Mirror theory: syntactic representation in perfect syntax

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Abstract:

In the better developed sciences it is the departures from symmetry rather than the symmetries that are typically taken to be in need of explanation. Mirror theory is an attempt to look at some of the central properties of syntactic representations in this spirit.

The core hypothesis of this theory is that in syntactic representations complementation expresses morphological structure: x is the complement of y only if y-x form a morphological unit, --a word. The second central assumption is the elimination of phrasal projection: a head x in a syntactic tree should be taken to ambiguously represent both the zero level head(s) and its associated phrasal node(s).

Keywords:

c-command, constituent structure, dependency, head chain, mirror principle, projection, spec-head relation

1. Introduction

It has been known since Mark Baker's work in the 80's that there is a pervasive symmetry between aspects of morphological and syntactic structures.* Baker and others attempted to explain this symmetry in terms of conspiracies of other syntactic principles. I shall argue below that these explanations are not successful. But even on general grounds, it seems to me that a different approach is needed. In the better developed sciences it is the departures from symmetry rather than the symmetries that are typically taken to be in need of explanation. The approach to be presented below, mirror theory, is an attempt to look at some of the central properties of syntactic representations in this spirit.FN1

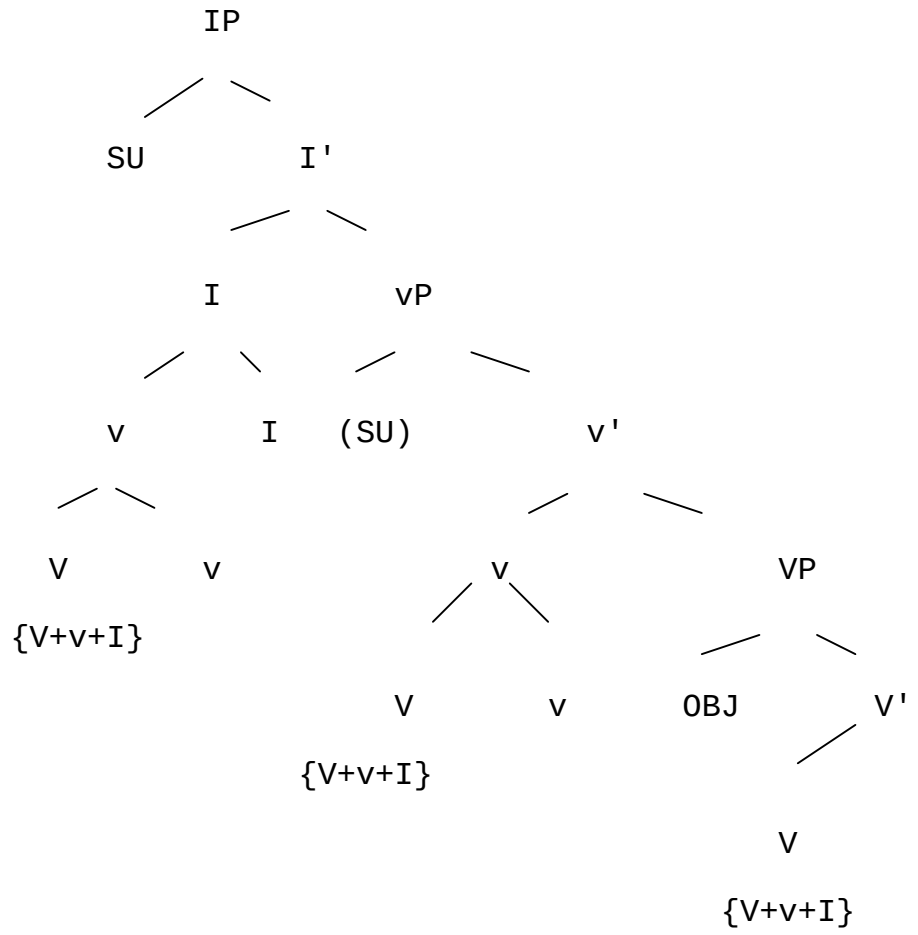
The core hypothesis of this theory is that in syntactic representations complementation expresses morphological structure: x is the complement of y only if y-x form a morphological unit, --a word. Call this the mirror hypothesis, or just Mirror for short.

The second central assumption is Telescope. As in Brody 1998a I refer to the set of nodes that are usually considered to be the projections of some head x (x^{min}), x's projection line (PL). The PL is usually taken to include a set of zero level and a set of phrasal nodes. Kayne 1995 argued that a head has only a single zero level projection and Brody 1998a that it has only a single phrasal projection. According to Telescope however, none

of these projections exist. A head x in a syntactic tree should be taken to ambiguously represent both the x^{min} and zero level head and the phrasal node of the PL.

Mirror reduces the basic structure of the sentence in (1), where {V+v+Infl} under V indicates the checking theory assumption that words enter syntax as preassembled units, to (2):

(1)



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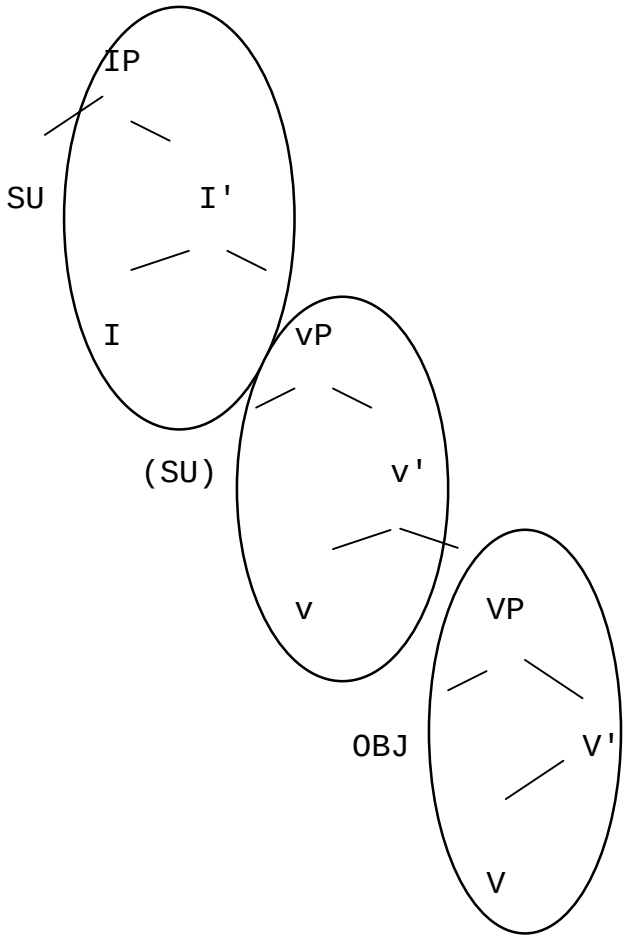
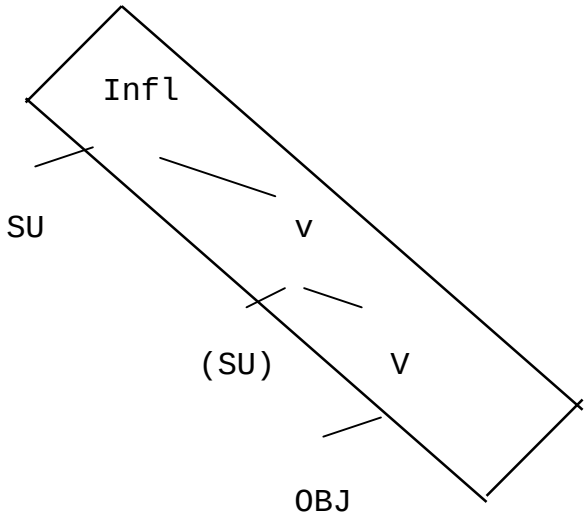


The three circled set of nodes (series of PLs, each except the first the complement of the next) are taken to express the morphological V+v+Infl unit that head chains are ususally taken to create. Just like the standard approach, we can assume that this unit is spelt out in the highest "strong" position involved, --say in Infl in French but in v in English.

Once Mirror is adopted there appears to be no reason to retain the (X^{min}-)X^{0}-XP distinction(s). In the context of multiple functional heads and shell structures the main remaining justification of these distinctions is that they make head chains possible. Given Mirror, this is now unnecessary.(2) is then

further reduced to (3), where the structure of the word "V-v-Infl" is syntactically expressed directly by the (inverse order of the boxed) complementation line. The morphological unit (V-v-Inf), which I shall call a morphological word (MW), is then not interrupted by irrelevant phrasal nodes:

(3)



Thus while Telescope is in principle independent from Mirror, assuming the latter leads directly and naturally to adopting also the former. The converse also holds: in the context of Telescope the most immediate way to solve the question of how head-chain type relations are to be expressed is the adoption of Mirror.

In mirror theory the only primitive relation between elements in syntax and morphology will be the spec ->head relation, where spec (and its constituents) are ordered to precede the head. Mirror licenses the syntactic head-complement relation as a (geometrically mirrored) morphological spec-head relation. Thus the head-complement relation is just a reverse order (morphological) spec-head relation. This gives also spec-

head-complement order.

MWs consist of elements (heads) in morphological spec-head relations and all syntactic head-complement relations correspond to(are identical with) such morphological spec-head relations. Furthermore members of MWs (heads) can form spec-head relations with other MWs. Eg. in (3) Su (which abbreviates a set of MWs) is the spec of Infl, and Infl is a head, a member of the MW: V-v-Infl. Finally an MW is then spelt out (in the morphological spec-head order) in the position of the highest strong head (or, lacking a strong head, in the lowest position).

In this paper I shall first enumerate some problems with the standard explanation of the mirror principle based on head movement and the head movement constraint (HMC) in section 2. Section 3 presents mirror theory, in which there is no syntactic distinction between words and phrases and where Mirror provides explanations and is not taken to be in need of one. This section concludes with a list of advantages of the mirror theory view. Due primarily to its restrictiveness (there is only a single primitive configurational relation), the theory explains generalizations ranging from locality of head chains to various additional properties of "phrase"-structures having to do (in standard terms) with phrasal projections.

In the version of mirror theory to be defended here, complementation is restricted to mirrored MWs. If X and its argument Y do not form an MW then Y cannot be the complement of

X, hence Y must be a spec of X or the spec of some element of (a decomposed) X. Section 4 discusses some (apparently inferior) alternatives to this version of the theory and some consequences and advantages of this view.

Section 5 presents an additional advantage of mirror theory. This theory makes it possible to eliminate c-command as a term of the grammar by systematically factoring it into its two constituent relations: the spec-head relation and domination (in fact also an extended spec-head relation in the proposed system). Some independent evidence is presented for this approach. I shall also show here that mirror theory entails the main effects of Kayne's LCA: the structures that would violate this principle cannot arise. Section 6 contains a short summary.

2.The standard explanation of the mirror principle

2.1. The mirror principle, locality and 'no excorporation'

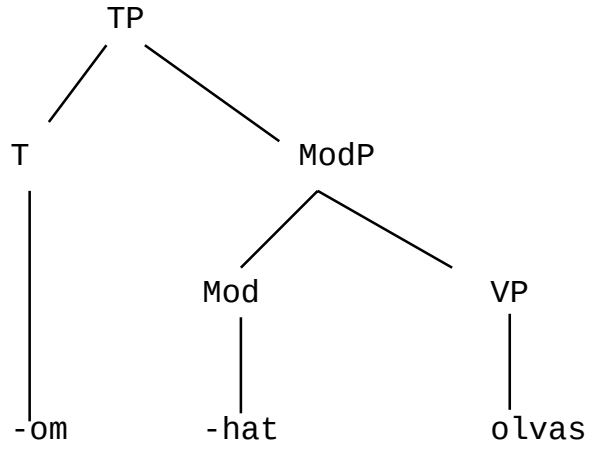
Cinque 1997 develops a strong empirical case for the claim that there is a correspondence in universal grammar between the hierarchy of spec positions that he argues adverbs occupy and the hierarchy of clausal functional projections. In the process, he provides much additional support for the mirror principle. According to one version of this principle, where words syntactically move to a host with which they form a unit, the order of morphological affixes mirrors the syntactic order of the relevant heads. Thus for example the syntactic order of T,

permissive suffix and V mirrors their overt morphological order in Hungarian.

(4) olvas-hat-om

read-permissive -1sg,present

(5)

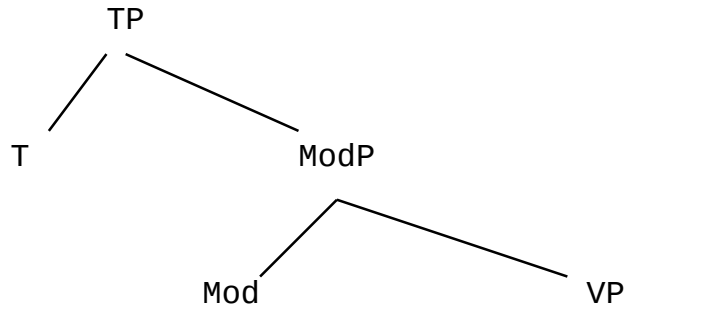


The importance of the mirror principle is enhanced by recent work that argues explicitely or suggests strongly that languages and constructions choose elements and segments from a universal and universally ordered series of functional projections (eg. Starke 1994, Rizzi 1995, Cinque 1997).

The mirror principle is often attributed to the strict locality of head movement/chains (Baker 1988). This involves two assumptions. One of these is that in a head chain the top element of the chain (left-)adjoins to a host that is the nearest c-commanding head, --essentially the head movement constraint, HMC. The other assumption is that excorporation is prohibited, so head chains must be of the 'roll-up' type, where a head x rolls up into y and then the resulting xy unit rolls up into z, and so on. There is no non roll-up successive step head chain.FN2 For

example there cannot be a three membered head chain [x^1, x^2, x^3] where x^1 has a host y, and x^2 has another host z. x can only "move" further together with its host. The partial structure in (5) cannot be completed with a chain as in (6), only with the chain structure in (7). (Phonologically not expressed traces, ie. non top chain members, are in square brackets, top members of nontrivial chains in curly brackets.)

(6)



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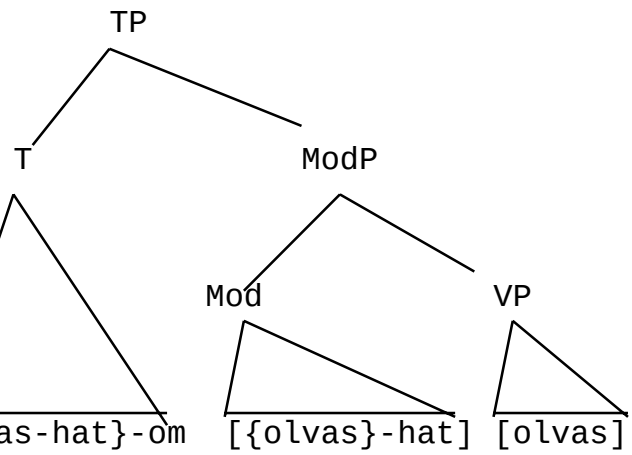


It is easy to see how these assumptions can entail the mirror principle. If successive heads roll up, the last element and each unit so created subsequently moving to the left of the immediately higher one (ie. respecting the HMC), the resulting order of the heads will be the exact inverse of original

(syntactic/complement)order.

Various empirical questions have been raised concerning the strict locality requirement of the HMC. For example it has been argued in connection with romance and slavic languages that head chains can sometimes cross more than one head. I will assume here that an analysis in terms of phrasal movement can ultimately be given for such cases.FN3 Koopman 1994 proposes that host heads can excorporate. Again, I will tentatively assume that they cannot. The relevant structures might involve phrasal chains (cf. Koopman and Szabolcsi 1998), with a phrase in spec of the host rather than a word adjoined to the host, in which case no complex head is created from which the head would excorporate. (Another logical possibility is that there is no excorporation because incorporation into the apparently excorporating host in the relevant cases has never taken place: the highest member of the chain of the apparently incorporating element is in fact in a lower position.)

Another issue has to do with the fact that considerations pertaining to head-chains, the HMC and the mirror principle do not seem to exhaust the set of ordering requirements of the spellout component. Prefixes in general, like eg. Romance clitics, and certain types of compounding (eg. French "ouvre-boite", etc.) quite clearly do not fall under these principles, at least not in the same way as suffixes like the ones discussed so far do. It would be incorrect to take the mirror principle to

require that spellout systematically mirrors the syntactic order in all cases. The appropriate domain of application for the mirror principle needs to be defined. The characterization above restricted the principle to apply to just those affixes that form head-chains linking their word-internal and their syntactic, complement internal positions. I will offer a somewhat different characterization in the context of the theory to be developed below.

But even after putting aside the directly empirical issues, questions remain about the HMC based derivation of the mirror principle. First of all in syntax the information that explicates the structure of words is expressed both word-internally (ie. X^0-internally) and by the phrasal order given by the (inverse) structure of complementation. For example given a word consisting of say a V and an Infl morpheme in that order, the associated complementation structure will be constructed from a projection of Infl, IP, and a lower projection of V, VP. It is not obvious that the account of this duplication, based on the conspiracy of the HMC and the no excorporation condition qualifies as a genuine explanation of this pervasive parallelism. Relating the phrasal and the word-internal orders in this way makes the correlation somewhat accidental, and invites the question: why should it be the case that these two in principle unrelated conditions force grammar to express redundantly the same ordering twice, both in terms of the phrasal complementation structure and

morphologically, in terms of word structure. If both the HMC and the no excorporation condition could convincingly be reduced to a simple theory of locality, then this point would become weaker, but still not all of its force will be taken away. (Inverse) phrasal order and morphological order seem to be just two sides of the same coin. The question still remains, if locality is not used here to ensure the correspondence of some order with itself. In other words we might expect that a better account might somehow capture the identity of the two orders, and in this way explain their correspondence by in fact making an explanation unnecessary.

2.2. Checking theory

Further problems arise from checking theory. The explanation of the mirror principle at least in the crude form given above predicts that a complex word composed from a host suffix and a chain-forming guest (with a lower trace) will appear in the syntactic position of the host suffix. Thus in the example (3) "olvas" will surface in TP and not in VP. But as is well known especially since the Emonds-Pollock analysis of the verbal complex in French and English, the phonological position of a word often does not correspond to the syntactic pre-suffix position. For example the verb in English precedes its inflection(s), hence on the account of the mirror principle just outlined, it should form a chain whose top member is the guest of

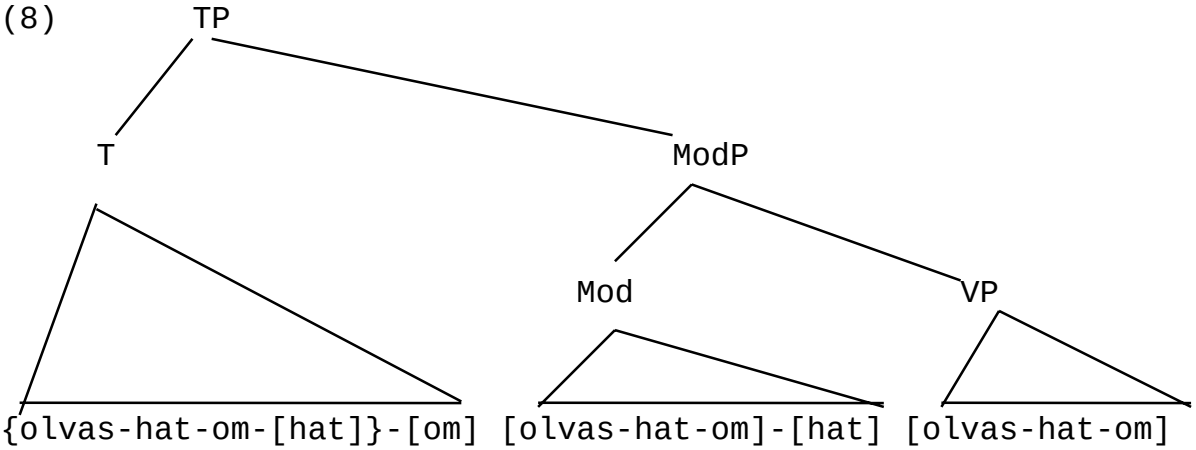
the higher host inflection. Pre-VP adverbs and negation show that the verb in English remains in the VP (cf. eg. Pollock 1989, Chomsky 1995).

The most popular resolution of this problem is checking theory (Chomsky 1995). According to checking theory, the verb will be introduced into the syntactic tree together with inflection, and remains in place in syntax.FN4 The V+Infl unit forms a chain though with the guest-of-inflection position(s)FN5 and through this chain the V+Infl unit can check the specifications of the Infl node(s) ensuring that they are identical to its own. A necessary additional assumption is that a checked duplicate (functional) head deletes at some point in syntax or phonology.

Thus, checking theory introduces yet another duplication of the word structure. The information is now reproduced three times in syntax: in the structure of complements, on the lexical item that is to check functional heads and on the heads that are to be checked. The duplication involved in checking theory can perhaps be defended by reference to checking in other chain types. For example in the case of wh-movement the postulation of such duplications (wh-features on both the host C node and on the wh-phrase) has been characteristic of the standard analysis long before checking theory and can indeed be argued for on independent grounds. (See also Brody 1995b for some independent evidence for this duplication specifically for head chains.)

But checking theory raises at least two apparently serious questions. First of all this theory does not in fact resolve the problem that configurations where the phonological position of a head is lower than the syntactic position of its suffix raise for the locality based explanation of the mirror principle. This is because given the duplication that this theory introduces, we now need an auxiliary assumption to ensure the mirror principle effect. Given the checking approach, the structure of (3) will be along the lines of (8). (Traces and deleted functional heads are in square brackets.)

(8)



Let us think of this structure in derivational terms for a moment. Given checking theory, to get all and only the correct suffix orders it is necessary to stipulate additionally, that checking must proceed in strict order, starting from the innermost suffix on the complex lexical element. The impossible "*olvas-om-hat" could also arise from the same syntactic structure in the above example if the external suffix could be checked when this unit moves to the lower functional head and

then the internal suffix could be checked in the second movement step. Let us put aside the problem that starting from the innermost element is rather unexpected for a quasi-morphological operation (Pollock 1993), and concentrate on the requirement that checking order must respect the order of suffixes. That this requirement is distinct from the question of whether checking starts with the innermost or the outermost suffix is transparent with three or more suffixal elements. But the ordering requirement amounts to a stipulation that is not obviously better than stipulating the mirror principle itself: the mirror principle is also just an ordering statement that refers to suffix order.

The point becomes perhaps even more obvious if we return to the representational framework. The ordering statement in the representational approach cannot refer to earlier and later applications. The statement that the innermost suffix must be checked first will have to be translated as saying that the innermost head must be checked by the lowest head among those that host a member of the chain of the lexical head+suffixes unit. The requirement that checking order respects the order of suffixes becomes the condition that the inverse order of the syntactic heads that host a member of the head+suffixes unit corresponds to the order of suffixes, --in other words the residue of the mirror principle itself with locality for the chain stated separately. FN6 FN7

The second problem with checking theory has to do with the fact that it inherits the duplication problem noted above in section 2.1. Checking theory ensures (in conspiracy with the X'-theory of phrasal projection, the HMC and the 'no excorporation' condition) that word structure and (inverse) phrasal complementation structure match. The order of host suffixes must match (the inverse of) the word-internal order of suffixes. If each suffix projects a phrase and each phrase is projected by a suffix, then this order of host suffixes corresponds to the order of phrasal complements.

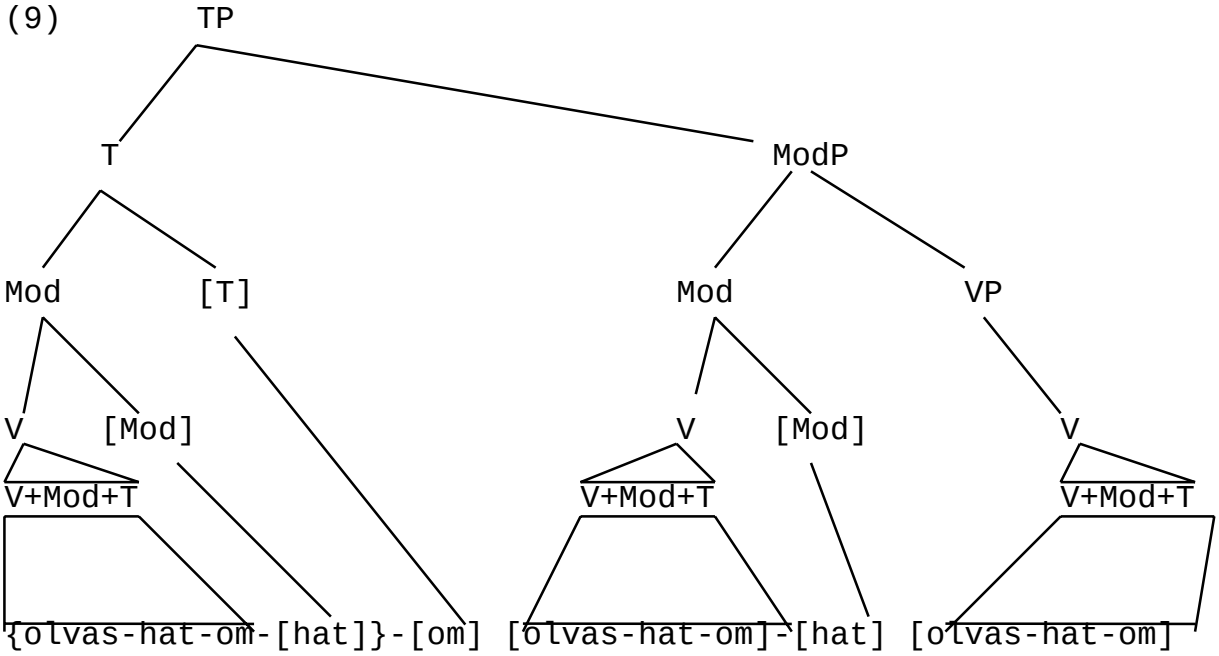
The problem here is reminiscent of the duplication that phrase structure rules created in theories antedating the principles and parameters approach. In these theories the number and type of arguments of a lexical head were specified in the lexicon and also by the appropriate phrase structure rules, which were then required to match. The assumption that phrase structure is projected from lexical properties resolved this duplication by eliminating phrase structure rules. Similarly, we seem to need a theory that makes it possible for the complementation structure and the morphological structure encapsulated in the structure of words not to be generated independently. Notice that this problem is not just that, given the lack of independent evidence for the duplication, it might be better to avoid syntactically representing the ordering information twice, both word internally and by the structure of complementation. There is also a

different (and probably stronger) point here, namely that under checking theory a different set of principles will generate each incarnation of the duplicate information.

2.3. Head chains

An additional difficulty for the head chain based explanation of the mirror principle arises from the fact that the guest and the host head must form a unit. In phrase structure grammars this must be a labelled constituent, necessarily labelled by the host. These assumptions introduce a further systematic set of otherwise unmotivated duplications. A fuller structure of (5) for example, will be (9):

(9)



The checking operation will result in the deletion of the square bracketed functional heads and neither the V head of VP nor the Mod head of ModP surface, since these are traces. We need not

worry about duplications introduced by traces and the checking heads, as we may consider these to be motivated on independent grounds. But there is another duplication in the structure that appears more difficult to defend, namely the repetition of the "V+Mod+T"series in the set of heads dominating this unit in its chain top position in T. This duplication may appear to be a technical issue of little consequence. There is no evidence however for this additional duplication, which, given the triplication of this information that checking theory creates, makes the analysis quadruplicate the features in question. Furthermore, again, the problem is not just that (unlike in the case of trace-copies) presence of the duplicate (quadruplicate) information in the syntactic representation is not independently motivated. The additional and probably more serious issue is that three distinct sets of principles generate the same structure. The duplication created by the series of word-internal dominating nodes appears unavoidable in standard approaches, as it is the consequence of certain basic assumptions which are distinct both from those that determine word-internal morphological order and those that define the complement series/extended projection. These assumptions are that (a) words and chain members are constituent nodes, (b) nodes are labelled and by one of their constituents (c) non chain-tails cannot label (attributed to the GPP in Brody 1994, 1995a, --and also in part in 1998a. See also this latter work for a discussion of the "target projects"

requirement of Chomsky 1995)

There are some additional problems that have to do directly with properties of head chains, and therefore are problems also for the explanation of the mirror principle which crucially involves such chains.

The first of these is that the mirror principle will follow from locality only if excorporation is impossible, but it is not clear why in general it should be impossible. Wh- and NP-"movement" XP chains can be successive in a non roll-up fashion (see FN5 above for a characterization of the notion of "roll-up"). Why should head movement be different? While various technical and partial answers exist,FN8 we appear to have no clear understanding of the reasons for this prohibition that needs to hold for all head chains if the mirror principle is to be attributed to locality, but appears to hold only for head chains.

The second problem here is the one we came across in a different connection in the previous section: assuming that c-command must hold between chain members, head chains necessitate the introduction of a more complicated and more stipulative definition of c-command. In particular it is necessary to allow for c-command "out of" certain types of constituents, namely the constituent created by the host and the top of the chain of the guest head. Kayne (1994) defines c-command in such a way that c-command out of adjunction is allowed, but the evidence for this

modification that does not involve head chains remains inconclusive (cf. Brody 1997c). (It is perhaps suggestive also, that none of the theories, reviewed in Brody 1997c, that attempt to reduce c-command to more basic notions appear to be able to allow for c-command out of adjunction.

The third of these difficulties has to do with the somewhat idiosynchratic nature of locality involved in head movement. A- and A'-chains cannot cross A and A' positions that may be occupied by a potential antecedent, --the relativized minimality generalization of Rizzi (1990). But head chains typically cross a head: namely the host of the chain-top. There are various ways to make XP and X^0 chains more similar here. Rizzi for example appears to assume that the host does not count as an intervener for the chain of the guest because it c-commands the guest: a category is a potential intervener for a chain-link only if it c-commands the lower chain member but not the higher. It is interesting to observe that the solution is incompatible with the adjunction structure of words and the Kaynean definition of c-command: it is crucial in Kayne's theory that neither the lower nor the higher segment of an adjunction host c-command the adjoined element.

Other approaches are imaginable that would make it possible to ignore certain head positions for relativized minimality. For example one could try to define interveners as XP or X^0-internal spec's, where an X^0 internal spec would be a head that did not

project. But I shall instead take the facts at face value, as another difference between head chains and XP-chains.FN9

3.Mirror Theory

3.1. Telescope

I will take the problems listed in the previous to motivate the search for an alternative view of the mirror principle and of head chains. I will now present such a theory below, which expresses the "head chain" relation differently. This theory takes the mirror principle to be a more basic generalization than the HMC and derives from it certain properties having to do with excorporation, c-command and locality, currently attributed to head chains and constraints on them.

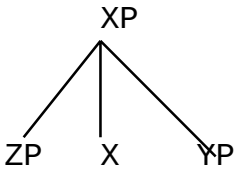
Let us approach this framework by looking first at the distinction between words and phrases in the theory of phrase structure of Brody 1998a. Phrases in this theory were created from lexical items by the rule Project, which forms projection lines, PLs. Some elements on the PL are phrases, other (lower) elements are words (X^0s) the lowest one the lexical item (X^{min}).

I argued that a PL should contain only a single phrasal node, an assumption that lead to the postulation of a tripartite shell structure for spec-head-complement structures. Similarly I adopted the view (Kayne 1994) that there is only a single X^0 node on a PL, eliminating the nonmaximal phrasal and the intermediate (non-highest among the X^0-projections) X^0 levels. Let us now ask

the further more radical question: are the remaining distinctions between XP, X^0 and X^{min} really necessary? In other words, do PLs exist, is the postulation of the PL-structure justified?

Focussing first on the distinction between words and phrases, consider the basic structure in (10).

(10)

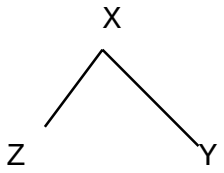


Here X projected a phrase, XP, creating a (partial) PL consisting of an XP immediately dominating X. In the theory of Brody 1998a the principle of 'Insert' licensed the phrase to phrase immediate domination relations between XP and ZP on the one hand and XP and YP on the other. As noted in Brody 1997c, 1998a, spec-head-complement order follows from Kayne's LCA only if the relevant structural asymmetries are stated: spec asymmetrically c-commands the head which asymmetrically c-commands material in the complement. One alternative I discussed was to state spec-head-complement order directly. Let us accordingly assume spec-head-complement order as a primitive (subject to some simplification later), with a view to eventually deriving the major effects of the LCA from the theory. More precisely, the assumption is that spec and its constituents precede, while the complement and its constituents follow the head.FN10

Given this approach to spec-head-complement order, there seems to be no compelling reason to distinguish syntactically XP

and X, in other words to retain the PL of X in (10). A single node can just as well serve as the syntactic representation of both a phrasal category and of its head. Applying the argument also to ZP and YP, (10) reduces to (11):

(11)



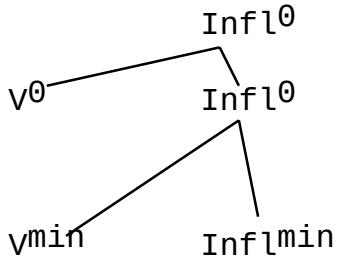
Thus as far as the word-phrase difference is concerned, there is no need for the ultimately somewhat strange operation of Project or its counterparts (i.e. the set forming and labelling effects of merge and move) in the minimalist framework. As far as the word-phrase distinction is concerned, there is no need to create copies of a lexical item and establish immediate domination relation between these copies. I refer to the assumption that a single copy of a lexical item can serve both as a head as a phrase. as Telescope.

Telescope can be viewed as eliminating the apparent conflict between the long tradition of dependency theories, see eg. Hudson (1990) and references cited there, and phrase structure theories of syntactic representations.FN11 Taking X to stand for a phrase, the lines connecting nodes can stand for immediate dominance relations. Taking X as a head, the lines express dependencies.FN12

Consider next the distinction between X^{min} and X^{0}. If X^{min}s are lexical elements, then this distinction captures the

difference between words that are assembled in syntax and those that are put together in the lexicon. Two questions arise: First, does the distinction really exist? It does not if either all words are assembled syntactically or if all of them are put together in the lexicon. Secondly, even if the distinction between X^{min}s and X^{0}s exists, it does not follow that it must be made explicit in syntactic representations. Take V+Infl as a simplified example. Instead of analysing this as in (12) we now attribute to it the simpler structure (13), where X^{0} and X^{min} levels are not distinguished.

(12)



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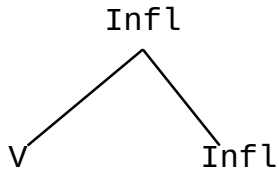


3.2.Mirror

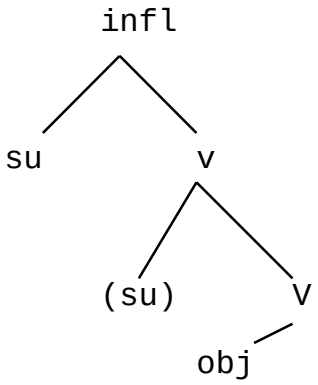
But even without looking at empirical phenomena that might be taken to motivate the X^{0} -X^{min} distinction (like the distinction between inflectional morphology and the incorporation of elements that are members of open classes, a matter to which I will return below) an immediate problem arises. Although neither the word vs phrase nor the lexical item vs word distinction seems necessary

at least in the elementary cases, abolishing both appears to make it difficult to provide a structure for complex words. Given a genuinely minimal analysis of the spec-head-complement structure like (11), there appears to be no place in syntax to express word-internal structure.

But this is not quite true. In fact, the impossibility of expressing word-internal structure in syntax in the traditional X^0-internal format is an advantage, since it eliminates a redundancy. As noted in section 2 above, this syntactic configuration reduplicates morphological information that is reduplicated in syntax also in another way: in the (inverse) order of functional and non-functional projections. Given standard phrase structure trees, phrasal nodes intervene between segments of the word in the representation the inverse order of projections provide, making these relations perhaps less suited to express word-internal structure. But the impoverished theory of (11), presents no such problems. Thus for example the lexical V+v+Infl structure will be expressed in syntax as Infl taking a v and v in turn taking a V complement.

At the same time, each of these nodes can, as usual, have their own specifiers. In (14) for example, these spec's are the subject, its trace and the object:

(14)



Given representations like (14) the fact that two elements x, y are part of a single morphological word (MW) is in general still made explicit in the syntactic structure. Although x and y need not collect under a special type of syntactic node, the X^0, their morphological relation is typically signalled by the fact that one is the complement of the other. (But see also FN13 below.)

Let us ask next what licenses the syntactic complement structure in (14) where V which is the complement of v and v is the complement of Infl. Here the morphological word (MW) consists of a V which is the spec of a v which in turn is the spec of an Infl node. The answer of course has to do with the mirror principle. Suppose that the single primitive relation of the morphological and the syntactic representations is the spec-head relation. In this relation spec precedes the head. The principle I refer to as Mirror ensures that the complement relation is nothing but a topologically mirrored morphological spec-head relation, ie. it is an ordinary spec-head relation in inverse order. Head-complement relations in syntax express morphological

spec-head relations.

As exemplified in (14), additional spec-head relations (here su-Infl, (su)-v and obj-V) can then be licensed in syntax between elements of MWs that have free spec valences (are not morphologically specified as being the spec of anything) and elements of (syntactically mirrored) MWs.

I state Mirror the principle that inverts the morphological spec-head order in (15):

(15) Mirror

the syntactic relation of "x complement of y" is identical

to an inverse order morphological relation "x spec of y"

(Universal) spec-head-complement order does not need to be specifically stipulated: it follows from the primitive spec-head order (spec precedes head) and from the (equally axiomatic) Mirror, which reverses this order in syntax in some of those cases where it exists also morphologically.

So, given Mirror, the morphological and therefore the spellout order of two elements, x,y in the syntactic complement relation (hence co-members of an MW) is the inverse of their syntactic order. There is no need to postulate two symmetrical representations, one syntactic the other morphological. The morphological representation is simply the inverse order mirrored construal of the syntactic complement line. Notice that in (15) Mirror is not stated as a biconditional, it does not require that all MWs be expressed in the mirrored syntactic form.FN13

Consider next the spellout question of mirrored MWs: Which element of the MW represents the spellout position? Here I adopt the standard account. Spellout takes place in the position of the deepest unit of the mirrored MW if none of its other elements has a "strong feature". If some do, then spellout takes place in the highest strong position. Thus both "overt" and "covert" head chains correspond to MWs. In (14) for example take a VP-adverbial like "often" to be in the spec of some head F, between Infl and v (Cinque 1997). V-v-F-Infl is then spellt out in the position of Infl in French and in the position of v in English, preceding and following the adverbial respectively.

In the standard framework the mirror principle follows from the HMC and the prohibition on excorporation only with major and numerous difficulties, as we have seen. In the proposed system Mirror trivially entails the effects of the HMC and the no excorporation requirement. Crossing over an intermediate head by a nonlocal step or via excorporation would correspond to a structure where say a head H with a suffix S is spelt out in the position of S but where the complement structure is S-X-H, ie. where S is separated from the complement that mirrors (syntactically represents) H by another head, X. This is impossible by hypothesis (ie. by Mirror): no such complement structure could have been created, since the complement structure must mirror the morphological structure, --here H+S.

Having eliminated head chains in favour of MWs, the c-

command and locality problems of head chains cease to be problems. In the present theory only chains corresponding to XP-chains in standard frameworks can exist, these link syntactic spec positions. Head chains correspond to MWs, which are not chains, hence they do not need to share properties like c-command and locality with ("phrasal") chains.FN14

The theory has other advantages. Certain questions that arose in the minimalist and earlier phrase structure systems, and which the theory in Brody 1998a made some headway in providing a solution for, simply do not arise, --the optimal situation. Since there is no phrasal projection and no projection lines --or in minimalist terms merge does not create sets distinct from the elements merged, and therefore also does not label any such units-- the issues of uniqueness and locality of projection do not arise.

The extended structure preservation problem also disappears from syntax: there is no syntactic distinction between XPs and X^0s, hence no possibility of one type dominating the other in an illegitimate configuration. (For a discussion of uniqueness and locality of phrasal projections and the extended structure preservation condition cf. Brody 1998a.)

Recall also that when a category is interpreted as a word, all spec-head relations, mirrored (ie. complement) or not, express dependencies. But the categories can also be interpreted as constituents, in which case morphological and syntactic spec-

head links are accordingly understood to express immediate domination or constituency relations. Since head-chains reduce to a spellout issue of the mirrored MWs, all chains remaining in mirror theory target syntactic spec positions and correspond to the phrasal chains of the minimalist framework and its predecessors. Such chain construction is possible, because categories and relations between them can also be interpreted as expressing constituency. In what follows I shall use terms like "VP" to refer to the V node together with its constituents (ie. the nodes it dominates). This use of the term "phrase" should of course not be taken to imply the existence of a V-projection, ie. of a phrasal category distinct from the V head. FN15

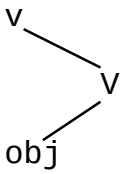
4. Specifiers and complements

4.1.Mirror and MWs

Without any auxiliary assumption, the hypothesis that the syntactic head-complement relation corresponds to a morphological spec-head relation entails that all standard complements that do not form an MW with the element on which they depend must be reanalyzed as syntactic specifiers. This conclusion does not appear to create major problems for arguments of lexical heads, like for example direct objects of verbs. These must now be specifiers not only in their chain top but also in their chain tail position. Some theories of aspect like eg. Borer 1993 allow the assignment of semantic roles in Case-checking spec-positions.

In the context of the generalized projection principle (Brody 1995a) this leads directly to the conclusion that objects must be "base-generated" in their Case-checking spec positions, ie. that they do not have a lower (complement) chain-tail. (Cf.Arad 1996 for a theory of aspect related to Borer's that embraces this conclusion.) If on the other hand objects have a lower "VP-internal" chain tail, that can still be a spec in a structure that would correspond to a multiple layer VP (with a decomposed verb interpretation of the Larsonian shell structure, on this matter cf. Brody 1995a, 1998a and references cited there):

(16)



In (16) Obj is the spec of V and a member (constituent/dependent) of the complement of v, hence it follows v and precedes V. This may be an appropriate structure for a sentential complement for example, if this does not form a Case checking chain. Further decomposition of the verb may be necessary to accomodate additional complements like datives, obliques adverbials etc, but this is no different from the situation in other binary branching theories.

How about those complements of functional categories, that are neither arguments of lexical heads nor appear to form an MW with the selecting head? Take the English complementizer node "comp" and "infl," ignoring their internal composition for

present purposes. It may be possible to say that when the comp node is empty, as in "**comp** Mary **has** left," the element in infl forms an MW (corresponding to a covert head chain) with the comp node that is spelt out in infl. Mirroring this MW makes infl the syntactic complement of comp. However infl and comp can also be spelt out independently as in "**that** Mary **should** leave." In order to treat "should" as the syntactic complement of "that" here, it would be necessary in present terms to postulate an MW that includes both. This would correspond to the standard covert head chain linking these two elements. In principle nothing prevents us in the standard framework from referring to the less restricted notion of covert head chain. But if we allowed such a unit to be spelt out as two nonadjacent, independent and morphologically non-interacting segments this would seem to empty the notion of MW of most of its content.

We are thus led to assume that contrary to the generally held view, infl must be a specifier of comp, rather than its complement. Similarly, assuming that in the above example the main verb "leave" does not form an MW with the auxiliary "should", the verb must be analyzed as a specifier rather than the complement of "should". (Again, for the sake of the example I ignore decomposition of these elements and other potentially intervening heads.) Note that from the point of view of the validity of this conclusion it is immaterial if the auxiliary is a higher verb or if it fills a position in the extended

projection of "leave" (cf. eg. Cinque 1997 for discussion of these possibilities.)

The conclusion that those complements that constitute separate MWs are in fact always specifiers is a very natural one in mirror theory although not strictly speaking forced. But I shall accept it, essentially because it appears to be preferable to the alternatives that would avoid it. Before exploring the consequences of this conclusion further, consider first the following alternative approach, which I shall call the "extended word theory." The complement relation between two functional or a functional and a lexical head have long been assumed to be somehow different in kind from ordinary complement relations, cf. Grimshaw 1991 for a theory that is explicit on this point. It is widely accepted that such projections and their complements form larger units, which Grimshaw referred to as extended projections and which, as noted above, recent research suggests have a universal structure. One could assumeFN16 that it is in fact "extended words" corresponding to extended projections, rather than MWs that complement relations mirror.FN17

4.2.Mirror and extended words

This theory of extended word mirroring could then have two different versions as concerns the status of MWs. One possibility would be to create MWs along the usual lines by creating chains. Given the antisymmetric nature of the structures, this would

regularly involve remnant "movement" chains. Alternatively an extended word could be thought of as an abstract MW, larger than the unit that morphology can submit to phonology/spellout. This larger unit would be related to the pronouncable MW via the same spec-head relation that relates elements of the smaller pronouncable units, --spec-head being the only configurational relation. In this version the (rightmost) element E_n of an MW L_1 (e.g. *–en* of *eaten*) that is not the spec of anything internal to L_1 can become the spec of the (leftmost) element E_1 of another MW L_2 e.g. *have* of *have+s=has*), ie. of the element that has no spec internal to its own MW L_2. If the links that create extended words are taken to be morphological then the whole of the extended word *(eat-en-have-s*) will be mirrored in syntax (*s-have-en-eat*) since each morphological spec-head relation corresponds to a syntactic a head-complement relation.

Both versions of the extended word theory seem dubious. If MWs are assembled via syntactic chain construction, then in addition to Mirror, which would then ensure that extended words are mirrored as complement series, the HMC and the no excorporation condition need to be reintroduced to constrain the structure of MWs. But as we have seen above (cf. the discussion following (15)), these conditions are redundant in the context of Mirror in a theory based on the mirroring of MWs.

The second version of the extended word theory, according to which extended words are abstract morphological units does not

improve matters either. This is because whatever initial plausibility the idea that morphology allows larger units than it can submit to phonology/spellout might have, incorporation phenomena tell us that extended words are not larger than what can phonologically present itself as an MW. N and V incorporation involve MWs that can span several extended words (cf. eg. Baker 1988 or Brody 1997c for examples). Hence on the second version of the extended word theory we would be left without any principled reasons for why extended words do not necessarily form phonologically observable MWs.

This argument against the second version of the extended word theory might be taken to be weakened by the fact that the present framework in principle provides the usual two major options for the treatment of open class incorporation structures, which can be assimilated either to syntactic chains (that correspond to XP-chains in standard theories) or to MWs (which occupy the place of head-chains). If open class incorporation involves chains, then the incorporated element will be in a syntactic spec position. If incorporation involves MWs then a unit consisting of an incorporated element and its host will normally involve two "extended words".

Consider then version 2b of the extended word theory in which extended words are created nonsyntactically and mirrored as before, and thus inflectional morphology is treated in terms of MWs but open class incorporation is analyzed differently, as

involving syntactic chains and thus syntactic spec positions. This theory is also unlikely to be correct, however. Recall that head chain type relations like inflection and incorporation obey a stricter locality requirement than XP-chains. (See Brody 1997c for additional evidence in the context of mirror theory.) Lacking the successive step option, an antecedent in the former relation must surface in a position that is strictly local to its trace. This property is shared by inflectional morphology and open class incorporation, but not by other (XP-) chains. If inflection but not open class incorporation is treated in terms of MWs, their similar strict locality behavior would not be captured. On the other hand if both phenomena are expressed in terms of MWs, then their strict locality will immediately follow in the present theory from Mirror.FN18

Given the foregoing considerations, I shall conclude that the mirror theory should hold in its strong form: a category C can be the syntactic complement of another, C', only if C is the morphological specifier of C’, ie. C and C' form an MW. (Cf. FN13 above on the question of whether the relation between MWs and complementation can be strengthened further to a biconditional.)

4.3.Mirror and spec's

The relation between the syntactic spec and the head is biunique. Hence if the category C that would standardly be treated as the complement is analyzed as the spec of C' (where C' is a

functional category or a (decomposed) lexical category (segment)), C' cannot have another syntactic spec. An element that standardly would have been taken as its spec will now have to occupy the spec position of some higher (functional or lexical category segment) head. This, perhaps radical, conclusion is corroborated by increasing amount of independent evidence.

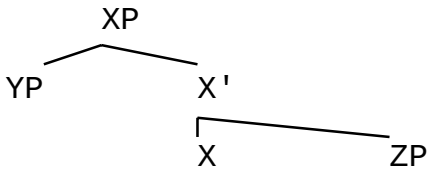
Cinque (1997) argues that there exists an Agr-type "DP-related" head that dominates each functional element. (Cf. also Kayne's (1998a,b,c) W nodes.) There is also evidence (Koizumi 1993, Bobaljik 1995) for an AgrO position lower than the small v head associated with the base position of the subject and similarly for AgrIO lower than the theta position of the object. Thus there are independent reasons to make the assumption, essentially forced by the restrictive nature of mirror theory, that lexical and functional heads are alike in being at least potentially dominated by an Agr-type (whatever that exactly means) head. This head can host specifiers standardly associated with the functional or lexical head that the Agr-type element immediately dominates.

Note that the fact that a head C' cannot have a second syntactic spec does not entail that all categories that are standardly treated as specifiers, ie. sisters of some intermediate projection level will now necessarily be specifiers of an Agr-type node. All that follows from mirror theory is that if a category C' had standard spec and complement C'' and C

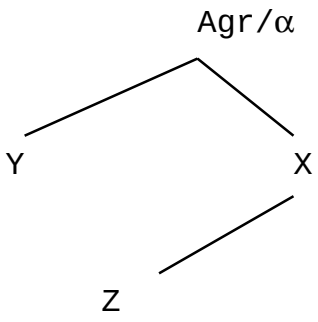
respectively, and under mirror theory C is now the syntactic spec of C' (in the case where C and C'' do not form an MW, so C cannot be the complement of C') C'' cannot also be the spec of C'. But it may not only be the spec of the Agr-type head associated with C', but also the spec of some other higher head. One such case may be instantiated by subjects in VPs if these are indeed in the spec position of a small v head dominating V.

Thus the standard phrasal structure in (17) will generally correspond to the structure in (18) under mirror theory.

(17)



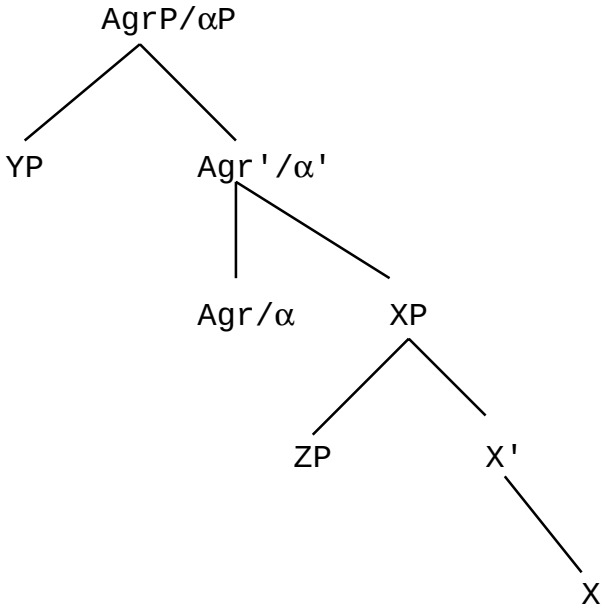
(18)



Agr/α and X must form an MW here, which on the assumption that Agr/α is strong will be spelt out in Agr/α, giving spec-head-comp order.FN19 Even though not strictly speaking incorrect, it is somewhat misleading to relate (17) to (18). (18) does indeed express the spec-head-complement structure that has been expressed standardly as (17), but (18) expresses the claim that the spec and the complement are spec's of two related but distinct heads. Thus it in fact corresponds more closely to a

structure that in standard terms would look like (19):

(19)



4.4. 'Wiggly' extended words

Let us return finally to the concept of extended projections. Recall that these correspond to extended words in the present theory, which eliminates phrasal projection altogether. In mirror theory a category can be a complement only if it forms an MW with the element it is the complement of. Extended words cannot generally be thought of as a series of heads, each the complement of the next. It will remain true, however, that extended words must correspond to a series of heads where each dominates the next (each depends on the previous one), but the dominance/dependency relation can now involve not only a morphological spec-head relation that corresponds syntactically to a head-complement link but also a syntactic spec-head relation. Extended words can be wiggly.

This has an immediate advantage in the analysis of those structures that under Kayne's antisymmetry hypothesis have to be treated in terms of a phrasal "roll-up" chain structure. For example Kayne (in derivational terminology) suggested (20) as one possible structure for sequences of inflectional morphemes in head-final type languages. (The other alternative is leftward head-raising with complements shifted across the spellout position of the head+suffixes unit, a configuration that in terms of mirror theory is analyzable as an MW, --cf. Brody 1997c for more detail and analyses of related constructions.)

(20) ...[$_{XP}$ [$_{YP}$ ZP Y (ZP)] X (YP)] U (XP)

In (20) the complement of Y, ZP, is shifted to Y's spec position and YP, a complement of X, is rolled up as a whole into the spec position of X. Similarly XP, U's complement, which contains all the elements so far described turns up in the spec of U. If Y is a verb and X and U inflectional suffixes, then the verb will follow its complement, ZP, but it will precede the suffixes, with which it will not form a constituent. Cinque (1997) observes that the fact that in Hindi the sentence final sequence of verbs carrying the functional suffixes do not form a constituent is expected under Kayne's suggested analysis of this language. This appears to rule out also the alternative of simple leftward head movement analysis.

Cinque observes further that in Hindi, the order of the V+functional suffix series combinations are the mirror image of

what he argues is the universal order of these elements, exhibited directly by English and Spanish for example. The order (21), which he argues is universal is exemplified in (22a) and (22b):

(21) Tense > Perfect Aspect > Progressive Aspect >Voice >V

(22) a.These books ha**ve** be**en** be**ing read** all year

b.Esos libros h**an** est**ado** si**endo** leid**os** todo el ano

Compare the Hindi examples in (23)

(23)a. Kis-ko raam-ne socaa ki siitaa-ne dekhaa thaa

Who Raam thought that Sita see-ANT be-PAST

'Who did R. think that S.had seen?'

b. Raam rotii khgaataa rahtaa thaa

Raam bread eat PROG be-PAST

'R.used to keep on eating bread'

Cinque's point, that the inverse order of the series of main V+functional suffixes follows directly from the Kaynean roll up structure, may be taken as further evidence for the "phrasal" (ie. non-head constituent) roll-up analysis. Similar non-head roll-up structures have been proposed also for various configurations, like sentence-final adverbial clauses, VP-final stacked adverbials and PPs, etc. in head-initial type languages, --cf. eg. Kayne 1994, Cinque 1997, Barbiers 1995 and Brody 1997c and to appear for more detailed discussion.

As is widely acknowledged, the approach is quite problematic however, since the chain structures it postulates have no

independent motivation. In particular, no systematic set of "triggers" for these movements have been found. In representational terminology: we have no principled account of what licences the non-tail positions of these chains. Secondly, often there appears to be no genuine independent evidence for the presence of the tail positions of these chains in the relevant structures. Finally, it is not clear how it can be ensured that these roll-up structures never involve successive step non roll-up movement, which would destroy the desired predictions (e.g. the inverse order of PROG and PAST in (23b).

In other words (at least in some of the relevant cases) it would be preferable to generate the roll-up structures directly, with the complements starting out in spec positions and eliminating the chains linking spec's and complements. We can then take whatever selectional relation was taken to license the complement to in fact license the same element in the spec position. This eliminates not only the "movement-trigger" problem, but also the successive step chain problem and the problem of lack of direct evidence for the chain-tail in complement position. In order to represent the roll-up structures without the roll-up chains, it is necessary to reject the assumption that each element of an extended projection must be the complement of the previous one. But this is exactly the proposal I arrived at above on independent grounds in the more restrictive framework of mirror theory: that in the series of

elements corresponding to an extended word, where each dominates the next, both morphological spec-head (ie. syntactic head-complement) and syntactic spec-head relations are legitimate. The restrictions of the theory thus again force an apparently empirically justified analysis.FN20

5. C-command and antisymmetry

5.1.C-command

The relation of c-command ceases to be necessary as it applied to head chains: elements of MWs are in a dependency/domination relation with respect to each other. The remaining conditions that involve c-command can also be restated to refer to the simple dependency/domination relation, --the structural "equivalent" of precedence. Suppose that as a consequence of the spec-head relation, an Agr-type node can carry the referential/thematic features of its spec. Principle C can then be taken to prohibit an R-expression from having an antecedent that dominates it (or equivalently, on which it depends). If the syntactic spec of this Agr is taken to pick up the reference of the head, then this spec in turn cannot corefer with the R-expression.FN21

In mirror theory the structural requirement on chain construction might similarly reduce to the simple notion of dependence/domination. In a wh-chain for example the Q head associated with the wh-phrase can be taken to form a chain with

the (wh-feature of the) trace/copy wh-phrase which it dominates. The antecedent wh-phrase will then not be a member of the chain itself, but a constituent (whose highest category is) in a syntactic spec-head relation with the chain.FN22

The central problem of c-command is the strange asymmetric stipulation in the definition of this relation: x c-commands y iff the category **immediately** dominating x dominates, **+/- immediately**, y. This fact is not explained by any of the various approaches that attempt to reduce c-command to more simple notions.FN23 If the approach suggested in the previous paragraph proves feasible, then the conclusion will be that the strange asymmetry was an artefact of coalescing two distinct relations to which in fact different constraints refer: the domination/dependency relation and the syntactic spec-head relation. As indicated, the conclusion is made possible by the mirror theoretical analysis of head chains as MWs.FN24

Some evidence for factoring the notion of c-command into the domination and the spec-head relation is provided by the properties of the non-distinctness requirement that chain-members are subject to. Lower members of a chain may sometimes omit information present in the highest member of an "overt" chain. Thus for example, the "reconstructed" trace/copy position triggers no principle C violation at least in cases like (24) in contrast with (25). This can be accounted for, if –for whatever reason- the R-expression *John* is not present in the lower chain

copy (cf. Lebeaux 1989, Brody 1995a, 1997c, 1999 Safir 1998, Kuno 1998 for discussion and somewhat different analyses).

(24)Which claim that John made do you think he later denied?

(25)?*Which claim that John was asleep do you think he later denied?

On the other hand it has been proposed that "covert" chains involve only a subset of the features of the contentive in the tail of the chain, cf. Brody 1995a, Chomsky 1995. Thus in "covert" chains the lowest element must be the most fully specified one, higher members are feature sets, while in "overt" chains the highest member must carry the full specification and lower members are (potentially) less fully specified categories.

We can make sense of this situation in terms of the assumption that the concept of chain refers to the relation between a constituent and one or more sets of features that dominate this constituent. So in a chain it is always the lowest element that is the most fully specified one. The approach instantiates the idea that "covert" chains only have certain features of the contentive element in their non-tail positions differently both from the theory of Chomsky 1995 and from that in Brody 1995a, 1998a. Cases standardly treated as "overt" chains will involve additional spec-head relations with the feature sets in the chain. Presumably for reasons of recoverability, the highest, normally phonologically overt, specifier constituent must be more fully specified than either the other lower

specifiers of the same chain or the contentive element of the chain itself.FN25

5.2.Antisymmetry

Finally the antisymmetric property of representations is also ensured by mirror theory. While this is intuitively clear, Kayne's LCA, which relates (asymmetric) c-command and precedence could not be adopted here. Given mirror theoretical structures, neither the standard definition of c-command, nor the domination relation that I proposed as an improved alternative, can be straightforwardly mapped to precedence relations between terminals. But under mirror theory there are simply no means provided with which non-antisymmetric structures could be built. Hence no external condition like the LCA is necessary to ensure the antisymmetry effects. As in the case of the structure of crystals, the properties of the basic building blocks determine the limits of variability of the composed larger structures.

More specifically, (given some additional assumptions, cf. Brody 1997c, 1998a) the LCA ensures that specifier and complement are on different sides of the head. This follows here directly from Mirror. A stipulation/axiom to the effect that the specifier precedes the head is necessary in both frameworks (cf. Brody 1997a section 2.3). The LCA entails binary branching: mirror theory does not provide means to violate this restriction. For each head only a single spec-head and a single mirrored

morphological spec-head (ie. complement) are possible as syntactic relations.The LCA ensures that projection lines (PLs) always branch rightwards, in other words that only the complement can be on the right of the head, specifiers and adjuncts must be on the left. It rules out furthermore multiple adjunction to the same element. In the present theory adjunction is eliminated (cf. e.g. Sportiche 1994, Brody 1994, 1998a and Cinque 1997 for arguments), hence the issue of multiple adjunction does not arise. Similarly, given Telescope, PLs are also dispensed with, hence rightward branching reduces to specifier-head-complement order, which, as just noted, mirror theory ensures.

6. Summary

I recapitulate the major general characteristics (I) and advantages (II) of mirror theory:

I.(a) The only primitive relation between elements in syntax and morphology is spec ->head, where the spec (and its constituents) precede the head.

(b) By Mirror, (some or all) morphological spec->head orders can be (geometrically) mirrored in syntax. The head-complement relation is just a reverse order (morphological) spec-head relation.

(c) Members (heads) of MWs can form spec-head relations with other MWs.

(d) An MW is spelt out (by Mirror, in the morphological

spec-head order) in the position of the highest strong head (or, lacking a strong head, in the lowest position).

II.(a) Single primitive configurational relation: spec-head.

(b)Locality and no excorporation properties of head-chain type relations follow. All head -complement links must match (are identical to) a(n inverse) spec-head link in the word stucture: structures corresponding to excorporation or non-local head-chains cannot be created.

(c)C-command problems of head-chains do not arise: MWs involve domination.

(d)Antisymmetry effects guaranteed (no means to violate LCA requirements, hence no need for the LCA).

(e)No categorial projection, hence uniqueness and locality issues of categorial projection (Chomsky 1995, Brody 1998a) do not arise.

(f)No word-phrase difference in syntax, hence no extended structure preservation (Chomsky 1995, Brody 1998a) question.

(g)Single expression of word-structure in syntax (in the case of suffixes the complementation structure). All duplications (listed in section 2 above) eliminated.

(h)Apparent conflict between dependency and constituent structure frameworks resolved.(Structures are interpretable as a dependency diagram or as a constituent structure.)

(i)The theory forces the independently motivated (Larson 1988, Cinque 1997 etc.) presence of additional heads dominating

each head H with a spec and also a complement with which H does not form an MW.(The complement must be the syntactic spec of H, hence the "standard" spec of H must in fact be the spec of a higher head.)

(j)The theory forces a weaker characterization of extended "projections" (ie. extended words), where these must correspond to a set of nodes each dominating the next, but not necessarily in the "complement of" relation. Given the evidence from "phrasal roll-up" structures this is again apparently a correct conclusion, -- reached on principled grounds.

(k) Given the sharing of features between spec and head, c-command may be unnecessary in general, no principle of grammar may need to make use this notion. In mirror theory, where heads dominate their complements, the conditions that refer to the domination and to the spec-head relations, suffice.

Footnotes

*The essential parts of this material formed part of invited presentations from Spring 1997, -- at the universities of Vienna, Tubingen, Budapest, Stuttgart and London, and at conferences and workshops in Jena, Tromso, Budapest (Collegium Budapest), Szeged (JATE), Wassenaar (NIAS) and Potsdam (GLOW workshop). I am grateful to these audiences. I would particularly like to thank Michal Starke and Peter Svenonius for detailed correspondence and helpful conversations. Thanks also to Collegium Budapest where

Brody 1997c, which contains the pre-final version of this paper, was written up during the tenure of my Fellowship.

FN1 Mirror theory is the theory of narrow syntax in perfect syntax, a general framework I cannot discuss here. See Brody 1997c, 1998a,b.

FN2 I argue in Brody 1995a, 1998a that the cycle is an unnecessary construct. Accordingly, I make the terminological adjustment and refer to excorporating "successive cyclic" XP and X^0 movement/chains as successive chains.

FN3 For some discussion see Phillips 1996, especially his note 17 on p.191. and the text to which his note relates. See also Boskovic 1997.

FN4 In Chomsky 1995 chapter 3, where checking theory is introduced, the verb would have remained in place only in overt syntax. In Brody 1995a and later also in chapter 4 of Chomsky 1995 there is no covert deplacement of phonological material and the verb remains in situ throughout. See also Brody 1998a.

FN5 A set of chains in a "roll-up" structure when the analysis is detailed enough to take account of more than one Infl position. As in Brody (to appear) I consider a series of chains to be in a roll-up structure if each chain (except the last) takes the top of the previous chain together with the host of this top member (where this host includes the root of the previous chain) to be the root of the next chain. In the theory to be developed below head roll-ups are treated in terms of MWs

but non head constituent roll-ups remain.

FN6 Given checking theory, the prohibition on excorporation can be translated as the requirement that in each non-root position of a head chain some suffix must be checked. Thus a version of checking theory might allow a successive step (non roll-up) head chain of for example the V+v+Infl unit, linking the V, the word-internal v-spec and the word-internal Infl-spec positions. The chain of V+v+Infl still cannot have a member in an additional (word-internal spec) position between V and v or between v and Infl given the requirement that in each (non-root) position some suffix must be checked. Further auxiliary assumptions would be necessary to make this account compatible with bare checking theory in Brody 1997a,c.

FN7 The comments about checking theory in the text refer to the standard version. One can imagine an improved version that avoids some of the problems raised. For example, given checking theory, the matching requirement on word structure and complementation structure (the first problem in the text) can be eliminated. If complements are generated in a random order, the correct complement order will be forced by the requirement, which as we have seen restates the mirror principle, that checking order must respect the order of suffixes. Such an approach, which also needs to assume additionally the HMC and the no excorporation requirement (or the equivalent in FN6), still would not help with most of the other problems raised. I will therefore

propose a more radical solution below.

FN8 As remarked on above (FN6), under a (non-standard) version of checking theory the excorporation prohibition may be dispensable, but the suggestion there does not explain why there is a difference between X^0 and XP chains in this regard any more than other solutions in the literature. For example Baker (1988) suggested prohibiting word-internal traces. But if separate heads can come together to form a word in syntax, why can they not separate again? Note also that under checking theory excorporation would not result in a word-internal trace anyway.

FN9 See Brody 1997c for some further empirical differences between head chains and XP-chains having to do with reconstruction and ellipsis phenomena.

FN10 As we shall see head-complement order follows under mirror theory from spec-head order. The latter, however must be stipulated. Kayne 1995 has attempted to relate this to the direction of time, --for critical discussion see Brody 1997c.

FN11 For other more recent atttempts to simplify the theory of phrase structure in terms of dependencies cf. Brody 1994 and Manzini 1995. This latter work, like Hudson's and others' in the dependency grammar tradition also dispenses with phrasal nodes, but adopts the assumption of Brody 1994 that all dependencies in the syntactic representation exhibit left-to-right order which I crucially reject here in favour of a principled alternative.

FN12 Hudson 1990 defines a constituent as a category

together with its dependents and assumes that the theory makes no use of this notion as he treats movement/chains in alternative ways. His is thus a conceptually different notion of constituent from the one outlined in the text.

FN13 A phonological distinction between free and bound forms appears to be necessary whether or not Mirror is a biconditional, just like in standard terms it appears to be necessary in addition to head chains and the X^0-XP distinction. If Mirror was not biconditional, then this free vs bound distinction would have to play a role also in determining which syntactic spec's form MWs with an element that is not their complement, --ie. it would have to be a morpho(-phono)logical notion.

To strengthen Mirror to a biconditional we might take apparently non-mirroring compounds like "blackbird" and "ouvreboite" to be created only in phonology/spellout. Another logical possibility is that (some of) these are created in the lexicon and then function in morphosyntax as a single unit, corresponding to a single head position.

Similar problems arise with VP external clitics, which probably reach their higher position via phrasal chains (Sportiche 1992, Cardinaletti and Starke 1994, Roberts 1977, Brody to appear) and may also form only a phonological unit with their host. As an alternative to the phonological account, Brody (to appear) assumes that the top member of the phrasal chain of the clitic can be expressed by an infl domain head of which it is

the specifier. This could capture Kayne's generalization that VP-external clitics occur only in null subject languages. Both null subjects and VP-external clitics (as opposed to weak and strong pronouns in Cardinaletti and Starke's sense) must be the spec of a licensing head. If furthermore the head H that expresses the clitic is lower in the extended word than the morphological host H' of the clitic, ie. H is (in) the complement of H', then H and H' will form an MW.

Further problems for strengthening (15) to a biconditional arise from Kaynean VP-shift type structures, --see FN20.

FN14 But see section 5 below for a different approach to "XP"-chains.

FN15 To avoid confusion, perhaps it would be better to change the terminology and use XF (X-family) instead of XP to refer to X and all categories that depend on X (equivalently: and all categories that X reflexively dominates). I will not adopt this usage here however.

FN16 I made a version of this assumption in an early version of this work (Brody 1997b).

FN17 In the present theory "extended projections" become "extended words" since not even non-extended phrasal projection is taken to exist.

FN18 This explanation is also lost if both inflectional morphology and open class incorporation are assimilated to XP-chains, as is sometimes suggested (e.g. Koopman and Szabolcsi

1998).

FN19 Note the possible analysis of "VP-internal" SOV: same structure , ie. (18) but with weak Agr.

FN20 Kayne 1998a argues that English constructions with an "only"-phrase in focus as e.g. (i) involve the preposing the "only"-phrase to spec-F and the subsequent preposing the (remnant) VP to spec F' (F' is notated as W by Kayne) as in (ii), an analysis he extends to various other related phenomena like negative- and even-phrases etc:

(i) Mary read [only one book]

(ii) Mary [read t] F' [only one book] F t_{VP}

Mirror theory, with its extended words which are allowed to span syntactic spec-head links, provides a natural account of how the VP in the preposed position gets licensed: V is allowed to continue its extended word there. If furthermore F and F' are in some relevant sense the same type of node then c-command of the trace can be ensured by allowing the "only" phrase in spec-F to count as a (derivative) spec-F' (See the discussion of c-command in section 5 below.). Interesting problems remain: in particular (a) how the V+Infl unit is composed and (b) what parameter distinguishes Hungarian (that does not allow this VP-shift) and English. The question in (a) is relevant to determining if the statement of Mirror in (15) can be strengthened to a biconditional. Various approaches suggest themselves that I will not explore here.

FN21 For arguments that the binding theory should be stated in terms of theta roles see Williams 1994. Under the present suggestion implicit arguments could correspond to theta roles represented configurationally as features/properties of heads that have no spec.

FN22 For a different instantiation of the same idea see Brody 1999, where r(estricted)-chains are taken to involve only features of heads and all spec constituents, including the lowest one, associated with these heads are external to the r-chain.

FN23 See Brody 1997c for a critical discussion of the derivational solution by Samuel Epstein (Epstein 1995 and Epstein et al. 1998). Neeleman and van de Koot 1998 conceptualize c-command as due to the dependency of a c-commanded dependent element being expressed by a function that can percolate to any dominating node and is then satisfied by an argument in spec-head relation with it. Their solution thus also merges two apparently distinct relations: the postulated percolation of a function and function satisfaction. My proposal in the text is that the two relations involved in c-command are distinct and therefore they are best kept separate.

FN24 This is because heads in mirror theory dominate and not c-command (categories in) their complement hence only spec's ever need to c-command.

FN25 Kayne 1994 argues that c-command by the spec S of a spec S' of a node N into the complement of N is possible. This is

incompatible with the proposal in the text. In Brody 1997c I provide evidence that such cases are better analysed as involving a chain that links S to a higher spec position S'', where S'' is the spec of a node that dominates N.

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