13 Heads, bases and functors

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13.1 Introduction

This chapter argues that when syntacticians refer to heads, they are referring to one of at least three distinct notions, all of which have a place in the theory of syntax.\(^1\) It can thus be seen as a working out and refinement of the syntactic portions of Zwicky (1985), especially in response to the discussion by Hudson (1987).

My 1985 paper examined several situations in which the assignment of head or dependent status to some participant in a syntactic construction is unclear; for them, tests that pick out the head in straightforward cases like verb or preposition plus object (see penguins, about penguins) do not always make a unique assignment. Hudson (1987) attempted to show that a unique head could be picked out anyway, but at the cost of abandoning some tests and re-interpreting others. Still other syntacticians (for instance, Fanchel, 1989; Warner, 1989; Radford, this volume) have proposed that various problematic cases involve the assignment of head status to more than one participant in a construction, but again at a cost (complications in other parts of the description or other parts of the theory). With these latter authors, I propose to ‘have it both ways’, but not by assigning multiple head status, a step I reserve (see section 13.8) for quite a different set of phenomena.

Instead, what I want to say about heads is rather like what most syntacticians now say about subjects. Over a considerable period of time, the literature on subjects has gradually disentangled a number of notions that coincide in prototypical instances of subjects, among them nominative marking, sentence topic, reference to the agent in an event and the ‘grammatical relation’ now simply labelled subject. All of these notions are relevant in some way to statements of grammatical generalizations, and they are related to one another by default
associations (for instance, the grammatical relation subject is by
default expressed by nominative marking).

I am proposing here to disentangle at least three notions that
coincide in prototypical instances of heads: the semantic functor (F);
the base (B), which is the required participant in a combination (in the
sense that omitting it yields some sort of ellipsis); and the head (H),
roughly as in the Head Feature Convention of Generalized Phrase
Structure Grammar (GPSG). Each of these is central to a combina-
tion, but in different ways: F is internally central, both semantically
and for the purposes of lexical subcategorization; B is central in the
same two ways, but for the purposes of semantic interpretation and
lexical subcategorization with respect to elements external to its
construct; and H is central with respect to the location of agreement
or government morphology with respect to elements outside its
construct. All of these notions are thus relevant to statements of
grammatical generalizations. They are also related by default associ-
tions; the default is for H to coincide with B (though this association is
broken in the constructions that are the major focus of this chapter),
and for H to coincide with F (though this association is broken for
modification constructions).

This is an essay in the foundations of syntax. It advances no
particular theory of syntax, old or new, but instead concerns itself
with pre-theoretical observations and metatheoretical strategies. Pre-
theoretical observations lead to claims about what concepts an
adequate theory must incorporate and what sorts of propositions
such a theory must be able to articulate, and so serve as boundary
conditions on theories. Metatheoretical strategies are proposals about
how theories should be constructed, given such boundary conditions.
It follows that neither conceptual economy nor formalism will be my
concerns in this chapter – which is not to say that these are unworthy
or irrelevant topics, only that I am taking up issues that are to some
extent antecedent to them.

An adequate theoretical framework for syntax will include a
considerable conceptual apparatus, one part of which has to do with
syntactically relevant properties of expressions and their parts, for
instance, the category they belong to (Noun, Verb, etc.) and their
rank (Word, Phrase and Clause, at least), another part of which – the
part I am concerned with in this chapter – has to do with syntactically
relevant relations between parts of expressions. Two of these rela-
tions, inclusion and ordering, serve as the basis for constituent-
structure theories; given this much conceptual apparatus, we can
make descriptive statements like those in (1). My interest here is with
two further sets of relations, which serve as the basis for dependency
and 'relational' theories; descriptive statements like those in (2) are
couched in terms of relations of this sort.

(1) a. The Clause *penguins fly* includes the Noun Phrase *penguins* and
the Verb Phrase *fly.*
b. In this Clause, the Phrase *penguins* precedes the Phrase *fly.*

(2) a. In this Clause, the Phrase *penguins* is a Dependent-of, in
particular an Argument-of, the Phrase *fly.*
b. In this Clause, the Phrase *penguins* is a Subject-of and an
Absolute-of the Phrase *fly.*

13.2 Conceptual apparatus: dependency relations and
functions

One specific issue I will be examining has to do with the relation, or
relations, holding in a hypotactic syntactic construction between a
central element, the *head*, and its satellite elements, its *dependents.* In
a set of syntactically related constituents, which one or ones should be
picked out as having a special central status? For what pur-
poses – that is to say, to capture what sorts of generalizations? And
on what grounds?

Here we are concerned with a theory of *dependency relations,* the
central notions of which are the cross-cutting contrasts between
Head-of and Dependent-of, on the one hand, and Functor-on and
Functee-of (I apologize for the barbarous terminology, but all the
good terms seem to be taken), on the other.² The four dependency
relations so defined are charted in (3), where the arrows connect
converse relations.³

(3)  

<table>
<thead>
<tr>
<th>Head-of</th>
<th>Functor-on</th>
<th>Functee-of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator-on</td>
<td>Modified-by</td>
<td></td>
</tr>
<tr>
<td>Modifier-of</td>
<td>Argument-of</td>
<td></td>
</tr>
</tbody>
</table>

²
In what follows it will sometimes be convenient to refer to a single term in a dependency relation, that is, to a subexpression serving as Head, Dependent, Functor, Functee, Operator, Modifier, Modified or Argument. For this I will use the label *dependency function*. For each dependency relation there is a dependency function, which is a property possessed by a subexpression that bears the dependency relation to some other subexpression within its sentence.

13.2.1 Modifier versus Argument

The intuition behind the distinction between Modifier and Argument is that these functions typically differ semantically, syntactically and morphologically. Semantically, Modifiers are functors, while Arguments are (semantic) arguments.

Syntactically, Modifiers are optional, while Arguments are obligatory within their constructions; several instances of the same type of Modifier can co-occur in a flat structure, while only one instance of any given type of Argument is allowed per construction; and a Modifier construction will be associated with a *lexical subcategory* of the Modifier (a class of lexemes eligible to serve in that function in the construction), the corresponding Head category being lexically unrestricted, while an Argument construction will have a lexically unrestricted Argument category but a lexical subcategory for the corresponding head.

Morphologically, Modifiers agree with their Heads and govern morphosyntactic properties of these Heads, while Arguments trigger agreement on their Heads and have morphosyntactic properties governed by their Heads. These morphological characteristics follow from the fact that Modifiers are Functors, given the generalization, originally due to Keenan (1974), that within a Functor–Functee construction, the Functor is the target for agreement triggered by the Functee (so that Operators agree with their Arguments, as when verbs agree with their Subjects and Direct Objects, and Modifiers agree with the Modifieds, as when adjectives agree with their companion nominals). Others, including Zwicky (1985), have extended this generalization to cover government: within such a construction, the Functor is a trigger for government with the Functee as target (so that Operators govern their arguments, as when verbs govern case forms on their Subjects and Direct Objects, and – much more rarely – Modifiers govern their Modifieds, as in the Arabic 'construct state'
examples mentioned by Vincent (this volume), where a Modifier Noun, in base form, governs the construct form on the preceding Modifier Noun). I will refer to this generalization about how syntax mediates between semantics and morphological form as 'the extended Keenan generalization'. As a slogan: Functors are agreement targets and government triggers.

The characteristic differences between Modifiers and Arguments can then be summarized as in (4):  

<table>
<thead>
<tr>
<th>Semantics</th>
<th>Modifier</th>
<th>Argument</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>semantic functor</td>
<td>semantic argument</td>
</tr>
<tr>
<td>Syntax</td>
<td>optional iterable lexically subcategorized</td>
<td>obligatory unique lexically unrestricted</td>
</tr>
<tr>
<td>Morphology</td>
<td>agreement target government trigger</td>
<td>agreement trigger government target</td>
</tr>
</tbody>
</table>

Note that agreement and government achieve marking of syntactic relations by two different principles. Agreement is a kind of sharing of properties between items that stand in some syntactic relation, while government merely marks the presence of this syntactic relation, via a property of the Dependent. However, the presence of a syntactic relation could also be indicated on the Head, via a mark of the lexical subcategory to which the Head belongs, as when the relation between a Verb and its Direct Object is marked not by government of some case (accusative or other) on the Direct Object, but rather by a transitivity marker on the Verb (like Tok Pisin -im, as in i tokim ol ‘(s)he says to them’). This is one way in which languages (or constructions within one language) can choose to mark either Dependent or Head (see Nichols, 1986), though the marks are different in character.

13.2.2 Head versus Dependent

The intuition behind the distinction between Head and Dependent is that these functions, too, differ in all three ways.

Semantically, the Head is the characterizing participant in a construction; intuitively, the meaning of a construct is a subtype of the meaning of the Head (red apple denotes a subtype of apple, make a box a subtype of make), while the Dependent plays a contributory role in the semantics, restricting the meaning of the Head in one way or another. This is the ‘kind of’ property of McGlashan (this volume).
With respect to its internal syntax, the Head is the *required* element in a construction, even an Argument + Head construction, 'required' in the special sense that without this element the construct is elliptical; the Verb Phrase *turkey* in *I ate chicken, and Kim turkey* is missing its Head Verb, and is grammatical but elliptical. A Dependent is syntactically 'accessory', in the sense that without a Dependent a construct is simply of a different type; the Verb Phrase *walked in Kim walked* lacks a Dependent, but is simply an intransitive, rather than an elliptical transitive. And the Head is the participant in the construction that is typically specified as of Word rank in the rule describing the construction, while a Dependent is typically specified as of Phrase rank (as in the rules describing Verb Phrase comprising Verb Word and Noun Phrase, and Noun Phrase comprising Noun Word and Adjective Phrase).

With respect to both its internal and its external syntax, the Head is the syntactic category determinant. It determines the syntactic category of the construct as a whole; that is, it is the constituent with which the construct as a whole shares its syntactic category (though not necessarily its rank), while the category of the Dependent has no direct reflection in the category of the construct.

With specific reference to its external syntax, the Head is the determinant in a somewhat different sense: the distribution of the construct as a whole is predictable from properties of the Head, the properties of a Dependent being irrelevant or 'transparent' in the matter, so that the Head determines what is in effect the lexical subcategory of the construct as a whole. The Head as *external representative*, or 'external determinant', is the element in a construction that serves as the trigger or the target for external lexical subcategorization (whichever is relevant for the type of Head in question), with respect to partners of the construct as a whole, and as the trigger for government or agreement (again, whichever is relevant for the type of Head in question). For external purposes, *demonstrate that the earth is flat* has a distribution predictable from the properties of *demonstrate*, with the Argument *that the earth is flat* transparent for these purposes, and *very red tomatoes* has a distribution predictable from the properties of *tomatoes*, with the Modifier *very red* transparent for these purposes. This is the 'distributional equivalence' criterion for headship of Zwicky (1985), which was based on Bloomfield's (1933: 194) formulation in terms of 'same form class'. In order to apply it, morphology must be ignored, whether this morphology indicates syntactic relations outside the combination in question or whether it
indicates syntactic relations between the participants in the combination; the point is to distinguish the selection of lexical subcategories from the selection of inflectional forms.

These closely linked characteristics—being the category determinant and the external representative—play a central role in the work of Harris (1946, 1951) that serves as the immediate antecedent of the ‘X-bar syntax’ in a variety of generative frameworks, including all of the last decade’s versions of GB (Pullum, 1985; Kornai and Pullum, 1990). Morphologically, the Head is the morphosyntactic locus, the element that exhibits the morphosyntactic properties that belong to the construct as a whole, including those determined in agreement and government; thus, the Head Verb eats in the Verb Phrase eats fish in Kim eats fish exhibits in its suffix the present-tense property of the Verb Phrase as well as the third person and singular number properties that belong to this Phrase. The Head Feature Convention of GPSG (Gazdar et al., 1985) packages the morphosyntactic locus characteristic together with the syntactic determinant characteristic, treating them both as a kind of feature-sharing between construct and constituent.

The characteristic differences between Heads and Dependents are summarized in (5):

(5)  
<table>
<thead>
<tr>
<th>Semantics</th>
<th>Head</th>
<th>Dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>characterizing</td>
<td>contributory</td>
</tr>
<tr>
<td>Syntax</td>
<td>required</td>
<td>accessory</td>
</tr>
<tr>
<td></td>
<td>Word rank</td>
<td>Phrase rank</td>
</tr>
<tr>
<td></td>
<td>category determinant</td>
<td>non-determinant</td>
</tr>
<tr>
<td></td>
<td>external representative</td>
<td>externally transparent</td>
</tr>
<tr>
<td>Morphology</td>
<td>morphosyntactic locus</td>
<td>morphosyntactically irrelevant</td>
</tr>
</tbody>
</table>

13.3 Conceptual background: syntactic relations and functions

Another issue has to do with the relationship between dependency relations and the specific relations usually called ‘grammatical relations’: Subject, Direct Object, Adjectival, Predicator, etc. In what follows I will use the label syntactic relation for these two-place relations and the label syntactic function for one term in such a relation, so that in the clause penguins fly the ordered expression-pair (penguins, fly) belongs to the Subject-of syntactic relation, the
expression *penguins* has the Subject syntactic function and the expression *fly* has the Predicator syntactic function.

I opt for the modifier 'syntactic' rather than 'grammatical' to emphasize that these notions are grounded specifically in syntax, whatever associations they might have with other aspects of a grammar (in particular, with semantics or morphology). This is not merely a terminological quibble. The substantive point is that the inventory of syntactic relations – in one language, or in a theoretical framework for all languages – is determined in the first instance by the needs of *syntax*. We posit these theoretical entities because some generalizations about the syntax of individual languages cannot be stated properly without them; if we must frame generalizations entirely in terms of syntactic categories, syntactic constituent structure and linear precedence – even if we can also refer to the categories of inflectional morphology, phonological properties of constituents, semantic content and pragmatic function – we will miss some generalizations.

A particularly simple approach to syntactic functions/relations would treat them as subordinate to the four main dependency functions/relations. There would then be a single hierarchy – actually, as in (3) above, a number of cross-cutting splits – embracing both types of entities.

Thus, the dependency function Argument would split into syntactic functions like Nuclear versus Oblique and Internal versus External, at a rather high level; at a somewhat lower level, Nuclear would split into Subject, Absolute, Direct Object and Ergate, and Internal into Direct Object, Indirect Object and others. The dependency function Operator would split into syntactic functions like Predicator and Locutor. And the dependency function Modifier would split into syntactic functions like Adjectival (Modifier-of-N) and Adverbial (Modifier-of-non-N); in turn, Adjectival and Adverbial would split into various subtypes.

These particular splits are summarized in (6), which is intended to be illustrative rather than definitive; it is not my purpose here to provide a detailed theory of syntactic functions. A somewhat different way of splitting dependency functions and syntactic functions, without cross-cutting, has been proposed by Hudson in various recent papers (see especially Hudson, 1988: 312).

(6) Argument: Nuclear versus Oblique; External versus Internal
    Nuclear: Subject, Absolute, Direct Object, Ergate
    Internal: Direct Object, Indirect Object, Oblique Object, Predicative, Complement, etc.
Operator: Predicador versus Locator
Modifier: Adjectival versus Adverbial
Adverbial: Degree Adverbial (Modifier-of-a), Sentence Adverbial (Modifier-of-s), etc.

13.4 Local determination of Word properties

In the approach I am taking here, which unites aspects of constituency and dependency frameworks, both dependency relations and syntactic relations are specified in the rules for particular syntactic constructions. (It is not my concern here whether some or all of these relations can be predicted from universal principles and/or parameter settings for a particular language.) In this regard they are like the relations of inclusion or linear precedence.

Phrase-structure syntax frameworks provide a way of taking the relations of inclusion and linear precedence, as specified in a particular rule for the participant constituents in that rule, and systematically determining such relations for subconstituents, ultimately for individual syntactic words within an expression. From the fact (determinable from one rule) that the Clause purple penguins fly hesitantly includes a Noun Phrase purple penguins and a Verb Phrase fly hesitantly, in that order, and the fact (determinable from a second rule or rules) that the Noun Phrase purple penguins includes an Adjective Word purple and a Noun Word penguins, in that order, and the fact (determinable from a third rule or rules) that the Verb Phrase fly hesitantly includes a Verb Word fly and an Adverb Word hesitantly, we can determine that the Clause purple penguins fly hesitantly includes the Noun Word penguin, that in this expression the Adjective Word purple precedes the Verb Word fly and so on. These predictions follow via general principles of relational inheritance: if X includes Y and Y includes Z, then X includes Z; and if X precedes Y, X includes $X_i$, and Y includes $Y_i$, then $X_i$ precedes $Y_i$.

What is important here is that the relevant properties of and relations between words can be locally determined, predicted from the properties of and relations between the constituents that participate in particular local rules. In a strictly word-based framework, there must be a converse mechanism, for predicting properties of and relations between larger expressions, ultimately from those specified in rules that concern individual words. It is not my purpose here to argue for a constituent-based framework over a word-based one. But there is no way to talk about these matters without choosing one sort of framework, so I have chosen the one I believe to be better
supported. I should add that this choice has nothing to do with a top-down versus bottom-up versus pure-licensing view of the way syntactic rules are applied in determining whether a particular expression is licensed by a grammar; both word-based and constituent-based frameworks can be viewed in all of these, and presumably many other, ways.

In any event, there are general principles that allow local determination of dependency relations and syntactic relations between individual words, given the relations that are specified between immediate constituents in particular syntactic rules. First, I assume that any multi-word expression has immediate constituents each of which bears a dependency relation and a syntactic relation to at least one other immediate constituent of it; there are no constituents that are simply 'thrown in'. Next I define what it is to be a Head-within a constituent: in a construct \( X \), any immediate constituent \( X_j \) of \( X \) that is Head-of some other immediate constituent of \( X \) is Head-within \( X \); and if \( X_j \) is Head-within \( X_j \) and \( X_i \) is Head-within \( X \), then \( X_j \) is Head-within \( X \). Then the principle of relational inheritance is that a Head-within a construct bears all the dependency relations and syntactic relations of the construct itself.

13.5 Dissociations

The world of syntactic functions is systematically related to the world of syntactic categories, via default associations between the two: Noun with Nuclear Argument, Verb with Predicator, Adposition with Locator, Adjective with Adjectival, Adverb with Adverbial and so on. These associations can be viewed in constituent-structure terms, as relating syntactic functions to categories like Noun Phrase, or in terms of word properties, as relating syntactic functions to categories like Noun Word.

But, as is well known, there are dissociations between syntactic functions and syntactic categories. In certain circumstances, Clauses can serve as Nuclear Arguments (That people are refusing to fly means we shouldn’t invest in airline stocks), PPs as Subjects (Under the bed is a poor place to hide), bare NPs as Adverbials (Be here Tuesday), NPs as Determiners (a thousand clowns) and so on.

There are also phenomena that suggest that dependency functions and syntactic functions are dissociable from one another, that the latter are not simply subtypes of the former as in hierarchical frameworks. One well-known class of such phenomena involves Arguments that clearly have the syntactic functions (and often the
syntactic categories as well) normally associated with Modifiers, as in the locational Dependent of verbs like reside in I reside near Stanford or the manner Dependent of verbs like word in We worded our response carefully. These are Arguments on the syntactic tests in (4), since they are obligatory, unique and lexically unrestricted. Yet what fills these slots in the construction at issue is not any standard sort of Argument syntactic function but, rather, specific types of Adverbial – which is to say, on the hierarchical view, a subtype of Modifier.

The natural suggestion to make is that the associations between syntactic functions and dependency functions that are assumed in the hierarchical view are, like the standard associations between syntactic functions and syntactic categories, only defaults, which can be overridden by stipulations for particular constructions in particular languages. Adopting this suggestion means giving up the hierarchical view and treating dependency functions and syntactic functions as two independent, though intimately related, systems. We then say that English has a construction in which a Verb Head (like word) is licensed with three Arguments: a Subject, a Direct Object and an Adverbial (of a specific type). Adverbials are by default Modifiers, but here we have Adverbials stipulated to be Arguments.

In examples like these, there is in a sense conflicting evidence as to whether some constituent is a Modifier or an Argument. Internally, constituents like carefully or with great care are typical Modifiers, and they have modificational semantics, but in their external syntax in construction with Heads like word they act like Arguments.

### 13.6 Splits

Modifiers and Arguments are both Dependents, so that examples like phrase my response with malice present no particular difficulty in assigning Head versus Dependent status. But there are other examples that do, and it is these that I am primarily concerned with in this chapter.

In a number of different places in the grammars of many, quite probably all, languages, there are elements of Word rank that are Dependents on some tests, but Heads on others: for instance, English auxiliaries like is in is going, has in has gone and must in must go. More specifically, these elements seem to be Modifiers (Adverbials or Adjectivals) serving as Operators; the English auxiliaries, for instance, have the semantics of (Adverbial) Modifiers but exhibit tense, person and number inflection the way Operator Verbs do.
The split of the morphosyntactic locus characteristic of Heads from some of the other characteristics has been stressed in Nichols' (1986 and elsewhere) very important work on what she calls 'head-marking' versus 'dependent-marking', though in fact her assignments of Head versus Dependent status on non-morphological grounds are still problematic; in particular, she treats auxiliaries as Heads without comment.

In the generative, especially GB, literature, these elements are sometimes given a special status by being labelled Specifiers,\(^\text{10}\) a label I will adopt here (but without adopting any attendant assumptions of GB syntax). As I observe below, some recent GB work takes these elements (in particular, auxiliaries, infinitival *to* and determiners) to be Heads. In contrast, in the Categorial Grammar literature, as in Bouma (1988, citing work by Bach), Specifiers are treated as special types of Modifiers, because of their semantics.

In general, a Specifier serves as a marker of grammatical categories – aspect, tense, modality, case, definiteness, subordination, degree, etc. – on the constituent with which it combines (the Specified). While individual Specifiers might have additional lexical content, they all are to some degree 'particle words', occurring in alternation with, or in combination with, inflectional expression of these grammatical categories on their Specifieds. Specifiers are thus the syntactic analogues of inflectional morphology (the *to* of *to sing* being parallel to the *-ing* of *singing*), while Arguments are the syntactic analogues of category-changing derivational morphology (the *people* of *people sing* being parallel to the *-er* of *singer*) and Modifiers are the syntactic analogues of category-preserving derivational morphology (the *rather* of *rather blue* being parallel to the *-ish* of *bluish*).

Here is the array of the characteristics that make them theoretically problematic (with short code names for each of the relevant characteristics):

\[(7) \quad \text{Dependent characteristics:} \]
\[\text{Semantics: they are contributory (like Modifiers and Arguments)}\]
\[-\text{CLS: they are not classifying} \]
\[\text{specifically like Modifiers [Functors]:} \]
\[\text{FTR: they are semantic functors} \]
\[\text{Internal syntax: they are accessory (like Modifiers and Arguments)} \]
\[\text{specifically like Modifiers [Functors]:} \]
\[-\text{REQ: they are not required} \]
\[\text{specifically like Arguments (Functees) (and Operators} \]
Let me go through these characteristics for one class of Specifiers, the English auxiliaries, in combination with Specifieds that have the syntactic category Verb Phrase and the syntactic function Complement.

First, on the Dependent side of the ledger: the auxiliaries have contributory rather than classifying semantics (¬CLS); the meaning of will sing is a subtype of the meaning of sing. In fact, semantically they act like Modifiers (Adverbials, in particular) rather than Arguments; they are semantic functors (FTR).

Auxiliaries are not required (¬REQ); for the most part, English clauses do not have to have an auxiliary to be well formed (though there are special clause types, like the inverted type in Do you love me?, that do). They are unique (UNQ); sequences of auxiliaries, as in must have been being praised, have hierarchical rather than flat structure, with only one auxiliary per constituent. They are lexically subcategorized (LEX); there is a small class of auxiliaries, and though there is a semantic core to the class, membership in the class is somewhat unpredictable, while there is no such lexical restriction for their Complements. Finally, they are not external representatives (¬REP); the distribution of a Verb Phrase like must rain a lot in Seattle or is raining here is predictable not from the properties of modal must or progressive be, but from the properties of their Complements, both of which have the weather verb rain as their Head.
On the Head side of the ledger: in the rules introducing them \((\text{VP} \rightarrow \text{V} + \text{VP})\), the auxiliaries are of Word rather than Phrase rank (\text{WRD}). As for category determination (\text{CAT}) in this case, we cannot tell, since both constituents and the construct have the category Verb. But they are morphosyntactic loci (\text{LOC}); the auxiliary in \text{It was becoming a dark and stormy night}, not its Complement \text{becoming}, shows the morphological indications of tense, person and number. In English we cannot really tell whether auxiliaries are agreement targets (\text{AGR}) or not, since Verbs do not show any morphological reflexes of agreement with their Complements. But they are certainly government triggers (\text{GOV}), since each auxiliary requires a particular verb form on its Complement: the modals require a base form, progressive \text{BE} requires a present participle form, perfective \text{HAVE} and passive \text{BE} require a past participle form and so on.\textsuperscript{11}

For combinations of auxiliary Verb with a Complement Verb Phrase, then, the characteristics of the Head are split between Specifier and Specified. It will be clear from (7) that the characteristics of the Functor are also split between Specifier and Specified. This is a fresh array of characteristics.

13.6.1 Instances of the split

This particular array arises in at least four different situations in one language or another. All of these have figured in the recent literature that has concerned itself with properties of Heads (notably, Zwicky, 1985; Hudson, 1987; and nearly all the other chapters in this volume).

First, as already discussed, there are some instances of certain (‘auxiliary’) Verbs in combination with a Complement Verb Phrase, though most instances of Verbs taking Complement Verb Phrases (as in \text{start raining} or \text{expect to go}) are unproblematically Heads.

Second, there are some instances of a determiner in combination with its companion nominal constituent, as in English \text{those penguins, three iguanas, each kangaroo} and \text{you guys}. These have some properties of clear Modifiers, like \text{numerous} in \text{numerous difficulties}, and some properties of clear (Operator) Heads, like \text{pile} in \text{a pile of potatoes}. They fit the profile of Specifiers in (7) perfectly, except perhaps for the category-determinant (\text{CAT}) property.

As many have noticed in the past decade, the resulting rule for determiners is quite parallel to the one for auxiliaries. There are, of course, two ways the rules could be framed so as to be parallel. On
the one hand, we could take the rule $VP \rightarrow V + VP$ (where different subtypes of Specifier V's govern different Specified VPs) to be the model for the analysis of determiners. This entails treating the determiners in question as a special kind of Noun in combination with a Complement Noun Phrase, as was (apparently) first suggested by Hudson (1987: section 6); see also Zwicky (forthcoming). The relevant NP rule is then $NP \rightarrow N + NP$, where different subtypes of Specifier Ns govern different Specified NPs.

Or we could posit (as in Abney, 1987; Hoeksema, 1988; and a number of other works, including several in this volume) a rule $DP \rightarrow D + NP$ and take it as the model for the analysis of auxiliaries, in which case the relevant VP rule is $XP \rightarrow X + VP$, for some appropriate $X$ that carries tense and agreement information in finite clauses lacking an overt auxiliary. If we take $X$ to be $I$, then the rule $DP \rightarrow D + NP$ will be parallel to $IP \rightarrow I + VP$; indeed, Grimshaw (in recent, still unpublished, work reported on at the 1991 West Coast Conference on Formal Linguistics) extends these proportions so that $N:V :: D:I :: P:C$, where $P$ is Adposition and $C$ is Complementizer. I now turn to cases of $P$ and $C$.

The third collection of problematic cases comprises some instances of ("grammatically used") Adpositions in combination with a Direct Object Noun Phrase, like the uses of to, of and by in give money to Pat and the discovery of flying pigs by Chris. Ordinary Adpositions, as in send books to China or eating sushi with your friends, are unproblematically Heads.

Grammatically used Adpositions show fairly clearly the split between the two 'determinant' characteristics in Specifier–Specified combinations; the Specifier is the category determinant (CAT) while the Specified is the external representative (REP). Concerning the Specifier as CAT: it is clear in many languages that the syntactic category of an Adposition in combination with its Object Noun Phrase is Adposition, not Noun; dative to Pat, ergative by Chris and so on in English are PPs, not NPs, on every relevant test I know of. (In particular, these Prepositions can be stranded, as in Who did you give it to?) On the Specified as REP: in general, grammatically used Adpositions serve as syntactically transparent 'flags' of the relationship between these Noun Phrases and some external Operator; in particular, in some languages Verbs show agreement with Adpositionally marked Objects of various sorts (Zwicky, forthcoming, citing Seiter, 1983, on Niuean; Davies, 1986, with respect to Jake, 1980, on Tigre; and Durie, 1988, on Acehnese).
The fourth collection of problematic cases comprises some instances of a subordinator (a ‘complementizer’) in combination with its clause (which we might want to treat as instances of a special kind of Adposition in combination with a Direct Object Clause). In English, complementizer that (as in *that pigs can’t fly* or *that you be the leader*) belongs here, while ordinary adverbial subordinators (as in *after you’re gone* and *while we were singing*) are unproblematically Heads. The clause is certainly the Specified in such combinations; in particular, it is the external representative. Whether the complementizer is the category determinant or not depends on what categories are to be assigned to the two constituents and the construct in question; the rule $CP \rightarrow C+XP$ (for some appropriate $X$; $IP$ is the choice in current GB work) achieves the desired result, though it is not the only imaginable way. But where we can tell, the complementizer has Specifier characteristics; it is a semantic function (FTR) and is lexically restricted (LEX), and in several languages (see Hoeksema, 1986, on Dutch; Rizzi, 1990: 55–7, with references on Kinande, Bavarian and French, among other languages) there is evidence indicating that complementizers of this sort can be agreement targets, exhibiting agreement with the Subject of the Specified clause (AGR).

(Some instances of a ‘degree’ Adposition in combination with a measure or extent phrase, as in English *over thirty students* and *about as many people as we expected* or in similar Russian expressions with case-governing prepositions (see Babby, 1988), might belong here as well.)

13.6.2 The analysis of Specifiers

What are we to make of these splits? No assignment of otherwise motivated syntactic categories, Functor–Functee status, Head–Dependent status or specific syntactic functions will yield the right split of characteristics for Specifier and Specified.

Nor will it do merely to add Specifier and Specified as new dependency functions on a footing with Operator, Modified, Modifier and Argument in (3), as in (8). Whether we do this by positing some third item, say Companion, in addition to Head and Dependent (8a), or by treating Head as a three-valued feature, along the lines of (8b), or by breaking Head and Dependent (like the phonological features High and Low) into cross-cutting binary features (8c), the right arrays of characteristics will not fall out.
Instead, we can preserve the essentially binary oppositions Functor–Functee (F versus non-F) and Head–Dependent (H versus non-H) in (3), while adding a third one at the top level of dependency functions. This third binary opposition, B (for base) versus non-B, picks out Specified versus Specifier as well as Operator versus Argument and Modified versus Modifier; that is, it picks out the three dependency functions in the upper right of (8), versus the three in the lower left.

Different dependency functions at the bottom level are then obtained by assigning B either to the H element in the ‘square of opposition’ in (3) or to the non-H element. The four possible assignments are enumerated in (9) and (10).

(9)

\[
\begin{align*}
&H + \text{non-}H \\
a. \text{Operator} = \text{Base: Operator} + \text{Argument} \\
&F_B \\
b. \text{Modified} = \text{Base: Modified} + \text{Modifier} \\
&B_F \\
\end{align*}
\]

(10)

\[
\begin{align*}
a. \text{Argument} = \text{Base: Specifier} + \text{Specified} \\
&F_B \\
b. \text{Modifier} = \text{Base: Specifier} + \text{Specified} \\
&F_B \\
\end{align*}
\]

Let me emphasize that H, B and F in the charts in (9) and (10) are still dependency functions, that is, they are still to be thought of as inherently relational in character. Saying that some constituent is an H in a construction is just a shorthand way of saying that it bears the H function to a co-constituent in that construction; and similarly for B and F.

Now that there is no longer a single notion of ‘head’, the scheme for local determination of Word properties, sketched in section 13.4 above, must be replaced by separate schemes for H, B and F, and for their associated syntactic relations. When this is done, all the
syntactically relevant relations between Words in an expression will
be predictable from relations specified in rules stated over consti-
tuents.

13.6.3 Another sort of Specifier

In the unproblematic Operator + Argument (9a) and Modified +
Modifier (9b) combinations, B coincides with H; indeed, in Operator
+ Argument combinations, which are in a sense the prototypical
combinations of head and dependent, H, F and B coincide in a single
element, the Operator. The Specifier + Specified combinations in (10)
are problematic in that B is assigned to a non-H element. In the ones
we have been considering, schematized in (10a), the H element is still
the F.

There remains the logical possibility of a different sort of Specifier
+ Specified combination, in which F is assigned to a non-H element,
as in (10b). In the Specifier + Specified combination of (10a), the
Specifier is the F and thus is the agreement target and government
trigger. In (10b), the Specified is the F, and so should be the agreement
target and government trigger. Both patterns can be illustrated from
possessive constructions in the world’s languages. I assume that in
both patterns possessors are Specifiers and possessed are Specifieds.

In the (10a) pattern, a possessor falls in with garden-variety
determiners, and consequently shows agreement with the possessed
nominal; pronominal possessors in many European languages are of
this type. In the (10b) pattern, a possessor falls in with Subjects
(Ergates, in particular) so that it can show a governed case (like the
English genitive in ’s), while the possessed nominal can show
agreement (as in Turkish).

13.7 Property correlates of F, H and B

None of this would be more than cleverness in chart-making if F, H
and B lacked consistent correlates in properties of subexpressions. In
fact, each has a primary ‘property correlate’, plus one or more
subsidiary property correlates, as follows:

(11)  a. F: semantic functor (ftr)
       agreement target (agr)
       government trigger (gov)
       lexically subcategorized (lex)

b. H: morphosyntactic locus (loc)
       Word rank (wrk)
category determinant (\textsc{cat})
c. \textit{B}: external representative (\textsc{rep})
required (\textsc{req})
classifying (\textsc{cls})

This assignment of correlates, together with the interpretation of the eight different assortments of \textit{H}, \textit{B} and \textit{F} into dependency functions, in (9) and (10), correctly sorts out the characteristics of these eight types of participants in syntactic constructions.

The characteristics not yet accounted for are uniqueness (\textsc{unq}) and (within \textsc{−req} constituents) optionality (\textsc{opt}). As for \textsc{opt}: all \textit{B} dependency functions (Operator in (9a), Modified in (9b), Specified in (10)) are obligatory, as in the non-\textit{B} dependency function Argument in (9a); all other non-\textit{B} dependency functions are optional. As for \textsc{unq}: any dependency function that is \textit{H} or \textit{B} or non-\textit{F} is unique; only Modifiers in (9b) are iterable.

\section*{13.8 Multiply headed hypotaxis}
Although the dependency functions that are both \textit{H} and \textit{F}, Operators and Specifiers, are unique, there are reasons for wanting to say that in certain constructions both constituents in a construction can be \textit{H}, so that these constructions will appear to be to some extent paratactic.

The cases I have in mind are (a) contracted \textit{wanna}, \textit{gonna} etc., on the analysis suggested by Frantz (1979), where the contraction is dependent on ‘relation sharing’ between the main verb \textit{want} and the infinitival verb \textit{to}; and (b) American English quasi-serial \textit{go get}, \textit{come see}, etc., on the analysis suggested by Pullum (1990), which also involves relation sharing. My proposal is that these are variant forms of, respectively, (a) the ordinary Verb + Complement construction of \textit{want to sing} (where \textit{want} is \textit{H}, \textit{F} and \textit{B} and \textit{to sing} is none of these), and (b) the auxiliary Verb + Complement construction of \textit{will sing} (where \textit{will} is \textit{H} and \textit{F} while \textit{sing} is \textit{B}). In these variant forms both the Verb and the Complement are \textit{H}.

Being \textit{H} means that both constituents are morphosyntactic loci with respect to agreement with or government by external material; both constituents will have morphosyntactic features that are determined from outside their construct. But there is also government within the construct: a Verb like \textit{want} governs a ‘marked infinitive’ Complement, with \textit{to}, and a Verb like \textit{will} governs a base-form (‘unmarked infinitive’) Complement. The result is a double set of morphosyntactic features on the \textit{H} Word of the Complement; in \textit{I}
wanna go, the infinitive marker to will have both a set of –Finite features (imposed by government by want) and a set of +Finite features (imposed by agreement with I), and in I go sing a lot, sing will have both a set of –Finite features (imposed by government by go) and a set of +Finite features (imposed by agreement with I).

Multiple sources of morphosyntactic features are quite common, of course (Zwicky, 1986). Sometimes the features are separately realized in the morphology of the language (as when Verbs show agreement with both Subject and Direct Object), but quite often one source of features receives morphological realization while another is, so far as the morphology is concerned, suppressed. In the case of wanna contraction, the features imposed by the main verb always ‘win’. In the case of the quasi-serial construction, speakers differ as to whether the main verb’s requirements, of the base form, wins (allowing things like I have come visit them) or whether an external determinant’s requirement wins (for perfective have as the external determinant, allowing things like I have come visited them), or whether the construction is possible only if both requirements can be satisfied (so that neither *I have come visit them nor *I have come visited them is acceptable, but I have often come put water on their plants is; see Pullum, 1990, for further details).

I should point out that the ‘double H’ analysis for wanna contraction and the quasi-serials is independent of the treatment of co-ordination. It is true that the standard GPSG approach to co-ordination treats every conjunct as a Head, that is, as H (in my terms here, it should also treat every conjunct as B) but this line of analysis could be abandoned (as I believe it should be) without any consequences for an analysis of some hypotactic constructions as having two H constituents.

13.9 References to H and to B

It has often been suggested that there are generalizations about the grammars of particular languages that make crucial reference to the distinction between Head and Dependent, H and non-H. In English, for example, many syntacticians have noted the powerful generalization that in Phrase constructs, the H constituent precedes all of its Arguments — a generalization that runs across VPs (including those with auxiliary Hs), PPs (including those with grammatically used PHs), AdjPs and AdvPs, as in Pollard and Sag (1987). On the other hand, the H constituent is also the one of Word rank, so that (as many have observed) the generalization could be stated instead in terms of rank (with ‘lexical’ categories preceding phrasal categories).
The dependency function $b$ seems frequently to play a role in the statement of the syntactic rules of particular languages. In English, for instance, rules that are standardly framed with references to 'the main verb' (see Levin, 1986) involve reference to the $b$ Verb Word. Thus, the gapping construction of English (as in I will order the salmon, and Terry the steak) has as one of its defining characteristics that it is missing material that contains the $b$ Verb Word (the 'main verb'). In contrast, the VP ellipsis construction (as in You must have been singing, and they must, too) has as one of its defining characteristics that a non-$b$ H Verb Word remains. The pseudo-gapping construction (as in I can finish my salmon before you can your steak) involves both of these conditions.

The dependency function $b$ also plays the central role in one instance of 'direct reference to heads' (Zwicky, 1988). What is at issue here is a condition that for some speakers of English requires that in genitive plural NPs the mark of plurality within the NP must be located on the same syntactic Word as the genitive mark. Genitive case is marked on the final Word of an NP (the student I was talking to's ideas), while plurality is marked on the 'head' (actually $b$) Word within the NP (the students I was talking to), and when these two do not coincide the result is ungrammatical for some speakers: *the students I was speaking to's ideas.

It may well be that most of the references to 'heads' in the grammars of particular languages are to be reformulated as references to the $b$ participant, and ultimately the $b$ Word, in some construction.

13.10 Concluding remarks

I have already remarked on the importance of Nichols' work on what is, in my terms, the dissociation of the morphosyntactic locus characteristic (now labelled $h$) from other characteristics of 'heads'. There are antecedents for other aspects of my proposals.

In particular, analyses with something of the flavour of (9) and (10) are to be found in Warner (1989), with special reference to complementizers and co-ordinating conjunctions, and Fenchel (1989), with special reference to determiners. Both Warner and Fenchel propose that these constructions have two heads and attempt to sort the syntactic features into two sets in such a way that the conventions of GPSG, in particular the Head Feature Convention (HFC) and the Control Agreement Principle (CAP), will distribute them properly between the two participants in a Specifier + Specified combination. In a similar vein, Hoeksema (1986) on agreement of complementizers
with Subjects in Dutch and Zwicky (forthcoming) on agreement of verbs with Adpositionally marked Arguments both propose to use the HFC and CAP to move features from a Specified to a Specifier to the construct embracing them both, so that these features can 'communicate' outside the construct.

My proposal here (also aired in Zwicky, 1990a, 1990b) is that such combinations do indeed have two central constituents in them, but that these two are of different type and that the difference should be available in a universal framework for syntax – available in the sense that within certain limits the individual constructions of particular languages are free to impose values for the features H, F and B on their constituents.

Somewhat different sorts of antecedents are to be found in Simpson (1983: section 2.5), who distinguishes between ‘phrase structure heads’ and ‘functional heads’ (adopting the distinction between ‘categorial’ and ‘functional’ properties in Lexical Functional Grammar, as in Bresnan, 1982b), and in Wandruszka (1989), who distinguishes between ‘heads on the classemic level’ and ‘heads on the lexemic level’, both of which I take to be roughly the distinction between H on the one hand and F/B on the other. An appreciation that there is some sense in which both parts of a Specifier + Specified construction contribute to the characteristics of their construct is to be found in Abney (1987) and much other recent GB work.

All of these writers thus distinguish what Nichols (1986: 57) takes to be concurrent defining characteristics of ‘heads’ across various theoretical frameworks, the F characteristics of government trigger (GOV) and lexical subcategorizand (LEX) and the H characteristic of category determinant (DET):

Linguists of divergent theoretical persuasions are in almost complete agreement as to what is the head and what is the non-head in a given construction; cf. Tesnière 1959, Garde 1977, Mel'čuk 1979b, 1981, Bresnan 1982[c] (passim), Marantz 1984. Briefly, the head is the word which governs, or is subcategorized for – or otherwise determines the possibility of occurrence of – the other word. It determines the category of the phrase.

Still another type of related proposal is to be found in Carlson (1983) and Pollard and Sag (forthcoming), where certain sorts of 'grammatical words' or 'particle words' are distinguished as markers. But these are neither Hs (at least on the morphosyntactic-locus and category-determinant criteria) nor Bs (on the external-representative criterion); they would appear to make a special class of F elements.

Undoubtedly, there are many earlier, perhaps even ancient, intimations that such constructions divide up, between their two consti-
tuents, various 'central' characteristics that, for other constructions, coincide in a single constituent. What I hope to have provided here is a reasonably full account of the characteristics in question, the extent to which they vary together and the extent to which they can vary independently. The central claim is that an adequate account of dependency functions requires that we recognize at least three relevant primitive functions, H, F and B.

NOTES

1. My thanks to Joyce Powers for comments on a much earlier version of this chapter and to David Dowty for pointing out the Wandruszka reference to me; and for their comments on intermediate versions, my thanks to members of the audience (especially Joan Bresnan and Peter Sells) at my 26 January 1990 presentation at Stanford's Center for the Study of Language and Information and to participants in the Talking Heads Round Table at the University of Surrey, 21–2 March 1991. The version of 31 March 1991 was finished at the Center for Advanced Study in the Behavioral Sciences, Stanford, California; my thanks to the Center for its hospitality and to the Ohio State University for sabbatical-year support (and for the assistance of Alex Schott in preparing the final manuscript, of 26 October 1991).

2. The names of dependency relations/functions and syntactic relations/functions will have initial capitalization. The choice of particular names is essentially arbitrary; nothing could possibly hinge on whether Predicate or Verbal or something else is selected as the name of a particular syntactic function, so long as the same name is chosen for corresponding functions in different languages. Some names are resonant with historical associations, of course - a fact that has both positive and negative consequences.

3. Modifier-of is also known as Adjunct-of, and Argument-of as Complement-of. I will not use 'Adjunct' at all in what follows, so that the reader is free to treat it as a synonym for 'Modifier'. I will, however, be using 'Complement' in a special sense, to refer to a specific syntactic function.

4. With function here understood as referring not to functions in the mathematical sense, which are special types of relations, but rather to the functions in the sense 'uses, roles', which are, speaking mathematically, properties.

5. See Pollard and Sag (1987: especially section 5.6) for further discussion of the Argument/Modifier distinction.

6. There is, of course, no claim here that all of these properties will be manifested for every Modifier and every Argument, or even somewhere or another in each language. The properties are nevertheless intended to
be universal, in the sense that if there is relevant evidence within a language then Modifiers and Arguments are distinguished as in (4).

7. As with (4), these distinctions are intended to be universal, in that if there is relevant evidence on the matter in a language, Heads and Dependents will be distinguished as in (5).

8. I reserve the names *absolutive* and *ergative* for morphological cases, parallel to *nominative* and *accusative*. Absolute and Ergate are the syntactic functions marked by absolutive and ergative case, respectively.

9. There is no necessary claim here that all syntactic functions, even all of the ones listed in (6), play a role in every language. Instead, different languages can make use of different assortments of functions from a universally characterized list, much as different languages make use of different assortments of phonological feature distinctions from a universally characterized list.

10. The companion constituent to a Specifier is usually labelled Head, and in much of this literature it is assumed that all endocentric constructions (even subject–predicate constructions) are Specifier + Head, so that the problematic characteristics of what I am calling Specifiers are obscured.

11. The observation that this is in fact government seems to have been made first by Pullum and Wilson (1977).

12. In recent GB work, following Pollock’s (1989) positing of the categories $t$ (tense), $\text{tr}$, $\text{Agr}$ (agreement), and $\text{Agrp}$, an assortment of grammatical categories are segmentalized as formatives, each with its own Specifier + Specified rule.