

## Decomposing Compounds\*

Anna Maria Di Sciullo  
Université du Québec à Montréal

### Abstract

This paper proposes that compounds, whether root, deverbal or *dvandva*, have a unifying property. They all include an internal functional projection, i.e. an F-tree. The head of this projection may be legible at the phonetic interface, whereas it is necessarily legible at the semantic interface. Empirical arguments are presented to motivate the F-tree hypothesis, which occurrence in compounds follows from the basic asymmetry of the relations generated by the grammar. Variation between languages with respect to the ordering of the constituents of compounds is proposed to be a function of whether the derivation of these constructs takes place in the morphological or in the syntactic plane of the computational space.

### 1. Scope

I analyze compounds as domains of computation with an internal functional projection. The head of this projection is legible at the semantic interface (LF) whereas it may or not be legible at the phonetic interface (PF). I argue that cross-linguistic variation in the precedence relations in these domains follow from their computational path.

I assume the theory of morphology and the overall architecture of the grammar defined in Di Sciullo (2005), which extends the Minimalist architecture (see Chomsky 2001, 2005) to a fully parallel model. According to Asymmetry Theory, the derivation of linguistic expressions takes place in parallel planes of the computational space, each plane being an instantiation of the basic properties of the grammar. The crucial difference between the morphological plane ( $D_M$ ) and the syntactic plane ( $D_S$ ) is that the former manipulates asymmetric relations only. The Strict Asymmetry of morphology is hard-wired in the grammar, since the operations of the morphology apply to minimal trees, i.e., trees with only one specifier and only one complement position. The hierarchical structure of the minimal tree is determined by the Universal Base Hypothesis (Kayne 1994), and thus the specifier precedes the head and the complement follows the head before linearization takes place. The specifier and the complement positions are filled by features, such as the argument [+A] feature, which are legible at LF, but may not be legible at PF. The head position may be filled with a root or with a predicate affix, while the specifier position may be filled with a modifier affix or with an operator affix. Likewise for compounds, modifiers (adjuncts) are in the specifier position, and they sister contain (asymmetrically c-command) predicates in the head position. In this theory, the linearization of the constituents takes place in the phonological plane ( $D_\Phi$ ) and the domains of the computation can be transferred from one plane to the other before they reach the interfaces.

The organization of this paper is as follows. First, I provide evidence that asymmetry is a characteristic property of compounds and that compounds include a functional projection. Then, I consider cross-linguistic variation in the precedence relations, focussing on English and French. Third, I illustrate the derivation of root, deverbal, and *dvandva* compounds. In the last section, I summarize the results.

---

\* This work is supported in part by funding from the Social Sciences and Humanities Research Council of Canada to the Interface Project, grant number 214-2003-1003, as well as by a grant to the Dynamic Interfaces Project from FQRSC, grant number 103690.

## 2. Compounds as domains of the computation

A compound is a domain of computation (see Chomsky 2001, 2005; Uriagereka 1999; Adger 2003 for syntactic domains (phases), and Di Sciullo 2003, Marantz 2003 for morphological domains). It has an internal structure which includes a functional head, as evidenced in section 2.2. It is strongly impenetrable and it is isolable at the interfaces. At the PF interface, it bears a unique primary stress and, at the LF interface, it has only one denotation<sup>1</sup> Given the Asymmetry Theory, the strict ordering of the constituents of compounds as well as their hierarchical structure are derived, as evidenced in the next section.

### 2.1 Asymmetry

The constituents of compounds cannot be reordered without giving raise to either morphological gibberish (\*) or to a difference of interpretation ( $\neq$ ) (see (1)). The irreversibility of the constituents of a compound follows from the *Strict Asymmetry of Morphology*, according to which asymmetry, and in particular asymmetric c-command, is the characteristic property of morphological relations.

- (1)
- a. a paper bag / \*a bag paper
  - b. a hard disk / \*a disk hard
  - c. a movie producer / \*a producer movie
  - d. a rail road /  $\neq$  a road rail
  - e. a blue gray /  $\neq$  a gray blue
  - f. a hit and run /  $\neq$  a run and hit

Assuming, as in Kayne (1994), that the precedence relations between the terminal elements of a linguistic expression is a function of the asymmetric c-command between the pre-terminal elements, structural relations in compounds cannot be reduced to sisterhood, even though most compounds include two elements (see Roeper and Siegel 1978; Roeper and Snyder 2005 for a different view). Moreover, asymmetric c-command is part of compounds as binding and control are observed word-internally. For example, in complex reflexives such as *himself*, the pronoun *him* is the antecedent of the simplex anaphor *self*, which cannot take an R-expression as its antecedent (see (2)); in reflexive compounds such as *self-respect*, *self* controls the internal argument of the derived nominal (see (3)).

- (2)
- a. John admires JOHN.
  - b. John admires himself.
  - c. \*John admires Johnself.
- (3)
- a. John respects Paul.
  - b. John's self-respect.
  - c. \*John's self-respect of/for Paul.

---

<sup>1</sup> English compounds are morphological domains; they are not syntactic domains since the operations of the grammar apply differently to these domains. For example, whereas the Nuclear Stress Rule (Chomsky and Halle 1968) places main stress on the rightmost constituent of a syntactic phrase, the Compound Stress Rule stresses the left member of a compound. See Cinque (1993) for discussion of stress assignment based on X-bar structure. Compounds also generally exhibit opacity with respect to syntactic and semantic operations, as discussed in Di Sciullo and Williams (1987). Their parts cannot be questioned or passivized, the antecedent of a pronominal anaphor cannot be a nominal element included in a compound.

Assuming that core binding and control relations rely on the asymmetric c-command relation, it follows that this relation is part of the structural relations of compounds. These expressions find a natural account in the Asymmetry Theory according to which asymmetric relations are the core relations of the Language Faculty.<sup>2</sup>

## 2.2 Functional projection

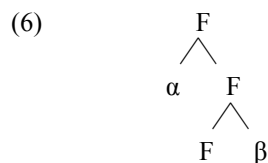
Compounds are traditionally classified in terms of root, deverbal, and *dvandva* (from Sanskrit, literally ‘two-and-two’ meaning ‘pair’) compounds. Root compounds instantiate a modification relation (see (4a)). Deverbal compounds (see (4b)) include a predicate-argument relation.<sup>3</sup> Dvandva compounds (see 4c)) are formed by the apposition of two constituents, each one contributing equally to the interpretation of the construct.

- (4) a. catfish  
 b. cigar cutter  
 c. learner driver

I propose that compounds have the unifying configurational property, which is an instance of the basic asymmetry of morphological relations:

- (5) *The F-tree hypothesis*  
 A compound includes a minimal functional (F) tree.

According to the hypothesis in (5), all compounds include the projection in (6), where F is a functional head. The other constituents of a compound may occupy the specifier of the F-tree, may take the whole F-tree as a complement, or may be located in the complement of the F-tree.



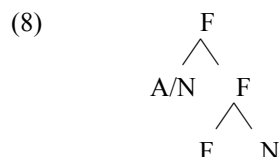
A first argument in favor of the hypothesis in (5) comes from the fact that a root compound (see (7)) includes a modification relation which, by standard assumptions is a functional relation (see Cinque 1999, Carlson 2003). Thus, the first constituent of a root compound in English, whether an adjective (A) or a noun (N), occupies the specifier of an F-tree, i.e., the position  $\alpha$  in (6)). Given the *Hierarchy of Homogeneous Projections* (Di Sciullo 2005: 30), according to which only functional projections are headed by functional heads which asymmetrically c-command lexical projections headed by lexical heads, the second

<sup>2</sup> Asymmetry has been shown to be a property of syntactic relations (Kayne 1994, Moro 2000, Chomsky 2000), phonological relations (Hulst and Ritter 2003, Raimy 2000), and morphological relations (Di Sciullo 2003a, Hale and Keyser 2002, Roeper 1999). See Di Sciullo (2003b, c) for discussion.

<sup>3</sup> In a root compound, the modifier restricts the denotation of the head, e.g., a *catfish* is a sort of fish, a *nervous system* is a sort of system; *sky blue* describes a sort of blue, and *blue gray* describes a sort of gray. In a deverbal compound the complement satisfies an argument of the (de)verbal predicate. I assume, as in Di Sciullo (1992, 1996), that argument structure is part of the derivation of deverbal compounds only, while modification relations can be part of both sorts of compounds, deverbal or root.

constituent of a root compound in English is located in the complement position of the F-tree, i.e., the position  $\beta$  in (6), see (8).

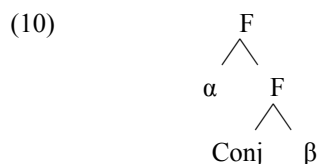
- (7) a. black board, happy hour, floppy disk  
 b. blue gray, pink orange, dark beige  
 c. fountain pen, ash tray, golf ball



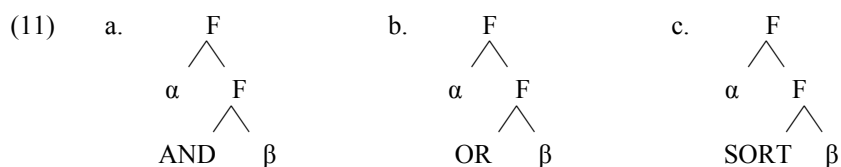
A second argument in favor of the F-tree hypothesis is that an F-tree must be part of the structure of compounds for interface legibility consideration. Thus, a connective must be PF legible in *dvandva* compounds such as the ones in (9a), which are not well formed otherwise (see (9b)):

- (9) a. bed-and-breakfast, hit-and-run, truth-or-dare  
 b. \*bed-breakfast, \*hit-run, \*truth-dare

Conjunctions and disjunctions are functional categories, and their presence in compounds provides evidence that compounds include a functional projection.<sup>4</sup> Since there is no modification relation between the members of a *dvandva* compound, the specifier position of the Conj-tree, i.e., the position  $\alpha$  in (10), cannot be the locus of one of the constituents of the compound. The only option available is that the first constituent takes the Conj-tree as its complement and the second constituent occupies the complement position of the Conj-tree, i.e., the position  $\beta$  in (10).



The F-tree is required at LF for semantic interpretation. AND and OR are operators providing the semantic relation between the constituents of *dvandva* compounds, whether they are legible at PF (e.g., *hit-and-run*, *truth-or-dare*) or not (e.g., *a win-win situation*, *a mother-child conversation*). SORT is another semantic head that relates the constituents of root compounds (e.g., *kitchen towel*, *happy hour*, *blue gray*) (see (11)).

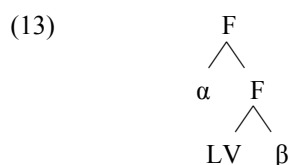


The F head bears the semantic features relating the parts of compounds whether or not the F head is legible at PF.

<sup>4</sup> See Larson (1990), Munn (1992), Thiersch (1993) and Kayne (1994) for discussion on the asymmetric properties of coordination structures.

The F-tree is also required for phonetic interpretation. In this respect, the languages from the Balkan family, including Modern Greek (MG), provide evidence for the presence of an F-tree in compounds.<sup>5</sup> In MG, all compounds include a linking vowel (LV) *-o-* (see (12)), which is analyzed as a functional head in Di Sciullo (2005) (see (13)). The PF legibility of F, here the LV, is dependent on the morpho-phonological features of the constituents of a compound. In MG for example, the LV must occur if the first member of the compound is a stem and the second member starts with a consonant.

- (12) a. pagvuno (MG) (root)  
 pag-LV-vun- -o  
 ‘ice mountain-NEU NOM-SG’  
 ‘ice-berg’
- b. kapnokalierjia (deverbal)  
 kapn-LV-kalierg- -i- -a  
 tobacco cultivate -ion-FEM NOM-SG  
 ‘tobacco-cultivation’



The LV is also found in other languages, including English and the Romance languages in a much more restricted set of compounds, where the first member is a stem (e.g., *lexic-o-semantic*, *syntactic-o-pragmatic*; *ital-o-américain* ‘Ital-o-American’, *sad-o-masochiste* ‘sad-o-masochist’ (Fr)). In English and in the Romance languages, the semantic relation between the parts of compounds with an LV is restricted to a coordination relation.

Thus, the motivation for the F-tree hypothesis is twofold. First, a compound with a modification relation includes the F-tree, since modifiers occupy the specifier of functional projections. Second, the F-tree must be part of compounds for interface legibility. Since it must be at LF, the F-tree is part of the derivation of compounds even in the cases where it is not legible at PF.

### 3. Cross-linguistic variation

The linear order of the constituents of a compound varies cross-linguistically. In some languages, including Yekhee, a North Central Edoid language from the Niger-Congo family, the affixal head is at the left periphery of the construct, whereas it is at the right periphery in other languages, including English (see (14)).<sup>6</sup>

- (14) a. ò- gwà ókò (Ye)  
 er- drive car  
 driver car  
 ‘driver’
- b. ò- dò áki  
 er- sell market (wares)  
 seller- market (wares)  
 ‘trader’

<sup>5</sup> I thank Angela Ralli for the Modern Greek data.

<sup>6</sup> I thank Grace Masagbor for the Yekhee data.

- c.      ò- gbè èlàmi  
          er- kill meat  
          killer - meat  
          ‘butcher’

I focus on French and English precedence relations, as they present a quasi mirror image of one another. Consider the following examples, including root, deverbal, and *dvandva* compounds:

- (15) a.      poisson chat      (Fr)  
          b      catfish  
          c.      bleu nuit      (Fr)  
          d.      night blue  
          e.      gris pâle      (Fr)  
          f.      pale gray  
          g.      papier à lettres      (Fr)  
          h.      letter paper  
          i.      coupe-cigar      (Fr)  
          j.      cigar cutter  
          k.      porte-plume      (Fr)  
          l.      pen-holder  
          m.      déchiqueteuse à papier (Fr)  
          n.      paper-shredder

The difference in the precedence relations follows if English compounds are derived in  $D_M$ , and French compounds are derived in part in  $D_S$ .<sup>7</sup> The arguments in favor of this hypothesis are the following.

First, French compounds have the internal structure of syntactic phrases, whereas this is not the case for English compounds. In French root compounds the modifier may follow the head (see (15a, c, e, g)), as it is the case in French syntax, in English the modifier precedes the substantive head (15b, d, f, h), whereas in English syntax it may follow it. In French, the complement follows the (de)verbal head (15i, k, m), whereas in English it precedes it (15j, l, n). If French compounds are derived in  $D_S$ , the position of the (de)verbal head follows from the fact that syntactic phrases are head-initial. If English compounds are derived in  $D_M$ , their head-final property follows from the Right Hand Rule (see Williams 1981, Di Sciullo and Williams 1987). The ordering of the constituents of compounds would not follow from the grammar without further stipulations if French compounds were derived in  $D_M$  and English compounds were derived in  $D_S$ . French morphological objects are right-headed (see (16)), and the fact that French compounds are left-headed would require further stipulations. English syntactic phrases in English are left-headed (see (17)), and the fact that English compounds are right-headed would also require further stipulations.

- (16) a.      lire      (Fr)  
               ‘read’  
          b.      lis-ible  
               ‘legible’  
          c.      lis-ibil-ité  
               ‘legibility’

<sup>7</sup> This divide is proposed in Di Sciullo (1982), and in Di Sciullo and Williams (1987) in a model in which the derivations are linearly organized: morphology precedes syntax. I recast this hypothesis in the Asymmetry framework, in which derivations are parallel and units of the computation are transferred from one plane of the computational space to the other.

- (17) a. read a paper  
 b. reading of papers  
 c. readability of the paper

Second, evidence for the  $D_M/D_S$  divide comes from the position of adjectives in compounds. In French syntax, adjectives may precede or follow the head noun, given certain restrictions—evaluative (restrictive modifiers, speaker-oriented) are generally pre-nominal, whereas descriptive (classifiers) are generally post-nominal. As expected, in French compounds, adjectives follow the noun (see (18)). This fact does not follow if French compounds are derived in  $D_M$ . On the contrary, in English syntax, adjectives are generally pre-nominal. As predicted by a morphological derivation, they appear in final position, when they head the compounds (see (19a)); they occur pre-nominally when they do not head the compound (see (19b)).

- (18) a. Peau-Rouge (Fr)  
       ‘redskin’  
       b. \*Rouge-Peau  
       ‘redskin’
- (19) a. sky blue, powder blue  
       b. red snapper, black eye

Third, in French compounds inflectional features can be PF legible, either in root compounds (see (20) where the nominal head is inflected) or in deverbal compounds (see (21) where the verb is inflected for 3<sup>rd</sup> person present). The fact that in (21) the verbal inflection is fixed does not undermine the hypothesis that French compounds are derived in  $D_S$ , since in Asymmetry Theory, syntactic domains may be transferred to  $D_M$ , where their internal structure is no longer accessible to the operations of  $D_S$ .

- (20) a. des  
       ‘frogmen’  
       b. des bateaux-mouches
- (21) a. porte-documents  
       ‘brief case’  
       b. coupe-papier  
       ‘paper cutter’

Fourth, as discussed in Di Sciullo (1982), French compounds may include a phrasal constituent, VP, PP, AP, NP (see (22)). This fact would be unexpected if these constructs were derived in  $D_M$ . The fact that they include a phrasal constituent follows if they are derived in  $D_S$  and then transferred in  $D_M$ .

- (22) a. trompe-la-mort  
       cheat the death  
       ‘trompe-la-mort’  
       b. un à côté  
       a at side  
       ‘(an) aside’  
       c. dur à cuire  
       hard to cook  
       ‘hard cookie’

- d. homme de paille  
man of straw  
'strawman'

Finally, a grammatical formative (the morphological spell-out of case) must be part of root compounds, (see (23)) and deverbal compounds (see (24)). This is expected if they are derived in  $D_S$ , where a grammatical formative must intervene between a nominal head and its complement.

- (23) a. corbeille à papier  
basket for paper  
'waste basket'  
b. chemin de fer  
road of steel  
'railway'
- (24) a. déchiqueteuse à papier  
shredder of paper  
'paper shredder'  
b. chauffeur de taxi  
driver of taxi  
'taxi driver'

The facts above provide evidence that English compounds are derived in  $D_M$ , whereas French compounds are derived in  $D_S$  and transferred in  $D_M$ . Thus, the variation between English and French compounds with respect to the ordering of their constituents reduces to the choice of a sort of derivation within the fully parallel model of grammar (see (25)). Compounds are not different from causatives in this respect, since languages have morphological, syntactic, or both sorts of causatives (see Di Sciullo and Williams 1987; Pyllkanen 2002).<sup>8</sup>

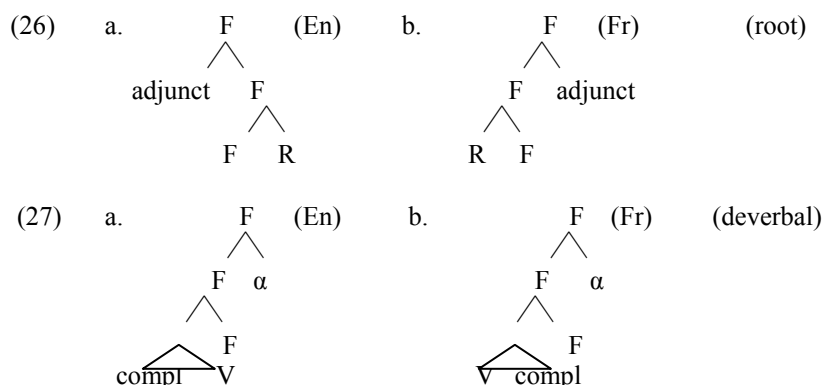
- (25) C(ompounds) variation matrix
- |                        |              |              |
|------------------------|--------------|--------------|
|                        | $D_M$        | $D_S$        |
| $C_{\text{English}}$ : | $\checkmark$ |              |
|                        |              |              |
| $C_{\text{French}}$ :  |              | $\checkmark$ |

Given Asymmetry Theory and the C-variation matrix in (25), it follows that the first constituent of an English compound is an adjunct. Adopting the analysis of adjuncts as specifiers of functional projections (Cinque 1999), the first constituent of a root compound occupies the specifier position of a functional projection (see (26a)). In contrast, in French, the

<sup>8</sup> The C-variation is the consequence of independent properties of the languages under consideration, given the Flip operation, which applies in the phonological dimension of the computational space ( $D_\Phi$ ) to objects transferred from  $D_M$  and  $D_S$  under different conditions. Assuming, as in Di Sciullo (2005) that there are argument features [ $\pm A$ ] in  $D_M$ , but no phrasal 'argument of' relation, non phrasal modification relations may be legible to the right of a functional head in French, whereas this is not the case in English. English compounds may only be derived in  $D_M$ , given M-Flip, which applies only when the specifier of a minimal tree is PF legible (see (31)). French compounds may only be derived in  $D_S$ , given that S-Flip applies when the specifier of a minimal tree is PF legible (see (37)). See Di Sciullo (2005) for discussion.



adjunct is the second element of a root compound and it follows the root (R) (see (27b)). Furthermore, the first constituent of an English deverbal compound is a complement (see (28a)), whereas it is a verbal head in French (see (28b)). As there is no variation in the order of the constituents in French and English *dvandva* compounds, I will discuss their properties in section 4.3.



Thus, if English compounds are derived in  $D_M$ , correct predictions can be made with respect to their form, given independent properties of morphological derivations and morphological objects. If French compounds are derived in  $D_S$ , correct predictions can be made with respect to their form, given independent properties of syntactic derivations and syntactic objects.

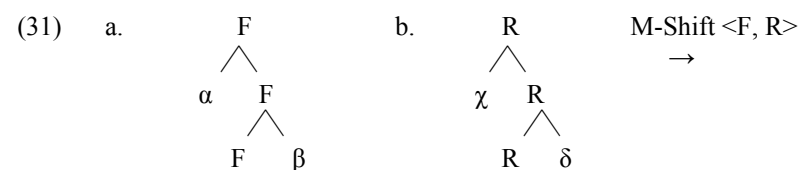
#### 4. Root, deverbal, and *dvandva*

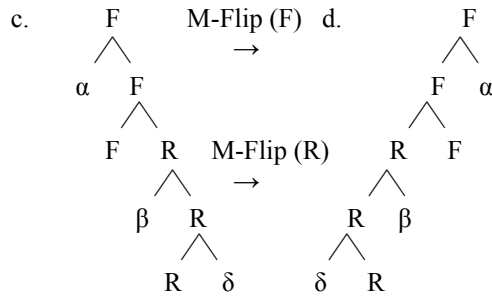
In this section, I illustrate the derivation for the three sorts of compounds. Given Asymmetry Theory,  $D_M$  compounds, whether root, deverbal, or *dvandva*, are derived by the application of M-Shift to two minimal trees. M-Shift may apply recursively to derive multi-member compounds. M-Link applies to derived structures in order to relate morphological features. M-Flip derives the mirror image of a tree—transferred from  $D_M$  or  $D_S$  to  $D_\Phi$ —in  $D_\Phi$ , and contributes to linearization (see (28)-(30)). The structures in (31) illustrate the application of M-Shift ( $\alpha$ ,  $\beta$ ), M-Flip (F), and M-Flip (R), where  $\alpha$  is an F-tree (F), and  $\beta$  is a root (R) tree:

(28) *M-Shift* ( $T_1$ ,  $T_2$ ): Given two trees  $T_1$  and  $T_2$ , M-Shift ( $T_1$ ,  $T_2$ ) is the tree obtained by attaching  $T_2$  to the complement of  $T_1$ . (Di Sciullo 2005: 31)

(29) *M-Link* ( $T$ ): Given a tree  $T$  containing a position  $\delta_1$  and a position  $\delta_2$ , such that  $\delta_1$  sister-contains  $\delta_2$  and  $\delta_1$  agrees with  $\delta_2$ , M-Link ( $T$ ) is the tree obtained by creating a featural relation between  $\delta_1$  and  $\delta_2$ . (Di Sciullo 2005: 32)

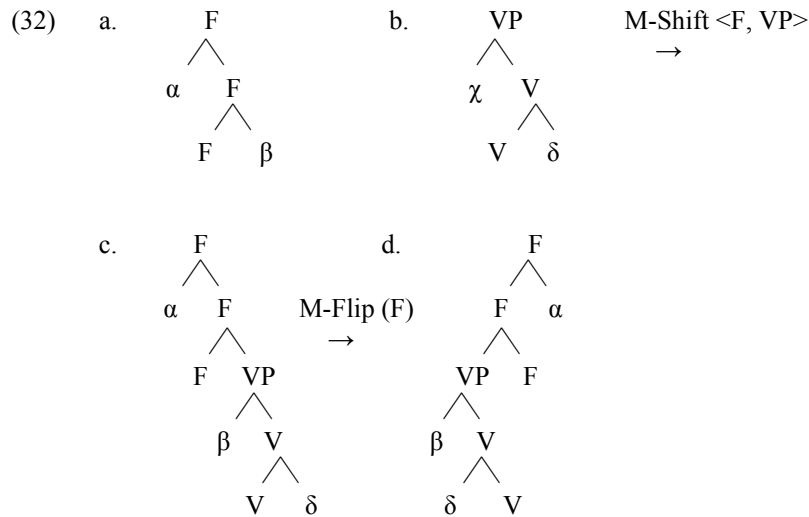
(30) *M-Flip* ( $T$ ): Given a minimal tree  $T$  such that the Spec of  $T$  has no PF features, M-Flip ( $T$ ) is the tree obtained by creating the mirror image of  $T$ . (Di Sciullo 2005: 135)





The derived structures (32c, d) qualify as a morphological domain (or M-Shell), since it satisfies *Strict Asymmetry* (Di Sciullo 2005:21) according to which every element is in asymmetric relation with another element of the same sort. In (32c,d), F asymmetrically c-commands R,  $\alpha$  asymmetrically c-commands  $\beta$ , and  $\beta$  asymmetrically c-commands  $\delta$ .

$D_S$  compounds, whether root, deverbal, or dvandva, are derived by the recursive application of S-Shift to two unanalyzed objects. When derived, a syntactic domain is transferred to  $D_M$ , where it undergoes M-Shift, and becomes a morphological domain. For example, M-Shift takes the tree in (32b) derived in  $D_S$  and substitutes it to the complement position of the F-tree in (32a). The resulting tree in (32c) also qualifies as a morphological domain with respect to Strict Asymmetry, notwithstanding the fact that the lower layer of the domain is derived in  $D_S$ .



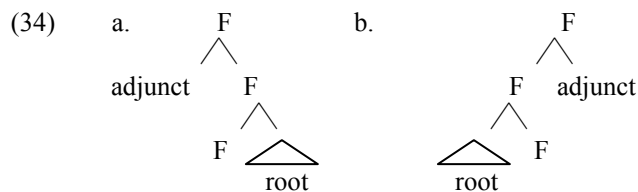
In the following section, I further discuss the derivation of compounds. For simplicity, I will not expand the minimal tree if the elements it contains are not relevant in the discussion. However, the structure of compounds necessarily includes two layers of asymmetric relations; it includes an M-Shell.

#### 4.1 Root compounds

Root compounds instantiate an adjunct-head relation, independently of the categorial features of the constituents (see (33)). The adjunct restricts the reference of the head of the construct, e.g., a *coffee table* is a sort of table, and a *gray blue* is a sort of blue.

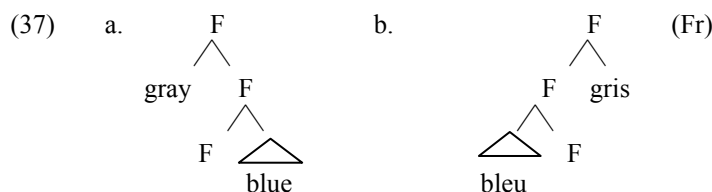
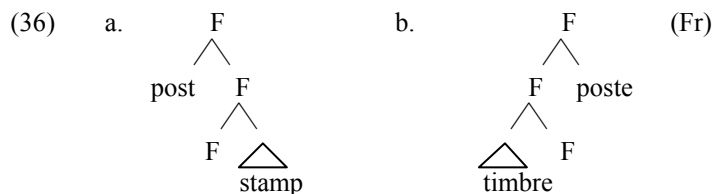
- |      |    |                |    |                   |
|------|----|----------------|----|-------------------|
| (33) | a. | post stamp     | a. | timbre poste (Fr) |
|      | b. | coffee table   | b. | table à café      |
|      | b. | nervous system | c. | système nerveux   |
|      | d. | gray blue      | d. | bleu gris         |

In English root compounds, the first constituent of the compound is an adjunct, and thus occupies the specifier of the F-tree, the second element occupies the complement of the F-tree. The relation between the first element and the second is mediated by an F head, which is not PF legible (see (34a)). In French root compounds, given the C-variation matrix, the first constituent is the head and it occupies the complement position of the F-tree, the second constituent sits in the specifier of the F-tree (see (34b)). This tree is derived in  $D_\phi$  by the application of S-Flip (see (35)).

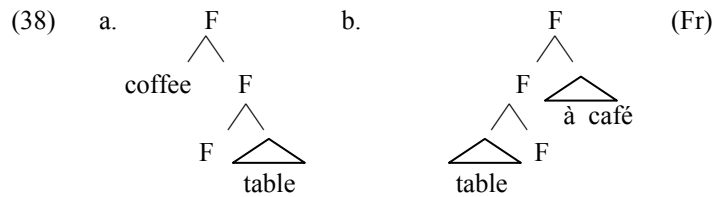


- (35) *S-Flip (T)*: Given a minimal tree  $T$  such that the Spec of  $T$  has PF features,  $S\text{-Flip}(T)$  is the tree obtained by creating the mirror image of  $T$ . (Di Sciullo 2005: 135)

In A-N and A-A compounds, the first constituent is an adjunct and the second constituent is the head. According to our analysis, the two elements are related by a functional F head, which is not PF-legible. Given the F-tree hypothesis and the C-variation matrix, root compounds structures are depicted in (36): (36a) is the adjunct-head structure of English compounds and (36b) is the head-adjunct structure of French compounds. The structures in (37) with adjectival constituents only are similar: both adjectives are located in the specifier position of their F-tree.



In French, root compounds may include a phrasal constituent. A preposition precedes the phrasal constituent and is generally one of the set of grammatical prepositions, such as *de* and *à*, as in *serviette de table* and *table à café*. I will take the PP constituent to be located in the specifier of the F-tree. This is illustrated in (38b).



The properties of French and English root compounds with adjectival constituents also follow from the theory. In English, the adjective in initial position is an adjunct to the nominal head or the adjectival head. This is the case because English compounds are derived in  $D_M$  and the position of the head is final in English morphology. In French, the adjective is post-nominal, as French compounds are derived in  $D_S$  and most adjectives may occur post-nominally in French syntax. Since they are derived in  $D_S$ , the fact that French compounds may also include a phrasal constituent also follows from the theory.

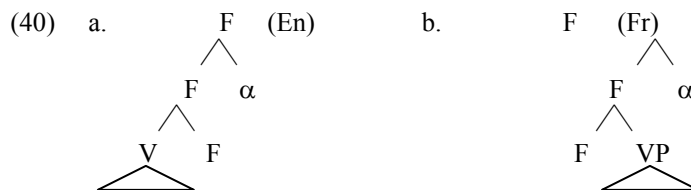
#### 4.2 Deverbal compounds

Contrary to root compounds, deverbal compounds affect the argument structure of the verbal constituent. Their derivation differs from the derivation of root compounds, whether they are derived in  $D_M$  or in  $D_S$ . Consider the following examples:

- (39) a. ball throw e. lance-pierre (Fr)  
 b. bottle-opener 'stone thrower'  
 c. movie producer f. producteur de film

A deverbal compound includes argument structure calculus. I showed in Di Sciullo (1992) on the basis of Italian that arguments that are saturated within a deverbal compound are no longer available for saturation outside of that compound. Compound specific constraints have been proposed to account for the restrictions on deverbal compound argument structure, including Roeper and Siegel's (1978) First Sister Principle, and Grimshaw's (1990) Prominence Theory. The fact that deverbal compounds manipulate the argument structure makes them different from root compounds. Their properties follow directly from the operations of the grammar, given the C-matrix variation, without requiring additional principles, as can be seen in what follows.

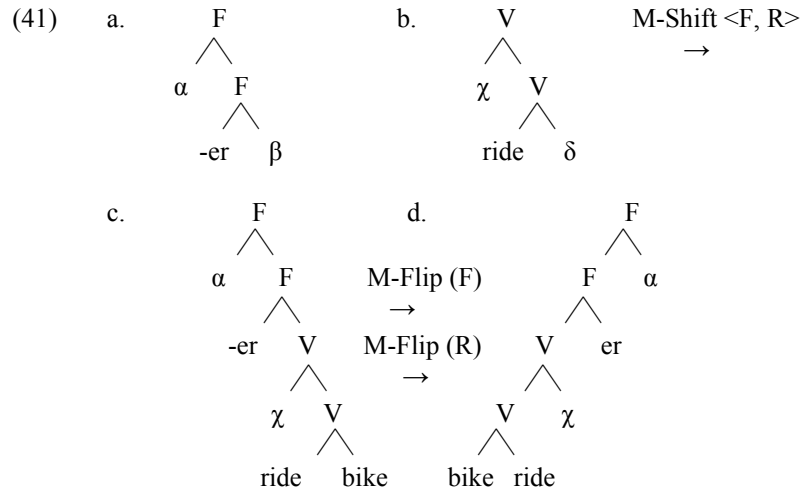
According to the F-tree hypothesis, an F-tree is part of the derivation of English and French deverbal compounds:



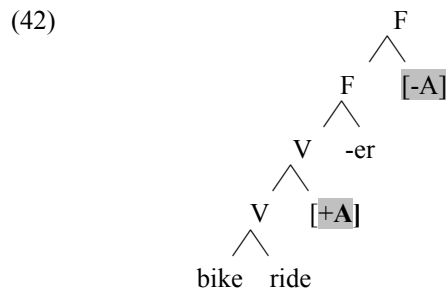
The central difference between English and French compounds is the order of the constituents within the verbal root projection. In English, the complement precedes the root, whereas in French it follows the root. This difference follows from the hypothesis that English compounds are derived in the morphology, whereas French compounds are derived in the syntax and transferred to the morphology.

In English, a deverbal compound can be formed of a bare noun and a verbal root, e.g., *to bike-ride*, a derivational affix may also be part of the construct, e.g., *a bike-rider*, and the bare noun satisfies an argument of the verb. M-Shift applies to F-tree and the R-tree yielding

(41c). M-Flip applies for linearization, since the specifiers of the minimal trees have no PF legible features.



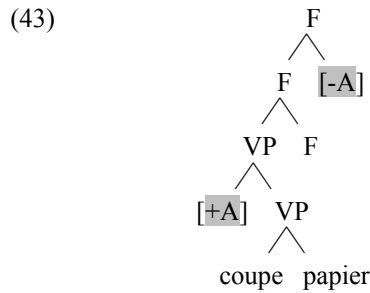
The internal argument of the base verb may be saturated within the compound, as in *bike-rider*, and this argument is no longer available for saturation in  $D_S$ , e.g., *\*John bike-rides a bike*. Moreover, M-Link applies to value the [-A] features (see (42)).



Deverbal compounds may also include a modifier, as in *easy-rider*. The derivation of such compounds proceeds as above, except for the following difference: there is no asymmetric linking of the [-A] features, which are not active in the derivation. Empirical evidence to this effect is that the internal argument of the base verb cannot be saturated outside of the compound, as in *\*John is an easy-rider of bikes*.

Thus, English deverbal compounds, whether they include a nominal non-head satisfying an internal argument of the base predicate or a modifier of that predicate are derived straightforwardly.

French deverbal compounds such as *coupe-papier* ‘paper cutter’ and *coupe-la-soif* ‘thirst-quencher’ have an internal head-complement structure. The first constituent is a (de)verbal head; the second constituent is its complement. The construct includes an F-tree asymmetrically c-commanding the verbal complex. In the case at hand, the head of the F-tree is not PF-legible:



M-Shift substitutes the syntactic VP domain to the complement position of the F-tree, and M-Flip applies to the upper layer of the shell deriving a mirror image of the F-tree

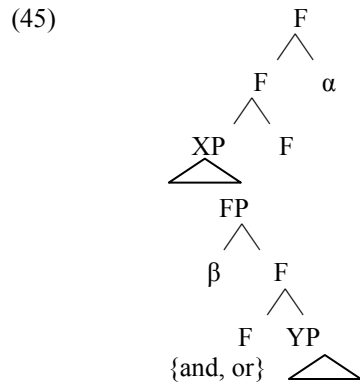
French deverbal compounds may also include an adverbial modifier, as in *lève-tôt* ‘early-bird’ and *couche-tard* ‘night owl’. In the derivation of deverbal compounds including an adverb, S-Flip applies in the Modifier layer of the construct. The proposed analysis correctly predicts that the bare adverbs will be post-verbal, since French compounds are derived in  $D_S$ . As is the case for compounds including a modification relation, there is no [-A] linking that would result from the application of M-Link to the M-Shell.

### 4.3 Dvandva compounds

In a dvandva compound, the F-tree asymmetrically relates the constituents of the compound. Here again, in some cases the F head is PF legible (see (44a)). When F is overt, no reordering is possible either, e.g., *\*a breakfast-and-bed*. The fact that no inverse ordering is observed between English and French dvandva compounds (see (44d)) suggests that they are derived in the syntax in both languages. Thus, the conjunction or disjunction domain is derived in  $D_S$  and transferred to  $D_M$ . Moreover, the denotation of the whole compound is not a function of the denotations of its parts. For example, a *learner-driver* is neither a learner nor a driver, but both. There must be a head projection which is superior to the whole conjunct. Moreover, the abstract head is required as dvandva compounds may be formed with pairs of Ns, ADJs, as well as Ps and Vs, but are nevertheless [+N] compounds, either N or A. Thus, in  $D_M$ , M-Shift substitutes the transferred conjunction domain to the complement of a categorically unspecified F-tree (see (45)).<sup>9</sup>

- (44)
- a. bed-and-breakfast, hit-and-run, truth-or-dare
  - b. an in-and-out visit, a pipe-and-slipper husband
  - c. un aller-retour, un touché-frappé (Fr)  
a go return, a touch hit  
‘a round trip’,
  - d. une conversation mère-enfant  
‘a mother-child conversation’
  - d. l’alliance France-Italie, le Paris-Brest (Fr)  
‘the France-Italy alliance’, ‘the Paris-Brest’

<sup>9</sup> The asymmetric structure of dvandva compounds, ensured by the intermediate F head, is independent of the categorial properties of the parts of the compounds, which brings additional evidence that configurational asymmetry is independent of specific categorial features.

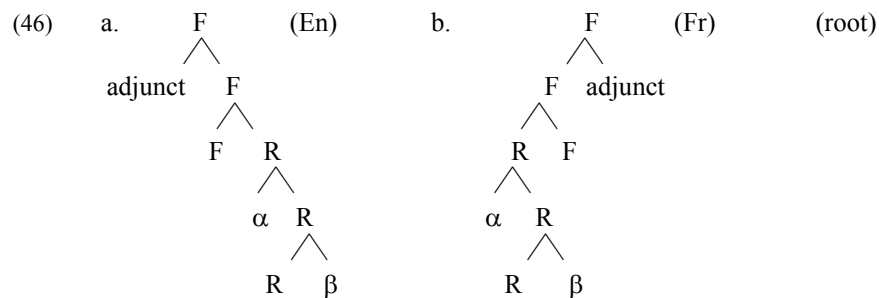


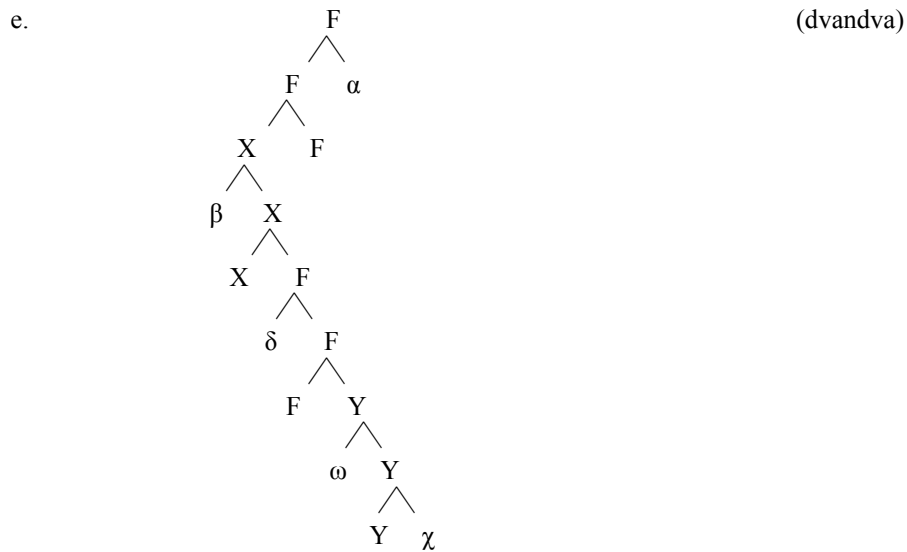
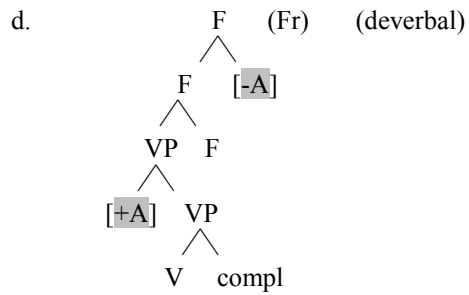
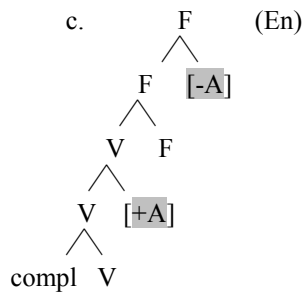
Thus, root and deverbal compounds differ from dvandva compounds. The first is a modifier-head relation and the second is a predicate-argument structure relation, dvandva are conjunction relations derived in  $D_S$  and transferred to  $D_M$ . In the case of dvandva compounds, the asymmetric property of the relations constituting compounds is enforced by the presence of an intermediate functional head, which can be overt in some cases and which is the site of the logical relation bridging the first element of the compound to the second. English and French root compounds differ in the choice of  $D_M$  or  $D_S$ . Dvandva and deverbal compounds are derived in  $D_S$  in both languages and transferred to  $D_M$  to integrate into the M-Shell.

## 5. Summary

In this paper, I argued that compounds include a functional projection. This property is expected given the asymmetry of morphological relations. Compounds are not symmetric structures; they are morphological domains where *Strict Asymmetry* holds.

Given Asymmetry Theory, the derivation of compounds is straightforward. Compounds are derived by the application of the operations of the grammar in the morphological or the syntactic planes of the computational space. Isolable domains of the computation can be transferred from one plane to the other before reaching the interfaces, where they are legible by the external systems. The proposed analysis captures the generic as well as the cross-linguistic properties of compounds. The C-variation matrix allows for either a morphological or a syntactic derivation of compounds, the internal properties of which follow then from the operations of  $D_M$  or  $D_S$ , given the fully parallel architecture of the grammar. The following trees are generated in the derivation of compounds:





The structure in (50a) is the structure of English root compounds, while the structure in (50b) is the structure of French root compounds. The structures in (50c) and (50d) are the structures of English and French deverbal compounds respectively. Finally the structure in (50d) is the structure of dvandva compounds for both languages. In all cases, an F-tree is part of these domains of computation. The presence of the F-tree in compounds provides additional evidence for the asymmetry of morphological relations, as discussed in Di Sciullo (2005), mainly on the basis of derivational morphology. In this paper, I have provided arguments to show that even in the case of compounds, root, deverbal or dvandva, asymmetric relations must be part of the derivations and are legible at the interfaces.

## References

- Adger, D. 2003. Stress and phrasal syntax. GLOW abstract.
- Carlson, G. 2003. Interpretive asymmetries in major phrases. In A.M. Di Sciullo, ed., *Asymmetry in Grammar. Volume 2: Morphology, Phonology and Acquisition*, 301-315. Amsterdam/ Philadelphia: John Benjamins.
- Chomsky, N. 2005. On phases. To appear in C. Otero et al. eds. *Foundation of Theoretical Linguistics*. Cambridge Mass.: The MIT Press.
- Chomsky, N. 2001. Derivation by phase. In M. Kenstowicz, ed., *Ken Hale: A Life in Language*, 1-52. Cambridge, Mass: The MIT Press.



- Chomsky, N. 2000. Minimalist inquiries. In R. Martin, D. Michaels and J. Uriagereka (Eds.) *Step by Step. Essays on Minimalist Syntax in Honor of Howard Lasnik*, 89-155. Cambridge, Mass.: The MIT Press.
- Chomsky, N. 1995. *The Minimalist Program*. Cambridge, Mass.: The MIT Press.
- Chomsky, N. and M. Halle. 1968. *The Sound Pattern of English*. New York: Harper & Row.
- Cinque, G. 1999. *Adverbs and Functional Projections. A Cross-Linguistic Perspective*. New York: Oxford University Press.
- Cinque, G. 1993. A null theory of phrase and compound stress. *LI* 24, 239-297.
- Di Sciullo, A.M. 2005. *Asymmetry in Morphology*. Cambridge, Mass.: The MIT Press.
- Di Sciullo, A.M. 2003c., ed. *Asymmetry in Grammar. Volume 1: Syntax, Semantics*. Amsterdam/ Philadelphia: John Benjamins
- Di Sciullo, A.M. 2003b., ed. *Asymmetry in Grammar. Volume 2: Morphology, Phonology and Acquisition*. Amsterdam/ Philadelphia: John Benjamins.
- Di Sciullo, A.M. 2003a. Morphological relations in Asymmetry Theory. In A.M. Di Sciullo, ed., *Asymmetry in Grammar. Volume 2: Morphology, Phonology and Acquisition*, 9-36. Amsterdam/ Philadelphia: John Benjamins.
- Di Sciullo, A.M. 2002. The asymmetry of morphology. In P. Boucher, ed., *Many Morphologies*. Pp. 2-28. Cascadilla Press.
- Di Sciullo, A.M. 1996. X<sup>0</sup>/XP Asymmetries. *Linguistic Analysis* 26, 1-26.
- Di Sciullo, A.M. 1992. Deverbal compounds and the external argument. In I. Roca, ed., *Thematic Structure. Its Role in Grammar*, 65-72. Berlin, New York: Foris Publications.
- Di Sciullo, A.M. 1982. Des principes généraux qui couvrent la syntaxe et la morphologie : le cas des composés syntaxiques. *Recherches linguistiques à Montréal*, vol. 18 : 197-210.
- Di Sciullo, A.M. and Williams, E. 1987. *On the Definition of Word*. Cambridge, Mass.: The MIT Press.
- Grimshaw, J. 1990. *Argument Structure*. Cambridge, Mass.: The MIT Press.
- Hale, K. and Keyser, S. J. 2002. *Prolegomenon to a Theory of Word Formation*. Cambridge, Mass.: The MIT Press.
- Hulst, Harry van der and Nancy Ritter. 2003. Levels, constraints, and heads. In A.M. Di Sciullo, ed., *Asymmetry in Grammar. Volume 2: Morphology, Phonology and Acquisition*, 147-188. Amsterdam/ Philadelphia: John Benjamins.
- Kayne, R. 1994. *The Antisymmetry of Syntax*. Cambridge Mass.: The MIT Press.
- Larson, R. K. 1990. Double objects revisited. Reply to Jackendoff. *Linguistic Inquiry* 21: 335-391.
- Lieber, R. 1992. *Deconstructing Morphology*. Chicago and London: Chicago University Press.
- Marantz, A. 2003. Pulling words up by the root. Handout, McGill.
- Moro, A. 2000. *Dynamic Antisymmetry*. Cambridge Mass.: The MIT Press.
- Munn, A. 1992. Topics in the syntax and semantics of coordination structures. Doctoral dissertation . University of Maryland.
- Raimy, E. 2000. Remarks on backcopying. *Linguistic Inquiry* 31: 541-552.
- Roeper, T. 1999. Leftward movement in morphology. Ms. UMASS.
- Roeper, T. and W. Snyder. 2005. Language learnability and the forms of recursion. In A.M. Di Sciullo, ed., *UG and External Systems. Language, Brain, and Computation*, 155-170. Amsterdam/ Philadelphia: John Benjamins.
- Roeper, T. and Siegel, D. 1978. A lexical transformation for verbal compounds. *Linguistic Inquiry* 9: 199-260.
- Selkirk, E. 1982. *The Syntax of Word*. Cambridge, Mass.: The MIT Press.
- Spencer, A. 1991. *Morphological Theory*. Cambridge: Cambridge University Press.
- Thiersch, C. 1993. On the formal properties of constituent coordination. Paper presented at the 16<sup>th</sup> GLOW Colloquium. *GLOW Newsletter* 30: 70-71.
- Uriagereka, J. 1999. Multiple spell-out. In S. D. Epstein and M. Hornstein, eds., *Working Minimalism*, 251-283. Cambridge, Mass.: The MIT Press.
- Williams, E. 1981. Argument structure and morphology. *The Linguistic Review* 1, 81-114.