Mirror Theory: Syntactic Representation in Perfect Syntax

Michael Brody

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. A 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 (their) associated phrasal node(s).

Keywords: c-command, constituent structure, dependency, head chain, mirror generalization, projection, specifier-head relation

1 Introduction

It has been known since Mark Baker's work in the 1980s 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 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 here, mirror theory, is an attempt to look at some of the central properties of syntactic representations in this spirit.[1]

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.

A second central assumption is Telescope. As in Brody 1998b 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 (1994)

[1] Mirror theory is the theory of narrow syntax in Perfect Syntax, a general framework I have discussed elsewhere. See Brody 1997b, and also 1997c, 1998a,b.

argued that a head has only a single zero-level projection, and in Brody 1998b I argued 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 $(V + v + I)$ under V indicates the checking theory assumption that words enter syntax as preassembled units, to (2).

(1)
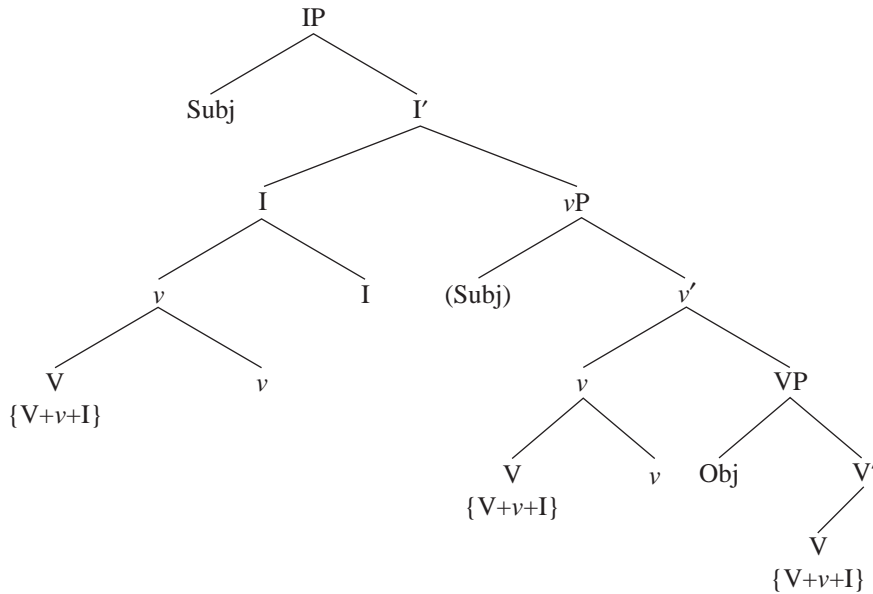
(2)
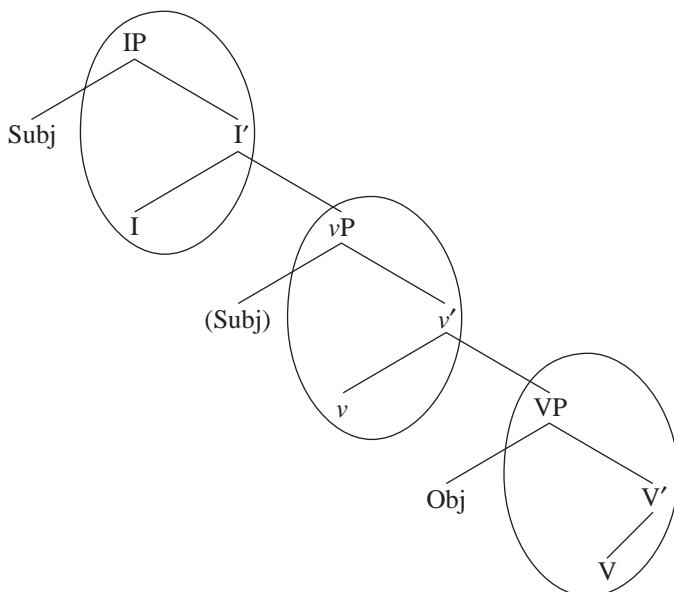
The three circled sets of nodes (series of PLs, each except the first the complement of the next) are taken to express the morphological $V + v + I$ unit that head chains are usually taken to create. Just as in the standard approach, we can assume that this unit is spelled out in the highest ''strong'' position involved—say, in I 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 for 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-I'' is syntactically expressed directly by the (inverse order of the boxed) complementation line. The morphological unit (V-v-I), which I shall call a *morphological word* (MW), is then not interrupted by irrelevant phrasal nodes.

(3)
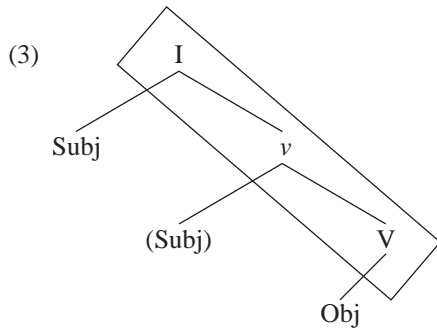
Thus, although Telescope is in principle independent from Mirror, assuming the latter leads directly and naturally to adopting the former. The converse also holds: in the context of Telescope the most immediate way to solve the question of how head chain–type relations are to be expressed is to adopt Mirror.

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

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

In section 2 I enumerate some problems with the standard explanation of the mirror generalization (often, somewhat misleadingly, referred to as the ''mirror principle'') based on head movement and the Head Movement Constraint. In section 3 I present 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. I also outline the advantages of the mirror theory view. Owing primarily to its restrictiveness (there is only one 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 specifier of X or the specifier of some element of (a decomposed) X. In section 4 I discuss some (apparently inferior) alternatives to this version of the theory and some consequences and advantages of this view.

In section 5 I present 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 specifier-head relation and domination (in fact also an extended specifier-head relation in the proposed system). I present independent evidence for this approach. I also show that mirror theory entails the main effects of Kayne's (1994) Linear Correspondence Axiom: the structures that would violate this principle cannot arise.
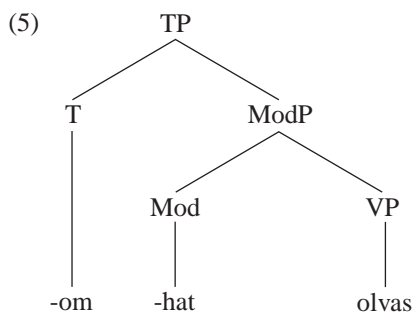
In section 6 I summarize the major general characteristics and advantages of mirror theory.

2 The Standard Explanation of the Mirror Generalization

2.1 The Mirror Generalization, Locality, and ''No Excorporation''

Cinque (1999) develops a strong empirical case for the claim that there is a correspondence in Universal Grammar between the hierarchy of specifier positions that he argues adverbs occupy and the hierarchy of clausal functional projections. In the process he provides much additional support for the mirror generalization. According to one version of this generalization, 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. 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)
```
                    TP
                  /    \
                 T      ModP
                 |     /    \
                 |   Mod     VP
                 |    |       |
                -om  -hat    olvas
```

The importance of the mirror generalization is enhanced by work that argues explicitly or suggests strongly that languages and constructions choose elements and segments from a universal and universally ordered series of functional projections (e.g., Starke 1994, Rizzi 1995, Cinque 1999).

The mirror generalization is often attributed to the strict locality of head movement/chains (Baker 1988). This involves two assumptions. One 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 is that excorporation is prohibited, so head chains must be of the ''roll-up'' type, where a head X rolls up into Y, the resulting X-Y unit rolls up into Z, and so on. There is no non-roll-up successive-step head chain.[2] 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); it can only be completed with the chain structure in (7). (Phonologically unexpressed traces—that is, chain members that are not the top of the chain—are in square brackets; top members of nontrivial chains are in curly brackets.)

(6)

(7)
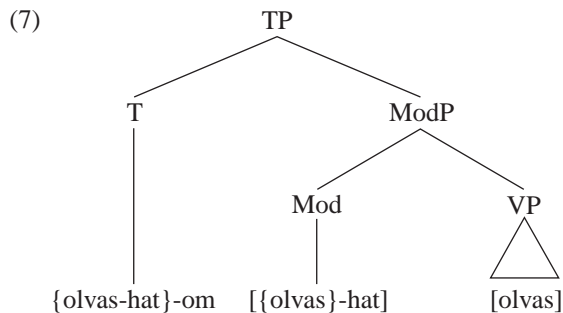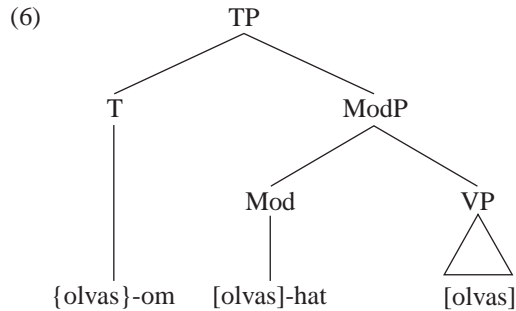
It is easy to see how these assumptions can entail the mirror generalization. If successive heads roll up, the last element and each unit so created subsequently moving to the left of the immediately higher one (i.e., respecting the HMC), the resulting order of the heads will be the exact inverse of the original (syntactic/complement) order.

---

[2] I argue in Brody 1995, 1997c 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.*

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.[3] 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 the host's specifier position 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 generalization do not seem to exhaust the set of ordering requirements of the Spell-Out component. Prefixes in general (e.g., Romance clitics) and certain types of compounding (e.g., French *ouvre-boîte* 'can opener') 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 generalization to require that Spell-Out systematically mirror the syntactic order in all cases. The appropriate domain of application for the mirror generalization needs to be defined. The characterization above restricted the generalization to applying 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 the directly empirical issues are set aside, questions remain about the HMC-based derivation of the mirror generalization. First of all, in syntax the information that explicates the structure of words is expressed both word-internally (i.e., X^0-internally) and by the phrasal order given by the (inverse) structure of complementation. For example, given a word consisting of a V and an I morpheme, in that order, the associated complementation structure will be constructed from a projection of I, 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 following question: why should it be the case that these two in principle unrelated conditions force grammar to express 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 would 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,

---

[3] For some discussion, see Phillips 1996 (esp. p. 191, n. 17, and the text to which that note relates). See also Bošković 1997.

we might expect that a better account would 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 generalization 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 (3) *olvas* will surface in TP and not in VP. But, as is well known especially since Emonds's (1978) and Pollock's (1989) analysis of the verbal complex in French and English, the phonological position of a word often does not correspond to the syntactic presuffix position. For example, the verb in English precedes its inflection(s); hence, on the account of the mirror generalization 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., e.g., Pollock 1989, Chomsky 1995).

The most popular resolution of this problem is checking theory (Chomsky 1995). According to checking theory, the verb is introduced into the syntactic tree together with inflection, and remains in place in syntax.[4] The V + I unit forms a chain with the guest-of-inflection position(s),[5] and through this chain the V + I unit can check the specifications of the I 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.
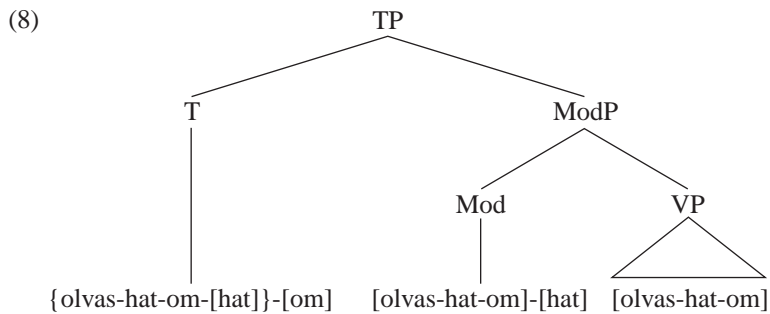
Thus, checking theory introduces yet another duplication of the word structure. The information is now reproduced three times in syntax: in the structure of complements, on the lexical item that is to check functional heads, and on the heads that are to be checked. The duplication involved in checking theory can perhaps be defended by reference to checking in other chain types. For example, in the case of *wh*-movement such duplications (*wh*-features on both the host C node and the *wh*-phrase) were characteristic of the standard analysis long before checking theory and can indeed be argued for on independent grounds.

But checking theory raises at least two apparently serious questions. First, 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 generalization. This is because given the duplication that this theory introduces, we now need an auxiliary assumption to ensure the mirror generalization effect. Given the checking approach, the

---

[4] In Chomsky 1995:chap. 3, where checking theory is introduced, the verb would have remained in place only in overt syntax. In Brody 1995 and later in Chomsky 1995:chap. 4, there is no covert displacement of phonological material and the verb remains in situ throughout. See also Brody 1998b.

[5] Checking of the ''V + elements of I'' unit involves a set of chains in a ''roll-up'' structure when the analysis is detailed enough to take account of more than one I 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 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 ''phrasal'' roll-ups remain (i.e., roll-ups into syntactic specifier positions of constituents that correspond to heads together with whatever these heads dominate).

structure of (3) will be along the lines of (8). (Traces and deleted functional heads are in square brackets.)

(8)

```
                        TP
                   ┌─────┴──────┐
                   T            ModP
                              ┌──┴───┐
                             Mod     VP
                                     /\
{olvas-hat-om-[hat]}-[om]   [olvas-hat-om]-[hat]   [olvas-hat-om]
```

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 syntactic structure in (8) 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 generalization itself: the mirror generalization 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 must respect the order of suffixes becomes the condition that the inverse order of the syntactic heads that host a member of the head + suffixes unit must correspond to the order of suffixes—in other words, the residue of the mirror generalization itself with locality for the chain stated separately.[6]

---

[6] Given checking theory, the No Excorporation Condition can be translated as the requirement that in each nonroot 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 $V+v+I$ unit, linking the V, the word-internal [Spec, v], and the word-internal [Spec, I] positions. The chain of $V+v+I$ still cannot have a member in an additional (word-internal specifier) position between V and v or between v and I given the requirement that in each (nonroot) position some suffix must be checked. Further auxiliary assumptions would be necessary to make this account compatible with bare checking theory in Brody 1997b,c.

   Note also that 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

The second problem with checking theory concerns the fact that it inherits the duplication problem noted in section 2.1. Checking theory ensures (in conspiracy with the X-bar 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 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 generalization arises from the fact that the guest and the host head must form a unit. In phrase structure grammars this must be a labeled constituent, necessarily labeled by the host. These assumptions introduce a further systematic set of otherwise unmotivated duplications. A fuller structure for (5), for example, will be (9). The checking operation will result in deletion of the square-bracketed functional heads, and neither the V head of VP nor the Mod head of ModP surfaces, 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. However, there is no evidence 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

---

generated in a random order, the correct complement order will be forced by the requirement, which as we have seen restates the mirror generalization, that checking order must respect the order of suffixes. Such an approach, which also needs to assume additionally the HMC and the No Excorporation Condition (or the above-mentioned equivalent), still would not help with most of the other problems raised. I shall therefore propose a more radical solution below.

(9)   TP
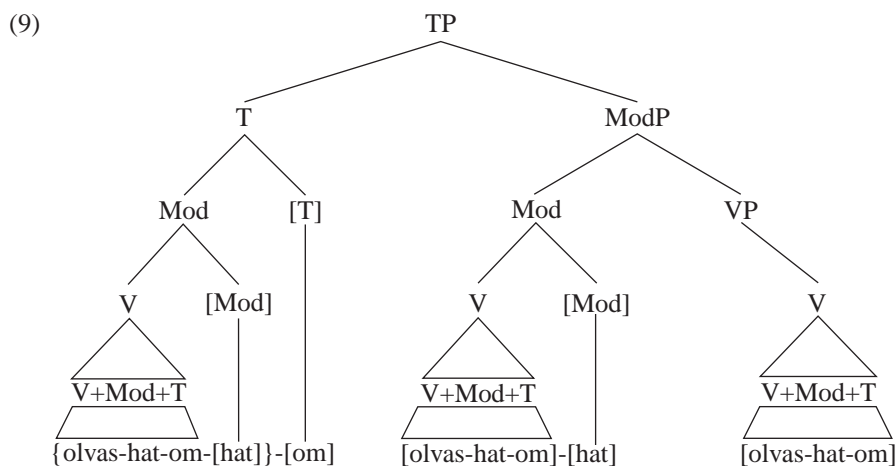
not just that (unlike in the case of trace copies) presence of the duplicate (quadruplicate) informa-
tion in the syntactic representation is not independently motivated. The additional and more serious
issue is that three distinct sets of principles generate the same structure. The duplication created
by the series of word-internal dominating nodes appears unavoidable in standard approaches, as
it is the consequence of certain basic assumptions that are distinct both from those that determine
word-internal morphological order and from those that define the complement series/extended
projection. These assumptions are that (a) words and chain members are constituent nodes, (b)
nodes are labeled by one of their constituents, and (c) elements that are not chain tails cannot
label (attributed to the Generalized Projection Principle in Brody 1994, 1995, and also in part in
1998b. Also see Brody 1998b for a discussion of the ''target projects'' requirement of Chomsky
1995).

    There are additional issues that have to do directly with properties of head chains and therefore
are problematic for the explanation of the mirror generalization, which crucially involves such
chains.

    The first of these is that the mirror generalization will follow from locality only if excorpora-
tion 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 footnote 5 regarding the
notion of roll-up). Why should head movement be different? Although various technical and
partial answers exist,[7] we seem to have no clear understanding of the reasons for this prohibition
that needs to hold for all head chains if the mirror generalization is to be attributed to locality,
but appears to hold *only* for head chains.

---

[7] As mentioned in footnote 6, under a (nonstandard) version of checking theory the No Excorporation Condition
may be dispensable, but the suggestion there does not explain why X^0 and XP chains differ in this regard any more than
other solutions in the literature. For example, Baker (1988) suggests 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.

The second problem here is the one we encountered in a different connection in section 2.2: 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 (see Brody 1997b). (It is perhaps suggestive also that none of the theories, reviewed in Brody 1997b, that attempt to reduce c-command to more basic notions appear to be able to allow for c-command out of adjunction.)

The third problem concerns the somewhat idiosyncratic nature of locality involved in head movement. A- and Ā-chains cannot cross A- and Ā-positions that may be occupied by a potential antecedent—Rizzi's (1990) Relativized Minimality. 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 Kayne's (1994) 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 specifiers, where an X^0-internal specifier 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.[8]

3 Mirror Theory

3.1 Telescope

I shall take the problems listed in the previous section to motivate the search for an alternative view of the mirror generalization and of head chains. I shall now present such a theory, which expresses the ''head chain'' relation differently. This theory takes the mirror generalization 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 proposed in Brody 1998b. Phrases in this theory were created from lexical items by the rule Project, which forms PLs. Some elements on the PL are phrases, other (lower) elements are words (X^0s), and the lowest element is the lexical item (X^{min}).

---

[8] See Brody 1997b for further empirical differences between head chains and XP chains having to do with reconstruction and ellipsis phenomena.

I argued that a PL should contain only one phrasal node, an assumption that led to the postulation of a tripartite shell structure for specifier-head-complement structures. Similarly, I adopted the view (Kayne 1994) that there is only one X^0 node on a PL, eliminating the nonmaximal phrasal and the intermediate (nonhighest among the X^0 projections) X^0 levels. Let us now ask the more radical question: are the remaining distinctions among XP, X^0, and X^{min} really necessary? In other words, do PLs exist? Is the postulation of the PL structure justified?

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

(10)
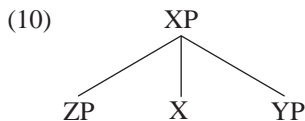
Here X projects a phrase, XP, creating a (partial) PL consisting of an XP immediately dominating X. In the theory developed in Brody 1998b the principle called Insert licensed the phrase-to-phrase immediate domination relations between XP and ZP on the one hand and XP and YP on the other. As noted in Brody 1997b, 1998b, specifier-head-complement order follows from Kayne's Linear Correspondence Axiom (LCA) only if the relevant structural asymmetries are stated: the specifier asymmetrically c-commands the head, which asymmetrically c-commands material in the complement. One alternative I discussed was to state specifier-head-complement order directly. Let us accordingly assume specifier-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 the specifier and its constituents precede the head, whereas the complement and its constituents follow it.[9]

Given this approach to specifier-head-complement order, there seems to be no compelling reason to distinguish XP and X syntactically—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 its head. Applying the argument also to ZP and YP, (10) reduces to (11).

(11)
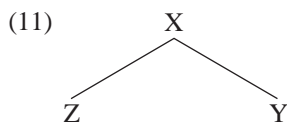
Thus, as far as the word/phrase distinction is concerned, there is no need for the ultimately somewhat strange operation Project or its counterparts (i.e., the set-forming and -labeling effects of Merge and Move) in the minimalist framework. As far as the word/phrase distinction is concerned, there is no need to create copies of a lexical item and establish an immediate domination

---

[9] As we shall see, head-complement order follows under mirror theory from specifier-head order. The latter, however, must be stipulated. Kayne 1994 has attempted to relate this to the direction of time (for a critical discussion, see Brody 1997b).

relation between these copies. I refer to the assumption that a single copy of a lexical item can serve both as a head and as a phrase as Telescope.

Telescope can be viewed as eliminating the apparent conflict between the long tradition of dependency theories (see, e.g., Hudson 1990 and references cited there) and phrase structure theories of syntactic representations.[10] Taking X to stand for a phrase, the lines connecting nodes can stand for immediate dominance relations. Taking X to stand for a head, the lines express dependencies.[11]

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 assembled in the lexicon. Two questions arise. First, does the distinction really exist? It does not if either all words are assembled syntactically or all words are assembled in the lexicon. Second, even if the distinction exists, it does not follow that it must be made explicit in syntactic representations. Take $V + I$ as a simplified example. Instead of retaining the two different guest positions indicated in (12), we now adopt the simpler structure (13), where X^0 and X^{min} levels are not distinguished.

(12)

I^0

V^0 I^0

V^{min} I^{min}

(13)

I

V I
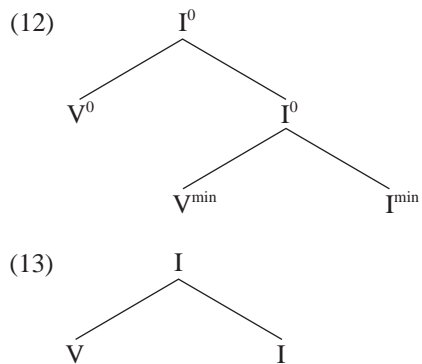
3.2 Mirror

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 shall return), an immediate problem arises. Although neither the word/phrase nor the lexical item/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 specifier-head-complement structure like (11), there appears to be no place in syntax to express word-internal structure.

---

[10] For more recent attempts to simplify the theory of phrase structure in terms of dependencies, see Brody 1994 and Manzini 1995. The latter work, like Hudson's and others' in the Dependency Grammar tradition, also dispenses with phrasal nodes, but it adopts the assumption made in Brody 1994 that all dependencies in the syntactic representation exhibit left-to-right order, which I crucially reject here in favor of a principled alternative.

[11] 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.

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, this syntactic configuration duplicates morphological information that is duplicated in syntax in another way as well: in the (inverse) order of functional and nonfunctional projections. Given standard phrase structure trees, phrasal nodes intervene between segments of the word in the representation the inverse order of projections provides, making these relations perhaps less suited to express word-internal structure. But the impoverished theory expressed in (11) presents no such problems. For example, the lexical $V + v + I$ structure will be expressed in syntax as I taking a v and v in turn taking a V complement.

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

(14)
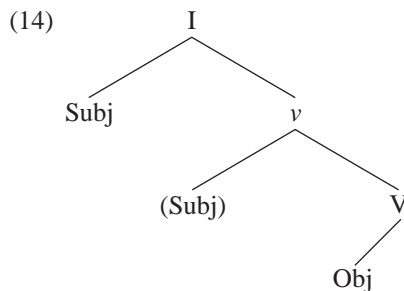
Given representations like (14), the fact that two elements X, Y are part of a single morphological word (MW) is in general still made explicit in the syntactic structure. Although X and Y need not collect under a special type of syntactic node, the X^0, their morphological relation is typically signaled by the fact that one is the complement of the other. (But see also footnote 12.)

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

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

I state Mirror, the principle that inverts the morphological specifier-head order, in (15).

(15) *Mirror*

The syntactic relation ''X complement of Y'' is identical to an inverse-order morphological relation ''X specifier of Y.''

(Universal) specifier-head-complement order does not need to be specifically stipulated: it follows from the primitive specifier-head order (specifier 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 Spell-Out 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 and 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.[12]

Consider next the Spell-Out question regarding mirrored MWs: which element of the MW represents the Spell-Out position? Here I adopt the standard account. Spell-Out 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 Spell-Out 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 specifier of some head F, between I and v (Cinque 1999). V-v-F-I is then spelled out in the position of I in French and in the position of v in English, preceding and following the adverbial, respectively.

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

---

[12] A phonological distinction between free and bound forms appears to be necessary whether or not Mirror is a biconditional, just as in standard terms it appears to be necessary in addition to head chains and the X^0/XP distinction. If Mirror is not biconditional, then this free versus bound distinction would have to play a role also in determining which syntactic specifiers form words with an element that is not their complement.

To strengthen Mirror to a biconditional, we might take apparently nonmirroring compounds like English *blackbird* and French *ouvre-botte* 'can opener' to be created only in phonology/Spell-Out. 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 1997, Brody, to appear) and may also form only a phonological unit with their host. As an alternative to the phonological account, I assume in Brody, to appear, that the top member of the phrasal chain of the clitic can be expressed by an I domain head of which it is the specifier. This could capture Kayne's (1994) 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 specifiers 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 (i.e., 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 VP-shift type structures like those proposed by Barbiers (1995), Cinque (1999), Kayne (1994, 1998a,b), and others; see footnote 18.

Now that we have eliminated head chains in favor of MWs, the c-command and locality problems relating to head chains cease to be problems. In the present theory only chains corresponding to XP chains in standard frameworks can exist; these link syntactic specifier 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.[13]

The theory has other advantages. Certain questions that arise in the minimalist and earlier phrase structure systems, and that the theory in Brody 1998b makes some headway in solving, simply do not arise—the optimal situation. Since there is no phrasal projection and no PLs—or, in minimalist terms, Merge does not create sets distinct from the elements merged and therefore 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 that one type will dominate the other in an illegitimate configuration. (For a discussion of uniqueness and locality of phrasal projections and the extended structure preservation condition, see Brody 1998b.)

Recall also that when a category is interpreted as a word, all specifier-head relations, mirrored (i.e., complement) or not, express dependencies. But the categories can also be interpreted as constituents, in which case morphological and syntactic specifier-head links are accordingly understood to express immediate domination or constituency relations. Since head chains reduce to a Spell-Out issue of the mirrored MWs, all chains remaining in mirror theory target syntactic specifier 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 (i.e., the nodes it dominates). This use of the term *phrase* should of course not be taken to imply the existence of a V projection (i.e., of a phrasal category distinct from the V head).[14]

4 Specifiers and Complements

4.1 Mirror and Morphological Words

Without any auxiliary assumption, the hypothesis that the syntactic head-complement relation corresponds to a morphological specifier-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, such as 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 (e.g., that proposed in Borer 1993) allow the assignment of semantic roles in Case-checking specifier positions. In the context of the

---

[13] But see section 5 for a different approach to ''XP'' chains.

[14] 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.

Generalized Projection Principle (Brody 1995) this leads directly to the conclusion that objects must be ''base-generated'' in their Case-checking specifier positions (i.e., that they do not have a lower (complement) chain tail). (See 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 tail can still be a specifier in a structure that would correspond to a multiple-layer VP (with a decomposed verb interpretation of the Larsonian shell structure; on this matter see Brody 1995, 1998b, and references cited there).

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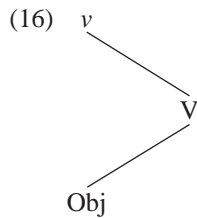
In (16) Obj is the specifier of V and a member (constituent/dependent) of the complement of *v;* hence, it follows *v* and precedes V. This may be an appropriate structure for a sentential complement, for example, if this does not form a Case-checking chain. Further decomposition of the verb may be necessary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

What about those complements of functional categories that neither are arguments of lexical heads nor appear to form an MW with the selecting head? Take the English complementizer nodes C and I, ignoring their internal composition for present purposes. It may be possible to say that when the C node is empty, as in *C Mary has left,* the element in I forms an MW (corresponding to a covert head chain) with the C node that is spelled out in I. Mirroring this MW makes I the syntactic complement of C. However, I and C can also be spelled 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, in the standard framework nothing prevents us from referring to the less restricted notion of covert head chain. But if we allowed such a unit to be spelled out as two nonadjacent, independent, and morphologically noninteracting segments, the notion of MW would seem to be emptied of most of its content.

We are thus led to assume that contrary to the generally held view, I must be a specifier of C, 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 whether the auxiliary is a higher verb or whether it fills a position in the extended projection of *leave* (see, e.g., Cinque 1999 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 we explore the consequences of this conclusion further, consider the following alternative approach, which I shall call the *extended-word theory*. The complement relation between two functional heads or a functional and a lexical head has long been assumed to be somehow different in kind from ordinary complement relations (see 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 refers to as extended projections and which, as noted above, recent research suggests have a universal structure. One could assume that it is in fact ''extended words'' corresponding to extended projections, rather than MWs, that complement relations mirror.[15]

4.2 Mirror and Extended Words

This theory of extended-word mirroring could then have two different versions with respect to 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/Spell-Out. This larger unit would be related to the pronounceable MW via the same specifier-head relation that relates elements of the smaller pronounceable units—specifier-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 specifier of anything internal to L_1 can become the specifier of the (leftmost) element E_1 of another MW L_2 (e.g., *have* of *have* + *s* = *has*), that is, of the element that has no specifier 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 specifier-head relation corresponds to a syntactic 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 (recall 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/Spell-Out might have, incorporation phenomena tell us that extended words are no larger than what can phonologically present itself as an MW. N- and V-incorporation involve MWs that can span several extended words (see, e.g., Baker 1988 or Brody 1997b for examples). Hence, on this

---

[15] I made a version of this assumption in an early version of this work (Brody 1997a).
   In the present theory ''extended projections'' become ''extended words'' since not even nonextended phrasal projection is taken to exist.

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 (which 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 specifier position. If incorporation involves MWs, then a unit consisting of an incorporated element and its host will normally involve two ''extended words.''

Consider then another variant of the second version 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 specifier 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 1997b, to appear, 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 will 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.[16]

Given the foregoing considerations, I 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′; that is, C and C′ form an MW. (See footnote 12 on the question of whether the relation between MWs and complementation can be strengthened further to a biconditional.)

4.3 Mirror and Specifiers

The relation between the syntactic specifier and the head is biunique. Hence, if the category C that would standardly be treated as the complement is analyzed as the specifier of C′ (where C′ is a functional category or a (decomposed) lexical category (segment)), C′ cannot have another syntactic specifier. An element that standardly would have been taken as its specifier will now have to occupy the specifier position of some higher (functional or lexical category segment) head. This, perhaps radical, conclusion is corroborated by an increasing amount of independent evidence.

Cinque (1999) argues that there exists an Agr-type ''DP-related'' head that dominates each functional element (cf. Kayne's (1998a,b) W nodes). There is also evidence (Koizumi 1993, Bobaljik 1995) for an Agr_O position lower than the v head associated with the base position of

---

[16] 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).

MICHAEL BRODY

the subject and similarly for an Agr$_{IO}$ position lower than the θ-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.
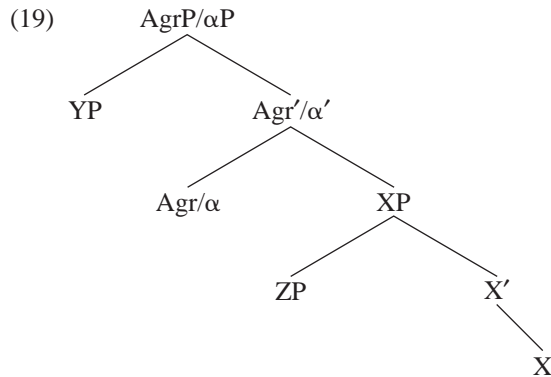
Note that the fact that a head C′ cannot have a second syntactic specifier does not entail that all categories that are standardly treated as specifiers (i.e., sisters of some intermediate projection level) will now necessarily be specifiers of an Agr-type node. All that follows from mirror theory is that if a category C′ has standard specifier and complement C″ and C, respectively, and under mirror theory C is now the syntactic specifier 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 specifier of C′. But it may be not only the specifier of the Agr-type head associated with C′, but also the specifier of some other higher head. One such case may be instantiated by subjects in VPs if these are indeed in the specifier position of a *v* head dominating V.

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

(17)

XP
├── YP
└── X′
    ├── X
    └── ZP

(18)

Agr/α
├── Y
└── X
    └── Z
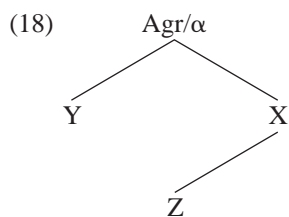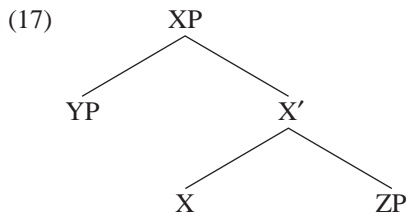
Agr/α and X must form an MW here, which on the assumption that Agr/α is strong will be spelled out in Agr/α, giving specifier-head-complement order.[17] Even though not strictly speaking incorrect, it is somewhat misleading to relate (17) to (18). (18) does indeed express the specifier-head-complement structure that has been expressed standardly as (17), but (18) expresses the claim that the specifier and the complement are specifiers of two related but distinct heads. Thus, it in fact corresponds more closely to a structure that in standard terms would look like (19).

---

[17] Note the possible analysis of ''VP-internal'' SOV: same structure (i.e., (18)) but with weak Agr.

(19)

```
                 AgrP/αP
                /      \
              YP      Agr′/α′
                      /     \
                  Agr/α      XP
                            /   \
                          ZP     X′
                                   \
                                    X
```

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 specifier-head relation that corresponds syntactically to a head-complement link but also a syntactic specifier-head relation. Extended words can be "wiggly."

This has an immediate advantage in the analysis of those structures that under Kayne's (1994) antisymmetry hypothesis have to be treated in terms of a "phrasal" roll-up chain structure. For example, Kayne (in derivational terminology) suggests (20) as one possible structure for sequences of inflectional morphemes in head-final languages. (The other alternative is leftward head raising with complements shifted across the Spell-Out position of the head + suffixes unit, a configuration that in terms of mirror theory is analyzable as an MW; see Brody 1997b 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 specifier position, and YP, a complement of X, is rolled up as a whole into the specifier position of X. Similarly XP, U's complement, which contains all the elements so far described, turns up in the specifier of U. If Y is a verb and X and U are 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 (1999) observes that the fact that in Hindi the sentence-final sequence of verbs carrying the functional suffixes does not form a constituent is expected under Kayne's suggested analysis of this language. This appears to also rule out the alternative of a simple leftward head movement analysis.

Cinque observes further that in Hindi the order of the V + functional suffix series combinations is the mirror image of what he argues is the universal order of these elements, shown in

(21). This order, exhibited directly by English and Spanish, for instance, is exemplified in (22a) and (22b) (from Cinque 1999).

(21) tense > perfect aspect > progressive aspect > voice > V

(22) a. These books have been being read all year.
   b. Esos libros han estado siendo leídos todo el año.

Compare the Hindi examples in (23) (from Cinque 1999, citing Mahajan 1990).

(23) a. Kis-ko Raam-ne socaa   ki   Siitaa-ne dekhaa thaa?
      who   Raam   thought that Sita   see-ANT be-PAST
      'Who did Raam think that Sita had seen?'
   b. Raam rotii   khgaataa rahtaa thaa.
      Raam bread eat   PROG   be-PAST
      'Raam used to keep on eating bread.'

Cinque's point, that the inverse order of the series of main V + functional suffixes follows directly from Kayne's roll-up structure, may be taken as further evidence for the ''phrasal'' roll-up analysis (i.e., roll-up into syntactic specifier positions of constituents that correspond to heads together with whatever these heads dominate). Similar nonhead roll-up structures have been proposed also for various configurations, such as sentence-final adverbial clauses and VP-final stacked adverbials and PPs in head-initial languages (for more detailed discussion, see, e.g., Kayne 1994, Cinque 1999, Barbiers 1995, Brody 1997b, to appear).

As is widely acknowledged, however, this approach is quite problematic, for three reasons. First, the chain structures it postulates have no independent motivation. In particular, no systematic set of ''triggers'' for these movements has been found. In representational terminology: we have no principled account of what licenses the nontail positions of these chains. Second, 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 specifier positions and eliminating the chains linking specifiers and complements. We can then take whatever selectional relation was taken to license the complement to in fact license the same element in the specifier 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 specifier-head (i.e., syntactic head-

complement) and syntactic specifier-head relations are legitimate. The restrictions of the theory thus again force an apparently empirically justified analysis.[18]

5 C-Command and Antisymmetry

5.1 C-Command

The relation of c-command ceases to be necessary as it has 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 specifier-head relation, an Agr-type node can carry the referential/thematic features of its specifier. 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 specifier of this Agr is taken to pick up the reference of the head, then this specifier in turn cannot corefer with the R-expression.[19]

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 that 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 specifier-head relation with the chain.[20]

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 approaches that attempt to reduce c-command to simpler notions.[21] If the approach suggested in the previous paragraph proves

---

[18] Kayne (1998b) argues that English constructions with an *only* phrase in focus as in (i) involve preposing the *only* phrase to [Spec, F] and subsequently preposing the (remnant) VP to [Spec, F′] (Kayne notates F′ as W) as in (ii), an analysis he extends to related phenomena such as negative and *even* phrases.

  (i) Mary read [only one book].

  (ii) Mary [read t] F′ [only one book] F t_{VP}

Mirror theory, with its extended words that are allowed to span syntactic specifier-head links, provides a natural account of how the VP in the preposed position is 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). Interesting problems remain: in particular, (a) how the V + I unit is composed here and (b) what parameter distinguishes Hungarian (which does not allow this VP-shift) and English. The question in (a) is relevant to determining whether the statement of Mirror in (15) can be strengthened to a biconditional. Various approaches suggest themselves that I will not explore here.

[19] For arguments that the binding theory should be stated in terms of θ-roles, see Williams 1994. Under the present suggestion implicit arguments could correspond to θ-roles represented configurationally as features/properties of heads that have no specifier.

[20] 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 specifier constituents, including the lowest one, associated with these heads are external to the r-chain.

[21] See Brody 1997b for a critical discussion of the derivational solution proposed by Epstein (1995; also Epstein et al. 1998). Neeleman and van de Koot (1998) conceptualize c-command as involving a function that expresses the dependency of a c-commanded dependent element. This function can percolate to any dominating node and is then satisfied

feasible, then the conclusion will be that the strange asymmetry was an artifact of coalescing two distinct relations to which in fact different constraints refer: the domination/dependency relation and the syntactic specifier-head relation. As indicated, this conclusion is made possible by the mirror-theoretical analysis of head chains as MWs.[22]

Some evidence for factoring the notion of c-command into the domination and specifier-head relations is provided by the properties of the nondistinctness 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. 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 (see Lebeaux 1989, Brody 1995, 1997b, 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 element (i.e., argument, *wh*-, or other quantificational category) in the tail of the chain (see Brody 1995, Chomsky 1995). Thus, in ''covert'' chains the lowest element must be the most fully specified one and higher members are feature sets, whereas 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. This approach instantiates the idea that ''covert'' chains only have certain features of the contentive element in their nontail positions in a way that is different from the approach in Brody 1995, 1998b (and also from the related one in Chomsky 1995). Cases standardly treated as ''overt'' chains will involve additional specifier-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.[23]

---

by an argument in specifier-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.

[22] This is because heads in mirror theory dominate and do not c-command (categories in) their complement; hence, only specifiers ever need to c-command.

[23] Kayne (1994) argues that c-command by the specifier S of a specifier S′ of a node N into the complement of N is possible. This is incompatible with the proposal in the text. In Brody 1997b I provide evidence that such cases are better analyzed as involving a chain that links S to a higher specifier position S″, where S″ is the specifier of a node that dominates N.

5.2 Antisymmetry

Finally, the antisymmetric property of representations is also ensured by mirror theory. Although this is intuitively clear, Kayne's LCA, which relates (asymmetric) c-command and precedence, cannot be adopted here. Given mirror-theoretical structures, neither the standard definition of c-command, nor the domination relation that I have proposed as an improved alternative, can be straightforwardly mapped to precedence relations between terminals. But mirror theory simply provides no means with which non-antisymmetric structures can 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; see Brody 1997b, 1998b) 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 (see Brody 1997c:sec. 2.3). The LCA entails binary branching; mirror theory does not provide a means to violate this restriction. For each head only one specifier-head and one mirrored morphological specifier-head (i.e., complement) are possible as syntactic relations. The LCA ensures that PLs always branch rightward—in other words, that only the complement can be on the right of the head, and that specifiers and adjuncts must be on the left. Furthermore, it rules out multiple adjunction to the same element. In the present theory adjunction is eliminated (see, e.g., Sportiche 1994, Brody 1994, 1998b, Cinque 1999 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 and advantages of mirror theory.

General characteristics of mirror theory
1. The only primitive relation between elements in syntax and morphology is specifier → head, where the specifier (and its constituents) precede the head.
2. By Mirror, (some or all) morphological specifier → head orders can be (geometrically) mirrored in syntax. The head-complement relation is just a reverse order (morphological) specifier-head relation.
3. Members (heads) of MWs can form specifier-head relations with other MWs.
4. An MW is spelled out (by Mirror, in the morphological specifier-head order) in the position of the highest strong head (or, in the absence of a strong head, in the lowest position).

Advantages of mirror theory
1. There is a single primitive configurational relation: specifier-head.
2. Locality and no-excorporation properties of head chain–type relations follow. All head-

complement links must match (are identical to) a(n inverse) specifier-head link in the word structure: structures corresponding to excorporation or nonlocal head chains cannot be created.

3. C-command problems of head chains do not arise: MWs involve domination.

4. Antisymmetry effects are guaranteed (there are no means for violating LCA requirements; hence, there is no need for the LCA).

5. There is no categorial projection; hence, uniqueness and locality issues of categorial projection (Chomsky 1995, Brody 1998b) do not arise.

6. There is no word/phrase difference in syntax, hence no extended structure preservation (Chomsky 1995, Brody 1998b) question.

7. There is a single expression of word structure in syntax (in the case of suffixes, the complementation structure). All duplications (listed in section 2) are eliminated.

8. The apparent conflict between dependency and constituent structure frameworks is resolved. (Structures are interpretable as a dependency diagram or as a constituent structure.)

9. The theory forces the independently motivated (e.g., Larson 1988, Cinque 1999) presence of additional heads dominating each head H with a specifier and also a complement with which H does not form an MW. (The complement must be the syntactic specifier of H; hence, the ''standard'' specifier of H must in fact be the specifier of a higher head.)

10. The theory forces a weaker characterization of extended ''projections'' (i.e., 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.

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

References

Arad, Maya. 1996. A bi-directional view of the syntax-lexicon interface. Ms., University College London.

Baker, Mark. 1988. *Incorporation: A theory of grammatical function changing.* Chicago: University of Chicago Press.

Barbiers, Sjeff. 1995. Extraposition and the interpretation of X-bar structure. *GLOW Newsletter* 34.

Bobaljik, Jonathan. 1995. Morphosyntax: The syntax of verbal inflection. Doctoral dissertation, MIT, Cambridge, Mass.

Borer, Hagit. 1993. The projection of arguments. In *University of Massachusetts occasional papers in linguistics 17.* GLSA, University of Massachusetts, Amherst.

Bošković, Željko. 1997. *The syntax of nonfinite complementation: An economy approach.* Cambridge, Mass.: MIT Press.

Brody, Michael. 1994. Phrase structure and dependence. In *UCL working papers in linguistics 6,* 1–33. Department of Phonetics and Linguistics, University College London.

Brody, Michael. 1995. *Lexico-Logical Form: A radically minimalist theory.* Cambridge, Mass.: MIT Press.

Brody, Michael. 1997a. Mirror theory. In *UCL working papers in linguistics 9,* 179–223. Department of Phonetics and Linguistics, University College London.

Brody, Michael. 1997b. Mirror theory. Ms., University College London.

Brody, Michael. 1997c. Towards perfect chains. In *Elements of grammar,* ed. Liliane Haegeman, 139–167. Dordrecht: Kluwer.

Brody, Michael. 1998a. The Minimalist Program and a perfect syntax. *Mind and Language* 13:205–214.

Brody, Michael. 1998b. Projection and phrase structure. *Linguistic Inquiry* 29:367–398.

Brody, Michael. 1999. Chains in Perfect Syntax. Paper presented at the GLOW workshop ''Technical Aspects of Movement,'' Potsdam.

Brody, Michael. To appear. Word order, restructuring and mirror theory. In *Proceedings of the Tromsø VO-OV Workshop.*

Cardinaletti, Anna, and Michal Starke. 1994. The typology of structural deficiency. Ms., University of Venice and University of Geneva/Max Planck Institute, Berlin.

Chomsky, Noam. 1995. *The Minimalist Program.* Cambridge, Mass.: MIT Press.

Cinque, Guglielmo. 1999. *Adverbs and functional heads: A cross-linguistic perspective.* Oxford: Oxford University Press.

Emonds, Joseph. 1978. The verbal complex V′-V in French. *Linguistic Inquiry* 9:151–175.

Epstein, Samuel David. 1995. Un-principled syntax and the derivation of syntactic relations. Ms., Harvard University, Cambridge, Mass.

Epstein, Samuel David, Erich M. Groat, Ruriko Kawashima, and Hisatsugu Kitahara. 1998. *A derivational approach to syntactic relations.* Oxford: Oxford University Press.

Grimshaw, Jane. 1991. Extended projections. Ms., Brandeis University, Waltham, Mass.

Hudson, Richard. 1990. *English word grammar.* Oxford: Blackwell.

Kayne, Richard. 1994. *The antisymmetry of syntax.* Cambridge, Mass.: MIT Press.

Kayne, Richard. 1998a. A note on prepositions and complementizers. WWW document, http://mitpress.mit.edu/celebration.

Kayne, Richard. 1998b. Overt vs. covert movement. *Syntax* 1:128–191.

Koizumi, Masatoshi. 1993. Object agreement phrases and the split VP hypothesis. In *MIT working papers in linguistics 18: Papers on Case and agreement I,* 99–148. MITWPL, Department of Linguistics and Philosophy, MIT, Cambridge, Mass.

Koopman, Hilda. 1994. Licensing heads. In *Verb movement,* ed. David Lightfoot and Norbert Hornstein, 261–295. Cambridge: Cambridge University Press.

Koopman, Hilda, and Anna Szabolcsi. 1998. The Hungarian verbal complex: Complex verb formation as XP-movement. Ms., UCLA, Los Angeles, Calif.

Kuno, Susumu. 1998. Binding theory in the Minimalist Program. Ms., Harvard University, Cambridge, Mass.

Larson, Richard. 1988. On the double object construction. *Linguistic Inquiry* 19:335–391.

Lebeaux, David. 1989. Relative clauses, licensing and the nature of the derivation. Ms., University of Maryland, College Park.

Mahajan, Anoop. 1990. The A/A′ distinction and movement theory. Doctoral dissertation, MIT, Cambridge, Mass.

Manzini, M. Rita. 1995. From Merge and Move to form dependency. In *UCL working papers in linguistics 7.* Department of Phonetics and Linguistics, University College London.

Neeleman, Ad, and Hans van de Koot. 1999. The configurational matrix. Ms., University College London.

Phillips, Colin. 1996. Order and structure. Doctoral dissertation, MIT, Cambridge, Mass.

Pollock, Jean-Yves. 1989. Verb movement, Universal Grammar, and the structure of IP. *Linguistic Inquiry* 20:365–424.

Pollock, Jean-Yves. 1993. Notes on clause structure. Ms., University of Picardie, Amiens.

Rizzi, Luigi. 1990. *Relativized Minimality.* Cambridge, Mass.: MIT Press.

Rizzi, Luigi. 1995. The fine structure of the left periphery. Ms., University of Geneva.

Roberts, Ian. 1997. Restructuring, head movement, and locality. *Linguistic Inquiry* 28:423–460.

Safir, Ken. 1998. Vehicle change and reconstruction in A′-chains. Ms., Rutgers University, New Brunswick, N.J.

Sportiche, Dominique. 1992. Clitic constructions. Ms., UCLA, Los Angeles, Calif.

Sportiche, Dominique. 1994. Adjuncts and adjunction. Ms., UCLA, Los Angeles, Calif.

Starke, Michal. 1994. On the format for small clauses. Ms., University of Geneva.

Williams, Edwin. 1994. *Thematic structure in syntax.* Cambridge, Mass.: MIT Press.

Department of Phonetics and Linguistics
University College London
Gower Street
London WC1E 6BT
England

m.brody@ling.ucl.ac.uk