

# Chapter 11 Lexical Categories and (Extended) Projection

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## 1. Syntactic structures as projections of lexical properties<sup>1</sup>

One of the most fundamental properties of human language is its hierarchical organization. A linguistic expression like (1a) is not merely a linear sequence of words, as in (1b), but is organized in a part-whole manner; i.e. two words (parts) may combine into a larger unit (whole), which in turn may combine with another word to form an even larger unit (whole), which again may combine with another lexical item to form an even larger syntactic unit, and so forth and so on. This part-whole organization of linguistic expressions is referred to as *phrase structure* or *constituent structure* (Carnie 2008).

- (1) a. three beautiful pictures of Sue  
b. [three] [beautiful] [pictures] [of] [Sue]  
c. [three [beautiful [pictures [of [Sue]]]]]

Evidence for this phrase structural organization of linguistic expressions comes from constituency behavior: parts (constituents) that form a whole (a larger constituent) behave as a unit syntactically. For example, the unit can be displaced to another syntactic position, as exemplified in (2a) for the linear string *of whom*; it can be pronominalized by a single word, as illustrated in (2b) for the string *pictures of Sue*, and in (2d) for the string *two beautiful pictures of Sue*; or it can undergo ellipsis, as shown in (2c) for the sequence *beautiful pictures of Sue*.<sup>2</sup>

- (2) a. [Of whom] did John see [three beautiful pictures —]?  
b. John saw [three beautiful *pictures of Sue*] and Bill saw [three ugly ones]  
c. John saw three *beautiful pictures of Sue* and Bill saw [four —]  
d. John saw [*three beautiful pictures of Sue*] and I saw [them] too

An important insight, already familiar from traditional and structuralist grammars under the name of *endocentricity*, is the idea that a phrasal unit like *three beautiful pictures of Sue* is organized around a core lexical item, the so-called *head* of the phrasal construction. It is this head which determines the categorial nature of the entire construction. Or to put it differently, the nominal head (the noun *pictures* in (1b)) projects its categorial feature onto the larger units in which it is contained: that is, the larger constituents *pictures of Sue*, *beautiful pictures of Sue* and *three beautiful pictures of Sue* are all syntactic objects that are *nominal* in nature. In short, the categorial property *noun* that is associated with the lexical item *pictures* is projected onto the

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<sup>1</sup> I would like to thank Marcel den Dikken and an anonymous reviewer for useful comments on a previous draft of the chapter.

<sup>2</sup> *Ellipsis* is used here as a descriptive term; that is, I abstract away from whether it involves deletion of lexical material or ‘insertion’ of a silent pronoun ONE. See Ross (1967), Jackendoff (1977), Lobeck (1995) for discussion.

larger phrase-structural units. These phrase-structural units may therefore be called nominal *projections*.

The idea that a property of a syntactic structure (e.g. the categorial nature of a phrasal constituent) is projected from a property of a lexical item plays a central role in generative syntax. As a matter of fact, this idea has been generalized to the extent that a syntactic structure in its entirety is essentially projectable from the properties of its constituent lexical items. In other words, a syntactic structure is a phrase structural manifestation of the lexical properties associated with the lexical items that constitute the building blocks for the syntactic structure.

This projection or “structuralization” (Chametzky 2000) of lexical information is explicitly stated in Chomsky’s (1981:29) *Projection Principle*:

*“Representations at each syntactic level (i.e., LF, and D- and S-structure) are projected from the lexicon, in that they observe the subcategorization properties of lexical items.”*

In this formulation, made within the theoretical confines of the Government and Binding framework (see chapters 2 and 4), projection regards the subcategorization property of a lexical item, i.e. the lexical property of C(ategorial)-selection. For example, the lexical entry of a verb like *meet* contains the C-selection property that *meet* takes an NP-complement, as in *(John) met her*. Chomsky’s projection principle expresses that each syntactic representation (i.e. D-structure, S-structure, and LF) associated with the linguistic expression *John met her* must represent the lexical information that *meet* takes an NP as its complement.

Also in the Minimalist Program (Chomsky 1993, 1995a; see chapter 4), where a linguistic expression is associated with two interface representations, LF and PF, the role of the projection principle in the mapping between lexicon and syntax is clearly present:

*“Another natural condition is that outputs consist of nothing beyond properties of items of the lexicon (lexical features)—in other words, that the interface levels consist of nothing more than arrangements of lexical features.”* (Chomsky 1995a: 225)

According to this statement, linguistic expressions are nothing but structural arrangements (i.e. projections, structuralizations) of lexical information. This formulation implies that no new (i.e. non-lexical) informational properties such as referential indices or hierarchical bar level information, may be introduced in the course of the derivation of a linguistic expression. Chomsky (1995a:225, 228) calls this constraint regarding the information present in syntactic structures the *inclusiveness condition*.

If any syntactic object is a structural projection of lexical information associated with lexical items, it is obviously crucial to have a clear view of the types of lexical items that are contained within the lexicon and the lexical information that is associated with them. A central dichotomy in the (syntactic) categorization of lexical items is that between *lexical categories* (also called *content words* or *major/ substantive categories*) on the one hand and *functional categories* (also called *function words* or *minor categories*) on the other hand. Lexical categories are often characterized as being those lexical items which have a relatively ‘specific or detailed’ semantic content and as such carry the principal meaning of a linguistic expression. They name the objects

(N: *picture, wine*), events (V: *to sleep, to eat*), properties (A: *beautiful, angry*) and locations/directions (P: *behind, to*) that are at the heart of the message that the sentence is meant to convey.<sup>3</sup> Another important lexical property of lexical categories is their argument structure or thematic grid: i.e. the information how many arguments the head licenses and what semantic role (agent, theme, goal, *et cetera*) each receives. For example, the verb *buy* in *John bought a house* is a two-place predicate, which assigns an agent role to the subject *John* and a theme role to the direct object *a house*.

As opposed to lexical categories, functional categories have a more ‘abstract’ meaning and fulfill an essentially grammatical function within a linguistic expression; in a sense they are needed to glue the content words together (Muysken 2008).<sup>4</sup> The abstract meaning of the functional lexicon comprises such properties as tense (e.g. the past tense bound morpheme *-ed*, as in *kill-ed*), (in)definiteness (the articles *a, the*), degree (the degree words *too, how*). Importantly, there is a certain connection between the lexical system and the functional system: For example, tense goes with verbs (*will sleep*), (in)definiteness goes with nouns (*a/the picture*), and a degree word like *too* goes with adjectives (*too angry*).

Some characteristic properties that have been noticed for functional categories are listed in (3), which is adapted from Abney (1987). It should be noted that none of the listed properties is necessary or sufficient to attribute functional status to a lexical item.<sup>5</sup>

(3) *General properties of functional heads*

- a. They constitute closed lexical classes.
- b. They lack descriptive content.
- c. They can be sisters only to one kind of category
- d. They are generally phonologically and morphologically dependent.
- e. They are usually inseparable from their sister projection.

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<sup>3</sup> It should be noted that the parallel between category and sense is by no means perfect. This can be easily illustrated on the basis of the category ‘noun’. The noun *examination*, for example, can have different interpretations. In a sentence like *The examination was on the table* it refers to a concrete entity (object reading); in the sentence *The examination of the patients took a long time* it refers to an event (Grimshaw 1990); and, finally, in the sentence *Those things on the table are examinations* it designates a property.

<sup>4</sup> Emonds (2000) expresses the distinction between lexical items of the ‘lexical type’ and lexical items of the ‘functional type’ in terms of a bifurcated lexical model. The former lexical items are located in what he calls the ‘Dictionary’, the latter in the so-called ‘Syntacticon’.

<sup>5</sup> The distinction between lexical categories (content words) and functional categories (function words) is a central one in studies on the syntactic categories of natural language. As with all types of categorization, there are elements which cannot be put straightforwardly under one of the two classes. Certain lexical items display ambiguous behavior: they share properties with lexical categories and at the same time they display functional characteristics. One of the first generative-syntacticians who drew attention to what he called the ‘squishiness’ of syntactic categories was Ross (1972, 1973). Emonds (1985:162-191) also addresses the question of gradience on the lexical-functional dimension. He points at the existence of closed classes of grammatical formatives that are subclasses of the lexical categories N, V, A and P. In informal terms, these subclasses can be characterized as the most frequently used and least semantically specified members of each lexical category. Emonds calls these “in between” subclasses ‘grammatical nouns, verbs, adjectives and prepositions’. Some examples of the category ‘grammatical noun’ are: *one, self, thing, place, way*. See also Corver and Van Riemsdijk (2001), who use the descriptive term ‘semi-lexical categories’ for such lexical items.

The dichotomy between lexical categories and functional categories raises a number of questions from the perspective of syntactic projection of lexical information, such as:

- a) Which lexicon-properties are associated with Lexical Categories (LC) and how are they projected onto a syntactic structure  $\Sigma$ ?
- b) Which lexicon-properties are associated with Functional Categories (FC) and how are they projected onto a syntactic structure  $\Sigma$ ?
- c) How is the knowledge about the ‘connection’ between the lexical system and the functional system (e.g. the knowledge that *the* goes with N and *will* with V) represented in the lexicon and how is this lexical information projected onto syntax?
- d) To what extent are functional projections (i.e. syntactic structures that project from the properties of a functional category) structurally the same as lexical projections (i.e. syntactic structures that project from the properties of a lexical category)?
- e) To what extent is there cross-categorial similarity as regards the ‘grammatical role’ of the functional projections that are associated with the lexical categories (V, N, A, P)?
- f) Is projection of lexical information cross-linguistically uniform, or do languages display cross-linguistic variation in this respect?

In this chapter I will present answers to some of these questions, as they have been given in the generative literature. There are two general answers that I would like to mention already here, since they are characteristic of the current generative-syntactic conception of phrasal architecture and the nature of syntactic projection. The first answer regards questions d) and e): much generative research on syntactic projection takes the view that projection is symmetric (i.e. parallel) across syntactic categories. According to this view, the structuralization of lexical properties (i.e. the way in which lexical information is mapped onto syntactic structure) is fundamentally the same in verbal, nominal, adjectival and prepositional phrases.

The second answer which I would like to already mention here regards question c). It is generally assumed these days that the projection of a lexical category —the so-called lexical projection— is structurally contained within the projection of a functional category.<sup>6</sup> This conception of projected structure —sometimes referred to as the *Functional Head Hypothesis* (Grimshaw 1991)— is represented in (4a), where FP stands for one or more functional projections on top of the lexical projection LP. Importantly, this conception of phrasal projection is different from the

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<sup>6</sup> Although structural containment of the lexical projection within the functional projection (see (4a)) is arguably the norm, there are cases in which a projection of a lexical category L1 is immediately contained in another lexical category L2. The quintessential phenomena are *incorporation* and *restructuring*. An illustration of the former phenomenon is given in (ia) from Mohawk, where the noun ‘meat’ directly combines with the verb ‘eat’ to give the complex verb ‘to meat-eat’ (*waha’wahrake’*); see Baker (1988, 2001). Notice that in the plain pattern in (ib) the (projection of the) lexical category is structurally contained within the functional projection DP, which has *ne* as its functional head.

- (i) a. Owira’a waha’wahrake’. (noun incorporation pattern)  
 Baby meat-ate  
 ‘The baby ate some meat.’
- b. Owira’a wahrake’ ne o’wahru. (plain pattern)  
 baby ate the meat  
 ‘The baby ate the meat.’

one held in earlier stages of generative grammar, according to which the functional projection(s) was/were taken to be part of (i.e. embedded within) the lexical projection; see (4b), which represents the so-called *Lexical Head Hypothesis*.

- (4) a. [<sub>FP</sub> Spec [<sub>F'</sub> F [<sub>LP</sub> L ]]]  
 b. [<sub>LP</sub> [<sub>FP</sub> F] [<sub>L'</sub> L XP]]

The functional head hypothesis in (4a) in combination with the symmetry hypothesis is at the basis of Grimshaw's (1991) notion of *extended projection*, which captures the phrase structural 'unity' of the lexical layer and the dominating functional layer(s); see section 7 for details. The functional head F and its phrasal projection FP in (4a) are considered to be extended projections of the lexical head L and its projection LP. Given the four lexical categories V, N, A and P, the following four extended projections can now be distinguished, where F(P) stands for one or a sequence of functional projections:

- (5) a. [<sub>FP</sub> F [<sub>VP</sub> V]] (extended verbal projection)  
 b. [<sub>FP</sub> F [<sub>NP</sub> N]] (extended nominal projection)  
 c. [<sub>FP</sub> F [<sub>AP</sub> A]] (extended adjectival projection)  
 d. [<sub>FP</sub> F [<sub>PP</sub> P]] (extended adpositional projection)

This chapter is organized as follows: Section 2 discusses the projection of phrasal structure and shows how the theory of phrase structure developed from a system of construction specific phrase structure rules to a system of general X-bar theoretic principles that govern the projection of syntactic structure. In section 3, some further X-bar theoretic issues are dealt with, more specifically: the featural definition of syntactic categories, and the bar level property (i.e. hierarchical levels of projection). Section 4 discusses a number of phrase structural properties, including (multi-)dominance, precedence, binary branching and multiplanar phrase structure. Section 5 shows how the Functional Head Hypothesis applies to the clausal system, leading to a conception of phrase structure in which the lexical projection VP is embedded within the functional projections IP and CP. Section 6 then discusses the projection of thematic information within the lexical projection, the regulating roles of the Theta Criterion and the Extended Projection Principle, and, finally, the so-called VP-internal Subject Hypothesis. Section 7 deals with the nature of functional categories and the concept of extended projection. Sections 8, 9 and 10 discuss, respectively, the extended nominal projection, the extended adjectival projection and the extended prepositional projection. Section 11 concludes this chapter.

## 2. Phrasal projection: From PS-rules to X-bar theory

In early generative grammar (cf. Chomsky's (1957) *Syntactic Structures* and Chomsky's (1965) *Aspects of the Theory of Syntax*), the phrase structures of a language L are generated by so-called phrase structure rules (see Carnie 2008 for discussion). Those rules have the format in (6), where X is the name of the phrase defined, and Y, Z and W are either phrases—and therefore in need of phrase structure definitions themselves—or the names of lexical categories such as Noun, Verb, Adjective and Preposition.

- (6)  $X \rightarrow Y Z W \dots$

This format may be instantiated by phrase structure rules like (7) and (8), which can generate a phrase structure representation like (9). The phrase structure rules in (7) are syntactic rules: they build a phrase structure; the phrase structure rules in (8) are lexical rules: they assign lexical items (*met*, *John*, *from*, *et cetera*) to syntactic categories (V, N, P, *et cetera*).<sup>7</sup>

- (7) a.  $S \rightarrow NP VP$   
 b.  $VP \rightarrow V NP$   
 c.  $NP \rightarrow (DET) N (PP)$   
 d.  $PP \rightarrow P NP$

- (8) a.  $V \rightarrow \textit{met}/ \text{---}NP$   
 b.  $P \rightarrow \textit{from}/ \text{---}NP$   
 c.  $N \rightarrow \textit{John}$   
 d.  $N \rightarrow \textit{man}$   
 e.  $N \rightarrow \textit{Brazil}$   
 f.  $ART \rightarrow \textit{the}$

- (9) [S [NP [N John]] [VP [V met] [NP [DET the] [N man [PP [P from] [NP [N Brazil]]]]]]]]

Within the “lexical” phrase structure rules in (7), two types of lexical rules can be distinguished: context-sensitive rules and context-free rules.<sup>8</sup> The former are instantiated by (8a,b): these rules indicate that V and P can be lexicalized by *meet* and *from*, respectively, only when they are followed by an NP. In other words, there must be an NP in their structural context. The reason for adding this context-sensitive information is that one does not want *meet* to be inserted in a VP which consists solely of a V (i.e. \**John met*). The context-free rules (8c-f) do not provide such a structural context requirement.

In the 1970s and 80s, the phrase structure component, as exemplified in (7)-(8), was largely “dismantled” (Stowell 1981; see also Fukui (2001) for discussion). This for a number of reasons: The phrase structure rule system was considered to be descriptively too rich, redundant and explanatorily inadequate (i.e. it did not give any insight into what Chomsky (1986b) calls *Plato’s problem*, i.e. the logical problem of language acquisition). For example, it was noticed that reference to context in phrase structure rules is restricted to rules such as (8) that assign lexical items to their syntactic categories (Chomsky 1986b:81). The phrase structure system could be simplified by separating the lexicon from the syntax. This separation led to a reduction in the variety of phrase structure rules. More specifically: there is only one type of phrase structure rule, viz. the context free one. Lexical phrase structure rules like (8) were abandoned entirely and context-sensitive information was stated in so-called subcategorization frames that were part of the lexical entry of a word. For example, the lexical entries of the verb *meet* and the preposition *from* contained the following subcategorization (i.e. C(ategorical)-selection) information:

<sup>7</sup> The ‘()’ in phrase structure rule (7c) indicates that the presence of *DET* and *PP* in the nominal structure is optional.

<sup>8</sup> Chomsky’s original conception of phrase structure rules was entirely context-free (which led to the introduction of subcategorization). See Lasnik (2000) for systematic discussion of the early developments of phrase structure grammar.

- (10) a. *meet*, [—NP]  
 b. *from*, [—NP]

But even a situation in which the phrase structural component only contains context-free rules like (7) turns out to be non-optimal. Much of the information expressed by the phrase structural rules in (7) is also available in the lexicon. For example, the information that a V can combine with an NP, as expressed by the phrase structure rule in (7b), is also available in the lexicon. The subcategorization frame associated with the verb *meet*, for example, already expresses this contextual information; see (10a). With the aim to avoid redundancy in the expression of information, it has been proposed that phrase structure rules expressing head-complement structure should be eliminated from the phrase structure system altogether. Thus, (7b) and (7d) could be simplified to:

- (11) a.  $VP \rightarrow V$   
 b.  $PP \rightarrow P$

The fact that an NP-complement must be present in a phrase structural representation like (9) now follows from the interaction of two things: first, the subcategorization information in the English lexicon that the verb *meet* takes an NP-complement as a lexical property; second, the projection principle, which requires that lexical properties be represented structurally in syntactic representations (i.e. “structuralization of lexical information”).

Even with the elimination of the head complement structure from phrase structure rules (i.e. the move from (7b,d) to (11)), redundancy remains within the system of context-free phrase structure rules in (11). Furthermore, a generalization is missed. The redundancy expressed is the fact that each phrasal constituent VP, PP, and NP contains a head of the same categorial type. Thus, VP contains a verbal head, PP a prepositional head and NP a nominal head. The generalization that the head node shares its categorial properties with the phrasal node containing it —traditionally known as the endocentricity property— is a deep and general property of human language which needs to be singled out from the construction specific phrase structure rules in (11) and (7c) and be stated as a general phrase structure principle of human language. This is what Chomsky (1970) did in *Remarks on Nominalizations*, where he proposed his so-called X-bar theory of phrase structure. According to this theory, the phrase structure component of human language consists of the following two basic phrase structure rules, which are considered to be principles of Universal Grammar:

- (12) *X-bar theory*  
 a.  $X' \rightarrow X YP$  (the head-complement phrasal structure)  
 b.  $X'' \rightarrow [Spec, X'] X'$  (the specifier-head phrasal structure)

The symbol  $X$  in (12) is a variable ranging over the lexical categories N, V, A and P. The symbol  $X'$  (called “X-bar”, although typographically it is often represented by a prime rather than a bar) represents a phrasal constituent consisting of the head  $X$  and a complement.  $X''$  (X-double bar) contains the  $X'$ -constituent and the so-called specifier of  $X'$ . It is useful to know that  $X''$  is equivalent to  $XP$ , where  $P$  stands for *Phrase*. It should also be mentioned here that in Jackendoff’s (1977) seminal study on English phrase structure an X-bar theory is proposed which went up to X-triple bar; I will come back to this in section 3.

An important consequence of the formulation in (12) is that headedness no longer needs to be stipulated in separate construction-specific phrase structure rules (i.e. separate phrase structure rules for NP, VP, PP in (7)/(11)). According to the X-bar principles in (12), when the verb *meet* becomes syntactically active and “structuralizes” so to speak, it “structuralizes” according to the laws of X-bar theory. That is, it projects its categorial property of being a V onto its phrasal projections (V' and VP). In other words, the categorial property of the head determines the categorial property of the phrase (X' and X'').

The universal phrase structural principles in (12) also immediately rule out imaginable phrase structures like (13), which could in principle be generated by the PS-rules in (14).

- (13) a. [<sub>VP</sub> [<sub>P</sub> from] [<sub>NP</sub> Brazil]]  
 b. [<sub>PP</sub> [<sub>NP</sub> Brazil]]

- (14) a. VP → P NP  
 b. PP → NP

As noted by Lyons (1968), these structures are not automatically excluded by the context-free phrase structure rule format in (7), which only needs to satisfy the requirement that the input symbol to the left of the arrow is a single non-terminal symbol and the output to the right of the arrow is a non-null string of non-terminal symbols. Thus, the context-free phrase structure rule system is too permissive, i.e. it generates syntactic structures that are not allowed in human language. The X-bar format of phrase structure rules, on the contrary, immediately rules out the illegitimate syntactic structures in (13): The VP in (13a) and the PP in (13b) must be projections of the heads V and P, respectively.

Besides giving us a notion of “possible phrase structure rules”, X'-theory, as represented by the rules in (12), expresses the idea of phrase structural parallelism (i.e. symmetry) across different categories. The “X” in (12) is a variable that ranges over the class of lexical categories V, N, A and P. This implies that the phrasal projections VP, NP, AP and PP are similar (symmetric) in their internal structural organization.<sup>9</sup> Chomsky (1970) argues that this parallelism permits a generalized formulation of grammatical functions (e.g. subject, object) and the rules of subcategorization. For example, the notion of “object of” is associated with the head-complement relationship; that is, objects are dominated by X'. Thus, the complements *the city* and *(of) the city* in (15a) and (15b) fulfill the grammatical function of “object”. Likewise, *destroyed* and *destruction* are subcategorized for (i.e. categorially-select) an NP, where *of* is often taken to be a case realization or case marker inserted late in the derivation (see Chomsky 1981). The patterns in (16) and (17) provide a further illustration of the idea that subcategorization information (*in casu*: selection of PP in (16) and selection of a clause, S', in (17)) is cross-categorially associated with the complement position of the head.<sup>10</sup>

<sup>9</sup> See Emonds (1985) for an asymmetric analysis of phrasal projection: N, A and P project to the double-bar level, while V projects to V'''.

<sup>10</sup> The clausal category labeled S', which in the 1970s and (part of) the 1980s was used to represent a clause introduced by a subordinating conjunction like *that* (Bresnan 1972), immediately contains a category COMP and a ‘lower’ clausal category S (see (43) in section 5). As we will see below, the S/S' notation is not perfectly X-bar

- (15) a. The enemy [<sub>V'</sub> [<sub>V</sub> destroyed] [<sub>NP</sub> the city]]  
 b. The enemy's [<sub>N'</sub> [<sub>N</sub> destruction] [of [<sub>NP</sub> the city]]]
- (16) a. John [<sub>V'</sub> [<sub>V</sub> relies] [<sub>PP</sub> on Mary]]  
 b. John's [<sub>N'</sub> [<sub>N</sub> reliance] [<sub>PP</sub> on Mary]]  
 c. John is [<sub>A'</sub> [<sub>A</sub> reliant] [<sub>PP</sub> on Mary]]
- (17) a. [John [<sub>V'</sub> [<sub>V</sub> claimed] [<sub>S'</sub> that Bill was unhappy]]]  
 b. [John's [<sub>N'</sub> [<sub>N</sub> claim] [<sub>S'</sub> that Bill was unhappy]]]

Although the parallel grammatical function of *the enemy* and *the enemy's* in (15) is intuitively quite clear, a uniform mapping of the grammatical function of “subject of” onto a phrase structural position (e.g. [<sub>Spec</sub>, X']) was not straightforward in the earliest conception of sentential structure. Sentences did not quite fit into the X-bar scheme as given in (12); they were generated by the PS-rule in (18), which, given its exocentric nature, clearly is not in accordance with the rules of X-bar theory:

- (18)  $S \rightarrow N'' V''$

As we will see in section 6 of this chapter, further developments in phrase structure theory and theta theory —more specifically, the so-called VP-internal subject hypothesis (Kitagawa 1986, Koopman and Sportiche 1991)— led to the identification of [<sub>Spec</sub>,LP], where L equals V, N, A, P, as the structural position associated with the thematic notion *external argument of*.<sup>11</sup> In other words, [<sub>Spec</sub>,LP] was considered to be a structural position to which a theta role can be assigned (i.e. a so-called theta-position).

Chomsky's original conception of the notion *specifier* is very different from the one associated with the VP-internal subject hypothesis. In *Remarks on Nominalizations*, Chomsky (1970:52) proposes “to refer to the *phrase* associated with N', A', V' in the base structure as the “specifier” of these elements.” The specifier position is the phrase structural position in which functional material can be found. In other words, the specifier position is associated with nonargumental rather than argumental (i.e. thematic) material. More specifically, [<sub>Spec</sub>,N'] is analyzed as the determiner, [<sub>Spec</sub>,V'] as the auxiliary, [<sub>Spec</sub>,A'] as the modifying element *very*, and [<sub>Spec</sub>,P'] as the modifying element *right*.

- (19) a. [<sub>NP</sub> the [<sub>N'</sub> reliance on his parents]]  
 b. [<sub>VP</sub> will [<sub>V'</sub> rely on his parents]]  
 c. [<sub>AP</sub> very [<sub>A'</sub> reliant on his parents]]  
 d. [<sub>PP</sub> right [<sub>P'</sub> above the door]]

In the 1970s, Chomsky's (1970) proposal of X-bar theory triggered the appearance of a great number of studies that tried to lay bare the phrasal syntax of NP (Selkirk 1970, 1977), AP (Bowers 1975, Bresnan 1973, 1977, Hendrick 1978), PP (Emonds 1976, Hendrick 1976, Van

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theoretic, despite the fact that it seems to invoke an X-bar theoretic notion.

<sup>11</sup> For the notion *external argument of* and *internal argument of*, see Williams (1981, 1995).

Riemsdijk 1978) and clauses (Hornstein 1977). A major landmark in the generative study of phrasal structure is Jackendoff (1977), which takes a cross-categorial X-bar theoretic perspective on English phrase structure. These studies showed among others (i) that the specifier can also sometimes be occupied by lexical categories (e.g. N, A), as exemplified in (20); (ii) that the specifier can be occupied by similar elements cross-categorially, which is a sign of symmetry; see, for example, (21) (cf. Van Riemsdijk and Williams (1986)); (iii) that the specifier can be phrasal, as illustrated by the examples in (22).<sup>12</sup>

- (20) a. [<sub>NP</sub> [<sub>NP</sub> the boy's] [<sub>N'</sub> reliance on his parents]]  
 b. [<sub>AP</sub> [<sub>AP</sub> quite heavily] [<sub>A'</sub> reliant on his parents]]  
 c. [<sub>PP</sub> [<sub>AP</sub> quite high] [<sub>P'</sub> above the door]]

- (21) a. [more [water]]  
 b. [more [beautiful]]  
 c. [more [in the picture]]

- (22) a. [[so much more] water than there that I went for a swim]  
 b. [[so much more] beautiful than me that I feel like an old man]  
 c. [[so much more] into ESP than the others that we should invite him for a talk]

In view of these phenomena, the architecture of phrasal categories can schematically be represented as follows, where FP is the phrasal projection of a functional head F and XP is the complement of L.<sup>13</sup> Importantly, the functional projection FP is contained within the lexical projection LP.

- (23) [<sub>LP</sub> FP [<sub>L'</sub> L XP]]

As we will see in section 5, this conception of phrase structure —the so-called Lexical Head Hypothesis—has shifted to one in which we have the reverse embedding relation; that is, the lexical projection LP is contained within the functional projection FP.

I would like to conclude this section on phrase structure rules and X-bar theory with the following remark: Originally, X-bar theory, as formulated in (12), was a set of constraints on the formal properties of phrase structure rules. Stowell (1981) presents a different perspective by taking X-bar theory as a constraint on syntactic structure. That is, the (phrase structural) form of the syntactic object that results from the “structuralization” of lexical information (e.g. projection of subcategorization and thematic information) is evaluated by the X-bar requirements.<sup>14</sup>

### 3. On features and projections: Categorical features and bar-levels.

<sup>12</sup> The *than*-phrase is often taken to originate in the complement position of the degree word *more*. Its surface position outside of the functional projection DegP results from extraposition (see e.g. Jackendoff (1977) for discussion).

<sup>13</sup> I abstract away here from the possibility of having a lexical phrase in the specifier position, as in (20).

<sup>14</sup> The idea that phrase structure theory might be interpreted as a set of well-formedness conditions goes back to McCawley (1968), antedating the introduction of X-bar theory.

This subsection discusses some further ‘featural characteristics’ of X-bar structures, starting with the featural definition of syntactic categories. As was noted in the previous section, the endocentricity requirement, as part of X-bar theory, states that a phrase ( $X'$ ,  $X''$ ) bears the same category as its head. For example, if the head is of the categorial type N, then the phrasal projections  $X'$  and  $X''$  are also of the categorial type N (i.e.,  $N'$  and  $N''$ ). In *Remarks on Nominalization* (1970), Chomsky proposes that the four basic syntactic categories N, V, A and P are actually not atomic syntactic categories. Rather, they are considered to be feature complexes, with [+/-N] (substantive) and [+/-V] (predicative) as the epistemologically basic concepts in the definition of syntactic categories.<sup>15</sup>

- (24) a.  $N = [+N, -V]$   
 b.  $V = [-N, +V]$   
 c.  $A = [+N, +V]$   
 d.  $P = [-N, -V]$

An advantage of this feature compositional analysis of syntactic categories is that it allows the expression of cross-categorial similarities among syntactic categories. For example, the two syntactic categories that can have an NP as their complement in English, verbs and prepositions, can now be referred to with the single designation [-N]; see (25). Reinterpreted in terms of case theory, the [-N] categories are the only categories that are able to assign case to their NP-complement (cf. Stowell (1981)). In short, with a system of features it becomes possible to characterize natural classes of syntactic categories, which share certain grammatical behavior.<sup>16</sup>

- (25) a. She  $[-N,+V]$  kisses  $[+N,-V]$  Peter) (She kisses Peter)  
 b.  $[-N,-V]$  with  $[+N,-V]$  Peter) (with Peter)  
 c.  $*[+N,-V]$  pictures  $[+N,-V]$  Peter) ( $*pictures$  Peter)  
 d.  $*[+N,+V]$  afraid  $[+N,-V]$  Peter) ( $*afraid$  Peter)

Another potential source of support for a system of categorial features comes from the conception of neutralization (Muysken and Van Riemsdijk 1986, Stowell 1981). The feature system permits the existence of categories that have an “in-between” status by being specified for a single feature. For example, it has been argued by Aoun (1981) and Van Riemsdijk (1983) that the distinction between A and V may be neutralized to [+V] in some languages.

A second featural characteristic of X-bar structures concerns the bar-level property, which designates the phrasal projection type. That is, how many distinguishable bar-levels (i.e. levels of phrasal projection) does the syntactic projection of a head have? In Chomsky’s (1970) original X-

<sup>15</sup> See Jackendoff (1977) for a feature analysis of syntactic categories in terms of the features [+/-S] (i.e. (im)possibility of a category to have a subject) and [+/-O] (i.e. (im)possibility of a category to have an (NP-) direct object). For further discussion of the featural basis of syntactic categories, see among others Muysken and Van Riemsdijk (1986), Reuland (1986) and Baker (2003).

<sup>16</sup> One may be sceptical about the usefulness of cross-categorial similarities stated in terms of a shared feature. It is just as easy to find cross-categorial generalizations that are not thus statable. For example, P (i.e., [-N,-V]) and A (i.e., [+N,+V]) are the possible adnominal adjuncts. Also, some generalizations pick three out of four categories, such as N, A and P not having tense. See Van Riemsdijk (1978: 112 ff.) for discussion.

bar theoretic statements (see (12)), two bar levels are distinguished:  $X'$  (the intermediate projection) and  $X''$  (the maximal projection). This conception of phrase structure, however, does not accommodate constituents that act as modifiers, like the attributive adjective *smart* in (26a); cf. Stuurman (1985:202). According to Jackendoff's (1977:53) Uniform Three-Level Hypothesis, there are three levels of phrasal projection:  $X'$ ,  $X''$  and  $X'''$ . As shown in (26b), the attributive AP (i.e.  $A'''$ ) *smart* can now be accommodated as a sister to  $N'$  (see chapter 13 for discussion of adjectival modification).

- (26) a. a smart student of physics  
 b. [ $N'''$  [ $A'''$  a] [ $N'$  [ $A'''$  smart] [ $N'$  student [ $P'''$  of physics]]]]]

The possibility of adding (in principle, infinitely) many modifiers to a phrase—for example, attributive adjectives modifying a noun—has led to an alternative phrase structural analysis which takes  $X''$  to be the maximal projection level and  $X'$  to be a recursive node. For example, the nominal expression in (27a) receives the X-bar analysis in (27b). Evidence that the addition of each attributive adjective adds an extra  $N'$ -layer comes from the phenomenon of *one*-pronominalization: on the assumption that this pro-form takes constituents for its antecedents, in (28) *one* is recursively coreferential with a  $N'$ -projection.<sup>17 18</sup>

- (27) a. a smart young Dutch student of physics  
 b. [ $N''$  a [ $N'$  smart [ $N'$  young [ $N'$  Dutch [ $N'$  student of physics]]]]]]]
- (28) a. He is a [smart young Dutch student of physics]<sub>i</sub> and Bill is another one;  
 b. He is a smart [young Dutch student of physics]<sub>i</sub> and Bill is a stupid one;  
 c. He is a smart young Dutch [student of physics]<sub>i</sub> and Bill is a smart young English one;

In Muysken (1983), the bar level property, which represents the hierarchical level of projection, is reinterpreted in terms of features, more specifically: [+/- maximal] and [+/- projection]. This feature definition leads to a system with three projection types: head ( $X_{[-max,-proj]} = X^0$ ), the intermediate iterative category  $X'$  ( $= X_{[-max,+proj]}$ ), and the maximal category  $XP$  ( $= X_{[+max,+proj]}$ ). This featural definition of projection types predicts a fourth type of category, viz.  $X_{[+max,-proj]}$ . This fourth type of category is possibly instantiated by particles (e.g. *away* as in *John threw the ball away*) and clitic pronouns (e.g. French *le* in *Jean le voyait*, Jean him<sub>clitic</sub> saw); see Chomsky (1995a:249). These categories can be bare, in the sense they do not (or not necessarily) have a complement and specifier structure, but nevertheless display phrasal behavior.<sup>19</sup>

<sup>17</sup> The (X-bar theoretic) notion of *adjunct* is often used to refer to YPs that are both daughter of a single-bar level category ( $X'$ ) and sister to a single-bar level category ( $X'$ ); see Carnie (2008:122). A *specifier* is a daughter of a maximal category ( $X''$ ) and sister to a single-bar level category ( $X'$ ). A *complement*, finally, is a sister to the head ( $X$ ). For the sake of completeness, it should be noted here that the notion of adjunct is also sometimes used to refer to a phrase YP that is *Chomsky-adjoined* to the maximal category  $XP$ , as in: [ $XP$  YP [ $XP$  Spec [ $X'$   $X$  Compl]]]] (see Carnie (2008:151) for discussion).

<sup>18</sup> In more recent conceptions of phrase structure, attributive APs have been associated with specifier positions of functional projections (see chapter 13 for discussion).

<sup>19</sup> For analyses that assume that pronominals can have a phrasal structure, see among others Cardinaletti and Starke (1999), Corver and Delfitto (1999), and Déchaine and Wiltschko (2002).

A further step towards the dismantling of the X-bar theoretic notion of bar level was undertaken by Speas (1985, 1990) and Fukui (1995). Rather than interpreting the notion of bar level by making reference to a certain rule (e.g.  $X' \rightarrow X YP$  in (12a)) or in terms of “projection” features (e.g.  $X_{[-max, +proj]}$ ), these studies suggest that the bar-level property is a derived property, rather than a primitive one, which can be “read off” the tree; that is, the bar-level property of a constituent is determined by the structural relation this constituent bears to other constituents in the tree. In other words, the bar-level property of a constituent is a relational property of that constituent, and not an inherent one. This relational notion of bar level is implemented as follows in Speas’s analysis. First of all, she proposes that phrasal structure is generated by means of a single rule mechanism, called *Project Alpha*, which projects (i.e. generates) phrasal structure up from a head. This rule states the following:

(29) *Project Alpha*

A word of syntactic category *X* is dominated by an uninterrupted sequence of *X* nodes.

This uninterrupted sequence of projections of *X* is called the ‘Projection Chain of *X*’. The maximal and minimal categories of this chain are defined in terms of their hierarchical position relative to other nodes in the tree. A maximal projection (*XP*) is the node of some category *X* that is immediately dominated by some other category; the minimal category (*X*) is the node that dominates nothing. The (intermediate) categories between the *XP* and the *X* are undefined for ‘bar level’ (and as such, according to Speas, invisible to syntactic computation).<sup>20</sup> To illustrate this relational notion of bar level, consider the following structure:

(30) John [<sub>V</sub> [<sub>V</sub> met] [<sub>N</sub> a [<sub>N</sub> smart [<sub>N</sub> young [<sub>N</sub> Dutch [<sub>N</sub> student]]]]]]]

The uninterrupted sequence of N-projections (making up *a smart young Dutch student*) constitutes the projection chain. The most deeply embedded N-constituent (in italics) is the minimal category (*student*). The highest N-constituent (in italics) is the maximal category (*a smart young Dutch student*), since it is immediately dominated by a different categorial projection, viz. a V-category.

This relational notion of bar level has as a consequence that vacuous projections (i.e. projections that do not branch) are ruled out. Thus, bare nouns, adjectives, prepositions *et cetera* —that is, words that take neither a complement nor a specifier— have a simple single-node structure. That is, instead of the (partially) labeled bracketings in (31a), we have the labeled bracketings in (31b):<sup>21</sup>

- (31) a. [<sub>N''</sub> [<sub>N'</sub> [<sub>N</sub> He]]] left the [<sub>A''</sub> [<sub>A'</sub> [<sub>A</sub> angry]]] dog [<sub>P''</sub> [<sub>P'</sub> [<sub>P</sub> inside]]]  
 b. [<sub>N</sub> He] left the [<sub>A</sub> angry] dog [<sub>P</sub> inside]

The relational notion of bar level (i.e. level of projection), as proposed by Speas and Fukui, is also characteristic of Chomsky’s (1995b) theory of Bare Phrase Structure, which in less formal terms states the following: “Given a phrase marker, a category that does not project any further is

<sup>20</sup> In (28), *one*-pronominalization is given as an argument for *X'*-recursion. Obviously, from Speas’s point of view, *one*-pronominalization has to be dealt with differently (if pronominalization is a rule of the syntactic computation).

<sup>21</sup> In Kayne’s (1994) Antisymmetry framework, vacuous projection of hierarchical structure is possible.

a maximal projection XP and one that is not a projection at all is a minimal projection  $X^0$ ; any other is an  $X'$ , invisible at the interface and for computation;” cf. Chomsky (1995b:396).<sup>22</sup> The computational mechanism that generates syntactic structure on the basis of the lexical items that constitute the input to syntax —the so-called Numeration— is the operation *Merge*. Merge takes a pair of Syntactic Objects ( $SO_i, SO_j$ ) —where SO can be a lexical item or a phrase built by the computational system— and replaces them by a new combined syntactic object ( $SO_{ij}$ ); see Chomsky (1995a:226). The SO whose categorial property is projected onto the newly created syntactic object constitutes the head of the syntactic projection.

#### 4. Dimensions of phrase structure representation

So far, it has been argued that a linguistic expression is essentially a structural arrangement (i.e. projection/structuralization) of lexical information which is associated with the constituent lexical items that make up the linguistic expression. This structural arrangement constitutes a *phrase structure* (also called: constituent structure), which can informally be characterized as a syntactic object which is hierarchically organized. This hierarchical organization is defined in terms of the phrase structural relation of *dominance*, which is essentially a containment relation (i.e. ‘top to bottom’ or ‘bottom to top’, depending on one’s perspective), and is traditionally known as *embedding*. Besides the hierarchical dimension of dominance (i.e. hierarchical arrangement), there is also a linear dimension, so-called *precedence* (i.e. linear arrangement), associated with phrase structure; that is, the hierarchically ordered phrase structure must be mapped onto a linearly ordered sequence of words. For example, the prepositional phrase *right above me* (as in *The sword hang right above me*) displays the following linear order at the (sound) surface: *right* < *above* < *me*, where < stands for ‘linearly precedes’. It is generally assumed that *dominance* is a fundamental ordering relation of syntactic structure. Opinions differ on whether *precedence* is a fundamental ordering relation which is “grounded” in syntax. In what follows, I will succinctly discuss some of the issues that concern the nature of phrase structure and its ordering dimensions.

##### 4.1 The hierarchical dimension of linguistic expressions

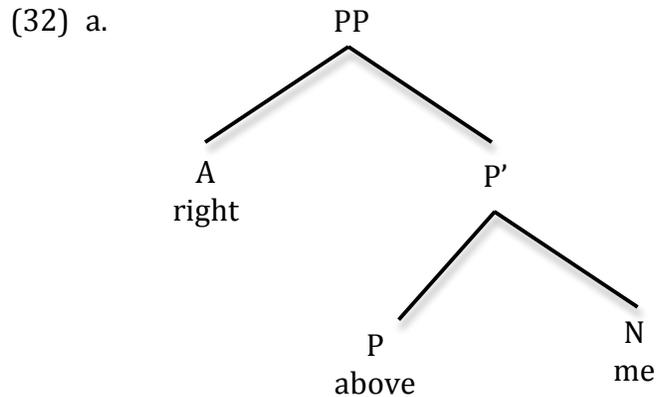
For my discussion, I will use the linguistic expression *right above me*. The phrase structural organization of this expression can be characterized as follows (see also (19d)): The prepositional lexical item *above* and the nominal lexical item *me* combine to form the larger syntactic object (i.e. phrase structure) *above me*, which is analyzed as a *prepositional* phrase structure under an analysis in which it is the categorial property ‘P’ which projects onto the larger phrasal constituent.<sup>23</sup> The phrasal structure *above me* combines in turn with the constituent *right*, which

<sup>22</sup> Chomsky’s (1995:228) Inclusiveness condition rules out the representation of bar level information, for example as primes ( $X', X''$ ), in syntactic structures. According to the inclusiveness condition, “no new objects are added in the course of computation apart from rearrangements of lexical properties.”

<sup>23</sup> In the tree structure in (32), the categorial label (e.g. P) and the lexical item (e.g. *above*) are represented as a single object (i.e. node). This expresses the view that the categorial value is a property of the word. It should be noted, though, that in the literature one also finds tree representations in which the categorial node (e.g. P) is connected to the lexical item (*above*) by means of a branch, as in (i):

(i) P  
|

yields the even larger prepositional phrase structure *right above me*. This phrase structural organization can graphically be represented by means of a *tree structure* (also called *phrase marker*), as in (32a), or a *labeled bracketing*, as in (32b).<sup>24</sup>



b. [PP [A right] [P' [P above] [N me]]]

The tree structure in (32a) contains five (labeled) nodes (i.e. constituents): The nominal node *me*, the prepositional node *above* and the adjectival node *right* constitute the so-called *terminal nodes*. These are nodes with no branches underneath them; in other words, they do not contain smaller constituents. The terminal nodes *above* and *me* form a larger (phrasal) constituent together, which is graphically represented by the ‘meeting’ of two *branches*, i.e. the connecting lines in the tree structure, in a single node, viz. P'. The prepositional label of this phrasal node results from the *projection* of the ‘prepositional’ categorial feature associated with *above*. The phrasal constituent *above me* combines with the adjectival node *right*, which yields the even larger prepositional constituent (i.e. node) *right above me*. When we leave the structure as it is in (32), PP can be characterized as the *root node* (i.e. the node which does not have any branch on top of it) and P' as the *intermediate node* (i.e. a node which is neither a root node nor a terminal node). P' and PP can further be characterized as *non-terminal* nodes.

Within the small tree structure in (32a), we can identify various dominance relationships between the nodes in the tree, where *dominance* can informally be defined as follows (see Carnie 2008:29):

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*above*

In early works of generative grammar, the categorial (head) node (P) was called a *preterminal node* and the node representing the lexical item a *terminal node*. In the tree representation in (32a), this distinction is not needed; the lexical item together with its categorial property constitutes a terminal node. See Carnie (2008:27 ff.) for discussion.

<sup>24</sup> It should be noted here that Chomsky's original conception of phrase structure was set theoretic (Chomsky 1957:27-29, 1975:183). See also Lasnik (2000:29ff.) for insightful discussion of Chomsky's early notion of set-theoretically defined P-marker. Also in Lasnik and Kupin (1977), it is argued that trees are not adequate representations of phrase structure. In Chomsky's (1995:241 ff.) Bare Phrase Structure Theory, this set-theoretic conception of phrase structure representation is explicitly present.

(33) *Dominance*

Node A dominates node B if and only if A is higher up in the tree than B and if you can trace a line from A to B going only downwards.

According to this definition, the (root) node PP dominates the nodes A, P', P and N in (32a). Furthermore, the node P' dominates the nodes P and N.

When there is only one branch between a dominating node and a dominated node, the (local) hierarchical ordering relation is identified as *immediate dominance* (see Carnie 2008:35):

(34) *Immediate dominance*

Node A immediately dominates node B if there is no Intervening node G that is properly dominated by A and properly dominates B. (In other words, A is the first node that dominates B.)

Thus, PP immediately dominates A and P' in (32a), and P' immediately dominates P and N. The immediately dominating node is called the *mother node* and the immediately dominated node is called the *daughter* node. For example, P' is the mother of P and N, and P and N are daughters of P'. Having the same mother node, the nodes P and N can further be characterized as *sister* nodes.

The notion of dominance also enables us to give a more precise definition of *constituency* (see Carnie 2008:37):

(35) *Constituent*

A set of nodes *exhaustively* dominated by a single node.

*Exhaustive dominance* holds between a set of daughter nodes and their mother node. Only when the mother nodes dominates the entire set (and only that set) can we say that the mother node exhaustively dominates the set. Thus, the terminal nodes *above* and *me* are exhaustively dominated by a single node and consequently form a constituent, viz. P'. The terminal nodes *right* and *above*, on the contrary, are not exhaustively dominated by a single mother node and therefore do not form a constituent.

#### 4.2 *The linear dimension of linguistic expressions*

Although there is little controversy about the question as to whether syntactic objects are organized along the dominance (i.e. top down) axis of syntactic trees, there has been more controversy about the question as to whether syntactic objects are organized along the precedence (i.e. left right) axis.<sup>25</sup> That is, is linear order of constituents encoded in phrase structural (i.e. syntactic) representations? And if it is, how is it 'regulated'? In a grammar model containing phrase structure rules, as in early generative models, not only the (immediate) dominance relation between the mother node and the daughter nodes but also the linear precedence relation(s) between the daughter nodes could easily be expressed. For example, a phrase structure rule like

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<sup>25</sup> See Chapter 18 for more elaborate discussion of issues related to linearization.

(36) expresses that  $P'$  contains two daughter constituents and that these daughter constituents have the linear relation ‘P precedes N’.<sup>26</sup>

(36)  $P' \rightarrow P N$

Within the Principles and Parameters tradition (Chomsky 1981), it is typically assumed that the dominance dimension and the precedence dimension are separate from each other, although both are still regulated in syntax.<sup>27</sup> Following the lead of Stowell (1981), who proposes that phrase structure rules are category neutral and govern the general hierarchical form of phrases in a particular grammar, attempts have been made to regulate the linear order of constituents in terms of general (parametrized) principles. One such parameter is the headedness parameter, which parametrizes the direction of headedness—head initial (e.g. VO) versus head final (e.g. OV)—in the X-bar schema (Travis 1984, 1989, Fukui 1993). Thus, English has the rule in (37a), while Japanese has the rule in (37b).<sup>28</sup>

(37) a.  $X' \rightarrow X (WP)$   
b.  $X' \rightarrow (WP) X$

Koopman (1984) and Travis (1984) have further suggested that the linearization of the head and its complement might be reduced to parametrized principles that belong to other parts of the grammar, specifically case theory (see Chapter 16) and theta theory (see Chapter 9). They propose that each of these theories has a parameter of directionality of assignment; that is (i) Case is assigned either leftward or rightward, and (ii) theta roles are assigned either leftward or rightward. In a language like English, the case directionality parameter and the theta directionality parameter are set the same way, viz. rightward. In Japanese, a rigid head final language, they are both set as leftward. Interestingly, Koopman and Travis argue that there are languages in which theta-directionality and case-directionality are set differently. Chinese, being one of those languages, has leftward theta role assignment but rightward case assignment. This non-uniform directionality results into different linearization patterns for V and its selected object: If it is a prepositional object (i.e. PP), it precedes V, given the fact that V assigns its theta role to the right. Since PP does not need case, it stays in a preverbal position. If it is a nominal object (i.e. NP), however, the NP starts out in a preverbal position, where it receives its theta role, but ends up after (rightward) movement in a postverbal position in order to receive (rightwardly

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<sup>26</sup> As noted in Carnie (2008:40), the easiest way to define precedence is by appealing to the most local of dominance relations (immediate dominance) in combination with the orderings of elements: Sister constituents are always ordered left to right on a single line in a tree structure. For example, the preposition *above* sister-precedes the noun *me* in (32a), since the former precedes the latter on the same horizontal line. Importantly, this linear ordering might result from ordering specifications in phrase structure rules or other generative principles of linearization.

<sup>27</sup> See also Gazdar and Pullum (1981) for a rule formalism which separates these two dimensions within Generalized Phrase Structure Grammar: I(mmediate)D(ominance)-rules regulate dominance relations and L(inear)P(recedence)-rules regulate precedence relations.

<sup>28</sup> The parameter should also be defined for the specifier-X'-relation:

(i) a.  $XP \rightarrow X' (YP)$   
b.  $XP \rightarrow (YP) X'$

assigned) case. Schematically, this yields the linearizations in (38), where *t* represents the trace of the displaced NP:

(38)  $t_i/PP\ V\ NP_i$

An important landmark in the generative study of hierarchical phrase structure and linearization is Kayne's (1994) *The Antisymmetry of Syntax*. In this study, Kayne tries to establish a formal relationship between the hierarchical organization of a syntactic structure projected from words and the linear ordering of that string of words. More specifically, he claims that precedence (a linear relation between two lexical items A and B) can be determined by asymmetric c-command (a hierarchical relation between A and B). That is, a lexical item A linearly precedes a lexical item B if and only if A asymmetrically c-commands B.<sup>29</sup> Since this connection will be amply discussed in Chapter 18, I restrict myself here to these few remarks (see also Chametzky (2000) and Carnie (2005) for discussion).<sup>30</sup> One important consequence of the antisymmetry approach should be pointed out, though; namely, the claim that underlyingly all sentences in all languages must be ordered as SVO (or better: specifier-head-object). This implies that any non-SVO order must be a derived order.

In Chomsky (1995a:334 ff.), it is argued that the hierarchical dimension and the linear dimension of linguistic expressions are truly separate from each other: the former is taken care of by the syntactic component (say, Merge and projection), the latter by the phonological component. This position is also taken in Berwick and Chomsky (forthcoming): Taking language (i.e. so-called *I-language*) to be at the interface with the *Conceptual-Intentional system* (i.e. the system of thought) and the *Sensorimotor system* (i.e. the system involved in the externalization of thought, for example, by means of sound), they argue that it is just hierarchy and structure which is relevant for the system of thought. The linear dimension of language is a property of the sensorimotor system: We speak linearly when we externalize our thoughts by means of sound (see also Hornstein 2009:55 ff.).

#### 4.3 Branching, multi-dominance and multiplanar structure.

An important X-bar theoretic question about phrase structure representation concerns the branching nature of phrasal projections. More specifically, are phrasal projections binary branching (i.e., does any mother node maximally have two daughters?), or can they also be

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<sup>29</sup> *Asymmetric c-command* is the structural relationship that holds between an *aunt node* and its *niece nodes*: A asymmetrically c-commands B if A c-commands B but B does not c-command A. For example, in the tree representation (32a), the adjectival node *right* asymmetrically c-commands the nodes *above* and *me*. Symmetric c-command typically involves a sisterhood relationship: A symmetrically c-commands B, if A c-commands B and B c-commands A; see Kayne (1994:4 ff.) for discussion. Reinhart's (1976:32) original definition of the c(onstituent)-command relationship is given in (i); see Carnie (2008:49 ff.) for discussion.

(i) *C-command*

Node A c-commands node B if neither A nor B dominates the other and the first branching node dominating A dominates B

<sup>30</sup> A consequence of Kayne's theory on the antisymmetry of syntax is that the essentials of X-bar theory can be derived. In other words, X-bar theory is not a primitive component of Universal Grammar

ternary, quaternary *et cetera* branching (i.e. can a mother node have more than two daughters?). In studies such as Jackendoff (1977) and Chomsky (1986:3), the latter position is taken. Chomsky formulates this in terms of the X'-schemata in (31), where X\* stands for zero or more occurrences of some maximal projection. A consequence of this analysis is that internal theta roles (e.g. goal and theme in a sentence like *John sent her a letter*) are assigned under sisterhood with the head (V).

- (39) a.  $X' = X X''^*$   
 b.  $X'' = X''^* X'$

In Kayne (1981, 1994), the binary branching hypothesis is adopted: a constituent branches maximally into two sub-constituents.<sup>31</sup> Or to formulate it from a bottom-up perspective: a new constituent is added one at a time to the existing syntactic structure generated so far by the computational system. An obvious consequence of this binary branching hypothesis is that a predicate which has two internal theta-roles in its thematic grid cannot assign both roles under sisterhood. That is, an internal role can also be assigned to the specifier position.<sup>32</sup> Notice, finally, that the operation Merge (Chomsky 1995a), which turns a *pair* of syntactic objects into a new syntactic object, automatically results into a binary branching syntactic representation.

Another question concerning phrase structure representation regards the ‘dimensionality’ of constituent-structure representation. As noted in sections 4.1 and 4.2, our (written) tree representations of linguistic expressions typically have two dimensions: a hierarchical (dominance) dimension and a linear one (precedence). In such a “standard” tree representation, a node (i.e. constituent) is typically dominated by a single mother node. It has been argued, though, that for certain linguistic expressions we might have to relax this constraint on multi-dominance.<sup>33</sup> These expressions typically involve a mismatch between an expected syntactic form and an available linear order. One such expression is the Right-Node Raising construction in (40a), where the direct object noun phrase *soccer* seems to belong to both *loves*, the transitive verb of the first conjunct, and *hates*, the transitive verb of the second conjunct. That is, a single constituent satisfies the requirements (*in casu* assignment of a theta role to an internal argument) of two different positions in the syntactic tree. One approach towards this pattern of constituent-sharing has been in terms of trees in which a single node (*soccer*) is simultaneously dominated by more than one mother node (the VP of the first conjunct and the VP of the second conjunct). This pattern of multi-dominance is represented in (40b). As indicated, the representation of multi-dominance in a single tree structure leads to “line crossing”: that is, the branch connecting the first conjunct’s VP and the NP *soccer* crosses three branches.

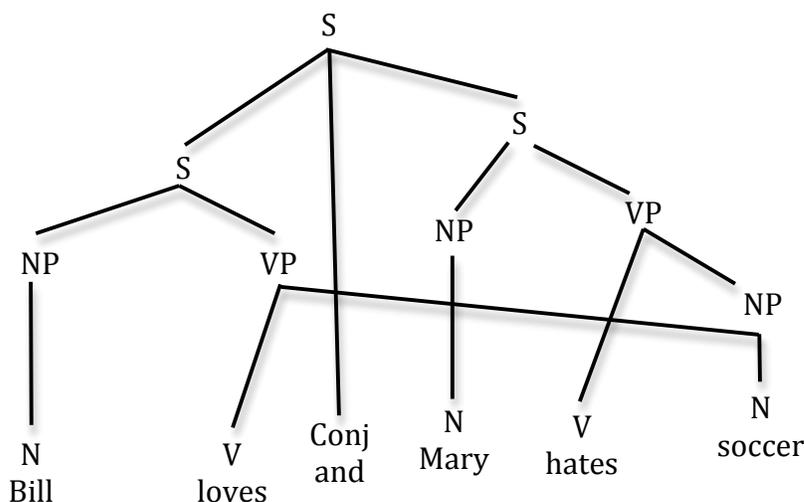
- (40) a. Bill loves and Mary hates soccer

<sup>31</sup> See also Larson’s (1988) *Single Complement Hypothesis*, according to which maximal projections (XP) are limited to one complement and one specifier per phrase.

<sup>32</sup> Of course, this follows only if there *are* in fact predicates that assign two internal theta-roles. In Den Dikken (1995), for example, an analysis of ditransitive constructions is proposed which takes the verb to select a single (small clause) complement within which one internal (Goal) and one external (Theme) role are assigned by a separate predicate (P).

<sup>33</sup> See, among others, Sampson (1975), McCawley (1982, 1989), Blevins (1990) for tree structures which feature multidominance and/or line crossing.

(40) b.



Next to phrase structure representations in which “multi-dimensionality” is represented in a single constituent structure (as in (40b)), there have also been approaches in which sentences (i.e. strings of words) are assigned multiple planes of constituent representation.<sup>34</sup> These multiple planes are typically motivated by situations in which one and the same linear string displays constituency behavior that matches different hierarchical properties (see Carnie 2008: 189 ff.).<sup>35</sup> In Haegeman and Van Riemsdijk (1986), for example, it is proposed that a string like (41a), can be organized along two phrase structural dimensions: The basic constituency structure (i.e. the top plane) represents the lexical knowledge that *counted* selects a full preposition *on*, which heads a PP. The bottom plane results from reanalysis of *count* and *to* into a single complex verb: [*v counted on*]. In this reanalyzed constituent structure, *Mary* is the direct object of the complex verb. It is this bottom tree which is input to an operation like ‘passivization’: Being the object of the complex passive verb *counted-on*, the underlying direct object NP *Mary* can be moved to the subject position of the clause, yielding a sentence like *Mary was counted on*.

<sup>34</sup> This amounts to a relaxation of the constraint that trees have a single root.

<sup>35</sup> Hale (1983) gives a multi-planar analysis of Warlpiri sentences, which are characterized by relatively free word order. He suggests that one plane of syntactic organization (so-called “L-syntax”) represents the basic predicational structures of the clause, while the other plane of syntactic organization (so-called S-syntax) reflects the surface-constituent relations.



represented in (42). In Jackendoff's (1977) analysis, its surface word order (42b) results from extraposition of the clause:

- (42) a. John is [<sub>AP</sub> [<sub>DegP</sub> far [<sub>Deg'</sub> [<sub>Deg</sub> too] [to understand this]]] [<sub>A'</sub> [<sub>A</sub> stupid]]]  
 b. John is far too stupid to understand this

In short, X-bar theory was taken to also hold for function words. One thing which was somewhat less clear and discussed less explicitly in this analysis concerned the selectional relationship between the function word and the lexical head: For example, the definite article *the* typically combines with N, the degree word *too* typically combines with A, and the auxiliary *will* typically combines with V. For the head-complement structure, this selectional relation was stated in terms of subcategorization (e.g. the verb *to meet* is subcategorized for an NP in its complement position, the adjective *dependent* for a PP, *et cetera*). The nature and 'directionality' of the selectional relationship between a lexical category and its function word(s) remained more implicit. For example, the lexical entry of a noun like *father* did not contain the information that it can combine with a definite article *the*, as in *the father*. Nor did the lexical entry of *the* specify that it was 'subcategorized' for an N'-constituent. In short, the nature of the relationship between lexical category and functional category remained quite implicit.

A different perspective on the structural relationship between the lexical system and the functional system was introduced in Chomsky (1986:3) in order to solve two problems regarding clausal structure (cf. Hornstein 1977). The two context-free phrase structure rules that had thus far been taken to be at the basis of clause structure were those in (43):

- (43) a.  $S' \rightarrow \text{COMP } S$   
 b.  $S \rightarrow N'' (\text{INFL}) V''$

Rule (43a), which finds its origin in Bresnan's (1970, 1972) seminal study on complementation, states that a clause can consist of a sentence-introducing COMP(lementizer) (e.g. *that*, *whether*, *if*, *et cetera*) and a "core" sentence S (see (44a)).<sup>36</sup> This COMP also functions as a landing site for fronted wh-phrases, as in (44b):

- (44) a. I wonder [<sub>S'</sub> whether [<sub>S</sub> John recognized her]]]  
 b. I wonder [<sub>S'</sub> who<sub>i</sub> [<sub>S</sub> John recognized t<sub>i</sub>]]]

Rule (43b), still present in Chomsky (1981), generates a syntactic structure in which the subject N'' is located outside of the maximal projection of V, as in (45a). It differs in this respect from the subject of the noun phrase, which, as shown in (45b), occupies the Spec-position of N.

- (45) a. [<sub>S</sub> The enemy [<sub>V''</sub> will [<sub>V'</sub> [<sub>V</sub> destroy] [<sub>NP</sub> the city]]]]]  
 b. [<sub>N''</sub> The enemy's [<sub>N'</sub> [<sub>N</sub> destruction] [of [<sub>NP</sub> the city]]]]]

The two phrase structure rules in (43) are problematic from an X-bar theoretic perspective: Although (43a) has the appearance of an X'-rule, with S being contained within S', it is clear that

<sup>36</sup> Interestingly, Bresnan (1970) (referred to in Chomsky 1973:244) used the label S' for what was later called S, and vice versa. So her phrase structure rule was:  $S \rightarrow \text{COMP } S'$ .

S is not a true head ( $X^0$ ) from which  $S'$  projects; S contains phrasal material. In other words, this rule does not conform with the endocentricity requirement that a phrase be projected from a head. Also the status of COMP, which is taken to be a head, is unclear. If COMP is a head, how can you move phrasal material to it? The phrase structure rule (43b) is also problematic from an X-bar theoretic perspective: the sentential structure (i.e. S) is not endocentric; S does not project from a head. If we take endocentricity (i.e. headedness) to be a universal property of phrase structure, including structure projected from functional categories (cf. Jackendoff 1977), then the phrasal structure generated by rule (43b) is illegitimate.

All these phrase structural problems at the clause level were solved by taking a new perspective on clausal phrase structure: more specifically, it was proposed that the X-bar system extends to functional categories such as C and I in the following way.

- (46) a. [ $I'$   $N''$  [ $I'$  I [ $VP$  ...  $V$  ...]]]      ( $S = I'$ )  
       b. [ $C''$  Spec [ $C'$  C [ $IP$  ... I ...]]]      ( $S' = C''$ )

According to the structure in (46a), the functional category I projects in accordance with the X-bar theoretic rules: I takes VP as its complement and takes the subject  $N''$  as its specifier (cf. Stowell 1981, Huang 1982, Pesetsky 1982, Chomsky 1986).<sup>37</sup> The same goes for the functional category C, which takes IP as its complement and uses its specifier position as the landing site for fronted wh-phrases (cf. Chomsky 1986). An important outcome of this conception of clausal architecture is the fact that the lexical projection VP is contained within the functional layers of the clause: IP and CP. In this respect, it crucially differs from earlier conceptions of phrase structure, like the ones presented in Chomsky (1970) and Jackendoff (1977).

The structural analysis in (46) has a number of advantages: First of all, the selectional relation between a functional head and a lexical phrase can be stated more elegantly: The functional head takes the selected phrase in its complement position, quite analogously to the c-selectional relation between a lexical head and its complement. In other words, the (subcategorization) information that C c-selects IP and that I c-selects VP is projected onto a head-complement structure. Secondly, and related to this, we can get rid of context-free phrase structure rules entirely (see Stowell 1981). In other words, the elimination of the base component can be extended to syntactic objects involving functional material. Thirdly, the structural analysis in (46) makes it possible to account for a number of word order phenomena in terms of “natural” movement operations. That is, the functional system creates syntactic positions (viz. [Spec,FP] and F) which serve as natural landing sites for phrasal (i.e. XP) movement and head (X-zero) movement. More specifically, we can assume a concept of structure preservation along the lines of Emonds (1970): heads move to head-positions, XPs to XP-positions (see also Chomsky 1986). For example, wh-movement can now be interpreted as movement of a wh-phrase to the specifier position of CP (cf. (47a)). The Germanic Verb-Second phenomenon (cf. Den Besten 1983, Koster (1975)) can now be analyzed as movement of the finite verb to C, coupled with movement of some phrasal category to [Spec,CP], as in (47b). And the placement of Romance main verbs in a pre-adverb position, as exemplified in (47c), can now be explained in terms of raising of the main verb to the functional head I (cf. Pollock (1989), extending proposals by Emonds (1978); see also

<sup>37</sup> The idea that the sentence category (S) is to be analyzed as the X-bar projection of I(nfl) is anticipated in Jeanne (1978).

Belletti (1990)). In short, the functional head hypothesis, represented in (46) for the clausal system, allows for an elegant account of a variety of word order phenomena in the sentential domain.

- (47) a. I wonder [<sub>CP</sub> [which president]<sub>i</sub> [<sub>C'</sub> C [<sub>IP</sub> she admires t<sub>i</sub> ]]]  
 b. [<sub>CP</sub>[Waarschijnlijk]<sub>j</sub> [<sub>C'</sub> bewondert<sub>i</sub> [<sub>IP</sub> zij t<sub>j</sub> deze president t<sub>i</sub> ]]]  
 Probably admires she this president  
 ‘She probably admires this president.’  
 c. Je crois [<sub>CP</sub> que [<sub>IP</sub> Jean [<sub>I'</sub> embrasse<sub>i</sub>+I [<sub>VP</sub> souvent [<sub>VP</sub> t<sub>i</sub> Marie]]]]]  
 I believe that Jean kisses often Marie  
 ‘I believe that Jean often kisses Marie.’

In summary: from the perspective of the functional head hypothesis, the clause has the general form in (48).

- (48) [<sub>CP</sub> ... [<sub>C'</sub> C [<sub>IP</sub> ... [<sub>I'</sub> I [<sub>VP</sub> ... [<sub>V'</sub> ... V ... ]]]]]]]

Each structural layer (VP, IP, CP) is associated with a particular type of information: VP is the configuration in which thematic information (theta roles) is assigned, IP is the structural domain associated with tense and event structure, and CP, finally, is the structural domain in which discourse-scopal properties are represented (see section 11; see also Chapter 12 for more elaborate discussion of the functional structure of the sentence).

## 6. The projection of thematic information

### 6.1. The Theta criterion, the Projection Principle, and the Extended Projection Principle

In section 1, the notion of projection was characterized as the “structuralization” of lexical properties of a lexical item. For example, the categorial property V of the lexical item (*to*) *meet* is structuralized in the sense that it is passed on to the phrasal projections of the lexical head V: V' and V''. Another lexical property associated with V is its so-called argument structure, i.e. the thematic properties associated with a lexical head (see Chapter 9). For example, the argument structure of the transitive verb *to meet* (see (49a)) expresses that it has two thematic roles (theta roles) to assign: theme and agent. As illustrated in (49b), the former is assigned to the direct object (the so-called internal argument), the latter to the subject (the so-called external argument); see Williams (1980).<sup>38</sup>

- (49) a. to meet, <agent, theme>  
 b. He<<sub>agent</sub>> met her<<sub>theme</sub>>

<sup>38</sup> The idea that particular theta roles map onto particular syntactic positions in the sentence is expressed in Relational Grammar by the so-called Universal Alignment Hypothesis (see Perlmutter and Postal 1984). According to this hypothesis, theta roles are mapped directly into argument position based on the following hierarchy: *Agent* < *Theme* < *Experiencer* < *Others*. Baker (1988) adopts this idea into the Government and Binding theory in the form of the Uniformity of Theta Assignment Hypothesis (UTAH). See also Larson (1988). Chapter 9 presents a more elaborate discussion of argument structure.

Besides transitive verbs like *to meet*, English (and human language, more generally) distinguishes other types of verbs, among which: unergative (intransitive) verbs (50a), unaccusative (intransitive) verbs (50b), and di-transitive verbs (50c). The argument structures of these verbs are given in (51).

- (50) a. He<sub><agent></sub> slept  
b. He<sub><theme></sub> grew  
c. He<sub><agent></sub> showed her<sub><goal></sub> the slave<sub><theme></sub>

- (51) a. to sleep, <agent>  
b. to grow, <theme>  
c. to give, <agent, goal, theme>

Given the fact that lexical information is projected onto syntax, the question arises how this is done for argument structure. That is, how does the thematic information as part of the lexical entry of a lexical item structuralize? The guiding intuition is that the theta roles as specified in the argument structure of the Verb match up with the syntactic constituents (e.g. noun phrase, clause) —also referred to as ‘arguments’— as part of the syntactic structure. This matching condition is stated in terms of the so-called Theta-criterion (cf. Freidin (1978), Chomsky 1981:36):

- (52) *Theta criterion*  
(i) Each argument bears one and only one theta-role, and  
(ii) each theta-role is assigned to one and only one argument.

The first statement of this criterion rules out illegitimate sentences like (53):<sup>39</sup>

- (53) a. \*He slept [the man]  
b. \*He slept [that John was afraid of cats]

Since the intransitive verb *sleep* can take only one argument (here *he*), then by the Theta Criterion, the second NP in (53a) or the clause in (53b), cannot also be construed as one of its arguments.

The second statement of the Theta-criterion in (52) applies to sentences like those in (54). (54a) cannot mean: ‘He recommended Sue to herself’. That is, the noun phrase *Sue* cannot be associated with two thematic roles (say, theme and goal). Likewise, (54b) cannot mean: ‘John recognized himself in the mirror.’ That is, the noun phrase *John* cannot be associated simultaneously with the thematic roles *agent* and *theme*.

- (54) a. \*He recommended Sue  
b. \*John recognized in the mirror

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<sup>39</sup> It should be noted that *sleep* CAN actually take a complement in resultatives, as in *He slept his head off* and *He slept himself into a mental breakdown*. The contrast between these and (53b) indicates that apparently small clauses differ from full clauses (which is something that still counts as a bit of a problem for the Small Clause hypothesis).

Within the Government and Binding framework (Chomsky 1981), D-structure is considered to be the ‘core’ representation of theta-properties. It has been proposed, however, that theta-properties must also be satisfied at the levels of S-structure and LF. This restriction is known as the *Projection Principle* and can be formulated as (55):

(55) *Projection Principle*

Lexical structure must be represented categorially at every syntactic level, i.e. D-structure, S-structure and LF.

The Projection Principle requires that the lexical information that a verb like *recognized* assigns the theme theta-role to an argument-NP in its complement position be also represented in the S-structure representation and the LF-representation. An important consequence of this principle is that displacement of an argumental noun phrase to another syntactic position, as in (56b,c), does not result in the disappearance of that noun phrase. The Projection Principle demands that a noun phrase be left there, a so-called trace, thus satisfying the lexical property of *recognize* that it has a theme theta-role to assign.

- (56) a. Bill recognized Sue<sub><Theme></sub>  
 b. Who<sub>i</sub> did he recognize t<sub>i<Theme></sub>?  
 c. Sue<sub>i</sub> was recognized t<sub>i<Theme></sub>.

Another important consequence of the Projection Principle is that it prohibits certain transformational operations. For example, it prohibits a displacement process that exchanges two noun phrases, leaving no traces (cf. Van Riemsdijk and Williams 1986). Thus, the exchange depicted in (57) is excluded because the theta-role assignments would be different in the two syntactic structures.

- (57) Bill<sub><Agent></sub> recognized Sue<sub><Theme></sub> → (D-structure)  
 Sue<sub><Agent></sub> recognized Bill<sub><Theme></sub> (S-structure)

Summarizing, the Projection Principle requires that the thematic properties associated with a lexical head (e.g. V) structuralize (i.e. are mapped onto argument positions) in a similar way across each syntactic level (D-structure, S-structure, and LF). Thus, the theme-role is structuralized as a (direct object) NP in the complement of V and the agent-role as an NP in the subject position.

A consequence of the Projection Principle is that absence of a theme theta role in the thematic representation of a verb (e.g. *to sleep*) results in the absence of a direct object NP in the syntactic structure. It is even impossible to just insert an expletive (i.e. semantically empty) pronoun *it* as a complement of the verb.

- (58) \*Bill slept it (meaning: ‘Bill slept’)

(58) shows that an object position is not projected structurally if there is no ‘thematic base’ for it. Subject positions differ from object positions in this respect. Clauses must have a subject position, i.e. even if there is no ‘thematic base’ for the projection of a subject position. Evidence for the obligatory presence of a subject position comes from the examples in (59):

- (59) a. It seems that John speaks Swahili  
b. \*Seems that John speaks Swahili

The raising verb *seem* does not have an agent role in its thematic representation. Its theta grid only contains a theme-role, which is assigned to the complement clause *that John speaks Swahili*. Even though there is no agent theta role available for projection onto a subject position in syntax, the subject position must be present in the syntactic representation. This is clear from the obligatory presence of the expletive pronoun *it*. In short, the subject position (i.e. [Spec,IP]) is obligatory.

The two principles —the Projection Principle in (55) and the requirement that clauses have subjects— constitute what is called the Extended Projection Principle (EPP) in Chomsky (1981). It should be noted here that in the literature the term *Extended Projection Principle* is usually applied in a metonymic kind of way, to refer just to the second requirement.

The question obviously arises as to why clauses must have a subject (i.e. [Spec,IP]). Chomsky and Lasnik (1995:55) speculate that this obligatoriness of the subject position (also referred to as the EPP-property) should be interpreted “perhaps as a morphological property of I or by virtue of the predicational character of VP (Williams 1980, Rothstein 1983);” see also Chapter 10. In Rizzi (2006), the EPP property is reinterpreted as a manifestation of what he calls ‘the Subject Criterion’, the general idea being that there is a functional layer in the higher functional field of the clause where the subject-predicate relationship is established.

Let me end this section with a brief remark on the structuralization of thematic information in Chomsky’s (1993, 1995a) Minimalist framework, according to which there is no D-structure representation (see also Chapter 4). This means that there is not a separate syntactic representation where thematic information is structuralized and which forms input to the ‘transformational component’. According to Chomsky (1995a:313) thematic information is projected onto syntax as a property of Merge. For example, when a verb like *meet* merges with the nominal object *him*, the former discharges its theme role to the latter within the local configuration just created. In other words, the theta-relatedness of a predicate and an argument is a ‘base property’. This ‘base’ connection between Merge and thematic discharge blocks structures in which a DP-argument receives its thematic role after having been displaced to some syntactic position (e.g. raising from the complement of V to [Spec,VP]) or in which a predicate discharges its thematic role after having been raised to some structural position (e.g. theta role assignment to [Spec,IP] after V has raised to I).<sup>40</sup>

## 6.2. The VP-internal subject hypothesis

In the earlier conceptions of clause structure, subjects —as opposed to objects, which are typically realized as complements of V —are realized in a position outside of the VP (whence

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<sup>40</sup> In the literature, there are proposals, though, in which such things *are* possible. In Hornstein (2001), for example, it is proposed that theta-features can drive displacement operations, which means that movement to theta-positions is possible.

Williams's (1980) distinction between external argument versus internal argument). According to the PS-rule in (43b), the subject is interpreted as the NP immediately dominated by S, and according to the reanalysis of S as IP, the subject can be identified as the specifier of IP (see (60a)). In the course of time, this VP-external analysis of the subject has been replaced by a VP-internal analysis (i.e. the subject as the specifier of the lexical projection VP, as in (60b)), which in turn has been replaced by an analysis in which the subject is associated with the specifier of a so-called 'small' vP on top of the lexical projection VP, as in (60c).

- (60) a. [IP John [I' will [VP [V' recognize her]]]] (VP-external hypothesis)  
 b. [IP -- [I' will [VP John [V' recognize her]]]] (VP-internal subject hypothesis)  
 c. [IP -- [I' will [vP John [v' v [VP recognize her]]]]] (light vP-hypothesis)

In Kitagawa (1986) and Koopman and Sportiche (1991), the traditional view that the subject of the clause corresponds to [Spec,IP] is abandoned. Instead they propose, building on Stowell's (1981) claim that subjecthood is a property of the specifier position of a lexical phrase, that the clausal subject originates in [Spec,VP], as is represented in (60b). The surface order *John will recognize her* (where the subject precedes the tensed auxiliary) is then obtained by movement of the agent-NP *John* to [Spec,IP]:

- (61) [IP John<sub>i</sub> [I' will [VP t<sub>i</sub> [V' recognize her]]]]

A conceptual argument in support of the VP-internal subject hypothesis is the fact that the lexical projection VP can now be identified as the sole syntactic domain of thematic role assignment. That is, the lexical projection (*in casu* VP) is the only domain in which structuralization (i.e. projection) of theta-properties takes place. In other words, theta assignment takes place locally within the VP. At the empirical level, a number of arguments have been adduced in support of the VP-internal subject hypothesis. To mention two of them: First, on the basis of the structure in (60b) a straightforward account can be given of the floating quantifier phenomenon, exemplified in (62b); see Sportiche (1988). Under the assumption that the quantifier *all* and the nominal expression *the boys* form a constituent underlyingly, the floating pattern can be derived by just moving the nominal expression and leaving the quantifier stranded, as in (62c). In the non-floating pattern in (62a), the entire complex phrase *all the boys* is moved from [Spec,VP] to [Spec,IP].

- (62) a. [All the boys] will recognize her  
 b. The boys will all recognize her  
 c. [IP [The boys]<sub>i</sub> [I' will [VP [all [t<sub>i</sub>]] [V' recognize her]]]]

Second, the VSO-order of Celtic languages like modern Irish (cf. McCloskey 1991) can be straightforwardly accounted for under the VP-internal subject hypothesis: the word order in the embedded clause in (63) follows from head movement of V to I in combination with a subject that remains *in situ* (i.e. in [Spec,VP]).

- (63) Sílim                    [go dtuigeann            Bríd    Gaeilge]    (Irish; Tallerman 2005)  
 think.PRES.1.SG    COMP understand.PRES    Bridget    Irish  
 'I think that Bridget understands Irish.'

While there is general agreement that the subject argument originates in a syntactic position lower than [Spec,IP], it has been proposed that this ‘base position’ of the subject-argument is not as low as [Spec,VP]. Instead, it is assumed that the verbal structure involved in the assignment of thematic roles is composed of two layers: one verbal layer (i.e. lexical VP) in which internal argumental roles such as theme and goal are assigned and another layer, so-called small vP (cf. Chomsky 1995a), in which the external role (agent) is assigned (see (60c)).<sup>41</sup> It is small v that assigns the external theta role (agent) to the subject-NP in [Spec,vP].

Splitting the agent off of the VP—and thus this way reintroducing the VP-external hypothesis, although in a more local way—has a number of advantages. First of all, it enables us to capture Marantz’s (1984) observation that while we find V+O idioms, there are no S+V idioms.<sup>42</sup> That is, the verb and the object can form a meaning unit together, expressing a metaphorical meaning, whereas S+V typically cannot. This is exemplified in (64), where (64a) has a literal meaning and (64b,c) the metaphorical meaning:

- (64) a. throw a ball  
       b. throw a party  
       c. throw a fit

If agents are tied to the verb less closely, then this might be expressed structurally by placing the subject in a verbal layer (i.e. small vP) separate from the verbal layer containing the internal arguments (i.e. VP).

Another argument in support of the structure in (60c), featuring small vP, comes from the analysis of di-transitive constructions (i.e. double object constructions) such as (65) and (66). In fact, the small vP analysis has its origin in the analysis of this construction type by Larson (1988).

- (65) a. John showed [Sue] [a book]  
       b. John showed [a book] [to Sue]

In (65a), we have the word order goal-theme, whereas in (65b) we have the order theme-goal, where the goal is realized as a PP. As noted by Barss and Lasnik (1986), the goal-theme order and the theme-goal order display the binding asymmetries in (66) and (67), respectively. As shown in (66a), the goal-NP is able to act as an antecedent for the reflexive pronoun (the theme-NP); the reverse binding pattern is not allowed (see (66b)). In (67a), it is the theme-NP which acts as a binder for the reflexive pronoun contained within the goal-PP; the reverse binding relation yields an ill-formed pattern.

- (66) a. John will show Sue<sub>i</sub> herself<sub>i</sub> (in the mirror)  
       b. \*John will show herself<sub>i</sub> Sue<sub>i</sub> (in the mirror)  
 (67) a. John will show Sue<sub>i</sub> to herself<sub>i</sub>

<sup>41</sup> This ‘small vP’ layer has alternatively been called PredP (Bowers 1993) and VoiceP (Kratzer 1995).

<sup>42</sup> There are apparent exceptions to the statement that S+V idioms do not exist. For example, in the expression *A little birdie told me that...*, which is used if someone does not want to say where he got some information from, the subject *a little birdie* and the verb *tell* seem to form an idiom. Marantz (1984), though, has argued against these being counterexamples to his generalization.

- b. ??John will show herself<sub>i</sub> to Sue<sub>i</sub>

Larson (1998) shows that under a split-VP analysis these binding facts can be straightforwardly accounted for in terms of the structural relation *c-command*, which is generally taken to be involved in binding relations involving reflexives (Reinhart 1976).<sup>43</sup> These binding facts suggest that the goal-NP *Sue* in (66a) and the theme-NP *Sue* in (67b) c-command the reflexive pronoun. This means that they are in a higher structural position than the theme-NP *herself* in (66a) and the goal-PP *to herself* in (67b). The derivation of (66a) is given in (68) and the derivation of (67a) in (69). With the presence of an extra verbal layer (in Larson’s analysis an additional projection VP, in Chomsky’s a vP), we can accommodate both the theme and the goal within the VP in such a way that one (specifier of VP) c-commands the other (complement of V). As indicated by the b-examples, the surface order is accomplished by moving the lexical verb to the functional head v (with movement of the vP-internal subject to [Spec,IP] in addition).

- (68) a. [IP -- [I' will [VP John [V' e [VP Sue [V' show herself]]]]]] →  
 b. [IP John<sub>i</sub> [I' will [VP t<sub>i</sub> [V' show<sub>j</sub> [VP Sue [V' t<sub>j</sub> herself]]]]]]
- (69) a. [IP -- [I' will [VP John [V' e [VP Sue [V' show to herself]]]]]] →  
 b. [IP John<sub>i</sub> [I' will [VP t<sub>i</sub> [V' show<sub>j</sub> [VP Sue [V' t<sub>j</sub> to herself]]]]]]

## 7. Functional categories and extended projections

With the clausal domain being split up in an enclosed lexical layer (VP), which itself may be further split up in a ‘big’ VP and a ‘small’ vP, and an enclosing functional layer (i.e. IP and CP), the question arises how in spite of this ‘divided’ syntactic structure, the unity or connection of these layers is preserved. Intuitively, VP-IP-CP feel like they belong together. And also empirically, this relatedness of the three layers is felt, for example by the fact that the lexical category Verb can be associated via head movement with the functional head positions I (see French (47c)) and C (see Dutch (47b)).

Abney (1987:57-8) tries to capture this ‘connection’ between the lexical layer (e.g. VP) and the functional layers (IP, CP) in terms of his notion of *S(emantic)-projection*, which he distinguishes from *C(ategory)-projection*. C-projection is simply the usual notion of syntactic projection: V c-projects to VP, I c-projects to IP, and C c-projects to CP. S-projection “is the path of nodes along which its descriptive content is ‘passed along’.” With this statement, Abney expresses that the descriptive content of the lexical category V is projected from the lexical head onto the members of the lexical projection line (V', VP) and the members of the functional projection lines (I, I', IP; C, C', CP). The notion of S-projection is more precisely defined as follows by Abney (1987:57,

<sup>43</sup> Jackendoff (1990b) countered Larson’s translation of the Barss and Lasnik binding asymmetries into c-command asymmetries, saying that they reflect a *linear* asymmetry, not one that should be couched in terms of c-command. See Den Dikken (1995) for an alternative structural analysis which also tries to capture the Barss and Lasnik asymmetries in terms of the c-command relationship.

his example (47)), where Abney (1987:56) uses the notion of f-selection to indicate “the syntactic relation between a functional head and its complement.”<sup>44</sup>

- (70) b is an s-projection of a iff
- a. b = a, or
  - b. b is a c-projection of an s-projection of a, or
  - c. b f-selects an s-projection of a.

When we now consider the syntactic structures in (71a) and (71b), the nodes V, V' and VP represent the C-projection of the lexical head V and the nodes V, V', VP, I, I', IP, C, C', CP represent the maximal S-projection of V.

- (71) a. [<sub>CP</sub> Spec [<sub>C'</sub> C [<sub>IP</sub> Spec [<sub>I'</sub> I [<sub>VP</sub> Spec [<sub>V'</sub> V YP ]]]]]  
 b. [<sub>CP</sub> Spec [<sub>C'</sub> C [<sub>IP</sub> Spec [<sub>I'</sub> I [<sub>VP</sub> Spec [<sub>V'</sub> V YP ]]]]]

While Abney tries to capture the ‘unity’ of the lexical projection VP and the functional projections IP and CP in terms of the more semantically oriented notion of ‘projection of descriptive content’, Grimshaw (1991) takes a somewhat more syntactic approach by characterizing the ‘unity’ of the three layers VP, IP and CP in terms of their shared categorial identity (see also Haider 1988, Van Riemsdijk 1990, 1998). That is, the functional heads I and C (and also their phrasal projections) are of the same categorial type as the lexical category: they are all verbal, i.e. [+V, -N] according to Chomsky’s (1970) characterization of syntactic categories in terms of primitive features [+/-V] (predicative) and [+/- N] (substantive); see section 3. What distinguishes the functional heads I and C from the lexical head V is their functional status, which is encoded as a value for the functional feature F. As shown in (72), F0 is assigned to the lexical category, F1 to the lowest functional category, and F2 to the next highest functional category, and so forth and so on. Importantly, a category label is now a pair consisting of a categorial specification and a functional specification. This compositional nature of the categorial labels expresses the idea that functional categories are relational entities: I and C are functional categories by virtue of their relationship to the lexical category V.

- (72) a. [+V,-N] F0 (= lexical category V)  
 b. [+V,-N] F1 (= functional category I)  
 c. [+V,-N] F2 (= functional category C)

In accordance with the idea of categorial projection, the phrasal projections of V (i.e. V' and VP) are also categorially specified as in (72a). The projections I' and IP have the specification in (72b), and C' and CP the one in (72c). Grimshaw uses the term *perfect projection* to refer to a maximal projection which projects from a category which it shares both categorial and functional features with. Thus, VP is a perfect projection of V and V'; IP is a perfect projection of I and I'; and CP is a perfect projection of C and C'. Note that this notion of perfect projection corresponds to Abney’s notion of C-projection. Grimshaw introduces the notion of *extended projection* to refer to a maximal projection which projects from a category which it shares categorial features

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<sup>44</sup> According to Abney (1987:56), “f-selection corresponds semantically to the “passing on” of the descriptive content of the complement.”

with (e.g. [+V,-N]). Thus, IP is an extended (verbal) projection of V, V', VP, I and I'; and CP is an extended (verbal) projection of V, V', VP, I, I', IP, C and C'.

With IP and CP having been characterized as extended verbal (i.e. [+V,-N]) projections, the question arises as to what other types of extended projections can be distinguished: On the basis of Chomsky's (1970) characterization of syntactic categories in terms of the features [+/-N, +/-V], the following four types of extended projections can be identified:

- extended verbal projections [-N,+V]
- extended nominal projections [+N,-V]
- extended adjectival projections [+N,+V]
- extended adpositional projections [-N,-V]

For an extensive discussion of the architecture of the extended verbal projection, I refer to Chapter 12. In sections 8-10, I will give a characterization of the other three extended projections.

## 8. On the functional structure of the extended nominal projection

### 8.1 From NP to DP

In early phrase structural analyses (Chomsky 1970, Selkirk 1970, Jackendoff 1977), nominal expressions such as *the analysis of the problem* and *John's analysis of the problem* were commonly analyzed as maximal projections of a lexical head N. In conformity with the X-bar theoretic principles, N combines with a complement (in casu (*of*) *the city*) forming an N'-level phrase, which in turn combines with the specifier (in casu: the determiner *the* or the prenominal possessor *John's*) yielding the maximal level NP.

(73) [<sub>NP</sub> the/John's [<sub>N'</sub> [<sub>N</sub> analysis] [<sub>PP</sub> of the problem]]]

As shown in (73) a determiner like *the*, analyzed as phrasal Art''' in Jackendoff (1977), and the prenominal lexical possessor-NP *John's* are taken to occupy the same position, viz. [Spec,NP]. This similarity in distribution may be somewhat surprising given the fact that ArtP and NP are quite different syntactic objects: one is a projection of a functional head, the other of a lexical head.

In the 1980s, an alternative conception of nominal expressions came to the fore: the so-called D(eterminer)P(hrase)-hypothesis. According to this view, nominal expressions are DPs rather than NPs. That is, the lexical projection NP does not enclose the functional projection (ArtP/DP) in its spec-position; rather, the functional projection DP encloses the lexical projection NP. Schematically:

(74) [<sub>DP</sub> Spec [<sub>D'</sub> D [<sub>NP</sub> Spec [<sub>N'</sub> N Compl]]]]]

One of the earliest proposals arguing in favor of this phrase structural architecture of nominal expressions was made in Brame (1982:321), who makes the following statement: "[...] I think it is a mistake to think of N as the head of an NP. One should think in terms of DPs, i.e. determiner



- man.ERG(PL) buy-OM-SM  
 ‘The men bought it.’  
 b. angute-t kuiga-t  
 man-ERG(PL) river-SM  
 ‘the men’s river.’

The identical morphological expression of the agreement relationship in the possessive nominal domain and the clausal domain in Yup’ik suggests that there is a common configurational structure which underlies this agreement relationship. If agreement involves a Spec-head relationship between the functional head I<sup>o</sup> and the subject noun phrase in the clausal domain, then this same structural relationship should be at the basis of the agreement relationship in the nominal domain. The DP-hypothesis provides this configuration, with [Spec,DP] being the locus for the agreeing possessor and D being the locus for the agreeing suffix which ultimately gets associated with the possessed noun via N-raising to D. Schematically, and abstracting away from the syntactic representation of the object marker:

- (76) a. [<sub>IP</sub> angute-t [<sub>I'</sub> [<sub>I</sub> -t] [<sub>VP</sub> kiputa-a]]] (75a)  
 b. [<sub>DP</sub> angute-t [<sub>D'</sub> [<sub>D</sub> -t] [<sub>NP</sub> kuiga]]] (75b)

### 8.3 Gerunds: Solving an X-bar theoretic problem

Abney (1987) argues that English nominal constructions of the type *John’s analysis of the problem* have the structure in (77), with the so-called Saxon genitive noun phrase *John’s* occupying [Spec,DP]; see Abney (1986) for an analysis in which ‘s is located in D.

- (77) [<sub>DP</sub> John’s [<sub>D'</sub> D [<sub>NP</sub> analysis of the problem]]]

As Abney points out, the structural analysis in (77) provides a straightforward account of gerundive nominal expressions like *John’s analyzing the problem*. Observe, first of all, that the traditional NP-analysis of gerunds, given in (78a), is not congruent with the requirements of X-bar theory: it violates the X-bar theoretic requirement that a phrasal node be headed by an X-zero category (i.e. a head) of the same categorial type. In (78a), there is no noun (N) heading NP. Under the DP-hypothesis, gerunds receive a phrase structural analysis which is compatible with X-bar theory. The functional node D takes the lexical projection VP as its complement—which is the ‘special’ property of gerundive nominals—and has the DP *John’s* in its specifier position.

- (78) a. [<sub>NP</sub> [<sub>NP</sub> John’s] [<sub>VP</sub> analyzing the problem]]  
 b. [<sub>DP</sub> [<sub>DP</sub> John’s] [<sub>D'</sub> [<sub>D</sub> D] [<sub>VP</sub> analyzing the problem]]]

As noted by Fukui and Speas (1986), a further strengthening of the parallelism between the clausal domain and the nominal domain can be obtained by adopting the NP-internal subject hypothesis, on a par with the VP-internal subject hypothesis (see section 6.2): that is, the external argument of a nominal head, just like that of a verbal head, starts out in the Spec-position of the lexical projection, i.e. NP, and reaches its surface position after displacement to [Spec,DP], as depicted in (79a). A conceptual advantage of this analysis is that we have a maximally uniform mapping of theta roles onto syntactic structure: both in the verbal domain and in the nominal

domain, arguments start out within the lexical projection (NP, VP). As exemplified in (79b), the external argument of a gerundive nominal expression starts out in [Spec,VP] and ends up in [Spec,DP] after displacement.

- (79) a. [<sub>DP</sub> John<sub>i</sub> [<sub>D'</sub> [<sub>D</sub> D] [<sub>NP</sub> t<sub>i</sub> [<sub>N'</sub> analysis [of the problem]]]]]  
 b. [<sub>DP</sub> John<sub>i</sub> [<sub>D'</sub> [<sub>D</sub> D] [<sub>VP</sub> t<sub>i</sub> [<sub>V'</sub> analyzing the problem]]]]

#### 8.4 Subextraction: DP = CP?

Whereas Abney draws a parallel between nominal D(P) and verbal I(P), Szabolcsi (1987, 1999), basing her analysis on Hungarian, takes a somewhat different position, though one which still supports the idea that nominal expressions are DPs rather than NPs. Instead of equating nominal D with I(nflection), which she takes to be suffixed directly onto N (i.e. [<sub>N</sub> N+I]), she argues that D(P) is an analog of C(P). The central insight here is that [Spec,DP], just like [Spec,CP], functions as an escape hatch for *sub-extraction*. In other words, cross-categorial parallelism involves here the phenomenon of sub-extraction (see Corver (2006)), i.e. displacement of a constituent out of a larger, containing phrase. Evidence for this escape hatch function of [Spec,DP] in Hungarian comes from the extraction of dative-marked possessors out of possessive nominal constructions. Before showing this, I should note that Hungarian has two types of possessive nominal expressions (cf. Szabolcsi 1987, 1994): one in which the possessor bears nominative case and one in which it bears dative case. Interestingly, the former appears in a post-article position, whereas the latter occurs in a pre-article position:

- (80) a. a Mari kalap-ja  
 the Mari-NOM hat-POSS.3P.SG.  
 b. Mari-nak a kalap-ja  
 Mari-DAT the hat-3P.SG.  
 'Mary's hat'

As shown in (81), the dative marked possessor, as opposed to nominative marked one, can in Szabolcsi's appropriate terms, 'run away from its nominal home'. Szabolcsi interprets this as evidence for the fact that the possessor cannot be extracted out of the noun phrase directly from the base position (i.e. the position associated with nominative case), and that subextraction from the noun phrase is only possible if the possessor can proceed through the specifier of DP, which is associated with dative case.

- (81) \*[Mari]<sub>i</sub> Peter látta [<sub>DP</sub> a [t<sub>i</sub> kalap-já-t]] ?  
 Mari-NOM Peter saw the hat-POSS.3P.SG-ACC  
 'Peter saw Mary's hat.'

- (82) [Mari-nak]<sub>i</sub> Peter látta [<sub>DP</sub> t'<sub>i</sub> a [t<sub>i</sub> kalap-já-t]] ?  
 Mari-DAT Peter saw the hat-POSS.3P.SG-ACC  
 'Peter saw Mary's hat.'

The two symmetric views on the role of D, i.e.  $D \approx I$  (Abney) and  $D \approx C$  (Szabolcsi), have resulted in phrase structural analyses of the nominal system in which there is both a functional

layer corresponding to clausal IP and a functional layer corresponding to clausal CP. This structural representation is given in (83), where AgrP is the nominal counterpart of the extended verbal projection IP, and DP the nominal counterpart of CP (see Giusti (1991), Cardinaletti (1992); cf. also Delsing (1993, 1998), Schoorlemmer (1998), who use the label PosP rather than AgrP).

(83) [DP Spec [D' D [AgrP Spec [Agr' Agr [NP Spec [N' N XP]]]]]]

The Hungarian nominal expression in (84) and the Italian one in (85) exemplify this structural representation.

(84) a. az én kalap-om  
the I hat-1P.SG  
‘my hat’  
b. [DP [D' az [AgrP én<sub>i</sub> [Agr' -om [NP t<sub>i</sub> [N' kalap]]]]]]

(85) a. la sua casa  
the his/her house  
‘his/her house’  
b. [DP [D' la [AgrP sua<sub>i</sub> [Agr' Agr [NP t<sub>i</sub> [N' casa ]]]]]]

### 8.5 Noun phrase internal word order and N-to-F movement

An important line of (syntactic) argumentation in support of the DP-hypothesis comes from *word order phenomena* within nominal expressions. As is well-known from the clausal system, (cross- or intra-linguistic) word order variation may result from the application of overt movement of a verbal head to a higher (i.e. c-commanding) functional head such as I or C. As argued by Pollock (1989), who builds on Emonds (1978), for example, the word order contrast between Romance (86) and Germanic (87) results from the presence versus absence of overt V-to-I movement:

(86) a. Jean mange souvent des pommes  
Jean eats often ART.PL apples  
b. [IP Jean [I' mange<sub>i</sub>+I [VP souvent [VP t<sub>i</sub> des pommes]]]]

(87) a. John often eats apples  
b. [IP John [I' I [VP often [VP eats apples]]]]

If L-to-F movement (i.e. movement of a lexical head to a functional head) applies in the extended verbal projection and is at the basis of various word order phenomena, then —from the perspective of cross-categorial symmetry— the same type of operation would be expected to be active in the nominal domain and to be at the basis of certain word order patterns.

Ritter (1988, 1991) provides evidence for the existence of N-to-D movement in her analysis of word order phenomena within the so-called Construct State construction in Hebrew. As shown in (88), the CS noun phrase differs in a number of respects from the so-called Free State (FS) noun

phrase. First of all, the CS cannot co-occur with a definite article (i.e., *\*ha-ahavat dan et acmo*).<sup>48</sup> Secondly, the subject *dan* must be bare; i.e. the genitive case that is associated with it cannot be realized prepositionally by means of *shel* (*\*ahavat shel dan et acmo*).

- (88) a. ahavat dan et acmo (CS)  
 love Dan ACC himself  
 ‘Dan’s love of himself’  
 b. ha-ahava shel dan et acmo (FS)  
 the-love of Dan ACC himself  
 ‘Dan’s love of himself’

Besides these differences, the two constructions in (88) share an important property: the subject *dan* is able to act as an antecedent for the reflexive object. Importantly, the following expressions in which the reflexive is the subject and *dan* the object are ill-formed.

- (89) a. \*ahavat acmo et dan  
 love himself ACC Dan  
 b. \*ha-ahava shel acmo et dan  
 the-love of himself ACC Dan

The examples in (89a) and (89b) suggest that both in the CS noun phrase and in the FS noun phrase, the subject asymmetrically c-commands the object. Ritter argues that this subject-object asymmetry follows from a SNO base pattern (i.e. Subject + Noun + Object), with S being in the specifier position of the lexical projection NP and O being in the complement position. The surface order NSO is then derived by the application of N-to-F movement. In the FS-construction, the lexical head *ahava* raises and adjoins to an intermediate functional head NUM (the locus of number features), as depicted in (90a); the subject *dan* is case-marked by the dummy case marker *shel*. In the CS-construction, the lexical noun *ahavat* raises via the intermediate functional NUM-head to the functional D-head, to which it gets adjoined; see (90b). It is assumed that this phonetically empty D-head assigns genitive case rightward under adjacency with the case-receiving subject. Ritter argues that this situation is obtained by moving the subject to [Spec,NumP].

- (90) a. [DP [D' ha [NumP [Num' ahava<sub>i</sub> [NP shel+dan [N' t<sub>i</sub> et acmo]]]]] (FS)  
 b. [DP [D' ahavat<sub>i</sub> [NumP dan<sub>j</sub> [Num' t'<sub>i</sub> [NP t<sub>j</sub> [N' t<sub>i</sub> et acmo]]]]] (CS)

Evidence that the lexical noun raises to a higher functional head (NUM in FS and D in CS) comes from the distribution of attributive adjectives. Consider, for example, the distribution of the attributive adjective *ha-gadol* in the following possessive noun phrases:

- (91) a. beyt ha-mora ha-gadol (CS)  
 house the-teacher the-big  
 ‘the teacher’s big house’  
 b. \*beyt ha-gadol ha-mora

<sup>48</sup> The *-t* ending on *ahavat* marks the construct state form.

- (92) a. ha-bayit ha-gadol shel ha-mora (FS)  
 the-house the-big of the-teacher  
 b. \*ha-bayit shel ha-mora ha-gadol  
 the-house of the-teacher the-big  
 ‘the teacher’s big house’

Starting from the assumption that attributive APs are base-generated as left branch modifiers adjoined to NP, Ritter (1991) argues that the word orders in the a-sentences result from the application of raising of the noun to a higher functional head: D in (91a), and NUM in (92a).<sup>49</sup>

Another illustration that certain noun phrase internal word order phenomena receive a straightforward account if one adopts an N-to-F head movement analysis comes from the distribution of attributive APs in the nominal domain. As noted by Cinque (1994), there is a contrast between Germanic languages and Romance languages as regards the placement of certain attributive APs with respect to noun. More specifically, in Romance, certain adjectives occur in postnominal position, whereas their Germanic counterpart occurs in pronominal position:

- (93) a. the Italian invasion of Albania (English)  
 b. \*the invasion Italian of Albania  
 (94) a. \*l’italiana invasione dell’Albania (Italian)  
 b. l’invasione italiana dell’Albania

In these examples, the AP *Italian/Italiana* is a ‘thematic’ AP which expresses the external theta role of *invasion/invasione* (cf. Kayne 1981, Giorgi and Longobardi 1991). The PP *of Albania/dell’Albania* occupies the complement position of N. English (representing Germanic) and Italian (representing Romance) differ from each other in the placement of the Noun with respect to the attributive AP. Cinque argues that this contrast follows from the presence of N-to-F movement in Italian and its absence in English. Schematically:<sup>50</sup>

<sup>49</sup> For further discussion of the Construct State, see Siloni (1996, 1997). See Shlonsky (2003) for an analysis of Hebrew Construct State noun phrases in terms of phrasal movement.

<sup>50</sup> A problem with the N-to-F head movement analysis for Romance is that, when there are multiple attributive modifiers, this head movement hypothesis predicts that the modifiers should all line up postnominally in the same order in which they line up pronominally. This, however, is not the distributional pattern we find, as shown by the example in (ib), which is the French counterpart of the English nominal expression in (ia):

- (i) a. a beautiful round table  
 b. une table ronde magnifique (French)  
 a table round beautiful  
 ‘a beautiful round table’

It is more likely, therefore, that some sort of snowballing or roll-up phrasal movement is involved in the derivation of the French word order in (ib). That is, starting from the underlying pattern *une magnifique ronde table*, the surface order is derived by first moving the phrase *table* to a position preceding *ronde* (yielding *une magnifique table<sub>i</sub> ronde<sub>i</sub>*) and subsequently moving the phrase *[table<sub>i</sub> ronde<sub>i</sub> t<sub>j</sub>]* to a position preceding the attributive adjective *magnifique* (yielding: *une [table<sub>i</sub> ronde<sub>i</sub> t<sub>j</sub>] magnifique t<sub>j</sub>*). See Cinque (2005) and Laenzlinger (2005) for an analysis of the ordering of attributive adjectives in terms of roll-up phrasal movement.

- (95) a. [DP the [FP [F' F [NP Italian [N' invasion [of Albania]]]]]]  
 b. [DP l' [FP [F' invasione<sub>i</sub> [NP Italiana [N' t<sub>i</sub> [dell'Albania]]]]]]

Cinque (1994) notes that certain attributive adjectives must occur prenominal in Italian (see (96a)). For those cases, he assumes that N raises to an intermediate F-head. That is, N-movement does not necessarily move the N-head to the highest F-projection.

- (96) a. la terribile invasione italiana dell'Albania  
 b. \*l'invasione terribile italiana dell'Albania

- (97) [DP la [AgrP terribile [Agr' invasione<sub>i</sub> [NP Italiana [N' t<sub>i</sub> [dell'Albania]]]]]]

Using a pre-DP-framework, Grosu (1988) argues for Rumanian that N moves to D, when D is an enclitic definite article (see also Dobrovie-Sorin 1988, Cornilescu 1995, Giusti (1994, 1997, 2002) for discussion of this phenomenon in a variety of Balkan languages). This is exemplified in (98). (98a) shows that when an indefinite article is present in D, the word order is basically the same as in Italian, with some adjectives in prenominal position and others in postnominal position. When the enclitic definite article *ul* is present, the noun can occur as the leftmost element within the noun phrase (see (98b)). The noun then functions as a host for the enclitic article.

- (98) a. un frumos baiat român (Rumanian)  
 a nice boy Rumanian  
 'a nice Rumanian boy'  
 b. baiatul frumos (cel roman)  
 boy-the nice (the Rumanian)  
 'the nice (Rumanian) boy'

The N-initial word order in (98b) can be captured straightforwardly under a head movement analysis which raises the lexical noun via the intermediate Agr-heads to D.

- (99) [DP [baiat]<sub>i</sub>-ul [AgrP frumos [Agr' t''<sub>i</sub> [AgrP cel roman [Agr' t'<sub>i</sub> [NP t<sub>i</sub> ]]]]]]]

Just like Rumanian, the Scandinavian languages exhibit postnominal enclitic definite articles, as illustrated in (100). Analogously to the Rumanian N-initial pattern in (98b), one might propose to derive the Scandinavian word order pattern N-Art<sub>def</sub> via N-to-D raising (Delsing 1988, Taraldsen 1989). However, the nominal expression in (100), which features both a pre-adjectival determiner and a postnominal enclitic article (also known as the double definiteness phenomenon), suggests that N-raising does not move as high as D but rather to the head position of a lower determiner projection, which hosts the enclitic article.<sup>51</sup>

- (100) a. hus-et (Norwegian)  
 house-the

<sup>51</sup> See Delsing (1993), Santelmann (1992), Kester (1992), Vangsnes (2001), Embick and Noyer (2001), Julien (2002, 2005) for discussion of N-raising and the double definiteness phenomenon in Scandinavian languages. See Hankamer and Mikkelsen (2005) for a lexical approach towards forms like *huset* in (100a).

- ‘the house’  
 b. det store hus-et  
 the big house-the  
 ‘the big house’

Although, as opposed to Rumanian, the Italian common noun *invasione* is not able to raise all the way up to D (see (96b)), there are nominal expressions in which the noun *can* raise as high as D. Longobardi (1994) argues that Italian proper names display this N-to-D movement behavior. The evidence for this is given in (101). In (101a), the proper name occurs with a definite article and is preceded by the adjectival possessive pronoun *mio*. (101b) shows that the nominal expression is ill-formed if the D-position is not realized. Interestingly, in (101c) we also have a nominal expression without an article, but now it is well-formed. As suggested by the word order, the D-position has been lexicalized via head raising of the proper name *Gianni* to D, the locus of referentiality.

- (101) a. [Il mio Gianni] mi ha finalmente telefonato  
 the my Gianni me has finally called  
 b. \*[Mio Gianni] mi ha finalmente telefonato  
 my Gianni me has finally called  
 c. [Gianni mio] mi ha finalmente telefonato  
 Gianni my me has finally called

In short, various word order phenomena within nominal expressions of different languages receive an interesting account in terms of noun phrase-internal head movement, if one adopts the functional head hypothesis for the nominal domain.

### 8.6 Islandhood

Another potential line of support for the DP-hypothesis comes from island phenomena (see Chapter 17). In Corver (1990), it is argued that the islandhood of certain nominal expressions can be accounted for in terms of the Subjacency Condition (Chomsky 1973) if one adopts a DP-hypothesis. According to this locality condition, a displaced constituent may not cross more than one bounding node, i.e. ‘barrier’ in terms of Chomsky’s (1986a) *Barriers* theory, by means of a single movement step. A category YP counts as an ‘(intrinsic) barrier’ if it is not *L-marked*, i.e. if it does not stand in a theta-government relation with respect to a *Lexical* head (e.g. V); see Chomsky 1986a:13 for discussion of L-marking). Furthermore, a category ZP can also become a barrier by inheritance; namely, when it dominates a category YP which is a Barrier. Given the syntactic configuration in (102), direct removal of a constituent XP from within the lexical projection NP (or any other maximal projection dominated by DP) to a position external to DP yields a violation of the Subjacency Condition: XP crosses YP, which is an intrinsic barrier since it is not L-marked by the functional category D, and it crosses DP, which inherits barrierhood from the dominated projection YP.<sup>52</sup>

<sup>52</sup> Crucially, this analysis only works if [Spec,DP] is not available as an escape hatch for subextraction; possibly,

(102) \*...XP<sub>i</sub>... [DP Spec [D' D [YP ... t<sub>i</sub> ... N....]]] (base order of XP and N irrelevant)

Corver (1990, 1992) shows the islandhood of the DP-configuration on the basis of examples like (103), where an attributive AP is extracted from within the noun phrase. Culicover and Rochemont (1992) do the same for subextraction of adjunct-PPs; see (104):

(103) a. Peter kissed [an extremely pretty girl]  
b. \*[Extremely pretty]<sub>i</sub> Peter kissed [DP [D' a [YP t<sub>i</sub> girl]]]

(104) a. Peter kissed [a girl with red hair]  
b. \*[With red hair]<sub>i</sub> Peter kissed [DP [D' a [YP girl t<sub>i</sub>]]]

Corver (1990, 1992) further notes that so-called Left Branch Condition effects (cf. Ross 1967) can be captured quite easily if one adopts a DP-analysis for nominal expressions. For example, the ill-formedness of the pattern in (105a) directly follows under a phrase structural analysis in which *who* is in a Spec-position and *-s(e)* in a functional head position (say D), as in (106). Subextraction of *who-se* involves fronting of a non-constituent, which is impossible (see also Chomsky 1995a:263). Subextraction of *who* is also ruled out under the assumption that the clitic element *-s(e)* cannot be stranded (see (105b)).<sup>53 54</sup> The only possible displacement is the one in (105c), where the entire noun phrase is pied piped.<sup>55</sup>

(105) a. \**Whose* did you kiss *sister*?  
b. \**Who* did you kiss *-se* *sister*?  
c. *Whose sister* did you kiss?

(106) You kissed [DP *who* [D' *-se* [*sister*]]]

---

there are restrictions on the types of categories that can land in [Spec,DP]. Arguably, [Spec,DP] *is* available as an escape hatch for subextraction of possessors in a language like Hungarian, which permits dative possessor extraction (see (82)). Under such an analysis, XP first moves to [Spec,DP] and, consequently, crosses only a single barrier, viz. YP in (102), which is permitted by the Subjacency Condition. Since XP has landed in [Spec,DP], it is no longer possible for DP to inherit barrierhood from YP. Consequently, XP can move out of [Spec,DP] to the (nearest) DP-external position without violating the Subjacency Condition. DP does not count as a barrier, since it is L-marked by the lexical category V.

<sup>53</sup> Kayne (2002) also argues that *who* and *-se* do not form a constituent and consequently cannot be removed from within the noun phrase. Interestingly, Kayne (ibidem, note 37) notes the contrast in (i):

(i) a. \*\**Whose* were you talking to *sister*?  
b. ?*Who* were you talking to's *sister*?

In (ia), a string which does not form a constituent is fronted, yielding a strongly ungrammatical sentence. In (ib), a constituent (*who*) is sub-extracted, leaving the clitic element *-se* behind. Stranding the clitic element yields a less unacceptable sentence.

<sup>54</sup> See Den Dikken (1999) and Bernstein and Tortora (2005) for an analysis according to which the possessive *-s(e)* and the contracted copula *-s*, as in *Who do you think's coming for dinner*, are the same thing.

<sup>55</sup> An important presupposition is here that *-s(e)* does not attach to *who* in syntax. That is, attachment of the clitic to its host takes place in phonology.

### 8.7 DPs as arguments

Szabolcsi (1992:130) tries to further strengthen the analogy between C and D by arguing that they fulfil a similar semantic role: they both act as subordinators in the sense that they enable the clause or the nominal expression to act as arguments (i.e., theta-role bearing constituents); see also Longobardi 1994, Stowell 1989. That is, C turns the proposition (IP) into a (sentential) argument, just as D turns the nominal predicate (NP) into an argument. Empirical support for this subordinating function of D and C comes from the fact that both elements are typically absent in root (i.e. non-argumental) contexts. This is exemplified in (107a,b) for Italian: declarative main clauses, as opposed to embedded clauses, are typically not introduced by a subordinating complementizer like *che*. Likewise, vocative nominal expressions (108b), as opposed to argumental noun phrases (108a), typically lack an (in)definite article.

- (107) a. \**Che abbia telefonato Gianni*  
 that has telephoned Gianni  
 ‘Gianni has made a phone call.’  
 b. *Credo che abbia telefonato Gianni*  
 I-think that has telephoned Gianni  
 ‘I think that Gianni has made a phone call.’
- (108) a. *Ho incontrato \*(un/il) grande amico di Maria ieri*  
 I-have met (a/the) great friend of Maria yesterday  
 b. *Caro amico, vieni a trovarmi*  
 dear friend, come to visit-me

As noted by Longobardi (1994), a bare NP is also possible in Italian as a nominal predicate (i.e. a non-argument) in copula constructions:

- (109) a. *Gianni è tenente*  
 Gianni is lieutenant  
 ‘Gianni is a lieutenant.’  
 b. *Gianni è grande amico di Maria*  
 Gianni is great friend of Maria  
 ‘Gianni is a great friend of Maria’s.’

Importantly, Longobardi (1994) observes that certain nominal expressions that lack an article may nevertheless function as arguments. As we have already seen in (101c), for example, proper names in Italian are typically bare. Longobardi proposes that, although these nominal expressions are articleless on the surface, there is a silent D present heading a DP. He proposes that the lexical noun raises to D for reasons of referentiality. Sometimes, this head movement step becomes visible, for example, when the noun crosses an adjectival possessive pronoun, as in (101c). The derived structure of *Gianni mio* is given in (110).

- (110) [DP [D' Gianni<sub>i</sub> [AgrP mio [Agr' t'<sub>i</sub> [NP t<sub>i</sub>]]]]]

### 8.8 A note on ‘dummy’ of and single extended projection

In Grimshaw (1991), the notion of *extended projection* refers to a maximal projection which projects from a category which it shares categorial features with. Thus, in (111a), the DP *a truck* is an extended projection of the noun *truck*. In the slightly more complex pattern *a truck with pipes* in (111b), the nominal expression consists of multiple extended projections, viz. (i) the DP *pipes*, which projects from the noun *pipes* and arguably contains a phonetically empty D representing the plural indefinite article, (ii) the PP *with pipes* headed by *with*, and (iii) the DP *a truck with pipes*, which projects from the noun *truck*.

- (111) a. He unloaded [<sub>DP</sub> a truck]  
b. He unloaded [<sub>DP</sub> a truck [<sub>PP</sub> with [<sub>DP</sub> pipes]]]

When we consider the nominal expression *a truck of pipes* in (112), one might be tempted, in view of the superficial similarity, to assign it a structural analysis similar to the one in (111b). It has been argued, though, that this so-called (pseudo)partitive construction constitutes a single extended projection (Van Riemsdijk 1998, Vos 1999), with *pipes* being the truly lexical category and the word *truck* being a so-called *semi-lexical* head; i.e. a head which is neither a truly lexical head nor a truly functional head (see note 5; see also Corver and Van Riemsdijk (2001), Löbel (2001), Stavrou (2003)). The lexical noun and the semi-lexical noun are ‘connected’ to each other by means of the dummy (i.e. semantically empty) preposition *of*. Importantly, *truck* designates a quantity. Thus, (112) can informally be paraphrased as: ‘He unloaded pipes, and the amount of pipes was equal to a truck (load)’.

- (112) He unloaded [a truck of pipes]

Another type of binominal construction that has been investigated quite extensively in the generative literature is the so-called *N of N* construction in (113), which also features the connecting element *of*; see Ruwet 1982, Kayne 1994, Den Dikken 2006, Bennis *et al* 1998):

- (113) John hated [that idiot of a policeman]

In Kayne (1994), Den Dikken (2006) and Bennis *et al* (1998), it is argued that the noun *idiot* starts out as a (small) clause-internal predicate nominal and reaches its surface position as a result of DP-internal predicate movement. In Kayne’s analysis, the predicate nominal moves to the Spec-position of a prepositional D *of* (see (114a)); in Den Dikken’s (2006) analysis the predicate nominal moves to the Spec-position of some functional head (a so-called Linker Phrase), which spells out as what he calls the ‘nominal copula’ *of*.<sup>56 57</sup>

- (114) a. [that [<sub>D/PP</sub> [<sub>NP</sub> idiot]<sub>j</sub> [<sub>D/P'</sub> of [<sub>IP</sub> a policeman [<sub>I'</sub> t<sub>j</sub>]]]]]  
b. [<sub>DP</sub> that [<sub>LP</sub> [<sub>NP</sub> idiot]<sub>j</sub> [<sub>L'</sub> R<sub>i</sub>+L (= *of*) [<sub>RP</sub> a policeman [<sub>R'</sub> t<sub>j</sub>]]]]]

<sup>56</sup> *RP* in (114b) stands for *Relator Phrase*, which is a functional head that mediates a predication relationship between a predicate (e.g. *idiot*) and a subject (e.g. *a policeman*).

<sup>57</sup> See also Doetjes and Rooryck (2003) and Uriagereka (2010) for discussion of DP-internal predicate movement.

In the spirit of Kayne (1994), and following Den Dikken's (2006) implementation of the predicate movement analysis of the *N of N* construction, Corver (1998, 2003) proposes the derived structure in (115) for a nominal expression like *a truck of pipes* in (112). That is, the quantity designating noun starts out as a predicate nominal and reaches its surface position as a result of DP-internal predicate movement:<sup>58</sup>

(115) [<sub>DP</sub> a [<sub>LP</sub> [<sub>NP</sub> truck]<sub>j</sub> [<sub>L'</sub> R<sub>i</sub>+L (= *of*) [<sub>RP</sub> pipes [<sub>R'</sub> t<sub>j</sub>]]]]]

## 8.9 Conclusion

Since Abney (1986, 1987), much generative syntactic research has been devoted to laying bare the architecture of the extended nominal projection by in depth investigation of the internal syntax of nominal expressions in a great variety of languages. In this section, I have only discussed a small number of the functional layers whose existence within the extended nominal projection has been argued for in the generative literature. I will end this section by simply listing, without any further discussion, some of the other functional layers that have been argued to be part of the extended nominal projection:<sup>59</sup> (i) Kase Phrase (KP), Bittner and Hale (1996); (ii) Quantifier Phrase (QP), Cardinaletti and Giusti (1992), Shlonsky (1991); (iii) Classifier Phrase (CIP), Cheng and Sybesma (1998), (iv) Divider Phrase (DivP), Borer (2005), (v) Word Marker Phrase (WMP), Bernstein (1993), (vi) Gender Phrase (GenP), Picallo (1991); (vii) FP hosting attributive adjectives (Cinque 1990), (viii) Topic Phrase (TopP), Giusti (1996), Aboh (2004); (ix) Focus Phrase (FocP), Giusti (1996), Aboh (2004), Corver and Van Koppen (2009). If the noun phrase internal distribution of adnominal adjectives follows the pattern of adverbial distribution along the lines of Cinque's (1999:106) *Universal Hierarchy of Clausal Functional Projections*, then adnominal adjectives will appear as specifiers of distinct functional projections. According to this approach, the extended nominal projection contains a universal hierarchy of AP-related functional projections including, for example, SizeP (*small*), ShapeP (*round*), ColorP (*white*), OriginP (*German*), as in *a small round white German car* (see Scott (2002)).

## 9. On the functional structure of the extended adjectival projection

### 9.1 From AP to DegP

In the wake of Chomsky's (1970) X-bar theory, as proposed in *Remarks on Nominalization*, generative linguists started to explore the internal structure of adjectival expressions (cf. Bowers 1975, Selkirk 1970, Bresnan 1973, Jackendoff 1977). It was observed that certain adjectives, just like verbs, can take PPs or clauses as their complement (see (116)). Furthermore, the specifier position of AP was identified as the locus for elements such as functional degree words (*how*,

<sup>58</sup> See Martí-Girbau (2010) for a DP-internal predicate movement analysis of (pseudo-)partitive constructions in Catalan.

<sup>59</sup> Some of these functional projections are not supposed to be unique to *nominal* extended projections. For example, FocP, TopP and RP are functional layers whose presence has also been argued for in the extended verbal domain. See Rizzi (1997) for FocP and TopP, and Den Dikken (2006) for RP.

*too, that, so, more, less*), adjectival modifiers (*extremely, terribly*), and measure phrases (*ten feet*). As indicated in (116b), the projection of the comparative morpheme *more* contains the *than*-phrase; this *than*-phrase surfaces in the right periphery of the adjectival structure as a result of AP-internal extraposition.<sup>60</sup>

- (116) a. John is [<sub>AP</sub> [<sub>DegP</sub> (far) too] [<sub>A'</sub> proud of Mary]]  
 b. John is [<sub>AP</sub> [<sub>AP</sub> [<sub>DegP</sub> (far) less t<sub>i</sub>] [<sub>A'</sub> proud of Mary]] [*than Bill is*]]  
 c. John is [<sub>AP</sub> extremely [<sub>A'</sub> proud of Mary]]  
 d. That fence is [<sub>AP</sub> ten feet [<sub>A'</sub> high]]

The adjectival structures in (116) represent what Grimshaw (1991) calls the lexical head hypothesis, i.e. the lexical head A is the head of the entire adjectival projection and the functional categories associated with A are located in [Spec,AP]. The alternative analysis, representing the functional head hypothesis, takes the entire adjectival construction to be a maximal category DegP, which is headed by the functional head Deg that takes the lexical projection AP as its complement. In Grimshaw's terms, DegP is an extended projection of the adjective. Schematically:

- (117) [<sub>DegP</sub> Spec [<sub>Deg'</sub> Deg [<sub>AP</sub> Spec [<sub>A'</sub> A YP ]]]]

From a conceptual point of view, the DegP-hypothesis in (117) seems to be the null hypothesis: if the lexical domain is closed off by a functional projection in the nominal and verbal systems, one would, for reasons of cross-categorial symmetry, expect the same to hold for the adjectival system (cf. Abney 1987, Grimshaw 1991, Corver 1990, 1991, 1997a,b).<sup>61</sup> In what follows, I will discuss some of the empirical arguments that have been given in support of the DegP-hypothesis, and the functional head hypothesis more in general.<sup>62</sup>

## 9.2 Accommodation of lexical items

Abney (1987) notes that under a DegP-hypothesis it is possible to accommodate the variety of adjectival specifiers under a two-bar X-bar theory. As shown in (118), degree words like *how* and *so* can co-occur with other specifying elements like *very* and *utterly*. Under a traditional AP-analysis, as in Chomsky (1970), the co-occurrence of these items is unexpected, since functional

<sup>60</sup> In this section, I will not discuss the syntax of degree clauses like *than Bill is* in (116b) and like *to serve on a submarine* in (i). Nor will I discuss the syntax of consecutive clauses like the one in (118a).

(i) John is [too tall to serve on a submarine]

For analyses (some adopting the lexical head hypothesis, others the functional head hypothesis), see among others the following studies: Baltin (1987), Larson (1988b), Corver (1990), Rothstein (1991a,b), Rijkhoek (1998), Kennedy (1999, 2002), Lechner (1999), White (1997), Heim (2000), Bhatt and Pancheva (2004).

<sup>61</sup> See Larson (1991/2010) for an analysis of degree words as elements that express relations between predicates. See note 46 for a similar analysis of Determiners.

<sup>62</sup> See Corver (2000, 2009) for an analysis of certain pre-adjectival degree modifiers in terms of predicate movement. That is, the degree modifier is taken to start out as a post-adjectival predicate and ends up in its surface position as a result of predicate movement within the adjectival system, quite along the lines of predicate movement in the nominal domain (see section 8.8).

degree words and adverbial degree modifiers are assumed to be located in one and the same structural position, namely [Spec,AP]. Under a DegP-analysis, the two elements can be accommodated: one item is located in Deg, the other in [Spec,AP].<sup>63</sup>

- (118) a. Fred was [*so utterly* confused that he fell off the podium]  
 b. [*How very* long] he can stay under water!

- (119) a. [<sub>DegP</sub> [<sub>DegP</sub> [<sub>Deg'</sub> *so* [<sub>AP</sub> *utterly* [<sub>A'</sub> *confused*]]]]] that he fell off the podium]  
 b. [<sub>DegP</sub> [<sub>Deg'</sub> *how* [<sub>AP</sub> *very* [<sub>A'</sub> *long*]]]]]

Corver (1990), building on Bresnan's (1973) proposal that a lexical and structural distinction should be made between quantifier-like degree words (Q<sup>0</sup>; e.g. *enough, more, less*) and determiner-like degree words (Deg<sup>0</sup>), accommodates the sequence of degree words in (118) by placing *so/how* in Deg and *utterly/very* in the spec-position of a functional projection QP, which is the complement of the functional Deg-head.<sup>64</sup> This leaves [Spec,AP] available for the external argument of the adjective (e.g. *Fred* in (118a)).

- (120) a. [<sub>DegP</sub> [<sub>DegP</sub> [<sub>Deg'</sub> *so* [<sub>QP</sub> *utterly* [<sub>Q'</sub> Q [<sub>AP</sub> *confused* ]]]]]] that he fell off the podium]  
 b. [<sub>DegP</sub> [<sub>Deg'</sub> *how* [<sub>QP</sub> *very* [<sub>Q'</sub> Q [<sub>AP</sub> *long*]]]]]]]

### 9.3 Word order phenomena and head movement

In Corver (1990, 1991, 1997a,b), it is noted that the formation of analytic comparative forms like *taller* is problematic if one adopts a traditional AP-analysis in which *-er* is located in [Spec,AP]. Under such an analysis, the analytic form is derived either by moving the bound morpheme rightward to the adjectival head or by moving the adjectival head leftward to the specifier position and adjoining it to *-er*. Clearly, the two movement patterns violate the ban against movement to a non-c-commanding position (see (121a)). Under the functional head hypothesis, the comparative forms can be straightforwardly derived by means of *head-to-head movement*, as illustrated in (121b). Note that the bound morpheme *-er* is analyzed here as a functional Q-head (rather than a Deg-head); see Bresnan (1973) and Corver (1997a,b).

- (121) a. [<sub>AP</sub> [<sub>DegP</sub> *-er*] [<sub>A'</sub> [<sub>A</sub> *tall*]]]]  
 b. [<sub>QP</sub> [<sub>tall</sub><sub>i</sub>+ [<sub>Q</sub> *-er*]]] [<sub>AP</sub> <sub>t</sub><sub>j</sub> ]]

Another word order pattern that may provide support for an A-to-F (where F = Deg/Q) raising analysis comes from the phenomenon of *enough*-inversion (see Bresnan 1973, Jackendoff 1977), which is illustrated in (122). As opposed to degree words such as *less, more, too et cetera*, the degree word *enough* occurs in a post-adjectival position.

- (122) a. John is [*fond enough* of Sue (to marry her)]  
 b. John is [*less fond* of Sue (than Bill is)]

<sup>63</sup> For the sake of discussion, I will assume here that the consecutive clause is adjoined to DegP.

<sup>64</sup> See Doetjes (1997, 2008), Neeleman et al. (2004), Corver (2000, 2005) for discussion of the various types of degree expressions and their syntactic placement.

Traditionally, the obligatory inversion pattern in (122a) has been interpreted as resulting from a rightward shift of the quantifier, from the specifier position of AP to a position in between the adjective and the complement of the adjective (Maling 1983). Such a displacement operation, however, involves lowering, which is generally taken to be an illegitimate syntactic operation. Under a functional head analysis, the phenomenon of *enough*-inversion may be reinterpreted as a leftward head movement operation adjoining the adjective to the quantifier-like degree word *enough*, as in (123); see Corver (1997a,b).<sup>65</sup>

(123) [[<sub>QP</sub> [<sub>Q</sub> fond<sub>i</sub>+<sub>Q</sub> enough]] [<sub>AP</sub> t<sub>i</sub> of Sue ]] [PRO to marry her]]

Also in other languages such inversion patterns are attested. In Welsh, for example, the degree word *iawn* ‘very’ occurs in a position in between the adjective and the PP-complement, just like English *enough* in (122a).<sup>66</sup> This inverted word order is given in (124). The post-adjectival placement of *iawn* may be analyzed in terms of head movement of the adjectival head to a higher functional position, say Deg, as is represented in (125), where I take *iawn* to occupy the specifier position of QP (Compare English (120b)).

(124) Rydyn ni’n falch iawn o Mair  
 are.1.PL we-PRED proud very of Mary  
 ‘We are very proud of Mary.’

(125) [<sub>DegP</sub> [<sub>Deg’</sub> falch<sub>i</sub> [<sub>QP</sub> iawn [<sub>Q’</sub> t’<sub>i</sub> [<sub>AP</sub> t<sub>i</sub> of Mair]]]]]

Zamparelli (1993) discusses the Italian word order facts in (126) and proposes that the word order in (126b), where the nominal measure phrase follows the adjective, is a derived order. More specifically, the adjectival head *alto* has moved to a functional head position which c-commands (and precedes) the measure phrase. The derived structure, slightly adapted here, is represented in (127); see also Corver (2009).

(126) a. Gianni è [molto alto]

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<sup>65</sup> As an alternative, one might propose that *fond* raises to Deg (via Q), with *enough* being in the specifier position of QP:

(i) [<sub>DegP</sub> [<sub>Deg’</sub> fond<sub>i</sub> [<sub>QP</sub> enough [<sub>Q’</sub> t’<sub>i</sub> [<sub>AP</sub> t<sub>i</sub> of Sue]]]]]

Crucially, both (123) and (i) give an account of the phenomenon of *enough*-inversion which is compatible with general constraints on movement; more specifically, the moved element ends up in a position from where it c-commands its original site.

<sup>66</sup> This inversion pattern is not attested with all degree words. Tallerman (1998), for example, notes the following contrast:

(i) a. dyn balch iawn (Welsh)  
 man proud very  
 ‘a very proud man’  
 b. llyfr rhy ddrud  
 book too expensive  
 ‘a too expensive book’

- Gianni is much tall  
 ‘Gianni is very tall.’  
 b. Gianni è [alto due metri]  
 Gianni is tall two meters  
 ‘Gianni is two meters tall.’

(127) [<sub>DegP</sub> alto<sub>i</sub> [<sub>QP</sub> [due metri]<sub>j</sub> [<sub>Q'</sub> t'<sub>i</sub> [<sub>AP</sub> t<sub>i</sub> t<sub>j</sub> ]]]]

Another word order pattern that is suggestive for the presence of a functional layer on top of the lexical projection AP is the adjectival Construct State construction as found in languages such as Modern Hebrew (128) and Standard Arabic (129); cf. Siloni (2002).

- (128) a. rina yefat mar'e. (Modern Hebrew)  
 Rina beautiful look  
 ‘Rina is good-looking.’  
 b. shney bakbukim mle'ey máyim  
 two bottles full water  
 ‘two bottles full of water’

- (129) r-rajul-u l-jamiil-u l-wajh-i (Standard Arabic)  
 the-man-NOM the-beautiful-NOM the-face-GEN  
 ‘the beautiful-faced man’

As discussed in Siloni (2002), the adjectival expressions in (128)-(129) display the characteristic properties of Construct State constructions. First of all, they are head initial. Secondly, the adjective directly precedes a noun phrase, i.e., without the mediation of any (dummy) prepositional element. Thirdly, phonological alternations are found between construct state forms (e.g., *yefat* in (128a)) and Free State forms (e.g., *yafa*, as in *yalda yafa*, girl beautiful, ‘a beautiful girl’). Fourthly, the nominal expression that directly follows the adjective carries genitival case, as is shown morphologically by the Standard Arabic example in (129). In view of the parallelism between the nominal Construct State construction and the adjectival one, it seems likely that the latter receives a similar structural analysis. This would mean that the nominal expression raises from within the lexical projection AP to a specifier position of some intermediate functional projection FP, and that the adjectival head raises to the head of DegP, the projection that closes off the extended adjectival projection. Schematically:

(130) [<sub>DegP</sub> yefat<sub>j</sub>+Deg<sup>o</sup> [<sub>FP</sub> mar'e<sub>i</sub> [<sub>F'</sub> t'<sub>j</sub> [<sub>AP</sub> t<sub>j</sub> t<sub>i</sub>]]]]]

#### 9.4 Displacement and islandhood

Another type of argument in support of the DegP-hypothesis comes from islandhood. As noted in Corver (1990), the non-extractability of degree words, which used to be accounted for in terms of Ross's (1967) Left Branch Condition, follows immediately under an analysis in which the degree word is a functional head taking AP as its complement. Being a head (i.e. Deg<sup>o</sup>), displacement of the degree word to, for example, [<sub>Spec,CP</sub>] is blocked for the same reason that displacement of C<sup>o</sup> or D<sup>o</sup> to [<sub>Spec,CP</sub>] is blocked: movement of a zero-level category to [<sub>Spec,CP</sub>] violates the

structure preservation requirement on substitution operations (cf. Chomsky 1986). Interestingly, left branch phrasal modifiers *can* be removed from within the extended adjectival projection. For example, the left branch adjunct DegP *hoe erg* in (132) can be extracted out of the adjectival projection and move to [Spec,CP].<sup>67</sup> Under a lexical head analysis, the contrast between the left branch extraction in (131a) and (132a) remains unexplained: both involve removal of a left branch maximal category from [Spec,AP]. As shown by (131b) and (132b), pied piping yields a well-formed structure in both cases.<sup>68</sup>

- (131) a. \*Hoe<sub>i</sub> is Jan [t<sub>i</sub> verslaafd aan slaappillen]?  
 How is Jan addicted to sleeping-pills  
 ‘How much addicted to sleeping pills is John?’  
 b. [Hoe verslaafd aan slaappillen] is Jan?

- (132) a. Hoe erg<sub>i</sub> is Jan [t<sub>i</sub> verslaafd aan slaappillen]?  
 How much is Jan addicted to sleeping-pills  
 b. [Hoe erg verslaafd aan slaappillen] is Jan?

<sup>67</sup> In Corver (1997b) it is suggested that the phrasal modifier originates in [Spec,QP].

<sup>68</sup> As noted in Hoekstra and Jordens (1991) and Van Kampen (1997), wh-movement in Dutch child language may shift a left branch element like *hoe*, leaving behind the adjectival projection. This is exemplified in (i), which is taken from Van Kampen (1997:116):

- (i) Ik weet niet hoe het lang is (Emma 3;1/Loura 3;6)  
 I know not how it long is  
 ‘I don’t know how long it is.’

As shown in (ii), subextraction of a left branch constituent is also permitted from within the nominal domain in Dutch child language ((ii) taken from Van Kampen 1997:116):

- (ii) Welk wil jij boekje? (S. 2;9)  
 Which want you booklet  
 ‘Which booklet do you want to read?’

Interestingly, instances of left branch subextraction are also found in ‘adult’ language systems. For example, Italian permits subextraction of *quanto* from within an adjectival projection (Rizzi 1990) and Polish allows subextraction of a wh-determiner (Corver 1992):

- (iii) Quanto è alto? (Italian)  
 How is tall  
 ‘How tall is he?’

- (iv) Jaki wykreciles numer? (Polish)  
 Which (you)dialed number  
 ‘Which number did you dial?’

The question obviously arises as to how to account for these differences in left branch subextraction behavior. Some researchers have tried to relate it to presence versus absence of a certain functional layer (e.g. DP in the case of nominal expressions) within the extended projection (see e.g. Corver 1990, 1992, Zlatić 1997, Bošković 2005). Others have argued that it should not be related to a difference in projection of functional structure but rather to the availability as an escape hatch of the Spec-position of the relevant functional projections (DP, DegP); see e.g. Progovac 1998, Rappaport 2001. See Corver (2006) for a general discussion of subextraction behavior.

The following subextraction facts from English can be accounted for along the same lines: subextraction of the left branch constituent *how* involves removal of a Deg-head, whereas subextraction of *how heavily* involves subextraction of a phrasal constituent. Again, pied piping of the entire adjectival phrase is permitted with both patterns.

- (133) a. \*How<sub>i</sub> do you think he is [t<sub>i</sub> dependent on his sister]?  
 b. [How dependent on his sister] do you think he is?  
 (134) a. [How heavily]<sub>i</sub> do you think he is [t<sub>i</sub> dependent on his sister]?  
 b. [How heavily dependent on his sister] do you think he is?

Another type of ‘displacement argument’ in support of the DegP-hypothesis is based on the Dutch subextraction phenomenon in (135), involving wh-movement of a measure phrase contained within the specifier position of the Degree Phrase.

- (135) a. [Hoeveel cm te klein]<sub>i</sub> denk je dat ze t<sub>i</sub> was?  
 How-many cm too small think you that she was  
 ‘How many centimeters too small do you think she was?’  
 b. \**Hoeveel cm te* denk je dat ze *klein* was?  
 c. [Hoeveel cm]<sub>i</sub> denk je dat ze [t<sub>i</sub> te klein] was?

(135a) shows that the entire adjectival phrase can be fronted to [Spec,CP]. (135c) illustrates that movement of just the measure phrase (MP) is permitted as well. The relevant example which favors the DegP-hypothesis is (135b). Here the sequence ‘measure phrase – degree word’ is extracted, yielding an ill-formed sentence. Under a phrase structural analysis like (136), the ill-formedness is directly explained by the fact that non-constituents cannot be input to wh-movement. Under the lexical head hypothesis, represented in (136a), the ill-formedness of (135b) remains a mystery. If you can move the lower MP and if you can pied pipe the entire adjective phrase, why should movement of the entire Degree Phrase (a maximal category) out of [Spec,AP] be blocked?

- (136) a. [<sub>AP</sub> [<sub>DegP</sub> hoeveel cm te] [<sub>A'</sub> klein]] (lexical head hypothesis)  
 b. [<sub>DegP</sub> [hoeveel cm] [<sub>Deg'</sub> te [<sub>AP</sub> klein]]] (functional head hypothesis)

## 10. On the functional structure of the extended adpositional projection

### 10.1 The syntactic structure of locative and directional adpositional phrases

In the 1970s, a number of studies appeared that showed that, just like verb phrases and noun phrases, prepositional phrases can have a complex internal structure which is built by phrase structure rules like (137) that accord with the rules of X-bar theory as given in Chomsky’s (1970) *Remarks on Nominalization* (see Jackendoff 1973, 1977, Hendrick 1976, Emonds 1976).

- (137) a. P' → P XP  
 b. PP → Spec P'

Jackendoff (1973, 1977) points out for English that the complement position can be occupied, for example, by phrasal categories such as NP (138a) and PP (138b). In the latter case, the prepositional head is typically a directional P and the complement a locative PP. Jackendoff further points out that the specifier position is the locus for elements such as *right* and *far* and for noun phrases designating a measure; see (139).

- (138) a. John stood [<sub>PP</sub> [<sub>P'</sub> [<sub>P</sub> behind] [<sub>NP</sub> the gate]]]  
 b. A great howl of pain emerged [<sub>PP</sub> [<sub>P'</sub> [<sub>P</sub> from] [<sub>PP</sub> behind the barn]]]

- (139) a. John stood [<sub>PP</sub> right/far/two meters [<sub>P'</sub> [<sub>P</sub> behind] the gate]]  
 b. A great howl of pain emerged [<sub>PP</sub> [<sub>P'</sub> [<sub>P</sub> from] [<sub>PP</sub> right/far/two meters [<sub>P'</sub> [<sub>P</sub> behind] the barn]]]]]

Similar structures are given for Dutch by Van Riemsdijk (1978) in his seminal study on the syntax of Dutch adpositional phrases. An important observation he makes about the Dutch adpositional system is that there is a class of pronouns —the so-called R-pronouns— which systematically precede the adposition.<sup>69</sup> Compare, for example, the patterns in (140):

- (140) a. Marie stond toen [vlak achter het hek] (Dutch)  
 Marie stood then right behind the gate  
 b. Marie stond toen [vlak achter hem/haar/\*het]  
 Marie stood then right behind him/her /it  
 c. Marie stond toen [vlak er achter] / [er vlak achter]  
 Marie stood then right there behind / there right behind  
 ‘Marie stood right behind it.’

In (140a), the adposition *achter* precedes its nominal complement, the full noun phrase *het hek*. In other words, *achter* is pre-positional here. In (140b), the pre-position *achter* combines with the pronominal complements *hem* and *haar*. As indicated, the neuter singular pronoun *het* is not permitted in this position. Instead we have the post-positional pattern in (140c), where *achter* is preceded by the R-pronoun *er*. In other words, the different syntactic placement of the pronoun correlates with a change in morphological form. As indicated, the R-pronoun can occur in a position in between the modifier *vlak* and the postposition (*vlak er achter*) or in a left-peripheral position within the PP (*er vlak achter*). In order to capture this word order variation, Van Riemsdijk (1978:87) proposes a PS-rule like (141), which permits a [+R] position both to the left and to the right of the modifier *vlak*:<sup>70</sup>

- (141) P'' → [+PRO,+R] – {N''', A''', P''', M} – [+PRO, +R] – P'

<sup>69</sup> They are called R-pronouns because they share the consonant *r* in their phonology: *er* (there), *daar* (there), *hier* (here), *waar* (where), *ergens*, (somewhere), *nergens* (nowhere), *overal* (everywhere). It should be noted that sharing the consonant *r* is hardly an efficient defining property of R-words: The Dutch personal pronoun *haar* 'her' also includes an *r*, but it does not fall within the class of R-pronouns; it must follow P, as in *achter haar* 'behind her', and not: *\*haar achter* (her behind).

<sup>70</sup> M in (141) stands for *Modifier* (possibly phrasal).

Van Riemsdijk (1978) further makes the important observation that the R-pronoun, as opposed to the full NP and the non-R-pronouns, can leave its prepositional home: the postposition can be stranded after subextraction of the R-pronoun. The specifier thus functions as an escape hatch for extraction, analogously to the specifier positions of extended projections discussed previously in this chapter (see sections 8.4 and 9.4)

- (142) a. Marie stond er<sub>i</sub> toen [PP t'<sub>i</sub> vlak achter t<sub>i</sub>]  
 Marie stood there then right behind  
 'Marie stood right behind it.'
- b. Daar<sub>i</sub> stond Marie toen [PP t'<sub>i</sub> vlak achter t<sub>i</sub>]  
 There stood Marie then right behind

### 10.2 Extended adpositional projections: word order and subextraction

Taking the perspective of cross-categorical symmetry, a number of studies have appeared since the 1990s, which apply the functional head hypothesis to the adpositional system. According to this view, the adpositional architecture consists of a lexical projection PP which is dominated by one or more layers of functional projections. Following Grimshaw (1991), this adpositional architecture can be characterized as an extended adpositional projection. Schematically, where FP stands for one or more functional projections on top of the lexical PP (see Van Riemsdijk 1990, Zwarts 1992).

- (143) [FP Spec [F' F [PP Spec [P' P XP]]]]

One of the first studies taking this functional head perspective on the adpositional system is Koopman (2000). Building on Van Riemsdijk's (1978) observations about the Dutch adpositional system, she argues that the extended projection of a locative adposition can consist of functional projections such as PlaceP, DegP<sub>(Place)</sub> and CP<sub>(Place)</sub>,<sup>71</sup> see also Den Dikken (2010) for Dutch and Svenonius (2010) for English).<sup>72</sup>

- (144) [CP Spec [C' C<sub>(Place)</sub> [DegP Spec [Deg' Deg<sub>(Place)</sub> [PlaceP Spec [Place' Place [PP Spec [P' P<sub>loc</sub> DP]]]]]]]]

The positions [Spec,PlaceP] and [Spec,CP] are the loci for Dutch R-pronouns, with the latter Spec-position being the structural position from where R-pronouns can leave their prepositional home (i.e. the escape hatch position). The projection DegP contains modifying material such as the lexical item *vlak* (see (140)), which is taken to be a lexicalization of the Deg-head, and the measure phrase *twee meter*, which, being a maximal category XP, occupies [Spec,DegP]. The strings *(daar) vlak (daar) achter* ('right behind it') and *(daar) twee meter (daar) achter* ('two meters behind it') are given in (145) and (146), respectively:

<sup>71</sup> CP<sub>(Place)</sub> is used on analogy with the CP-layer in the extended verbal domain. It is the functional layer which provides the escape hatch for subextraction from the extended adpositional projection.

<sup>72</sup> See also Asbury et al. (2008) for discussion of the syntax and semantics of adpositional PPs in a broad variety of languages. Other studies on the internal architecture of the adpositional system are among others: Helmantel (2002), Botwinik-Rotem (2004), and Asbury (2008).

- (145) a. [<sub>CP</sub> Spec [<sub>C'</sub> C<sub>(Place)</sub>] [<sub>DegP</sub> Spec [<sub>Deg'</sub> vlak [<sub>PlaceP</sub> daar<sub>i</sub> [<sub>Place'</sub> Place [<sub>PP</sub> Spec [<sub>P'</sub> achter t<sub>i</sub>]]]]]]]]]  
 b. [<sub>CP</sub> daar<sub>i</sub> [<sub>C'</sub> C<sub>(Place)</sub>] [<sub>DegP</sub> Spec [<sub>Deg'</sub> vlak [<sub>PlaceP</sub> t'<sub>i</sub> [<sub>Place'</sub> Place [<sub>PP</sub> Spec [<sub>P'</sub> achter t<sub>i</sub>]]]]]]]]]

- (146) a. [<sub>CP</sub> Spec [<sub>C'</sub> C<sub>(Place)</sub>] [<sub>DegP</sub> twee meter [<sub>Deg'</sub> Deg [<sub>PlaceP</sub> daar<sub>i</sub> [<sub>Place'</sub> Place [<sub>PP</sub> Spec [<sub>P'</sub> achter t<sub>i</sub>]]]]]]]]]  
 b. [<sub>CP</sub> daar<sub>i</sub> [<sub>C'</sub> C<sub>(Place)</sub>] [<sub>DegP</sub> twee meter [<sub>Deg'</sub> Deg [<sub>PlaceP</sub> t'<sub>i</sub> [<sub>Place'</sub> Place [<sub>PP</sub> Spec [<sub>P'</sub> achter t<sub>i</sub>]]]]]]]]]

Evidence for the placement of *vlak* (or *pal*) in Deg comes from the phenomenon of P-incorporation: As noted by Den Dikken (1992:106, 1995), an intransitive adposition cannot be incorporated into a verb when it is modified by a bare modifier like *vlak* (see (147)). This incorporation process is possible, however, when the adposition is modified by a phrase like *twee meter* (see (148)). If *vlak* occupies Deg, as in (145), P-incorporation is blocked for reasons of locality: the lexical head P is too distant from V, since the Deg-head *vlak* is an intervening head c-commanding the lexical adposition. When Deg is empty, the adposition can move through this extended functional position on its way to V.

- (147) a. ..dat Jan de bal [vlak over] heeft geschoten  
 ..that Jan the ball right over has shot  
 '...that Jan shot the ball right over.'  
 b. \*..dat Jan de bal [vlak t<sub>i</sub>] heeft [[over]<sub>i</sub>+geschoten] (no P-incorporation)

- (148) a. ..dat Jan de bal [twee meter over] heeft geschoten  
 ..that Jan the ball two meter over has shot  
 '...that Jan shot the ball two meters over.'  
 b. ..dat Jan de bal [2 meter t<sub>i</sub>] heeft [[over]<sub>i</sub>+geschoten] (P-incorporation)

Koopman further argues that the CP<sub>(Place)</sub>-level is the (functional) phrase structural level which determines the external syntactic behavior of the extended prepositional projection. For example, this phrase structural level is accessible to displacement operations such as wh-movement and scrambling.

In line with Jackendoff's (1990a) conceptual meaning analysis of locative and directional PPs, Koopman (2000) proposes that the extended projection of directional adpositions contains a PathP on top of (some projection of) PlaceP (see also Van Riemsdijk and Huijbregts (2007), Den Dikken (2003, 2010), Svenonius (2004)). This yields the following representation, which is an extended projection of lexical P:

- (149) [<sub>PathP</sub> Spec [<sub>Path'</sub> Path [<sub>CP</sub> Spec [<sub>C'</sub> C<sub>(Place)</sub>] [<sub>DegP</sub> Spec [<sub>Deg'</sub> Deg<sub>(Place)</sub>] [<sub>PlaceP</sub> Spec [<sub>Place'</sub> Place [<sub>PP</sub> Spec [<sub>P'</sub> P XP]]]]]]]]]]]

As discussed by Van Riemsdijk (1978) and as shown in (150), Dutch distinguishes three types of directional PPs at the surface: prepositional, postpositional and circumpositional.<sup>73</sup>

- (150) a. *prepositional directional PP*  
 Jan is met z'n auto [in het water] gereden

<sup>73</sup> I will abstract away from the distribution of degree words and measure phrases in this discussion of directional adpositional phrases. See Koopman (2000) and Den Dikken (2010) for discussion.

- Jan is with his car in the water driven  
‘Jan drove into the water with his car.’
- b. *postpositional directional PP*  
Jan is met z'n auto [het water in] gereden  
Jan is with his car the water in driven  
‘Jan drove into the water with his car.’
- c. *circumpositional directional PP*  
Jan is met z'n auto [onder het viaduct door] gereden  
Jan is with his car under the railway-arche through driven  
‘Jan drove under the railway-arche with his car.’

Koopman argues that all three extended directional adpositional projections involve displacement of a lower extended projection of P into [Spec,PathP]; (see Den Dikken (2010) for adaptations and refinements of Koopman’s analysis). More specifically, CP<sub>(Place)</sub> moves to [Spec,PathP] in order to derive the prepositional pattern in (150b) and the circumpositional one in (150c). The displacement process is most clearly visible in the circumpositional pattern, where *door* lexicalizes the functional Path-head. As shown in (153a,b), CP<sub>Place</sub> moves to Spec,PathP, after the lexical P *onder* has raised to the functional head Place. Koopman argues that on analogy with these circumpositional patterns, prepositional directionals display the same derivation, as shown in (151a,b).<sup>74</sup> Thus, these directionals are prepositional on the surface but hidden postpositional structures at a more abstract level. Consider, finally, the derivation of postpositional PPs like (150b). As depicted in (153a,b), a PlaceP (rather than CP<sub>(Place)</sub>) is moved to [Spec,PathP], after the lexical P has undergone head movement via Place into Path.<sup>75</sup>

- (151) a. [PathP Spec [Path' Path<sub>ø</sub> [CP(Place) C [PlaceP in<sub>j</sub> [PP t<sub>j</sub> het water]]]]]  
b. [PathP [CP(Place) in het water]<sub>k</sub> [Path' Path<sub>ø</sub> t<sub>k</sub>]]
- (152) a. [PathP Spec [Path' in<sub>j</sub> [PlaceP Spec [Place' t'<sub>j</sub> [PP Spec [P' t<sub>j</sub> het water]]]]]]]]]  
b. [PathP [PlaceP t'<sub>j</sub> het water]<sub>k</sub> [Path' in<sub>j</sub> t<sub>k</sub>]]
- (153) a. [PathP Spec [Path' door [CP(Place) C [PlaceP onder<sub>j</sub> [PP t<sub>j</sub> de brug]]]]]  
b. [PathP [CP(Place) onder de brug]<sub>k</sub> [Path' door t<sub>k</sub>]]

<sup>74</sup> Koopman points out that the phonologically empty Path-head of the directional extended pre-positional phrase gets incorporated into the lexical head that selects the PathP. Importantly, not all lexical heads are able to function as a host for this incorporated null Path-head. In other words, there is a selectional relationship between the lexical head and directional pre-PP. For example, the pre-PP *in de kamer* can only have a locative meaning when it combines with the verb *lopen* (‘walk’); see (i). This suggests *lopen* cannot function as a host for an incorporated null-Path head. A verb like *rijden* (‘to drive’) in (150) can function as a host for an incorporated zero Path-head. See also Den Dikken (2010) for discussion.

<sup>75</sup> See Van Riemsdijk (1990) for an alternative analysis in which the postpositional element in Dutch post- and circumpositional phrases is a functional P (i.e. p), which takes a lexical PP-complement to its left. The postpositional pattern *het water in* is derived by movement of the lexical P to the functional p-head, as in (ib). In the circumpositional pattern *onder het viaduct door*, the functional head is occupied by *door* (see (ic)).

- (i) a. [pp [PP P NP] p]  
b. [pp [PP t<sub>i</sub> het water] in<sub>i</sub>]  
c. [pp [PP onder het viaduct] door]

As is clear from the above discussion, various word order patterns can be accommodated if one adopts a more articulate structure of the adpositional system.

### 10.3 Agreement in postpositional phrases

Another phenomenon that has been interpreted as evidence for a more articulate adpositional structure comes from the phenomenon of adpositional agreement. In Kayne (1994:49), the following statement is made about this phenomenon: “Kenneth Hale (personal communication) notes that although there are languages like Navajo, with obligatory agreement between an adposition (postposition) and its lexical complement, prepositional phrases in SVO languages never, as far as he knows, show such agreement.” Kayne argues that the observation that adpositional agreement is attested with postpositional phrases but not with prepositional ones follows from his theory of antisymmetry (see Chapter 18), according to which ‘complements’ to the left of a head are actually in a specifier position of a functional head.<sup>76</sup> In other words, the agreement relationship between the nominal element and the adposition is associated with a Spec-head configuration. Schematically, where  $\alpha$  represents the feature for which the adposition, which raises to Agr, and the nominal element agree.

$$(154) \quad [_{AgrP} DP_{k/\alpha} [_{Agr'} P_i + Agr_{\alpha} [_{PP} t_i t_k]]]$$

A language which nicely shows this relationship between a postpositional configuration and adpositional agreement is Hungarian. As noted in Marácz (1989:362), Hungarian displays what he calls ‘dressed’ adpositions: i.e. postpositions which are inflected for person-number agreement when they select a personal pronominal complement.<sup>77</sup> This is exemplified in (155). As shown in (156), adpositional agreement is absent when the nominal argument is a full noun phrase.

- (155) a. (én) mögött-*em*  
           I       behind-AGR.1.SG  
           ‘behind me’  
       b. (te) mögött-*ed*  
           (you) behind-AGR.2.SG

<sup>76</sup> The reviewer of this chapter points out a curious case of ‘agreement’ in Malagasy: adpositions may carry tense/aspect inflection, apparently. Randriamasimanana (1999:510) gives the following example:

- (i) N-andeha t-any       Antsirabe I       Paoly       (Malagasy)  
       PAST-go PERF-to Antsirabe ART Paul  
       ‘Paul went to Antsirabe.’

<sup>77</sup> Besides ‘dressed’ adpositions, Marácz distinguishes ‘naked’ adpositions. The two types of adpositions display different morphosyntactic behavior. For example, the noun phrase of a dressed P displays nominative case (a default case, according to Marácz 1989). Naked Ps, on the contrary, assign a lexical case to their nominal complement (e.g. instrumental, allative, superessive, ablative).

- (i) a. János mögött               (dressed P)  
       John-NOM behind  
       ‘behind John’  
       b. János-on       át       (naked P)  
       John-SUPER over  
       ‘over John’

- ‘behind you’  
 c. (ö) mögött-*e*  
 (he) behind-AGR.3.SG  
 ‘behind him’  
 d. mi-mögött-*ünk*  
 we-behind-AGR.1.PL  
 ‘behind us’

- (156) a fiú mögött(\*-*e*)  
 the boy behind(\*-AGR.3.SG)  
 ‘behind the boy’

Under the assumption that case and agreement checking exploits the Spec-head configuration, the derived structure of (155a) can now be represented as in (157):

- (157) [<sub>AgrP</sub> [<sub>én<sub>k</sub></sub> [<sub>Agr'</sub> [[mögött]<sub>i</sub>+ [<sub>Agr</sub> **em**]]] [<sub>PP</sub> *t<sub>i</sub>* *t<sub>k</sub>*]]]]

From the fact that a degree modifier like *pont* (‘precisely’) precedes the agreeing pronoun, we may conclude that the AgrP-projection is located below DegP under an extended adpositional structure like the one proposed by Koopman (2000).

- (158) János [pont én mögöttem] állt  
 János precisely I behind.AGR.1.SG stood  
 ‘Janos stood precisely behind me.’

#### 10.4 Axial and deictic projections

I will conclude this section on the extended adpositional projection with two further functional projections that have been identified for this domain: AxPart and DeixP (see Svenonius 2006). Svenonius argues that the functional projection AxPartP is attested in the extended projection of ‘complex prepositions’ like *in front of* in (159a), to which he assigns the ‘decomposed’ syntactic structure in (159b):

- (159) a. John stood [*in front of* the house]  
 b. [<sub>PlaceP</sub> [<sub>Place</sub> *in*] [<sub>AxPartP</sub> [<sub>AxPart</sub> *front*] [<sub>KP</sub> [<sub>K</sub> *of*] [<sub>DP</sub> the house]]]]

The element *in* corresponds to the functional head Place, the abstract noun-like element *front* is a functional head Ax(ial)Part, and *of* is a genitival case, which is structurally represented by the functional projection KP.<sup>78 79</sup>

<sup>78</sup> Jackendoff (1996:14) gives the following description of the notion of ‘axial part’.

“The ‘axial parts’ of an object—its *top*, *bottom*, *front*, *back*, *sides*, and *ends*—behave grammatically like parts of the object, but, unlike standard parts such as a *handle* or a *leg*, they have no distinctive shape. Rather, they are regions of the object (or its boundary) determined by their relation to the object’s axes. The up-down axis determines top and bottom, the front-back axis determines front and back, and a complex set of criteria distinguishing horizontal axes determines sides and ends.”

Svenonius (2006) further argues that the extended adpositional projection may contain a Deictic projection, a layer of functional structure which expresses degrees of proximity to a deictic center. Evidence for such a functional layer comes, for example, from Persian which exhibits a distal marker in the adpositional structure (see Pantcheva 2006):<sup>80</sup>

(160) *dær 10 metri-ye un birun-e xane* (Persian)  
 at 10 meters-EZ DIST outside-EZ house  
 ‘there, 10 meters outside the house’

## 11. Projection and symmetry: some concluding remarks

The central topic of this chapter was the projection of syntactic structure. A syntactic structure is essentially a phrase structural manifestation (“a structuralization”) of the lexical properties (features) that are associated with the lexical items that constitute the building blocks for the syntactic structure. In other words, lexical information as specified in the lexical items of the lexicon is projected onto a syntactic structure. A fundamental distinction in the lexicon is that between lexical categories (content words) and functional categories (function words). According to the current generative-linguistic conception of phrase structure, this distinction is reflected in the structuralization of lexical information. The projection of the lexical category (N, V, A, P) constitutes the lowest structural domain of a so-called extended projection. The sequence of functional projections is built on top of the lexical projection and consequently constitutes the higher domain of the extended projection. The projection of the lexical category (V, N, A, P) is the domain in which thematic (s-selectional) information gets structuralized. This structuralization of thematic information (i.e. the mapping of theta roles onto syntactic arguments) is evaluated by the Theta Criterion. The structuralization of Category-selectional information (i.e. the subcategorization property) applies both at the level of lexical categories (e.g. the verb *meet* takes a DP as its complement) and at the level of functional categories (e.g. the complementizer *that* takes a TP<sub>[+finite]</sub> as its complement). Functional categories, as opposed to lexical categories, have the lexically specified ability of attracting a designated property to their specifier position (i.e. the displacement property of human language). In the clausal domain, for example, the functional head T is lexically specified for needing a constituent (typically a DP) in its specifier position (i.e. [Spec,TP]). This requirement, known as the Extended Projection Principle (EPP), can be satisfied by displacement (Internal Merge) of an argumental DP into this

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<sup>79</sup> As pointed out by the reviewer of this chapter, Finnish seems to provide a good illustration of the ‘nominal flavor’ of AxPart: The ‘nominal flavor’ element takes case inflection like a regular noun. This is exemplified in (i):

- (i) a. *pöydän a-lla* (table-GEN top-ADESSIVE; ‘on top of the table’)
- b. *pöydän a-lta* (table-GEN top-ABLATIVE; ‘off the top of the table’)
- c. *pöydän a-lle* (table-GEN top-ALLATIVE; ‘on to the top of the table’)

For discussion of adpositional patterns having a ‘nominal flavor’, see also Aboh (2010), Noonan (2010), and Terzi (2010).

<sup>80</sup> EZ in (160) stands for *Ezafe*, i.e. the marker that shows up in so-called *Ezafe*-constructions (see Ghomeshi 1997).

position, but also by inserting (External Merge) an expletive element in this position. Importantly, the EPP-property, which is a feature lexically associated with T, gets structuralized, i.e. is projected in syntax. Likewise, the ‘EPP-property’ of other functional categories may get structuralized via displacement or ‘base insertion’ of lexical material.

A major guideline of generative syntactic research has always been the quest for symmetry. In this chapter, we saw several illustrations of this, among which: (i) the uniform X-bar theoretic format for the phrase structural organization of the lexical categories N, V, A and P (ii) the extension of the X-bar theoretic format to functional categories; and (iii) the uniform binary branching organization of phrase structure. All this suggests that the projection of lexical items onto syntactic phrase structure applies in a cross-categorially uniform way. A further illustration of this “symmetry of projection” comes from the structuralization of the functional-lexical dichotomy: For all extended projections, it is assumed that the lexical structural layer is hierarchically embedded within the functional structural layer.

This question about the symmetry of projection raises two further questions, which were already raised in section 1 but have not been explicitly addressed so far:

- 1) To what extent is there cross-categorial similarity as regards the “grammatical role” of the functional projections that are associated with the lexical categories (V, N, A, P)
- 2) Is projection of lexical information cross-linguistically uniform, or do languages display cross-linguistic variation in this respect?

Let us begin with question 1). This question addresses the issue of whether the various layers of information as represented in the four extended projections (i.e. extended N, V, A and P) are similar in type. The general research program on extended projections tends to adopt the position that, at a more abstract level, the same types of information are attested across the various extended projections and that the structural organization of these “informational layers” is highly similar (see among others Abney 1987, Szabolcsi 1987, Cinque 2002). It seems uncontroversial that the extended projection of the lexical category V includes, as its core, the following three functional projections (see Chomsky (2002), Den Dikken (2010)):

- a projection for aspectual information
- a projection for temporal-deictic information
- a projection for expressing illocutionary force

The aspectual projection (AsP) encodes information about the delimitedness/boundedness versus non-delimitedness/unboundedness of an event.<sup>81</sup> The temporal-deictic projection (TP) encodes information about how the event is situated in time: ‘present’, ‘past’, and ‘future’. The Force

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<sup>81</sup> ‘Delimitedness’ (also called ‘boundedness’) refers to the property of an event’s having a distinct, definite endpoint in time (see Verkuyl 1993, Tenny 1994). For example, sentence (ia) describes a delimited event since the destroying of the car requires a certain amount of time and has a definite endpoint, as is clear from the (un)acceptability of the temporal adjunct-PPs. Sentence (ib) does not describe a delimited event, since the pushing of the car is something that can go on for an indefinite period of time.

- (i) a. They destroyed the car in an hour/\*for an hour
- b. They pushed the car for an hour/\*in an hour

projection (CP) encodes illocutionary properties such as ‘declarative’, ‘interrogative’, ‘exclamative’, *et cetera*. It is generally assumed that these information types are distributed across the clause (i.e. the extended verbal projection) in the following organized way:

(161) [CP ....C... [TP ...T... [AsP ...Asp... [VP ... V ...]]]]

The organization of information within the other extended projections (Ext-NP, Ext-PP, Ext-AP) seems to be quite similar (cf. Den Dikken 2010): NumP has been interpreted as the nominal correspondent of verbal AsP (Ritter 1991), with the *mass/count* distinction being parallel to the *delimited/non-delimited* distinction in the verbal domain. Personal deixis (‘me’, ‘you’, ‘other’) can be interpreted as the nominal counterpart of verbal Tense (‘present’, ‘past’, ‘future’). And, as hinted at by many studies on the DP-hypothesis, D can be analyzed as the informational equivalent of C (cf. among others Szabolcsi (1999), Bennis et al. (1998))

As Den Dikken (2010) notes, this structural organization of information can also be identified in the extended adpositional projection. The ‘verbal-aspectual’ distinction between *delimited* versus *non-delimited* events has its ‘spatial’ equivalent at the level of locative P (Koopman’s PlaceP) and directional P (Koopman’s PathP). For example, both *walk into the house* and *walk around the house* involve a PATH-denoting PP, but while the former PATH is bounded, the latter is not (see also Zwarts (2005)). As noted by Tortora (2008), locative PPs also display this spatial-aspectual distinction: the Italian PP *sopra il tavolo* ‘on the table’ expresses that the figure is at a specific point on the table (punctual, bounded location), whereas in the PP *sopra al tavolo* ‘on to-the table’ the figure is spread out all over the table (non-punctual, unbounded location). As further argued by Den Dikken, the extended adpositional system also contains a projection for encoding spatial-deixis (see also Svenonius (2010)). This projection structuralizes the distinction between ‘here’ (‘at the speaker’) and ‘there’ (‘not at the speaker’) in the locative domain, and between orientation ‘towards the speaker’ and ‘away from the speaker’. In a language like German, these deictic-spatial distinctions can be nicely expressed by means of the following particles: *hier* [proximal, place], *da/dort* [distal, place], *her* [proximal, path], *hin* [distal, path]; see Van Riemsdijk and Huijbregts (2007). Finally, as noted by Koopman (2000), the extended adpositional projection is topped off by a functional projection which, just like CP and DP, is ‘accessible’ to external-syntactic operations like wh-movement and scrambling and provides an escape hatch position for subextraction operations.

If aspectual, deictic and force layers can be identified in the extended verbal, nominal and adpositional projections, then arguably we should be able to identify these informational layers also in the extended adjectival projection. One might argue, for example, that the aspectual dimension is found in the extended adjectival expressions in (162), which feature a gradable adjective whose degree is specified in different ways. In (162a), the measure phrase *five feet* identifies a specific point on the scale of ‘degrees of tallness’. In other words, the degree is ‘punctual and bounded’. This bounded reading is also found in a comparative form like (162b), where the measure phrase designates the size of the gap that spans from today’s pile of snow up to yesterday’s pile of snow (see Schwarzschild (2005)). Interestingly, the degree expressed by a comparative form like *taller* can also be unbounded. This is the case in (162c), where the modifier *ever* specifies the unboundedness of the degree of tallness.<sup>82</sup>

<sup>82</sup> This unbounded degree can also be expressed by iteration of the comparative adjective (see (ia)) or, when we

- (162) a. The pile of snow was [five feet tall]  
 b. Today's pile of snow is [two feet taller than yesterday's]  
 c. The piles of snow grow [ever taller] in his garden

The presence of a deictic-degree dimension within the extended adjectival projection is suggested by the occurrence of adjectival expressions like (163), in which the demonstrative elements *this* and *that* refer to a degree of tallness.

- (163) a. The fish was [this tall] (accompanied by a gesture indicating the size)  
 b. Was the fish really [that tall]?!

Finally, just like the other extended projections, the extended adjectival projection is closed off by a functional projection which, just like CP and DP, is 'accessible' to external-syntactic operations and provides an escape hatch position for subextraction operations (see, for example, the subextraction patterns in (132a) and (134a); see also Corver (2000) on subextraction in Rumanian).

Let me finally say a few words about the second question mentioned above, i.e. the question as to whether the projection of lexical information onto syntax is cross-linguistically the same or different (see also Chapter 28). Or, to put it differently, is the lexical information associated with lexical items structuralized uniformly across languages or do languages differ in this respect? In the history of generative syntax, different answers have been given to this question for the various types of projection we have discussed in this chapter. For example, as for the projection of phrasal structure, it has been proposed by Hale (1981) and Farmer (1984) that a distinction should be made between 'configurational languages' (e.g. English) and 'non-configurational' languages (e.g. Warlpiri). The former project a hierarchical (X-bar) structure in which argumental phrases are in an asymmetric relation to the verb (e.g. the subject is in a more prominent position with respect to the verb than is the direct object), whereas the latter project a flat structure in which argumental phrases are in a hierarchically symmetric relation to the verb—essentially, they are all complements to the verb—and are freely ordered with respect to each other. In Hale (1981), the non-configurationality property is expressed by means of the following rule, which essentially states that linguistic expressions are formed by stringing words together:

(164) E → ...W\*...

Other linguists have argued that non-configurationality is only apparent. Saito (1985) and Hoji (1986), for example, have shown that an apparently non-configurational language like Japanese

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have a free comparative morpheme, by iteration of the comparative morpheme itself (see (ib)):

- (i) a. The piles of snow grow [taller and taller] in his garden  
 b. Mary became [[more and more and more] intelligent]

Note that iteration of the comparative adjective is not possible when the a 'single' degree of tallness is designated:

- (ii) \*Today's pile of snow is [two feet *taller and taller* than yesterday's]

actually has a hierarchical syntactic structure in which the subject-argument and the direct object-argument are hierarchically distinct.<sup>83</sup> According to this view, all languages are uniform as regards the projection of hierarchical structure.

Also with respect to the projection of thematic information, different views have been presented: a very influential view has been Perlmutter and Postal's (1984) Universal Alignment Hypothesis, according to which the mapping between theta roles and syntactic argument positions is based on a universal hierarchy (see also Baker's (1988) Uniformity of Theta Assignment Hypothesis). There have been different views, however, according to which theta-roles are not (necessarily) mapped onto fixed syntactic positions. For example, this has been argued for by researchers who advocate a base generation approach towards the phenomenon of scrambling (see e.g. Bayer and Kornfilt (1994), Neeleman (1994)). According to this base generation analysis, the thematic roles associated with a lexical head (e.g. V) may be assigned to different syntactic 'satellite' positions within the verbal projection. In other words, there is not a designated syntactic position onto which a specific theta role is projected.

Another potential dimension of variation regards the notion of extended projection. More specifically, do all languages display the same projection levels or may languages differ in this respect? In Corver (1990, 1992), for example, it is proposed that nominal expressions in Slavic are NPs (i.e. lexical projections) rather than DPs, and that this accounts for the possibility in those languages of subextracting left branch specifying elements (cf. Ross (1967)). Languages that do not permit left branch extraction (e.g. English) typically have a DP-layer on top of the NP-projection. This DP-layer creates a barrier for subextraction. Thus, according to this view, languages may differ in the architecture of the extended nominal projection (say, bare NP versus extended DP); see also Fukui (1988), Baker (2003), Bošković (2005). Other researchers, however, have argued that these asymmetries in left branch subextraction should not be related to a difference in extended projection. More specifically, all languages project a DP-level on top of the lexical projection NP (see, for example, Progovac (1998), Rappaport (2001)). In other words, according to this view, extended nominal projections are cross-linguistically uniform.<sup>84</sup>

Even though views may differ on whether languages may vary in their ways of projecting lexical properties onto syntactic form, there arguably is consensus on one important thing: projection of lexical knowledge onto syntactic structure is a core mechanism of human language.

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<sup>83</sup> See also Adger, Harbour and Watkins (2009) for a highly configurational analysis of Kiowa, a language that appears to be highly nonconfigurational on the surface.

<sup>84</sup> The question as to whether nominal projections are cross-linguistically uniform or not is also a topic of discussion in the literature on the East Asian Altaic languages (Japanese, Korean). See Fukui (1988) for the view that Japanese nominal expressions lack a DP-layer, and see Park (2008) and Furuya (2008) for analyses in defense of a DP-layer in languages such as Korean and Japanese.

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