An HPSG Account of Nonfinite Verbal Complements in Latin
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Chapter 3

Introduction to HPSG

3.1 General Remarks

The grammatical framework used for this dissertation is HEAD-DRIVEN PHRASE STRUCTURE GRAMMAR (HPSG). HPSG is chosen for its formal precision, which allows for clear-cut grammatical differentiations. Other grammatical theories providing the same precision in formulation could, however, have been chosen as well. Generally, this dissertation is kept in the framework of HPSG developed by Pollard and Sag (1994) and Sag and Wasow (1999).\(^1\)

In HPSG, partial information stemming from different linguistic sources is integrated in an order-independent way. As the grammar is formulated in terms of a declarative system of constraints, it can be applied for both parsing and generation of language. HPSG is a linguistic theory based on signs. Signs are the principal type of object, falling into two disjoint subtypes, phrasal and lexical signs. Signs allow for the parallel representation of all kinds of linguistic information, syntactic, semantic, phonological, contextual, etc. Signs are described by attribute-value matrices (AVMs). There is work in the mathematical foundations of HPSG which develops feature structures as the model theoretic objects which the theory describes. As this thesis focuses on descriptive Latin syntax, we shall ignore these foundational questions. Interested readers may consult King (1989), Carpenter and Pollard (1990, 1991), Carpenter (1990, 1992), Carpenter, Pollard, Franz (1991).

\(^1\)For a more thorough introduction to the grammatical theory of HPSG, these books are recommended.
3.1.1 Overview

The primary aim of this chapter is to make this study more accessible to readers without any knowledge of HPSG. A secondary aim is to clarify for those who are already familiar with HPSG exactly how I am using this theory, i.e. which version and what parts of the theory I am focussing on. We attempt to explain briefly the most fundamental assumptions and mechanisms of this grammar. However, we have to point out that due to space limitations, we concentrate only on those aspects of HPSG which will be needed to understand the chapters of this dissertation which follow. We begin with an explanation of the basic elements of HPSG. We explain what kind of linguistic descriptions are used (section 1.2) and how the type hierarchy is built up (section 1.3). Next we introduce phrasal structures (section 2). In a subsection we demonstrate how descriptions combine (section 2.1) and how indices are used to refer remotely to parts of descriptions (section 2.1.1). Grammatical government is illustrated presenting verbs as well as prepositions governing different cases (section 3). A subsection introduces how impersonal constructions are dealt with. Section 4 introduces the Head-Specifier Rule, the Head-Complement Rule, and the Head-Modifier Rule. Moreover, section 4.2 shows us which basic principles are needed to constrain the set of phrase structure models.

Afterwards we focus on more specialized parts of the grammar which are necessary to understand this dissertation. As there are fundamental differences between the copula esse and the other verbs in Latin, we discuss the copula in an extra section (section 5). In the section on verb phrase complementation the difference between Raising- and Control verbs is explained, illustrated by English and Latin examples (section 6). We also present the standard HPSG binding theory and note the limited extent to which it can cope with the Latin data (section 7). A brief section discusses word order (section 8).

Of course, many more grammatical topics have already been abundantly studied in HPSG. As they are not needed to understand my dissertation, I do not introduce them here.

3.1.2 Linguistic Descriptions

An AVM consists basically of sets of pairs of attributes and their values. A value may in turn be further specified by its own attribute-value pairs. They need not be complete and can thus provide partial information. An example of an AVM is given in (1):

\[
\begin{array}{c|c|c}
\text{Attribute} & \text{Value} & \text{Modified Value} \\
\hline
\text{Gender} & \text{Masculine} & \text{Masculine}\text{ Singular} \\
\text{Number} & \text{Plural} & \text{Plural} \\
\end{array}
\]
3.1. GENERAL REMARKS

![Diagram of a word structure]

Notice that this is not the only feature organization possible, as different HPSG-authors might represent their AVMs in slightly different ways. In this dissertation we follow the organization developed by Pollard and Sag (1994).

What kind of information does this entry provide? (1) is the lexical entry of a noun, which is a subtype of word. In HPSG, the lexicalization of linguistic information leads to a drastic reduction in the number and complexity of phrase structure rules. A lot of information contained by the sign imperator in (1) is not specific to this entry alone, but shared by other signs of the same word class. Therefore inheritance is used to structure the lexicon.

In (1), we get phonetic (PHON), syntactic (SYN) and semantic (SEM) information simultaneously. Note that we are using small capitals in prose (PHON) to refer to the attributes we refer to in lower case in the attribute-value descriptions such as (1). The value of the PHON-attribute should be a feature representation serving for phonological interpretation. Since in this dissertation it will play no role, we just spell the words, using the Latin alphabet.

Syntax gives us the head-features of imperator: it is a noun. The head-feature AGR (AGREEMENT) is a feature shared by all nouns. The value of that feature is another feature structure wearing the two attribute labels
PERSON and NUMBER. These subsorts are called atomic, as for them no further attribute labels are appropriate. PERSON values are found in three subsorts in Latin: first, second, third, and NUMBER values come in two subsorts, singular and plural.

In (1) we see that the noun imperator requires neither a SPECIFIER (SPR), nor a COMPLEMENT (COMPS). Note that the values for SPECIFIER and COMPLEMENT are given each in a LIST of feature structures. The list specifies a sequence of categories corresponding to the specifier (and complements, respectively) that the word combines with. These two lists are empty. We turn to the function of valence features including SPR and COMPS in section 4 below. Semantically the noun imperator is analysed as a referring expression (MODE referential). The feature structure in (1) likewise contains information about the context (CONX), which we will have little occasion to exercise in this thesis.

Each noun has the feature CASE. The value of the CASE attribute must be one of the most specific subsorts of the sort case. Latin provides us with five subsorts of case: nom(inative), gen(itive), dat(ive), acc(usative) and abl(ative).²

A more elaborate version of the AVM given for imperator in (1) would additionally contain the following information:

\[
\text{(2) imperator} \left[ \text{syn} \left[ \text{head noun [case nom]} \right] \right]
\]

This AVM can be read as a path: the value of the path \([\text{syn} | \text{head} | \text{case}]\) is nominative.

3.1.3 Type Hierarchy

Let us repeat: signs are modelled by feature structures which are described by attribute-value-matrices (AVMs). HPSG works with typed feature structures in which the type indicates what kind of object is being described. Types are partially ordered in type hierarchies using the subsumption mechanism. Thus the ontology of the language is organized into a multiple inheritance hierarchy. Higher types or supertypes express broader generalizations, whilst

²Latin also has a sixth case, vocative. It is only partially realized and will play no role in this dissertation.
3.2. PHRASAL STRUCTURES

lower or subtypes contain more specific details. In (3), a simple example of a type hierarchy is given.

\[
\begin{array}{c}
\text{word} \\
\text{noun} \quad \text{verb} \\
\text{proper name} \quad \text{common noun} \quad \text{transitive} \quad \text{intransitive}
\end{array}
\]

Properties shared by all words, nouns, common nouns, etc. have to be specified only once. They are inherited by their subtypes. Now look back at structure (1). The PHON-value is specific to the noun-lexeme imperator. Note, however, that all words carry a PHON-feature. All words carry the attributes SYN, SEM and CONX. All words are headed; the agreement features PER and NUM are shared by all nouns. The value 3 for person is shared by all common nouns, and the value sg for number is shared by all singular nouns. All this information—general and specific—is found in the AVM given in (1).

3.2 Phrasal Structures

(1) describes the (nominative form of) the word imperator. Therefore (1) is a lexical sign. HPSG employs phrasal signs, as well. In HPSG, as well as in GB, structure is chiefly determined by the interaction between highly articulated lexical entries and parametrized universal principles of grammatical well-formedness, with rules reduced to a handful of highly general and universally available phrase structure schemata.\(^3\) Phrase structure schemata are also referred to as immediate dominance rules.

HPSG assumes that all signs have the attributes PHON, SYN, and SEM; all phrasal signs have the attribute DTRS, as well. This differentiates phrasal from lexical signs. The value of a phrasal sign is a feature structure of sort constituent-structure representing the immediate constituent structure of the phrase. We will primarily deal with the subsort headed-structure which is used for headed constructions.

The grammatically most important constituent of a phrase is called the head of the phrase. It determines the external properties of the phrase, i.e. how it combines with other elements. The head determines the category of the phrase. Since phrasal heads themselves have heads, the term head is also used transitively to refer to the word that functions as head of the phrase

\(^3\)Note, however, that there is increasing interest among HPSG practitioners in construction grammar (Ginzburg and Sag:2000).
and any subphrase containing that word. Three main attributes for the sort *headed-structure* are HEAD DAUGHTER (HEAD-DTR), SPECIFIER-DAUGHTER (SPR-DTR) and COMPLEMENT-DAUGHTERS (COMP-DTRS) of which only the first is obligatory. Specifiers and complements may be optional.

Following the proposal in Sag and Wasow (1999), we also use the term SPECIFIER to refer to subjects. The feature SPECIFIER (SPR) is introduced to state co-occurrence restrictions for heads and the specifiers they select. The value of SPR is a list which contains just one element, which in case of a verb is the subject of the sentence. The value of the feature COMPLEMENT-DAUGHTERS is a list containing the complements of the structure. (4) indicates the minimal structure of a headed structure:

\[
(4) \quad \begin{array}{c}
\text{head-str} \\
\text{head-dtr} \quad (\text{a sign}) \\
\text{spr-dtr} \quad (\text{a list of signs}) \\
\text{comp-dtrs} \quad (\text{a list of signs}) \\
\end{array}
\]

In each headed structure, there is only one head daughter and one SPR-DTR, but there might be none, one or more COMP-DTRS, ordered by increasing obliqueness. Let us look at a simple head-specifier-structure:

\[\text{The feature SPR is used in HPSG to refer to determiners, as well. In English, for example, the determiner the would have to be analysed as specifier of the noun boy in the noun phrase the boy. Although Latin NPs can have specifiers—in *iste puér* ‘that boy’ the demonstrative *iste* is analysed as specifier of the noun *puér*, specifiers of NPs will play no role within this dissertation.}\]
3.2. PHRASAL STRUCTURES

(5) \[
\begin{array}{c}
\text{phrase} \\
\text{phon} \langle \text{imperator, ambulat} \rangle \\
\text{head} \quad \langle \text{verb} \rangle \\
\text{spr} \quad \langle \text{vform} \rangle \\
\text{comps} \quad \langle \text{fin} \rangle \\
\text{head-dtr} \\
\text{dtr} \\
\text{spr-dtr} \\
\text{phrase} \\
\text{phon} \langle \text{ambulat} \rangle \\
\text{syn} \quad \langle \text{head} \rangle \\
\text{spr} \quad \langle \text{head} \rangle \\
\text{phrase} \\
\text{phon} \langle \text{imperator} \rangle \\
\text{syn} \quad \langle \text{head} \rangle \\
\text{nom} \quad \langle \text{noun} \rangle \\
\end{array}
\]

(6) shows how the sentence is represented by means of a phrase structure tree:

(6) \[
\begin{array}{c}
S_{f_n} \\
\text{SPR(NP_{nom})} \\
\text{imperator} \\
\text{HEAD(VP_{f_n})} \\
\text{ambulat}
\end{array}
\]

The node $S_{f_n}$ in (6) corresponds to the outermost phrasal structure within the square brackets in (5): we have a finite sentence in which the head is a finite verb and both the values for SPR and COMPS are satisfied. The dtr- bracket in (5) represents the level of the VP (the head-dtr) and the NP (the spr-dtr). We use categories symbols such as VP and NP as abbreviations for AVM’s. The meaning of the boxed integer or ‘tag’ will be discussed in the next subsection. For now it is sufficient to note that the different occurrences of the boxed number, e.g. [2], all describe the same thing.

Let us have a more detailed look at the head-daughter and the spr-daughter in (5). We already mentioned that AVMs do not need to be complete. What do we observe? The head-dtr, ambulat, carries the head-
features *verb* and *vform finite*. *ambulat* is third person singular. But we
do not see any *agr*-value specified within the head daughter. This is not
necessary. The *head-dtr* has a specifier, *spr*. The *spr*-daughter is the NP
*imperator* we already studied in (1). This NP’s *head*-features are *case* and
*agr*. Because *agr* is a head feature, any NP that serves as the subject of a
verb like *ambulat* will have to contain a lexical head noun that is also specified
as
\[
\begin{bmatrix}
\text{agr} \\
\text{per} \\
3
\end{bmatrix}
\]
which we abbreviate \[\text{agr} \ [3_{sg}]\]. and as \[\text{case} \ [\text{nom}].\]

So we need no further *agr*-feature on the verb in order to assure congruence
between subject and verb. It suffices that such verbs bear the partial
information
\[
\begin{bmatrix}
\text{spr} \\
\text{NP} \\
\text{agr} \\
\text{per} \\
3
\end{bmatrix}
\]
This is a consequence of the Head
Feature Principle and the Head-Specifier-Rule which will be explained in
section 4 of this chapter.

### 3.2.1 Variables

Let us once again have a look at figure (5). In (5), we encounter a notation
widely used in HPSG, which is *tagging*. The boxed integer or ‘tag’ \[2\] fulfils
the same purpose as a variable in mathematical logic. Tagging indicates a
kind of structure sharing which involves token identity of values. We could
therefore rewrite the structure in (5) in the following way:
If no further information is included, (7) and (5) describe the same structures. Instead of using the tag $[2]$, we “spelled out” the information in (7). Notice that the two different feature structures must have the same value for all features, once they are identified.

It is also worth noting that (7) is weaker than (5) in those cases in which either the $[\text{syn}|\text{head}]$-value or the $[\text{dtrs}|\text{head-dtr}|\text{syn}|\text{head}]$-value are further modified. Feature structure (5) constrains these two values to be identical, whilst (7) merely describes them equivalently.

### 3.2.2 Unification

Unification merges two feature structure descriptions into one description which contains all the information of both. Unification of two feature structure descriptions is possible if and only if the information they contain is consistent. The unification of two feature structures thus combines all of the information from both of them. If $D_1$ is satisfied by a set (of feature structures) $\sigma_1$ and $D_2$ by $\sigma_2$ then the unification of $D_1$ and $D_2$ ($D_1 \cup D_2$) is satisfied by the intersection of $\sigma_1$ and $\sigma_2$. 
Now look at the following example:

(8a) *imperatores ambulat.
emperors he-walks.
"*The emperors walks.'

(8b) \[
\text{phrase} \\
\text{phon} \{\text{imperatores, ambulat}\} \\
\begin{array}{c}
\text{head} \\
\text{syn} \\
\text{spr} \\
\text{comps}
\end{array} \begin{bmatrix}
\text{verb} \\
\text{vform} \\
\text{fin}
\end{bmatrix} \\
\begin{array}{c}
\text{agr} \\
\text{[num sg]}
\end{array} \\
\begin{array}{c}
\text{per 3}
\end{array} \\
\end{array}
\]

(8b) is an inconsistent description. This means that (8b) describes no possible feature structure. The head-feature of the verb \textit{ambulat} requires that its specifier NP must carry the agreement features of third person singular. This is the import of the shared tag [2]. \textit{imperatores} however, carries the head-feature agreement of third person plural. Singular and plural are values
which are not consistent. Therefore, *imperatores* is no appropriate SPR-DTR for the verb *ambulat*. *imperatores ambulat* is ruled out as an ungrammatical sentence.\(^5\)

In section 4 of this chapter we will introduce rules and principles in detail. For reasons of illustration, we anticipate a little here. Let us have another look at (8b). We have a head-daughter and a specifier-daughter within the same AVM. As the values for the agreement features do not match, (8b) is inconsistent. Now let us approach the ungrammatical (8a) *imperatores ambulat* from a slightly different perspective. In (8c) we find the lexical entry for the verb *ambulat*; and in (8d) the lexical entry for the NP *imperatores* is given:\(^6\)

\[(8c) \quad \textbf{ambulat} \]
\[
\begin{array}{c}
\text{verb-lxm} \\
\text{phon} \langle \textit{ambulat} \rangle \\
\text{syn} \left[ \begin{array}{c}
\text{head} \\
\text{vform fin} \\
\text{agr} [ \text{per 3 num sg} ] \\
\text{spr} \langle \text{NP} \left[ \text{syn \{head [agr \textbf{a}]\}} \right] \rangle \\
\end{array} \right]
\end{array}
\]

\[(8d) \quad \textbf{imperatores} \]
\[
\begin{array}{c}
\text{noun-lxm} \\
\text{phon} \langle \textit{imperatores} \rangle \\
\text{syn} \left[ \begin{array}{c}
\text{head} \\
\text{agr} [ \text{per 3 num pl} ] \\
\end{array} \right]
\end{array}
\]

Let us now try to combine these two words (8c) and (8d). The result of this attempt should be that *imperatores* serves as the specifier of the verb *ambu-\

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\(^{5}\) The attentive reader will note that (8b) specifies agreement information on verbs, which we noted above is not strictly necessary. We add it here for the purpose of illustration.

\(^{6}\) The entry in (8c) is of type *verb-lexeme* and the entry in (8d) is of type *noun-lexeme*. Lexemes are differentiated from *words*. There is one basic entry for most nouns and verbs, containing a description of type *lexeme*. All nominal and verbal *word* entries are derived by applying lexical rules to these *lexeme* entries. For further information on lexical rules, see section 4.1.5 of this chapter.
lat. In order to combine heads with their specifiers, HPSG uses the Head-Specifier Rule:

\[
\begin{align*}
\text{phrase} & \rightarrow \text{H} \hspace{1cm} \text{spr} \\
\text{comps} & \rightarrow \hspace{1cm} \text{spr}
\end{align*}
\]

This rule will be properly introduced in section 4. Is (8d) imperatores a suitable candidate for being unified with the specifier of (8c) ambulat? In (8c) we see that the phrase ambulat requires its specifier to have the same agreement values as the head, that is PER 3 and NUM sg. However, the agreement values of imperatores in (8d) show us that only PER is 3, which is required by the specifier of (8c), but that NUM is plural. Due to this mismatch between (8c) and (8d), unification, which is an operation of combining descriptions in the most general way, fails and our grammar will not produce a sentence like the ungrammatical (8a).

3.2.2.1 Semantic Indices

Another kind of indices in HPSG are semantic indices. Look at the following example:

\[
\langle \text{NP} \text{H}, \text{NP} \rangle
\]

In (10) the tag is used as a semantic index with the first NP, whilst the tag of the second NP covers the entire NP. Thus NP \[ \text{I} \] is an abbreviation for the structure given in (11):

\[
\begin{align*}
\text{syn} & \rightarrow \text{head noun} \\
\text{spr} & \rightarrow \langle \rangle \\
\text{comps} & \rightarrow \langle \rangle \\
\text{sem} & \rightarrow \text{index \text{H}}
\end{align*}
\]

This convention will be convenient in specifying control structures, and also in explaining the treatment of grammatical government, to which we now turn.

3.3 Grammatical Government

Latin is a language rich in morphology. As was already stated in section 1.2 (Linguistic Descriptions), we have five cases, each of which may be required
by one or another grammatical head. These are cases of GOVERNMENT. In finite sentences, the subject of the verb normally bears nominative case. Complements of the verb can appear in all four cases genitive, dative, accusative, and ablative.

### 3.3.1 Accusative Complements

Transitive verbs take an accusative object, e.g. (12):

(12a) Imperator puellam amat.

   emperor(nom) girl(acc) loves.

   ‘The emperor loves the girl.’

(12b) is the lexical entry for the matrix verb *amat*.

(12b) amat

   \[\begin{array}{c}
   \text{head} \\
   \text{spr} \\
   \text{comps}
   \end{array}
   \begin{bmatrix}
   \text{verb} \\
   \text{VFORM} \\
   \text{fin}
   \end{bmatrix}
   \begin{bmatrix}
   \text{NP}_{nom} \\
   \text{NP}_{acc}
   \end{bmatrix}\]

In (12b), NP\textsubscript{nom} stands for a noun-lexeme containing the following information:

(12c) \[\begin{array}{c}
\text{noun-lxn} \\
\text{phon} \\
\text{syn} \\
\text{head} \\
\text{spr} \\
\text{comps}
\end{array}\]

   \[\begin{bmatrix}
   \text{noun} \\
   \text{case} \\
   \text{nom}
   \end{bmatrix}
   \begin{bmatrix}
   \text{agr} \\
   \text{per} \\
   3
   \end{bmatrix}
   \begin{bmatrix}
   \text{num} \\
   \text{sg}
   \end{bmatrix}\]

Note that *imperator* given in (1) would be a suitable candidate for a specifier here. From (12b) we see that the verb *amat* needs not only a nominative specifier or subject, which is *imperator* in (12a), but also an accusative object (*puellam*).

### 3.3.2 Verbs Taking Two Complements

Some verbs in Latin take more than one object. These verbs either govern two accusative objects, or they take a direct and an indirect object, the first
bearing accusative, the second bearing dative case. (13) is an example of a double accusative verb:

(13a) Germani Romanos agros poposcrunt.
Germans(nom) Romans(acc) fields(acc) they-demanded.
‘The Germans asked the Romans for fields.’

(13b) \textbf{poposcrunt}

\begin{verbatim}
head  \verb|\begin{tabular}{c}
VFORM \ fin
\end{tabular}| \\
spr  \langle \text{NP}_{\text{nom}} \rangle \\
comps \langle \text{NP}_{\text{acc}} \text{, NP}_{\text{acc}} \rangle \\
      \langle \text{index, s} \rangle \\
sem  \verb|\begin{tabular}{l}
\text{reln, poscere} \\
\text{sit, s} \\
\text{poscens, ref} \\
\text{quod poscens poscit, ref} \\
\text{a quo poscens poscit, ref}
\end{tabular}| \\
\end{verbatim}

We see that in (13) the verb \textit{p}os\textit{c}ere takes two direct objects, one indicating the thing which is asked for, and the other one indicating the person who is asked to give the thing.\footnote{Note that semantics in HPSG is based upon situation semantics. A good introduction into this topic is given by Barwise and Perry (1983) and also by Ginzburg and Sag (2000).} Now compare (13) to (14):

(14a) Romani agros Germanibus dant.
Romans(nom) fields(acc) Germans(dat) they-give.
‘The Romans give fields to the Germans.’
3.3. GRAMMATICAL GOVERNMENT

(14b) \(\textit{dant}\)

\[
\begin{array}{c}
\text{head} \\
\text{spr} \\
\text{comps} \\
\text{sem}
\end{array}
\begin{array}{c}
\left[\begin{array}{c}
\text{verb} \\
\text{VFORM fin}
\end{array}\right] \\
\langle \text{NP}_{\text{nom}} \rangle \\
\langle \text{NP}_{\text{acc}} \text{, NP}_{\text{dat}} \rangle \\
\left[\begin{array}{c}
\text{index s}
\end{array}\right]
\end{array}
\]

As in (13), the verb \(\textit{dare}\) in (14) governs two objects. Semantically, the direct or accusative object indicates a thing—what is given—and the dative or indirect object indicates a person—to whom something is given.

All this information is found within the corresponding AVMs in (13b) and (14b). The \textsc{specifier-daughter} of both \textit{poposcrunt} and \textit{dant} is a nominative NP. Note that this nominative NP bears a semantic index. This index is found again in the \textsc{semantics} value. The value of the \textsc{sem}-list is a set of all the \textsc{restrictions} formulated for the verb \textit{poposcrunt} in (13) and \textit{dant} in (14). First, the \textsc{relation} is given. In (13), the \textsc{relation} is \textit{poscere}, ‘to demand’. The nominative subject is semantically coindexed with \textit{poscens}, the one who demands. What he demands is coindexed with the first accusative object. The second accusative object semantically expresses from whom he demands whatever it is he demands. In (14), semantic indices are also structure shared. The one who gives corresponds to the NP\textsubscript{nom}, the thing given to the NP\textsubscript{acc}, and the one who receives what is given to the NP\textsubscript{dat}.

Note that in studies investigating German, another highly case-sensitive language, a more fine-grained differentiation between structural and lexical case has been drawn. Compare (15a) to (15b):

(15a) \(\text{Der Mann unterst"utzt mich.}\)

\(\text{the man(nom) supports me(acc).}\)

‘The man supports me.’
(15b) Der Mann hilft mir.
    the man(nom) helps me(dat).
    ‘The man helps me.’

The object of *hilft* is in dative case, whilst the object of *unterstützt* bears accusative case. It is argued that the object of the verb *helfen* bears dative as a lexical case, whilst the object of *unterstützen* bears accusative as a structural case. The idea is that structural cases are realized in a structurally predictable way either as nominative or accusative depending on the grammatical context of the realization. This is shown in the corresponding lexical entries given below:

(16a) *unterstützen*

```
    spr  (NP[str])
    comps [NP[str]]
```

(16b) *helfen*

```
    spr  (NP[str])
    comps (NP[ldat])
```

Readers who want to learn more about the differentiation between structural and lexical case in HPSG should study Heinz and Matiaske (1994) and Kathol (1994). These articles treat the German case system in detail. A further investigation in the Latin case system might also result in a more fine-grained differentiation between lexical and structural cases. However, in this thesis project no research was done on this topic.

### 3.3.3 Ablative and Genitive Complements

Latin verbs sometimes also govern complements in either ablative (17) or in genitive case (18). Note, however, that genitive and ablative complements are quite rare, as most complements appear in either accusative or dative case.

(17a) utor occasione.
    I-make-use-of occasion(abl).
    ‘I make use of the occasion.’

(17b) utor

```
    spr  (NP_acc)
    comps (NP_abl)
```
3.3. **GRAMMATICAL GOVERNMENT**

The AVM shows that *utor* has a complement, and that this complement bears ablative case. The AVM likewise mentions a subject in nominative case, which, however, is left unexpressed in (17a).

(18a) memini mortuorum.

I-commemorate dead(gen,pl).

‘I commemorate the dead.’

(18b) **memini**

\[
\begin{array}{c|c}
\text{spr} & \langle \text{NP}_{nom} \rangle \\
\text{comps} & \langle \text{NP}_{gen} \rangle \\
\end{array}
\]

In (18b) we see that *memini* has a nominative subject which is phonetically unexpressed and the genitive complement.

### 3.3.4 Governing by Prepositions

Prepositions in Latin govern only two different cases: either accusative or ablative. Below, two examples are given. (19) illustrates a preposition governing accusative case, whilst (20) shows an example in which a preposition governs ablative case.

(19a) *summa* cum laude

highest(ABL,fem,SG) with praise(ABL,fem,SG)

‘with highest distinction’

(19b) **cum**

\[
\begin{array}{c}
\text{head prep} \\
\text{spr} \langle \rangle \\
\text{comps} \langle \text{NP}_{ABL} \rangle \\
\end{array}
\]

*summa cum laude* is a PP. The head of this prepositional phrase is the preposition *cum*, subcategorizing for an *NP_{ABL}*-complement.

(20a) trans hortum

through garden(ACC)

‘through the garden’
(20b) \textbf{trans}  
\[
\begin{array}{c}
\text{head} \\
\text{prep} \\
\text{spr} \\
\text{comps} \end{array}
\begin{array}{c}
\langle \rangle \\
\langle \text{NP}_{\text{acc}} \rangle \\
\langle \text{NP}_{\text{nom}} \rangle \\
\langle \text{NP}_{\text{acc}}, \text{PP}_{\text{acc}} \rangle \\
\end{array}
\]

\textit{trans hortum} is also a prepositional phrase. Here, \textit{trans} is the head governing a complement in accusative case.

Note that the prepositions \textit{in} and \textit{sub} can govern both accusative and ablative case. Between these two cases, there are differences in meaning. Accusative is used with \textit{in} and \textit{sub} if a direction is expressed, whilst ablative with \textit{in} and \textit{sub} indicates a place. Whether a PP_{acc} or a PP_{abl} is realized depends on the matrix verb, governing either a PP_{acc}- or a PP_{abl}-complement.

For purposes of illustration, two sentences are given, both containing a PP headed by the preposition \textit{sub}. In (21), \textit{sub} is used with accusative case, and in (22), it is used with ablative case.

(21a) Imperator mittit militem \textit{sub} iugum.  
emperor sends soldier(acc) under yoke(acc).  
‘The emperor puts a yoke on the soldier.’

Let us have a look at the lexical entry for the verb \textit{mittit}.

(21b) \textbf{mittit}  
\[
\begin{array}{c}
\text{spr} \\
\text{comps} \end{array}
\begin{array}{c}
\langle \text{NP}_{\text{nom}} \rangle \\
\langle \text{NP}_{\text{acc}}, \text{PP}_{\text{acc}} \rangle \\
\end{array}
\]

In (21b) the verb \textit{mittit} subcategorizes for a direct object and a prepositional phrase governing accusative case. \textit{mittere} ‘to send’ governs only accusative PPs, because accusative is the case indicating a direction: somebody is sent in a certain direction towards which he has to move. This change is indicated by the accusative case with the preposition \textit{sub}. In (22), however, no change is given.

(22a) Miles \textit{sub} iugo \textit{est}.  
soldier(nom) under yoke(abl) is.  
‘The soldier is under the yoke.’

(22b) \textbf{esse}  
\[
\begin{array}{c}
\text{spr} \\
\text{comps} \end{array}
\begin{array}{c}
\langle \text{NP}_{\text{nom}} \rangle \\
\langle \text{PP}_{\text{abl}} \rangle \\
\end{array}
\]

\textit{esse} is the verb ‘to be’.
3.4. RULES AND PRINCIPLES

The copula esse ‘to be’ indicates that the soldier is under the yoke (locative). So esse governs a prepositional phrase in ablative case.

### 3.3.5 Impersonal Constructions

In Latin, there are some verbs which never construct with a subject. These verbs take a “dummy” subject in English, for example, ‘it’. But Latin dispenses of no expletives (“dummies”), bare of semantic content. Compare (23) to (24):

(23) ambulat.
    walks
    ‘He walks.’

(24) pluit.
    rains.
    ‘It rains.’

Both (23) and (24) are examples where we have only one verb forming a whole sentence. In (23) the subject is not phonetically realized. But we can easily add a nominative NP, such as for example imperator. In (24), however, this is not possible. (22) is an impersonal construction which can take no subject. This is what is expressed by the corresponding lexical entry:

(25) pluit
    \[
    \text{syn} \left[ \begin{array}{c}
    \text{head} \\
    \text{VFORM fin}
    \end{array} \right] \\
    \text{spr} \langle \rangle \\
    \text{comps} \langle \rangle 
    \]

The impersonal construction pluit governs no further constituents.

### 3.4 Rules and Principles

#### 3.4.1 Rules

#### 3.4.1.1 Agreement Revisited: the Head-Specifier Rule

The AGREEMENT-feature is a feature structure containing the features NUM, PER, GEN, and CASE. In order not to have to instantiate the AGR-feature on both nouns and verbs, HPSG has found an elegant way to describe agreement.
To make use of it we have to introduce the Head-Specifier-Rule which we already worked with in section 2:

\[
\begin{align*}
\text{phrase} &\quad \text{comps} \quad \langle \rangle \Rightarrow \text{H} \quad \text{phrase} \\
\text{spr} &\quad \langle \rangle \\
\end{align*}
\]

This rule sanctions all head-specifier phrases, including the following:

\[
S \rightarrow \text{NP VP}
\]

In (27), we introduce the same head-specifier rule via AVM:

\[
\begin{align*}
\text{head-spr phrase} &\quad \text{phon} \quad \langle \text{H} \quad \text{H} \rangle \\
\text{head} &\quad \text{verb} \\
\text{VFORM fin} &\quad \text{comps} \quad \langle \rangle \\
\text{syn} &\quad \text{spr} \quad \langle \rangle \\
\text{head-dtr} &\quad \text{phon} \quad \langle \text{H} \rangle \\
\text{syn} &\quad \text{head} \quad \langle \text{H} \text{NP} \rangle \\
\text{sp-dtr} &\quad \text{phon} \quad \langle \text{H} \rangle \\
\text{syn} &\quad \text{head} \quad \langle \text{H} \text{noun case nom} \rangle \\
\end{align*}
\]

The outermost phrasal structure within the square brackets in (27) corresponds to S, which we find on the left hand side of the rule in (26). On the right hand side of the rule in (26) we have a structure represented by the tag \[\text{H}\] which is subcategorized for by the head of the phrase (H) as its specifier. In (27) the variable \[\text{H}\] has this function. The structure tagged \[\text{H}\] in (27) corresponds to the pronunciation of the Specifier-Daughter within the square brackets of the AVM given in (27). Also in (27), the Spr-Daughter
is subcategorized for by the head-daughter as the head-daughter’s specifier, represented by the tag \[\text{3}\]. Now let us look at (28) where we further instantiate the head-specifier rule (27) to create the head-specifier phrase \textit{imperator ambulat}.

\[(28) \begin{array}{l}
\text{hd-spr-phrase} \\
\text{phon} \langle \text{imperator, ambulat} \rangle \\
\text{syn} \\
\text{head} \begin{bmatrix}
\text{verb} \\
\text{vform} \\
\text{fin}
\end{bmatrix} \\
\text{spr} \langle \rangle \\
\text{comps} \langle \rangle \\
\text{head-dtr} \\
\text{phrase} \\
\text{phon} \langle \text{ambulat} \rangle \\
\text{syn} \\
\text{head} \begin{bmatrix}
\text{NP}
\end{bmatrix} \\
\text{spr} \langle \rangle \\
\text{dtrs} \\
\text{spr-dtr} \\
\text{phrase} \\
\text{phon} \langle \text{imperator} \rangle \\
\text{syn} \\
\text{head} \begin{bmatrix}
\text{noun} \\
\text{case} \\
\text{nom}
\end{bmatrix}
\end{array}\]

Note that the head-specifier-rule (26), (27) is a general rule, sanctioning all head-specifier phrases. On the left hand side of the rule (26) we have the mother. On the right hand side the mother expands into the head-daughter and the specifier. On the left hand side of the rule we have a saturated phrase where both \textsc{spr}- and \textsc{comps}-list are empty. On the right hand side we are now on an intermediate level between saturated phrase and lexical category of type \textit{word}. The specifier-daughter of a sentence, its subject, is an NP. As already mentioned, NPs can have specifiers on their own.\(^8\)

On the right hand side of the rule (26) we have the head-daughter and the specifier. Any NP that serves as the subject of a verb has to contain a lexical head noun specified for \textsc{agr}-features unifiable with those of the verb,\(^8\)

\(^8\)Specifiers of NPs, however, will play no role in this dissertation.
because AGR is a head feature. The Head Feature Principle which will be properly introduced in the next section identifies the HEAD-value of an NP with that of its head daughter. A specification for verbs is given in (29):

\[
(29) \quad \begin{bmatrix}
\text{verb-lxm} \\
\text{spr} \quad \left[ \begin{array}{l}
\text{head} \\
\text{noun}
\end{array} \right] \quad \text{agr} \\
\text{3sg}
\end{bmatrix}
\]

Verbs with the specifier requirement given in (29) will occur exclusively with third person singular nouns of either masculine, feminine or neuter gender, but never with plural nouns or nouns in the first or second person singular.

We normally require the specifier of a VP to be an NP:

\[
(30) \quad \begin{bmatrix}
\text{phrase} \\
\text{head} \\
\text{verb} \\
\text{spr}
\end{bmatrix} \quad \langle \text{NP} \rangle
\]

The head feature AGREEMENT is enforced by the specifier of the verb. The Head-Specifier-Rule, in collaboration with the Head Feature Principle, therefore enables us to instantiate the AGR-feature only on nouns. It is not necessary that verbs also carry an AGR-feature. It is sufficient to identify third person singular verbs as those which require that their specifier subjects be third person singular:

\[
(31) \quad \begin{bmatrix}
\text{verb-lxm} \\
\text{head} \\
\text{verb} \\
\text{spr} \quad \langle \text{NP} \rangle \\
\text{agr} \\
\text{3sg}
\end{bmatrix}
\]

Note that impersonal structures would include VPs with empty specifier requirements:

\[
(32) \quad \text{impersonal verbs}
\]

\[
\text{VP}_{\text{imp}} = \begin{bmatrix}
\text{phrase} \\
\text{head} \\
\text{verb} \\
\text{spr} \\
\langle \rangle
\end{bmatrix}
\]

These verbs may be assumed to show third person marking by default.

\footnote{Pace several examples immediately earlier.}
3.4. RULES AND PRINCIPLES

3.4.1.2 Head-Complement Rule

Another important rule we need is the head-complement rule:

\[
(33) \quad \text{phrase} \quad \text{comps} \quad \langle \rangle \Rightarrow H \left[ \text{word} \quad \text{comps} \quad \langle \ldots \rangle \right] \quad \langle \ldots \rangle
\]

By means of this rule we get from the phrasal level to the lexical level. On the right hand side of the rule we see that there can be none, one or more complement-daughters. In (28) we had no complement-daughter, due to the fact that the VP *ambulat* is intransitive. For purpose of demonstration, we will provide another example, this time introducing a transitive verb:

\[(34) \quad \text{imperator} \quad \text{puellam amat.} \]
\[\quad \text{emperor(nom) girl(acc) he-loves.} \]
\[\quad \text{‘The emperor loves the girl.’} \]

In (34), *imperator* is the nominative subject of the sentence. *amat* is the verb which subcategorizes for a complement, the direct object *puellam*. The tree structure below indicates the structure of (34):

\[
S
\]
\[
\quad \text{NP} \quad \text{VP}
\]
\[
\quad \text{imperator} \quad \text{puellam amat}
\]

We are now interested in the internal structure of the VP *puellam amat*. Therefore we realize the head-complement rule (33) as (35):

\[
(35) \quad \text{head-comp-phrase}
\]
\[
\quad \text{phon} \langle \ldots \rangle
\]
\[
\quad \text{syn} \quad \text{spr} \langle \ldots \rangle
\]
\[
\quad \text{comps} \langle \ldots \rangle
\]
\[
\quad \text{head-dtr} \quad \text{phon} \langle \ldots \rangle
\]
\[
\quad \text{syn} \quad \text{head} \langle \ldots \rangle
\]
\[
\quad \text{spr} \langle \ldots \rangle
\]
\[
\quad \text{comps} \langle \ldots \rangle
\]
\[
\quad \text{comp-dtr} \quad \text{[phon \langle \ldots \rangle]}
\]
Note that (35) is a head-complement phrase with one complement. The head-daughter has a specifier, which was already licensed by the head-specifier rule, and a complement. As can be seen in (33), head-complement phrases can have any number of complements. But in order to keep things simple here, (35) introduces just one complement. (36) introduces further specifications, illustrating how the head-complement rule is elaborated to the VP *puellam amat*:

\[
(36) \begin{aligned}
\text{head-comp-phrase} & \quad \text{phon} \langle \text{puellam, amat} \rangle \\
\text{head} & \quad [\text{spec} \langle \text{amat} \rangle] \\
\text{syn} & \quad \text{spr} \langle \text{amat} \rangle \\
\text{comps} & \quad \langle \rangle \\
\text{head-dtr} & \quad \text{spr} \langle \text{amat} \rangle \\
\text{comps} & \quad \langle \rangle \\
\text{comp-dtr} & \quad [\text{phon} \langle \text{puellam} \rangle]
\end{aligned}
\]

### 3.4.1.3 The Argument Structure List

In the previous subsections we have introduced the HEAD-SPECIFIER rule and the HEAD-COMPLEMENT rule. SPR and COMPS are features that encode information about what arguments a verb takes.

To facilitate talking about all of the arguments of a verb together, we posit a new list-valued feature ARG-STR (ARGUMENT STRUCTURE), consisting of the non-commutative sum of the SPR-value (the subject) and the COMPS-value (the complements). The $\oplus$ operator denotes an operation which appends one list onto another:

- **Argument Realization Principle:**
  A word’s value for ARG-STR is $a \oplus b$, where $a$ is its value for SPR and $b$ is its value for COMPS.

(37) is an AVM containing both the attributes SYN and ARG-STR:
3.4. RULES AND PRINCIPLES

\[
\begin{align*}
(37) \quad & \text{syn} \begin{bmatrix}
\text{spr} & \{\mathbf{4}\} \\
\text{comps} & \{\mathbf{3}\}
\end{bmatrix} \\
& \text{arg-str} \begin{bmatrix}
\mathbf{1} & \mathbf{3}
\end{bmatrix}
\end{align*}
\]

3.4.1.4 Modification

In addition to the Head-Specifier Rule and the Head-Complement Rule there is also a HEAD-MODIFIER Rule in HPDG.

We introduce a head feature called MOD. The MOD value of a word specifies what kind of thing the word modifies. We can now state that it is a lexical property of adjectives that they modify nouns [mod np] or [mod n] and a lexical property of adverbs that they modify either verbs or sentences [mod vp] or [mod v] or [mod s]. The following Head-Modifier Rule accounts for both nominal and verbal modification:

\[
(38) \quad \text{Head-Modifier Rule} \\
[ ] \Rightarrow H \mathbf{4} \begin{bmatrix}
\text{head} \\
\text{mod} \mathbf{4}
\end{bmatrix}
\]

The Head Modifier Rule will licence a modified noun phrase if the head daughter is of category NOUN and the modifier daughter’s MOD value is also of category NOUN.

\[
(39) \quad \text{adjectival modification} \\
\begin{array}{c}
\text{NP} \\
\text{N} \\
\text{A} \begin{bmatrix}
\text{head} \\
\text{mod} \mathbf{4}
\end{bmatrix}
\end{array}
\]

\textit{imperator} \quad \textit{magnus}

The Head-Modifier Rule will also license the verb phrase in (39), under the assumption that adverbs are lexically specified as [mod vp].
(40) **adverbial modification**

\[
\text{VP} \\
\text{[head [mod [V]]]} \\
\text{currit} \quad \text{celeriter}
\]

In (39), the noun *imperator* ‘emperor’ is modified by the adjective *magnus* ‘great’, and in (40) the verb *currit* ‘runs’ is modified by the adverb *celeriter* ‘fast’. Note that the formulation given for the head-modifier rule in Pollard and Sag (1994) requires that modification always takes place at a phrasal level. We do not have to be that strict here.

### 3.4.1.5 Lexical Rules

A lexical rule is a mechanism which reduces redundancy and stipulation in the lexicon by using information in one lexical entry as the basis for generating another lexical entry. The idea is that the lexicon contains two types of entries: basic ones or lexemes, and those ‘derived’ from them. Lexical rules are used for deriving predictably related lexical entries, such as inflected forms of verbs and nouns.

Note that in this dissertation we distinguish between *words* and *lexemes*. In this respect we follow the tradition regarding words as being built up from smaller units through the addition of affixes. For most nouns and verbs, we will assume that there is only one basic lexical entry, which contains a description of type *lexeme*. We derive all nominal and verbal *word* entries by applying lexical rules to these *lexeme* entries.

Lexical rules have the general form ‘X $\Longrightarrow$ Y’. The intended interpretation of this is that for any lexical entry that is consistent with the description in X, there is another lexical entry that includes the description in Y. The input and output entries are identical, except in those ways that the rule specifies. A lexical rule applies to a lexical entry of type *lexeme* and produces as output a new lexical entry whose morphological form, syntactic category and meaning are systematically related to the input. Let us consider an example. In this dissertation, passive will be treated in terms of lexical rules. Transitive verbs do take passive forms. In the following chapter, we will come across the following *lexical rule for passive*:
(41) **Passive Lexical Rule**

\[
\begin{array}{c|c|c}
\text{tv-txm} & \langle \text{NP} \rangle & \langle \text{NP} \rangle \\
\text{spr} & \langle \text{NP} \rangle & \langle \text{NP} \rangle \\
\text{comps} & \langle \text{NP} \rangle & \langle \text{NP} \rangle \\
\text{arg-st} & \langle \text{NP} \rangle & \langle \text{NP} \rangle \\
\end{array}
\Rightarrow
\begin{array}{c|c|c}
\text{word} & \langle \text{NP} \rangle & \langle \text{PP} \rangle \\
\text{spr} & \langle \text{NP} \rangle & \langle \text{PP} \rangle \\
\text{comps} & \langle \text{NP} \rangle & \langle \text{PP} \rangle \\
\text{arg-st} & \langle \text{NP} \rangle & \langle \text{PP} \rangle \\
\end{array}
\]

\(f_{\text{pass}}\) is a morphological function applying to the active verb-lexeme, giving it passive morphology. The order of the elements on the spr-, comps-, and arg-st lists is rearranged. The specifier of the active lexeme is removed and turned into an optionally adjoined PP. The complement of the active lexeme is turned into the specifier or subject of the passive lexeme.

### 3.4.2 Principles

Let us repeat: in HPSG, we have two principal types of objects, lexical and phrasal signs. Word structures are licensed by lexical entries, whilst phrase structures are licensed by grammar rules. A grammar rule in HPSG is interpreted as a very general description of a certain kind of phrase, one that is satisfied by infinitely many resolved phrase structures. We got to know three grammar rules in the last section.

Grammar rules are in turn constrained by principles which will be explained in this section.

#### 3.4.2.1 The Head Feature Principle

The purpose of principles is to constrain the set of phrase structure models. So principles constrain rules. In this dissertation, we work with two principles. These are the Head Feature Principle and the Valence Principle. Let us now introduce the first basic principle of HPSG, the

- **Head Feature Principle:**

  The \textbf{head}-value of any headed phrase is structure-shared with the \textbf{head}-value of the head daughter.

  This means that the \textbf{head}-value of the mother and the \textbf{head}-value of the head daughter must be unified. If we look at the previous subsections, we see that we already worked with that principle. Let us come back to our simple example (5) *imperator ambulat*. The head-specifier rule was used to expand the sentence S into NP and VP:

\[
S \Rightarrow \text{NP} \ \text{VP}
\]
The AVM notation of the headSpecifier rule noted in (28) is repeated here as (42):

\[
(42) \begin{array}{c}
  \textit{hd-spr-phrase} \\
  \text{phon} \langle \text{imperator, ambulat} \rangle \\
  \text{syn} \quad \begin{array}{c}
    \text{head} \quad \begin{array}{c}
      \text{verb} \\
      \text{vform} \quad \text{fin}
    \end{array} \\
    \text{spr} \quad \langle \rangle \\
    \text{comps} \quad \langle \rangle
  \end{array}
  \end{array}
\]

As (42) is of type \textit{hd-spr-phrase}, which is a subtype of \textit{headed phrase}, the Head Feature Principle applies. In (42), the tag 2 illustrates how the Head Feature Principle is applied. The head value of the head daughter is found via the path HEAD-DTR.SYN.HEAD 2. So the VP has the same head-value as is found on the S-level in (42). Note that the Head Feature Principle is a general constraint governing all trees built by headed rules.

3.4.2.2 Valence Principle

Another principle constraining the rules used in HPSG is the valence principle. In order to discuss and explain this principle, we return to our simple example sentence \textit{imperator puellam amat} which we used in order to introduce the head-complement rule. In a first step, the sentence is expanded into subject and verb:

\[ S \Rightarrow NP \; VP \]

In a second step, we get from the phrasal to the lexical level:
3.4. RULES AND PRINCIPLES

\[ VP \rightarrow V \ NP \]

How this is done using the head-specifier rule and the head-complement rule is illustrated in (43):

(43) **Realizing the Specifier**

\[
\begin{array}{c}
\text{head} \\
\text{spr} \\
\text{comps}
\end{array}
\]

imperator

**Realizing the Complement**

\[
\begin{array}{c}
\text{head} \\
\text{spr} \\
\text{comps}
\end{array}
\]

In section 4.1 we introduced the Head-Specifier Rule, the Head-Complement Rule, and the Head-Modifier Rule. The Head-Complement Rule states that all the complements of a head are discharged in a head-complement phrase. The Head-Specifier Rule states that the specifier value is discharged in a head-specifier phrase. In order to make these rules work, constraints have to be added preserving valence specifications: the mother in the Head-Specifier Rule must preserve the head’s COMPS value which is the empty list. The mother in the Head-Complement Rule must preserve the head’s SPR value, and the mother in the Head-Modifier Rule must preserve both
the COMPS value and the SPR value of the head. The valence principle is the operant generalization which, like the Head Feature Principle, constrains the set of phrase structure models that satisfy our grammar rules:

- **Valence Principle:**
  Unless the rule says otherwise, the mother's SPR and COMPS values are identical to those of the head daughter.

The Valence Principle has two effects:
1. The appropriate elements mentioned in particular rules are canceled from the relevant valence specifications of the head daughter in head-complement or head-specifier phrases, and
2. all other valence specifications are simply passed up from head daughter to mother.

Note that due to the valence principle, HPSG grammar rules cancel elements off the valence lists in a way inspired by the combinatory rules of CATEGORIAL GRAMMAR.

### 3.4.2.3 Comparison With Chomsky's Projection Principle

In (42) we see that the $S_m \text{ imperator ambulat}$ has two daughters, the **head-daughter ambulat** which is the $V_P_m$ and the **spr-daughter**, the NP *imperator*. The **head-dtr** of the headed phrase structure shares its HEAD value with the phrase itself: the HEAD value of both mother and head-daughter is *verb*. In this way the headed phrase ($S_m$) is really a projection of its head-daughter ($V_P_m$). The Head Feature Principle resembles the (Extended) Projection Principle developed by Chomsky within the framework of GB (Chomsky, 1986). This fundamental principle of GB states that representations at each syntactic level are projected from the lexicon. The subcategorization properties of a lexical item must be maintained and satisfied at every level of representation. The Projection Principle therefore enhances the role of the lexicon in the syntax, as it asserts that some position in syntactic structure will only exist if some lexical item licenses it. Note that the Projection Principle in isolation would rule out movement rules altogether. The limited range of movement operations still recognized in GB is made possible only by the existence of empty categories. The Projection Principle greatly separates GB from all the earlier versions of Transformational Grammar in which movement was far less restricted.

Both HPSG and GB assume the existence of distinct attributes or levels of linguistic structure. Yet note that HPSG, contrary to GB, is a strictly nonderivational and nontransformational theory. We already saw how the sentence
imperator ambulat is generated in HPSG via the Head Feature Principle (see (42)). This is how GB would generate the same sentence:

(D-structure)

\[
\begin{array}{c}
S \\
\text{NP}_{3sg} \text{ imperator} \quad \text{INFL}_{3sg} \quad \text{VP} \\
\text{INFL}_{3sg} \quad \text{V} \\
V \\
\text{ambula-}
\end{array}
\]

(S-structure (or LF))

\[
\begin{array}{c}
S \\
\text{NP}_{3sg} \text{ imperator} \quad \text{INFL}_{3sg} \quad \text{VP} \\
\text{INFL}_{3sg} \quad \text{V} \\
\text{ambula-t} \\
\text{empty}
\end{array}
\]

Chomsky works in a transformational framework. He differentiates between deep (D-) structure and surface (S-) structure. In deep structure, Chomsky interprets the sentence (S) as saturated projection of the Inflectional Phrase (I'). We have an NP\textsubscript{nom} (imperator) which gets coindexed with the verbal inflection. The VP carries no agreement and no tense features. Move-\(\alpha\) transforms deep into surface structure.

The verb gets moved to the position of INFL. Now it takes features of tense and agreement. The inflected verb in surface structure is coindexed with its subject. As the verb is moved to the position of INFL, this transformation leaves an empty trace behind.

The HPSG head feature principle guarantees that the information in the syntax value of the lexical head is respected in the sentence itself. So the head-value of the headed phrase loosely corresponds to GB’s D-structure. In HPSG, the head-daughter token-identically shares information with the mother, whilst GB works with movement (move \(\alpha\)) in place of structure sharing. In HPSG, an S is expanded into an NP and a VP. In GB, move \(\alpha\) fulfills a similar role. The verb is merged with the inflection which is coindexed with the subject.
3.5 The Copula

If the verb appears in a construction as a participle and there is a subject NP then additional agreement between subject and verb is required. The agreement is mediated by a copula verb. An example is given in (44):

(44a) Puella laudata est.
girl(nom,fem,sg) praised(nom,fem,sg) is.
‘The girl is praised.’

(44b) Puellae laudatae sunt.
girls(nom,fem,pl) praised(nom,fem,pl) are.
‘The girls are praised.’

We suggest a finer specification within the type hierarchy of the verbs, so that we differentiate between non-predicative verbs and the copula: 10

\[
\text{verb} \\
\text{non-predicative} \\
\text{copula}
\]

The Latin copula obviously serves as a kind of “agreement identifier”, subcategorizing for an NP (its specifier) and a participle. For the copula a lexical specification is introduced which instantiates the case, number, gender, and person of the specifier on the complement:

(45) **esse: lexical specification for participles**

\[
\begin{array}{l}
\text{copula-lrm} \\
\text{head} \\
\text{spr} \\
\text{comps}
\end{array}
\begin{array}{l}
[] \\
\langle \text{NP} \ [\text{agr} \ [\text{copula}]] \rangle \\
\langle \text{VP}_{past.part.} \ [\text{spr} \langle \text{agr} \ [\text{copula}] \rangle] \rangle
\end{array}
\]

Agreement of case, number, gender, and person is also required in other predicative constructions. The complement which the copula subcategorizes for could also be a noun or an adjective:

---

10See the following chapter.
3.6. VERB PHRASE COMPLEMENTATION

(46) Puella otiosa est.
     girl(nom,fem,sg) lazy(nom,fem,sg) is.
     ‘The girl is lazy.’

(47) Pater poeta est.
     father(nom,masc,sg) poet(nom,masc,sg) is.
     ‘The father is a poet.’

So we have to slightly revise our lexical specification for the copula:\(^{11}\)

\[
\begin{align*}
\text{essv: revised lexical specification for particiles} \\
\text{copula-bm} & \quad \text{head} \quad \\text{copula} \\
\text{spr} & \quad \left[ \text{NP} \left[ \text{agr} \quad \square \right] \right] \\
\text{comp} & \quad \sqrt{\text{VP}_{past,part.}} \quad \left[ \text{spr} \left[ \text{agr} \quad \square \right] \right] \lor \text{NP} \lor \text{AP} \left[ \text{head} \mid \text{mod} \text{NP} \left[ \text{AGR} \quad \square \right] \right]
\end{align*}
\]

The sign $\lor$ indicates disjunction. The complement of the copula can be either a VP\(_{past,part.}\) or an NP or an AP.\(^{12}\)

3.6 Verb Phrase Complementation

In this section we introduce the standard analysis of verbal complementation as this has been developed for English, German, and other languages. Extensive literature on this issue is found in Gazdar, Klein, Pullum, and Sag (1984), Haegeman (1992), and Borsley (1999).

3.6.1 Raising to Object versus Object-Control

Now we turn to the treatment of verb phrase complementation, i.e. of raising-verbs and control-verbs. Both take infinitival complements. But there is one fundamental difference between Raising- and Control-verbs. Raising verbs govern more syntactic complements than they have semantic arguments. The extra syntactic argument functions as the subject of another complement and must obey any special co-occurrence restrictions imposed by that complement. Control-constructions, on the contrary, are interpreted as if they had subjects with the same reference as another complement to the same predicate. The relationship between two NPs, the second being typically an unexpressed subject, is referred to as control.

\(^{11}\)AP means adjective phrase.

\(^{12}\)It would be a challenging task to unify the subcategorization of essv and its (possible) complements. However, this task goes beyond the goals of this dissertation.
Whether a verb is of type raising or of type control can be easily found out by means of a simple test. Let us have a look at the following English examples:

(49) The doctor believes the nurse to have examined the patient.

(50) The doctor persuade the nurse to examine the patient.

In both (49) and (50) the matrix verb takes both an accusative object and a verbal infinitive as its two complements. So we get the same syntactical tree structure in the standard HPSG treatment, as is illustrated in (51) and (52):

(51) S
    NP  VP
    the doctor believes the nurse to have examined the patient

(52) S
    NP  VP
    the doctor persuade the nurse to examine the patient

However, there are semantic differences between the two verbs: we inspect passive variants of (49) and (50).

(53a) The doctor believes the nurse to have examined the patient.
3.6. VERB PHRASE COMPLEMENTATION

(53b) The doctor believes the patient to have been examined by the nurse.

(54a) The doctor persuades the nurse to examine the patient.

(54b) The doctor persuades the patient to be examined by the nurse.

Whilst the semantic content is identical in (53a) and (53b), there are differences between (54a) and (54b). The identity in content in (53a) and (53b) is due to the fact that the accusative object of the matrix verb believe is assigned no semantic role in the belief situation: we have a believer, the doctor, but no “believere” — what is believed is simply the proposition that the nurse examines the patient. This is different in the persuade situation. Here we have a persuader, the doctor, and a persuadee: the nurse in (54a), the patient in (54b), in addition to the proposition, a characterization of what the persuadee is persuaded to do. The differences in the semantics of the two verbs may clearly be seen if we compare the two SEM values:

\[
(55) \text{believe} \begin{cases} 
\text{arg-st} & \langle \text{NP} [\text{NP} [\text{NP} ]], \text{VP} \rangle \\
\text{vform} & \text{inf} \\
\text{spr} & \langle \text{index} \rangle \\
\text{sem} & \langle \text{index} \rangle \\
\text{restr} & \langle \text{reln} \rangle \\
\text{sit} & \langle \text{believe} \rangle \\
\text{soa} & \langle \text{ref} \rangle \\
\end{cases}
\]
These representations reflect the fact that believe denotes a two-place relation between an individual and a proposition, whilst persuade denotes a three-place relation among a persuader, a persuadee, and a proposition involving the person persuaded. So control verbs assign one more semantic role than raising verbs.

Recall from section 2.1.1. that indices specified after a category denote semantic structure.

3.6.1.1 Differences in Passive

We assume that realization in the passive voice realigns subcategorized dependents with semantic roles, without affecting truth-conditional content. In case of believe the entire syntactical as well as semantic value of the subject of the VP-complement is structure-shared with that of the object of the matrix verb. Therefore the NP to be “raised” need not be specified additionally in the semantics. It follows that the passive form of the VP\_obj does not differ in the semantic CONTENT of the clause. (57) is the more specific instance of the lexical entry for the object-raising verb believe (55) taking an active and a passive verbal complement:
3.6. VERB PHRASE COMPLEMENTATION

(57) believe governing active VP

\[
\begin{align*}
\text{arg-st} & \left< \text{NP} \| \text{NP} \| \text{VP} \right> \\
\text{sem} & \left< \text{index s} \right> \\
\text{restr} & \left< \text{reln believe} \| \text{sit s} \| \text{believer} \| \text{ref} \| \text{soa} \right>
\end{align*}
\]

(57) reflects the structure of the verb believe as it appears in the example sentence (53a). believe takes an accusative object and a transitive VP\textsubscript{inf} as its complements. Note that the accusative object of believe is not referred to in the semantics of (57).

In fact the same structure (57) is appropriate for the matrix verb in (53b). It is commonly known that the relational semantics in active and passive sentences are identical. This is the case if we compare (53a) to (53b); the believer referred to is the same. We have no “believer”. The proposition that is believed is semantically identical in (53a) active and (53b) passive. The difference between (53a) and (53b) lies thus not in the matrix verb believe but rather in the embedded verbs examine vs. be examined. Whereas the former subcategorizes for an accusative object (and subject), the latter subcategorizes for an ablative PP\textsubscript{a}. This difference is semantically irrelevant.

The situation is different in (54): the VP-complement’s unexpressed subject is coindexed with the object of the matrix verb. If the object changes, the semantics changes, as well. This is demonstrated by the further specification of the entry reflecting instances of persuade governing active (58a) and passive (58b) VPs, respectively.
(58a) **persuade** governing active VP

\[
\begin{align*}
\text{arg-st} & \quad \left< \text{NP} \text{[} \text{NP} \text{]} \text{ NP} \text{]} \text{ VP} \right> \left< \text{vform inf} \right> \\
\text{sem} & \quad \left< \text{NP} \text{[} \text{NP} \text{]} \text{ NP} \text{]} \text{ VP} \right> \left< \text{spr} \right> \\
\text{index} s & \quad \left< \text{reln persuade} \rightangle \\
\text{sit} s & \quad \left< \text{persuader } \text{[} \text{ref} \text{]} \rightangle \\
\text{person} & \quad \left< \text{prop } \text{[} \text{ref} \text{]} \rightangle
\end{align*}
\]

(58b) **persuade** governing passive VP

\[
\begin{align*}
\text{arg-st} & \quad \left< \text{NP} \text{[} \text{NP} \text{]} \text{ NP} \text{]} \text{ VP} \right> \left< \text{vform inf} \right> \\
\text{sem} & \quad \left< \text{NP} \text{[} \text{NP} \text{]} \text{ NP} \text{]} \text{ VP} \right> \left< \text{spr} \right> \\
\text{index} s & \quad \left< \text{reln persuade} \rightangle \\
\text{sit} s & \quad \left< \text{persuader } \text{[} \text{ref} \text{]} \rightangle \\
\text{person} & \quad \left< \text{prop } \text{[} \text{ref} \text{]} \rightangle
\end{align*}
\]

(58a) reflects the structure of **persuade** as it appears in (54a), whilst (58b) reflects that of **persuade** in (54b). The **persuader** referred to is identical in (57a) and (57b). But the **persuadee** is not the same: in (58a) it is ‘the nurse’, and in (58b) it is ‘the patient’. Different objects with active and passive VP’s thus change the semantics with object-control verbs, whilst with object-raising verbs they leave the semantics unaffected. The difference between (54a) and (54b) lies in the role fillers in the semantics—a possibility not available in raising verbs.

### 3.6.2 Raising to Subject versus Subject-Control

There is likewise a well worked out HPSG analysis of subject-raising and subject-control verbs. We illustrate the differences in discussing another
example:
(59a) The doctor continues to treat the patient.

(60a) The doctor tries to treat the patient.

Again, we examine active and passive forms in the two embedded clauses in order to find out about the semantic differences:
(59b) The patient continues to be treated by the doctor.

(60b) The patient tries to be treated by the doctor.

The active and passive forms in the embedded clauses lead to distinct semantics in the complex sentences (60a) and (60b). There is a change in semantics between active and passive embedded infinitives with control-verbs such as try, whilst semantics stay identical with active and passive infinitives of raising-verbs, such as continue.

Again, we have a look at the corresponding lexical entries:  

(61) \textbf{continue} \\
\begin{align*}
\text{arg-st} & \quad \begin{cases}
\text{NP}_\square, \text{VP} \hspace{1cm} [\text{vform inf}] \\
\text{spr} \quad \langle \square \rangle \\
\text{sem} \quad \langle \text{index} \rangle
\end{cases} \\
\text{index} & \quad s \\
\text{sem} & \quad \begin{cases}
\text{restr} \quad \langle \text{reln continue} \rangle \\
\text{sit} \quad s \\
\text{arg} \quad \square
\end{cases}
\end{align*}

(62) \textbf{try} \\
\begin{align*}
\text{arg-st} & \quad \begin{cases}
\text{NP}_\square, \text{VP} \hspace{1cm} [\text{vform inf}] \\
\text{spr} \quad \langle \text{NP}_\square \rangle \\
\text{sem} \quad \langle \text{index} \rangle
\end{cases} \\
\text{index} & \quad s \\
\text{sem} & \quad \begin{cases}
\text{restr} \quad \langle \text{reln try} \rangle \\
\text{sit} \quad s \\
\text{trier} \quad \text{ref} \\
\text{arg} \quad \square
\end{cases}
\end{align*}

\footnote{These entries make use of the attribute \textsc{argument-structure} or \textsc{arg-str}. The value of this feature lists all phrases that serve as arguments of a given head. See 3.4.13.}
And again, we notice the differences: the subject of *continue*, the doctor, is the subject of the VP$_{inf}$ to treat the patient. This subject plays no role in the *continue* relation, because the meaning of the whole VP$_{inf}$ is the semantic argument of *continue*. The subject of *try* is also the subject of the VP$_{inf}$ to treat the patient. However, this subject is assigned to the TRIER-role. Therefore the passive form of the VP$_{inf}$ differs in semantics as the TRIER-role is assigned to a different subject. This can be seen if we compare (60a) to (60b): in (60a) the doctor tries to do something whilst in (60b) the patient tries to do something. Hence the difference in semantic representation.

### 3.6.3 Further Differences between Raising- and Control-verbs

In the standard literature$^{14}$ further differences between Raising- and Control-verbs have been noticed and discussed, focussing on English examples.

#### 3.6.3.1 Use of Expletive Pronouns

English disposes of two expletives, *there* and *it*, which have an extremely restricted distribution. The expletive *there* typically occurs as the subject of the copula when an additional postcopular indefinite NP also occurs. Two examples are given:

(63)  
  a. There are two men repairing the car.
  b. There is a man in the garden.

Expletive *it* occurs most frequently as the subject of weather verbs or temporal expressions, as is illustrated in (64a) and (64b):

(64)  
  a. It rains.
  b. It is five o’clock now.

Let us now take a raising verb like *believe* and a control verb like *force* and see whether sentences having an expletive subject can be embedded in Raising- and Control-constructions:

(65)  
  a. I believe there to be two men repairing the car.
  b. *I force there to be two men repairing the car.

---

3.6. VERB PHRASE COMPLEMENTATION

   c. I believe it to rain.
   d. *I force it to rain.

This test shows us that expletives can only be raised. They can never be sub-categorized for by control-constructions. Note, however, that this distinction between raising- and control-verbs can play no role for the discussion of Raising and Control in Latin, as Latin disposes of no expletiva.

3.6.3.2 Idiom Parts

Another important standard test used for the differentiation between Raising- and Control-verbs is the question whether they allow embedding of idiom parts. Let us study an example for illustration:

(66)   a. They believe the cat to be out of the bag.
   b. The cat is believed to be out of the bag.
   c. *They force the cat to be out of the bag.
   d. *The cat is forced to be out of the bag.

An idiomatic reading is only possible with raising- and not with control-verbs.

The HPSG treatment of raising treats expletives and idiom chunks as syntactically, but not semantically independent, accounting for the data in 6.3.1 and 6.3.2 using the structures (55) and (56).

3.6.4 Raising and Control in Latin

What about Raising- and Control-verbs in Latin? We try to apply as many of the standard tests we got to know in the previous section as possible in order to find out how far raising and control verbs differ in Latin. Let us start with Subject-raising and Subject-control:

(67)  Caesar pergit pellere Gallos.
       Caesar continues to-beat Gauls.
       ‘Caesar continues to beat the Gauls.’

(68)  Galli pergunt pelli a Caesare.
       Gauls they-continue to-be-beaten by Caesar.
       ‘The Gauls continue to be beaten by Caesar.’

(69)  Caesar temptat pellere Gallos.
       Caesar tries to-beat Gauls.
       ‘Caesar tries to beat the Gauls.’
(70) Galli temptant pelli a Caesare.
    Gauls they-try to-be-beaten by Caesar.
    ‘The Gauls try to be beaten by Caesar.’

In (67) and (68) we have a subject-raising verb, *pergo*, whilst in (69) and (70) *tempto* is definitely a subject-control verb.

Let us compare the verbs used in (67) and (68), assuming we transfer as much as possible of the standard HPSG analysis. We return to several key issues in the chapter on the Acl. (71) illustrates the token of *pergit* after it is unified with the VP complement in (67), and (72) represents the token of *pergit* after unification with the VP complement in (68).

(71) \[ \textbf{pergit} + \textbf{VP}_{inf,act} \]

\[
\begin{align*}
\text{arg-st} & \quad \langle \text{NP} \rangle, \text{VP} \quad \langle \text{vform inf} \rangle \\
\text{sem} & \quad \left[ \begin{array}{c}
\text{index s} \\
\text{restr} \quad \left[ \begin{array}{c}
\text{reln pergere} \\
\text{sit s} \\
\text{arg} \text{[0]} \\
\end{array}\right]
\end{array}\right]
\end{align*}
\]

(72) \[ \textbf{pergit} + \textbf{VP}_{inf,pass} \]

\[
\begin{align*}
\text{arg-st} & \quad \langle \text{NP} \rangle, \text{VP} \quad \langle \text{vform inf} \rangle \\
\text{sem} & \quad \left[ \begin{array}{c}
\text{index s} \\
\text{restr} \quad \left[ \begin{array}{c}
\text{reln pergere} \\
\text{sit s} \\
\text{arg} \text{[0]} \\
\end{array}\right]
\end{array}\right]
\end{align*}
\]

If we compare (71) to (72) we see that the subject of the VP_{inf} plays no role in the *continue*-relation. So semantics stay the same regardless whether the VP_{inf} is active or passive.

Now we have a look at the corresponding entries for the verb *tempto*. Compare (73) to (74):
3.6. VERB PHRASE COMPLEMENTATION

(73) \( \text{temp} + \text{VP}_{inf, act} \]\n\[
\begin{array}{l}
\text{arg-st} < \text{NP}, \text{VP} \\
\text{spr} \langle \text{NP} \rangle \\
\text{sem} \langle \text{index} \rangle \\
\text{index} s \\
\text{restr} \langle \text{reln} \text{temptare} \text{sit} s \text{tempants} \text{ref} \text{arg} \rangle
\end{array}
\]

(74) \( \text{temp} + \text{VP}_{inf, pass} \]\n\[
\begin{array}{l}
\text{arg-st} < \text{NP}, \text{VP} \\
\text{spr} \langle \text{NP} \rangle \\
\text{sem} \langle \text{index} \rangle \\
\text{index} s \\
\text{restr} \langle \text{reln} \text{temptare} \text{sit} s \text{tempants} \text{ref} \text{arg} \rangle
\end{array}
\]

For the verb \( \text{temp} \) a passive \( \text{VP}_{inf} \) changes the semantics: the subject of the matrix verb \( \text{temp} \) is assigned to the \text{trier}-role. In the active (73) the subject is the NP \textit{Caesar}, whilst in the passive (74) the subject is the NP \textit{Galli}. A different subject results in a different semantic value due to role assignment with control-verbs.

In connection with object-control verbs, a peculiar distinction has to be noticed:

(75) Imperator iubet servum hostem incidere.
    Emperor orders slave(\text{acc}) enemy(\text{acc}) to-kill.
    ‘The emperor orders the slave to kill the enemy.’

(76) Imperator iubet hostem a servum incidi.
    Emperor orders enemy(\text{acc}) by slave to-be-killed.
    ‘The emperor orders the enemy to be killed by the slave.’
(75) and (76) are semantically very different. Let us study (75) first: *servus*, ‘the slave’ is the one who receives the emperor’s order. This is formally noted in the specialization of the lexical entry for *iubet* in (77):

(77) \[ \text{iubet} + \text{VP}_{\text{inf,act}} \]

\[
\begin{align*}
\text{arg-st} & \quad \left< \text{NP}^{1}, \text{NP}^{2}, \text{VP} \right> \\
\text{spr} & \quad \left< \text{NP}^{3} \right> \\
\text{vform} & \quad \text{inf} \\
\text{sem} & \quad \text{index}^{4} \\
\text{restr} & \quad \left< \text{reh}^{5}, \text{iubere}^{6} \right> \\
\text{sit} & \quad \text{s} \\
\text{inhens} & \quad \text{ref}^{7} \\
\text{iussus} & \quad \text{ref}^{7} \\
\text{arg} & \quad \text{[} \\
\end{align*}
\]

The accusative specifier of the VP\textsubscript{inf} (*servum* in (75)) is assigned to the semantic role of *iussus*. The *inhens* orders an action to take place which shall be carried out by the *iussus*.

Does *hostis* ‘the enemy’ receive an order in (76)? The slave is not ordered to carry out an action, but, as the VP\textsubscript{inf} is passive, he is ordered to undergo an action. Pollard and Sag (1994: 308 ff.) note that in control phenomena, with certain sorts of embedded complements a shift in controller assignment takes place.

Compare sentences (78a) to (78b):

(78a) The doctor promised the nurse to examine the patient.

(78b) Grandma promised the children to be able to stay up for the late show.

In both (78a) and (78b), the matrix verb is the object-control verb *promise*. In (75a), the subject ‘the doctor’ is the controller of the unexpressed subject of the VP\textsubscript{inf} ‘to examine the patient’. This is a special case of subject control which we discussed in the previous section. But in (78b), the object ‘the children’ is the controller. What is promised in (78b), contrary to (78a), is rather a state than an action: it is promised that the children will be able to do something. This controller shift which marginally exists in English is analysed by Pollard and Sag as \textsc{coercion}. 
3.6. VERB PHRASE COMPLEMENTATION

Now let us come back to our Latin examples (75) and (76). In (75), the emperor gives an order to the slave. Semantically, an action is ordered: the action that the slave may kill the enemy. But in (76), the emperor does not give an order to the enemy; he gives the order that the enemy be killed, which semantically entails undergoing rather than initiating an action. Exchanging an active VP_{\text{inf}} for a passive VP_{\text{inf}} used as a complement of Latin object-control verbs thus radically changes the semantics.\footnote{It is nonetheless striking that no such shift is found in English: The doctor ordered the patient to be X-rayed by the specialist.} We allow that object-control verbs with passive VP_{\text{inf}s} be cases of coercion in Latin.\footnote{We would like to point out that an alternative analysis of \textit{iubet} in (76) is also possible. Note that in (76), the matrix verb cannot be passivized, which should require an extra lexical entry with \textit{iubet:}}

(79) is the feature structure for the verb token in (76):

Note that in (79), the accusative object of the matrix verb is not the controller. If we look at the semantics, we see that no \textit{iussus} is referred to, but a \textit{iussum} which is expressed by the passive VP_{\text{inf}} \textit{hostem a servo incidi}. This rather denotes a state than an action.\footnote{The enemy is ordered by the emperor to be killed by the slave.'}

\begin{itemize}
  \item (presumed) ungrammaticality of (76a) makes it possible to assume that the NP_{\text{acc}} \textit{hostem} in (76) is not a direct object of \textit{iubet.} An alternative analysis of (76) would then treat \textit{iubet} not as an object-control verb in (76), but as an Acl-verb subcategorizing for an infinitival clause \textit{hostem a servo incidi.} The feature structure for the verb token in (76) would then be:

\begin{figure}
\centering
\includegraphics[width=\textwidth]{feature_structure}
\caption{Feature structure for the verb token in (76).}
\end{figure}

\end{itemize}

\begin{itemize}
  \item Coercion with the A+1 will be discussed in chapter 6, section 7.2.
\end{itemize}
CHAPTER 3. INTRODUCTION TO HPSG

From the previous chapter reviewing the scholarship on Latin verb complementation it is already clear that we shall claim there is no Raising-to-Object in Latin. At first sight, it might seem obvious to analyse a sentence such as (79) in terms of Raising-to-Object:

(80) Caesar credit Antonium venire.
Caesar(nom) believes Anthony(acc) to-come.
‘Caesar believes Anthony to come.’

However, the fact that verbs such as credere construct with both impersonal and personal passives and sometimes only with impersonal passives\(^\text{18}\) calls for a different analysis. The various arguments speaking against an analysis of (80) in terms of Raising to Object have been discussed in full length in the previous chapter. The next chapter will show how sentences such as (80) have to be analysed instead.

3.6.4.1 Further Constituent Tests

Recall that Latin has no expletives. So the test involving the English “dummy” pronouns there and it cannot be applied to the Latin language.

Idiom parts in Latin cannot be embedded by control-verbs. We take the idioms digitum caelum attingere ‘to walk on air’ and ne digitum quidem porrigere ‘not lift a finger’ and find out which verbs in our corpus subcategorize for these idiomatic expressions. Note that verba sentiendi et dicendi can take idiom parts as their complements, but control-verbs never do so.\(^\text{19}\)

(81) Nostri antem principes digitum se caelum putent
our but leaders finger self(acc) sky they-believe(subj)
attingere.
to-touch
‘But should our leaders believe that they can walk on air...’

Cic., Att., 2, 1, 7

(82) Chrysippus quidem et Diogenes detracta utilitatem ne
digitum Chrysippus but and Diogenes apart-from use not finger
quidem eius causa porrigendum esse dicebant..
even his reason must-extended be they-said.
‘But Chrysippus and Diogenes said that, apart from the use he brings
one should not even lift a finger for him.’

\(^\text{18}\)This is the case for the verb constituio.

\(^\text{19}\)As these idioms appear very rarely in Latin, we cannot draw any statistical conclusions.
The standard HPSG analysis of raising and control verbs predicts that idiom parts that do not involve subject (specifier) positions should be possible both in raising and in control constructions. We have no explanation for the restricted occurrence of these idioms in “raising” constructions only. Note that no examples were found in which idiom parts were subcategorized for by control-verbs. So we assume that this is not grammatical in Latin, as it is ungrammatical in English.

3.7 Binding Theory

In this section, the HPSG binding theory as developed by Pollard and Sag (1994) is presented.\footnote{The binding theory will be needed in Chapter 6 where we discuss the occurrence of the reflexive personal pronoun in complement structures.} Note that this theory is very similar to the binding theory worked out by Chomsky (1986). Binding focusses on the classification of referentially dependent elements, including reflexive pronouns in Latin, according to syntactic constraints on the distribution of their possible antecedents.

Let us first have a look at the sortal hierarchy of nominal objects in HPSG:

(83)

\[
\text{nominal object} \quad \begin{array}{c}
\text{pronoun} \\
\text{anaphor} \quad \text{ppro}
\end{array} \quad \text{non-pron}
\]

Because the HPSG theory is so clearly inspired by the earlier Chomskyan theory, we shall present the Chomskyan theory first.

The three sorts of nominal objects—anaphor, personal pronoun and non-pronoun in HPSG have their correspondents in Chomsky’s government and binding (GB) theory:

<table>
<thead>
<tr>
<th>GB</th>
<th>HPSG</th>
<th>overt</th>
<th>empty</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) +a-p</td>
<td>ana</td>
<td>se</td>
<td>subject or compl of ctrl-verb</td>
</tr>
<tr>
<td>(ii) -a+p</td>
<td>ppro</td>
<td>is</td>
<td>null subject of finite clause</td>
</tr>
<tr>
<td>(iii) -a-p</td>
<td>npro</td>
<td>Caesar</td>
<td>not existing in Latin</td>
</tr>
</tbody>
</table>
The reflexive pronoun (anaphor) is categorized by Chomsky as being [+anaphoric] and [-pronominal]. An overt Latin example is the personal reflexive pronoun se. An example of an empty Latin anaphor (in the Chomsky view) would be the subject or complement of a control-verb.\footnote{In the HPSG analysis of control-verbs, the controller and the unexpressed subject of the infinitival phrase both appear on the ARG-STR list. If we take the ARG-STR list of the object-control verb \emph{inbet} \\
\( \langle \text{NP} \langle \text{NP} \text{ VP} \prod \prod \rangle \rangle \), the NP \textit{inbet} subcategorized for by the VP \textit{inbet} as its spr can be interpreted as fulfilling a role analogous to that of the reflexive bound by its antecedent.} The personal pronoun lacks anaphoric behaviour [-a]. It is [+pronominal]. An overt example is the Latin nonreflexive demonstrative pronoun is. An empty example (in the Chomskyan view) is the null subject of a finite clause. A non-pronoun lacks both anaphoric and pronominal qualities [-a, -p]. An overt example is a name, like \textit{Caesar}; or a count noun, like \textit{puer} ‘boy’. Empty examples of this category do not exist in Latin.\footnote{We are aware of the fact that this statement is highly theory-dependent. There might be some Chomskians who would not agree on this point. We only want to state that empty examples of this category are not needed for an analysis of Latin in HPSG.}

### 3.7.1 Binding in GB (Chomsky, 1986)

We first have a look at the binding theory presented in Chomsky (1986a). Within the typology of GB, noun phrases are cross-classified by the two binary features \emph{anaphor} and \emph{pronominal}. GB works with empty and overt categories:

- **empty categories**
  
  \begin{tabular}{ccc}
  & +a & -a \\
  +p & PRO & pro \\
  -p & NP-trace & variable \\
  \end{tabular}

- **overt categories**
  
  \begin{tabular}{ccc}
  & +a & -a \\
  +p & is & \\
  -p & se & Caesar \\
  \end{tabular}

NPs can be either overt or empty. Overt NPs have phonetic content, whilst empty ones do not. According to Chomsky (1986a), there are no overt NPs which are both pronominal and anaphoric. Note that Chomsky interprets...
3.7. BINDING THEORY

NP-traces as anaphors which have to be bound according to the principles of the Binding Theory. Note also that the anaphor and the personal pronoun show a complementary distribution of features, [+p-a] for the personal pronoun and [-p+a] for the anaphor.

Chomsky differentiates between four kinds of empty NPs. Little pro, the empty pure pronominal, is the empty (unrealized) subject of a finite clause. NP-trace is the empty element left behind by NP-movement. Variables are traces left by elements that undergo wh-movement. Big PRO is the subject of infinitive clauses. It is assumed to be the phonetically unrealized specifier of control verbs such as cogere.

In Chomsky’s binding theory [+ anaphoric] elements have to be bound within a certain local domain, and [+ pronominal] elements must not be bound within a certain other local domain. Binding in GB is now defined in the following terms:

- Y binds Z iff:
  i) Y and Z are coindexed; and
  ii) Y c-commands Z.

In order to understand binding, we need a definition for c- or configurational command:

- Y c-commands Z iff:
  i) Z is contained in the least maximal projection containing Y; and
  ii) Z is not contained in Y.

Binding is thus defined in configurational terms. The following scheme demonstrates the binding configuration developed by Chomsky (1986a):

\[
\text{XP} \\
\text{Y} \\
\text{Z} \\
\text{Antonius} \\
\text{se, lavat}
\]

We see that Y Antonius c-commands Z and c-commands everything dominated by Z. Chomsky’s binding theory is especially concerned with “A-binding”, where the binder is in an A or argument position, that is, subject, object, or the object of a preposition. Z is called A-bound if it is bound by a Y in an argument position. Otherwise, Z is called A-free. The anaphor se is bound by the subject NP of the clause, Antonius, as
• *Antonius* and *se* are coindexed,

• *se* is not contained in $Y_i$, *Antonius*, yet *se* is well contained within $XP$, the least maximal projection containing *Antonius*.

### 3.7.2 Binding in HPSG (Pollard and Sag, 1994)

HPSG, in contrast to GB, is a nonderivational theory. Moreover, HPSG makes far less use of empty categories. But apart from that, there are great similarities between the two theories.

HPSG reconstructs the theory proposed by Chomsky, preserving it to a great extent. Yet there are some important differences to mention: whilst GB is oriented towards configurationality, HPSG defines binding in terms of obliqueness.

The relation called **local obliqueness-command** (or local o-command) is defined as follows:

• Let $Y$ and $Z$ be *synsem* objects with distinct _local_ values, $Y$ referential. Then $Y$ *locally o-commands* $Z$ just in case $Y$ is less oblique than $Z$.

In HPSG, a *synsem* object is a sign which has to be equipped with both the attributes **syntax** and **semantics**. A *synsem* object $Y$ is less oblique than a *synsem* object $Z$ when it precedes $Z$ on the **complement-list** of a lexical head. Complements are ordered by increasing obliqueness. The element on the **specifier-list** of that head is the least oblique constituent.

Let us consider an example:

(84) *Antonius* scribit epistulam ad *se*.

*Antonius* writes letter(nom) to self(abl).

‘Antonius writes a letter to himself.’

---

23The purpose of the requirement that $Y$ and $Z$ have distinct _local_ values is to exclude cases where $Y$ and $Z$ would be analysed in GB terms as belonging to the same chain. This condition, formulated by Pollard and Sag (1994:253) has no further consequences for the work presented in this dissertation.

24We have suppressed the notion ‘synsem’ thus far because its motivation is irrelevant to the issues in this thesis. For our purposes a *synsem* object is simply a syntactic constituent—a word or phrase.
3.7. BINDING THEORY

Let us now have a look at the ARG-STRUCTURE list of *scribit*.\(^{25}\)

\[(85)\]  
\[
\text{scribit} \\
\begin{align*}
\text{spr} & \langle \text{NP}_{\text{nom}} \rangle \\
\text{comps} & \langle \text{NP}_{\text{acc}}, \text{PP}_a \rangle \\
\text{arg-str} & \langle \text{NP}_{\text{nom}}, \text{NP}_{\text{acc}}, \text{PP}_a \rangle
\end{align*}
\]

The least oblique element is the specifier, \(\text{NP}_{\text{nom}}\). The accusative object precedes the PP on the ARG-STR list and is therefore less oblique than \(\text{PP}_a\). \(\text{PP}_a\) is the most oblique element. So both *epistulam* and *Antonius*, being less oblique than *a se*, locally o-command the PP.

Note that local o-command is just a special case of the more general relation called o-command. O-command is defined in the following terms:

- Let \(Y\) and \(Z\) be *synsem* objects with distinct local values, \(Y\) referential. Then \(Y\) o-commands \(Z\) just in case \(Y\) locally o-commands \(X\) dominating \(Z\). \(Y\) locally o-commands \(X\) iff \(Y\) is less oblique than \(Z\).

Now we see that local o-command is just a special case of the more general relation called o-command where \(X=Z\). Let us consider an example:

\[(86)\]  
\[
\text{Pater}_i \text{ se}_i \text{ lavat.} \\
\text{father}_i \text{ self(acc)}_i \text{ washes.} \\
\text{‘The father washes himself.’}
\]

In (86) \(Y\) corresponds to *pater*, \(Z\) corresponds to *se*. *Pater* locally o-commands *se* because *pater* is the subject or specifier of the sentence and therefore less oblique than the accusative complement.

\[(87)\]  
\[
\text{Pater}_i \text{ secum}_i \text{ disputat.} \\
\text{father}_i \text{ self(abl)-with}_i \text{ disputes.} \\
\text{‘The father disputes with himself.’}
\]

In (87) \(Y\) corresponds to *pater*, \(X\) corresponds to *secum*, \(Z\) corresponds to *se*. *Pater* locally o-commands the whole PP *secum* (=\(X\)) dominating the anaphor *se* (=\(Z\)); and it therefore o-commands the word *se*.

\(^{25}\)The ARG-STRUCTURE list is simply the complements list with the specifier (subject) added as the least oblique element.
The HPSG binding theory is quite similar to Chomsky’s notion of A(rgument-)binding. Using the definition of o(bliqueness-)command the definition of o- or obliqueness-binding runs as follows:

- Y (locally) o-binds Z just in case Y and Z are coindexed and Y (locally) o-commands Z. If Z is not (locally) o-bound, then it is said to be (locally) o-free.

The HPSG binding theory is now formulated in terms of three principles:

1. Principle A. A locally o-commanded anaphor must be locally o-bound.
2. Principle B. A personal pronoun must be locally o-free.
3. Principle C. A nonpronoun must be o-free.

Note that Principles A and B are stated in nonconfigurational relations, and that only Principle C appeals to a tree-configurational notion.

If we apply Principles A, B, and C to sentences (86) and (87) we see that binding of the anaphor is correctly predicted.

### 3.8 Word Order Domains

Word order or linear precedence is an issue which will be ignored in my dissertation, as I exclusively focus on syntactic mechanisms formulated in terms of obliqueness. Yet a few words might nevertheless be useful in this place, since I am dealing with a language with relatively free word order using a theory developed primarily for languages with relatively fixed word order. Pollard and Sag (1994) do not deal with LP rules, and Pollard and Sag (1987) just marginally mention this topic. For English, they say (1987:172) that in any phrase containing a lexical head among its immediate daughters, that head has to precede all of its sister constituents:

```
HEAD [ LEX + ] < [ ]
```

This rule ensures the grammaticality of (88a) and the ungrammaticality of (88b):

(88a) with high distinction

(88b) *high with distinction
3.8. WORD ORDER DOMAINS

In a PP, the preposition has to be realized before all of the elements of the NP it subcategorizes for.

A second rule the authors state is that oblique complements are to precede more oblique ones:

\[
\text{COMPL} \ll \text{COMPL}
\]

This rule accounts for the grammaticality of (88c) and the ungrammaticality of (88d):

\[
(88c) \quad \left[ \text{VP give [Kim [a book]]} \right]
\]

\[
(88d) \quad \ast \left[ \text{VP give [a book] [Kim]} \right]
\]

Latin is a language with a very, although not completely free word order. The LP rules stated for English are not valid for Latin. Let us just briefly indicate a possible methodology of how to develop a set of constraints formulating LP rules for Latin.

We could state for Latin that for all finite clauses, all constituents of that clause have to appear in the same set. Note, however, that this is not true for nonfinite constructions as the Acl. If, using a single ID scheme, we expand the Acl into

\[
\text{Acl} \implies \text{NP VP}
\]

we can state that all constituents of NP form a set and all constituents of VP form another one. Intermediate elements of the matrix clause can also be realized, such as in (89):\(^{26}\)

\[
(89) \quad \text{Antonius dicit imperatorem esse.}
\]

Antonius(acc) he-says emperor(acc) to-be.

‘He says that Antonius is the emperor.’

The finite matrix verb interrupts the elements of the Acl. Another more frequently used possibility is to realize the matrix verb \textit{dicit} first, and then all the elements of the Acl, in arbitrary order.\(^{27}\)

\(^{26}\)We are following ideas developed by Kathol (2000), an extensive study focussing on word-order problems in German, using the framework of HPSG.

\(^{27}\)Note that there may be pragmatic differences in (90) a-f and (91) a-f. In this place, we are only interested in whether these sentences are grammatical or not. We do not claim that the meaning of (90) a-f and (91) a-f is identical. The topics and the foci in (90a)-(90f) and (91a)-(91f) differ.
(90)  a. dicit Antonium imperatorem esse.
     b. dicit imperatorem Antonium esse.
     c. dicit Antonium esse imperatorem.
     d. dicit imperatorem esse Antonium.
     e. dicit esse Antonium imperatorem.
     f. dicit esse imperatorem Antonium.

The fact that the NP Antonium may appear between the elements of the VP, as in (90b) and (90e), is another indication of how free Latin word order is. It is also possible to realize the Acl first, again with its elements in arbitrary order, and then the matrix verb.

(91)  a. Antonium imperatorem esse dicit.
     b. Imperatorem Antonium esse dicit.
     c. Antonium esse imperatorem dicit.
     d. Imperatorem esse Antonium dicit.
     e. Esse Antonium imperatorem dicit.
     f. Esse imperatorem Antonium dicit.

If we put the matrix verb between the constituents of the Acl, we can put it only between subject and verb. Thus in the following (92a) and (92b) are grammatical whilst (92c) is not:

(92)  a. Antonium dicit imperatorem esse.
     b. Imperatorem dicit Antonium esse.
     c. *Antonium imperatorem dicit esse.

This suggests that on the S’ level we treat the subject of the Acl as well as its VP as two elements. Linear precedence requires that we form three sets of (a) the matrix clause, (b) the Acl’s subject and (c) the Acl’s VP\textsubscript{af}. The order of these three set elements in the sentence is free:

LP rule for the Acl
\{\{all elements of NP\textsubscript{as}\}\ \{all elements of VP\textsubscript{af}\}\ \{matrix clause\}\}  

If we look at (90b,c), (90e,f), (91b,c) we note that the word order of the elements within the VP\textsubscript{as} is free. So all VP\textsubscript{af}-internal elements form a set.

With regard to Latin PPs, we can state that either the prepositional head is realized first, with all other constituents following in free order. Or, if the NP subcategorized for by the preposition is modified by an adjective, the adjective may precede the preposition.
3.9. **FURTHER WORKS ON HPSG**

(93)  
  a. cum summa laude  
  b. cum laude summa  
  c. summa cum laude  
  d. *summa laude cum  

In order to formulate the corresponding LP rule we first go to the $S'$ level, or even to the $S''$ level:

\[
\begin{align*}
  \text{PP} & \Rightarrow P \text{ NP} \\
  \text{NP} & \Rightarrow A \text{ P} + N
\end{align*}
\]

The LP generalizations are as follows:

**LP rule for the PP**

$P \text{ NP}$ or $A \text{ P} N$.

Not every formalisation would easily accommodate this sort of rule.

Certainly, word order in Latin is not totally arbitrary. Linearization of the elements definitely plays a role if we attend to contextual problems. Prominently realized elements can be more focused and so for some aspects of Latin grammar word order might be a relevant topic. However, as I exclusively deal with matters of government, subcategorization, and control in this thesis, word order will be ignored here.

3.9 **Further Works on HPSG**

This chapter can offer only a brief introduction into HPSG, in order to help the reader of this thesis understand the theoretical background in which this study is written. A lot of issues have not been mentioned here. In HPSG, information given within the AVMs can be either LOCAL or NONLOCAL. In this introductory chapter we have only dealt with LOCAL features. HPSG uses the NONLOCAL feature standardly in the analysis of questions and unbounded dependencies. An excellent book written on questions and other sentences in HPSG is Ginzburg and Sag (1999). The reader who wants to learn more about linearization problems in HPSG can find work done on this topic by Reape (1993, 1994) and Kathol (2000). Semantics are dealt with by Pollard and Sag (1994) in chapter 8, as well as by Pollard and Yoo (1998).

Let me mention finally that the standard reference to HPSG (still) is Pollard and Sag (1994). Wasow and Sag (1999) have written an introduction to syntax based on HPSG-like mechanisms which is a little easier to understand for readers not familiar with formal syntactical theories.