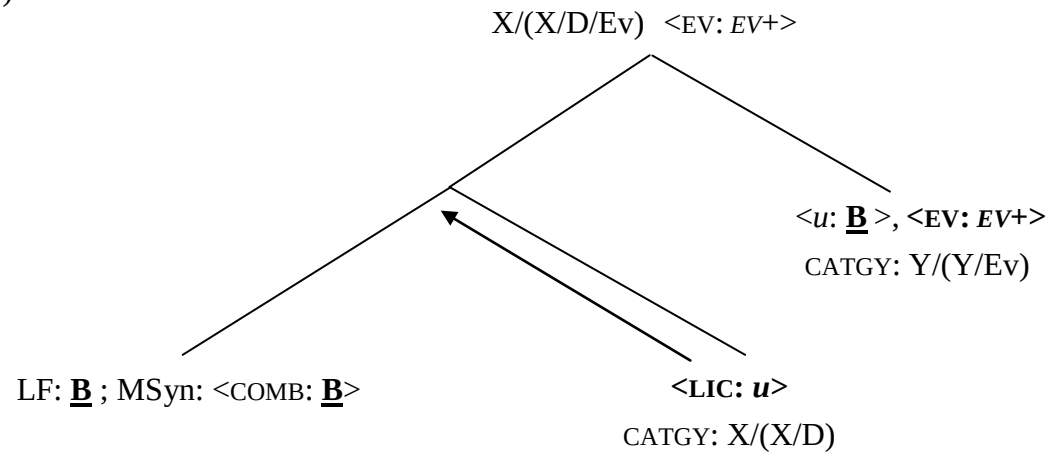
(59) [**B** [AN CAT]$_{X/(X/D)}$ [PAST]$_{(Y/T)/(Y/T)}$]$_{(X/T)/(X/D/T)}$

Licensing the object with Ev+ is similar, but not identical because Ev+ is a binder rather than an operator. First, we need to declare the item as a License head.

(60) <EV: *EV*+> ⊂ <LIC: *u*>

The underdetermined <LIC: *u*> feature will percolate one step, upon which it will be sister to the <EV: *EV*+> feature on the Ev head, allowing unification. The result of the unification will appear on the mother.

(61)



Here, for merge by **B**, Y = X/D, so that the mother category will be X/(X/D/Ev), as shown. This reflects the binding of successive selections of the verb by the two operands of **B**. As with T, the selection immediately preceding the licenser is the one discharged, correctly. A canonical transitive verb will then have the selections order as in (62), and a typical merge will be as in (63):

(62) V/D/T/D/Ev

(63) [**B** [*AN MOUSE*]$_{X/(X/D)}$ [*EV*+]$_{(X/D)/(X/D/Ev)}$]$_{X/(X/D/Ev)}$

The whole is a doubly quantifying expression: it will bind both the Ev selection and the preceding D selection.

Canonically, we might have expected the licenser to be the head of the complement of the binder, with (52) bracketed as in (64a), with the combinator of each merge being **I**. The configuration for simple checking between a DNP and its licenser demands rather the bracketing in (64b).

(64) a [Subject [T-Fin [Object [Event-binder Verb]]]]

b [**I** [**B** Subject T-Fin] [**B** Object Event-binder] Verb]

c [**I** [**B** [**I** AN CAT] PAST] [**B** [**I** AN MOUSE] EV+] CHASE]

It is now impossible to obtain the illicit discharge of the D selections made by the verb, giving rise to (53), repeated here as (65).

(65) *Object T-Fin Subject Event-binder Verb

The only alternative for scope switch will be that in (66):

(66) [**I** [**B** Obj Ev-binder]$_{X/(X/D/Ev)}$ [**B**^{2} [**B** Subj T-Fin] Verb$_{V/D/T/D/Ev}$]$_{V/T/D/Ev}$]$_{V/T}$

Under this analysis, there appears to be a problem with (67a), which is grammatical. The subject and the T-fin heads are not adjacent.

(67) a John PAST ate shellfish yesterday and PRES is sick today

b #Not many of his friends did badly at school but earn pots of money now

However, we find (67b) can only be construed as involving a quotation "did badly at school but earn pots of money now". We take it, then, that the referential subject *John* in (67a) is elided under identity in the second conjunct, where this option is not available in (67b) (it would give the wrong semantics). Assuming this is correct, the examples are not a problem for the analysis.[29]

3.2.2 'Subject first'

Finally, the generalised PF displacement rule (48) of section 3.1 needs to be augmented to ensure that subjects precede other arguments and medial and low adjuncts. A subject is not necessarily initial in its clause, for example if a high adjunct is merged.

Given the new structures argued for, exemplified in (64b) and (66), the configuration is as in (68), where it is required that the first-merged operand of **B**^{n} is attracted to **B**^{n}.

(68) **B**^{n} [**B** subject T-Fin]$_{(X/T)/(X/D/T)}$ X $_{RelP}$

[29] We note that the relation between licenser and DNP could be reversed, with finite Tense and Ev+ seen as demanding DNPs, rather than licensing them. But then, it is not clear what would rule out subjects in non-finite clauses, since as we have seen, mutual checking is too flexible. Further, this proposal is inimical to our claims relating to resultatives (Ch $), unless some other head above the Ev selection could be used instead for licensing objects. This cannot be Voice, since PASS (passive) falls below Ev.

This will be well formed provided the RelP has D as its innermost selection, and as its second selection, T. This will be the case if the subject selection has not already been discharged. The MSyn feature for attraction of a phrase to $\underline{\mathbf{B}^{\mathbf{n}}}$ will then be as in (69):[30]

(69) $\underline{\mathbf{B}^{\mathbf{n}}}$ has category X / Y / Z where CATGY. Z = (RelP/T)/(RelP/D/T)

→ <CATGY: Z, PF: *u*> ∈ MSyn: $\underline{\mathbf{B}^{\mathbf{n}}}$

With the general displacement rule (48) from section 3.1, there are now two rules, listed in (70).

(70) a $\underline{\mathbf{B}^{\mathbf{n}}}$ has category X/Y/Z, Y ∈ RelP → <CATGY: RelP, PF: *u*> ∈ MSyn: $\underline{\mathbf{X}}$

b $\underline{\mathbf{B}^{\mathbf{n}}}$ has category X/Y/Z, Z = (RelP/T)/(RelP/D/T)

→ < CATGY: Z: PF: *u*> ∈ MSyn: $\underline{\mathbf{X}}$

The second rule here, for subjects, is more specific than the first above. Hence it will come into play if it applies, overruling the general rule.[31]

Lastly, we note that whereas a high subject-orientated adverb merged below the object correctly falls under (70c), this gives incorrect results when one is merged immediately below the subject in those cases where the subject is merged below the object or indirect object. In this latter case, (70d) ensures that the subject precedes other arguments, even if it is merged low, but it will necessarily leave the subject-orientated adverb behind in a low position.. However, a high position is also possible (see section 2.3.2; the position is also possible when the subject has low scope). However, because the high adverbs have category (Rel/D/T)/(Rel/D/T), instead of being merged with the verb or other Rel phrase, they may be composed with the subject+licenser as in (71) (we show only category):

(71) [$\underline{\mathbf{B}}$ (Rel/T)(Rel/D/T) (Rel/D/T)/(Rel/D/T)] → Rel/(Rel/D/T)

subject subject-orientated adverb

Under this arrangement, the whole phrase will be displaced by the rule in (70d) above, giving the high position as required. A similar strategy can allow clausal adverbs to be merged with the subject by $\underline{\mathbf{B}^{\mathbf{2}}}$ as in (72), with again the effect that they will remain adjacent to the subject.

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[30] Note that this formulation applies only when the subject is the first merged operand of the combinator. Thus it does not apply when an adjunct is merged with the subject, as in *On Saturday John, and on Sunday Hamish, visits Lucinda*.

[31] If scope switch is also encoded by type-lifting the verb, as in Cormack 1982a or Hendriks 1993, then these rules need minor variants. The definition of RelP is extended to cover cases where a D selection is replaced by an (X/(X/D) selection. Rule (c) needs a variant also replacing the D selection with an (X/(X/D) selection. Then the rules will have the required effect for English. We hope to avoid this type-lifting (see also Ch. 6).

(72) [**B**^{2} Rel/Rel (Rel/T)(Rel/D/T)] → Rel/(Rel/D/T)

clausal adverb subject

Then no further rules are required to give the right effects.

3.2.3 Licensing selection 3 binders

We turn now to licensing the third argument in a clause. There must be some item responsible for this, since a binding DNP now demands checking with some <LIC: *u*> item. One possibility is that it is the verb itself that bears such a feature, correlating with making a third D selection. Given that we have postulated that a DNP has feature checking for merge with **B**, and that we require for English that the merge of the three arguments can be in any order for scope, this suggestion will lead to an impasse: if the subject and object are merged below the third argument, then the final selection cannot be discharged with **B** as stipulated. It follows that the licence for discharging a category D selection 3 must be an independent head. In many languages, including English, the licensing head is an item with the PF of a preposition (see Pesetsky and Torrego 2004a 513-4 for an argument that a P is similar to T in licensing a noun phrase).

There appear to be two possibilities here. One is to take the relevant <e> selection by the verb to be categorially for P, where the PREP item is an identity operator semantically, operating on a DNP. The other is to take the PREP item as an instance of a separate selection by the verb, as with Tense and Ev items, but with a PREP item being semantically an identity function. It turns out that given the local checking required for licensing, only the second is viable. We will for expository reasons refer to the relevant lexical items as 'PREP1' items.

A verb like *GIVE* has the category and type in (73a), while the vacuous preposition has the properties in (73b), where we give it LF ID$_{to}$ for expository purposes:

(73) a <VERB: *GIVE*>; LF: GIVE; V/D/T/D/Ev/D/P ; <e, <*u*, <e, <ev, <e, <int, t>>>>>>

b <PREP: *TO*>; LF: ID$_{to}$; CATGY: (X/D)/(X/D/P)

c [**B** SHE PRES] WILL [**B** [THE TOYS] EV+] [**B** [SOME CHILD ID$_{to}$]] GIVE

A sentence like *She will give the toys to some child* will have the simplified LF in (73c). The settings in (73b) give rise to licensed DNPs under simple checking with **B**, as for example in (74):

(74) [**B** [SOME CHILD]$_{X/(X/D)}$ [ID$_{to}$]$_{(X/\mathbf{D})/(X/D/P)}$]$_{X/(X/D/P)}$

Here, two phrasal binders are being merged, but neither meets the conditions in (70c). Note however that the binder [SOME CHILD] discharges the D selection marked in bold of

the item with which it is merged. The rule in (75) requires that the binder comes second in the structure, so that the phrase in (74) has the PF '*to some child*', as required.

(75) **X** has category X/Y/Z , Z = RelP/(RelP/D) → <CATGY: Y, PF: *u*> ∈ MSyn: **X**

This will entail that licensing Ev or Tense too would appear before the DNP it licensed. However, these Licensers are not overt in English, so we have no evidence either way.

The reader may be wondering how the very local relation between the PREP1 item and the DNP is compatible with coordinated DNPs, as in (76):.

(76) The teacher spoke [to Alice and Fiona] about their homework

We discuss this example in Chapter $.

Note that the new rule is the generalised version of (9) from section 2.2, repeated here as (77).

(77) If **I** has category X/Y/Z, and Z = (V/D)/(V/D/D),

then **I** has an MSyn feature set <<CATGY: V/D/D>, <PF: *u*>>

The original displacement rule was formulated for displacement across the object in a simple transitive clause, without Licensing elements, and can no longer apply in those cases. But it serves the purpose here, suggesting that it may have been retained (rather than discarded by the child when no longer in use for its original purpose), and generalised.

These complex binders, discharging both a D selection and a Licence selection work just like the simple binders we used in the earlier sections, so far as the displacement of verbs and verb phrases is concerned. Thus if this phrase is merged with the verb GIVE, as in (78), the verb will be displaced to the initial combinator **I** under the generalisation for phrasal displacement in (70b) above.

(78) [**I** [**B** [SOME CHILD]$_{X/(X/D)}$ [ID$_{to}$]$_{(X/D)/(X/D/P)}$]$_{X/(X/D/P)}$ GIVE$_{V/D/T/D/Ev/D/P}$]$_{V/D/T/D/Ev}$

But we have not yet ensured that the preposition has the PF *to*, rather than the default *of*. The verb GIVE in *He gave a book **to** the child* contrasts with the fixed preposition required by related but distinct DIVIDE1 and DIVIDE2 in *He divided the cake **into** six pieces*, or in *He divided the cake **among/between** the children,*[32] or SHARE1 and SHARE2 in *He shared the cake **with**/**between** the children*. This requires mutual checking between the verb and the preposition, so that all PREP1 items must have an associated verb (or other head) feature.

[32] We assume here the strict dialect where the PF of the preposition is conditioned by the Number feature on its associated DNP.

Note that although it is convenient for mnemonic purposes to use 'PREP1', it is not necessary to distinguish these semantic identity prepositions by goal category or word class from regular relational prepositions. If a regular transitive preposition were used to discharge the P selection, there would be no way of discharging the third D selection of the verb. Conversely, an identity item cannot be inserted unless called for, for pragmatic reasons. We therefore give both classes the same word-name PREP and goal category P. The lexical entry for one of these items includes the information in (79).

(79) a lexeme α, CMSyn: <PREP: *β*>, LF: ID, CATGY: (X/D)/(X/D/P)
→ <PREP: *β*> ⊂ <LIC: *u*>

b lexeme α, CMSyn <PREP: *β*>, LF: ID, CATGY: (X/D)/(X/D/P)
→ <PREP: *β*, REL: *u*> ∈ MSyn.α

A relational head making a D selection whose discharge is licensed by such a preposition includes the information in (80). A relational head like VERB: *PUT* of category V/T/D/D/Ev/P however would not have the <PREP: *u*, REL: *u*> diploid among its MSyn features, since it involves a predicate PP.

(80) lexeme: α, CMSyn <REL: *γ*>, CATGY: RelP/D/P,
→ <PREP: *β*, REL: *γ*> ∈ MSyn.α for some β

These parameters ensure that a head making a third <e> selection designates a particular preposition, so that the preposition will have the required PF.

The parameter specified in (80) does not need to specify that the D selection of the relational head which is to be licensed by P is the third selection in the lexical entry; this licenser will always be utilised first because it is available immediately. It could be the second selection, in a transitive, with the Ev head not contributing a licenser.

There are a few verbs whose PF form occurs both with and without a PREP1 item, with distinct LF interpretations (see Neeleman 1997 for useful discussion). One such example is *believe*.

The situation with argument PPs which are locative, such as with *PUT* in (81) is different, since the PREP1 item contributes its regular transitive PREP2 meaning.

(81) Gerald put the presents into the wardrobe / under the sink / behind the door

If the PREP is a transitive relational head, then the LIC for its internal DNP argument may be provided by the Ev binder in the PP (see below), assuming this binds its selection 2.

The PREP1 items mentioned so far are all also regular transitive PREP items, but the two classes are by no means coextensive. In particular, for double object structures, for instance, a phonologically null PREP1 item may be invoked (Ch 2).

Nothing would prevent some language using P-licensing for all the arguments of a verb, though this simpliciter would eliminate the association of subjects with finiteness. We also note that although a PREP1 item licenses a binding DET, its position makes it suited to being realised as a clitic attached to the whole DNP. This could be specified by countermanding or omitting the rule in (75), and specifying the clitic-hood of the PREP1 items appropriately. This may well be the correct treatment of English *"'s"*, which attaches to a DNP. This morphology appears to be an alternant to other default PREP1 items, attaching to whichever argument of a nominal is merged last.

We have structured the discussion above in terms of the arguments of a relational head which is a verb. But of course other relational heads make D selections. A prepositional phrase like *under the sofa* has a prepositional head of category P/D/D. Here, selection 2 will be licensed by an Ev item, just as for a verb. No prepositional head seems to be syntactically ditransitive, though some, such as *AFLOAT*, are monotransitive (Chapter 2, § 6.1), while BETWEEN is in some sense a three place relation in LoT. Selection 1 cannot be discharged by Tense, so it can be discharged only in association with some selection of a verb — under Raising or Control (Chapter 5), or (covert) asymmetric conjunction (Chapter 6). In contrast, relational heads with goal category A or N never have an overt internal argument discharged without a preposition, suggesting that they are necessarily unaccusative. In chapter 5, we argue that they are in fact nil1 items at least in English.

There are now four lexical rules required for PF-displacement in English, three from (70) of section 3.2.2, and (75). In addition, there are lexical rules connected with the items whose word-names unify with LIC. These include the specifications in (79) and (80) above, and (56) and (60) of section 3.2.1.

3.3 Some simple morphological case marking

Morphological case marking may be parasitic on syntactic Case marking, and provides evidence for the Licensing system. We see the MSyn features as licensing syntactic Case on the DNP via Agree, even in the absence of any morphological case within the DNP.[33] Here, we briefly consider some morphological correlates of the Licenser.[34] Suitable features may have the property of inducing overt PF reflexes of syntactic Case via the MS→PF mapping, presumably as a further aid to parsing. The PF reflex is typically nominative morphological case (for Tense licensing) or Accusative (for Ev licensing) appearing somewhere on the DNP binder. Morphological case for determiners bearing other CASE features is more varied in many languages, often depending on the specific

[33] Our proposals here owe much to Pesetsky & Torrego 2001, 2004, 2007, 2011.

[34] In many languages, such as German and Icelandic, overt morphological case can be induced as 'quirky case' by idiosyncratic verbs, arguably overruling the syntactic Case on the DNP at PF (see for instance Woolford 2003).

relational lexeme. Since the word-name for the case licenser may appear in the specification, defaults and exceptions can be readily set up.

Consider a language where nouns bear case-marking. Where case-marking correlates with the Licensing of the related DNP, it is straightforward to set up a feature on the required items or classes of item. A simple feature <LIC: *u*> introduced as in (82) will percolate upwards to unify with that on the mother DNP. This, as noted in section 3.2.1 will bear the relevant <LIC: α> feature. Then the addition of the valued LIC value to other number, person and gender features will be sufficient to enable the PF of the noun to be obtained via the MF→ PF mapping rules such as that in (83).

(82) lexeme: α, <NOUN: *β*> ∈ MSyn.α → <LIC: *u*> ∈ MSyn.α

(83) MS→PF.MSyn: { NOUN: *u*, PERSON: *u*, NUM: *u*, GEN: *u*, LIC: *u*} = δ

Obtaining a case feature for the noun in a predicate NP by simple percolation would always result in the feature being unified with that on the nearest c-commanding binding DNP (at LF). This will be correct in many languages, for predicate noun phrases in depictives or resultatives, or as complements of BE and SEEM.

If the tensed verb agrees in phi-features with a noun within a DNP it selects for, the information may be transmitted using diploid features involving the LIC head. This keeps the contributions from the different arguments separate, but avoids taking agreement features to be part of the category as in Steedman and Baldridge 2011: 10. We illustrate with phi-feature agreement relating to TENSE licensing, postulating that a finite verb has the additional agreement feature shown in (84a). Here, what is required for English is the NUM value associated with a DNP which is the subject, i.e. licensed by TENSE. A NOUN has the feature shown in (84b). For the latter, the NUM feature could instead be assigned to a separate Num head in the DNP.

(84) a lexeme: α , <VERB: β>:

<VERB: β, AUX: TENSE> ∈ MSyn.α → <LIC: *TENSE*, NUM: *u*> ∈ MSyn.α

b lexeme: δ, <NOUN: γ> → <LIC: *u*, NUM: η> ∈ MSyn.δ

c lexeme: ε, <LIC: φ> → <LIC: φ, NUM: *u*> ∈ MSyn.ε

It is essential that the NUM-seeking feature on the VERB not unify directly with the feature on the NOUN. The latter must first check the LIC value of its containing DNP, via a feature stipulated on a LIC head, as in (84c). Now, because (84 b,c) are conversely underdetermined diploid features, they will necessarily percolate and unify at the first node dominating both (Chapter 3, section 4.2.2); this will be the node shown above the DNP and its Licenser in the diagrams in section 3.2.1. It will not percolate further. However, since a DNP has scope over the relational head whose selection it discharges, this node is high enough that the percolating feature from the VERB will eventually be

sister to it, and hence after unification, the NUM feature of the NOUN heading the subject will appear in the MSyn of the VERB, as required. [35]

If even nouns whose DNP is not licensed by Tense will bear the feature in (84b), it follows that every finite VERB will have to have a NUM-agreement feature similar to that in (84a) for each of the License features, whether agreement with internal arguments contributes to its PF or not. This can be avoided if the generalisation over the lexicon giving the features on a noun in (84b) is restricted as in (85):

(85) For lexeme: δ,

$$\{\langle \text{NOUN}: \gamma\rangle, \langle \text{LIC}: \text{TENSE}\rangle\} \subset \text{MSyn } \delta \quad \rightarrow \quad \langle \text{LIC}: u, \text{NUM}: \eta\rangle \in \text{MSyn}.\delta$$

The feature in (85) will be added 'on line', as soon as the LIC feature on the NOUN is determined.

We hope that these simple illustrations are sufficient to indicate how morphological feature information may be transmitted around the tree as required.

3.4 Displacement in the DP: inverse linking

There is an interesting puzzle about scope order inside a DNP. Consider (86), example (8) from May and Bale 2005. [36]

(86) At most two senators on every committee voted to abolish it

How does *every committee* have scope not only high enough to outscope *two*, but to bind the pronoun *it*?

We begin with the simpler (87).

(87) [Two portraits of three people] were sold

This is ambiguous. Either (i) there were some pictures which portrayed three people, of which two were sold; or (ii) there were three people such that two portraits of each were sold. Neither of these readings entails the other. Analogous ambiguity arises in (88 a, b, c), with the surface scope and natural constituency being absurd in each instance (e.g. for (c), the bracketing [*all the* [*chairs at every table*]] entails that a chair in the relevant context can be in more than one place at some moment):

(88) a [Two saucers from each tea-set] are chipped

b [The sharp edge of each tool] should be wiped with an oily rag

[35] An appeal to something like the notion 'Head' of the 'Head Feature Principle' of GPSG and HPSG (e.g. Sag and Wasow 1999 §3.4) is not needed here, because of the intervention effects induced by diploid unification.

[36] For discussion of earlier theories and problems, also see May and Bale (2005).

c [All the chairs at every table] must be dusted each morning.

The LF for the surface scope order for each is constructed in much the same way. The PP is either an argument of, or a post nominal modifier of, the preceding noun, and forms an NP with it as in (89a), for (86). The initial determiner (TWO) will then necessarily take scope over this complex, whatever its inner structure. We discuss the subject noun phrase in (86), showing first in (89b) the LF order where PORTRAIT and its complement are merged before TWO, so that TWO scopes over THREE.

(89) a [Two portraits of three people] were sold

b [**I** [TWO $_{X/(X/D)/(N/D)}$] [**I** [**B** [THREE PEOPLE] ID$_{of}$] PORTRAITS]]$_{N/D}$]]$_{X/(X/D)}$

The PREP$_1$ *of* is an identity operator, as discussed in section 3.2. In (89b), the quantifier phrase THREE PEOPLE binds the third D selection of the relational head PORTRAIT, which properly has the relational category N/D/T/D/Ev/D/P. This will be unaccusative, but to simplify, we pretend that the selection is N/D/P/D (see Chapter 6 for *np*-trace). The phrase will merge with the head PORTRAIT using **I**, to which *portraits* must move by phrasal displacement, in accordance with the Phrasal Displacement Rule in (70c) of section 3.2.3) above. This gives the correct PF surface order.

For the scope reversed order, it is necessary that the initial quantifier not have the inner quantifier in its scope. We therefore propose that the subject in (90a) have the gross LF order in (90b). In (90c), **B**^{2} must be used to merge the quantifier TWO with the transitive PORTRAITS, with the result that it is the innermost selection of PORTRAITS that gets bound by the quantifier TWO (see similarly Büring 2004, Kobele 2010). This leaves the internal argument to be bound by the phrase [*of* THREE PEOPLE], as required. This is shown in (90d). As before, we suppress selection 2 and the licensing Ev binder, together with the Tense selection and binding in an NP.

(90) a [Two portraits of three people] were sold

b [[THREE PEOPLE] [TWO PORTRAITS]]

c [**B**^{2} [TWO $_{X/(X/D)/(N/D)}$] [PORTRAIT $_{(N/D/\mathbf{D}/P)}$] $_{(X/(X/D))\ /\mathbf{D}\ /P}$]

d [**I** [*of* THREE PEOPLE] $_{Y/(Y/\mathbf{D}/\mathbf{P})}$] [TWO PORTRAITS]$_{(X/(X/D))/\mathbf{D}/\mathbf{P})}$] $_{X/(X/D)}$]

Note that in (90d), the DNP THREE PEOPLE is binding two selections (marked by the bold **D** and **P**) which are internal argument selections of a relational head, PORTRAITS. The LF in (90) has the right semantics, but incorrect PF order. The PF of the phrase [TWO PORTRAITS] must be attracted to **I**.

We note that in this merge, [*of THREE PEOPLE*] is binding two selections of its operand, but its operand is not a RelP. This situation is similar to that for which (75) in section

3.2.3, repeated here as (91), was introduced, except that two selections are bound, as specified in (92).

(91) **X** has category X/Y/Z , Z = RelP/(RelP/D) → <CATGY: Y, PF: *u*> ∈ MSyn: **X**

(92) **X** has category X/Y/Z , Z = RelP/(RelP/D/X) → <CATGY: Y, PF: *u*> ∈ MSyn: **X**

Then according to (92) the phrase *two portraits* will be displaced to $\mathbf{B}^2$ in (90), from where it will subsequently be displaced to **I**.

The specification in (92) will also apply to the scope switched reading in examples like those in (88), such as (88c), repeated here as (93a). The subject noun phrase of the scope switched reading needs to have the LF partially sketched in (93b). The conjunction indicates the modification of the noun CHAIRS by an incomplete post-modifying PP (see Chapter 4, §).

(93) a [All the chairs at every table] must be dusted each morning

b [[**B** [EVERY TABLE] PRES] [ALL [ID$_{THE}$ [∧ CHAIRS [AT]]]]X/(X/D/T)/D]

Here, we assume that the preposition *at* is a Relational head, of type <e, <ev, <e, <int, t>>>> and category P/T/D/Ev/D, and canonic MSyn <PREP: *AT*>. The definite article in *all the chairs* is an identity element at LF, with pragmatic indication of definiteness (see Chapter 2, and Chapter 6 for predicational noun phrases). The same strategy for the scope of the DETs within the subject will allow the binding required in (86) cited above and repeated here as (94) (example (8) from May and Bale 2005).

(94) At most two senators on every committee voted to abolish it

The displacement rule given in (92) has one other slightly surprising application, which we add here. Suppose we want to construct a sentence like that in (95), without appealing to ellipsis (see Steedman 1990). Then the structure must include phrases consisting of a direct and an indirect object. Suppose such a merge is as in (96). Here, 'Y' must instantiate to 'X/**D/Ev**', giving the final category shown.

(95) John gave a book to his wife and scooters to the twins

(96) [**B** [**B** *A BOOK EV*+]$_{X/(X/D/Ev)}$ [**B** *HIS WIFE TO*] $_{Y/(Y/D/P)}$]$_{X/((X/\mathbf{D/Ev})/D/P))}$

Now it can be seen that the structure falls under (92) above, since the selections marked in bold in Y above, and the final category have been discharged. It follows that the two noun phrases will be reversed at PF, with the second being displaced to **B** of the merge. The two phases merged will have to be reversed at LF to give the correct PF for (95). This is a curious result, but we note that in (97), the relevant reading is readily available, despite the surface order not conforming to the LF scope.

(97) John gave a courgette plant to each girl and a tomato plant to each boy

We assume then that this effect is tolerable.

4 Discussion

4.1 Summary

In this chapter, we have demonstrated that MSyn features can be given that induce phrasal displacement, leaving the LF intact. The features are only assigned to an attracting combinator, and are assigned obligatorily to combinators of certain (generalised) categories. In addition to the displacement rules repeated below, we postulated a number of Simple checking features on a DNP or a DET, and on a LIC head, to induce locality. These were necessary to permit merge-induced scope variation of arguments.

The form of the rules proposed has been as in (98), for W = Y or Z, and W′ = Y or Z:

(98) CATGY. **X** = X/Y/Z, CATGY.W = α → <CATGY: W′, PF: *u*> ∈ MSyn.**X**

The categories concerned were always expressed in a general form, involving RelP, a binder, or an underdetermined category. In suitable cases involving RelP, there may in fact be a choice of phrases that can be displaced to the combinator position (as in 'Light predicate Raising' vs. displacement of the verb alone).

The total set of phrasal displacement rules provided from (70) of §3.2.2, and (91) and (92) above is given in (99).

(99) a **X** has category X/Y/Z, Y ∈ RelP
→ <CATGY: RelP, PF: *u*> ∈ MSyn: **X**

b **X** has category X/Y/Z, Z = (RelP/T)/(RelP/D/T)
→ < CATGY: Z: PF: *u*> ∈ MSyn: **X**

c **X** has category X/Y/Z , Z = RelP/(RelP/D) → <CATGY: Y, PF: *u*> ∈ MSyn: **X**

d **X** has category X/Y/Z, Z = RelP/(RelP/D/X) → <CATGY: Y, PF: *u*> ∈ MSyn: **X**

String vacuous displacement of the verb is not required.

It seems likely that phrasal displacement must be to an empty head (i.e. one with no canonic MSyn feature contributing to overt PF). It is not yet clear whether there can be phrasal displacement to heads other than combinators. If displacement to heads other than combinators were permitted, it might be that the head could canonically be associated with PF features surfacing as a clitic, though we have no such examples to hand. We will assume however that only a combinator is a locus of phrasal displacement. A default rule

of the form '**X** has category X/Y/Z → < Z: *u*, PF: *u*> ∈ MSyn: **X**' could be added to give every combinator PF content, but there seems no necessity for this.

Because only the combinator, but not the attracted phrase, bears an MSyn feature relating to this displacement, the feature checking is 'simple', in the terms of Chapter 3, rather than 'mutual'. This is in contrast to our earlier work on 'Split Signs', where we also assigned features to the attractee. Unlike the combinator features, these were not determinate in relation to a particular LF. The current version allows instead optionality with respect to which suitable features on a phrase may be unified with a sister checking feature. Simple checking is constrained with respect to the relative positions of the checker and checkee, a fact which was exploited in the section on scope shifted subjects (involving additionally, features of Licensing heads for DNPs).

It may be noted that the 'A-over-A' principle, banning the displacement of a smaller constituent from within a larger one of the same category (Chomsky 1964:931) seems not to apply.

(100) "A phrase of the category A (A arbitrary) cannot be extracted from another phrase of the same category A" (Chomsky 1986)

The Minimalist version as in (101), from Heck and Müller (2010), does apply if the only features at issue are categorial features:

(101) F-over-F Principle:
In a structure $\alpha_{[*F*]}$... [$\beta_{[F]}$ ... [$\gamma_{[F]}$ ...] ...] ..., movement to [*F*] can only affect the category bearing the [F] feature that is closer to [*F*].

Here, [*F*] represents a 'strong' feature, one which requires that the PF associated with the corresponding [F] phrase is realised at α (see Heck and Müller op cit. for history and discussion). For us, the features involved in phrasal displacement where either a larger or a smaller item may be displaced are both on the same node in the tree. Head movement as in Chapter 3 satisfies (101) too. Under our grammar, both apply simply because of the fact that fully determined features do not percolate, together with the 'Now or Never' constraint forbidding wilful failure to unify features when the features are compatible (Chapter 3, §5).

The distinction we have made between displacement to a head or a combinator raises the further question whether there is some generalisation accounting for which attracting heads induce head movement and which, phrasal displacement.[37] That the answer may very well be negative comes from a contrast between Afrikaans on the one hand and Dutch and other Germanic languages on the other, with respect to pseudo-coordination

[37] See Roberts 2010 for arguments for the integration of head movement and phrasal movement. See also Koopman & Szabolcsi 2000.

with motion and posture verbs as the initial conjunct. In a verb-second structure, Afrikaans permits examples as in (102) (de Vos 2006).

(102) Waarom [loop en eet] Jan piesangs

Why walk and eat Jan bananas *t?*

'Why does Jan walk and eat bananas?' [Quirky verb-second]

Here, in a Verb Second structure, the whole conjunction may be displaced. But in other Germanic languages, according to de Vos, verb-second can only involve a single verbal head. This entails that the head-movement vs. phrasal displacement choice is not tied to the particular inversion head, but rather that there is at least sometimes a parametric choice, between inversion to the head and, we suggest, inversion to the associated combinator, where the latter allows phrasal displacement. However, the phrasal inversion here is limited to very small phrases, as are the comparable displacements mentioned in Chapter 3, footnote 52.

4.2 Some comparisons with current Minimalism

We note that because the checking for phrasal displacement is simple, and the displacement features are required (by stipulation) to be locally identifiable, the search space consists only of the features at the two operands of the displacement head (the combinator) — sister and aunt of the combinator. The final PF position of a displaced phrase must in fact 'nearly c-command' its original LF position, where 'nearly c-command' here means c-commanded directly, or c-commanded by the mother, of the displacement position. This falls out from the rules for the percolation and unification of features plus the stipulated locality. This is in contrast to the Probe-Goal system of Chomsky 2004 which is constrained not by percolation but by a stipulated c-command requirement on the (downward, left to right) search space of the active feature. However, if instead of a combinator position, the displacement position were a standard specifier position, then this would necessarily c-command the required phrases (in both instances, the phrase here has the widest scope). Inasmuch as the combinator positions substitute *inter alia* for the notion 'specifier', the displacements here, though not falling under *wh*-movement, must share features with 'specifier' positions unless the displacement is very local. This suggests that the Probe-Goal system for the phrasal displacements we have been looking at may be isomorphic to the subpart of our proposals where the phrase is just a head. Chomsky 1995, 2001 et seq. proposes that displacement is accomplished by the 'Internal Merge' or 'Remerge' of some constituent already merged in a tree to the root of that tree; this is necessarily to a c-commanding position.

Internal Merge however is usually taken to permit LF displacement effects as well as PF displacement effects. But remerge plays havoc with LF, and in consequence, violates

the ‘no tampering’ condition. The semantics is no longer compositional. We suggest that the ‘remerge’/‘internal merge’ is ultimately more complex than the introduction of MSyn features for all displacement.

Additionally, it is not obvious to us whether appropriate language-specific constraints for the displacements discussed above could be supplied via ‘Edge Features’ — unless we consider the combinator features we have proposed to be Edge features themselves.

We suggest that the post-LF displacement account is simpler, preserving as it does a sharp separation between the universal LoT base, the corresponding NL categories, and the surface vagaries of different natural languages. It also puts both head movement and phrasal displacement under the same broad heading of MSyn induced displacement, as seems necessary for the alternations discussed at the end of §4.1 above.

4.3 Parametric choices

We have put forward five rules for phrasal displacement in English. These rules might not apply in some other language, or might be weakened or strengthened; additional rules might be added, all within the framework proposed, based on the configuration resulting from the merge of a combinator with its two operands.

Prior to the setting up of the rules was the argument that the clause-internal functional heads of English did not have their own goal category, which immediately excludes comparable rules that refer to displacement of functional heads. There seems to be no good reason why this should apply to all languages, unless we assume that the child begins without functional heads, and is conservative about the rule format.

More questions arise in considering other languages. We cannot attempt to ascertain whether the options available are capable of accounting for each and every NL. Nor do we intend to explore the effects of giving the combinators associated with non-relational heads similar features. However, we hope we have shown that the effect of the possible settings can be readily seen from the surface order, if the parameters are first determined from sentences with fewer relevant arguments and adjuncts.

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