

Linearization and Local Dislocation: Derivational Mechanics and Interactions*

DAVID EMBICK
University of Pennsylvania

1. Introduction

On the assumption that the syntax generates hierarchical representations that are accessed by both sound and meaning systems, it is an empirical question how the syntactic representation and the representation(s) referred to in different morphophonological processes relate to one another. In Chomsky and Halle [7:9], for example, this question is posed in terms of how two conceptions of *surface structure*, “output of the syntactic component” and “input to the phonological component,” relate to one another, with identity being a possibility that is excluded because of the existence of cases in which these two notions appear to differ. What is then required is a theory of the possible relationships between syntactic and phonological structures, on the assumption that in spite of some differences, the overall patterns are systematic. In terms of current models of syntax and its interfaces, this amounts to giving a theory of PF.

Since this set of questions was initially formulated, research in this area has identified a range of cases in which syntactic structure and phonological structure do not line up with one another, in a number of domains (prosodic phonology, cliticization, bracketing paradoxes, etc.). To the extent that phenomena of this type require syntactic and phonological representations that are distinct from one another, the further question is how great the differences are. I take it that the possible deviations are highly restricted in their scope, something that amounts to assuming a “restrained” view of PF. Within the context of a derivational framework, the program is to specify the different

*A version of this paper was presented at the colloquium at the University of Massachusetts, Amherst, the III Encuentro de Gramática Generativa at the University of Comahue in Neuquén, Argentina, and the colloquium of the CUNY Graduate Center. I am grateful to these audiences for raising a number of significant points that I have attempted to integrate into this written version. For additional comments on the work presented here I am indebted to Rajesh Bhat, Morris Halle, Alec Marantz, Marjorie Pak, and Dominique Sportiche. I also would like to thank an anonymous reviewer for this edition of *Linguistic Analysis* for a number of helpful points.

computations that augment and alter the syntactic representation. The central concern is thus to provide a theory in which sound/syntax connections (and thus sound/meaning connections) are as systematic as possible given the range of data to be accounted for.

In terms of specific proposals, one way of viewing a certain part of the research in the framework of Distributed Morphology is as an attempt to identify some of the relevant PF-mechanisms, and to answer attendant questions concerning their ordering, interaction, and so on. One component of this syntactic approach to morphology is a theory of the operations that apply on the PF branch of the grammar, with some traditionally "morphological" phenomena (allomorphy, phonological versus syntactic bracketing, syncretism) being addressed as part of a larger set of questions whose primary concern is the interface that mediates between hierarchical representations and their ultimate phonetic expression.

This article contributes to this line of research by examining the representation of linear order in the PF component of the grammar, as revealed by cases in which PF-rules affix one element to another under linear adjacency: *Local Dislocation* (LD). Part of what it means to have a theory of PF is to have a constrained theory of mismatches between syntax and morphophonology, and affixation under adjacency results in mismatches that any syntactic theory must account for. Moreover, by looking at the "special" cases—i.e., the cases in which some PF requirement triggers an operation resulting in a mismatch—some insight can be gained on linear representations in the normal case.

While the focus of this article is on the details of LD, it is important to view this operation in the context of a general theory of syntactic affixation. The fact that the conditions on affixation are sensitive to syntactic and post-syntactic notions of locality is a significant point with important architectural consequences; see Embick [14] and Embick and Marantz [18] for discussion. There are two primary components to the discussion below, which follow on some initial points about LD in section 2. Concentrating on the formal properties of LD, I examine in section 3 two different properties of linear representations that restrain the application of LD. It is argued that linearization statements that concatenate elements—and hence LD operations defined in terms of these—are *typed*, with the types being distinct structural objects defined by the theory of constituent structure. The second part of this formal characterization makes clear the idea that LD is (head-)adjunction under adjacency. Beyond these

formal properties of LD, another factor that potentially interacts with processes of this type is found in the idea that syntactic structures are interpreted at the interfaces cyclically. In section 4, I examine a specific way in which cyclic Spell-out interacts with PF operations and LD, based on an example from French prepositions and determiners. This case study paves the way for further investigation of cyclicity and the interface of syntax and PF.

1.1. Architectural Assumptions

The framework of *Distributed Morphology* is assumed here. This is a Non-Lexicalist theory of grammar, in which there is no generative Lexicon; this means that the derivation of complex objects takes place in the syntax, or in terms of operations that make reference to the output of the syntax (i.e., representations in the PF component).

I assume here a "dynamic" conception of PF, in which this component consists of an (ordered) set of computations that apply to the output of the syntax.¹ In the normal case, morphological structure is syntactic structure; i.e., PF operations that are "morphological" in nature apply to the structure that is the output of the syntax. This is part of a larger picture, in which structure generated by the syntax is modified in various ways at PF in accordance with that component's function of "packaging" syntactic representations for phonology.

The syntax derives hierarchical structures out of two types of terminal nodes. The first type, the *Roots*, correspond in many ways to the "lexical" or "open-class" vocabulary. The second type are functional heads (= "functional" or "abstract" morphemes). These feature bundles do not contain phonological representations in the syntax; rather, the phonological content of these nodes is added to them at PF. The process responsible for this is called *Vocabulary Insertion*. At PF, morphemes like T[past] (Tense with the feature [past]) have phonological material added to them, as specified in that language's *Vocabulary Items* (e.g., T[past] ↔ -ed). Following the application of Vocabulary Insertion, the node T[past] has a phonological matrix, e.g., T[past, -ed], where -ed is called the phonological *exponent* of this node.

¹ In some cases it appears that "PF" is used ambiguously in this sense and in the sense of "final phonological representation" (i.e., the output of the computations that are articulated in the dynamic view). Whatever the relevant notion of "final output" here might be, the point is that any derivational approach requires an account of what the different PF representations are and how they are derived.

A further set of operations in the PF part of the grammar linearize the hierarchical structure generated by the syntax. Local Dislocation, because it is defined in terms of linear adjacency, occupies an important position in the theory of linearization.

1.2. Linearization and Local Dislocation: Preliminaries

The starting point for the discussion of post-syntactic representations of linear order is the hierarchical representation generated in the syntax. An important assumption behind the project pursued in this article is that the structural notions relevant for PF representations and linearization are those defined by the constituent structure. For the purposes of this discussion, I take for granted certain notions that are operative in current research, such as “head,” “complex head,” and so on. The approach that is outlined here is exclusively structural. This means that, for example, the analysis makes no reference to the notion of “word” (prosodic or otherwise) as far as syntax and morphology are concerned—there are only structures (“head,” “terminal,” etc.) and their phonological interpretations. Whether or not there is ultimately the need for something like the *prosodic word* that cannot be defined structurally, it must be recognized that adding such an element to the ontology would constitute a significant modification.²

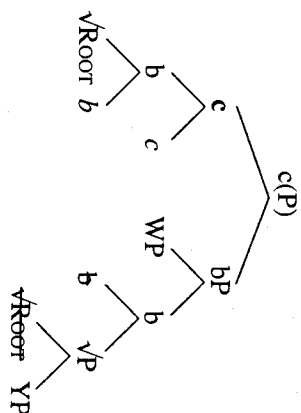
Some structures, and in particular the head, have an important status at PF. In particular, the normal case is for terminals within a single complex head to have an intimate phonological connection (“word-level phonology”). This aspect of the relationship between structure and phonology figures prominently in the discussion of section 3.

Some important structural notions are illustrated in (1). What (1) represents is a structure typical of head movement, in which a Root moves to functional head *b*, with the resulting complex then moving to functional head *c*:³

² For related questions concerning the general status of the prosodic hierarchy from the perspective of the kind of theory advanced here see Pak [28, 29].

³ Unpronounced instances of moved elements are presented in strikethrough. I do not address the question of how it is determined which instance of a moved item is pronounced.

(1) Hypothetical Structure



One possibility discussed below is that the syntactically significant objects in this representation—the complex head(s) and the terminals within such heads—are themselves the objects that figure in statements of linear order. As a preliminary to this component of the discussion, the following definitions from Embick and Noyer [13] are relevant:

(2) Definitions

- a. M-Word: (Potentially complex) head not dominated by further head-projection (cf. Chomsky [4] “*H_{max}*”)
- b. Subword: Terminal node within an M-Word (i.e., either a Root or a feature bundle)

Illustrating with reference to (1), boldfaced *c* is an M-Word, while italicized *Root*, *b*, *c* are Subwords. Part of what is being investigated here is the idea that only these objects can be referred to by PF processes, such that other structure (e.g., the “intermediate” *b* in the complex head in (1)) has no status as far as the theory is concerned. This idea is clearly related to a parallel premise for phrase structure.

The structure in (1) shows a complex head created by one kind of syntactic affixation, head movement. In many cases, a complex head is created by a process that is not head-movement as typically understood. Instead, one piece is affixed to another under adjacency: Local Dislocation, in the terminology employed here. This operation is a descendant of “merger under adjacency” (Marantz [23, 24], and

A further set of operations in the PF part of the grammar linearize the hierarchical structure generated by the syntax. Local Dislocation, because it is defined in terms of linear adjacency, occupies an important position in the theory of linearization.

1.2. Linearization and Local Dislocation: Preliminaries

The starting point for the discussion of post-syntactic representations of linear order is the hierarchical representation generated in the syntax. An important assumption behind the project pursued in this article is that the structural notions relevant for PF representations and linearization are those defined by the constituent structure. For the purposes of this discussion, I take for granted certain notions that are operative in current research, such as "head," "complex head," and so on. The approach that is outlined here is exclusively structural. This means that, for example, the analysis makes no reference to the notion of "word" (prosodic or otherwise) as far as syntax and morphology are concerned—there are only structures ("head," "terminal," etc.) and their phonological interpretations. Whether or not there is ultimately the need for something like the *prosodic word* that cannot be defined structurally, it must be recognized that adding such an element to the ontology would constitute a significant modification.²

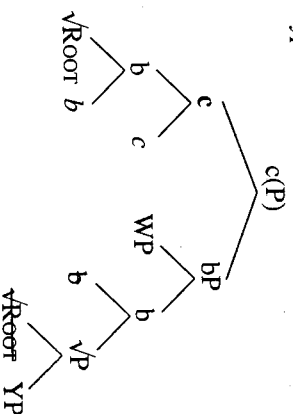
Some structures, and in particular the head, have an important status at PF. In particular, the normal case is for terminals within a single complex head to have an intimate phonological connection ("word-level phonology"). This aspect of the relationship between structure and phonology figures prominently in the discussion of section 3.

Some important structural notions are illustrated in (1). What (1) represents is a structure typical of head movement, in which a Root moves to functional head *b*, with the resulting complex then moving to functional head *c*:³

² For related questions concerning the general status of the prosodic hierarchy from the perspective of the kind of theory advanced here see Pak [28, 29].

³ Unpronounced instances of moved elements are presented in strikethrough. I do not address the question of how it is determined which instance of a moved item is pronounced.

(1) Hypothetical Structure



One possibility discussed below is that the syntactically significant objects in this representation—the complex head(s) and the terminals within such heads—are themselves the objects that figure in statements of linear order. As a preliminary to this component of the discussion, the following definitions from Embick and Noyer [13] are relevant:

(2) Definitions

- a. *M-Word*: (Potentially complex) head not dominated by further head-projection (cf. Chomsky [4] "H_{max}")
- b. *Subword*: Terminal node within an *M-Word* (i.e., either a Root or a feature bundle)

Illustrating with reference to (1), boldfaced *c* is an *M-Word*, while italicized *Root*, *b*, *c* are *Subwords*. Part of what is being investigated here is the idea that only these objects can be referred to by PF processes, such that other structure (e.g., the "intermediate" *b* in the complex head in (1)) has no status as far as the theory is concerned. This idea is clearly related to a parallel premise for phrase structure.

The structure in (1) shows a complex head created by one kind of syntactic affixation, head movement. In many cases, a complex head is created by a process that is not head-movement as typically understood. Instead, one piece is affixed to another under adjacency: Local Dislocation, in the terminology employed here. This operation is a descendant of "merger under adjacency" (Marantz [23, 24] and

related work) and ultimately of the "affix hopping" transformation of early generative grammar (Chomsky [3]),⁴

To take an example, the formation of English comparatives and superlatives shows distinct analytic and synthetic forms, depending on the phonological properties of the adjective involved:

- (3) a. Mary is more intelligent than John.
b. Mary is smarter than John.

As discussed in Embick [14] (extending Embick and Noyer [13]), the affixation of the comparative morpheme (Deg) occurs under linear adjacency. As far as the syntax is concerned, both types of comparatives in (3) have an identical structure: this is represented in (4), where Deg is part of a DegP that is attached to *αP*:

- (4) *Syntax of the Comparative*
[_{αP} [_{DegP} Deg...] [_{αP} Adjective...]]

At PF, there is a rule of Local Dislocation that affixes Deg to the adjective to produce a synthetic form when they are linearly adjacent, and when the adjective has the appropriate phonological properties. When the rule attaches Deg to the adjective as in (3b), Deg is realized as the "affix" *-er*, and the result is one "word" (i.e., a synthetic form). When the rule does not apply, Deg and the adjective are spelled out as two distinct "words," as in (3a).

In an abstract sense, Local Dislocation operations like that illustrated above take two separate elements—e.g., two M-Words—and create from them a single M-Word by affixing one to the other. Unlike the other types of syntactic affixation (head movement, Lowering), LD operates in terms of linear adjacency.

With reference to the structure in (1) and the definitions in (2), Embick and Noyer [13] define a "typed" conception of LD, in which the two categories of objects in (2) can only move with respect to one another:

- (5) *Typing assumption on LD*: M-Words only dislocate with adjacent M-Words, and Subwords with Subwords.

⁴In addition to this, some approaches discuss the need for a "downwards" operation with the same locality properties as head movement (head to head of complement); this is Lowering in the terminology of Embick and Noyer [13].

This condition imposes restrictions on the application of LD, and is investigated in further detail below.

2. Some Properties of Local Dislocation

In the following subsections I examine two instances of LD, with reference to some particular properties that are important to the theory under discussion. The first example, involving the placement of the Latin enclitic *-que* 'and,' illustrates the typing assumption (5), along with some of its consequences. It also illustrates the importance of a cyclic conception of PF operations. The second case, drawn from Lithuanian, is based on the distribution of the "reflexive" morpheme *-si*. This case study shows that *-si*, a Subword with a requirement that something appear to its left, must satisfy this requirement within its own M-Word. This appears to be a case in which the "word" is special for linear relations, but illustrates and in fact follows from (5) as well.

2.1. Illustration 1: Latin *-que*

The Latin enclitic *-que* 'and' appears in simple conjunctions as an enclitic on the second conjunct, as the following examples show with elements of different grammatical categories:⁵

- (6) a. Nouns:
 diu noctu-que
 'by day and by night'
b. Verbs:
 vivimus vigemus-que
 'we live and we flourish'
c. Adverbs:
 bene pudice-que adservatur
 '[She's] been chaperoned well and modestly'

⁵The properties of *que* are discussed in all standard reference works on Latin grammar; e.g. Kühnert and Stegmann [21], Sommer [35], Ernout and Thomas [15], Leumann et al. [22]. Theoretical discussions of this clitic in terms that line up with the assumptions of this discussion are found in Marantz [24] and Embick and Noyer [13].