# Rethinking Some Empty Categories: Missing Objects and Parasitic Gaps in HPSG

Claire Grover

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Department of Language and Linguistics

University of Essex

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# Abstract

This thesis proposes new analyses of English missing object constructions (MOCs) (e.g. the *tough* construction, purpose infinitives, etc.) and parasitic gap formation. These analyses are formulated in the framework of Head-Driven Phrase Structure Grammar (HPSG).

HPSG divides unbounded dependency constructions (UDCs) into two classes depending on whether the filler is in argument or non-argument position. MOCs have argument fillers and are classified as weak UDCs. The evidence that motivates the weak UDC analysis is re-evaluated and it is claimed that, in fact, MOCs are not UDCs. It is proposed that a lexical rule promotes missing objects from the COMPS to the SUBJ list in much the same way as passive promotes objects. In contrast to passive, the original subject is not demoted and missing object VPs have two elements in SUBJ, both available to be controlled. Raising and Equi signs are modified to permit them to inherit second SUBJ members from their complements: in this way the apparent unboundedness of MOCs is described as a series of local control dependencies. The analysis of English MOCs extends easily to Italian and Spanish and a unified account of MOCs, clitic-climbing and long NP movement is developed.

Parasitic gaps may occur with MOCs and this is generally taken as evidence that MOCs are UDCs. It is shown that there are problems with the HPSG analysis of parasitic gaps and a new account is developed. It is claimed that parasitic gaps are not a unified phenomenon and that there are two distinct classes of parasitic gaps. A-type parasitic gaps (e.g. parasitic gaps in subjects) are treated as phonologically null non-pronominals whose distribution is governed by the binding theory. C-type parasitic gaps (e.g. parasitic gaps in *without* adjuncts) are treated as part of a theory of coordination.

# Acknowledgements

This thesis grew out of some joint research with Marc Moens described in Grover and Moens (1990b). This paper was submitted to Natural Language and Linguistic Theory and perhaps it would have been published had we ever got around to making the revisions suggested by the reviewers. My first thanks therefore go to Marc for his important contribution to this thesis. I am also greatly indebted to the three anonymous NLLT reviewers who provided detailed and extremely constructive reviews. It was the attempt to answer their criticisms that turned the paper into a thesis!

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# Contents

# Chapter 1

# Introduction

## 1.1 Introductory Remarks

In this thesis I re-examine certain assumptions about missing object constructions and parasitic gaps and I formulate new analyses of these phenomena. The framework in which I conduct this research is Head-Driven Phrase Structure Grammar (HPSG). HPSG uses typed feature structures to model linguistic objects and it integrates syntactic and semantic information into one representation. Typed feature structure formalisms are computationally well-understood and provide a basis both for theoretical linguistic work and for computational implementations. HPSG does not utilise any kind of movement rule and instead it uses 'structure-sharing' to model linguistic dependencies. Entire syntax trees are encoded as feature structures and dependencies between empty categories and their antecedents are modelled by constraints requiring structure-sharing of certain parts of these feature structures. The syntax-semantics mapping is also achieved through structure-sharing since syntactic and semantic information is contained within the same representation. The ease with which dependencies can be expressed combined with the fact that all the linguistic information is contained in one object means that HPSG provides a theory which can simultaneously impose a wide range of interacting linguistic constraints. I use the version of the theory in Pollard and Sag (1994) and in particular I use the revisions that Pollard and Sag outline in their final chapter.

Linguistic theory recognises a distinction between local (or bounded) dependencies and nonlocal (or unbounded) ones. *Wh*-question formation is the archetypical nonlocal dependency

where an element may be displaced to a position some distance away from the clause from which it originates. In this thesis I will use the term 'unbounded dependency construction' (UDC) to refer to nonlocal constructions involving displaced elements. Chomsky (1977) proposed that there were only two ways in which an element could be displaced from its canonical position: np-movement was responsible for bounded constructions such as passive, and *wh*-movement was responsible for all other displacements. This meant that quite a number of constructions were classed together as *wh*-movement and were therefore supposed to be analysed in the same way. The list of such constructions includes *wh*-questions, topicalisations, relatives, clefts, the *tough* construction, purpose infinitives and comparatives. When non-transformational theories such as Generalized Phrase Structure Grammar (GPSG, Gazdar et al. 1985) and Lexical-Functional Grammar (LFG, Bresnan 1982b) challenged the use of transformations, they did not challenge the distinction between local constructions and UDCs. In GPSG it was shown that UDCs could be generated without the use of movement transformations by propagating information between the 'filler' and the 'gap' using the feature SLASH. HPSG continues to use a SLASH feature to describe UDCs.

In recent years linguists have begun to question whether all the constructions classed as UDCs really should be treated in a uniform way. This questioning follows from the fact that although UDC analyses work well for core cases like *wh*-questions, topicalisations and relatives, they work rather less well for the other cases. Current versions of Government-Binding Theory (GB), for instance, Chomsky (1986), make a difference between UDCs whose fillers occur in non-argument ($\overline{\text{A}}$) positions and UDCs whose fillers are in argument (A) position. The first class includes *wh*-questions, topicalisations and relatives and the second class includes the *tough* construction and purpose infinitives. In order to maintain a uniformity between the two classes, GB proposes that the apparent filler in the second class is not directly the antecedent to the gap: instead the gap arises as a result of movement of a null operator which is coindexed to the apparent filler. In the GPSG framework, Hukari and Levine (1991) make the same distinction as GB. They continue to treat the first group using the SLASH feature but for the second group they use a feature called GAP which is like SLASH in some respects but which differs from it in others. Pollard and Sag (1994) also make the same distinction. They divide UDCs into strong UDCs and weak UDCs, where strong UDCs are the ones with non-argument position fillers and weak UDCs are the ones with argument position fillers. They use the same SLASH-based mechanism for both classes but they make a distinction in terms of the way the filler relates to the displaced element: in strong UDCs the filler is token identical

to the displaced element but in weak UDCs the two are merely coindexed.

Although linguistic theories now recognise two distinct classes of UDC, they still assume that both classes of UDC can be treated using the same basic mechanism and that, broadly speaking, they are a unified class. In this thesis I deal with a class of constructions which, following Gazdar et al. (1985), I term 'missing object constructions' (MOCs).[1] This class is a subset of HPSG's class of weak UDCs and it includes the *tough* construction, purpose infinitives, and *too/enough* complements. In the face of differences between these constructions and strong UDCs, I go one step further than standard versions of GB, GPSG or HPSG by suggesting that MOCs do not behave like strong UDCs for the simple reason that they are not UDCs at all. I explore the similarities between MOCs and Equi and Raising constructions and I suggest that the missing object in an MOC is controlled in the same way that the missing subject in Equi and Raising constructions is controlled. The apparent unboundedness of MOCs can then be explained in terms of sequences of local control relations. In departing from the UDC hypothesis I join a small group of other dissidents: Cinque (1990), Jones (1991) and Bayer (1990) all provide analyses which depart from the UDC assumption.

The second part of this thesis deals with parasitic gaps. These too are treated as UDCs in the standard versions of the major theories and again the UDC assumption has been subject to questioning. Current GB treats parasitic gaps as involving empty operator movement and this means they are put in the same class as MOCs. Within the GB framework, Contreras (1993) and Cinque (1990) try to bring the analyses of MOCs and parasitic gaps closer together. However, similarities between MOCs and parasitic gaps seem only to be apparent to GB linguists and the apparent similarity derives from the fact that GB uses empty operator movement for both constructions. Pollard and Sag (1994) assume that both parasitic gaps and MOC gaps result from SLASH dependencies but, beyond that, they do not notice any particular similarities. I share Pollard and Sag's view that MOCs and parasitic gaps are not particularly related and my reason for dealing with them both in this thesis arises from the way they interact. Missing object gaps can licence parasitic gaps and this is usually taken as evidence that MOCs must be UDCs because it is commonly claimed that parasitic gaps can only be licenced by UDC gaps. Since I propose that missing objects are not UDC gaps, I must develop a theory of

[1] As I mention in the acknowledgements, the research reported in this thesis originated in collaborative work with Marc Moens (Grover and Moens 1990a, Grover and Moens 1990b). Grover and Moens (1990b) was submitted to the journal Natural Language and Linguistic Theory. They recommended some fairly substantial revisions, but for a variety of reasons we did not revise it. The basic claim of the paper is same as the one I make here—MOCs are control constructions and not UDCs—and Chapters 4 and 5 are based on parts of the original paper. The HPSG analysis that I propose also has its roots in the original paper although the details differ in many respects.

parasitic gaps which accounts for the interactions between MOCs and parasitic gaps. I review the Pollard and Sag (1994) account of parasitic gaps and show that there are several problems with this and I propose a new analysis that questions the assumption that parasitic gaps are a unified phenomenon.

In the rest of this chapter I provide a brief overview of some parts of HPSG. I first introduce the HPSG features and types and describe the means by which signs are combined to make phrases. I then review the subparts of the theory which are particularly relevant to this thesis. I describe the basic mechanism behind UDCs and show how Pollard and Sag (1994) treat MOCs and parasitic gaps—the two constructions which are the central concern of this thesis. In the final part of this chapter I describe the HPSG binding theory and commence the process of modifying the Pollard and Sag theory by proposing a change in the behaviour of the feature SUBCAT. In Chapters 2 and 3, I motivate further modifications to parts of HPSG which impinge on the new analyses of MOCs and parasitic gaps in the core chapters of the thesis. In Chapter 2 I question Pollard and Sag's lexical approach to English case-marking and I show that a method of structural case-marking is more appropriate. The structural approach means that case-marking is no longer a major obstacle to a Raising treatment of the control relationship in the *tough* construction. In Chapter 3 I discuss Equi and Raising constructions: I show that there is a constraint that requires Equi controllees to be role-assigned in the controlled complement. Since Raising controllers are not role-assigned, this constraint accounts for the previously unexplained fact that certain sequences of Equi and Raising predicates are ill-formed. I also propose that Raising controllers, like other non-role-assigned elements, are not included in the SUBCAT list and this enables the definition of o-command to be stated more simply. I conclude the chapter with a description of signs for auxiliary verbs and modals.

With the end of Chapter 3 the preparatory part of the thesis is complete and all the peripheral modifications are made. The core chapters of the thesis are Chapters 4–8. In Chapter 4 I describe the class of MOCs in some detail and I show that although they are usually treated as a type of UDC, their behaviour is such that they would be better analysed as if the missing object was controlled rather than extracted. In Chapter 5 I modify HPSG to develop a control account of MOCs. I exploit the way the valence features separate SUBJ from COMPS and I define a lexical rule which creates missing objects by promoting objects from the COMPS list to the SUBJ list. I show that the apparent unboundedness of MOCs is in fact better described as a series of local control relationships involving Equi and Raising predicates and I modify Equi and Raising

signs accordingly to permit missing objects to be inherited. The missing object lexical rule is similar to the passive one in that both promote objects from COMPS to SUBJ (although passive also demotes the subject). I explore the differences and similarities between MOCs and passive and, in connection with promoted objects of prepositions, I show that pseudo-passives and prepositional MOCs can both be analysed using the missing object lexical rule in combination with either a pseudo-passive lexical rule or a second missing object lexical rule. In connection with the question of whether the relationship between the subject and the missing object in *tough* constructions is Equi or Raising, I argue that the relationship is syntactically a Raising one. I also show that the interactions between Equi and Raising predicates that I discussed in Chapter 3 have their counterpart in MOCs and this has implications for the semantic part of the signs for *tough* adjectives. Although I treat the *tough* control relation as Raising, there are other MOCs which seem to have an Equi relation and, in this context, the constraint that Equi controllees must be role-assigned causes these constructions to be strictly bounded. I conclude Chapter 5 with a discussion of MOCs in other languages. I describe the way long-distance MOCs in Italian and Spanish are only permitted when restructuring verbs are involved and I discuss other constructions in these languages which are also sensitive to restructuring verbs. I show that the English MOC analysis can be transferred to Italian and Spanish with the proviso that it is only restructuring verbs that can inherit missing objects. An analysis of clitic-climbing and of long NP movement follows easily on the assumption that objects promoted by the missing object lexical rule are also involved in these constructions. Moreover, the fact that long-distance effects occur only with restructuring verbs follows from the fact that the same mechanism underlies all three cases.

In Chapters 6 and 7, I turn my attention to parasitic gaps. I show that there are problems with Pollard and Sag's (1994) UDC-based treatment of parasitic gaps and I suggest that many theories of parasitic gaps are not satisfactory because they assume that parasitic gaps are a unified phenomenon. The HPSG account uses a split SLASH path to describe the distribution of real gaps and parasitic gaps and this treatment is similar to their use of split SLASH paths to generate across-the-board extractions from coordinations. By contrast, Engdahl's (1983) treatment of parasitic gaps denies that parasitic gaps are related to coordinate gaps and emphasises a connection with the binding theory. In particular, Engdahl shows that configurational notions play a role in parasitic gap constructions: just as a non-pronominal must not be c-commanded by its antecedent, a parasitic gap must not be c-commanded by the real gap. I propose that parasitic gaps be divided into two classes, a-type parasitic gaps

and c-type parasitic gaps and that these receive differing analyses. I treat a-type parasitic gaps as a kind of empty anaphoric element and c-type parasitic gaps as a kind of across-the-board gap. Engdahl's approach and the HPSG approach are in opposition to one another yet, in making the a-type/c-type distinction, I am able to build on Engdahl's insights for a-type parasitic gaps and the HPSG insights for c-type parasitic gaps. In Chapter 7 I show how HPSG can be modified in order to provide new analyses of the two classes. I claim that a-type parasitic gaps are phonologically null non-pronominal NPs and not SLASH gaps. I investigate how this analysis can be implemented as part of the binding theory. For c-type parasitic gaps I exploit the conjunctive nature of the constructions in which they occur and I replace Pollard and Sag's Coordination Principle with a Conjunction Principle. I show that the optionality of c-type parasitic gaps patterns with violations of the across-the-board condition in true coordinations and I develop an account which controls gap distribution in both c-type parasitic gaps and coordinations.

In Chapter 8, I investigate interactions between MOCs and parasitic gaps. A-type parasitic gaps occurring with MOCs can be accounted for as long as the antecedent to the parasitic gap is not required to be a UDC gap. I show that MO gaps share properties with UDC gaps which allow them to be parasitic gap antecedents. I also discuss some examples that Pollard and Sag treat as parasitic gaps (the 'certain heroes' examples) but which are not parasitic gaps at all. I show that with one additional assumption these examples are generated by my revised version of HPSG. For c-type parasitic gaps occurring with MOCs I show that these parasitic gaps are missing objects rather than UDC gaps. The distribution of missing objects follows from the fact that VPs in coordinate and subordinate structures share their subject requirements.

## 1.2 HPSG: Signs, Subcategorisation and Constituent Structure

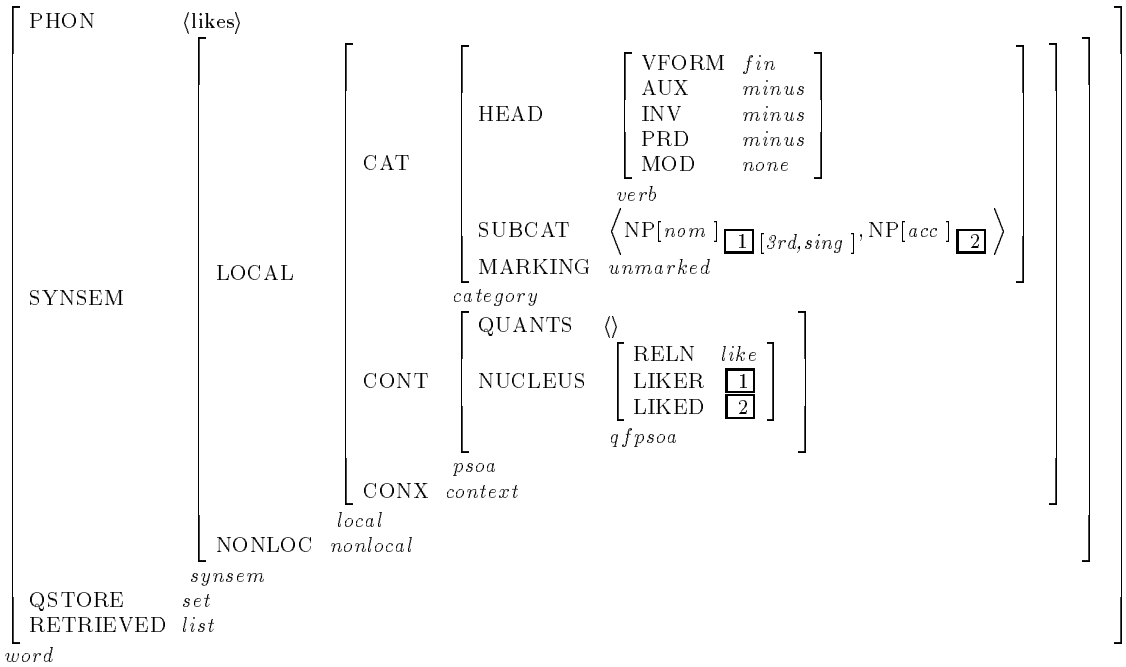
In this section and in the rest of this chapter I provide a brief introduction to the parts of HPSG that are needed to understand the analyses proposed in this thesis. To this end, I restrict my attention to the basic elements of HPSG and to the sub-theories which are directly relevant to this thesis. Readers interested in other aspects of the theory are referred to Pollard and Sag (1994). The main part of Pollard and Sag (1994) describes what I will refer to as the 'standard' version of HPSG but in the final chapter, Chapter 9, Pollard and Sag put forward some revisions to the theory which resolve certain difficulties in the standard version. The revisions are necessarily much less thoroughly worked out than the standard version but, for reasons which will become apparent, I will adopt the revised version in preference to the standard version. I will refer to the Chapter 9 version as 'the C9 version' or 'the C9 revisions'. In describing the sub-parts of HPSG I will start out with the standard version but quickly shift focus to the C9 version.

Pollard and Sag (1994) describe HPSG as 'a system of signs' and indeed, the *sign* is the fundamental object in HPSG. Unlike multi-stratal theories such as Government-Binding theory (GB, Chomsky (1981), (1982), (1986) and see Haegeman (1991) for an overview), HPSG encodes information from all linguistic levels in one structured object containing phonological, syntactic, semantic and discourse information. Formally, signs are modelled by typed (or sorted) feature structures (Moshier 1988, Pollard and Moshier 1990, Carpenter 1992). In contrast to GB, HPSG uses no notion of 'movement' or 'transformation'. Instead sub-parts of feature structures are related by structure-sharing, i.e. token identity of values in feature structures.

In typed feature structure systems, the types are declared in an inheritance hierarchy and declarations are made to indicate which features are appropriate for each type. For each feature the type of its value must also be specified. Linguistic objects in HPSG are of type *sign* which has subtypes *word* and *phrase*. Feature structures of type *sign* are specified for the features PHON (phonology), SYNSEM, QSTORE and RETRIEVED.[2] The feature PHON takes a list of phonological representations. The feature SYNSEM encodes syntactic and semantic information.

[2]Throughout this thesis, I use italics when referring to types and small capitals when referring to features.

(1)




The feature structure in (1) is a partial representation of the sign for the verb *likes*. The bottom left corner of each feature structure is annotated with its type—the whole sign is a feature structure of type *word* (a subtype of *sign*). Some features have atomic types as values, where an atomic type is one for which no features are appropriate. The type *fin*, for example, is an atomic type. Other types are non-atomic and for some of them (e.g. *synsem* and *local*) I have shown the features inside them, but for other non-atomic types I have not included the features that are appropriate for them. I have omitted them in order to restrict the size of the feature structure in (1) and I have chosen to omit either those feature structures that are not particularly relevant to this thesis (e.g. *context*) or those which I will describe in more detail below (e.g. *nonlocal*). The attributes PHON and SUBCAT are list-valued and this is represented by the use of angle brackets. Although the elements in PHON are phonological representations I will use orthography to represent them. SYNSEM has a feature structure of type *synsem* as value and this is specified for the features LOCAL and NONLOCAL (sometimes abbreviated to LOC and NONLOC). I will discuss NONLOCAL in Section 1.3. LOCAL has the type *local* as value and this is specified for the features CAT (category), CONT (content) and CONX (context). CAT is where syntactic information relating to the category and subcategorisation properties of the linguistic entity is encoded. CONT contains basic context-independent semantic information and CONX contains context-dependent semantic information. Inside CAT, the feature HEAD contains information about the category of a word or phrase. Its value is constrained to be of type *head* and in the case of (1) it is specified as the type *verb* which is a subtype of *subst*

(substantive) which in turn is a subtype of *head*. The type *verb* is specified for the features VFORM (verb form), AUX (auxiliary) and INV (inverted) and its supertype *subst* is specified for the features PRD (predicative) and MOD (modified). In (1) the values of these features indicate that *likes* is a finite non-auxiliary, non-inverted, non-predicative non-adjunct verb. The feature MARKING is used to distinguish markers such as complementizers and conjunctions from other categories.[3]

The feature CONT encodes the semantic type and content of a linguistic object. The subtypes of its value *content* are *psoa* (parameterized-state-of-affairs), *nom-obj* (nominal object) and *quant* (quantifier). The theory of semantic interpretation in HPSG is loosely based on situation semantics (see, for example, Gawron and Peters 1990, Cooper 1990). Broadly speaking, a *psoa* is a proposition while elements which are *nom-obj* have entity interpretations. Objects of type *quant* are quantifiers. A *psoa* has the features QUANTS and NUCLEUS where the QUANTS list contains quantifiers which have been scoped (i.e. removed from QSTORE) and NUCLEUS has a *qfpsoa* (quantifier-free psoa) as value. In (1) the QUANTS list is empty. *qfpsoa* feature structures have a relation as value of RELN and various arguments encoded as values of features whose names are closely linked to the relation. In (1) the RELN is *like* and the argument roles are LIKER and LIKED. A feature structure of type *nom-obj* has the features INDEX and RESTR (restriction). The following two feature structures show the CONT value of the pronoun *she* and the noun *sandwich* respectively:

(2)
$$\left[\begin{array}{ll} \text{INDEX} & \left[\begin{array}{ll} \text{PERSON} & 3rd \\ \text{NUMBER} & sing \\ \text{GENDER} & fem \end{array}\right]_{ref} \\ \text{RESTR} & \{\} \end{array}\right]_{ppro}$$

(3)
$$\left[\begin{array}{ll} \text{INDEX} & \boxed{1}\left[\begin{array}{ll} \text{PERSON} & 3rd \\ \text{NUMBER} & sing \\ \text{GENDER} & neut \end{array}\right]_{ref} \\ \text{RESTR} & \left\{\left[\begin{array}{ll} \text{QUANTS} & \langle\rangle \\ \text{NUCLEUS} & \left[\begin{array}{ll} \text{RELN} & sandwich \\ \text{INST} & \boxed{1} \end{array}\right]_{qfpsoa} \end{array}\right]_{psoa}\right\} \end{array}\right]_{npro}$$

[3]Several of the features which occur in signs will be of no relevance to a particular discussion. I have included such features in (1) but in future I will omit irrelevant features from diagrams. Of the features shown in (1), QSTORE, RETRIEVED, CONX, MOD and MARKING are unlikely to be seen again since they do not have any particular role to play in the analyses in this thesis. I will also often omit PHON.

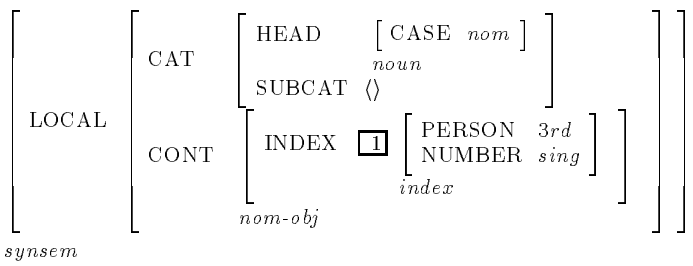
The type of *she* is *ppro* (personal pronoun) and of *sandwich* is *npro* (non-pronominal). These are both subtypes of *nom-obj*. The index associated with a noun or NP encodes the referential property of the noun and serves as the 'anchor' to a real entity. The feature INDEX has a value of type *index* and this has three subtypes: *ref* (referential), *it* and *there*. The former is the type appropriate for all nominals except for the expletive pronouns *it* and *there* which are marked with their own individual subtypes of *index*. Feature structures of type *index* are specified for the three agreement features PERSON, NUMBER and GENDER. Both *she* and *sandwich* are third person singular but *she* is [GENDER *fem*] and *sandwich* is [GENDER *neut*]. The RESTR part of a *nom-obj* feature structure describes the entity or entities to which the index is the anchor. For the pronoun *she* there is no restriction in the CONTENT part of the feature structure but for *sandwich* the restriction requires the index to be anchored to an instance of a sandwich. There may be more than one restriction and so the value of RESTR is a set of *psoa*s. (Braces in feature structure diagrams indicate set values.) The use of the index $\boxed{1}$ in (3) indicates structure-sharing (also called re-entrancy or token identity).[4] A single feature structure may be the value for more than one feature and when two distinct paths share a value this is structure-sharing. When structure-sharing occurs the identity between the two values is indicated by using the same index at the two points in the feature structure. By convention, just one index out of the two is annotated with the information about the value. In (3), there is a feature structure of type *ref* which is labelled with the index $\boxed{1}$ and it is the value both of the path SYNSEM|LOC|CONT|INDEX and of the path SYNSEM|LOC|CONT|RESTR|NUCLEUS|INST.

Turning back now to (1), the SUBCAT feature is still to be explained. SUBCAT contains information about the arguments that an item subcategorises for and its value is a list of feature structures of type *synsem*. To include a full specification of the SUBCAT elements in diagrams such as (1) would make them too large to fit on the page or to be easily readable. For this reason it is conventional to use abbreviations which refer to the essential parts of a feature structure while omitting the inessential parts. The verb *likes* has two NP arguments and these are referred to in the SUBCAT list by means of abbreviations. The NP[*nom*] and NP[*acc*] parts of these abbreviations refer to the SYNSEM|LOC|CAT|HEAD value and the subscripted parts ($\boxed{1}$[*3rd, sing*] and $\boxed{2}$) refer to the SYNSEM|LOC|CONT|INDEX value. Since the abbreviation NP[*nom*]$_{\boxed{1}[3rd,sing]}$ occurs in the SUBCAT list which is a list of *synsem* objects it describes

[4] It is slightly unfortunate that the term 'index' is used both for feature structures of type *index* and for the boxed numbers which are used to indicate structure-sharing. In practice this does not usually lead to confusion.

the *synsem* part of a nominative third person singular noun phrase and it expands out as the following minimally specified feature structure:[5]

(4)




The structure-sharing between the value of INDEX of the NPs in the SUBCAT list and the values of the roles LIKER and LIKED in the CONT part of the sign in (1) creates the link between the syntactic argument structure and the semantic form. The first NP in SUBCAT will be realised as the subject and through structure-sharing this means that the subject will play the LIKER role rather than the LIKED role.

The SUBCAT feature plays two distinct roles in the standard version of HPSG. In its first role, SUBCAT ensures an appropriate realisation of arguments. It contains information about the syntactic argument structure of a category and it interacts with other parts of the grammar to ensure that subcategorised arguments are realised in appropriate positions in the constituent structure. In addition to defining how syntactic arguments are realised, the SUBCAT list also defines the syntax-semantics mapping. The semantic parts of elements in the SUBCAT list are structure-shared with appropriate parts of the *content* feature structure. In its second role, SUBCAT encodes the 'obliqueness' ordering that exists between the arguments of a head—the left/right ordering of the list corresponds to increasing obliqueness. The obliqueness ordering is crucial both for linear precedence relations and for the binding theory (see Section 1.4). In the SUBCAT list, subjects and complements are treated as being much the same except that the subject is less oblique than the complements and therefore occurs as the first member. In the C9 version of the theory, Pollard and Sag review some differences between subjects and complements and, following Borsley (1987) and Borsley (to appear), they propose that the SUBCAT feature should be replaced by three list-valued 'valence' features which they name SUBJ (subject), COMPS (complements) and SPR (specifier).[6] The valence features take over the first role of the SUBCAT feature of ensuring the appropriate realisation of arguments but they do not take over its second role as the locus of information relevant to binding. The

[5] From this point on I will only include type annotations that cannot immediately be inferred.

[6] Specifiers of nouns, adjectives, prepositions and adverbs are members of SUBCAT in the standard version of HPSG and they appear in their own valence feature list in the C9 version.

sign for *likes* in (1) must be updated to take account of the shift from SUBCAT to the valence features. The new sign is identical except that its CAT value is now as follows:

(5)
$$\begin{bmatrix} \text{HEAD} & \begin{bmatrix} \text{VFORM} & fin \\ \text{AUX} & minus \\ \text{INV} & minus \\ \text{PRD} & minus \\ \text{MOD} & none \end{bmatrix} \\ & verb \\ \text{SUBJ} & \left\langle \text{NP}[nom]\,\boxed{1}[3rd, sing] \right\rangle \\ \text{COMPS} & \left\langle \text{NP}[acc]\,\boxed{2} \right\rangle \\ \text{SPR} & \langle\rangle \\ \text{MARKING} & unmarked \end{bmatrix}$$

Constituent structure is modelled by feature structures which, for each phrasal category, indicate what its daughters are. Thus instead of having categories being labels on syntax trees, the syntax trees are part of the categories themselves. All signs of type *phrase* have the feature DTRS (daughters) which takes feature structures of type *con-struc* (constituent structure) as value. Pollard and Sag (1994) restrict their attention to headed structures and they identify several different types of headed structure. Each of these types is constrained to have certain properties. The definitions of the constraints are different in the standard version and the C9 version because the former makes reference to the SUBCAT list and the latter to the valence feature lists. Since I use the C9 version of the theory in the rest of this thesis I will describe the C9 definitions of the types of headed structures. The type *headed-struc* (which is a subtype of *con-struc*) has seven subtypes: *head-comps-struc*, *head-mark-struc*, *head-spr-struc*, *head-filler-struc*, *head-subj-struc*, *head-adj-struc* and *head-subj-comp-struc*. I will restrict my attention here to *head-comps-struc* and *head-subj-struc* since they are particularly relevant in this thesis. (6) shows the basic form of these structures:

(6)
$$\underset{head\text{-}comps\text{-}struc}{\begin{bmatrix} \text{HEAD-DTR} & sign \\ \text{COMP-DTRS} & list(phrase) \end{bmatrix}} \qquad \underset{head\text{-}subj\text{-}struc}{\begin{bmatrix} \text{HEAD-DTR} & sign \\ \text{SUBJ-DTR} & phrase \end{bmatrix}}$$

The HEAD-DTR feature in these structures is acquired because these are subtypes of *headed-struc* but the COMP-DTRS and SUBJ-DTR features are particular to the types. Over and above the constraints imposed by the feature system and type-hierarchy, there are other constraints which enforce additional restrictions. These come from the ID schemata and from the Valence Principle. The Head-Complement Schema requires that the HEAD-DTR in a *head-comps-struc* should be of type *word* and this ensures that complements will only occur as sisters to a lexical head. The Head-Subject Schema requires that the HEAD-DTR in a *head-subj-struc* should be

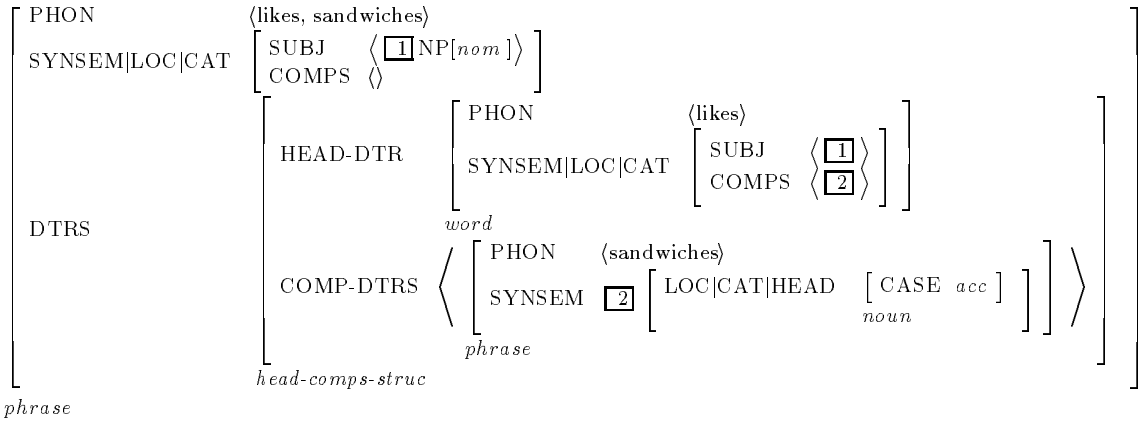
of type *phrase* and ensures that subjects will be sisters to non-lexical heads.[7] (The type *head-subj-comp-struc* deals with inverted structures and must be defined separately because it is an exception to this rule.) The Valence Principle ensures a one-to-one correspondence between the SUBJ-, COMPS- and SPR-DTRS in the constituent structure and the arguments encoded in the valence features. It does this by ensuring that each valence feature member is structure-shared with a daughter of the appropriate type. Its definition is as follows:

(7) VALENCE PRINCIPLE

In a headed phrase, for each valence feature F, the F value of the head daughter is the concatenation of the phrase's F value with the list of SYNSEM values of the F-DTRS value.

This has two effects: first it ensures that each daughter has a SYNSEM value which is token identical to a *synsem* element in a valence list and second, it ensures that each argument is taken off the valence list at the point where it is realised—the mother inherits from the head only those valence elements which have not been realised. The following feature structure shows the relevant parts of the sign for the VP *likes sandwiches* where the head daughter is the sign for the verb *likes* as shown in (1) and updated in (5) and the single member of the COMPS-DTRS list is an accusative NP whose SYNSEM value is structure-shared with the single element in the COMPS list on the head. The COMPS list on the mother is empty because the complement has been realised but the SUBJ list on the mother and the SUBJ list on the head share the same element since the subject has not yet been realised.

(8)

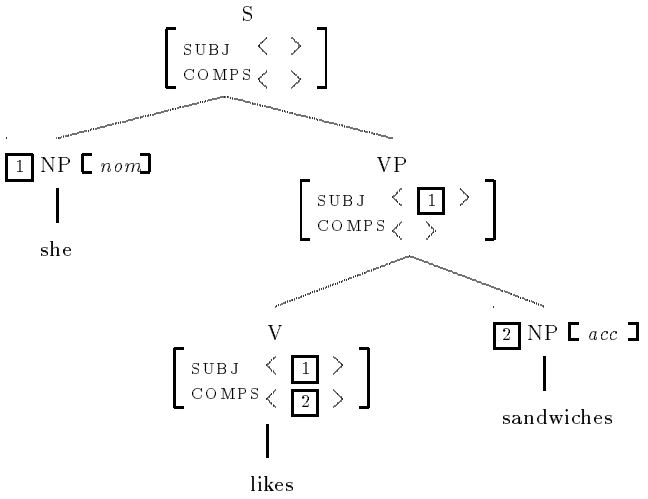



Although constituent structures are embedded inside the feature descriptions of categories, it is hard to display them in this format. In order to increase comprehensibility, Pollard and

[7] In the standard version of the theory the Head-Complement Schema is Schema 2 and the Head-Subject Schema is partly equivalent to Schema 1. In the C9 version there is one extra subtype of *headed-struc* and so it is not clear that it is appropriate to continue using the standard version names.

Sag often display constituent structure information in a tree format of the kind shown in (9) and I will adopt this convention.

(9)




This tree shows the contents of the SUBJ and COMPS lists on the verbal elements in the sentence *she likes sandwiches* and it shows the structure-sharing between the daughter elements and the valence feature elements.

## 1.3 Unbounded Dependency Constructions in HPSG

Unbounded dependency constructions (UDCs) are treated by means of the feature SLASH which is part of the value of NONLOCAL. This treatment derives from the GPSG SLASH analysis (see Gazdar et al. 1985) which demonstrated that feature-based grammars could provide a declarative, non-derivational treatment of constructions which had previously been assumed to require movement transformations.

Pollard and Sag (1994) distinguish two classes of UDC: strong ones and weak ones. *Wh*-questions, topicalisations, *wh*-relatives, *wh-it*-clefts and pseudoclefts are strong UDCs, while purpose infinitives, the *tough* construction and non-*wh*-relatives and it-clefts are weak UDCs. Strong UDCs are ones where the filler (i.e. the antecedent to the gap) is in a non-argument position and where there is syntactic connectivity between the filler and the gap.[8,9] Weak UDCs, on the other hand, have fillers in argument positions and, according to Pollard and

[8]The distinction between non-argument and argument position is the same as in GB (which uses the notation $\overline{\text{A}}$ for non-argument and A for argument).

[9]I use the term 'gap' throughout this thesis to refer to the position from which an element is displaced. This is purely descriptive and implies nothing about syntactic analysis. Similarly, I use the term 'filler' to describe the antecedent to a gap, irrespective of whether it is in non-argument or argument position and again this implies nothing about syntactic analysis.

Sag, there is no syntactic connectivity between the filler and gap. I will introduce the basic mechanisms and describe the analysis of strong UDCs in Section 1.3.1 and in Sections 1.3.2 and 1.3.3 I will describe the HPSG account of *tough* constructions and parasitic gaps. These are the main subject matter of this thesis and I will present my revisions to Pollard and Sag's account in Chapters 4–8.

### 1.3.1 Strong UDCs

The feature NONLOCAL has a feature structure of type *nonlocal* as value. This type is specified as follows:

(10)
$$\begin{bmatrix} \text{INHER} & \begin{bmatrix} \text{SLASH} & set(local) \\ \text{REL} & set(ref) \\ \text{QUE} & set(npro) \end{bmatrix} \\ & nonlocal1 \\ \text{TO-BIND} & \begin{bmatrix} \text{SLASH} & set(local) \\ \text{REL} & set(ref) \\ \text{QUE} & set(npro) \end{bmatrix} \\ & nonlocal1 \end{bmatrix}$$
*nonlocal*

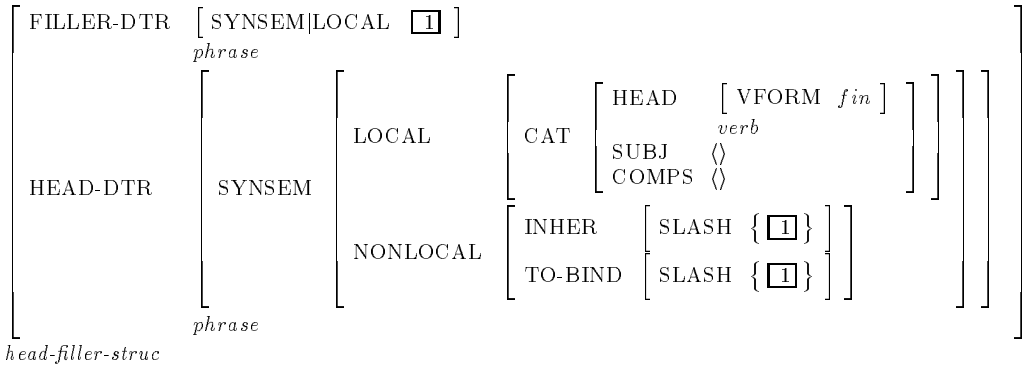
The features REL and QUE are used for propagating information about the *wh*-words in relatives and *wh*-questions but they are not of direct interest here and need not be described further. The feature INHER (inherited) or more precisely the path INHER|SLASH is responsible for the link between filler and gap. An unbounded dependency can be described in terms of three parts, the top of the dependency (i.e. the filler), the bottom (i.e. the gap) and the middle part that links the two. In the standard version of HPSG a trace occurs in the gap position. Trace is a phonologically null constituent with the following lexical entry:

(11)
$$\begin{bmatrix} \text{PHON} & \langle\rangle \\ \text{SYNSEM} & \begin{bmatrix} \text{LOCAL} & \boxed{1} \\ \text{NONLOCAL} & \begin{bmatrix} \text{INHER} & \begin{bmatrix} \text{SLASH} & \{\boxed{1}\} \\ \text{REL} & \{\} \\ \text{QUE} & \{\} \end{bmatrix} \\ \text{TO-BIND} & \begin{bmatrix} \text{SLASH} & \{\} \\ \text{REL} & \{\} \\ \text{QUE} & \{\} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

This sign has no local features of its own but certain properties will be imposed on it by the context in which it occurs. For example, if it occurs as the object of a transitive verb or of a preposition then it will be constrained to be an accusative NP. The structure-sharing between trace's LOCAL value and the INHER|SLASH value ensures that information about the trace is transmitted upwards via the SLASH feature.

The top of a strong UDC is described by a particular type of *con-struc*, namely *head-filler-struc*, as shown in (12). The LOCAL value of the filler is structure-shared with the INHER|SLASH element in the head.

(12)




The middle part of a UDC propagates the INHER|SLASH value up from the trace so that it structure-shares with the INHER|SLASH on the head in the head-filler structure. This propagation is controlled by the Nonlocal Feature Principle:

(13) NONLOCAL FEATURE PRINCIPLE

In a headed phrase, for each nonlocal feature F = SLASH, QUE, or REL, the value of SYNSEM|NONLOCAL|INHERITED|F is the set difference of the union of the values on all the daughters and the value of SYNSEM|NONLOCAL|TO-BIND|F on the HEAD-DAUGHTER.

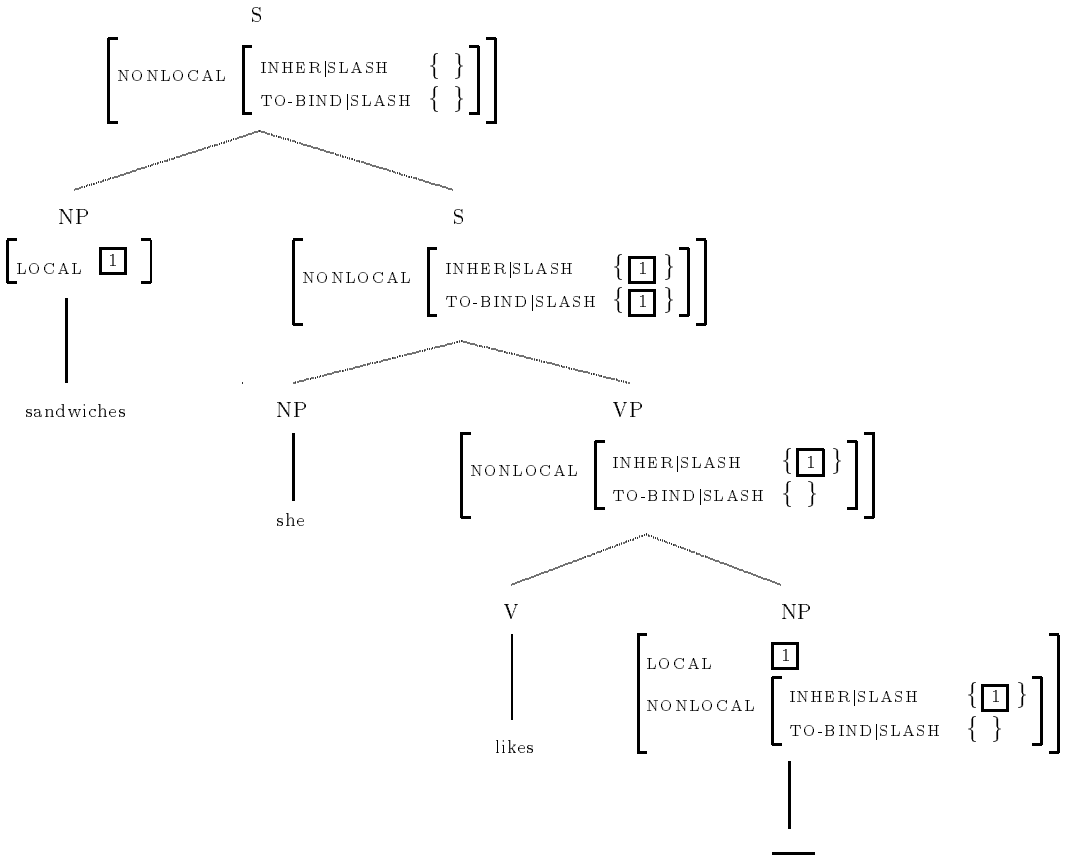
The basic effect of this principle is to ensure that any INHER|SLASH value on a daughter is passed up to the mother, but the subtraction of the TO-BIND|SLASH value makes it more complex. The purpose of the TO-BIND feature is to prevent dependencies propagating up beyond the point at which they are bound. For example, in the head-filler structure in (12) the element in the INHER|SLASH set on the head is bound to the LOCAL part of the filler and so the dependency ought not to be permitted to propagate up to the mother. Without the TO-BIND part of the Nonlocal Feature Principle the mother would wrongly inherit the dependency but with it, the dependency cannot go beyond the head-filler structure. As a result the following example is blocked:

(14) *Kim, I thought that Kim, I knew _.[10]

(15) Sandwiches, she likes _.

The following tree representation of the analysis of (15) summarises the basic components of a UDC in standard HPSG. (Empty TO-BIND|SLASH values are not shown.)

(16)




The HPSG treatment of extracted embedded subjects as in (17) is similar to the GPSG treatment.

(17) Kim, she thinks _ likes sandwiches.

The Subject Extraction Lexical Rule (SELR) maps signs for words that subcategorise for a finite S complement into similar signs except the S is replaced by a finite VP.[11] Additionally,

[10] Throughout this thesis I will use _ to indicate gap positions.

[11] A lexical rule is one which infers new lexical entries on the basis of existing ones. The version of the SELR in (18) is the version given as (10) in Chapter 9 of Pollard and Sag 1994. In the interests of readability, I have followed Pollard and Sag in not showing the paths to the relevant features —the input and output entities in (18) are abbreviations for feature structure descriptions rather the feature structure descriptions themselves. In (69) in their Chapter 9, Pollard and Sag provide a definition of the SELR which is generalised to allow extraction of subjects of small clause complements.

the INHER|SLASH set of the word contains an element structure-shared with the LOCAL value of the VP's SUBJ element. The definition of the Subject Extraction Lexical Rule is as follows:

(18) SUBJECT EXTRACTION LEXICAL RULE (SELR)

$$\begin{bmatrix} \text{SUBJ} & \langle \text{Y} \rangle \\ \text{COMPS} & \langle \ldots, \text{S}[\textit{unmarked}], \ldots \rangle \end{bmatrix} \Rightarrow$$

$$\begin{bmatrix} \text{COMPS} & \left\langle \ldots, \begin{bmatrix} \text{SUBJ} & \langle [\text{LOC} \ \boxed{1}] \rangle \\ \text{INHER|SLASH} & \{\} \end{bmatrix}^{\text{VP}}, \ldots \right\rangle \\ \text{INHER|SLASH} & \{\boxed{1}\} \end{bmatrix}$$

This lexical rule achieves extraction of an embedded subject without causing a trace to be left behind. In the C9 version of HPSG, Pollard and Sag suggest a change in the way that other SLASH dependencies are eliminated. They consider evidence from Pickering and Barry (1991) which questions the psychological reality of traces and they suggest that all SLASH elimination is 'traceless'. They propose that extracted complements should be handled by means of the Complement Extraction Lexical Rule (CELR) which in effect moves elements from the COMPS list to the INHER|SLASH set. The Complement Extraction Lexical Rule is formulated as follows:[12]

(19) COMPLEMENT EXTRACTION LEXICAL RULE (CELR)

$$\begin{bmatrix} \text{SUBCAT} & \langle \ldots, \boxed{3}, \ldots \rangle \\ \text{COMPS} & \langle \ldots, \boxed{3}[\text{LOC} \ \boxed{1}], \ldots \rangle \\ \text{INHER|SLASH} & \boxed{2} \end{bmatrix} \Rightarrow$$

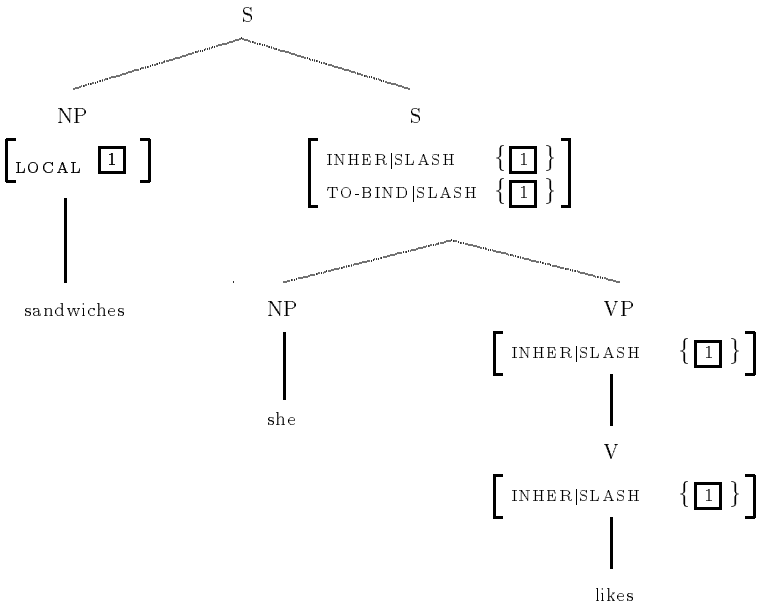
$$\begin{bmatrix} \text{SUBCAT} & \left\langle \ldots, \boxed{4}\begin{bmatrix} \text{LOC} & \boxed{1} \\ \text{INHER|SLASH} & \{\boxed{1}\} \end{bmatrix}, \ldots \right\rangle \\ \text{COMPS} & \langle \ldots\ldots \rangle \\ \text{INHER|SLASH} & \{\boxed{1}\} \cup \boxed{2} \end{bmatrix}$$

The C9 traceless account of extraction results in the following tree structures for (15) and (17):[13]

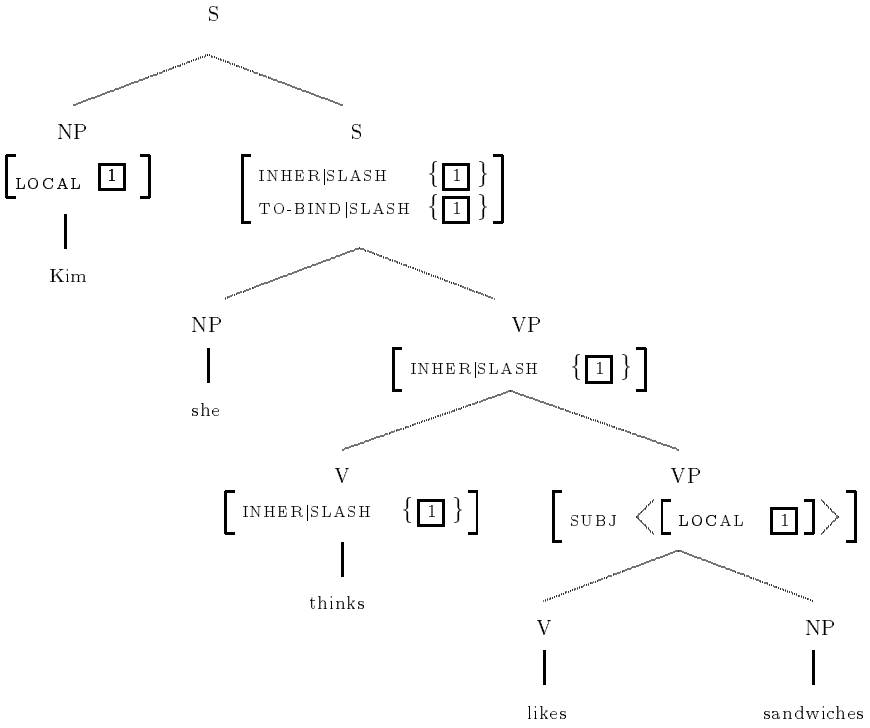
[12] The complex specification of input and output SUBCAT lists is designed to deal with a problem arising from the fact that the element to be extracted occurs both in the COMPS and the SUBCAT list. When this element is removed from COMPS it is necessary to change the SUBCAT element to reflect the fact that the category is slashed. The expression in the SUBCAT list on the output describes a category just like the element in the input ( $\boxed{3}$[LOC $\boxed{1}$]) except that its INHER|SLASH value is $\{\boxed{1}\}$. This added complexity is not crucial for the general discussion here but see fn.14 in Section 1.3.3 for discussion of how traceless extraction affects the Subject Condition and how appeal needs to be made to the INHER|SLASH values of SUBCAT elements.

[13] For expository clarity all empty INHER|SLASH and TO-BIND|SLASH specifications have been suppressed.

(20)


S
NP
S
LOCAL 1
INHER|SLASH {1}
TO-BIND|SLASH {1}
sandwiches
NP
VP
INHER|SLASH {1}
she
V
INHER|SLASH {1}
likes

(21)


S
NP
S
LOCAL 1
INHER|SLASH {1}
TO-BIND|SLASH {1}
Kim
NP
VP
INHER|SLASH {1}
she
V
VP
INHER|SLASH {1}
SUBJ ⟨ [LOCAL 1] ⟩
thinks
V
NP
likes
sandwiches

### 1.3.2 The *Tough* Construction

Pollard and Sag (1994) treat *tough* constructions, as illustrated in (22), as weak UDCs.

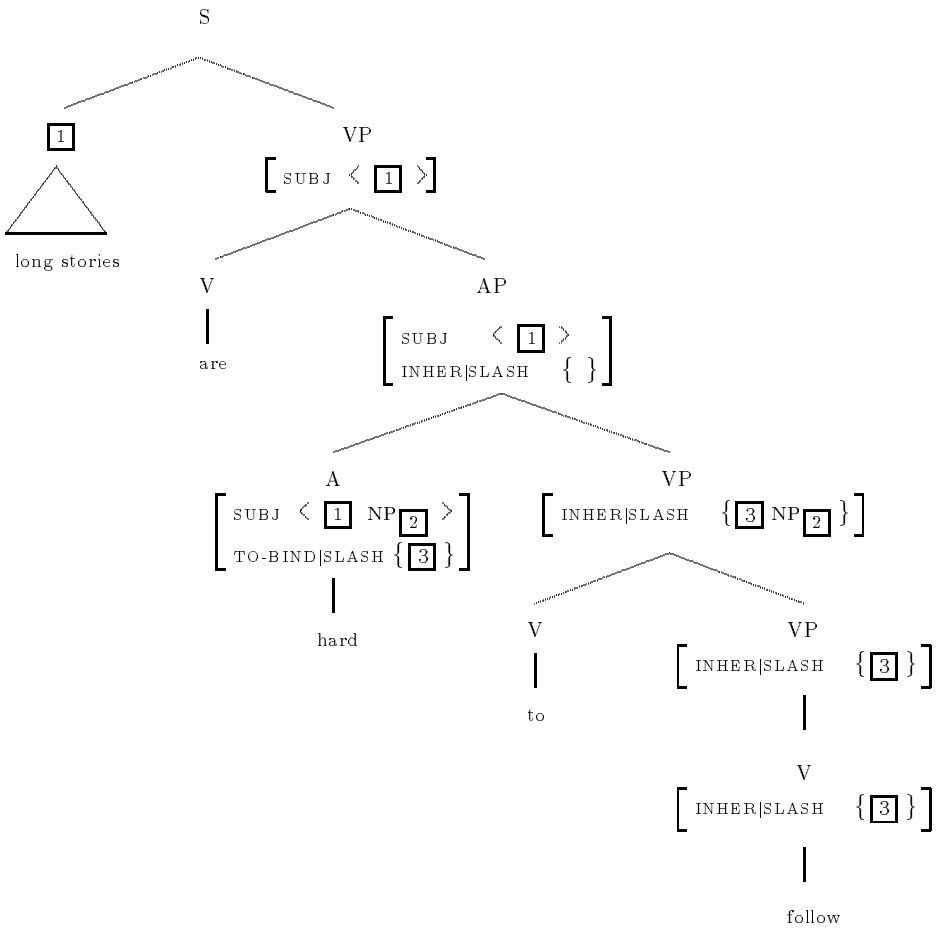
(22) a. Long stories are hard to follow _.
b. Kim would be easy for you to persuade Lee to talk to _.

The weak UDC approach means that the bottom and middle of the dependency are treated in the same way as with strong UDCs but the top part differs. The fillers in (22) (i.e. *long stories* and *Kim*) are subjects of the *tough* adjectives and occur in argument position. There is no special type of *con-struc* for relating the filler and the INHER|SLASH element but the sign for the *tough* adjective specifies the link between the subject and the INHER|SLASH value. The following is a revised version of the SYNSEM value Pollard and Sag give to *tough* adjectives. The revisions take into account the C9 shift from SUBCAT to SUBJ and COMPS.

(23)
$$\left[\begin{array}{ll} \text{LOCAL|CAT} & \left[\begin{array}{ll} \text{HEAD} & \textit{adjective} \\ \text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle \\ \text{COMPS} & \left\langle (\text{PP}[\textit{for}\,]), \text{VP}\,[\,\textit{inf}, \text{INHER} \mid \text{SLASH}\ \{\boxed{2}\text{NP}\,[\textit{acc}] : \textit{ppro}_{\boxed{1}}, \ldots\}\,] \right\rangle \end{array}\right] \\ \text{NONLOCAL|TO-BIND|SLASH} & \{\boxed{2}\} \end{array}\right]$$

The structure-sharing between the *tough* adjective's TO-BIND|SLASH value and the INHER|SLASH value on its VP complement is simply another instance of the technique that prevents an INHER|SLASH member from propagating upwards once it has been bound. The identification of filler and gap is achieved by means of the structure-sharing between the *index* of the *tough* subject and the *index* of the INHER|SLASH member. This coindexation causes the two elements to be co-referential but it does not involve the full syntactic identity that occurs in strong UDCs.

(24)




The tree in (24) summarises Pollard and Sag's analysis of the *tough* construction. In Chapters 4 and 5 I develop my own theory of *tough* constructions and I question Pollard and Sag's assumption that only a weak link is required between the *tough* subject and the object gap.

### 1.3.3 Parasitic Gaps

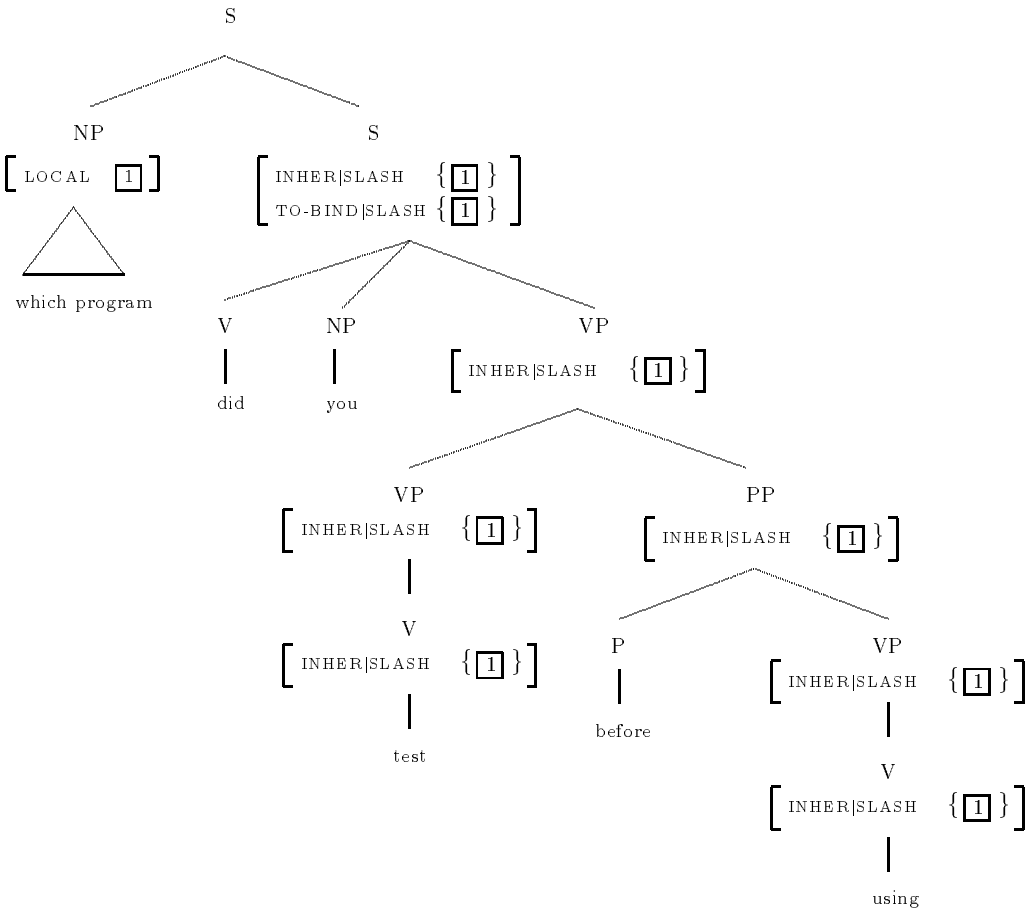
Parasitic gaps constructions, such as the ones in (25), have two gaps but a single filler, which is the antecedent to both.

(25) a. Which program do serious users of _ need a manual for _?
b. Which program did you test _ before using _?

In HPSG, parasitic gaps come about simply as a by-product of the Nonlocal Feature Principle which controls SLASH propagation (see (13) above). The Nonlocal Feature Principle requires the INHER|SLASH set on the mother to be the union of the INHER|SLASH sets on the daughters (minus the TO-BIND|SLASH value on the head). This allows for the possibility that two daughters may be specified with the same SLASH dependency which is shared with the mother.

The tree Pollard and Sag assign to (25b) is shown in (26). The element in the INHER|SLASH set on the larger VP ( 1 ) is shared with both of its daughters.

(26)




It has been frequently noted that parasitic gaps often occur in positions which are not possible sites for a lone gap. Thus the first gap in (25a) is in a subject and gaps in subjects are not normally possible. In (25b) the second gap is in the adjunct and it is generally assumed that this is not a possible gap position. On the basis of examples such as (27), Pollard and Sag claim that lone gaps in adjuncts are actually possible and so they argue that no additions are needed to describe possible gap locations in head-adjunct structures of the kind in (25b) and (27).

(27) Which program did you consult Kim before using _?

(28) *Which program are serious users of _ happy with it?

As (28) demonstrates, lone gaps in subjects are not permissible. In order to block non-parasitic gaps in subjects, Pollard and Sag formulate the Subject Condition:[14]

[14]In fact this definition does not work for the traceless account of extraction because the extracted element disappears from the COMPS list. In a footnote in Chapter 9, Pollard and Sag provide the follo-

(29) SUBJECT CONDITION

A lexical head's subject can be slashed only if one of its complements is.

In Chapters 6 and 7, I re-evaluate the HPSG treatment of parasitic gaps. I propose that there are two distinct types of parasitic gap which receive quite different analyses. I argue that the gap in the subject in (25a) is a phonologically null anaphoric element and not a UDC gap. This means that all UDC extractions from subjects can be blocked and the Subject Condition can be dispensed with. To formulate an account of such parasitic gaps as anaphoric I use the binding theory which deals with co-referentiality between NPs. In the next section I describe the HPSG binding theory and motivate some modifications to the behaviour of the SUBCAT list.

## 1.4 The HPSG Binding Theory

### 1.4.1 The Standard Version

Pollard and Sag (1994) present a theory of coindexation of referentially dependent elements which in many ways is similar to the subsystem of GB known as the binding theory. GB categorises NPs using the boolean valued features p and a (pronominal, anaphoric) and their combination gives rise to four distinct types of NP. Three of these types have overt realisations, pronouns (+p, –a), anaphors, i.e. reflexives and reciprocals (–p, +a), and R-expressions (–p, –a).[15] A category binds another category if it c-commands it and they are coindexed. Three principles express constraints on how the different kinds of NP can be bound:

(30) A. An anaphor must be bound in its governing category.
B. A pronoun must be free in its governing category.
C. An R-expression must be free everywhere.

---

wing more accurate definition which makes appeal to the SUBCAT list (via the o-command relation—see Section 1.4 for details).

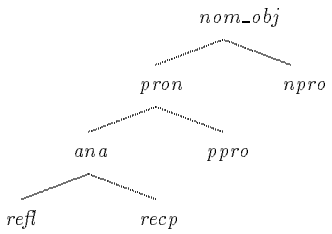
SUBJECT CONDITION (Revised)
A slashed subject can be realised as a constituent only if it locally o-commands a slashed element.

As mentioned in fn.12 in Section 1.3.1, the Complement Extraction Lexical Rule removes an element from COMPS but as a side effect the equivalent SUBCAT member becomes slashed.

[15] GB differs from other approaches in using the term 'anaphor' in a very narrow sense to mean only reflexives and reciprocals and Pollard and Sag (1994) do the same. I use the term in its wider sense to refer to any constituent which can be co-referential with an antecedent.

HPSG's binding theory is similar to the GB binding theory in that it has three principles governing the distribution of anaphors (reflexives and reciprocals), pronouns and coindexed non-pronominals respectively. In Pollard and Sag (1994), the three classes are defined as subtypes of the type *nom-obj* arranged in the type-hierarchy in (31).

(31)




The type *ana* corresponds to GB's class of anaphors, the type *ppro* corresponds to their pronouns and the type *npro* (non-pronominal) corresponds to the GB class of R-expressions.

The HPSG binding theory differs from the GB account in its definition of binding domains: GB uses c-command to define these domains but HPSG uses o-command. The 'o' is a reference to the obliqueness hierarchy which is the ordering placed on elements in the SUBCAT list. The HPSG definition is therefore not linked to configurations in tree structure but is indirectly linked to predicate-argument structure since the obliqueness ordering usually corresponds to the order of arguments of a predicate (and usually also to linear order). Informally, o-command says that a less oblique argument o-commands its more oblique co-arguments. Pollard and Sag start with a simple definition of o-command which they later refine. The simple definition is as follows:[16]

(32) DEFINITION OF (LOCAL) O-COMMAND

Let Y and Z be *synsem* objects with distinct LOCAL values, Y referential. Then

(i) Y *locally o-commands* Z just in case Y is less oblique than Z and
(ii) Y *o-commands* Z just in case Y locally o-commands X dominating Z.

(32) makes a distinction between o-command and local o-command. Local o-command is a relation between elements on the same SUBCAT list while o-command is a more complex relation between an element on a SUBCAT list and an element dominated by a more oblique

[16]The restrictions that Y be referential and that the two elements should have distinct LOCAL values stem from considerations about expletive NPs and Raising constructions respectively. I will discuss the referential restriction in more detail in the next section but will defer discussion of the distinct LOCAL value restriction to Chapter 3.

member of that SUBCAT list. The domination relation is defined in terms of the DTRS part of the feature structure.

With a definition of (local) o-command in place the concepts *o-binding* and *o-free* are defined as follows:

(33) 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*.

Again, there are local and more general specifications of these concepts. Finally, the definitions of the three binding principles are stated as follows:

(34) HPSG BINDING THEORY

Principle A. A locally o-commanded anaphor must be locally o-bound.
Principle B. A personal pronoun must be locally o-free.
Principle C. A non-pronoun must be o-free.

The following examples illustrate how the binding theory works. (35a) shows a reflexive (*ana*) bound by a local o-commander as required by Principle A. (35b) is ill-formed because it violates Principle A in that the reflexive is bound by a non-local o-commander. (36a) is ill-formed because a *ppro* is bound by a local o-commander in violation of Principle B but (36b) is fine since the *ppro* is locally o-free. (37a) and (37b) are both unacceptable because the *npro*s are locally o-bound and o-bound respectively but (37c) is well-formed because the *npro* is bound by a non-o-commander.

(35) a. Kim$_i$ looks after herself$_i$.
b. *Kim$_i$ prefers for Lee to look after herself$_i$.

(36) a. *Kim$_i$ looks after her$_i$.
b. Kim$_i$ prefers for Lee to look after her$_i$.

(37) a. *She$_i$ looks after Kim$_i$.
b. *She$_i$ prefers for Lee to look after Kim$_i$.
c. Her$_i$ mother looks after Kim$_i$.

There are two problems with the definition of (local) o-command in (32). The first relates to the unexpressed subjects of controlled complements in Equi constructions, as illustrated in (38).[17]

[17] I deal with Equi constructions in more detail in Chapter 3.

(38) a. Kim$_i$ tries _$_i$ to leave.
b. Lee persuades Kim$_i$ _$_i$ to leave.

The missing subject of the controlled complement *to leave* in (38) is coindexed to (bound by) an argument of the Equi verb. In (38a) the missing subject is coindexed to the subject of *try* and in (38b) it is coindexed to the object of *persuade*. Pollard and Sag argue that the unexpressed subjects of controlled complements in examples such as these are reflexives but the coindexation indicated would violate Principle A given the definition of local o-command in (32). Although the VPs are locally o-commanded by the antecedent NPs, the unexpressed subjects are not o-commanded by them at all and so the examples in (38) are wrongly predicted to be ill-formed. In order to maintain the treatment of unexpressed subjects of Equi controlled complements as reflexive, Pollard and Sag must revise their definition of local o-command. They achieve this revision by making appeal to the fact that controlled complements have non-empty SUBCAT lists: the controlled VP is on the same SUBCAT list as the antecedent NP and information about its unexpressed subject is contained in its SUBCAT list. This allows Pollard and Sag to treat local o-command as a relation between an element and either a more oblique member of the same SUBCAT list or an element in the SUBCAT list of a more oblique member of the same SUBCAT list.

The solution for the problem with Equi constructions points the way for Pollard and Sag to solve a second problem with the definition of o-command. This second problem concerns the fact that Pollard and Sag want to find a definition of o-command which is entirely non-configurational, i.e. they prefer a definition which makes no reference to tree-configurational notions. As it stands, their definition of local o-command is non-configurational but their definition of o-command uses the concept of domination which is understood in terms of the tree-structure encoded in the DTRS feature. The solution to this problem is to access non-local elements not through DTRS information but through SUBCAT information. Loosely speaking, an element o-commands all the members of the SUBCAT lists of the heads of the elements it locally o-commands.

The following revised definitions of local and general o-command incorporate Pollard and Sag's solutions to the two problems just discussed.

(39) DEFINITION OF LOCAL O-COMMAND (revised)

Let Y and Z be *synsem* objects with distinct LOCAL values, Y referential. Then Y *locally o-commands* Z just in case either:

(i) Y is less oblique than Z; or
(ii) Y locally o-commands some X that subcategorises for Z.

(40) DEFINITION OF O-COMMAND (revised)

Let Y and Z be *synsem* objects with distinct LOCAL values, Y referential. Then Y *o-commands* Z just in case either:

(i) Y is less oblique than Z; or
(ii) Y o-commands some X that subcategorises for Z; or
(iii) Y o-commands some X that is a projection of Z (i.e. the HEAD values of X and Z are token-identical).

The first two points of the two definitions are very similar and indeed, Pollard and Sag say that cases of local o-command are exactly those cases of o-command which do not involve clause (iii) of (40).

The diagrams in (41) illustrate the o-command relations in (36b) and (37c) respectively. The relevant SUBCAT lists are indicated in angle brackets and the projection relation is indicated by a vertical dotted line. In (41a) the antecedent o-commands the *ppro* to which it is coindexed by virtue of the fact that it o-commands an element which is a projection of the head that subcategorises the *ppro*. In (41b) the coindexation between the antecedent and the *npro* is permitted because the antecedent does not o-command the *npro*.

(41) a. prefer: ⟨ $NP_i$ , S ⟩
look-after: ⟨ NP , NP[ *ppro*] $_i$ ⟩

b. look-after: ⟨ NP , NP[ *npro*] $_i$ ⟩
mother: ⟨ $DetP_i$ ⟩

Pollard and Sag claim that their new definition of o-command makes the binding theory totally non-configurational. However, since clause (iii) of (40) involves accessing the head of a phrase in order to reach elements on its SUBCAT list and since the only route to the head of a phrase is through the DTRS feature, it is not at all clear to me that this claim is correct. In the next section I will propose a modification which definitely does permit the binding theory to be stated non-configurationally.

### 1.4.2 The C9 Revisions and Further Modifications

In the standard version of HPSG, the SUBCAT list has two purposes: it encodes information about how arguments are to be syntactically realised and it serves as the domain in which the binding theory operates. In the C9 revisions, Pollard and Sag replace the SUBCAT list by the valence features SUBJ, COMPS and SPR but this only replaces it in its function as the locus of information about syntactic argument structure. Pollard and Sag suggest that the SUBCAT list must be retained in addition to the valence features since it is still needed for the binding theory. They hypothesise that the SUBCAT list is the list concatenation of the values of SUBJ, SPR and COMPS in that order, but they fairly quickly overturn this hypothesis when they notice that the Complement Extraction Lexical Rule (see Section 1.3.1) removes an element from COMPS without also removing it from SUBCAT. In my analysis of Raising constructions in Chapters 3 and 5, I will exploit the possibility of a mismatch between the valence features and SUBCAT.

Beyond their brief discussion of the relationship between SUBCAT and the valence features, Pollard and Sag do not explore the consequences of the fact that SUBCAT is now only used for the binding theory. I propose a change in the behaviour of SUBCAT which simplifies the statement of o-command. In its initial incarnation SUBCAT is used to control the syntactic realisation of arguments and, as a phrase is built and arguments are realised, SUBCAT loses its members until, in a completely saturated phrase, SUBCAT is empty. With the C9 revisions, SUBCAT does not play a role in the process of argument realisation and so there is no need to assume that it loses members as a phrase is built. I propose that a SUBCAT list simply propagates with no modification from a head to its mother so that phrasal categories will contain in their SUBCAT list a complete record of their argument structure.[18] In clause (iii) of (40) the arguments of a subcategorised phrase can only be accessed by looking at the head of that phrase because this is the place where the SUBCAT list is complete. In a version of the theory incorporating my suggestion that SUBCAT is propagated but is not modified, there is no need to access the head of a phrase because the information is readily available in the SUBCAT list of the phrase itself. A further revised definition of (local) o-command is shown in (42):

[18] One way to propagate the SUBCAT list is to make it part of HEAD and therefore subject to the Head Feature Principle. A second way would be to have a separate principle governing the propagation of SUBCAT. I remain agnostic as to which would be preferable.

(42) DEFINITION OF (LOCAL) O-COMMAND (further revised)

Let Y and Z be *synsem* objects with distinct LOCAL values.
Then Y *locally o-commands* Z just in case either:

(i) Y is less oblique than Z; or
(ii) Y locally o-commands some X whose SUBCAT and SUBJ lists contain Z;

and Y *o-commands* Z just in case either:

(iii) Y locally o-commands Z; or
(iv) Y o-commands some X whose SUBCAT list contains Z.

Here the definition of general o-command is very easily stated and there is no recourse whatsoever to notions of configurationality. The only complexity lies in the second clause of the definition of local o-command which deals with the case of unexpressed subjects of Equi controlled complements. As explained above, these are reflexive and therefore need to be locally o-commanded by their controllers in order that the Equi coindexation pattern should be acceptable to the binding theory. In order to access unexpressed arguments of controlled complements, it is necessary to use membership of the SUBJ list as an additional requirement.

Notice that I have dropped the condition that the o-commander should be referential. Pollard and Sag include this condition to prevent expletive NPs from being considered to be o-commanders and this is specifically related to their treatment of reflexives and reciprocals (NPs of type *ana*). Their theory is that *ana* NPs must be locally o-bound if they have a local o-commander (Principle A) but otherwise they are exempt from the binding theory and can be coindexed by some other method. This permits the reflexive in (43a) and the reciprocal in (43b) to be coindexed to an element which is not a local o-commander. The reflexive in (43a) is the only member of the SUBCAT list of the noun *rumours* and similarly the reciprocal in (43b) is the only member of the SUBCAT list belonging to *parents*. This means that neither has a local o-commander and therefore both are exempt from the binding theory and free to be coindexed by some other mechanism.

(43) a. Belinda$_i$ wondered whether [ those rumours about herself$_i$ ] had reached Max's ears.

b. [ Max and Belinda ]$_i$ assumed that [ each other's$_i$ parents ] would bail them out.

In certain examples involving expletive subjects, reflexives and reciprocals can be bound by an element which is not a local o-commander, as illustrated in (44), taken from Pollard and Sag (1994).

(44) a. They$_i$ made sure that it was clear to each other$_i$ that this needed to be done.
b. They$_i$ made sure that it was clear to themselves$_i$ that this needed to be done.

In the standard version of the theory, the *ana* elements (44) appear to have expletive *it* as a local o-commander yet they are able to be coindexed non-locally. Pollard and Sag's restriction in the definition of o-command that the o-commander should be referential is designed to solve this problem. Since only a referential object can be an o-commander it follows that the reflexive and the reciprocal in (44) do not actually have local o-commanders and are therefore exempt from the binding theory and free to be bound by some other method.

Once the C9 changes are adopted and the SUBCAT list is no longer involved in the syntactic realisation of arguments, there is no longer a need to include expletive elements in SUBCAT lists. I propose that only elements which are assigned a role with respect to the predicate in the semantic part of a sign should be included in the SUBCAT list corresponding to that predicate. This amounts to the claim that only role-assigned elements are relevant to the binding theory. The adoption of this proposal means that the referential specification in the definition of o-command can be dropped. The new proposal is a departure from Pollard and Sag's original hypothesis that the SUBCAT list contains the same elements as the combined SUBJ, COMPS and SPR lists but they themselves depart from this and, in fact, there is much to be gained from recognising a clear difference between the two kinds of list which reflects the different roles they play. The valence features are responsible for ensuring that a head combines syntactically with its syntactic arguments but the SUBCAT list is concerned with coindexation and co-reference and it is fitting that it should contain only elements which have a semantic identity.[19] In Chapter 3, I will exploit this aspect of the SUBCAT list to good effect in connection with Raising constructions.

[19]In the light of the fact that SUBCAT is only concerned with binding relations, it might be appropriate to change its name to, say, BINDING. In the interests of continuity, I will not do so here.

# Chapter 2

# Case-Marking in HPSG

As I explained in Chapter 1.1, my account of MOCs and parasitic gaps will require some quite extensive changes to parts of HPSG. Along with these larger changes, there are a number of smaller changes which are independently motivated but which are required because of interactions between different parts of the theory. In Chapter 5, I will argue that there is a Raising relationship between the *tough* subject and the missing object in a *tough* construction. Within HPSG as formulated in Pollard and Sag (1994) this analysis is problematic because of case-marking. In order to show that case-marking does not invalidate my analysis of MOCs I must revise Pollard and Sag's account of case-marking. In this chapter, therefore, I examine case-marking in HPSG and propose a modification of the Pollard and Sag (1994) account of English case assignment which better reflects the fact that case-marking in English is structurally determined. In Section 2.1, I describe the distinction between structural and lexical case and in Section 2.2 I adapt the Heinz and Matiasek (1994) analysis of German case-marking to English. In Section 2.3 I show that some beneficial consequences (which are quite independent of my analysis of MOCs) follow from the new account.

## 2.1 Structural and Lexical Case

Pollard and Sag (1994) deal only briefly with the question of how NPs become marked for case. Their assumption is that case-marking is part of subcategorisation: the list values of the valence features of a lexical head specify the categorial status of each argument and, for NP arguments, this usually includes a specification for CASE. For example, (1) shows the SYNSEM|LOC value for the finite verb *kicks* and it can be seen that the SUBJ and COMPS lists constrain the subject and the object to be marked as *nom(inative)* and *acc(usative)*

respectively.

(1)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & verb[fin] \\ \text{SUBJ} & \langle \boxed{1}\text{NP}[nom]\,\boxed{3}\rangle \\ \text{COMPS} & \langle \boxed{2}\text{NP}[acc]\,\boxed{4}\rangle \\ \text{SUBCAT} & \langle \boxed{1}, \boxed{2}\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{KICKER} & \boxed{3} \\ \text{KICKED} & \boxed{4} \end{array}\right] \\ & kick \end{array}\right]$$

English has a comparatively impoverished case system, however, and it seems that a distinction between case-marking which is determined by a lexical head and case-marking which reflects structural position is required for languages with more complex case systems.[1] Just such a distinction is made in GB: Chomsky (1981) distinguishes 'structural' from 'inherent' case-marking and Haider (1985) uses the terms 'structural' and 'lexical'. Within HPSG, Sag, Karttunen and Goldberg (1992) use the features CASE and DCASE (D for default) to distinguish between lexical and structural case respectively in their analysis of Icelandic case-marking and Pollard (1994) and Heinz and Matiasek (1994) make a distinction between structural and lexical case in their treatments of German. The following German examples taken from Heinz and Matiasek illustrate the distinction:

(2) a. Der Mann unterstützt mich
The man (nom) helps me (acc)
'The man is helping me'

b. Der Mann hilft mir
The man (nom) helps me (dat)
'The man is helping me'

The verbs *helfen* and *unterstützen* in (2) (which can both translate into English as *help*) differ in the case-marking of their objects. The normal, 'default' case-marking for German direct objects is accusative and when a direct object receives accusative case this is thought to be structural case-marking—i.e. the NP is accusative by virtue of its occurring in object position. The object of *unterstützen* is marked in this way. By contrast, some German direct objects receive dative case, as with *helfen*, and here the case-marking is entirely dependent on the verb. The lexical entry for the verb dictates that the object must be marked as dative and so this is an instance of lexical case-marking. It can be demonstrated that the case-marking of the object of *unterstützen* is structural while that of the object of *helfen* is lexical by considering how they behave under passivisation, as shown in (3). The argument of *unterstützen* which is

[1] This point is acknowledged by Pollard and Sag (p.30, fn.25).

the object in the active is realised as the subject in the passive and receives nominative case. This shows that case-marking of this NP is structural since it varies according to position. For the dative argument of *helfen*, on the other hand, case must be lexical since this NP is dative irrespective of whether it surfaces as an active object or a passive subject.

(3) a. Der Kunde wird unterstützt
The customer (nom) is helped
'The customer is helped'

b. Dem Kunden wird geholfen
The customer (dat) is helped
'The customer is helped'

(4) a. Ihn dürstet
Him (acc) is thirsty
'he is thirsty'

b. Mir graut
Me (dat) horrifies
'I am horrified'

The default case-marking for German subjects is nominative, as exemplified by the subjects of active *unterstützen* and *helfen* in (2). This case-marking is structural, i.e. a consequence of structural position rather than of properties of the verb. In the examples in (4) the single arguments of the verbs *dürsten* and *grauen* are marked as accusative and dative respectively and this case-marking is lexical.[2]

To handle the two different kinds of case-marking, both Heinz and Matiasek (1994) and Pollard (1994) introduce the type *str(uctural)* as a possible value for the feature CASE. This type is a non-maximal type assigned to subcategorised NPs by verbs in the lexicon and it becomes more specific only when the verb actually combines with the argument. The lexical entries for the four verbs in (2) and (4) would have the following SUBCAT values in Heinz and Matiasek's account.[3]

(5)

| | |
|---|---|
| unterstützen | ⟨NP[*str*], NP[*str*]⟩ |
| helfen | ⟨NP[*str*], NP[*dat*]⟩ |
| dürsten | ⟨NP[*acc*]⟩ |
| grauen | ⟨NP[*dat*]⟩ |

Pollard does not make a concrete proposal about how *str* is to become realised as *nom* on subjects and *acc* on objects since he perceives this to be problematic. He suggests that a

[2] Whether or not these were thought to be subjects would depend on theory internal considerations.

[3] Pollard adopts the SUBJ/COMPS approach to subcategorisation but Heinz and Matiasek retain the old SUBCAT list. I reproduce their examples here since I am not sure whether the NPs in (4) belong in the SUBJ list or the COMPS list.

mechanism that realises structural case must either involve a default principle of case assignment or be one which refers to tree configuration (the information in the DTRS feature). The first option involves two steps: (i) use the lexical rule which creates finite verbs to assign *nom* to their *str* subjects and *acc* to their *str* objects and (ii) appeal to the notion that *acc* is the default for all other instances of *str* (for instance in the valence feature lists of non-finite verbs). This option is problematic since it is not clear how to formalise such defaults. Pollard finds the second option unattractive because HPSG has a "traditional aversion" to notions based on tree-configurationality.[4]

Heinz and Matiasek make a proposal about how *str* is to be realised and their account is an instance of Pollard's second option of appealing to tree configurationality. They formulate a Case Principle which causes *str* to be realised as either *nom* or *acc* and which operates on signs whose DTRS value is of type *head-comp-struc*. Furthermore, the part of the feature structure that the principle operates on is the SUBCAT list of the head-daughter.

## 2.2 Case-Marking in English

There is a degree of inconsistency between the account of German case-marking in Pollard (1994) and Heinz and Matiasek (1994) and the account of English case-marking in Pollard and Sag (1994). In Pollard and Sag (1994), case is assigned to English NP arguments in the SUBCAT lists of their heads and, in terms of the structural versus lexical distinction, this amounts to a claim that English case-marking is lexical. This claim would be counterfactual since the evidence actually points to English case-marking being predominantly, if not wholly, structural—the case-marking of all NP arguments of verbs in English depends on whether they occur as subjects or objects, and if as subjects, whether they are subjects of finite verbs or of non-finite verbs.[5]

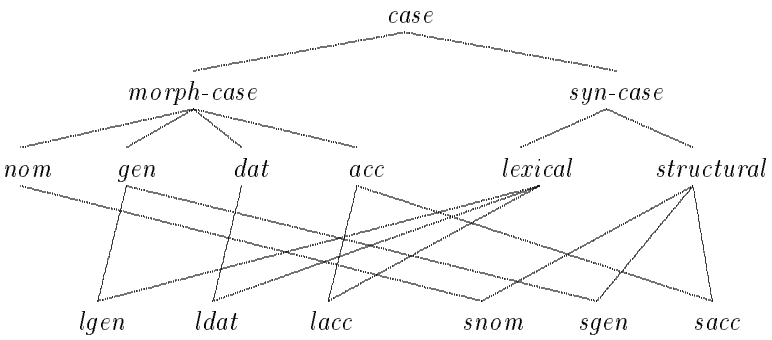
In this section I will propose for English a much simplified version of Heinz and Matiasek's account of German case-marking. The general advantage of this approach is that it acknowledges that English case-marking is structural rather than lexical but it also has more specific benefits which I will detail in Section 2.3.

[4]In their account of Icelandic quirky case, Sag, Karttunen and Goldberg (1992) take the second option for assigning nominative case as the default for subjects: they assume that the grammar rule that introduces the subject will mark the DCASE (default case) value as *nom*.

[5]Chomsky (1981, p.171) suggests that the second object in double object constructions, e.g. *a book* in *John gave Bill a book*, might have inherent (i.e. lexical) case rather than structural case. Later on (p.292), he speculates that "English has lost the inherent Case system".

In order for their account of German to work, Heinz and Matiasek propose quite a complex subpart of the type-hierarchy for the type *case*, which I reproduce in (6).

(6)




On the assumption that all case-marking in English is structural, it is unnecessary to make the distinctions that Heinz and Matiasek make and, in fact, the simple partitioning of the type *case* into *nom* and *acc* as in Pollard and Sag (1994) is sufficient. It must be borne in mind, however, that the type *case* in the English type-hierarchy behaves analogously to the type *structural* in the German hierarchy in that the more specific sub-types of *case* are not specified on NPs in the valence feature lists of lexical items. These NPs will become more specifically marked for case but this happens in the DTRS part of the feature structure at the point of combination of the head with the NP. The lexical entries even of finite verbs do not specify the case of their NP arguments, thus the SYNSEM|LOC value in the lexical entry for *kicks* will be as shown (7) rather than as in (1).

(7)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \textit{verb}[\textit{fin}] \\ \text{SUBJ} & \langle \boxed{1}\,\text{NP}\,\boxed{3}\rangle \\ \text{COMPS} & \langle \boxed{2}\,\text{NP}\,\boxed{4}\rangle \\ \text{SUBCAT} & \langle \boxed{1}, \boxed{2}\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{KICKER} & \boxed{3} \\ \text{KICKED} & \boxed{4} \end{array}\right] \\ & \textit{kick} \end{array}\right]$$

In order that appropriate case values are acquired, I follow the Heinz and Matiasek analysis in introducing a Case Principle. This can be stated as follows:

(8) THE CASE PRINCIPLE

(i) In a feature structure of type *comps-head-struc*, any NPs in the COMPS list of the head daughter are [CASE *acc*].

(ii) In a feature structure of type *subj-head-struc*, the first NP in the SUBJ list of the head daughter is [CASE *nom*] if the head is specified as [VFORM *fin*] or [VFORM *bse*] and [CASE *acc*] otherwise.[6]

The effect of the new account is to remove the responsibility for case-marking from verbs and other subcategorising heads and to assign case in valence feature lists only at the point where a head combines with an argument, i.e. inside the DTRS feature on phrasal signs. This means that the subject in (9a) is constrained to be nominative because it occurs in a feature structure of type *subj-head-struc* where the head is finite and because its synsem value is structure-shared with the single member of the VP's SUBJ list. The subject of *kick* in (9b) structure-shares with the object of *expected* since *expect* is an object raising verb. Its accusative case-marking is dictated by neither verb, however, but is simply a consequence of the fact that it occurs as a daughter in a *comps-head-struc*.

(9) a. She kicks the ball.
b. Kim expected her to kick the ball.

In following Heinz and Matiasek's lead, I have developed an account of English case-marking which reflects the fact that, for English, case-marking is structural rather than lexical. In so doing I have adopted Pollard's second strategy which makes reference to tree-configuration. In spite of Pollard's objection that HPSG theory would want to avoid tree-configurationally-based constraints, it does seem that this account comes closer to capturing the true nature of English case-marking.

## 2.3 Some Consequences

In this section I investigate some small problems with the version of HPSG in Pollard and Sag (1994) and show how they are solved by the new account of case-marking.

### 2.3.1 Subjects of Non-finites

In the lexically-based account of case-marking in Pollard and Sag (1994) there is a problem relating to the case-marking of subjects of non-finites. Pollard and Sag assume that finite verbs assign nominative case to their subjects but that non-finite verbs and predicative non-verbals leave their subjects unspecified for case. The problem here is that they do not specify how the correct case-marking for such subjects can be ensured and it is hard to see how they can prevent the incorrect case being assigned to the subjects of the non-finite verbs in (10).

[6] On the assumption that *arrive* in *I require that he arrive on time* is the [VFORM *bse*] form, I assume that base form verbs occur with a nominative subject.

(10) a. It would be possible for him (*he) to be promoted.
b. It was decided that he (*him) be promoted.
c. Him (*he) being promoted made us all glad

Notice that Pollard and Sag cannot allow non-finite heads to assign case to their subjects since this would predict many instances of subject raising to be ill-formed owing to a clash in case-marking requirements.[7] In (11), the entire SYNSEM of the subject of *tends* structure-shares with the SYNSEM of the subject of *to talk too much*. If the finite *tends* assigns nominative case to its subject and the infinitive *to* assigns accusative case to its subject then a clash in case assignments would result. Furthermore, presumably the base form verb *talk* would try to assign nominative to the common subject and this would mean a second clash with the needs of the infinitive.

(11) He tends to talk too much.

If Pollard and Sag cannot permit non-finites to assign case to their subjects then they will need some other mechanism to perform this case-marking. The account developed in the previous section is a good candidate since it achieves the correct case-marking in (10) and doesn't predict a case conflict for (11). But if Pollard and Sag need the Case Principle for the examples in (10) then it would seem logical to adopt the whole of the new account rather than have some NPs case-marked lexically while some are marked structurally. This suggests that a recognition that English case-marking is structural is inevitable.

### 2.3.2 Passive and Case-marking

Pollard and Sag (1987) use a lexical rule to derive lexical entries for passive verbs from entries for base form transitive verbs. This lexical rule is shown in (12).

(12)
$$\underset{base \wedge trans}{\left[\begin{array}{ll} \text{PHONOLOGY} & \boxed{1} \\ \text{PAST-PART} & \boxed{2} \\ \text{SYN|LOC|SUBCAT} & \langle \ldots, [\,]_{\boxed{3}}, [\,]_{\boxed{4}} \rangle \\ \text{SEM|CONT} & \boxed{5} \end{array}\right]} \Rightarrow \underset{passive}{\left[\begin{array}{ll} \text{PHONOLOGY} & f_{PSP}(\boxed{1}, \boxed{2}) \\ \text{SYN|LOC|SUBCAT} & \langle (PP[BY]_{\boxed{4}}), \ldots, [\,]_{\boxed{3}} \rangle \\ \text{SEM|CONT} & \boxed{5} \end{array}\right]}$$

[7] I am grateful to Elisabet Engdahl for drawing this problem to my attention.

The feature system has changed considerably since Pollard and Sag (1987), as has the order of elements on the SUBCAT list. The only point about (12) that I want to make here, however, is that contrary to what we might have expected, the object NP in the input SUBCAT list is not completely identified with the subject NP in the output SUBCAT list. The two categories share the same index but they are not required to share major category attributes. Assuming that there is some way to ensure that both will be realised as NPs, this may not have any deleterious consequences since information about whether an NP is referential or expletive resides in the index and will therefore be retained. There are two cases, however, which indicate that the NP should be entirely structure-shared between input and output. The first case concerns passivisation of object raising verbs—the relevant examples are shown in (13).

(13) a. Thomas believes there to be hedgehogs in the garden.
b. There are believed to be hedgehogs in the garden.

In (13a) the object is the Raising controller and in the passive version in (13b) this same element is still the controller even though it is now realised as the subject. The relation between Raising controllers and controllees is encoded as a structure-sharing of entire *synsem* objects but with the formulation of passive in (12) this structure-sharing would be destroyed in the output of passive.[8] Instead of retaining the controller element in the output, a new NP would be introduced which had the same index as the original controller but which was not token identical to the controllee. It is possible that some other part of the grammar could reinstate the Raising relationship but there would be no need for this if passive was formulated with complete structure-sharing rather than just coindexation.

The second case that is relevant here concerns idiomatic phrases which permit passivisation. With these the idiomatic reading is retained, as illustrated in (14). Assuming that the passive lexical rule is responsible for these examples, this would seem to suggest that the entire object should be shared between input and output.

(14) a. I knew it wouldn't be long before the cat was let out of the bag.
b. Advantage was always being taken of her because she was so kind.

In sum, it seems a odd that the entire category is not structure-shared and the obvious explanation for lack of sharing seems to be case-marking: if the object of the base form is constrained to be accusative then complete structure-sharing would mean that the subject of

[8] See (29) in Chapter 3 for an example of an object raising sign.

the passive would be required always to be realised by an accusative NP and, as (15) shows, this is not the case.

(15) He (*him) was kicked.

With the new account of structural case-marking, neither the input nor the output of the passive lexical rule would assign case to the subcategorised arguments and case-marking would therefore not be a block to requiring structure-sharing of the entire *synsem* object which represents the active object and passive subject. In (16) I show a revised version of the passive lexical rule which has been updated to take account of the more recent feature system and type-hierarchy as well as the C9 revisions. Notice that the argument in question is completely structure-shared between input and output valence feature lists and that this is not marked for case since its case value will be structurally determined by the Case Principle.

(16) PASSIVE LEXICAL RULE

$$\left[\begin{array}{ll} \text{PHON} & \boxed{1} \\ \text{SYNSEM|LOC} & \left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \left[\text{VFORM } \textit{bse}\right] \\ \text{SUBJ} & \langle \boxed{2}\text{NP}\,\boxed{3}\rangle \\ \text{COMPS} & \langle \boxed{4}\text{NP},\ldots\rangle \\ \text{SUBCAT} & \langle \boxed{2},\boxed{4},\ldots\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \textit{transitive} \end{array}\right] \end{array}\right] \Rightarrow$$

$$\left[\begin{array}{ll} \text{PHON} & f_{PSP}(\boxed{1}) \\ \text{SYNSEM|LOC} & \left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \left[\text{VFORM } \textit{pas}\right] \\ \text{SUBJ} & \langle \boxed{4}\rangle \\ \text{COMPS} & \langle\ldots,(\boxed{5}\text{PP}[\textit{by}]\,\boxed{3})\rangle \\ \text{SUBCAT} & \langle \boxed{4},\ldots,\boxed{5}\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \textit{transitive} \end{array}\right] \end{array}\right]$$

### 2.3.3 Subject Raising Entries

In Section 2.3.1, I pointed out that finite subject raising verbs cause difficulties for an attempt at lexically assigned case because of a clash between their putative need to assign nominative case to the raised subject and the putative need of the infinitive controlled complement to assign accusative case to the same element. There is another respect in which a lexically based treatment of case-assignment would cause inconvenience for the analysis of subject raising verbs. This stems from the fact that subject raising predicates can occur with non-NP subjects, as illustrated in (17).

(17) a. That Kim is a habitual liar tends to bother Lee.
b. To get rich quick seems to be Lee's first priority.
c. In the bath appears to be where Sandy has her best ideas.

In signs for subject raising verbs (see, for example, (37) in Chapter 3), controller and controllee are structure-shared *synsem* objects. The controller occurs in the SUBJ list of the raising verb and the controllee occurs in the SUBJ list of its controlled complement. There is no specification of the categorial status of the controller/controllee element in order that the controller can be realised as whatever category the embedded verb requires as its subject. If finite Raising verbs were to lexically assign nominative case to their NP subjects then there would need to be more than one lexical entry for finite subject raising verbs: one for the case where the controller is realised as an NP and at least one other entry for non-NP subjects. This conclusion follows from the fact that only NPs have a specification for CASE and therefore a lexical assignment of CASE would constrain the controller to be an NP. With my proposed shift to structural case assignment via the Case Principle there is no problem with the existing entries for subject raising verbs and there are no unnecessary complications in the lexicon. Notice that exactly the same problem arises with the auxiliaries and some modals which also inherit their subject requirements from their unsaturated complements.

### 2.3.4 Case Marking and Unbounded Dependencies

As I described in Section 1.3, Pollard and Sag (1994) divide unbounded dependency constructions into two classes, weak UDCs and strong UDCs. Strong UDCs include topicalisations, *wh*-questions and *wh*-relatives and they have the property of 'strong connectivity'. This means that filler and gap are strongly identified with one another to the extent that they share all *local* information, including their case value. The examples in (18) illustrate.

(18) a. Him (*he), Lee really can't stand $\__{acc}$ .
b. The person who (*whom) Lee said $\__{nom}$ robbed the bank

In the initial analysis of UDCs in Pollard and Sag (1994), an object gap is treated as a phonologically null constituent, i.e. trace. For the purposes of case assignment this means that it is no different from a normal object and can receive accusative case via the Case Principle. This case marking is transmitted to the filler as a result of structure-sharing of LOCAL values. Subject gaps receive a traceless analysis, however, and in the C9 version of Pollard and Sag (1994) a traceless account is also proposed for object gaps. The traceless account causes SLASH dependencies to arise by using lexical rules to rearrange items between the COMPS list and the INHER|SLASH set on lexical items.

In the case of extracted subjects of embedded finite clauses, the Subject Extraction Lexical Rule affects lexical items which subcategorise a finite sentential complement by replacing the finite S in their COMPS list with a finite VP whose SUBJ requirement is structure-shared with an element in their INHER|SLASH set. For extracted complements, the Complement Extraction Lexical Rule effectively moves a complement from the COMPS list to the INHER|SLASH set. This means that case-marking of the extracted element cannot be the result of the Case Principle as it is formulated in (8) since the item in question is not found in the COMPS or the SUBJ list of the head daughter but in its INHER|SLASH set instead. In order for extracted elements to receive the appropriate case-marking either the Extraction Lexical Rules must be reformulated so that they perform case assignment *en passant* or the Case Principle must be augmented to deal with these cases. The first option is undesirable because the Extraction Lexical Rules do not make reference to syntactic category and an attempt to case-mark an NP which was moved to the INHER|SLASH set would involve making a more specific set of rules, one for each possible extracted category. The second option requires an additional clause to be added to the Case Principle. The revised Case Principle is shown in (19): the third clause is the new one.

(19) THE CASE PRINCIPLE (revised)

(i) In a feature structure of type *comps-head-struc*, any NPs in the COMPS list of the head daughter are [CASE *acc*].

(ii) In a feature structure of type *subj-head-struc*, the first NP in the SUBJ list of the head daughter is [CASE *nom*] if the head is specified as [VFORM *fin*] or [VFORM *bse*] and [CASE *acc*] otherwise.

(iii) If a lexical sign has an NP in its INHER|SLASH set then that NP is [CASE *nom*] if the sign has a finite VP in COMPS and [CASE *acc*] otherwise.

The new clause affects lexical signs which have an NP in their INHER|SLASH set. I assume that the only such signs will be outputs of the Extraction Lexical Rules. The outputs of the Subject Extraction Lexical Rule will always have a VP[*fin*] in their COMPS list and the extracted NP must be *nominative*. (No verb directly subcategorises a VP[*fin*] complement so the only place where they will occur is as a result of the Subject Extraction Lexical Rule.) The outputs of the Complement Extraction Lexical Rule will never have a VP[*fin*] in their COMPS list and the extracted NP must be *accusative*.

# Chapter 3

# Control Constructions in HPSG

In this chapter I discuss Raising and Equi constructions, examples of which are shown in (1)–(4). These are constructions where a verb, adjective or noun subcategorises for an unsaturated complement (shown in square brackets in (1)–(4)). Unsaturated complements are phrases such as non-finite VPs and predicative NPs and APs which are lacking a subject. Although the complement lacks a syntactically realised subject, a semantic interpretation for the subject argument is not lacking because Equi and Raising predicates impose a link between the missing subject of their unsaturated complement and one of their other arguments. Thus, the italicised NPs in (1)–(4) are interpreted as coreferential with the unexpressed subjects of the unsaturated complements—these NPs are often referred to as 'controllers' and the unexpressed subjects of the complements as 'controllees'.

(1) a. *Cinderella* wanted VP[ to go to the ball ].
b. *Jack* was eager VP[ to climb the beanstalk ].

(2) a. *The troll* seemed AP[ rather bad-tempered ].
b. *A hero* is certain VP[ to be handsome ].

(3) a. Rapunzel relied on *the prince* VP[ to rescue her ].
b. The prince asked *Cinderella* VP[ to marry him ].

(4) a. Everyone expected *the frog* VP[ to turn into a prince ].
b. The step-sisters considered *themselves* AP[ beautiful ].

(1) and (3) are Equi examples and (2) and (4) are Raising examples. In (1) and (2) the controllers are the subjects of the Raising or Equi predicates while in the examples in (3) and (4) the controllers are their objects.

It is quite common to discuss Raising and Equi together but in spite of superficial similarities, the two constructions are often thought to be quite distinct. For this reason there is no

universally agreed cover term for the two constructions. I will follow the lead of Gazdar et al. (1985), Bresnan (1982a), Klein and Sag (1985) and Dowty (1985), among others, in using the term 'control construction' as a cover term for Raising and Equi.[1] It should be noted, however, that this use of the term 'control' diverges from its use in the GB literature where 'control' is a more recent term for Equi constructions. It should also be noted that Pollard and Sag (1994) follow the GB lead in using 'control' to refer only to Equi. It is unfortunate that my use of terminology differs from Pollard and Sag's but there is really no other suitable cover term for Equi and Raising available. I will refer to examples such as those in (1) and (2) as 'subject control constructions' to reflect the fact that it is the subject of the control verb which is the controller. Similarly, I will refer to examples like those in (3) and (4) as 'object control constructions' because in these the object is the controller. I will cross-classify examples according to whether they are Equi or Raising using the terms 'subject raising', 'subject equi', 'object raising' and 'object equi' where the term 'subject raising' is a gloss for 'subject control with a Raising relation' and so on.[2]

The purpose of this chapter is to discuss how control constructions are analysed in HPSG in order to lay the foundations for my treatment of MOCs in Chapter 5. In Section 3.1, I provide a brief overview of control and describe the differences between Equi and Raising constructions. In Section 3.2, I describe the standard HPSG account of control as found in Pollard and Sag (1994) (which is based on Sag and Pollard (1991)). In Section 3.3, I update the standard account to make it compatible with the C9 revisions and I also suggest some modifications which are independently motivated but which contribute to the analysis of MOCs in Chapter 5.

## 3.1 A Brief Overview

### 3.1.1 Approaches to Control Constructions

Every treatment of control constructions must propose a means of dealing with the fundamental problem of a type mismatch between the syntactic form of the controlled complement and its semantic interpretation. At some level of interpretation, the missing subject argument

[1] LFG, as described for example in Bresnan (1982a) and Mohanan (1983a) makes a distinction between 'functional' control and 'anaphoric' control. With functional control, a controller must be present and in a given local argument position. With anaphoric control, the controller need not be present and its position may vary. Bresnan (1982a) explicitly states that Raising is a type of functional control. Equi may be either functional or anaphoric.

[2] Relational Grammar (Perlmutter 1984) uses the term 'object raising' to refer to the *tough* construction and the term 'raising to object' to refer to what I call 'object raising'.

of the controlled complement is resolved to be coreferential with its controller and this means that at some point the semantic type of the controlled complement is a proposition. Yet syntactically, controlled complements are non-sentential phrases which do not denote propositions. The problem is how to reconcile the mismatch and in their solution to this problem accounts of control fall broadly into two classes, depending on whether they represent the controlled complement at logical form as a proposition or as a property (where a property is a function from NP denotations to propositions). I will refer to the two types of theory as propositional and property-theoretic respectively. Accounts of control also differ as to what syntactic category they assign to controlled complements: they appear to be VPs, NPs and APs and some accounts treat them as such while other accounts treat them as sentential complements whose subjects are not phonologically realised. I will refer to these respectively as non-sentential and sentential accounts of control.

Since Rosenbaum (1967), transformational grammar in all its incarnations has adopted a propositional, sentential account of control. In GB (cf. Manzini 1983), an Equi controlled complement is an S with a [+a,+p] empty subject (PRO) and a Raising controlled complement is an S containing an NP trace in subject position which results from movement of the raised constituent. In both cases there is no mismatch between syntactic and semantic type and the propositional approach to the semantics of control is taken.

At the other end of the spectrum, Chierchia (1984) and Dowty (1985) advance a property-theoretic, non-sentential approach. They assume that controlled complements are the VPs, APs and NPs that they appear to be and that these have the semantic type property rather than proposition. Equi and Raising verbs denote relations between NP denotations and properties and so for Dowty and Chierchia there is no type mismatch. The fact that the controller and the controllee are coreferential is simply a question of lexical entailments associated with Equi and Raising verbs.

Jacobson (1990) refers to the Chierchia/Dowty analyses of Equi and Raising as LE Equi and LE Raising respectively (LE for lexical entailment) and she accepts LE Equi entirely. She highlights a number of problems with LE Raising, however, and proposes that Raising is best dealt with by means of function composition, not just in the semantics but also in the syntax (and this entails using categorial grammar as the syntactic component). Jacobson's composition account of Raising treats Raising predicates as functions from propositions to propositions so this is a propositional, non-sentential approach to Raising where the type

mismatch is resolved by the use of function composition.

In the GPSG framework, Klein and Sag (1985) propose a propositional, non-sentential account of both Equi and Raising which requires special treatment for control predicates to deal with the syntax/semantics mismatch. They assume that controlled complements have no syntactic subjects and that semantically they are properties but they have a process of functional realisation which causes the properties to be applied to controller denotations with the result that the final logical forms for control sentences contain propositions not properties. The price associated with this approach is that specialised functions have to be invoked for Equi and Raising predicates in the translation to logical form. In the case of Raising the specialised function is equivalent to the standard function composition operator so in this sense the GPSG approach to Raising is comparable to Jacobson's although it does not include function composition in the syntax.

Although GPSG and HPSG differ quite considerably in the way they model the relationship between syntax and semantics, the HPSG account of control in Pollard and Sag (1994) can still be seen as a descendent of the GPSG one: syntactically the controlled complements are non-sentential but the account is a propositional one. I describe the HPSG approach in more detail in Section 3.2.

### 3.1.2 Equi and Raising

The distinction between Equi and Raising is widely made and is extremely well-documented in the literature, for example, Bresnan 1982a, Dowty 1985, Klein and Sag 1985, Jacobson 1990, Sag and Pollard 1991, Pollard and Sag 1994. There is a well-documented collection of cases where Equi and Raising behave differently and, broadly speaking, most accounts agree that these follow from two fundamental interrelated differences. Firstly, in Equi constructions, controller and controllee are distinct entities which are coindexed but in Raising constructions they are the 'same' entity. Secondly, for Equi it follows that the controller and controllee both play a semantic role—the controller with respect to the Equi predicate and the controllee with respect to the embedded predicate. For Raising on the other hand, the single controller/controllee entity is a semantic argument of just the embedded predicate. The first difference entails no more than co-referentiality between controller and controllee for Equi but complete syntactic identity for Raising: cases 1–3 below represent some particular instantiations of this. The second difference can be illustrated by showing the argument

structures involved in the two constructions. Assuming a propositional analysis of control and, for convenience, a predicate logic representation of logical forms, it can be seen that controllers in Raising constructions are not arguments of the Raising predicate itself but only of the lower predicate. Corresponding Equi predicates have one more argument because the controller/controllee plays a role for both the Equi and the embedded predicates:

| | | | | |
|---|---|---|---|---|
| (5) | a. | John seems to sing | $seem'(sing'(j))$ | (Raising) |
| | b. | John tries to sing | $try'(j,\ sing'(j))$ | (Equi) |
| | c. | John expects Mary to sing | $expect'(j,\ sing'(m))$ | (Raising) |
| | d. | John persuades Mary to sing | $persuade'(j,\ m,\ sing'(m))$ | (Equi) |

Cases 4–6 below are attributable to this difference in argument structure. The following is a fairly complete list of cases where Equi and Raising are known to differ. These can be thought of as diagnostic tests for Equi and Raising and also as a test-bed against which theories can be evaluated since the differences should be consequences of any analysis. In Section 3.2, I briefly describe the analysis of control in Pollard and Sag (1994) and show how the differences follow from their account.

**1.** Raising predicates appear to place no constraints of their own on the syntactic nature of the controller and as a result the controller may be of whichever type the controlled complement would select as a subject: normal NPs, the dummy NPs *it* and *there* and sentential subjects are all possible, as illustrated in (6). Equi predicates, on the other hand, require the controller to be a normal NP (7a). Dummy NPs or sentential subjects are not possible Equi controllers (7b–e).

| | | | |
|---|---|---|---|
| (6) | a. | Bill seems to hate lasagne. | (subject raising) |
| | b. | There seem to be a lot of insects about. | (subject raising) |
| | c. | It is likely to worry Bill that we're late. | (subject raising) |
| | d. | That we are late doesn't seem to bother Bill. | (subject raising) |
| | e. | We expected there to be a lot of insects. | (object raising) |
| (7) | a. | Bill tried to eat the lasagne. | (subject equi) |
| | b. | *There try to be a lot of insects about. | (subject equi) |
| | c. | *It is eager to worry Bill that we're late. | (subject equi) |
| | d. | *That we are late doesn't try to bother Bill. | (subject equi) |
| | e. | *We persuaded there to be a lot of insects. | (object equi) |

**2.** In languages with 'quirky' case marking such as Icelandic (Andrews 1982a, 1982b, Sag, Karttunen and Goldberg 1992), the controller in a Raising construction retains the quirky case associated with the controllee whilst the controller in an Equi construction does not.

**3.** As Pollard and Sag (1994) note, some Equi verbs subcategorise for a PP which contains the controller as in (8) but there are no instances of Raising controllers occurring inside PPs.

(8) a. We were depending on Lee to help us.
b. Kim appealed to Lee to behave well at the party.

**4.** In pairs which differ only with respect to whether the controlled complement is passivised or not, the sentences in a Raising pair (9) have the same interpretation while the sentences in an Equi pair (10) do not:

(9) a. Mary seems to like Bill.
b. Bill seems to be liked by Mary.

(10) a. Mary tries to like Bill.
b. Bill tries to be liked by Mary.

**5.** Idiomatic expressions retain their idiomatic reading when involved in Raising constructions but not when involved in Equi constructions:

(11) a. The cat seems to be out of the bag.
b. The cat tries to be out of the bag. (* on idiomatic reading)

**6.** Equi constructions cause existential entailments to be associated with the controller but Raising ones can be ambiguous and have a reading where they do not: (12a) entails the existence of *a giant* while one reading of (12b) does not.

(12) a. A giant tried to hide in the shrubbery.
b. A giant appears to be hiding in the shrubbery.

**7.** Jacobson (1990) discusses a phenomenon termed Null Complement Anaphora by Hankamer and Sag (1976) and Grimshaw (1977, 1979) whereby a VP complement may be omitted. Null Complement Anaphora can occur with Equi predicates but not with Raising predicates, as demonstrated in (13).

(13) a. Lee tried to keep the kitchen tidy and then Kim tried.
b. *Lee appeared to be tidying up and then Kim appeared.

**8.** Jacobson also notes that many Equi verbs are able to occur with a proposition denoting NP in place of their controlled complement but Raising verbs cannot:

(14) a. Kim tried something. It was to climb the apple tree.
b. *Kim seemed something. It was to like climbing trees.

**9.** A further difference between Equi and Raising that Jacobson discusses concerns the ability of the controlled complement to be fronted. Equi controlled complements can be preposed but Raising ones cannot:[3]

(15) a. To be left off the party list, Kim would hate.
b. *To have been left off the party list, Kim seems.

**10.** Jacobson mentions a difference between Equi and Raising with respect to nominalisation (as first noted by Chomsky (1970)): Equi control can occur in NPs but Raising cannot.

(16) a. Kim's desire to go to the party
b. *Kim's appearance to be happy

## 3.2 The HPSG Account

There are two distinct steps involved in an account of control: (i) identifying which of a control predicate's arguments is the controller and (ii) specifying the form of the link between the two and the means of making it. It would be possible simply to stipulate these in the lexical signs for the control predicates on a case by case basis but this would not be a very elegant solution. Instead, linguistic theories attempt to provide principles which generalise across cases.

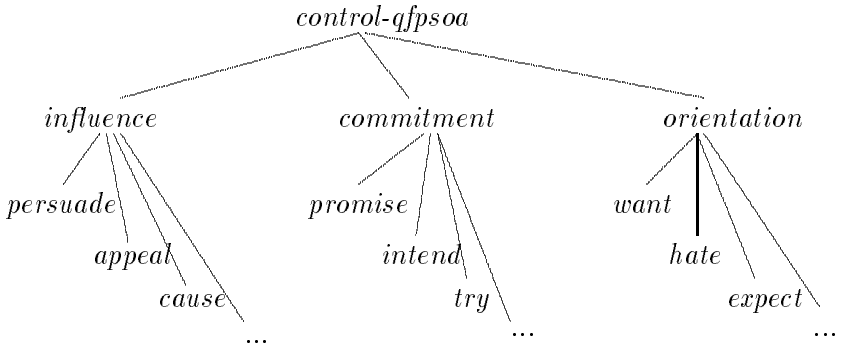
As was explained above, Pollard and Sag take a propositional, non-sentential approach to both Equi and Raising and in this respect they treat the two constructions as alike. However, the means by which they accomplish the two steps indicated above are different for the two constructions and the differences in behaviour between Equi and Raising follow from the differing analyses. Below I briefly summarise the Pollard and Sag (1994) account of Equi and Raising but note that this summary is not completely true to the original since I update the feature structures to take account of the C9 revisions which I have decided to adopt.

[3]In fact this is not very robust even for Equi and some speakers might reject (15a). Raising examples, however, are significantly worse for all speakers.

### 3.2.1 Equi

When discussing the identification of the controller in Equi constructions, Pollard and Sag (1994) argue that the principles which identify the controller argument must make reference not to grammatical relations (like subject and object) but to the thematic roles which are assigned to the arguments of predicates in the semantic feature structure. In their type-hierarchy they identify *control-qfpsoa* as a subtype of *qfpsoa* which itself has subtypes *influence*, *commitment* and *orientation*. The relevant part of the type-hierarchy is shown in (17).

(17)




All Equi predicates belong to one of these semantic classes and the choice of controller argument follows from class membership: for *influence* predicates the controller is the argument which realises the INFLUENCE role in the *content* part of the feature structure, for *commitment* predicates the controller is the COMMITTOR and for *orientation* predicates the controller is the EXPERIENCER.

Pollard and Sag argue that the link between controller and controllee in Equi constructions is purely semantic in nature and they demonstrate that coindexation (i.e. structure sharing of indices) is the appropriate means to achieve the link. They cannot directly access the controllee's index from inside the controlled complement's CONTENT feature however, because they cannot specify the path to it in advance. This is because the controllee's index plays whichever role the embedded predicate assigns to its subject—the subject of *kick* fills the KICKER role, the subject of *laugh* fills the LAUGHER role etc. Instead, they access the controllee's index indirectly through the SUBJ valence feature on the controlled complement: because the controlled complement is unsaturated, the category it requires as its subject is encoded in its SUBJ list. Pollard and Sag propose that the coindexation between Equi controller and controllee should be encoded as a principle in the grammar. This principle is shown in (18).[4]

[4]This is the same as the version given in the Appendix of Pollard and Sag (1994) except it has been revised to take account of the C9 shift from SUBCAT to the valence features. The use of the term

(18) CONTROL THEORY

If the SOA-ARG value of a *control-qfpsoa* is token-identical with the CONTENT value of a *local* object whose CATEGORY|SUBJ value is a list of length one, then the member of that list is (1) reflexive, and (2) coindexed with the INFLUENCED (respectively, COMMITTOR, EXPERIENCER) value of the *control-qfpsoa* if the latter is of sort *influence* (respectively, *commitment*, *orientation*).

Notice that Pollard and Sag require the semantic type of the controllee to be *reflexive*. This means that even though it is the control theory which is responsible for the coindexation of controller and controllee, the results of coindexation must be entirely consistent with the binding theory. As explained in Section 1.4, the subjects of unsaturated complements of a head are locally o-commanded by the less oblique arguments of that head. For Equi-type coindexation to occur, controlled complement subjects must be *reflexive* since only reflexives may be locally o-bound.

The effect of the control theory is to place special constraints on feature structures whose CONTENT value is of type *control-qfpsoa* and this includes the lexical entries for Equi verbs. (19)–(21) show the relevant parts of the feature structures for the lexical entries of the verbs *persuade*, *try* and *hate* respectively.[5]

(19)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle \\ \text{COMPS} & \left\langle \text{NP}\ \boxed{2}, \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}\ \boxed{2} \right\rangle \\ \text{CONT} & \boxed{3} \end{array}\right]_{\text{VP}[inf]} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{INFLUENCE} & \boxed{1} \\ \text{INFLUENCED} & \boxed{2} \\ \text{SOA-ARG} & \boxed{3} \end{array}\right]_{persuade} \end{array}\right]$$

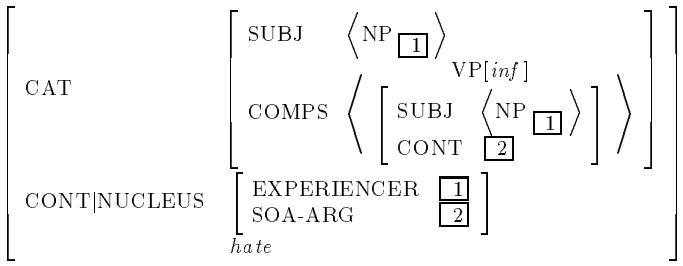
(20)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle \\ \text{CONT} & \boxed{2} \end{array}\right]_{\text{VP}[inf]} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{COMMITTOR} & \boxed{1} \\ \text{SOA-ARG} & \boxed{2} \end{array}\right]_{try} \end{array}\right]$$

'*local* object' makes reference to the concept of locality used in the binding theory (as described in Section 1.4) and I take it that an object is local to a lexical head if it appears in one of its valence feature lists. Recall that Pollard and Sag use the term 'control' in a narrow way to refer only to Equi—the control theory is relevant only to Equi constructions and not to Raising.

[5] In the interests of clarity, I will omit the paths to the SUBJ and CONTENT features of the controlled VPs in the COMPS lists.

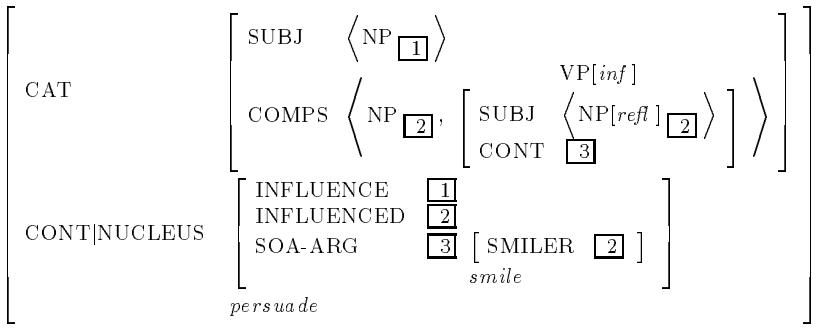
(21)



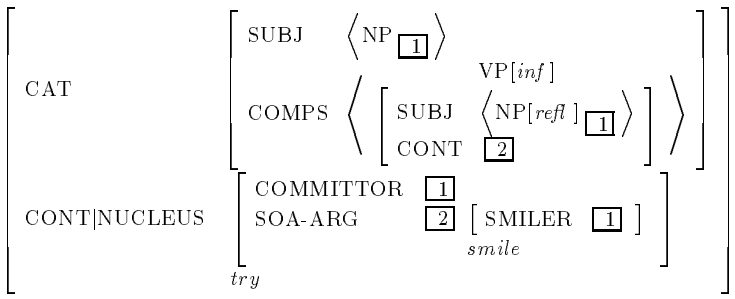

When these entries are used in sentences such as those in (22) then the relevant parts of the resultant feature structures are as shown in (23)–(25).

(22) a. Kim persuaded Lee to smile.
b. Kim tried to smile
c. Kim hates to smile

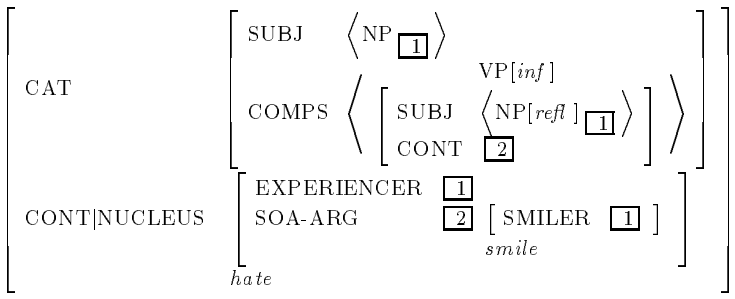
(23)




(24)




(25)




### 3.2.2 Raising

As I explained above, an analysis of control can be thought of as involving two distinct parts, (i) identifying the controller and (ii) establishing the link between controller and controllee. The Pollard and Sag (1994) analysis of Raising differs from the Equi analysis in both respects.

With Equi the controller is identified as a particular argument of the Equi predicate but, with Raising, although the controller is subcategorised by the Raising predicate, it plays a semantic role only with respect to the embedded verb. Pollard and Sag formulate the Raising Principle shown in (26) to ensure that whenever a predicate subcategorises a non-expletive element which is assigned no semantic role then it must also subcategorise an unsaturated complement whose subject is structure-shared with the unassigned element.[6]

(26) RAISING PRINCIPLE

Let E be a lexical entry whose SUBCAT list L contains an element X not specified as expletive.[7] Then X is lexically assigned no semantic role in the CONTENT of E if and only if L also contains a (nonsubject) Y[SUBCAT ⟨X⟩].

A revised version of (26) is given in (27) to take into account the C9 shift from SUBCAT to SUBJ and COMPS.

(27) RAISING PRINCIPLE (revised)

Let E be a lexical entry whose SUBJ list $L_s$ or COMPS list $L_c$ contains an element X not specified as expletive. Then X is lexically assigned no semantic role in the CONTENT of E if and only if $L_c$ also contains a Y[SUBJ ⟨X⟩].

The Raising Principle can be thought of as a well-formedness condition on signs to prevent any non-role-assigned, non-expletive arguments from occurring unless they structure-share with a SUBJ argument of a subcategorised complement. Since the structure-shared elements are entire SYNSEM objects, this imposes syntactic identity between controller and controllee and is a much stronger link than the coreferentiality induced by the coindexation in Equi constructions.

[6] The Raising Principle is unlike all other principles in the grammar in that it is a constraint on the form of lexical entries and not a constraint on feature structures. Since lexical entries are themselves constraints on feature structures, the Raising Principle is a constraint on constraints and, in fact, a more careful definition is needed. In the Appendix to Pollard and Sag (1994), the following definition is given:

> RAISING PRINCIPLE
> Let E be a lexical entry in which the (description of the) SUBCAT list L contains (a description corresponding to) a member X (of L) that is not explicitly described in E as an expletive. Then in (the description of) the CONTENT value, X is (described as) assigned no semantic role if and only if L (is described as if it) contains a nonsubject whose own SUBCAT value is ⟨X⟩.

[7] The non-expletive proviso is present because the expletives *it* and *there* are subcategorised but assigned no semantic role.

The relevant parts of the lexical entries for the subject raising and object raising verbs *tend* and *expect* are shown in (28) and (29) respectively. Notice that the controller/controllee element is not constrained to be of any particular syntactic category—any constraints on it will be imposed by the embedded predicate rather than the Raising predicate.[8],[9]

(28)

$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \left\langle \begin{bmatrix} \text{VP}[\mathit{inf}] \\ \text{SUBJ} \ \langle \boxed{1} \rangle \\ \text{CONT} \ \boxed{2} \end{bmatrix} \right\rangle \end{bmatrix} \\ \text{CONT|NUCLEUS} & \underset{\mathit{tend}}{\left[ \text{SOA-ARG} \ \boxed{2} \right]} \end{bmatrix}$$

(29)

$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{SUBJ} & \langle \text{NP} \ \boxed{1} \rangle \\ \text{COMPS} & \left\langle \boxed{2}, \begin{bmatrix} \text{VP}[\mathit{inf}] \\ \text{SUBJ} \ \langle \boxed{2} \rangle \\ \text{CONT} \ \boxed{3} \end{bmatrix} \right\rangle \end{bmatrix} \\ \text{CONT|NUCLEUS} & \underset{\mathit{expect}}{\begin{bmatrix} \text{EXPECTOR} & \boxed{1} \\ \text{SOA-ARG} & \boxed{3} \end{bmatrix}} \end{bmatrix}$$

When these entries participate in Raising sentences such as those in (30), the resultant feature structures are as shown in (31) and (32). (Compare these with the subject and object equi examples in (24) and (23)).

(30) a. Kim tends to smile.
b. Kim expects Lee to smile.

[8]In object raising sentences the possibilities for realising the controller are constrained by linear precedence restrictions. As illustrated in (i) and (ii), an object raising controller may be an NP or a PP but as shown in (iii) and (iv) it cannot straightforwardly be an S or a VP. This is presumably because of constraints about how verbal phrasal categories linearise with respect to one another. Examples (v) and (vi) are clearly related to (iii) and (iv) and demonstrate that it is possible to rescue such examples using extraposition. I will not attempt to deal with constraints on the realisation of object raising controllers here.

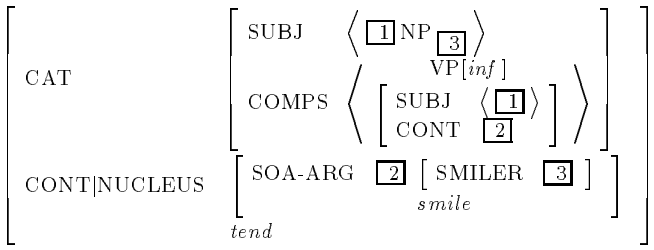
(i) Kim believed the cat to belong to the neighbours.
(ii) Sandy considers in the bath to be a good place to drink coffee.
(iii) *Lee believes that the cat is missing to be a tragedy.
(iv) *Kim considers to pull the cat's tail to be amusing.
(v) Lee believes it to be a tragedy that the cat is missing.
(vi) Kim considers it to be amusing to pull the cat's tail.

[9]An alternative way of encoding the structure-sharing in subject raising signs is to make matrix and complement share entire SUBJ values rather than just the element inside the SUBJ list:

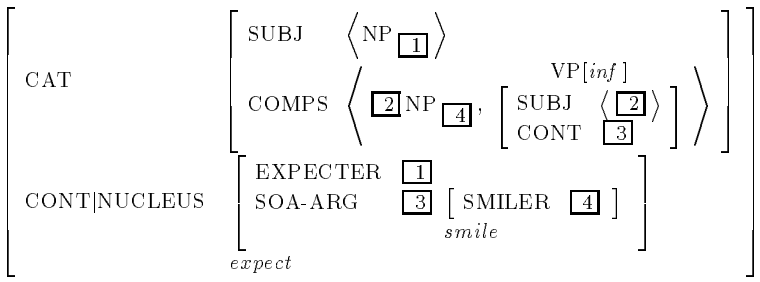
$$\begin{bmatrix} \text{CAT} & \begin{bmatrix} \text{SUBJ} & \boxed{1} \\ \text{COMPS} & \left\langle \begin{bmatrix} \text{VP}[\mathit{inf}] \\ \text{SUBJ} \ \boxed{1} \end{bmatrix} \right\rangle \end{bmatrix} \end{bmatrix}$$

I think that the two methods would always yield the same result so there should be no practical consequences. I use the version in the text because this makes subject raising signs more easily comparable with object raising and subject and object equi signs.

(31)




(32)




### 3.2.3 Differences between Equi and Raising

In Section 3.1.2 I listed ten cases where Equi and Raising constructions differ. Here I briefly discuss how these differences follow from Pollard and Sag's analysis.

Controller and controllee structure-share their whole SYNSEM values in Raising constructions and this explains how it is that Raising controllers are syntactically identical to their controllees: if a controllee is required by the embedded predicate to be the expletive NP *there* then that is how the controller surfaces. Similarly, the inheritance of quirky case follows from the structure-sharing of SYNSEM values since the specification of case is part of the SYNSEM value.[10] It also follows from the shared SYNSEM value that Raising controllers cannot occur inside PPs since this would involve a categorial mismatch with the controllee. The link between controller and controllee is much weaker in Equi constructions and this explains why quirky case is not inherited in Equi constructions and why Equi controllers can occur inside PPs.

The most significant difference in the HPSG analyses of Equi and Raising is that an Equi controller is role-assigned with respect to both the Equi and the embedded predicates but a Raising controller is role-assigned only in the embedded predicate. From this most of the remaining differences listed in Section 3.1.2 follow. The fact that Equi controllers can only be referential and not expletive follows from the fact that they are role-assigned (expletives cannot be role-assigned). In pairs of examples with active and passive controlled complements,

[10]The fact that case is always shared between Raising controllers and controllees causes a slight problem for some instances of 'default' case assignment. See Chapter 2 for details and an alternative to the standard HPSG method of case assignment.

the difference in meaning for Equi follows from the role assignment for the controller and the lack of difference for Raising follows from the fact that the controller plays no role in the matrix clause. Similarly the failure of idioms to retain their idiomatic reading with Equi constructions follows from the dual role imposed on the referent of the coindexed controller and controllee. The difference between the two constructions with respect to existential entailments associated with the controller ought also to follow from different patterns of role assignment although as Pollard and Sag (1994) note (p.328,fn.3) this is usually achieved by allowing both a wide and a narrow quantifier scope for Raising controllers but only a wide scope for Equi controllers. Pollard and Sag's scoping mechanism does not currently allow a narrow scope reading for Raising controllers and so more research is needed before this difference in behaviour can be seen to follow from the Equi and Raising analyses.

The cases noted by Jacobson, where Equi controlled complements may be omitted or moved or replaced by a nominal while Raising controlled complements may not, follow from the different role assignment patterns in conjunction with the Raising Principle. The Raising Principle only allows a (non-expletive) element not to be role-assigned if that element is structure-shared with the missing subject of a controlled complement. Pollard and Sag suggest that Null Complement Anaphora is a lexical process that permits the removal of an unsaturated complement from the SUBCAT list (or in the C9 version, the COMPS list) but this process cannot affect Raising signs since the result would violate the Raising Principle. Similarly, the other cases noted by Jacobson would involve the removal of the controlled complement from the COMPS list and hence a violation of the Raising Principle.

## 3.3 Refinements

In Chapter 5, I will propose some modifications to the HPSG analysis of control which are required by my treatment of MOCs as control constructions. In this section, however, I want to discuss some refinements to the HPSG analysis of control in the light of interactions with the binding theory. These refinements have a bearing on data concerning the stacking of Equi and Raising predicates. Similar examples occur with MOC predicates but the observations and the refinements are essentially independent of the MOC analysis.

### 3.3.1 Equi Controllees and Role Assignment

As a starting point I want to consider in some detail how constraints on the nature of Equi controllers and controllees are realised. As I described earlier, Equi controllers and controllees cannot be expletive and in the Pollard and Sag (1994) analysis this follows from the fact that the controller is role-assigned and therefore required to be referential. Since the referentiality resides in the type of the index of the controller and since it is precisely the index which is structure-shared in coindexation, it follows that the controllee must be referential too. There is an imbalance here though: the controller is referential because it is role-assigned but the controllee is referential only because it is coindexed to the controller. To correct this imbalance I propose that there is a constraint on Equi controllees to the effect that they too should be role-assigned and then from this it would follow that they must be referential. This new constraint would reinforce the effects of coindexation so that we can now say that expletives are disallowed on two counts. Simply from the question of the distribution of expletives, it may seem that there is no need for the extra role-assignment constraint but there is evidence from interactions of Equi with Raising that just such a constraint does exist. Consider the following examples:

(33) a. *Kim tries to tend to be efficient.
b. Kim tries to want to be efficient.

(34) a. *Kim persuaded Lee to be likely to win.
b. Kim persuaded Lee to try to win.

(33a) shows a subject equi verb with a Raising VP as its controlled complement while (33b) has an Equi VP complement. Similarly, (34a) shows an object equi verb with a Raising VP controlled complement while (34b) has an Equi complement. The (a) examples are ill-formed and the (b) examples are not. I claim that the ill-formedness of the (a) examples follows from the fact that the subjects of subject raising verbs are not role-assigned and therefore cannot be Equi controllees.[11] The Equi–Equi sequences in the (b) examples, on the other hand, are well-formed because the subjects of Equi verbs are role assigned and are therefore good candidates to be Equi controllees. Observe that since the controllees in the (a) examples are referential there can be no appeal to the explanation that Pollard and Sag use to block expletive Equi controllees.

[11] This problem does not arise with object raising verbs since it is their objects not their subjects which are non-role-assigned.

It might be argued that the oddness of the examples in (33a) and (34a) is oddness inherent in the message that the example conveys rather than grammatical ill-formedness and I would agree that the fundamental problem with them lies in the meaning of the verbs *try* and *persuade* and in facts about real world activities. It is useful here to consider some investigations into the nature of thematic roles and their semantic basis. Ladusaw and Dowty (1988) suggest that thematic roles such as AGENT, PATIENT, GOAL etc. do not have an independent status in grammar but are a 'shorthand' for collections of entailments and presuppositions of verbs. The idea here is that the notion of agentivity, for example, is some sort of generalisation over the kinds of entailments and presuppositions that a certain class of verbs impose on their subject arguments. It follows from this that verbs can be classed according to whether they share common features in how they select certain arguments. Zaenen (1988,1993), for example, uses a notion of 'controllability' as a means to select those Dutch verbs which can occur in the impersonal passive construction. Controllable verbs such as *eat* and *kick* are ones which refer to actions that are under the control of their agent while verbs which are not controllable are ones such as *happen*, *rain* and *die*. Zaenen suggests that a test for controllability is whether the verb can head the controlled complement of the Equi verb *force*, as illustrated in (35). A similar test is whether it can combine with *on purpose*, as in (36).

(35) a. Kim forced Lee to eat.
b. *Kim forced the incident to happen.

(36) a. Kim kicked the cat on purpose.
b. ??Kim died on purpose.

In the same vein as Zaenen's work, we would probably want to say that Equi verbs like *try* and *persuade* place certain requirements on their controlled complements—they must contain verbs that have agentive subjects which have some kind of control over the action. The significant point here is not in the details of the characterisation of the type of verb but in the fact that at the very least they must be verbs which assign a semantic role to their subjects. This follows from the fact that a non-role-assigned subject is not a participant in the action and therefore cannot be in control. The ill-formedness of (33a) therefore follows from the fact that the non-role-assigned subject of *tend* is not in control of the tendency and similarly, the ill-formedness of (34a) derives from the fact that the subject of *likely to win* is not in control of the likelihood.

### 3.3.2 Encoding the Role Assignment Constraint

Assuming that the role assignment constraint on Equi controllees is correct, there remains the question of how it should be encoded in the grammar. One option is to treat it as part of the lexical entailments associated with Equi predicates and not enforce it in the grammar at all. A second option is to build it into the lexical entries for Equi verbs. I remain agnostic as to which route is to be preferred but for the sake of completeness I can suggest how the constraint might be grammatically encoded.

In Section 1.4, I described how the Pollard and Sag (1994) binding theory could be updated to take account of the C9 shift from the SUBCAT list to the valence features SUBJ, COMPS and SPR. I explained that the SUBCAT list must be retained as the domain in which the binding theory operates and I also motivated a treatment of expletives whereby they occur only in valence feature lists and not in the SUBCAT list. There is an intimate connection between an element being role-assigned and it occurring in the SUBCAT list and it would seem logical to forbid all non-role-assigned syntactic arguments from occurring in the SUBCAT list. It would follow from this that Raising controllers are not permitted to appear in the SUBCAT list of the Raising predicate because they are not role-assigned. Fuller versions of the Raising lexical entries for *tend* and *expect* in (28) and (29) are shown in (37) and (38), where it can be seen that the Raising controller does not occur in the SUBCAT list belonging to the Raising predicate.

(37)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \left\langle \boxed{2} \left[\begin{array}{ll} \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{COMPS} & \langle\rangle \\ \text{CONT} & \boxed{3} \end{array}\right]_{\text{VP}[inf]} \right\rangle \\ \text{SUBCAT} & \langle \boxed{2} \rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\text{SOA-ARG} \ \boxed{3}\right]_{tend} \end{array}\right]$$

(38)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \langle \boxed{1}\text{NP}\,\boxed{2} \rangle \\ \text{COMPS} & \left\langle \boxed{3}, \boxed{4} \left[\begin{array}{ll} \text{SUBJ} & \langle \boxed{3} \rangle \\ \text{COMPS} & \langle\rangle \\ \text{CONT} & \boxed{5} \end{array}\right]_{\text{VP}[inf]} \right\rangle \\ \text{SUBCAT} & \langle \boxed{1}, \boxed{4} \rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{EXPECTER} & \boxed{2} \\ \text{SOA-ARG} & \boxed{5} \end{array}\right]_{expect} \end{array}\right]$$

With these signs for Raising predicates, Equi predicates can be constrained to select only role-assigned controllees by changing Equi entries so that the controllee is required to be a

member both of the SUBCAT list and the SUBJ list of the controlled complement. Thus if one wanted to encode the role-assignment constraint directly in Equi lexical entries, the following would be revised versions of the entries in (19)–(21) which would achieve the desired effect.

(39)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{1}\text{NP}\,\boxed{2} \right\rangle \\ \text{COMPS} & \left\langle \boxed{3}\text{NP}\,\boxed{4}, \boxed{5}\left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{7}\text{NP}[\textit{refl}]\,\boxed{4} \right\rangle \\ \text{SUBCAT} & \left\langle \boxed{7}, \ldots \right\rangle \\ \text{CONT} & \boxed{6} \end{array}\right] \right\rangle \\ \text{SUBCAT} & \left\langle \boxed{1}, \boxed{3}, \boxed{5} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{INFLUENCE} & \boxed{2} \\ \text{INFLUENCED} & \boxed{4} \\ \text{SOA-ARG} & \boxed{6} \end{array}\right] \end{array}\right]$$

*persuade*

(40)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{1}\text{NP}\,\boxed{2} \right\rangle \\ \text{COMPS} & \left\langle \boxed{3}\left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{5}\text{NP}[\textit{refl}]\,\boxed{2} \right\rangle \\ \text{SUBCAT} & \left\langle \boxed{5}, \ldots \right\rangle \\ \text{CONT} & \boxed{4} \end{array}\right] \right\rangle \\ \text{SUBCAT} & \left\langle \boxed{1}, \boxed{3} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{COMMITTOR} & \boxed{2} \\ \text{SOA-ARG} & \boxed{4} \end{array}\right] \end{array}\right]$$

*try*

(41)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{1}\text{NP}\,\boxed{2} \right\rangle \\ \text{COMPS} & \left\langle \boxed{3}\left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{5}\text{NP}[\textit{refl}]\,\boxed{2} \right\rangle \\ \text{SUBCAT} & \left\langle \boxed{5}, \ldots \right\rangle \\ \text{CONT} & \boxed{4} \end{array}\right] \right\rangle \\ \text{SUBCAT} & \left\langle \boxed{1}, \boxed{3} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{EXPERIENCER} & \boxed{2} \\ \text{SOA-ARG} & \boxed{4} \end{array}\right] \end{array}\right]$$

*hate*

### 3.3.3 Raising and The Binding Theory

In Section 1.4 I showed how retaining the SUBCAT list as the domain of the binding theory allowed for a simpler definition of o-command. I proposed that expletives should occur only as valence feature members and not in the SUBCAT list. This has the effect that expletives never occur in the domain of the binding theory and that Pollard and Sag's restriction that o-command is a relation between *referential* objects is superfluous. In a similar fashion, the change to Raising signs that I proposed in the previous section also has a simplifying effect on the definition of o-command. In Pollard and Sag (1994), Equi signs are made subject to the binding theory through a definition of local o-command which treats the subjects of controlled

complements as being locally o-commanded by the other arguments of the higher predicate (and to avoid a violation of Principle A, the subjects of such controlled complements must be reflexive.) As Pollard and Sag observe, it follows from this that the configuration arising in Raising signs is also potentially capable of being affected by the binding theory since the structure-shared controller/controllee element occurs as the subject of the controlled complement and as a potentially o-commanding argument of the higher predicate. The problem here is that because the entire *synsem* object is structure-shared, controller and controllee cannot differ with respect to what subtype of *nom-obj* they are and this means that in examples such as (42) both controller and controllee would be of type *npro* which would violate Principle C of the binding theory.

(42) Kim appears to be delirious.

Pollard and Sag's solution to this problem is to prevent Raising controllers and controllees from being in an o-command relation by requiring that elements in an o-command relation should have distinct LOCAL values. Since Raising controllers and controllees structure-share their entire *synsem* feature structures the controller cannot o-command the controllee and the binding theory does not apply.

The changes to the Raising entries that I proposed in the previous section obviate the need for the distinct LOCAL values restriction imposed by Pollard and Sag since the controller/controllee element occurs only once, in the lower SUBCAT list, and this means that there is no risk of the binding theory applying. A final revised version of the definition of (local) o-command is shown in (43) (compare this to (42) in Section 1.4).

(43) DEFINITION OF (LOCAL) O-COMMAND (final version)

Let Y and Z be *synsem* objects. Then Y *locally o-commands* Z just in case either:

(i) Y is less oblique than Z; or
(ii) Y locally o-commands some X whose SUBCAT and SUBJ lists contain Z;

and Y *o-commands* Z just in case either:

(iii) Y locally o-commands Z; or
(iv) Y o-commands some X whose SUBCAT list contains Z.

Apart from the issue of Equi controllees needing to be role-assigned and apart from the simplification of the definition of o-command, there are very few discernible consequences of my proposal that Raising controllers do not appear in SUBCAT lists. Since Raising controllers

do still occur in valence feature lists, the only real ramifications would be with respect to the binding theory and even here the consequences are very few. This is because the raised element does occur on the SUBCAT list of the controlled complement and is therefore still available to act as an antecedent just as before. The only cases where there might be a difference is where a category intervenes between a Raising controller and its controllee. Two such examples occur in (44):

(44) a. John$_i$ seems to himself$_i$ to be unproductive.
b. ??Max$_i$ strikes himself$_i$ as qualified for the job.

These examples are taken from Pollard and Sag (1994) (p.276). In both cases, the reflexive is not locally o-commanded by the unexpressed subject of the Raising complement on the lower SUBCAT list and cannot therefore be bound by it. In the Pollard and Sag account, the subject is also present on the higher SUBCAT list and, since this position does locally o-command the reflexive, it must bind it. This means that they predict both (44a) and (44b) to be well-formed. They cite Postal (1971) as treating such examples as ill-formed but they themselves are in the position where it is expedient to claim them to be grammatical (although pragmatically deviant). On my account, the raised subject is not available as an o-commanding antecedent at all since it occurs only in the lower SUBCAT list. However, the binding theory only affects reflexives which have suitable o-commanders; otherwise they are exempt and free to be coindexed by more general mechanisms. Since my account entails that the reflexives have no suitable o-commanders, they are exempt and their coindexation is not the product of the binding theory.[12]

[12]Notice that the claim that the anaphors in (44) are exempt means that the binding theory cannot block ill-formed examples such as (i):

(i) *These books seemed to myself to be awful.

However, as Pollard and Sag explain, it does not follow from the fact that the binding theory is not responsible for the coindexation of exempt anaphors that other factors do not play a role in constraining their coindexation. One general observation about exempt anaphors is that a linguistically explicit antecedent is still preferred. Thus, for example, the anaphor in (ii) is exempt but has no linguistic antecedent and the result is ill-formed in the same way as (i) is.

(ii) *Mike found pictures of myself in the drawer.

Furthermore, Pollard and Sag show that processing and discourse factors play a role with respect to the coindexation of an exempt anaphor and an example with appropriate contextualisation such as (iii) is a considerable improvement on (i).

(iii) ?Mary was getting worried. The evidence seemed to herself at least to be conclusive but if Jack wouldn't even consider it then the whole case would be lost.

### 3.3.4 Sequences of Control Predicates

In Section 3.3.1 I used just the examples in (33) and (34) to motivate the constraint that Equi controllees must be role-assigned. In this section I would like to examine some more data. (45)–(51) are examples of Equi–Raising sequences and Equi–Equi sequences

(45) a. *Kim tries to tend to be efficient. (Equi–Raising)
b. ?Kim tries to seem to be efficient. (Equi–Raising)

(46) a. Kim wants to try to be more efficient. (Equi–Equi)
b. ?Kim tries to want to be more efficient. (Equi–Equi)

(45a) is a repeat of (33a) and it seems to be judged by all speakers to be ill-formed. (45b) is a parallel example where *seem* replaces *tend* and, although we might expect the judgement to be the same, this example is more acceptable than (45a). Since (45b) is acceptable at least to some speakers it could pose a problem for my view that role assignment is necessary for Equi controllees. In fact, this example is not problematic since I believe that *seem* is effectively ambiguous between a Raising and an Equi reading. In order to find (45b) well-formed, one has to think of 'seeming to be efficient' as something which is actually under Kim's control—an appropriate gloss for the example would be the following:

(47) Kim tries to behave in a way that causes her to seem to be efficient.

This means that in (45b) *seem* is behaving as if it had Zaenen's property of controllability which in turn would suggest that in this example the subject of *seem* is role-assigned. On the assumption that *seem* is behaving like an Equi verb here, there are two possible ways to treat it. One solution is to assign it two lexical entries, one Raising and one Equi, and the other solution is to treat the shift from Raising to Equi as a kind of coercion similar to the controller shift coercion outlined by Pollard and Sag (1994). To account for (45a) the first solution would require that *tend* had only a Raising entry while the second solution would involve classifying *tend* as non-coercible. My inclination is towards the second solution although it should be noted that the phenomenon of coercion is very hard to model. Notice that *tend* and *seem* pattern in exactly the same way in imperatives:

(48) a. The boss is coming. Seem to be busy!
b. *The boss wants increased productivity. Tend to be busier than ever!

Assuming that the imperative construction requires controllable verbs, the similarities between (45) and (48) are unsurprising.

I included the Equi–Equi sequences in (46) as a contrast to the ill-formed or questionable Equi-Raising examples in (45) but notice that (46b) is noticeably worse than (46a) and that this would follow from the fact that *want* is not a controllable verb. In this case too there is a feeling that *want* must be coerced to a meaning where its subject is in control and therefore to a world view where one can decide which desires to have and which not to have. Again, an imperative with *want* is decidedly odd:

(49) ??The coach is looking for team spirit. Want to be a team player or else!

As a final point, one might wonder whether Raising predicates are like Equi predicates in requiring their controllees to be role-assigned. An examination of data parallel to that in (45) and (46), as shown in (50) and (51), does seem to indicate a similar pattern:

(50) a. ??Kim seems to tend to be efficient. (Raising–Raising)
b. ?Kim tends to seem to be efficient. (Raising–Raising)

(51) a. Kim tends to want to be efficient. (Raising–Equi)
b. Kim appears to be trying to be efficient. (Raising–Equi)

The Raising–Equi sequences in (51), where the controllee is role-assigned, are fine but the Raising–Raising sequences in (50) are questionable. Moreover, the example in (50a) where the embedded Raising verb is the non-coercible *tend* is markedly worse than (50b) where the embedded Raising verb is the more flexible *seem*. Perhaps surprisingly, however, examples where the raised element is expletive, and which cannot therefore involve any shift from Raising to Equi in the controlled complement, do not seem to be particularly bad:

(52) a. There tend to seem to be ants in the grass.
b. There seem to tend to be ants in the grass.

From this it seems that the oddness of (50) cannot be attributed to a constraint requiring role-assignment for Raising controllees. Moreover, this conclusion also follows from the fact that simple cases of expletive raised elements as in (53) are permissible: the expletive controllee is non-role-assigned by virtue of its being an expletive and any constraint like the Equi constraint would wrongly predict (53) to be ungrammatical.

(53) There tend to be ants in the grass.

Postal (1974) discusses whether repeated raisings of the same NP are acceptable or not. The examples in (54) and (55) are taken from Postal (1974) and the grammaticality judgements indicated are his.

(54) a. ?The bagel was expected by Max to be believed by Irving to have been eaten by Seymour.
b. *There was expected by Max to be believed by Irving to be a bagel in his lunchbox.

In spite of judging these examples to be ill-formed, however, Postal does not conclude that repeated raisings are impossible. Instead he suggests that any badness in (54) is due to the presence of the infinitive marker *to*. In contexts where *to* can be omitted he observes a marked increase in acceptability:

(55) a. *There seems to be likely to be a riot.
b. There seems likely to be a riot.

In the case of sequences of Raising predicates, it seems to me that judgements are much less robust than in the case of Equi–Raising sequences and I will therefore assume that even though some repeated raisings are bad, there is no general grammatical constraint against them. In Section 5.3.1 I will return to this issue briefly when I examine how object raising verbs interact with the *tough* construction.

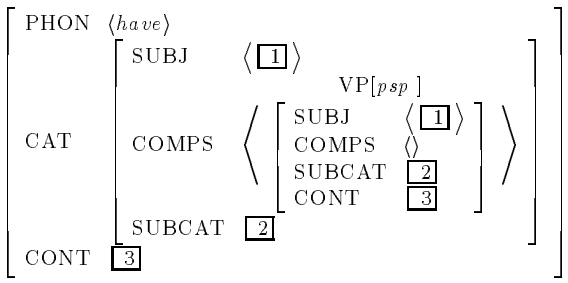
### 3.3.5 Auxiliaries and Modals

In this section I give signs for some auxiliary and modal verbs since these are control verbs too. The auxiliaries behave very much like subject raising verbs in that they place no restrictions on the nature of their subjects—like subject raising verbs they inherit any restrictions that are imposed by the complement VP. The examples in (56) illustrate:

(56) a. There will be food at the party.
b. It has been annoying me that Kim never tidies up.
c. That Kim never tidies up doesn't bother Lee.
d. That Kim never tidies up has been bothering me for years.
e. It is believed to be Sandy's turn to tidy up.
f. There were expected to be riots

Jacobson (1990) makes the claim that subject raising verbs and auxiliaries are fundamentally different. She proposes that subject raising verbs combine with their complements by syntactic function composition but that auxiliaries are what she calls 'lexical inheritors', i.e. they have a category of the general form $(X/\alpha)/(Y/\alpha)$. Jacobson acknowledges that either one of syntactic function composition or lexical inheritance is able to account for various Raising properties, yet remarkably, she does not justify her assumption that they both occur in the grammar and that the former underlies Raising while the latter underlies auxiliaries. Given that HPSG is not a formalism in which Jacobson's distinction finds easy expression, and following the lead of Pollard and Sag (1994), I treat auxiliaries as a kind of subject raising verb although their signs differ from subject raising signs in some key respects. Compare (57), the sign I assign to the perfective auxiliary *have*, to the sign for *tend* in (37).[13]

(57)




The obvious difference between subject raising verbs and auxiliaries is that subject raising verbs contribute a predicate to the semantic content of a sentence whereas auxiliaries contribute tense and aspect information.[14] This means that an auxiliary has no CONTENT value of its own but acquires one from its complement—as indicated with $\boxed{3}$ in (57). Just as auxiliaries are transparent with respect to semantic content, they also seem to be transparent with respect to binding and obliqueness relations. In (57) I have made the auxiliary simply inherit the SUBCAT list of its complement and in this respect too there is a difference with subject raising verbs.

(58) Kim has read that book.

[13]The sign in (57) is very similar to the sign that Pollard and Sag (1994) give for auxiliary *to* although theirs is presented early in the book and does not use the C9 valence features. The use of the valence features in conjunction with the retention of the SUBCAT list as the domain of the binding theory has allowed me to let the auxiliary and subject raising signs differ more strongly than Pollard and Sag were able to do and with beneficial consequences. In this sense my analysis coincides more with Jacobson's assumption that subject raising verbs and auxiliaries are not the same kind of verb, although I agree with Pollard and Sag that it is not necessary to conclude that the grammar needs syntactic function composition as a mode of combination.

[14]I do not attempt to decide exactly where in a sign such information should appear although see Moens (1993) for suggestions about how temporal and aspectual information can be expressed in HPSG.

In the present perfect sentence in (58), the subject is directly coindexed with a role (READER) in the CONTENT part of the larger VP and it structure-shares with an element on its SUBCAT list. This means that the subject is role-assigned even though it is separated from the main verb by the auxiliary. Although auxiliaries are Raising verbs in terms of their control properties, it follows from the inheritance of the lower SUBCAT list and the consequent role-assignment of the raised argument that they behave differently from subject raising verbs in examples where they are stacked with Equi verbs. I argued above that subject raising subjects are not role-assigned and I used this to explain the ill-formedness of the sequences of Equi and Raising verbs in (33a) and (34a). By contrast, auxiliary subjects are usually role-assigned and sentences where they follow Equi verbs are perfectly well-formed, as shown in (59).

(59) a. Kim will try to have finished the manuscript by Thursday.
b. Kim was happy to be working on that problem.

If an auxiliary takes a subject raising VP complement, as *be* does in (60) then it cannot felicitously follow an Equi verb because it inherits the subject raising verb's attributes where the subject is not role-assigned. The infinitive marker *to* is treated in HPSG as a kind of auxiliary verb and its sign is just like the sign for *have* in (57) except that it subcategorises for a base form VP complement rather than a past participle. In (60) it inherits from *be* the SUBCAT and CONT values which in turn *be* inherits from *tending*.

(60) *Kim was happy to be tending to be helpful.

As I explained in Section 3.2.3, Pollard and Sag (1994) use the Raising Principle to explain why Raising predicates cannot undergo Null Complement Anaphora: to achieve Null Complement Anaphora the controlled complement would have to be removed from the Raising predicate's SUBCAT list but this would violate the Raising Principle's requirement that any non-role-assigned, non-expletive must be structure-shared with a SUBJ element in a complement. Since auxiliaries are Raising verbs it should follow that they too cannot undergo Null Complement Anaphora. The facts are less clear here since bare auxiliaries do frequently occur, as shown in (61). Pollard and Sag argue convincingly, however, that the process involved in (61), which is usually termed VP-ellipsis, is a different process from Null Complement Anaphora. As support they cite Hankamer and Sag (1976) who demonstrate that VP-ellipsis is surface anaphora (i.e. it requires a syntactically realised antecedent) while Null Complement Anaphora is deep anaphora (i.e. the antecedent is pragmatically determined).

(61) a. Lee kept being noisy and Kim did too.
b. Lee has been to Paris but Sandy hasn't.
c. Kim was annoyed. Sandy was too.

Given that the examples in (61) involve VP-ellipsis, it is necessary to ensure that auxiliary signs cannot be input to the Null Complement Anaphora rule since that would falsely imply that the examples in (61) are ambiguous. As I have shown, the inheritance of the complement's SUBCAT and CONT values means that auxiliary subjects are frequently role-assigned; nevertheless the Raising Principle is still sufficient to block Null Complement Anaphora with auxiliaries since the removal of the VP complement from a sign such as (57) will leave the auxiliary with underspecified SUBCAT and COMPS values effectively causing the SUBJ element to be non-role-assigned.

Turning now to modal verbs, it has frequently been observed that these are ambiguous between an 'epistemic' and a 'deontic' reading (see, for example, Palmer (1979)). Epistemic readings reflect notions of logical necessity and possibility and are treated in modal logic by means of the modal operators. Deontic readings are less 'logical' and more like standard verb meanings—they tend to reflect notions such as ability, obligation and permission. (62a) and (63a) are examples where the epistemic reading is the most natural (it is necessarily the case that..., it is not possible that...) while for (62b) and (63b) the deontic reading is more natural (you are obliged to..., you are permitted to...).

(62) a. Look over there! That must be the Eiffel Tower.
b. Dogs must be kept on a leash.

(63) a. It can't be the Eiffel Tower. We're in Manchester!
b. You can let your dog off the leash in the park.

It is tempting to follow Ross (1969) in conjecturing that deontic modals are Equi verbs while epistemic ones are Raising verbs: examples such as those in (64) with expletive subjects do not seem to have deontic readings and this is what we would expect if the deontic modals are Equi verbs.

(64) a. There must be a mistake.
b. There can't be a hedgehog in the garden.
c. It may interest you to know that the Eiffel Tower is in Paris.
d. That the dog ran away must bother you.

(65) a. It may be admitted that we are behind schedule.
b. It must be made clear that she isn't working hard enough.

However, Borsley (1991) provides the examples in (65) which demonstrate that in some cases at least a deontic reading is available with an expletive subject and so we must conclude that both epistemic and deontic modals are Raising verbs. I assume, therefore, that most modals have two entries, a deontic one similar to the entry for a standard raising verb like *seem* and an epistemic one similar to the entries for ordinary auxiliaries.

# Chapter 4

# Missing Object Constructions

As I explained in Chapter 1.1, one of the key claims of this thesis is that the prevailing view of missing object constructions (MOCs) as a kind of unbounded dependency construction (UDC) fails to account for certain important aspects of their behaviour. I propose that a more plausible alternative is to treat them as a kind of control construction. In this Chapter, I describe MOCs in some detail and motivate the claim that they are control constructions. This lays the foundation for Chapter 5 which proposes a new treatment which does not use SLASH.

In Section 4.1, I briefly review how MOCs have been treated in the literature and in Section 4.2 I examine a range of types of MOC. In Section 4.3 I give an inventory of properties of MOCs and in Section 4.4 I motivate the control account of MOCs.

## 4.1 Introduction

(1) a. This poem is hard (for the children) to understand $\__{mo}$.
b. This poem is too long (for the children) to memorise $\__{mo}$.
c. We brought some food along (for us) to eat $\__{mo}$ on the way.

(1) shows some examples of MOCs. (1a) is an example of a *tough* construction (or *tough* Movement as it was termed in the transformational literature) and is the archetypical exponent of a missing object construction: it is one where an NP object is missing from the infinitival VP complement of a *tough* adjective (*hard* in this case) and where the subject of the *tough* adjective (*this poem*) is to be interpreted as the antecedent for that missing object.[1] The examples in (1b) and (1c), although not *tough* constructions, similarly contain an infinitival

[1] Here and elsewhere, I indicate the position of the missing object with $\__{mo}$.

VP with a missing object whose antecedent is an argument of a higher predicate (*this poem* in the case of (1b) and *some food* in the case of (1c)). I will refer to the VP complements in these constructions as *missing object* VP*s* (MO-VPs) and to the optional *for*+NP sequence as the *for*-phrase.

In almost all current syntactic theories, MOCs are claimed to be a type of unbounded dependency construction (UDC) and as such are claimed to have much in common with the sentences in (2), a topicalisation and a *wh*-question respectively. Conversely, they are claimed to have little in common with the examples in (3), which are examples of control constructions.

(2) a. This poem, the children will never understand.
b. Which poem did you ask the children to memorise?

(3) a. The children keep trying to understand the poem.
b. The poem seems to be a long one.

As mentioned above, my main thesis is that, contrary to current belief, MOCs are really control constructions rather than UDCs. I claim that the missing object in an MOC is not a UDC trace but an understood argument which is obligatorily controlled by an antecedent in much the same way as understood subjects are controlled by antecedents. In both cases a control predicate mediates the controller-controllee relationship. In Chapter 5 I will argue that for some MOCs the control relationship is Raising while for others it is Equi.[2]

MOCs, particularly the *tough* construction, have received considerable attention over the decades. In early transformational grammar (Postal and Ross 1971, Akmajian 1972, Lasnik and Fiengo 1974) there was debate as to whether the transformation involved in the *tough* construction was a deletion rule or a movement rule—the former was seen as a kind of Equi, the latter (termed *tough* Movement by Postal (1971)) was not dissimilar to Raising transformations, hence my control account is not without a precursor. A later version of transformational grammar (Chomsky 1977) attempts to assimilate *tough* constructions to UDC constructions, and all later versions of transformational grammar have continued this attempt (see e.g. Chomsky (1982), Stowell (1986)). Exponents of LFG (Bresnan 1982b), of GPSG (Gazdar et al. 1985) and of HPSG (Pollard and Sag 1994) have perpetuated the assumption that MOCs

[2]While the early transformational rule of *tough* movement was essentially a Raising account of the *tough* construction, my claim constitutes a quite radical break with current thinking. It is now generally thought to be the case that only subjects can be obligatorily controlled. There are many languages in which anaphoric control of null objects occurs—see for example, (Rizzi 1986) on Italian and (Mohanan 1983b) on Malayalam. As far as I am aware, obligatory control of objects is thought not to be possible.

are a type of UDC. To my knowledge, the only current grammatical framework which has not succumbed to this belief is Relational Grammar (Perlmutter 1983).

Recently there has been a growing desire to deal with the problem that not all supposed UDCs behave exactly like the archetypical cases of topicalisation and *wh*-question formation and there has been a tendency to distinguish two classes of UDC. Within the GPSG framework, Hukari and Levine (1987a, 1991) retain the standard GPSG SLASH analysis for UDCs which have fillers in non-argument position (*wh*-questions, topicalisations) but they introduce a second SLASH-like feature, GAP, to describe a second class of UDC which have argument position fillers (the *tough* construction, *too/enough* complements). In a similar vein, GB (e.g. Chomsky 1982) recognises a difference between UDCs where the trace is $\overline{\text{A}}$-bound by an overt filler and UDCs where the trace is $\overline{\text{A}}$-bound by an empty operator:[3] the former include *wh*-questions and topicalisations, the latter, the *tough* construction and *too/enough* complements. As I described in Section 1.3, the Pollard and Sag (1994) HPSG account classifies UDCs as either strong UDCs (or filler-gap constructions) or as weak UDCs. In both cases, the SLASH features in the values of NONLOC|INHER and NONLOC|TO-BIND are used to propagate information about the gap up to the point where the dependency is cached out but, while the connectivity of strong UDCs is achieved through structure sharing of the *local* part of the filler with the value of SLASH, the weaker connection in weak UDCs is achieved by coindexation between the value of SLASH and an element on a SUBCAT list (i.e. an element in argument position).

While the standard versions of GPSG, HPSG and GB continue to treat MOCs as UDCs, albeit of a weaker kind than topicalisation, there have been some individual attempts to describe MOCs as something other than UDCs. Within the GB framework, Cinque (1990) makes a distinction between UDCs, which contain $\overline{\text{A}}$-bound variables (*wh*-traces), and a class of constructions which include the *tough* construction, the complements of *too/enough* and parasitic gaps. Cinque treats the empty categories in this second class not as variables but as 'pro'.[4] Working in the categorial grammar framework, Bayer (1990) treats the *tough* construction as a kind of Raising and presents an analysis based on Jacobson's (1990) use of function composition as the mechanism underlying Raising. There are three other non-standard accounts which bear some similarity to my analysis. The first is Schachter's (1981) proposal expressed in

[3] The GB terms $\overline{\text{A}}$-bound and A-bound mean respectively, bound by an element in a non-argument position (e.g. a filler) and bound by an element in an argument position.

[4] GB has two empty pronominal elements, '(big) PRO' and '(little) pro'. PRO is the category of the missing subjects of controlled complements and pro is the category of dropped subjects in 'pro-drop' languages such as Italian. It is usually assumed that there is no pro in English, so Cinque's analysis departs quite significantly from the standard version of GB.

the framework then known as 'Daughter Dependency Grammar' (Hudson 1976), which was a precursor of 'Word Grammar' (Hudson 1984). Schachter's analysis is rather sketchy and the frameworks are difficult to compare but he does reject both Chomsky's (1977) *wh*-movement analysis and a GPSG-style SLASH-based account. The second can be found in Jones (1991), which is a revised version of his PhD thesis, Jones (1985). Jones' primary interest is purpose infinitives like (1c) but he does extend his analysis to the *tough* construction as well. Working within the GB paradigm, Jones denies that *wh*-movement is responsible for the missing object in MOCs and instead he proposes that a process akin to passivisation is responsible for the externalisation of the missing object. While the descriptive mechanisms of HPSG and GB are sufficiently different to make comparison rather difficult, I believe that Jones' claim is in essence the same as the one I am making. The third non-standard approach can be found in Geissler and Kiss (forthcoming). This is an HPSG analysis of the German tough construction where it is proposed that argument inheritance is the mechanism behind the local tough dependency. Although Geissler and Kiss use a different mechanism from the one that I propose, their account is compatible with mine.

There is an account of the *tough* construction in Jacobson (1992) which seemingly has much in common with my account. Jacobson describes her objective thus:

> "...I will argue that there is no syntactic relationship between the subject of the *tough* adjective and the "gap," and this then raises the question of how it is that the subject is understood as filling the gap position. I will suggest that this can be handled purely by lexical meaning, exactly as in the case of control of a "missing" subject." (Jacobson 1992 p.270.)

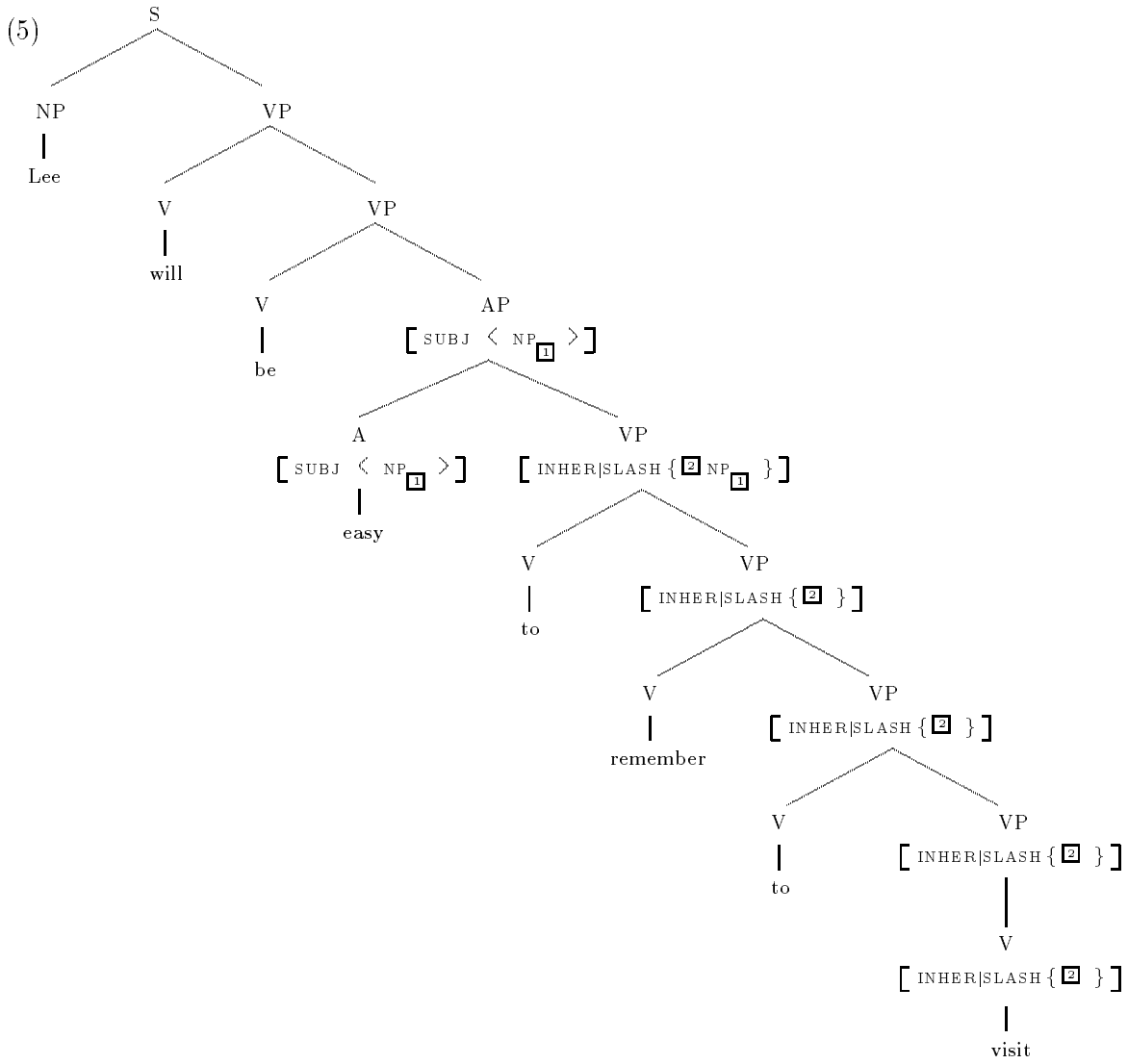
From this brief quote it appears that Jacobson is making a similar proposal to my own but, in fact, her account is much the same as the HPSG account as I described it in Section 1.3.[5] In order to avoid confusion, I conclude this section by explaining the key ways in which my proposal differs from the HPSG/Jacobson approach. (5) shows a tree representation of the HPSG analysis of (4).[6]

(4) Lee will be easy to remember to visit.

[5]Both accounts treat the relationship between the gap and the subject as an Equi relation but Jacobson treats the subject as non-role-assigned.

[6]I omit the TO-BIND|SLASH value.

(5)




The tree shows firstly that for HPSG the mechanism that underlies the presence of the gap and the propagation of information about it is the normal UDC mechanism, the SLASH feature. At the point where the slashed VP becomes the complement of the *tough* adjective *easy*, the SLASH propagation path is terminated and the relationship between the value of SLASH and the SUBJ value of *easy* is handled by coindexation. In effect, for HPSG the dependency in the *tough* construction is like a normal UDC for the bottom and middle parts (the trace and the upwards propagation from the trace) but it is just like Equi at the point where the gap is identified with the subject of the *tough* adjective. My account differs from Pollard and Sag's (and from Jacobson's) in that I claim that the UDC/SLASH mechanism plays no part whatsoever in the *tough* construction. Like Jones (1991), I claim that the missing object is not a UDC trace but is rather a promoted object like the promoted object in the passive construction. Furthermore, I claim that the propagation of information about the missing object is achieved not through the SLASH feature but through a series of local control relationships each licenced

by the lexical signs for control verbs (both Equi and Raising) and auxiliaries. As far as the top part of the dependency is concerned, i.e. the relationship between the *tough* subject and the missing object, there is general agreement that this is a control relationship (in the wide sense of the term 'control') but there is no consensus as to whether it is Equi or Raising (where Equi is equated with coindexation and Raising with a larger sharing of syntactic information). Proponents of the Equi view are Pollard and Sag (1994), Jacobson (1992) and Chomsky (1982) while Postal (1971), Bayer (1990) and Hukari and Levine (1991) support the Raising view. In Section 5.3.1 I will review the evidence relevant to this debate and draw some conclusions of my own. In the rest of this chapter I discuss the MOC data in order to motivate my claims in an analysis-independent way and in Chapter 5 I describe my account in some detail.

## 4.2 An Overview of Missing Object Constructions

### 4.2.1 Definitions

I define an MOC as a construction which (a) contains a VP from which an object argument is missing and where (b) the antecedent of the missing object occurs as an argument of some higher predicate.[7] Thus the examples in (1a–c) all count as MOCs because not only do they contain VPs with missing objects (the objects of *understand*, *memorise* and *eat* respectively) but the antecedents of those missing objects are arguments of a higher predicate (the matrix subject in the case of (1a) and (1b), the matrix object in the case of (1c)). The UDC examples in (2), on the other hand, are not MOCs because, although they contain VPs with missing objects, the antecedents of these objects are not arguments of any other predicate.

According to the above definition, all of the following examples are MOCs.[8] (The MO-VPs are bracketed, the position of the missing objects are marked with a subscripted underline and the antecedents of the missing objects are italicised.)

[7] I use the term 'object' in a loose sense here to describe NPs which are non-subjects.

[8] There are some constructions which qualify as MOCs which I do not deal with in this thesis. For example, the complements of *take* and *cost* in (i) and (ii) are presumably MO-VPs:

(i) *The bike* cost five pounds VP[ to mend $\__{mo}$].

(ii) *The journey* took four hours VP[ to complete $\__{mo}$].

- *Tough* Constructions

(6) a. *The book* is easy VP[ to read $\__{MO}$ ].
b. *John* is impossible VP[ to talk to $\__{MO}$ ].

- Purpose Infinitives

(7) a. He brought *John* along VP[ to talk to $\__{MO}$ ].
b. Sue bought *it* VP[ to read $\__{MO}$ to the children ].

- *Too/Enough* Complements[9]

(8) a. *The book* is too long VP[ to read $\__{MO}$ in one go ].
b. *The book* is simple enough VP[ to read $\__{MO}$ to the children ].

- *Need* Predicates.

(9) a. *The car* needs VP[ washing $\__{MO}$ ].
b. *These envelopes* want VP[ typing $\__{MO}$ ].
c. *The book* is worth VP[ reading $\__{MO}$ ].

(10) a. I need *these flowers* VP[ wrapping $\__{MO}$ immediately ].[10]
b. He wants *the flowers* VP[ wrapping $\__{MO}$ ].

### 4.2.2 *Tough* Constructions

Since *tough* constructions are the most familiar of the MOCs and since I will generally use *tough* examples to illustrate properties of MOCs in Section 4.3 and elsewhere, they do not need describing in detail here. One point that I would like to make is that the class of adjectives taking MO-VPs as complements is often described as if it were a unified class (i.e. the class of *tough* adjectives) yet it is far from clear that this is actually the case. Following Lasnik and Fiengo (1974), Schachter (1981) provides the following examples to demonstrate that there is a difference between archetypical *tough* adjectives like *easy* and 'object deletion' adjectives like *pretty*.

(11) a. Mary is pretty to look at.
b. Mary is easy to look at.

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[9]There is a type of *too/ enough* construction where the adjective and the *too/ enough* plus complement form part of an NP:

(i) He's got problems too important VP[ to ignore $\__{MO}$ ].

(ii) It was too heavy a load VP[ to carry $\__{MO}$ ].

It is not at all clear what the antecedent of the missing object is with examples like these. I mention them here for the sake of completeness but it is beyond the scope of this thesis to deal with such examples.

[10]These examples are acceptable only in some varieties of British English and, as far as I am aware, not in American English at all.

(12) a. *It is pretty to look at Mary.
b. It is easy to look at Mary.

(13) a. *Mary is pretty to get John to avoid looking at.
b. Mary is easy to get John to avoid looking at.

(14) a. *Mary is pretty to work for.
b. Mary is easy to work for.

The mechanisms that I will develop for generating MOCs will enable me to distinguish between *easy* and *pretty* in such a way as to entail the differences in (12)–(14). Detailed discussion can be found in Section 5.3.3.

### 4.2.3 Purpose Infinitives

There are a number of treatments of missing object purpose infinitives which assume that the missing object in these is controlled in much the same way as the subject is controlled (cf. especially Jones 1985, Jones 1991, Bach 1982). One reason for this assumption may be that purpose infinitives come in two different varieties—those with object gaps and those without, as in (15) and (16) respectively:[11]

(15) Sue brought *John* along (for us) VP[ to talk to $\__{mo}$ ].

(16) Sue brought *John* along VP[ to keep her company ].

(I will refer to the ones with object gaps as MO purpose infinitives and to the ones without object gaps as non-MO purpose infinitives.) The non-MO example in (16) is uncontroversially a case of control—the unexpressed subject of the VP complement is controlled by *John*, the object of *brought*. The MO example in (15) differs from (16) in two respects: firstly, the complement is lacking both a subject and an object and, secondly, it is the *object* that *John* is the antecedent to. The missing subject is controlled by the NP (*us*) if the *for*-phrase is present. When the optional *for*-phrase is absent, the understood subject is controlled pragmatically.

[11] There is also a kind of purpose infinitive often referred to as 'in-order-to infinitives' (see Green (1992)) as in (i) and (ii). As indicated, these can occur without an overt *in order* ('in-order-less in-order-to infinitives').

(i) Kim bought the strawberries (in order) to make jam.

(ii) Lee went to the movies (in order) to avoid the jam-making.

To confuse matters further, infinitival relatives can look very much like MO purpose infinitives:

(iii) Kim ate the strawberries to make jam with _ instead of the ones for desert.

I will not deal with in-order-to infinitives or infinitival relatives in this thesis.

In looking at the examples in (15) and (16), it is clear why Jones and Bach should feel that a control relationship underlies both cases—how else can the strong similarities be explained? Any theory which claims that MOCs are a type of UDC, on the other hand, will predict that MO purpose infinitives are fundamentally different from non-MO ones.

There is a difference between MO and non-MO purpose infinitives in that the MO ones seem to have a more restricted distribution. As Faraci (1974) and Bach (1982) point out, there are only a small number of matrix verbs with which MO purpose infinitives can felicitously co-occur:

(17) a. *I read the book VP[ to review $\__{mo}$ ].
b. *I opened the box VP[ to use $\__{mo}$ ].

Some authors have used this limited distribution as grounds for treating MO purpose infinitives as complements rather than adjuncts (see, for example, Bach 1982 and Hukari and Levine 1987b) but others treat them as adjuncts. Green (1992) discusses this issue and characterises the verbs which can occur with purpose infinitives as ones which "affirm or entail availability, possession or control of the entity corresponding to the gap ... by the inferred controller of the infinitive..". For a number of reasons Green treats MO purpose infinitives as adjuncts and Jones (1991) does too. I will remain agnostic on the complement versus adjunct issue since it is beyond the scope of this thesis to investigate the syntax and semantics of all MOCs in detail. The mechanism that I provide for generating VPs with missing objects is sufficient to describe how all MO-VPs come about but details of how these are integrated into the different MO constructions will vary. I provide a detailed analysis of how *tough* adjectives combine with MO-VPs in Chapter 5 but I leave this aspect of purpose infinitives to future research.

### 4.2.4 *Too/Enough* Complements

The adjectival degree specifiers *too* and *enough* optionally license the presence of an infinitival VP. As with the case of purpose infinitives, this VP comes in two varieties, a VP with an object gap (18) and a VP with no object gap (19).

(18) a. This book is too long (for you) VP[ to read $\__{mo}$ in one go].
b. This book is short enough (for you) VP[ to read $\__{mo}$ in one go].

(19) a. This book is too long (for it) VP[ to be interesting ].
b. This book is long enough (for it) VP[ to keep you busy for a while ].

In the case of the MO-VP (18), the matrix subject is the antecedent of the missing object and the NP in the *for*-phrase, if present, controls the understood subject. If the *for*-phrase is absent then the understood subject is controlled anaphorically.

I will not investigate the syntax or semantics of *too/enough* complements in any great depth but I have included them here because it is common practice to classify them along with *tough* constructions and purpose infinitives, i.e. as MOCs. As with purpose infinitives, I claim that the mechanism that generates the MO-VP is the same as with the *tough* construction so my analysis goes part of the way to describing *too/enough* constructions. What I do not describe is how the MO-VP is connected syntactically and semantically to the *too/enough* phrase.

### 4.2.5 *Need* Predicates

In this section I consider a class of predicates whose *-ing* VP complements lack objects as in (20) and (21):[12]

(20) a. *The socks* need VP[ mending $\__{mo}$ ].
b. *The socks* could do with VP[ mending $\__{mo}$ ].
c. *The cat* wants VP[ feeding $\__{mo}$ ].
d. *The cat* requires VP[ feeding $\__{mo}$ ].
e. *The exhibition* is worth VP[ visiting $\__{mo}$ ].
f. *The exhibition* warrants VP[ visiting $\__{mo}$ ].

(21) a. He needs *his socks* VP[ mending $\__{mo}$ ].[13]
b. I want *those toys* VP[ clearing $\__{mo}$ away immediately ].

In the examples in (20) the matrix subject is obligatorily interpreted as the antecedent to the missing object, whilst in the examples in (21) it is the matrix object which is the antecedent.

[12] *Worth* is the only predicate in this class which is not a verb and I am not entirely sure what category it belongs to: at first glance it appears to be an adjective just like *tough* adjectives (except that its complement is an *-ing* VP). Maling (1983) argues that it is a preposition and while I am tempted to agree with her because of the differences in (i) and (ii), examples such as (iii) suggest that it is an adjective. (I am grateful to Carl Pollard and an anonymous Natural Language and Linguistic Theory reviewer for the data in (iii).)

(i) a. How easy is John to please?
b. *How worth is the book reading?

(ii) a. John is more difficult than Mary to please.
b. *This book is more worth than that one reading.

(iii) a. How worth reading is this book?
b. This book is more worth reading than that one.

[13] As I noted before, these British English examples are not acceptable in American English. I am unsure about other varieties of English.

In both sets of examples, the understood subjects of the *-ing* VPs do not have an overt controller within the sentence and are anaphorically controlled.

There are a number of verbs that subcategorise for an *-ing* VP complement with which they have normal control relations, for example:

(22) a. *It* began raining (subject raising)
b. *John* hated being late (subject equi)
c. John likes *there* being people around (object raising)
d. Mary saw *John* leaving the building (object equi)

The *need* examples in (20) and (21) are strikingly similar to the ordinary cases of control in (22) but, at the same time, they are also similar to the MOCs described in Sections 4.2.2–4.2.4. It was for this reason that in Grover and Moens (1990b) we first hypothesised that MOCs might really be cases of control rather than UDCs. This hypothesis appears even more credible when we consider that some of the verbs in the *need* class have subcategorisations which alternate with the ones exemplified above and which are clearly cases of control:

(23) a. *John* needs VP[ to mend his socks ].
b. We need *someone* VP[ to help us wash up ].
c. *The cat* wants VP[ to go outside ].
d. We want *the cat* VP[ to go outside ].

(24) a. *The socks* need VP[ to be mended ].
b. *The socks* need VP[ mended ].[14]
c. *The socks* could do with VP[ being mended ].
d. *The cat* wants VP[ to be fed ].
e. *The cat* wants VP[ fed ].[15]

(25) a. He needs *his socks* VP[ (to be) mended ].
b. I want *those toys* VP[ (to be) cleared away immediately ].

If the examples in (24) and (25) are compared to the ones in (20) and (21), it can be seen that the same *semantic* argument of the complement VP is controlled by the matrix subject or object (italicised) in both cases. The difference is that in (24) and (25), the complement VP is a passive VP and therefore the controlled argument is its syntactic subject, whilst in (20) and (21) the complement VP is active and the syntactic object is controlled.

[14, 15] Examples such as these are commonly used in Scotland and also in some places in North America, for example in western Pennsylvania (e.g. Pittsburgh), and, according to Carl Pollard (p.c.), in parts of Ohio and West Virginia too. They are unacceptable in most varieties of English.

These examples will be seen to be particularly pertinent in the light of the analysis developed in Chapter 5, where I propose that there is a very strong parallel between passive verbs and MO verbs. I have only discovered one passing reference to *need* predicates and, encouragingly, this reference comments on the similarity with passive: Kilby (1984,p.147) observes the difference between *He wants to shoot* and *He wants shooting* and comments that the meaning of the complement of the former differs from the meaning of the complement of the latter "just as an active sentence differs from a passive".

While I assume that the examples in (20) and (21) are MOCs similar to the *tough* construction, this analysis might be disputed on the basis of the *-ing* form of the complement. There are two possible objections: (a) it could be claimed that these *-ing* constituents are NPs not VPs; and (b) even if they are VPs, there is some resistance to the idea of treating *-ing* VPs as controllable in the same way as infinitival VPs are controllable. Turning first to the objection in (a), while it is not always easy to tell the difference between nominal and verbal *-ing* forms, the evidence does seem to suggest that the complements of *need* predicates are verbal: they cooccur with adverbs rather than adjectives (*The carpet needs shaking well* versus **The carpet needs good shaking*) and they disallow initial determiners (*The child needs taking to the doctors* versus **The child needs a/the taking to the doctors*).[16] With respect to the objection in (b), while many linguists tend to restrict their accounts of control just to infinitival VPs, others, such as Pollard and Sag, have a fairly wide definition of what can be a controlled complement: in Pollard and Sag (1994), their definition encompasses infinitival VPs, base form VPs, and predicative NPs, APs, and PPs. They also recognise the *-ing* VPs in (22a&b) as controlled complements though it is less clear how they view the *-ing* VPs in (22c&d). Carl Pollard (personal communication) has suggested that (22c) might contain a small clause rather than a Raising controlled complement. Ignoring the details of particular examples, though, it is clear that many *-ing* VPs can be treated as controlled complements and this is what I will consider all of the *-ing* VPs in (22) and all the MO *-ing* VPs in (20) and (21) to be.

One difference between *need* predicates and *tough* ones is that the cases of apparent unboundedness that occur with *tough* are not possible with *need* predicates:

(26) a. *These socks need trying to mend $\__{mo}$.

b. *Kim wants his socks finishing mending $\__{mo}$.

[16] Examples such as *The child needs a good talking to* may appear to be counter-examples to this claim but here I assume *a good talking to* to be an NP licensed by the fact that *need* can also occur as a straightforward transitive.

I will provide an explanation of this difference in Section 5.3.3.

As a final point, notice that if the *need* examples are essentially the same as the other MOC examples, then it might be expected that just as all other MOC predicates permit an optional *for*-phrase as controller of the understood subject of the MO-VP, then so should *need* predicates. In fact, none of the *need* predicates permit a *for*-phrase, and most of them (except *worth*) do not allow any overt NP controller of the VP's subject argument:

(27) a. *The car needs for him VP[ washing $\__{mo}$ ].
b. *The car needs him VP[ washing $\__{mo}$ ].
c. *The car needs his VP[ washing $\__{mo}$ ].
d. *This book is worth for him VP[ reading $\__{mo}$ ].
e. This book is worth him VP[ reading $\__{mo}$ ].
f. This book is worth his VP[ reading $\__{mo}$ ].
g. *She wants the flowers for him VP[ wrapping $\__{mo}$ ].
h. *She wants the flowers him VP[ wrapping $\__{mo}$ ].
i. *She wants the flowers his VP[ wrapping $\__{mo}$ ].

I assume that this difference between *-ing* VPs and infinitival ones must be related to other differences between them. Further research is needed in order to find an explanation of the differences.

## 4.3 Properties of MOCs

In the previous few sections I have introduced each type of MOC and dealt with issues related specifically to individual cases. In this section I look at properties which are common to MOCs. All of these properties are ones which are well-documented in the literature and which can be found discussed in Hukari and Levine (1987b), Hukari and Levine (1991), Jacobson (1992) and Pollard and Sag (1994), to name but a few.

**1.** They have a missing object—the first of the two definitional properties discussed in Section 4.2.1.

**2.** The antecedent occurs in an A position, not an $\overline{\text{A}}$ position—the second of the two definitional properties.

**3.** The dependency between the missing object and its antecedent can appear to be unbounded. Consider the examples in (28), taken from Hukari and Levine (1987b):

(28) a. Kim would be difficult to persuade Robin to attempt to reason with $\__{mo}$ .
b. Jim is too nice to try to persuade Robin to tease $\__{mo}$ .
c. Sandy bought it to try to read $\__{mo}$ over the weekend.

**4.** The dependency is subject to island constraints. Again, these are examples from Hukari and Levine (1987b):

(29) a. *Kim would be difficult to imagine the likelihood of kissing $\__{mo}$.
b. *Kim would be difficult to imagine a person who dislikes $\__{mo}$.

(30) a. *Robin is too antisocial to think about the likelihood of inviting $\__{mo}$.
b. *Robin is too antisocial to think about people who like $\__{mo}$.

(31) a. *Leslie bought this picture to contemplate the chances of studying $\__{mo}$.
b. *Leslie bought this picture to impress the artist who painted $\__{mo}$.

**5.** They can license parasitic gaps:

(32) a. These papers were easy (for me) to file $\__{mo}$ without reading _.
b. She is too high-powered for rivals of _ to succeed in overthrowing $\__{mo}$.
c. That chest would be worth varnishing $\__{mo}$ after sanding down _.

**6.** They do not permit embedded subject gaps:

(33) a. *David is easy for me to believe $\__{mo}$ cheated Sam.
b. *Sally is too nice for me to believe $\__{mo}$ hates Ellen.
c. *Michael checked the car to ensure $\__{mo}$ would last the journey.

**7.** Examples where the missing object is contained in a finite clause are (close to) unacceptable. The examples in (34a–c) are from Hukari and Levine (1987b) but the grammaticality judgements are mine (Hukari and Levine mark (34a) and (34b) with a % rather than a *). Speakers do vary in their grammaticality judgements on this issue.

(34) a. *Mary is hard for me to believe Leslie kissed $\__{mo}$.
b. *Robin is too shy for me to believe Kim kissed $\__{mo}$.
c. *Leslie bought this picture to ensure Kim sees $\__{mo}$.
d. *The car needs telling Sue that she should wash $\__{mo}$.

**8.** They are not islands for extraction:

(35) a. What is Bill too busy to talk to $\__{mo}$ about _?
b. Which violin is this sonata easy to play $\__{mo}$ on _?

**9.** The missing object (and its antecedent) may be a sentential complement:

(36) a. That there are no biscuits left is hard to believe $\__{mo}$ .
b. That Bill ate all the biscuits is worth explaining to Fred $\__{mo}$ .
c. That there are no biscuits left needs explaining to Fred $\__{mo}$ .

**10.** A case conflict between the missing object and its antecedent does not result in ungrammaticality:

(37) a. She (nom) is too weird to feel comfortable with $\__{mo}$ (acc).
b. They (nom) are impossible to find $\__{mo}$ (acc).

**11.** The presence of an MO-VP is licensed (subcategorised) by a lexical item (italicised in (38)), i.e. an MO-VP is a complement, not an adjunct. The exception to this may be MO purpose infinitives which seem to be more like adjuncts and are treated as such by Green (1992) and Jones (1991). Green claims that it is always the PATIENT argument in the VP to which the purpose infinitive attaches that controls the missing object and, if she is correct in this claim, then in all cases of MOCs, the missing object is obligatorily controlled by a specific argument of the predicate with which the MO-VP co-occurs.

(38) a. Simon is *easy* MO-VP[ to please $\__{mo}$ ].
b. Simon is *too* busy MO-VP[ to talk to $\__{mo}$ ].
c. We *bought* a lamp MO-VP[ to put $\__{mo}$ in the study ].
d. These books *need* MO-VP[ putting $\__{mo}$ on the shelves ].

## 4.4 MOCs: Unbounded Dependency or Control?

Of all the properties in Section 4.3, the third property, apparent unboundedness, is the one which has been taken to be clear proof that MOCs must be UDCs: if truly unbounded examples do exist, then MOCs can only be UDCs. I claim that the dependency in MOCs is **not** unbounded and that examples which appear to be unbounded, such as the ones in (28), can instead be described as a series of local control dependencies. Some of the motivation for this claim lies

in the fact that in most respects MOCs do not behave like UDCs—of the list of eleven properties in Section 4.3, only the third, fourth and fifth properties are ones which are typical of UDCs while the rest are all difficult to explain under a UDC account. Most of the properties in Section 4.3, on the other hand, follow quite naturally from a control account. Below I briefly discuss the MOC properties listed as 1–11 in the previous section, with a view to demonstrating that they accord more with a control account than with a UDC account:

**1 & 6.** The 'gap' must always be an object gap. This is a problem for a UDC account since missing embedded subjects are possible in all other UDCs. Compare (33) and (39):

(39) a. Who do you believe _ cheated Sam?
b. Sally, I believe _ hates Ellen.
c. The car which you ensured _ would last the journey.

For a control account, the fact that embedded subject gaps are not possible will simply follow from the form of the analysis—in Chapter 5 I will show how MO-VPs can be generated using a lexical rule which affects non-subject arguments only.

**2 & 10.** The antecedent occurs in an A position. As I explained in Section 1.3, Pollard and Sag (1994) divide UDCs into two classes, strong UDCs and weak UDCs. Strong UDCs have antecedents in $\overline{\text{A}}$ positions and strong syntactic connectivity (including identity of case-marking) is achieved by causing the filler and gap to structure-share their LOCAL values. Weak UDCs have antecedents in A positions and there is no syntactic connectivity so antecedent and gap may differ with respect to case-marking. For Pollard and Sag, MOCs are weak UDCs and they would therefore not be expected to display properties typical of strong UDCs. The evidence in points 2 and 9, however, is just as consistent with a control analysis of MOCs since it is typical of control constructions that the controller is in an A position and there is no risk of a case clash. (Recall that in Chapter 2 I motivated a structural approach to case-marking in English which eliminates any concern about possible case-conflict with raising constructions.) Points 2 and 9 are therefore inconclusive evidence in the control versus UDC debate. Notice, however, that Pollard and Sag (1994) do not have any explanation as to why MOCs should differ from other weak UDCs in other respects such as the failure to allow embedded subject gaps (point 6) and the difficulty associated with a dependency into a finite domain (point 7).

**5.** They can licence parasitic gaps. This property is often taken as a defining property of UDCs and it may seem that this poses an insuperable problem for the control analysis of MOCs. However, there is reason to suppose that the current assumption on the part of feature-based

theories that the UDC mechanism (i.e. SLASH) underlies the generation of all parasitic gaps is incorrect. Engdahl (1983) originally discussed the relationship between the parasitic gap and the 'real' gap in terms of binding and in Chapters 6–8 I develop a new HPSG-based account which dispenses with the UDC mechanism for a whole class of parasitic gaps. Once the means of generating parasitic gaps is separated out from the means of generating UDCs the intimacy of the connection between them does not seem so inevitable and it is possible to describe the way they occur with MOCs without having to abandon the control analysis of MOCs. I will defer further discussion of parasitic gaps until Chapters 6–8.

**3 & 7.** In spite of the fact that some apparently unbounded examples of MOCs are well-formed, for example (28), ones such as (34) which involve dependencies into finite clauses are dubious and often unacceptable, even though extractions out of finite clauses are perfectly natural with all other UDCs:

(40) a. Who do you want me to believe that Leslie kissed _?
b. Those pictures, Leslie wanted to ensure that Kim would see _.
c. The car which you told Mary that she should wash _

There is no obvious way that a UDC account can prevent dependencies into finite clauses just in the case of MOCs. For a control account of MOCs the differences between (28) and (34) are less problematic. The control relation—whether in normal control constructions or in MOCs—has as its domain non-finite unsaturated phrases, and not finite Ss. The VPs embedded one inside the other in the examples in (28) are all normal control domains and so the data in (28) can be described as involving a series of local control relations. The examples in (34), by contrast, involve a finite S, a non-control domain, so we would expect them to be ill-formed. If the difficulty for the UDC analysis is explaining why for so many speakers the dependency cannot pass into a finite clause, the difficulty for my account is explaining why there are any speakers at all who find the examples in (34) acceptable. In Section 5.2 I will discuss possible locations of missing objects and show that the speaker variation evident here can be accommodated.

**4.** MOCs appear to be like ordinary UDCs in that neither will permit dependencies into certain 'island' constituents (compare (41) with (29)–(31)). There are some NPs whose complements can be extracted in UDC constructions ('picture nouns' as in (42)) and although some parallel MOC examples are well-formed (as in (43a)), others such as (43b&c) are not. An account which treats all of the examples in (42) and (43) as UDCs would be unable to

explain this difference. In Section 5.2 I try to characterise more precisely the positions in which missing objects may occur.

(41) a. *Who did you imagine the likelihood of kissing _?
b. *This book, I wondered about the chances of reviewing _.

(42) a. Who did you sell some pictures of _?
b. Which country did George meet the king of _?

(43) a. Sandy was easy to take pictures of $\__{mo}$.
b. *Sandy is hard to sell some pictures of $\__{mo}$.
c. *France would be impossible to meet the king of $\__{mo}$.

**8.** The examples in (35) are complex for a UDC account since if a SLASH dependency is involved in the non-question forms of (35), then a double dependency must occur in order to form (35). While Pollard and Sag (1994) assign SLASH a set value which permits certain double dependencies, it is surely preferable to analyse the examples in a way that doesn't require a double value for SLASH—the control analysis of MOCs is such a one. Pollard and Sag (1994) provide the following other example of a double extraction in English:

(44) Someone that stupid, how much time do we really want to waste _ arguing with _?

This example involves a topicalisation out of a *wh*-extraction and it seems different in a not easily defined way from extractions out of *tough* constructions. Topicalisation looks very similar to left-dislocation (which involves a resumptive pronoun instead of a gap) and it is possible that there is some analysis which does not involve a double SLASH value. Notice that other 'weak UDCs' such as clefts which Pollard and Sag group with *tough* constructions do not permit further extractions and that Pollard and Sag have no means to block such examples:

(45) a. *Which problem was it Kim that I wanted to talk to _ about _.
b. *Which sonata was it that violin that I played _ on _.

**9.** The fact that the antecedent in an MOC may be a sentential complement is also a problem for UDC accounts since sentential objects are generally not easy to prepose—compare (46) with the examples in (36).

(46) a. ?That she ate all the biscuits, Mary supposes she should explain to John _.
b. ?That the biscuits are finished, I thought you knew _.

In control constructions, on the other hand, a raising predicate may easily occur with an inherited sentential subject (as in (47)), so once again, MOCs appear to be more like control constructions than like UDCs.

(47) That she ate all the biscuits doesn't seem to embarrass Mary at all.

**11.** The final property of MOCs is the fact that the presence of the MO-VP is licensed by a lexical item. This property is typical of obligatory control constructions where a control predicate both subcategorises for a constituent with a missing argument and determines which of its other arguments will be the controller. The presence of a UDC, on the other hand, is not typically determined by some lexical item, so yet again, MOCs have more in common with control constructions.

This review of the properties of MOCs suggests that there is much evidence to support a control analysis of MOCs. In Chapter 5 I formulate a detailed articulation of such an analysis in the framework of HPSG.

# Chapter 5

# A Control Analysis of Missing Object Constructions

In Chapter 4, I described a set of MOCs and examined their properties with a view to deciding whether they were UDCs or not. I concluded that MOCs were really very unlike ordinary UDCs and that, in fact, they appeared to have much more in common with control constructions. In this chapter I pursue the control approach to MOCs: in Section 5.1, I explain the changes and additions to HPSG that will be needed and briefly review how the analysis measures up against the properties of MOCs first discussed in Sections 4.3 and 4.4. In Section 5.2 I look in more detail at the similarities and differences between passive and MOC formation and consider problems connected with the locations in which missing objects can occur. In Section 5.3 I investigate the control relationships involved in MOCs in more detail. I make further revisions to the treatment of *tough* adjectives and I discuss MOC predicates which have an Equi control of the missing object. In Section 5.4, I show how the treatment of MOCs developed for English can be applied to Italian and Spanish so that the *tough* construction, clitic climbing and long NP movement all follow from the mechanism that underlies MOCs.

## 5.1 The Analysis

In Chapter 4, I argued against a UDC-based account of MOCs and for a control-based account. In Chapter 3, I reviewed the HPSG account of control and revised it in a number of ways and I am now in a position to use the revised HPSG framework to describe MOCs as control constructions. In Section 5.1.1 I show how the verb whose object is missing and the VP in which it immediately occurs may be generated. In Section 5.1.2 I give signs for MO predicates such as *tough* which subcategorise MO-VPs. In Section 5.1.3 I revise the signs for ordinary

control predicates in order to allow them to participate in MOCs.

### 5.1.1 Generating MO Verbs

My account of MOCs derives from the hypothesis that, in spite of the consensus of opinion that they are UDCs, MOCs really involve only local control dependencies. Fundamental to my account is the claim that the deepest VP in the complement of an MOC predicate, i.e. the VP which is actually missing its object, has more in common with an ordinary passive VP than it has with a slashed VP in a true UDC construction. Consider the most deeply embedded VPs in (1)–(3) (marked in bold):

(1) John VP[ has VP[ been VP[ **taught** ]]].

(2) a. John VP[ is AP[ easy VP[ to VP[ **teach** $\_\_{mo}$ ]]]].
b. John VP[ may VP[ need VP[ **teaching** $\_\_{mo}$ ]]]?

(3) Who are you supposed to be VP[ **teaching** $\_\_$ ].

I claim that the passive VP in (1) and the MO-VPs in (2) are extremely similar and that both are equally dissimilar to (3), a standard UDC construction. In both (1) and (2) the patient argument of *teach* occurs as the subject of a higher predicate rather than in a non-argument position as in (3).

We are accustomed to describing the passive example in (1) by saying that the patient argument which would be the object of the active form of *teach* has to be realised as the subject of the passive form. The fact that this promoted object does not immediately occur as the subject of the passive VP can be described in terms of control: the promoted object in (1) (i.e. *John*) is an argument of the predicate *teach* yet it is able to occur directly as the subject of *has* and indirectly as the subject of *been* because *has* and *been* are control verbs and share the subject requirements of their complement. My claim is that something similar occurs with the bold VPs in (2): their promoted objects are occurring as subjects of higher predicates, and the connection between the MO-VPs and these subjects is maintained through successive control relations.

The MOC case is, however, more complex than the passive case. In a passive VP, the object argument of the active can be thought of as having been promoted to become the subject and the subject argument of the active, if present, has been demoted to the by-phrase. In the MOC case, the original object argument has been promoted and needs to be controlled, but

the original subject has not been demoted. It remains the subject, and it too is a controllee: as I noted in Chapter 4, it is controlled by the *for*-phrase if this is present, otherwise it is pragmatically controlled. This means that an MO-VP has two arguments which are controllees whereas a passive VP has just one.

In Chapter 1 I adopted the C9 version of HPSG whereby the SUBCAT list is replaced by the valence feature lists SUBJ, COMPS and SPR. At that point I said that these changes would facilitate my account of MOCs and I am now in a position to show why. We can think of the SUBJ list as the place where information about arguments *external* to the verb phrase is encoded and of the COMPS list as the locus of information about *internal* arguments.[1] The process of passivisation causes what would normally be an internal argument to be promoted to become an external argument and this is modelled by having the Passive Lexical Rule move an NP from the COMPS to the SUBJ list. The concomitant internalisation of the subject (demotion to a *by*-phrase) is modelled by shifting it from the SUBJ to the COMPS list. (4) shows the revised version of the Passive Lexical Rule which I introduced as (16) in Chapter 2.

(4) PASSIVE LEXICAL RULE

$$\left[\begin{array}{ll} \text{PHON} & \boxed{1} \\ \text{SYNSEM|LOC} & \left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \left[\text{VFORM } \textit{bse}\right] \\ \text{SUBJ} & \langle \boxed{2}\text{NP}\,\boxed{3}\rangle \\ \text{COMPS} & \langle \boxed{4}\text{NP},\ldots\rangle \\ \text{SUBCAT} & \langle \boxed{2},\boxed{4},\ldots\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \textit{transitive} \end{array}\right] \end{array}\right] \Rightarrow$$

$$\left[\begin{array}{ll} \text{PHON} & \text{f}_{\text{PSP}}(\boxed{1}) \\ \text{SYNSEM|LOC} & \left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \left[\text{VFORM } \textit{pas}\right] \\ \text{SUBJ} & \langle \boxed{4}\rangle \\ \text{COMPS} & \langle\ldots,\langle \boxed{5}\text{PP}[\textit{by}]\,\boxed{3}\rangle\rangle \\ \text{SUBCAT} & \langle \boxed{4},\ldots,\boxed{5}\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \textit{transitive} \end{array}\right] \end{array}\right]$$

As the corresponding change in the SUBCAT list shows, the externalisation and internalisation of arguments with passive results in a change to the obliqueness ordering for a verb's arguments: the original subject, which was the least oblique argument becomes the most oblique argument.

Turning to the creation of missing objects, I propose that a lexical rule, similar to the Passive Lexical Rule, can be used to create signs for verbs which head MO-VPs. (5) shows the Missing Object Lexical Rule.

[1] I use the terms 'internal' and 'external' in approximately the same sense as GB theory uses them. The internal/external distinction is originally due to Williams (1981).

(5) MISSING OBJECT LEXICAL RULE (MOLR)

$$\left[\text{SYNSEM|LOC}\ \left[\text{CAT}\ \left[\begin{array}{ll}\text{SUBJ} & \langle ... \rangle \\ \text{COMPS} & \langle ..., \boxed{1}\text{NP}, ... \rangle\end{array}\right]\right]\right] \Rightarrow$$

$$\left[\text{SYNSEM|LOC}\ \left[\text{CAT}\ \left[\begin{array}{ll}\text{SUBJ} & \langle ..., \boxed{1} \rangle \\ \text{COMPS} & \langle ... \rangle\end{array}\right]\right]\right]$$

This rule takes as input lexical signs (signs of type *word*) which subcategorise for an NP complement and produces as output signs which are identical except that an NP originally in the COMPS list is now the last member of the SUBJ list. When used in conjunction with the schemata which define constituent structure, the output signs will head phrasal constituents which have one complement NP fewer than usual and which are looking to combine with an extra external argument. (7) is an example of an output from the MOLR with the input being the sign for *teach* in (6). The output verb will head VPs like the one in (2a).

(6)

$$\left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \mathit{verb}[\mathit{bse}] \\ \text{SUBJ} & \langle \boxed{1}\text{NP}_{\boxed{3}} \rangle \\ \text{COMPS} & \langle \boxed{2}\text{NP}_{\boxed{4}} \rangle \\ \text{SUBCAT} & \langle \boxed{1}, \boxed{2} \rangle\end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll}\text{TEACHER} & \boxed{3} \\ \text{TAUGHT} & \boxed{4}\end{array}\right]_{\mathit{teach}}\end{array}\right]$$

(7)

$$\left[\begin{array}{ll}\text{CAT} & \left[\begin{array}{ll}\text{HEAD} & \mathit{verb}[\mathit{bse}] \\ \text{SUBJ} & \langle \boxed{1}\text{NP}_{\boxed{3}}, \boxed{2}\text{NP}_{\boxed{4}} \rangle \\ \text{COMPS} & \langle\rangle \\ \text{SUBCAT} & \langle \boxed{1}, \boxed{2} \rangle\end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll}\text{TEACHER} & \boxed{3} \\ \text{TAUGHT} & \boxed{4}\end{array}\right]_{\mathit{teach}}\end{array}\right]$$

Because no changes are made to the SUBCAT list, the obliqueness relations encoded therein remain unchanged. Notice that because of this lack of change in the obliqueness relations in the SUBCAT list, it would have been impossible to express this lexical rule in the pre-C9 version of the theory since there is no difference in obliqueness, only in the locations in which arguments are to be found. Passive, on the other hand, was expressible in the earlier version because of the way it reordered the SUBCAT list.

It may perhaps seem odd to permit the SUBJ list to have more than one member since it seems to imply that the output is a category with two subjects. In the original precursor to this work, Grover and Moens (1990a) and Grover and Moens (1990b), we labelled our equivalents of SUBJ and COMPS as EXTERNAL and INTERNAL respectively and this does capture the intention behind the analysis more accurately. In the interests of conformity, however, I will

not rename the SUBJ and COMPS features since it is only a notational difference. It may be of interest to point out that there is no real motivation in Pollard and Sag (1994) for making the value of SUBJ a list rather than a single category and in fact the only reason that I can find for the list-valued SUBJ is that it makes the statement of the Valence Principle (see (7) in Section 1.2) more general. By permitting SUBJ to have more than one member in my analysis of MOCs I provide concrete motivation for SUBJ being list-valued. Kiss (1994) formulates an analysis of German raising which also requires SUBJ to be list valued.

In formulating the MOLR I have not specified the syntactic category of signs that may be input and so, in theory, any lexical category with a COMPS and a SUBJ feature could be input. In practice, only verb and preposition entries will be affected since these are the only categories that can take NP complements. I defer until Section 5.2 a discussion of prepositions as input to the MOLR. One restriction that I have not incorporated is that if the input is a verb then it cannot be a finite form. I take it that in the lexical component there are means to constrain where lexical rules may apply and that the MOLR cannot apply to signs which are output from the lexical rule(s) responsible for finite forms. Of the possible non-finite forms, I assume that inputs can be the base form (*bse*), the present participle (*prp*), the past participle (*psp*) and the passive participle (*pas*) as in (8). The existence of examples involving the passive participle (*pas*) such as (8c) has implications for the ordering of the two rules in the lexical component: I have assumed that passive applies before the MOLR.

(8) a. Kim wasn't easy to be ignoring $\__{mo}$
b. ? Lee was tough to have beaten $\__{mo}$.
c. An undeserved prize is always hard to be given $\__{mo}$.

The MOLR as it stands allows for any NP in the COMPS list to become a missing object but this is too permissive. In Section 5.2 I will discuss the possible positions of missing objects in more detail. The formulation is also too restrictive in that it requires the missing object to be an NP and, as we have seen, sentential complements can also be affected. Again, I will discuss this issue in Section 5.2.

Notice that in accordance with the changes in the theory of case assignment that I suggested in Chapter 2, the NP that is promoted is not case-marked. If and when it gets realised it will be case-marked according to the position in which it surfaces. This means that case-marking will not be significant to any analysis that I propose.

Signs such as (7) are lexical signs and combine with their complements in structures of type *head-comps-struc*. I described the schema which constrains head-complement structures (Schema 2 in the standard version of the theory) in Section 1.2 and it needs no further revision. The resulting VPs will be ones with two elements in their SUBJ list and it is important that they should be prevented from combining with both these arguments in structures of the type *head-subj-struc* (defined by Schema 1 in the standard version). MO-VPs can only combine with their missing arguments by virtue of being subcategorised by a lexical item which imposes appropriate control relations between its arguments and the missing arguments of the MO-VP. A revised version of the constraint on head-subject structures is shown in (9). The restriction that the SUBJ list of the head should have just one member is sufficient to prevent application of the rule to MO-VPs.

(9) HEAD-SUBJECT SCHEMA

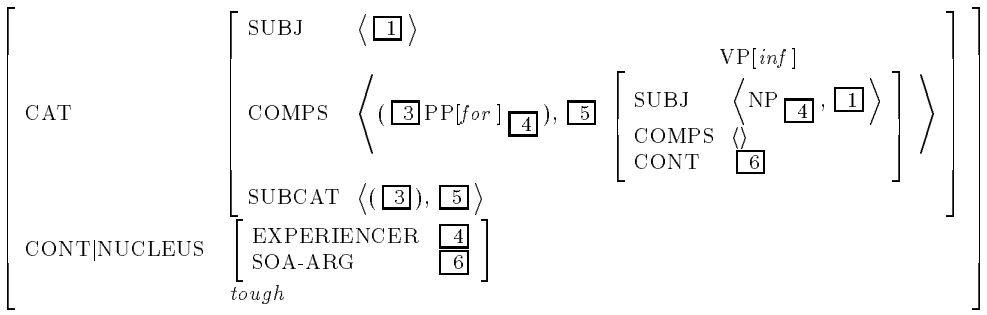
A phrase with DTRS value of sort *head-subj-struc* has a HEAD-DTR value which is a phrasal sign with a one-member list as the value of its SUBJ feature.

Adopting the position that MOCs are control constructions and allowing controlled complements to have more than one potential controllee will of course lead to more complexity in the implementation of the theory of control. This affects both straightforward cases of control and MOC cases. Adopting the C9 features SUBJ and COMPS goes some way towards alleviating this greater complexity—once we allow for the possibility of more than one external argument other details of the implementation follow relatively straightforwardly. In Section 5.1.2 I show how the signs for MO predicates control both of the two members on the SUBJ list and in Section 5.1.3 I show how signs for ordinary control predicates can be revised so that they are able to inherit missing objects and participate in the long-distance examples of MOCs.

### 5.1.2 Signs for MO Predicates

MO predicates subcategorise for a VP complement which has a two-member SUBJ list. The more oblique member, the promoted object, is obligatorily controlled by an argument of the MO predicate. The less oblique argument, the subject, may, but need not, be coindexed with one of the MO predicate's arguments. A new sign for *tough* is given in (10).

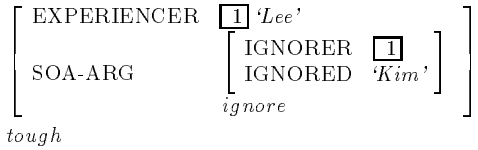
(10)



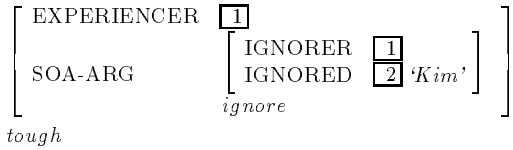

Here both members of SUBJ on the controlled complement are discharged: the subject SUBJ member of the complement is coindexed with *tough*'s optional PP argument in a standard Equi relation ( 4 ) and the promoted object argument of the complement is structure-shared with the single SUBJ member of *tough* ( 1 ). The latter structure-sharing derives from the assumption that the control relation between the missing object and the subject of *tough* is a Raising relation and accordingly there is no semantic role for the missing object to play with respect to *tough* and the controller does not appear in the SUBCAT list. The Raising assumption is far from uncontroversial and I will examine the evidence for and against it in Section 5.3.1. Since the PP argument of *tough* is optional, this means that a controller for the subject of the complement will only be found when the PP occurs. When the PP is absent the subject of the complement is pragmatically controlled. Notice that the need to find a subject for the complement is not passed on to *tough*'s SUBJ list, so an obligatory controller cannot be expected to be found outside the *tough*-clause. The semantic part of the signs for the sentences in (11) are given in (12).[2] Notice that when there is no referent for the EXPERIENCER role the coindexation between it and the IGNORER role is nevertheless established and any contextually derived antecedent for the one must also be interpreted as the antecedent for the other.

(11) a. Kim is tough for Lee to ignore $\__{mo}$.
b. Kim is tough to ignore $\__{mo}$.

(12) a.




b.




[2] I use shorthands such as *'Lee'* in feature structures to indicate that the index it labels is re-entrant with an index in the CONTEXT|BACKGROUND part of the sign such that the individual that the index is anchored to is named *Lee*.

In (14a–c) I give signs for some other MOC predicates, *need*, *bring* and *want*, corresponding to their uses in (13a–c).[3] (Of course, all three have other subcategorisations for which other signs will be needed.)

(13) a. The bike needs mending $\__{mo}$.
b. Kim brought a bike (for you) to ride $\__{mo}$.
c. I want this bike mending $\__{mo}$.

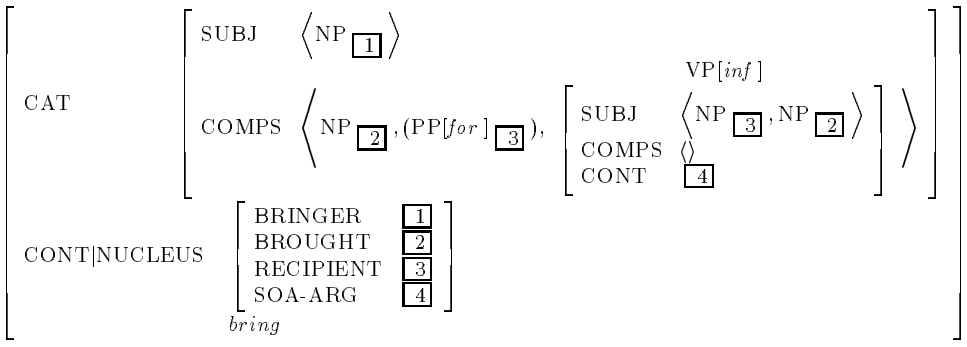
These signs are all very similar to the sign for *tough*. All of them take VP complements which have two SUBJ members but *need* and *want* require it to be a *prp* VP complement instead of the infinitival VP complement of *tough* and *bring*. *Bring* is like *tough* in that it has an optional PP argument which controls the first SUBJ member of the controlled complement. *Need* and *want*, on the other hand, do not contain a controller for the complement's subject, so this will be pragmatically controlled just as it is with *tough* and *bring* when the optional PP argument is absent. *Want* and *bring* differ from *tough* and *need* because one of their complements (the object) controls the promoted object of the MO-VP. This means that the control relationship for *want* and *bring* is an object control relationship while for *tough* and *need* it is a subject control relationship. Unlike *tough* I have assumed that for *need* and *want* the control relationship between the missing object and its controller is Equi for reasons which I will explain in Section 5.3.3; for *bring* I have also assumed that the relationship is Equi since the controller/missing object is clearly role-assigned with respect to *bring*. I will discuss the nature of the control relationship between missing object and its controller in more detail in Section 5.3.

(14) a.

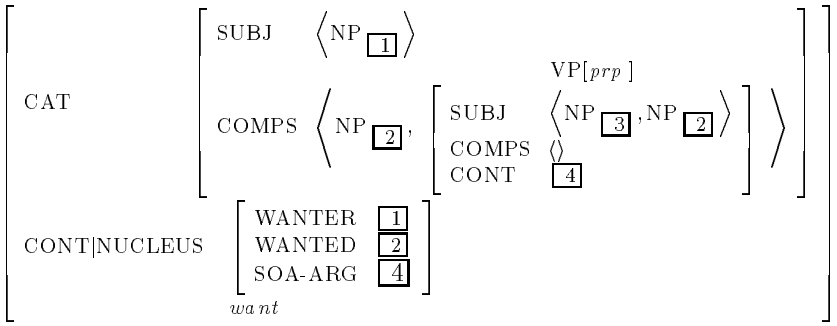
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \langle \text{NP}\ \boxed{1} \rangle \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{SUBJ} & \langle \text{NP}\ \boxed{2}, \text{NP}\ \boxed{1} \rangle \\ \text{COMPS} & \langle\rangle \\ \text{CONT} & \boxed{3} \end{array}\right] \right\rangle \end{array}\right]^{\text{VP}[psp]} \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{NEEDER} & \boxed{1} \\ \text{SOA-ARG} & \boxed{3} \end{array}\right]_{need} \end{array}\right]$$

[3] Here I am assuming for the sake of simplicity that the MO-VP in MO purpose infinitive constructions is subcategorised by the verb.

b.




c.




### 5.1.3 Signs for Control Predicates

In an ordinary control sentence such as (15a), the most deeply embedded VP (*swim*) has a missing subject which is controlled by the matrix subject *John*. Yet it is not directly controlled. Rather, it is associated with the matrix subject through a series of distinct control relations: there is a control relation between the subject argument of *to* and the subject argument of *swim*, and a control relation between the subject argument of *tried* and the subject argument of *to*, and a control relation between the subject argument of *has* and the subject argument of *tried*. In HPSG, each of these control relations is brought about firstly by assuming the kind of structure indicated in (15a) and secondly by ensuring that the signs for control verbs contain the information which identifies the controller with the controllee. In this way, the phenomenon of control can be entirely driven by the lexical signs for control verbs and adjectives: if these signs are correctly specified, then all else follows.

(15) a. John VP[ has VP[ tried VP[ to VP[ swim ]]]].
b. John VP[ would VP[ be AP[ hard VP[ to VP[ try VP[ to VP[ help $\_{}_{mo}$ ]]]]]]].

In a similar fashion, to deal with apparently long-distance examples of MOCs such as (15b), all that is needed is to ensure that the lexical signs for control predicates make the appropriate associations between controller and controllee. In this section, therefore, I give revised signs

for ordinary control verbs. My treatment relies on certain assumptions about the structure underlying lists. It is common in computational implementations of feature structure formalisms to simulate lists by means of a 'first/rest' (or 'head/tail') strategy whereby the first member of the list is a value of the feature FIRST and the remainder of the list is encoded as the value of the feature REST. The value of REST is itself a list with the features FIRST and REST and so an entire list can be encoded recursively. In (16b) I show an example of the internal structure of a list comprising of two members. This is the same list as appears in list notation in (16a), which can be thought of as a shorthand for the more cumbersome underlying feature structure.

(16) a. $\langle \text{NP}\,\boxed{1}, \text{NP}\,\boxed{2} \rangle$

b.
$$\begin{bmatrix} \text{FIRST} & \text{NP}\,\boxed{1} \\ \text{REST} & \begin{bmatrix} \text{FIRST} & \text{NP}\,\boxed{2} \\ \text{REST} & e\_list \end{bmatrix}_{ne\_list} \end{bmatrix}_{ne\_list}$$

There are three types involved in the feature structures underlying lists: *list* is a supertype of the two more specific types *e_list* (empty list) and *ne_list* (non-empty list). The features FIRST and REST occur with *ne_list* but *e_list* is an atomic type (i.e. it has no features associated with it). The feature FIRST takes a feature structure of type *synsem* as value but the feature REST takes a *list* as value.[4] Whether a list continues beyond a first member depends on whether REST takes an *ne_list* or an *e_list* as value. Notice that the difference between the two-member list in (16) and the one-member list in (17) is that in the former the (outermost) REST feature has an *ne_list* value while in the latter REST has an *e_list* value.

(17) a. $\langle \text{NP}\,\boxed{1} \rangle$

b.
$$\begin{bmatrix} \text{FIRST} & \text{NP}\,\boxed{1} \\ \text{REST} & e\_list \end{bmatrix}_{ne\_list}$$

In what follows I will use expressions such as (18a) as shorthand notation for a list which has at least one member ( $\boxed{1}$ ) and where the second index ( $\boxed{2}$ ) annotated with the type *list* refers to the *list* value of REST whether it is an *ne_list* or an *e_list*, i.e. it refers to the part of the list that follows the first member. As before, if I omit the *list* annotation after the second

[4] In fact, not all lists in HPSG are lists of *synsem* objects—the value of PHON is a list of phonological strings, the value of RETR is a list of quantifiers and the value of COMP-DTRS is a list of phrases. To be completely accurate, lists should be sorted according to the type restrictions on their members but I will gloss over this issue here since it is not problematic in any way for the questions at hand.

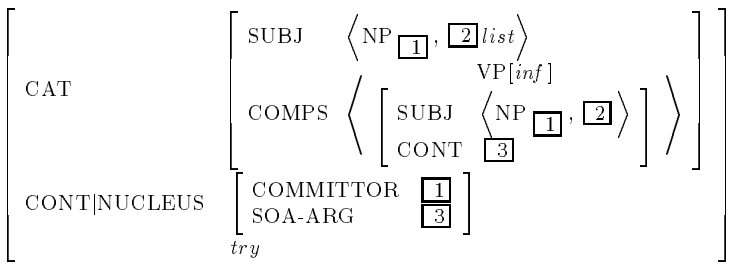
member of the list as in (18b) then I intend this to indicate exactly a two-member list, i.e. the second index picks up the REST|FIRST value rather than the entire REST value.

(18) a. $\langle \boxed{1}, \boxed{2} list \rangle$

b. $\langle \boxed{1}, \boxed{2} \rangle$

In order to allow subject equi verbs like *try* to mediate the control relationship between the missing object and the MO predicate that assigns a controller to it, as in (15b) and (20), the sign for *try* must be altered as in (19):[5]

(19)



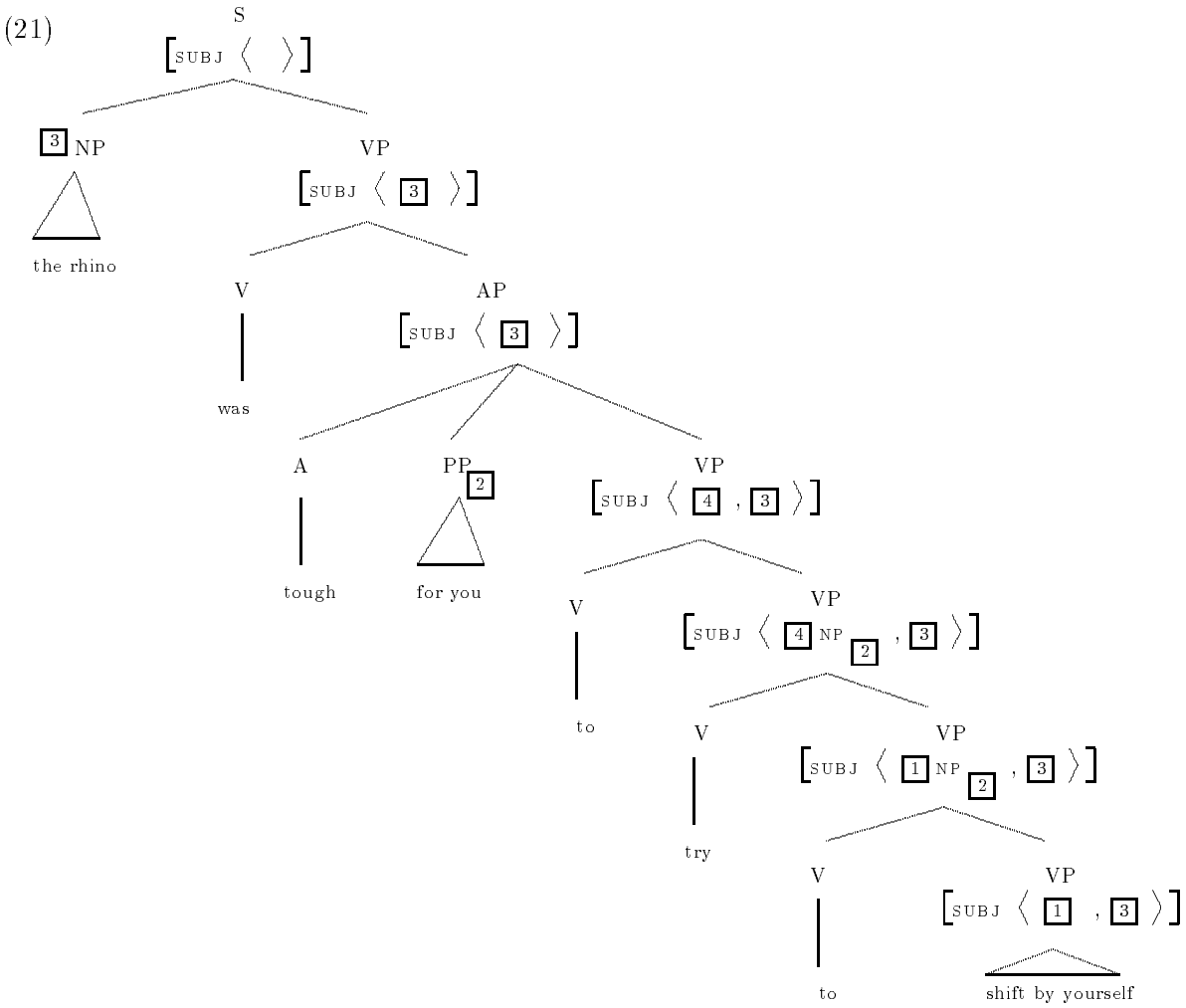

This sign is slightly different from the sign I originally gave for *try* in (20) in Section 3.2.1. The earlier version only allowed for the complement having a one-member SUBJ list whereas the new version in (19) allows for the possibility that the complement might have two elements in its SUBJ list. The SUBJ list of the complement is specified as $\langle$ NP $\boxed{1}$, $\boxed{2}$ $\rangle$ where the first member, NP $\boxed{1}$, is the subject of the complement, and the second index, $\boxed{2}$, refers either to an *e_list* or to a one-member *ne_list* containing information about a missing object.[6] The SUBJ list of *try* contains a subject NP coindexed in an Equi relation to the subject of the complement and it inherits the tail of the SUBJ list of the complement: if the tail is empty then the tail of the SUBJ list of *try* will also be empty, but if there is a missing object in the tail then this passes up to *try*. In this way one sign can be used for both cases and subject equi verbs like *try* can be made to pass on information about missing objects. The tree in (21) shows how the SUBJ information is distributed in the analysis of (20). To understand the feature passing in the VPs headed by the auxiliaries *be* and *to*, see their revised signs below.

[5]Notice that I adhere to the usual practice of only labelling one element of a re-entrancy with type information (i.e. $\boxed{2} list$) and that the absence of the *list* specification on the other part of the re-entrancy should not be confused with the shorthand in (18b).

[6]There should never be any cases where the SUBJ list has more than two members since there is nothing in the grammar apart from the MOLR which adds elements to a SUBJ list.

(20) The rhino was tough (for you) to *try* to shift $\_mo$ by yourself.

(21)




Turning now to subject raising verbs, these pass on second SUBJ members just as subject equi verbs do. The sign (22) is a revised version of the sign for *tend* which I gave in (37) in Section 3.3.2.

(22)

$$\left[\begin{array}{ll} & \left[\begin{array}{ll} \text{SUBJ} & \langle \boxed{1}, \boxed{2}\, list \rangle \\ \text{COMPS} & \left\langle \boxed{3} \left[\begin{array}{ll} \text{SUBJ} & \langle \boxed{1}, \boxed{2} \rangle \\ \text{COMPS} & \langle\rangle \\ \text{CONT} & \boxed{4} \end{array}\right] \right\rangle \\ \text{SUBCAT} & \langle \boxed{3} \rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{SOA-ARG} & \boxed{4} \end{array}\right] \\ & tend \end{array}\right]$$

The difference between the older version and the new version in (22) resides solely in the SUBJ lists of *tend* and its complement. The older sign for *tend* only allowed for a one-member SUBJ list whereas the new sign deals with both one- and two-member SUBJ lists. As I observed in Chapter 3 (fn.10), it would have been possible to have required subject raising verbs to

structure-share the entire list value of SUBJ with their complements instead of sharing the contents of the list and indeed this would still be possible and, perhaps, now that the SUBJ list may have more than one member, it may be desirable. An alternative sign for *tend*, therefore is the one in (23). Both (22) and (23) behave in such a way that if a missing object occurs in the SUBJ list of the complement then it will propagate into the SUBJ list of *tend* but if there is no missing object the verb behaves in the standard way.

(23)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \boxed{1} \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{SUBJ} & \boxed{1} \\ \text{COMPS} & \langle\rangle \\ \text{CONT} & \boxed{2} \end{array}\right]_{\text{VP}[inf]} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{SOA-ARG} & \boxed{2} \end{array}\right]_{tend} \end{array}\right]$$

Auxiliaries also inherit a missing object from their complement and their signs need to be altered in much the same way as subject raising signs. The following is a revised version of the sign for *have* that I introduced in (57) in Section 3.3.5.

(24)

$$\left[\begin{array}{ll} \text{PHON} & \langle have \rangle \\ \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{1}, \boxed{2} list \right\rangle \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{1}, \boxed{2} \right\rangle \\ \text{COMPS} & \langle\rangle \\ \text{SUBCAT} & \boxed{3} \\ \text{CONT} & \boxed{4} \end{array}\right]_{\text{VP}[psp]} \right\rangle \\ \text{SUBCAT} & \boxed{3} \end{array}\right] \\ \text{CONT} & \boxed{4} \end{array}\right]$$

Turning now to object control verbs, revised signs for the object equi verb *persuade* and the object raising verb *expect* are given in (25) and (26) respectively:

(25)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}\,\boxed{1}, \boxed{2} list \right\rangle \\ \text{COMPS} & \left\langle \text{NP}\,\boxed{3}, \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}\,\boxed{3}, \boxed{2} \right\rangle \\ \text{CONT} & \boxed{4} \end{array}\right]_{\text{VP}[inf]} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{INFLUENCE} & \boxed{1} \\ \text{INFLUENCED} & \boxed{3} \\ \text{SOA-ARG} & \boxed{4} \end{array}\right]_{persuade} \end{array}\right]$$

(26)

$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}\,\boxed{1}, \boxed{2} list \right\rangle \\ \text{COMPS} & \left\langle \boxed{3}, \left[\begin{array}{ll} \text{SUBJ} & \left\langle \boxed{3}, \boxed{2} \right\rangle \\ \text{CONT} & \boxed{4} \end{array}\right]_{\text{VP}[inf]} \right\rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{EXPECTOR} & \boxed{1} \\ \text{SOA-ARG} & \boxed{4} \end{array}\right]_{expect} \end{array}\right]$$

These signs differ from the subject control signs in that the controller is not the subject of *expect* or *order*, but the direct object, which is in the COMPS list. This gives rise to the structure-sharings indicated with [3]. In the case of *expect*, the object raising verb, the structure-sharing is of complete *synsem* objects while with *order* it is just coindexation. As with the subject control cases, the tail of the the SUBJ list is shared between control predicate and controlled complement and this permits a missing object to be propagated if it occurs.

The combination of the MOLR to initiate a missing object, the revised signs for control predicates and the signs for MO predicates is sufficient machinery to generate a wide variety of both short- and seemingly long-distance MOCs.

### 5.1.4 Properties of MOCs

In Section 4.4 I discussed the properties of MOCs with a view to challenging the standard assumption that they are UDCs. Here I briefly review these properties again to demonstrate that they follow, mostly straightforwardly, from the new account of MOCs.

**1.** The argument that is missing is always an object. This follows from the form of the MOLR which affects only elements originating in the COMPS list.

**2.** The antecedent occurs in an A position, not an $\overline{\text{A}}$ position. This follows generally from the fact that controllers are always arguments of a higher predicate and particularly from the form of the signs for MO predicates which impose the control relationship.

**3.** The dependency between the missing object and its antecedent can appear to be unbounded. As I hope to have demonstrated, examples which are apparently unbounded can often be easily described as a sequence of control relationships whereby ordinary Raising and Equi predicates permit information about the missing object to propagate through them. There are some acceptable or nearly acceptable examples which cannot be described just with the help of the revised signs for control verbs. I will discuss these in Section 5.2.

**4.** The dependency is subject to island constraints, that is, the missing object cannot usually be a subpart of a larger NP. This follows from the form of the analysis given so far which only allows missing object information to propagate through VPs and APs. There are, however, examples where missing objects can occur inside NPs and I will discuss such examples and possible ways of extending the analysis in Section 5.2.

**5.** They can licence parasitic gaps. In Chapters 6–8 I will propose a new account of parasitic

gaps and show that their ability to occur with MOCs does not invalidate the analysis of MOCs that I have proposed here.

**6.** They do not permit embedded subject gaps. Again, this follows from the form of the MOLR which only affects elements originating in a COMPS list.

**7.** The missing object cannot usually occur inside a finite clause. I have not discussed the issue of whether information about a missing object can propagate out of a clause but there is room in the control account to model the speaker variation that is evident in this issue. I discuss this further in Section 5.2.

**8.** They are not islands for extraction. The fact that MOCs do not form *wh*-islands follows from the fact that they are not UDCs. The new account correctly predicts that extractions out of MOCs are no more peculiar than extractions out of passive VPs.

**9.** The missing object (and its antecedent) may be a sentential complement. The MOLR does not currently permit non-NPs to be promoted from COMPS to SUBJ but if we assume that this can be rectified and that the relationship between the missing object and its controller is a Raising relationship then this property is entirely consistent with a control account of MOCs. I will investigate this issue in more detail in Section 5.3.1.

**10.** A case conflict between the missing object and its antecedent does not result in ungrammaticality. Given the reformulation of English case-assignment in Chapter 2, case-marking would not be an issue for any analysis of English MOCs since even in Raising relationships which exhibit strong connectivity, elements are case-marked according to the position in which they are realised and not according to the position of the controllee. For languages like German which have some lexically assigned case-marking, the evidence is consistent with my analysis—see Section 5.3.1 for details.

**11.** The presence of an MO-VP is licenced by a lexical sign. Again, this follows from my account since signs with two elements in their SUBJ list cannot occur freely and must be subcategorised by an MO predicate in order that the SUBJ elements be properly controlled. It is possible that MO purpose infinitives are adjuncts rather than complements and are therefore not subcategorised for but it is undeniably the case that selection of a kind is involved since only certain types of verb can co-occur with MO purpose infinitives.

## 5.2 MOCs and Passive Compared

In Section 5.1.1, I claimed that signs for MO verbs are generated in a way which is directly comparable to the way in which passive verbs are generated and indeed, there is a lot of evidence to corroborate this claim. There are similarities between the two processes in that many of the elements that can be promoted by passive can also be promoted by the MOLR and similarly, many elements which cannot be passivised also cannot be missing objects.

Examples in the first category are certain non-NP arguments which are promotable by both passive and the MOLR:

(27) a. That John is happy is hard to believe $\__{mo}$.
b. That John is happy is believed by everyone.

(28) a. Whether we should go or not is hard to decide $\__{mo}$.
b. Whether we should go or not has not been decided yet.

Examples in the second class, where neither process can apply, are shown in (29) and (30). Notice that sentences with extractions from these positions are perfectly well-formed, as the examples in (31) demonstrate.

(29) a. *John is resembled by Sue.
b. *John is easy to resemble $\__{mo}$.

(30) a. *Twelve stone is weighed by John.
b. *Twelve stone is easy to weigh $\__{mo}$.

(31) a. Who does Sue resemble _?
b. How much does John weigh _?

The two lexical rules are currently not formulated to permit the examples in (27) and (28) or to block the examples in (29) and (30). It is not clear what the sentential complements in (27) and (28) have in common with ordinary referential NPs that allows them to be promoted in the same way so I will not attempt to modify the lexical rules to permit them. Similarly, the NPs in (29) and (30) clearly differ from ordinary NPs in a way that prevents their promotion but I will not explore such differences here. Nevertheless, although the lexical rules are inadequate with respect to (27)–(30) it should be clear that the same revisions would be appropriate for both rules.

In spite of all the similarities between passive and MOCs, there are places where the patterns of acceptability differ, most notably with ditransitive verbs. In the following 'dative-moved' examples, the ones marked with a ? are unacceptable to at least some speakers of English (myself included).

(32) a. Bert was handed the note.
b. ?The note was handed Bert.

(33) a. ?Bert was easy to hand $\_\_{mo}$ the note.
b. ?The note was easy to hand Bert $\_\_{mo}$.

It is worth pointing out that although passive and MOC formation seem to differ in this respect, this does not lend any particular support to a UDC analysis: if we examine the grammaticality patterns for constituent question formation in the same contexts, as in (34), then the pattern is different from either pattern in (32) and (33) (again, the ? indicates ungrammaticality for at least some speakers and, again, this includes myself).

(34) a. ?Who did you hand _ the note?
b. What did you hand Bert _?

I would suggest that those speakers who reject (32b) have a passive rule which can only affect the least oblique member of COMPS. Since the recipient is less oblique than the thing received, it can be promoted by passive but the thing received cannot. For those speakers who also reject the equivalent MOC example in (33b) it would seem that a similar restriction applies for the MOC lexical rule. Here, however, the constraint against promoting a more oblique element only applies in the case of two NPs in COMPS, since, as we will see, missing objects do not generally have to be the least oblique argument in COMPS. Where a speaker does have a constraint against promoting a more oblique element, I assume this relates to processing difficulties that would be engendered by the potential ambiguity that would arise. This would mean that there is a strong likelihood of there being a correlation between grammaticality judgements for (32b) and (33b), i.e. if a speaker rejects one then she is also likely to reject the other, and similarly for those who accept them.

Although missing objects and extracted elements arise by two quite different processes, in Chapter 8 I will explore the idea that they have a feature in common which marks them as being displaced from their canonical position and which permits them to act as antecedents to parasitic gaps. I do not wish to preempt discussion of this feature here but it is possible

that it plays a role for those speakers who reject (33a) and (34a). Although neither MOC formation nor the revised traceless formulation of extraction cause empty categories to occur in constituent structure, I suggest in Chapter 8 that the displaced element may be marked as phonologically null in its canonical position in the SUBCAT list. I suggest that speakers who reject (33a) and (34a) have a constraint against elements which are so marked from occurring in a non-rightmost position in situations where ambiguities might arise. This accords with a general tendency for gaps in English to occur in rightmost constituents, as noted by Kuno (1973) and others. So for speakers who have a grammar which minimises ambiguity, only one out of two possibilities is permitted for elements marked with the proposed feature. It follows that I would predict that either a speaker rejects both (33a) and (34a) or she accepts both.

For myself and other speakers who have the two restrictions just described, the net effect with respect to MOCs is to render both objects in a dative-moved VP unpromotable. I find this effect is particularly strong in benefactive ditransitives, as shown in (35). Notice that an account of MOCs which uses the standard UDC mechanism to describe missing objects is entirely unable to explain the badness of (35b).

(35) a. *Kim would be easy to make $\__{mo}$ a cake.
b. *A cake would be easy to make Kim $\__{mo}$.

Turning now to non-dative-moved ditransitives, there is no potential for ambiguity in these since the more oblique nonsubject argument is explicitly marked with a preposition. It follows that there should be no problems deriving from ambiguity considerations for promotion or extraction of elements in the COMPS lists and indeed MOC formation and extraction can easily affect either argument. However, passivisation of the object of the preposition is impossible:

(36) a. *Bert was handed the note to.
b. The note was handed to Bert.

(37) a. Bert was easy to hand the note to $\__{mo}$.
b. The note was easy to hand $\__{mo}$ to Bert.

(38) a. Who did you hand the note to _?
b. What did you hand _ to Bert?

There are further differences between MOCs and passives relating to the objects of prepositions. MOCs, such as (39), which leave a stranded preposition are extremely common and usually perfectly well-formed. In some cases, equivalent passives (often termed 'pseudo-passives') are also well-formed, as is (40).

(39) The garden is easy to look after $\__{mo}$.

(40) The garden hasn't been looked after properly.

As the contrast between (36a) and (37a) shows, pseudo-passives affecting a PP which is not the least oblique member of COMPS are ill-formed but equivalent MOCs are not. Pseudo-passives constitute a problem which does not currently have a solution in HPSG. Missing objects embedded in PPs are also a problem for my account of MOCs as it has been formulated so far. Even though the data do not coincide completely, I assume that the two problems are related and are susceptible to a common solution. In what follows I will extend my account of MOCs in order to permit missing objects in prepositional arguments and I will demonstrate that part of the new mechanism can be used to generate pseudo-passives.

When I introduced the MOLR in Section 5.1.1, I observed that the rule did not specify the syntactic category of the input sign and that in practice the only inputs would be verbs and prepositions since these are the only categories that directly subcategorise for NPs. At this point where missing objects inside PPs are at issue, the utility of allowing preposition signs to be affected by the MOLR will be apparent. It means that the possibility of PPs with an extra element in their SUBJ list already exists and, furthermore, if a means were found to propagate information about the extra element upwards then the mechanism would be complete. Before I investigate such a mechanism, however, a digression into the nature of PPs is in order.

Since Gazdar et al. (1985), it has been standard in feature-based theories to distinguish subcategorised PPs whose prepositions play no semantic role (so-called 'case-marking' prepositions) from PPs (subcategorised or otherwise) whose prepositions do have a semantic contribution to make. The PPs in (41) are in the former class and those in (42) are in the latter.

(41) a. Kim gave the report to Sandy.
b. Lee relies on Kim.
c. Kim took a picture of Lee.
d. Lee was beaten by Sandy.

(42) a. Kim put the report in the wall-safe.
b. Lee found the keys under the chair.
c. Kim was behind the pillar.
d. Sandy went to the movies with Lee.

A second distinction that is made both in GPSG and HPSG is between predicative and non-predicative categories where being predicative is strongly correlated with having a subject.

Argument NPs are ordinarily non-predicative but some, such as post-copula indefinites, are predicative and subcategorise for a subject:

(43) Kim is a fool.

Similarly, PPs may be predicative or non-predicative. All case-marking PPs are taken to be non-predicative and to acquire semantic content from their (non-predicative) NP objects. These PPs therefore do not subcategorise for a subject. Other PPs such as the ones in (44) are predicative and do subcategorise for a subject.

(44) a. Kim was in the bath.
b. With Kim in the bath, no-one could use the bathroom.

Beyond this, the account of the syntax and semantics of PPs in Pollard and Sag (1994) is not quite clear. Specifically, it is not clear what Pollard and Sag's assumptions are about PPs which are subcategorised for and which have a semantic contribution to make but which do not occur in positions which are clearly predicational. I will assume that some of these PPs are predicative while others are not. For example, I assume that the locative PPs in (42a&b) are predicative and denote two-place relations (between *the report* and *the wall-safe* and between *the keys* and *the chair* respectively). On this assumption, the direct objects of the verbs *put* and *find* are interpreted as the subjects of the PPs and hence these are object control verbs. Other semantically contentful PP arguments may not be predicative, for example those in (45).

(45) a. Kim looked at Sandy.
b. Lee sat on the chair.

In this case I assume that the PP has the same semantic content as its NP object, just as case-marking PPs do. The meaning of the preposition contributes to the meaning of the sentence by virtue of it being incorporated into the semantics of the verb. Thus the type of the verb in (45a) is *look-at* rather than just *look*.

While my assumptions help to classify many PPs, there are many others which I am uncertain about and it is not possible to investigate this matter in detail here. Nevertheless, with many cases it is possible to say whether a PP is a simple case-marker, a non-predicative PP with a semantic contribution to make or a predicative PP which denotes a two-place relation and

which therefore needs a subject. The discussion of prepositions in Pollard and Sag (1994) is limited in the main to non-predicative prepositions which have an NP in COMPS but an empty SUBJ list. It is consistent with the theory of HPSG, however, to treat predicative prepositions as predicates with two arguments, one in the COMPS list and one in the SUBJ list. This means that the effect of the MOLR on a preposition sign is to move an NP from COMPS into SUBJ, causing SUBJ to be a two-member list if the preposition is predicative or a one-member list if it is non-predicative. The following two signs for non-predicative *at* are input to and output of the MOLR respectively.

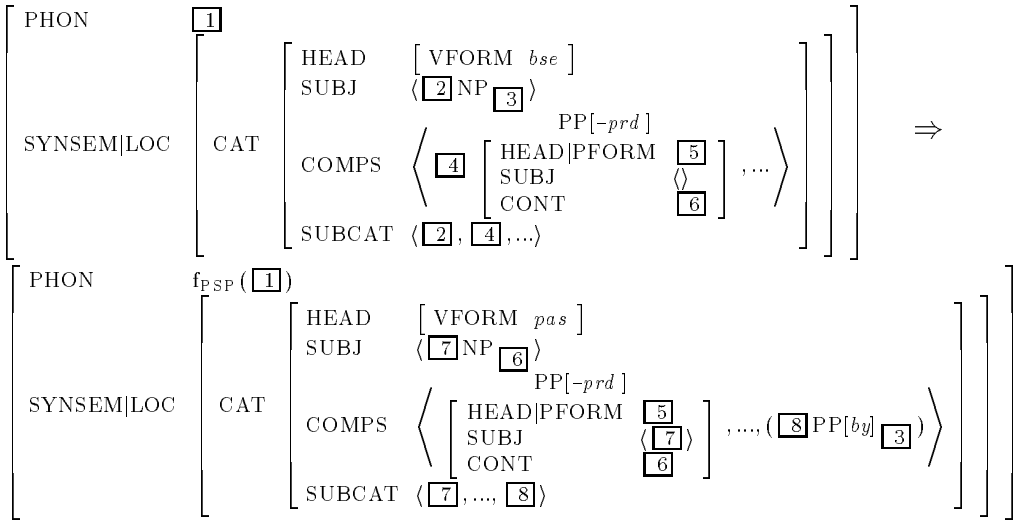
(46)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \left[\begin{array}{ll} \text{PFORM} & at \\ \text{PRD} & minus \end{array}\right] \\ & prep \\ \text{SUBJ} & \langle\rangle \\ \text{COMPS} & \langle \text{NP } \boxed{1} \rangle \end{array}\right] \\ \text{CONT} & \boxed{1} \end{array}\right]$$

(47)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{HEAD} & \left[\begin{array}{ll} \text{PFORM} & at \\ \text{PRD} & minus \end{array}\right] \\ & prep \\ \text{SUBJ} & \langle \text{NP } \boxed{1} \rangle \\ \text{COMPS} & \langle\rangle \end{array}\right] \\ \text{CONT} & \boxed{1} \end{array}\right]$$

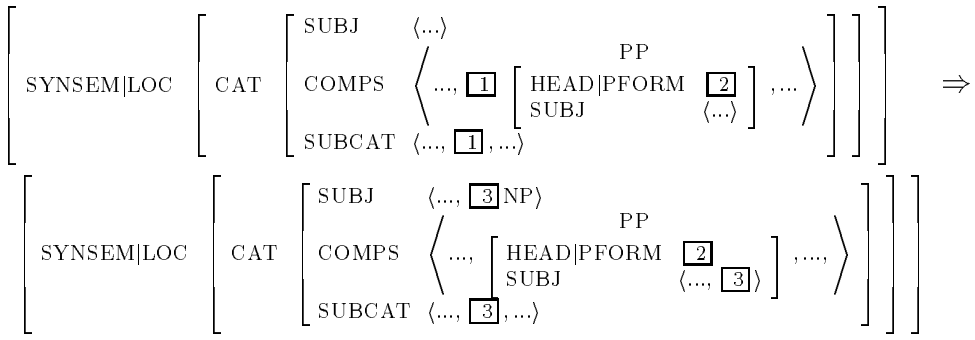
The output sign has an empty COMPS list and will therefore not combine with an NP to its right. In effect this a sign for a stranded preposition although the cause of its stranding is not *wh*-movement.

I am now in a position to formulate two new lexical rules, one which generates pseudo-passives and one which permits missing objects in PP arguments. The two rules are shown in (48) and (49) respectively.

(48) Pseudo-Passive Lexical Rule (PPLR)




(49) Missing Object Lexical Rule 2 (MOLR2)




The Pseudo-Passive Lexical Rule (PPLR) is more restrictive than the MOLR2 in that it only affects verbal signs with a non-predicative PP complement which occurs as the first member of the COMPS list. I assume that these restrictions relate to properties of passive in general and that it is not accidental that both of the passive lexical rules only affect objects with NP semantics which are least oblique members of COMPS.

(50) Kim was laughed at by Sandy.

The verb *laughed* in (50) is derived by means of the PPLR. The sign for the verb *laugh at* in (51) is input to the PPLR and the output is the sign in (52). The sign for the stranded preposition in (50) is the output of the MOLR in (47).

(51)

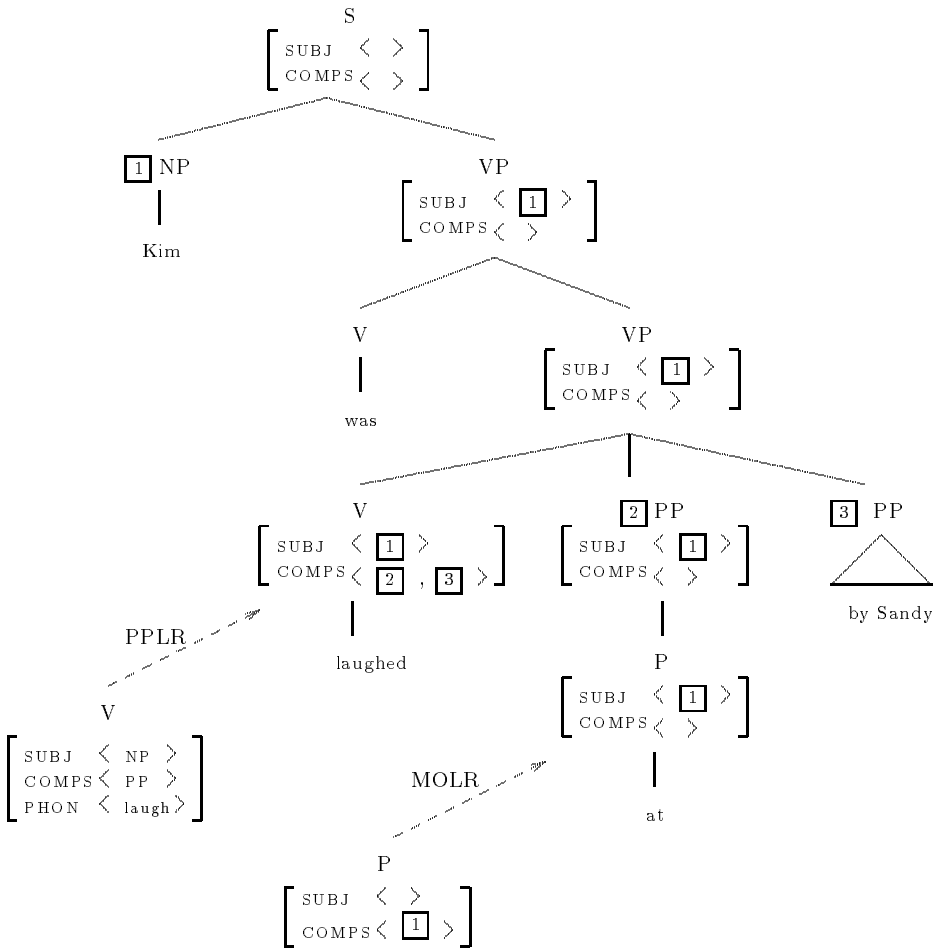
$$\begin{bmatrix} \text{PHON} & \langle laugh \rangle \\ \text{CAT} & \begin{bmatrix} \text{HEAD} & verb[bse] \\ \text{SUBJ} & \langle \boxed{1}\,\text{NP}\,\boxed{2} \rangle \\ \text{COMPS} & \left\langle \boxed{3} \begin{bmatrix} \text{HEAD|PFORM} & at \\ \text{SUBJ} & \langle\rangle \\ \text{CONT} & \boxed{4} \end{bmatrix} \right\rangle \\ \text{SUBCAT} & \langle \boxed{1}, \boxed{3} \rangle \end{bmatrix} \\ \text{CONT|NUCLEUS} & \begin{bmatrix} \text{DERIDER} & \boxed{2} \\ \text{DERIDEE} & \boxed{4} \end{bmatrix} \\ & laugh\text{-}at \end{bmatrix}$$

(52)

$$\begin{bmatrix} \text{PHON} & \langle laughed \rangle \\ \text{CAT} & \begin{bmatrix} \text{HEAD} & verb[pas] \\ \text{SUBJ} & \langle \boxed{5}\,\text{NP}\,\boxed{4} \rangle \\ \text{COMPS} & \left\langle \begin{bmatrix} \text{HEAD|PFORM} & at \\ \text{SUBJ} & \langle \boxed{5} \rangle \\ \text{CONT} & \boxed{4} \end{bmatrix}, (\boxed{6}\,\text{PP}[by]\,\boxed{2}) \right\rangle \\ \text{SUBCAT} & \langle \boxed{5}, \boxed{6} \rangle \end{bmatrix} \\ \text{CONT|NUCLEUS} & \begin{bmatrix} \text{DERIDER} & \boxed{2} \\ \text{DERIDEE} & \boxed{4} \end{bmatrix} \\ & laugh\text{-}at \end{bmatrix}$$

The diagram in (53) shows the analysis of (50) and indicates the lexical rule application as well: the dotted lines point between input and output.

(53)



A difference between the PPLR and MOLR2 is that the former can only affect PPs which immediately follow the verb while the latter can affect any PPs. Furthermore, unlike the PPLR, MOLR2 does not require the PP to be non-predicative. As a result the following examples are predicted to be well-formed:

(54) a. The garage is impossible to put the car in $\__{mo}$.
b. Kim is difficult to talk to Lee about $\__{mo}$.
c. This violin is easy to play the sonata on $\__{mo}$.

I find these examples not quite fully acceptable but since equivalent purpose infinitives are fine, as in (55), I assume that this is related to the semantics of *tough* adjectives in some way.

(55) a. I bought the box to put pencils in $\__{mo}$.
b. I borrowed the book for you to read to the children from $\__{mo}$.
c. I brought the violin to play the sonata on $\__{mo}$.

As I have formulated it, MOLR2 can apply to any lexical sign which subcategorises a PP and in practice this will mean that any appropriate verb, adjective, noun or preposition might be input. The following examples demonstrate that a missing object may be the object of a PP complement of any of these categories.

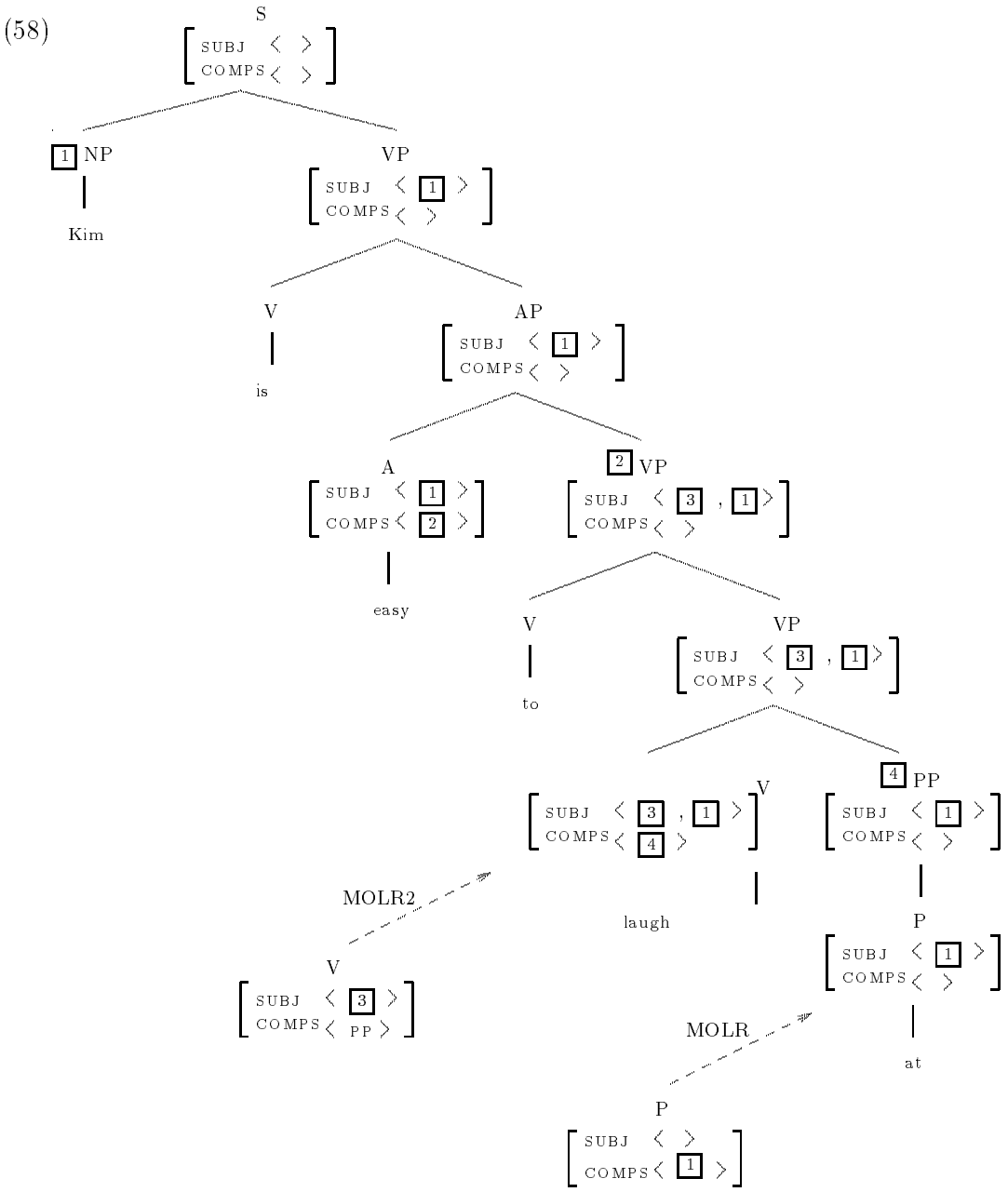
(56) a. Kim is easy to laugh at $\__{mo}$.
b. Kim is easy to get angry with $\__{mo}$.
c. Kim is difficult to sit next to $\__{mo}$.
d. Kim is always tough to have discussions with $\__{mo}$.

Examples (56a–c) can be generated with the machinery I have introduced so far. The MOLR produces MO-PPs headed by signs such as (47) and MOLR2 allows categories to inherit missing objects from their PP complements. In the case of (56a&b) these categories are a verb and an adjective respectively and the MO-VP *laugh at* and the MO-AP *angry with* can be easily generated. For example, the entry for the verb *laugh at* in (51) can be input to MOLR2 and the output will be (57).

(57)
$$\left[\begin{array}{ll}
\text{PHON} & \langle laugh \rangle \\
\text{CAT} & \left[\begin{array}{ll}
\text{HEAD} & verb[bse] \\
\text{SUBJ} & \langle \boxed{1}\text{NP}_{\boxed{2}}, \boxed{5}\text{NP}_{\boxed{4}} \rangle \\
 & \quad \text{PP}[-prd] \\
\text{COMPS} & \left\langle \left[\begin{array}{ll}
\text{HEAD|PFORM} & at \\
\text{SUBJ} & \langle \boxed{5} \rangle \\
\text{CONT} & \boxed{4}
\end{array}\right] \right\rangle \\
\text{SUBCAT} & \langle \boxed{1}, \boxed{5} \rangle
\end{array}\right] \\
\text{CONT|NUCLEUS} & \left[\begin{array}{ll}
\text{DERIDER} & \boxed{2} \\
\text{DERIDEE} & \boxed{4}
\end{array}\right] \\
 & laugh\text{-}at
\end{array}\right]$$

(58) is a diagram showing the analysis of (56a). Again the application of the lexical rules is indicated with dotted lines.

(58)




The example in (56c) involves two applications of the MOLR2: the first allows the preposition *next* to inherit the missing object of its MO-PP complement (*to*) and the second allows the verb *sit* to inherit the missing object from the MO-PP *next to*. I have already demonstrated how control predicates are able to pass on information about missing objects and this is what the verbs *to* and *get* in (56a–c) do. The *tough* adjectives pick up the missing object in the normal way.

There is one step missing in the derivation of the example (56d): while MOLR2 makes it

possible to generate the MO-NP *discussions with*, there is no mechanism to share the missing object information with the verb *have*. One possibility would be to make MOLR2 more general and permit missing objects to be passed up from NPs as well as from PPs. I have hesitated to do so here because many examples of MO-NPs are quite unacceptable, as illustrated in (59b). It seems that *tough* constructions lend themselves semantically to generic interpretations and so the example in (59a) is good because the two bare plural NPs give rise to a generic interpretation. By contrast, (59b) is not so good because both NPs are definite and the generic interpretation is not available. This effect seems to be limited to the *tough* construction, however, since an equivalent non-generic purpose infinitive as in (60) is fine.

(59) a. Supermodels are easy to take photos of $\__{mo}$.
b. ??The supermodels were easy to take those three photos of $\__{mo}$.

(60) I brought my dog along for you to take some photos of $\__{mo}$.

There is more to this problem than genericity, however, since examples like (61a&b) are bad. The problem with (61a&b) seems to be in the combination of the MO-NPs with the verbs that subcategorise them. Loosely speaking, the ability to form an MO-NP construction might be correlated with the degree to which the NP meaning can be incorporated into a composite meaning with the verb. To take photos of something is a concept which has already has a single unit linguistic realisation, the verb *photograph*, and so it is perhaps not surprising that the object of *photos of* can 'escape'. By contrast, there is a weaker link between *photos* and the verbs *collect* and *despise* in (61a&b). However, the well-formedness of (62) would seem a counter-example since the link between *find* and *photos* does not seem particularly strong.

(61) a. *My dog would be hard to collect photos of $\__{mo}$.
b. *Supermodels are easy to despise photos of $\__{mo}$.

(62) Uncle Albert is hard to find photos of $\__{mo}$.

Given the uncertainty of the data, I will not pursue the topic of missing objects inside NPs any further. However, I would like to reiterate that, should it be thought desirable, MOLR2 can be generalised to cover such examples.

To summarise the discussion so far, I have proposed that missing objects arise by means of the MOLR, which is similar to the passive lexical rule but more permissive in that it allows objects of prepositions to be promoted. I argued that MO-PPs which arise in this way occur both in pseudo-passives and in MOCs where the missing object is the object of a preposition

and I formulated two new lexical rules, the PPLR and MOLR2, which pass on the missing object of the preposition to the category which subcategorises the PP. Again, the PPLR is rather restrictive and MOLR2 is much more permissive in allowing any major category lexical sign to be input to it. The two missing object lexical rules together with the revised signs for control predicates allow for a wide range of missing object positions and routes whereby information about missing objects may propagate upwards. The range of possibilities is so wide that it may seem that my account is doing little more than providing an alternative method of SLASH propagation but this is not the case. The account of MOCs that I have formulated restricts the missing object to being a nonsubject NP and restricts the range of missing object positions much more than a UDC account does.

A final issue that needs to be dealt with is the question of whether missing objects in finite sentential contexts are permissible. Hukari and Levine (1991) discuss the following example which they themselves find unacceptable. They note that opinion is divided on this issue: Nanni (1978) and Kaplan and Bresnan (1982) find such examples well-formed but Ross (1967), Postal (1971), Bresnan (1971) and Brame (1976) find them unacceptable.

(63) *Kim is tough for me to believe that Sandy would ever marry $\__{mo}$.

Hukari and Levine (1991) suggest that speakers who find these examples acceptable may be conflating their response with their judgements of topicalisations such as (64) and if this is so then they predict that such speakers would find examples such as (65) less acceptable since the MO subject is a pronoun and nominative pronouns are less likely to be interpreted as topics.

(64) Kim, it is tough for me to believe that Sandy would ever marry _.

(65) *She is tough for me to believe that Sandy would ever marry $\__{mo}$.

If Hukari and Levine's explanation of these grammaticality judgements is not correct then this is an area of genuine speaker variation and I must demonstrate that there are ways of either excluding or permitting these examples. As it stands my analysis will exclude these examples because of the revised definition of head-subject structures that I gave in (9) which will only permit a VP to combine with its subject if its SUBJ list is a one-member list. This means, for example, that the MO-VP *marry* $\__{mo}$ in (63) cannot combine with the subject *Sandy* because it has two elements in its SUBJ list. For speakers who do accept such examples, the restriction

in the revised definition of head-subject structures would need to be lifted and MOLR2 would need to be generalised to permit verbs which subcategorise for finite sentential complements to inherit the remaining element on the SUBJ list of the S. This generalisation of MOLR2 would not be unlike the generalisation that would be needed to permit missing objects inside NPs and it would be tempting to hypothesise that the speakers who accept missing objects in finite sentential complements are also the speakers who accept them in NPs.

## 5.3 The Control Relation in MOCs

### 5.3.1 Raising or Equi?

The sign given for *tough* in (10) contains a Raising type of structure-sharing for the control relationship between the promoted missing object and its controller, the subject of *tough*. It also has an Equi type of coindexation for the subject of the complement and its controller the *for*-phrase. In neither case was this treatment properly justified.

Dealing first with the optional *for*-phrase and the missing subject it controls, I have assumed (a) that the *for*+NP sequence is a PP rather than a complementizer + subject non-constituent sequence and (b) that the relationship between the *for*-phrase and the missing subject is Equi rather than Raising. The assumption in (a) is a consequence of the need to prevent the control of the missing object from operating over a sentence boundary: since the complementizer + subject analysis implies a sentence boundary it must be rejected in favour of the PP analysis. Quite apart from this, however, it turns out that assumptions (a) and (b) are the only possible assumptions given the example in (66).

(66) *John is easy for it to bother that Mary is missing.

If the *for*-phrase in (66) was a complementizer + subject sequence then there would be no reason for (66) to be ungrammatical—we expect a predicate that subcategorises for a sentential complement not to put any constraints on the form of the subject of that complement, yet this is what would appear to be happening in (66). The assumption that the *for*-phrase is a PP, on the other hand, would explain (66) since we would expect *easy* to be able to constrain the nature of its PP argument. And if the *for*-phrase is a PP, then the relationship between it and the missing subject of the complement must be a control relationship. And since a dummy NP is disallowed, we can conclude that the relationship must be Equi.

If the *for*-phrase/missing subject relationship is an Equi relationship it follows that a *tough* construction with a subject raising predicate intervening between the *tough* adjective and the MO-VP will be ill-formed since this will be an example of an Equi-Raising sequence as discussed in Section 3.3. As I showed in that section, Equi controllees are constrained to be role-assigned and this means that subject raising controllers cannot become Equi controllees. As (67) shows, this prediction is borne out.

(67) *Strangers are easy (for Kim) to tend to be polite to.

Notice that the version of (67) without the optional *for*-phrase is at least as bad as the version with it. From this it is clear that the EXPERIENCER role associated with the *for*-phrase is present even when the *for*-phrase is not and that the Equi relationship also holds in the absence of an overt *for*-phrase.

There is independent evidence that the PP assumption is the correct one—preposing of the *for*-phrase is possible as illustrated in (68) and this is expected if the *for*-phrase is a PP constituent but not if it is a non-constituent sequence of complementizer + NP.[7]

(68) For John these weights are easy to lift.

Jacobson (1992) discusses the status of the *for*-phrase in quite some detail. On the basis of the evidence just discussed, she too argues that the *for*-phrase must be a PP. She notes that Gazdar et al. (1985) and Hukari and Levine (1990) treat it as a complementizer + subject sequence and she reviews and rebuts Hukari and Levine's arguments quite thoroughly.

Turning now to the relationship between the missing object and its controller, the first point to make is that the question of whether this is a Raising relationship or an Equi one is entirely independent of the UDC versus control issue. Irrespective of how the missing object is deemed to be generated and of how information about it propagates to the place where it is cached out, all accounts agree that the subject of a *tough* adjective is coreferential with the missing object. If only coreferentiality (coindexation) is assumed then the relationship is an Equi one

[7]The fact that the *for*-phrase is a PP in MOCs does not imply that it must be a PP elsewhere. Where MOCs have a non-MO counterpart, i.e. purpose infinitives and *too/enough* complements (see Sections 4.2.3 and 4.2.4), the correct analysis seems to be a complementizer + NP sequence, as the following examples indicate:

(i) *For her parents Sue invited George along to meet him.

(ii) *For me George is too selfish to like him.

but if syntactic connectivity is assumed then it is Raising. I have so far been assuming that the relationship is Raising but I have not yet motivated this claim and indeed the evidence is complex and rather unclear. There is a history of debate on this topic that stems back at least as far as the early transformational dispute about movement versus deletion in Postal and Ross (1971) and Lasnik and Fiengo (1974) (where movement is equated with the Raising hypothesis and deletion with the Equi hypothesis). Pollard and Sag (1994) find in favour of the Equi account as does Jacobson (1992), although she allows the putative Equi controller not to be role-assigned and therefore treats it as a kind of hybrid. Hukari and Levine (1991) claim that there is syntactic connectivity between the *tough* subject and the missing object and Bayer (1990) argues similarly. In what follows I will examine the evidence point by point and show that there is a case both for the Equi and the Raising hypotheses. In response to this I will make some revisions to my account in order to accommodate the apparent contradiction.

The first issue is the question of restrictions on the controller. As I have already discussed in Chapter 3, and as (69) and (70) demonstrate, Raising controllers can be expletive NPs but Equi controllers cannot. Furthermore, Raising controllers can be sentential but Equi controllers cannot. (71) demonstrates that *tough* constructions pattern with Equi predicates with respect to expletives but with Raising predicates with respect to sentential controllers.

(69) a. There seems to be a frog in the swimming pool.
b. It seems to be raining.
c. That Kim has run away seems to upset Lee.

(70) a. *There tries to be a frog in the swimming pool.
b. *It tries to be raining.
c. *That Kim has run away tries to upset Lee.

(71) a. *There is easy to believe to be a frog in the swimming pool.
b. *It is easy to expect to be raining.
c. That Kim has run away is hard for Lee to accept.

The badness of examples like (71a&b) is taken by Pollard and Sag (1994) to be evidence that the control relation is Equi. On their account, the key property of Equi controllers is that they must be referential (i.e. they must be of type *ref* which is a subtype of *nom-obj*). Since examples like (71c) are possible, this presumably means that sentential arguments must be referential in some way although Pollard and Sag have not made provision for referential sentential arguments.

From the point of view of the Raising hypothesis, the existence of (71c) is unproblematic but the badness of (71a&b) needs to be explained. There are several possible ways of dealing with this problem. One way is the route taken by Bayer (1990) where he points out that examples with expletive missing objects are hard to construct since there are very few places where expletive objects actually occur. In fact, expletive objects only occur with object raising verbs as illustrated in (72b&c) and as (73a) shows, a referential missing object in this position is also far from acceptable.[8]

(72) a. Kim considered Lee to be annoying.
b. Kim believes there to be ghosts in the cellar.
c. Kim expected it to annoy Lee that the food was cold.

(73) a. ?Lee was easy (for Kim) to consider to be annoying.
b. *There are easy (for Kim) to believe to be ghosts in the cellar.
c. *It was easy (for Kim) to expect to annoy Lee that the food was cold.

Bayer refers to the discussion in Postal (1974) about the ill-formedness of repeated raisings (see Section 3.3.4). Postal observes that these are not very good with referential NPs and are significantly worse with expletives. Bayer concludes that the similar pattern with the *tough* examples in (73) is evidence for the Raising approach to *tough*, not against it.

Given the unclearness of the data, I am not entirely happy to follow Bayer's lead on this issue but there is another approach to the problem which does not provide any explanatory insight although it does describe the data adequately. This approach is simply to make a minor change to the Missing Object Lexical Rule to prevent expletive objects from being promoted to the SUBJ list. This would require a slight alteration to the type-hierarchy which currently partitions *nom-obj* into *ref*, *it* and *there*. The new version would make *ref* and *nonref* subtypes of *nom-obj* with *it* and *there* as subtypes of *nonref*. Then a $\neg$*nonref* restriction could be placed on the object in the input to the lexical rule. I am not entirely happy with this approach either, so in Section 5.3.2 I will propose another a solution which is more adequate.

The issue of the type of the controller of the missing object does not provide conclusive evidence in the Equi versus Raising debate. I turn next to the question of whether the *tough* subject plays a semantic role with respect to the *tough* predicate.

[8] Postal cites Chomsky (1973) as finding (i) ill-formed:

(i) Smith was easy for Jones to expect to recover.

Raising predicates often have an alternative subcategorisation possibility with an expletive *it* subject and an extraposed VP or S object, as illustrated in (74). Not all Raising predicates are like this (for example, **it tends that your brother is bad-tempered*) but a significant proportion of them are. As (75) demonstrates, Equi predicates do not occur with such an alternative subcategorisation but a large number of *tough* adjectives do, as in (76). The existence of the alternative subcategorisation is often taken to be a semantic correlate of being a Raising predicate, and indeed in early Transformational Grammar the non-raised form was taken to be the deep structure to which the Raising transformation applied. The fact that the Raised element plays no semantic role with respect to the Raising predicate permits it either to appear inside the syntactic realisation of the propositional argument or to be Raised out of it. Equi predicates, by contrast, assign a semantic role to the Equi controller and this means it must be realised as a syntactic argument of the Equi predicate.

(74) a. It seems that your brother is bad-tempered.
b. Your brother seems to be bad-tempered.

(75) a. *It tries that your brother is bad-tempered.
b. Your brother tries to be bad-tempered.

(76) a. It is easy (for Lee) to annoy your brother.
b. Your brother is easy to annoy.

It seems from this evidence that *tough* constructions are more like Raising constructions although there are conflicting views in the literature on the question of whether there are meaning differences between the two different subcategorisations of a *tough* adjective. It is standard to assume that there is no truth conditional difference in meaning between the Raised and the non-Raised examples in (74) and this is consistent with the view that the Raised element plays no semantic role with respect to the Raising predicate. Jacobson (1992) cites this evidence as a reason to treat at least some *tough* adjectives as not assigning a role to their subject (although she still maintains an Equi relationship). Pollard and Sag (1994), on the other hand, claim that it is a "well-known fact" that (77a) and (77b) differ in interpretation. The problem here is that if Jacobson is right then both (77a) and (77b) are truth conditionally equivalent to (77c) and must therefore be truth-conditionally equivalent to one another. This in turn means that the two sentences must differ in some non-truth conditional way. Bayer (1990) describes the difference in terms "avenues of perception": all three examples in (77) must denote the same proposition but in (77a) and (77b) the *tough* subject is an avenue of perception for that proposition. Pollard and Sag take the meaning

difference as evidence that the relationship between the *tough* subject and the missing object must be an Equi one since the meaning difference would follow from the controller being role assigned in the higher clause. For Bayer the difference in meaning does not imply that the *tough* controller should be role-assigned. I will return to this issue when I outline some revisions to my account below.

(77) a. This sonata is easy to play on that violin.
b. That violin is easy to play this sonata on.
c. It is easy to play this sonata on that violin.

A standard test for the Raising/Equi distinction is to construct examples where the controller is part of an idiom and to see whether the example retains its idiomatic interpretation. Since Raising controllers play a role only with respect to the embedded predicate an idiomatic interpretation can be maintained but with Equi the controller fills two semantic roles and this destroys the idiomatic interpretation. The examples in (78) and (79) demonstrate.

(78) a. The cat seems to have got his tongue.
b. Advantage tends to be taken of unwary tourists.

(79) a. The cat tried to get his tongue. (* on idiomatic reading)
b. *Advantage was eager to be taken of unwary tourists.

Opinion differs as to whether idiomatic readings survive in the *tough* construction. (80a) is taken from Bayer (1990) and (80b&c) are examples from Jacobson (1992). The judgements are theirs although I find them more or less acceptable too. Lasnik and Fiengo (1974) find such examples ill-formed. Assuming that the ill-formedness is not as bad as with the Equi examples in (79), these examples do seem to lend support to the Raising hypothesis.

(80) a. Tabs are difficult to keep on my brother.
b. ?The cat would be quite easy to let out of the bag.
c. Careful attention was very hard to pay to that boring lecture.

A further correlate of the difference between Equi and Raising with respect to role-assignment of the controller concerns the possibility of ambiguous readings. Raising constructions are typically ambiguous between a *de re* reading and a *de dicto* (non-specific) reading. For example, (81a) has a *de re* reading where a particular filmstar is expected to come to the party and where the existence of that filmstar is an entailment but it also has a *de dicto* reading

where it is not any particular filmstar who is expected and where there is no existential entailment. In the Equi example (81b) only a *de re* reading is available and the sentence entails the existence of a filmstar. It has often been observed that *tough* constructions are like Raising predicates in that they too permit *de dicto* readings—the examples in (82) illustrate. (The example in (82b) is attributed to Emmon Bach by Sag (1982).)

(81) a. Lee expected a filmstar to come to the party.
b. Lee persuaded a filmstar to come to the party.

(82) a. A filmstar would be difficult to meet.
b. A good man is hard to find.

One way to account for *de re*/*de dicto* ambiguities in standard Raising examples such as (81a) is to allow two different scopings of the existential quantifier. The reading where it has wide scope over both *expect* and *come* is the *de re* reading and the one where it has narrow scope just over *come* is the *de dicto* reading. A narrow scope reading is possible for Raising controllers because they do not play a semantic role with respect to the higher predicate but it is impossible for Equi controllers because the quantifier is an argument of the higher predicate and must have wide scope. If *tough* subjects are treated as Raising controllers and are not role-assigned with respect to the higher predicate then a similar scope-based account of the ambiguity in (82) is possible, and, indeed, this is the kind of treatment that Sag (1982) provides. Since Pollard and Sag (1994) treat *tough* subjects as Equi controllers, they have a potential problem in explaining the existence of the *de dicto* reading for *tough* constructions. However, they have a problem in general in that their treatment of quantifier scoping does not currently permit narrow scopings in these examples anyway. They observe (p.328,fn.3) that it is not the case that *de re*/*de dicto* ambiguities have to be treated as following from scope differences and it is possible that they could formulate a treatment which provides the right readings without giving up the Equi hypothesis. Carl Pollard (p.c.) has suggested that possibly *tough* adjectives induce opacity effects on their subjects in the same way that predicates like *necessary* do:

(83) A good manager is necessary.

The issues of *de dicto* readings, idiomatic readings, meaning differences and alternative subcategorisations just discussed are tied up with not assigning a semantic role to Raising controllers in the higher clause. On the question of whether *tough* subjects are Raising controllers or

Equi controllers the evidence from these issues is not entirely conclusive but it does seem that the Raising hypothesis is more likely.

I turn now to the more syntactic effects of the differences between Equi and Raising. As I discussed in Chapter 3, Equi predicates permit Null Complement Anaphora, i.e. their controlled complements may be left unexpressed, as in (84b), but Raising predicates do not—(84a). *Tough* constructions pattern with Equi in this respect, as illustrated in (84c).

(84) a. *Kim seemed to be talking but Sandy didn't seem.
b. Kim tried to talk but Sandy didn't try.
c. Kim is hard to talk to but Sandy is easy.

Pollard and Sag (1994) treat the fact that Raising controlled complements cannot be omitted as a consequence of the Raising Principle. This prevents the loss of the VP because it would leave a non-expletive, non-role-assigned element in a control predicate's valence lists which was not structure-shared with another element. An account of *tough* constructions which treats the *tough* subject as a Raising controller would need to explain how it is that the Raising Principle can be violated by *tough* constructions.

Another issue in the debate is the question of connectivity. Jacobson (1992) centres her Equi-type analysis on what she takes to be a successful demonstration that there is no syntactic connectivity between the subject of the *tough* adjective and the missing object. Her examples are shown in (85).

(85) a. This theory captures the fact that languages are learnable.
b. *This theory captures that languages are learnable.
c. That language is learnable is hard for any theory to capture.

Verbs like *capture* and *express* subcategorise for a proposition-denoting NP and not for a sentential argument but in the *tough* construction a sentential subject can be the controller for the missing NP. Jacobson takes this to be strong evidence that there is no syntactic connectivity between the *tough* subject and the missing object but Bayer (1990) and Hukari and Levine (1991) dispute this claim. They point out that the same apparent lack of connectivity is also evident in topicalisations as in the following example:

(86) That language is learnable, no theory may really be able to capture/express/reflect.

Hukari and Levine provide a thorough discussion of this issue and produce a number of examples which seem to demonstrate that there is syntactic connectivity in the *tough* control relation. The examples in (87) are theirs:

(87) a. Robin demanded of us that we be/*were there on time.
b. That we be/*were there on time would have been very difficult for Robin to demand of us.

The final issue relating to syntactic consequences of the Equi/Raising debate concerns case-marking. Since English case-marking is entirely structural, I argued in Chapter 2 that case should be assigned not in the valence lists of lexical items but by the Case Principle which assigns case according to the position in which an NP actually occurs. I pointed out that the new method of case-marking would mean that case conflicts were not relevant to the issue of syntactic connectivity in Raising constructions. In my Raising account of the *tough* construction, the subject of *tough* is case-marked according to whether it occurs as the subject of a finite verb or as an object, as illustrated in (88). The missing object is not assigned case by the verb that subcategorises for it because case is no longer treated as a by-product of subcategorisation. However, the connectivity that follows from the raising relation does mean that the NP in the COMPS list of the verb *please* will, through structure-sharing, acquire the same case-marking as the *tough* subject. This is inevitable since the two are the same NP.

(88) a. He is easy to please.
b. I found him easy to please.

Pollard and Sag's (1994) claim that the relationship between the missing object and its controller is an Equi relationship is closely bound up with their use of the UDC mechanism to generate MOCs. One of the major problems a UDC based approach to MOCs faces is the fact that missing subjects are not possible. While Pollard and Sag have no explanation of this fact, they do have a means to enforce it. They do this by having an adjective like *tough* subcategorise for a VP complement which has an accusative NP in its INHER|SLASH set. The accusative specification then prevents the SLASH value being terminated by the Subject Extraction Lexical Rule and thus only nonsubject gaps are possible. Even if the structural approach to case-marking outlined in Chapter 2 is adopted this means that it is not possible to leave the missing object unspecified for case since the explicit marking of the NP in the SLASH list overrides the effect of not having the MO verb case-mark its object. In turn this means that a Raising relationship between the *tough* subject and the missing object is impossible

for Pollard and Sag because whenever the *tough* subject is nominative there will be a case conflict. By contrast, my account seeks to explain the lack of missing subjects by proposing that a lexical rule promotes members of the COMPS list and this by its very nature implies that there will be no missing subjects. Specifically it means that there is no need to explicitly require the missing element to be accusative and the issue of case-marking has no bearing on the Equi/Raising debate.

While case-marking is not an issue for English *tough* constructions, there are implications for languages which have some lexically assigned case-marking. The connectivity associated with the Raising analysis implies that lexically assigned case-marking should surface in the *tough* construction just as it does in other Raising constructions. Conversely, if it does not surface then this implies lack of connectivity and therefore an Equi analysis. German has a mixture of structurally and lexically assigned case and it has a *tough* construction which is similar to the English one. It seems that lexically assigned case **does** survive in the tough-construction and so this is strong evidence for a Raising analysis of the German *tough* construction.

The facts are as follows. The verb *sehen* does not assign case to its object and so the object receives the structurally assigned accusative case (89a). The verb *danken* lexically assigns dative case to its object and this wins out over the structurally determined default (89b). In the German *tough* construction, the promoted object of *sehen* has no lexically assigned case value and so it is assigned nominative case to accord with its structural position (90a). The promoted object of *danken* retains its lexically assigned case however, as (90b) shows.

(89) a. Hans sieht den Mann
Hans sees the man (acc)
'Hans sees the man'

b. Hans dankt dem Mann
Hans thanks the man (dat)
'Hans thanks the man'

(90) a. Der Mann ist leicht zu sehen
the man (nom) is easy to see
'The man is easy to see'

b. Dem Mann ist leicht zu danken
the man (dat) is easy to thank
'The man is easy to thank'

The fact that the German *tough* construction exhibits connectivity between the *tough* subject and the missing object implies that a Raising analysis is needed for German. While it is possible that English and German *tough* constructions may differ in this respect, the German

data does lend some plausibility to a Raising account for English since the two languages are so closely related. For an HPSG approach to the German tough construction which is similar to mine, see Geissler and Kiss (forthcoming).

At this point I have investigated all of the issues which are commonly raised in the debate about whether the relationship between the *tough* subject and the missing object is Equi or Raising. In the face of conflicting evidence it is hard to reach a conclusion but it seems to me that the case for Raising is stronger than the case for Equi.

### 5.3.2 Revised Signs for *Tough* Adjectives

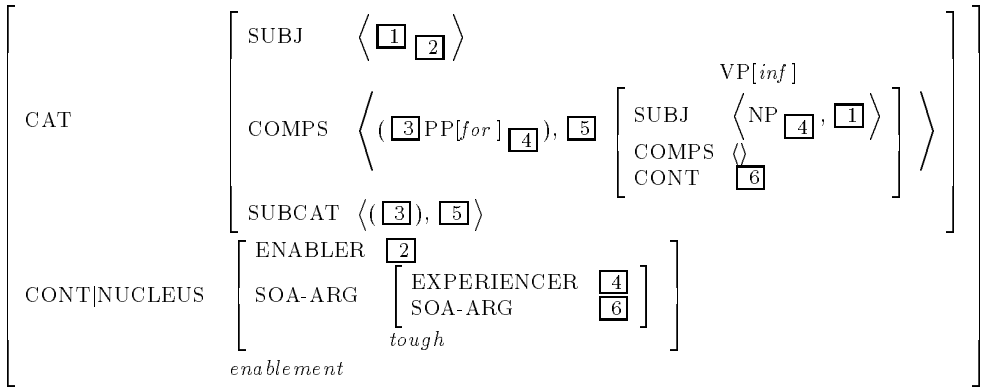
In spite of my tentative conclusion that the control relation in *tough* constructions is Raising, there is a problem which arises from my treatment of control as described in Chapter 3 which would appear to support the Equi hypothesis. This problem stems from my claim that Equi–Raising sequences are ill-formed and that this is due to a constraint that Equi controllees must be role-assigned. The examples in (91) are ones where a *tough* subject is an Equi controllee and although they are not absolutely impeccable they seem to be well-formed. This is a problem because my theory of control predicts them to be ill-formed since the *tough* subject is not role-assigned.

(91) a. Kim wants to be easy to get on with.
b. Lee was keen to be impossible to beat.
c. Sandy convinced Lee to be easier to live with.

In spite of this theory-internal evidence in favour of the Equi hypothesis, I hesitate simply to adopt it because the evidence for Raising is quite strong. Instead I propose that the semantic part of the sign for *tough* adjectives is actually more complex than I have previously assumed. Schachter (1981) describes *tough* predicates as expressing properties of acts rather than of entities but with the proviso that the act "is presented as having the characteristic in question by virtue of some property or properties of an entity". He goes on to describe the meaning of *Mary is easy to look at* as "something like: Mary is such that looking at her is easy". Similarly, Bayer (1990) describes the *tough* subject as being an "avenue of perception" for the proposition that the *tough* adjective is predicated of. I propose to formalise these informal descriptions by introducing an *enablement* relationship between the *tough* subject and what I have so far taken to be the semantic content of a *tough* sentence. Thus I propose

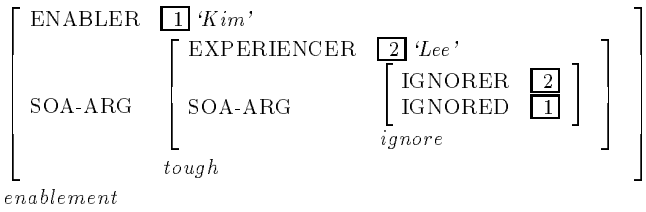
(92) as the sign for *tough* to replace the sign I originally gave in (10).[9]

(92)




The two signs differ not at all in their syntactic parts: the subject of *tough* is entirely structure-shared with the missing object of the VP and it does not occur in the SUBCAT list. In this sense the relationship is a standard Raising one. In the semantics, however, the feature structure of type *tough* is no longer directly a value for CONT|NUCLEUS but is embedded as an argument of the *enablement* relation. The *tough* subject/missing object element still plays no semantic role with respect to *tough* but it is role-assigned with respect to the *enablement* predicate. (93) shows the new CONT|NUCLEUS value for the example *Kim is tough for Lee to ignore* for which I previously gave the feature structure in (12a)

(93) a.




The revised sign for *tough* resolves the problem stemming from the role-assignment constraint on Equi controllees since the *tough* subject is now role-assigned with respect to the *enablement* predicate though still not with respect to *tough*.[10] Moreover, there are other positive results

[9]Ewan Klein (p.c.) has pointed out the obvious Montagovian representation of Schachter's analysis would be (i) which is logically equivalent to (ii):

(i) $\lambda PP(m)(\lambda x[easy(look\text{-}at\,(\text{PRO}, x))])$

(i) $easy(look\text{-}at\,(\text{PRO}, m))$

He suggests that in a theory of semantics that allows more 'information packaging', (i) and (ii) could be distinct. It is not clear to me how the benefits of lambda abstraction could be incorporated into the feature-based semantics of HPSG. Note, however, that recent work in situation semantics (see Barwise and Cooper 1993) does incorporate lambda abstraction and may be transferrable to the HPSG framework.

[10]The new sign counter-exemplifies my implicit claim in Section 3.3.2 that role-assigned elements will also always appear in the SUBCAT list and it does not assist at all in the hypothesised method of encoding the role assignment constraint on Equi controllees since that method relies on role-assigned

that follow if (92) is adopted as the basic sign for *tough*. The new sign, while treating the missing object/*tough* subject syntactically as if it is Raised, does assign a role to it in the *enablement* feature structure and semantically this makes the relationship more like Equi. Much of the data considered above that seemed indicative of Equi can now be explained:

- The fact that *tough* subjects are never expletive follows from the fact that they are role-assigned with respect to the *enablement* predicate and role-assigned elements are never expletive.

- The existence of a non-raised alternative subcategorisation possibility for *tough* adjectives is consistent with the new analysis because the *tough* subject is not role-assigned with respect to *tough*.

- The conflicting views of Jacobson (1992) and Pollard and Sag (1994) as to the semantic equivalence or non-equivalence of the examples in (77) can be elucidated. All of the examples in (77) have the same representation of the *tough* proposition and so there is an equivalence in meaning. However, for (77a&b) the *tough* proposition is an argument of the higher *enablement* predicate and different participants in the *tough* proposition surface as role players in the *enablement* relation, hence there is a difference in meaning.

- *Tough* constructions are Equi-like in permitting Null Complement Anaphora and with the earlier sign this is a problem for the Raising hypothesis since removal of the VP complement would violate the Raising Principle in leaving a non-role-assigned, non-expletive, non-structure-shared element in the SUBJ list of *tough*. In the new sign for *tough*, the subject is role-assigned with respect to the *enablement* predicate and therefore removal of the VP complement would not cause a violation of the Raising Principle.

- The fact that, *pace* Jacobson (1992), there does seem to be connectivity between the *tough* subject and the site of the missing object, follows from the new sign since in the standard Raising manner, entire *synsem* objects are structure-shared.

- Although case-marking is not relevant to the English *tough* construction, the combination of the distinction between lexically and structurally assigned case and the assumption of connectivity is sufficient to account for the German data in (90).

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elements being present on the SUBCAT list. However, as I said in Section 3.3.2, I am not at all sure that the role assignment constraint should be explicitly encoded in the grammar and so I do not consider this to be a problem.

The issues of idiomatic readings and *de dicto* readings with the *tough* construction are not much illuminated by the new approach. The fact that the *tough* subject is role assigned with respect to two different clauses ought to make it impossible for expressions to retain their idiomatic readings but, as we have seen, at least some speakers find examples such as those in (80) acceptable. The following are Lasnik and Fiengo's (1974) examples which, as indicated, they judge completely unacceptable.

(94) a. *Tabs were easy to keep on Mary.
b. *Advantage was easy to take of Bill.
c. *Heed is important to pay to such warnings.
d. *Attention is difficult to pay to boring lectures.
e. *The baby would be easy to throw out with the bathwater.

On the issue of *de dicto* readings, here again it might be supposed that the role-assignment of the *tough* subject would render these impossible. However, it is hard to draw conclusions in the absence of a strategy that clearly spells out whether *de dicto* readings are to be accounted for in terms of quantifier scoping and, if they are, exactly how this would be achieved. A possibility that I have not properly explored is that the *enablement* relation should be part of the BACKGROUND conditions rather than directly part of the CONTENT. I suspect that this might be a better solution but it would require more complexity in the way that conditions on Equi controllees are stated and in the way that the Raising Principle is stated given that the explanation of the possibility of Null Complement Anaphora is tied up with the *enablement* relation.

### 5.3.3 Equi MO Predicates

Lasnik and Fiengo (1974) distinguish between adjectives like *pretty* as used in (95a) and standard *tough* adjectives as in (95b). They then attempt to blur this distinction by arguing that '*tough* movement' is actually achieved by the same process as is involved in (95a), namely 'object deletion'.

(95) a. Mary is pretty to look at.
b. Mary is easy to look at.

Schachter (1981) also discusses the two classes and argues that the difference between the two is semantic. That there is a difference is demonstrated by Schachter's examples which I presented as (12)–(14) in Section 4.2.2 and which I reproduce here as (96)–(98):

(96) a. *It is pretty to look at Mary.
b. It is easy to look at Mary.

(97) a. *Mary is pretty to get John to avoid looking at.
b. Mary is easy to get John to avoid looking at.

(98) a. *Mary is pretty to work for.
b. Mary is easy to work for.

An explanation for these differences suggests itself quite easily in my account. I propose that the sign for an adjective like *pretty* involves an Equi style of coindexation of its subject and the missing object rather than the full structure-sharing in the Raising relation for *tough* adjectives. The proposed sign for *pretty* is given in (99).

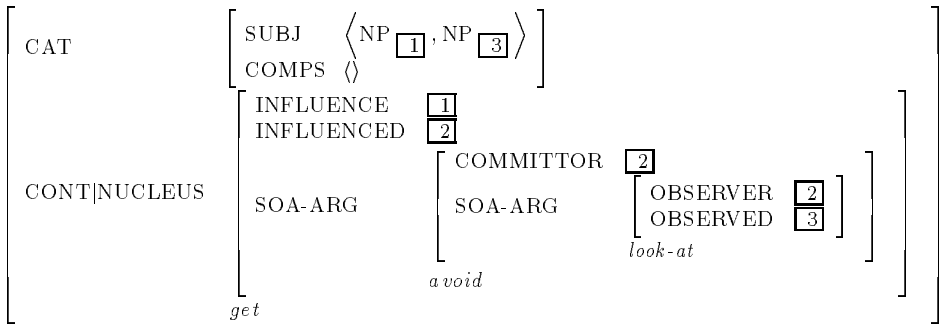
(99)
$$\left[\begin{array}{ll} \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \langle \boxed{1}\text{NP}_{\boxed{2}} \rangle \\ \text{COMPS} & \left\langle \boxed{3} \left[\begin{array}{ll} \text{SUBJ} & \langle \text{NP}, \text{NP}_{\boxed{2}} \rangle \\ \text{COMPS} & \langle\rangle \\ \text{CONT} & \boxed{4} \end{array}\right]_{\text{VP}[inf]} \right\rangle \\ \text{SUBCAT} & \langle \boxed{1}, \boxed{3} \rangle \end{array}\right] \\ \text{CONT|NUCLEUS} & \left[\begin{array}{ll} \text{INST} & \boxed{2} \\ \text{MANIFESTATION} & \boxed{4} \end{array}\right]_{pretty} \end{array}\right]$$

It is not entirely clear what would be an appropriate semantic representation for *pretty* examples but for the sake of completeness I have formalised Schachter's intuition that "the property expressed by the predicate is presented as manifesting itself through the the act expressed by the infinitive".

The ill-formedness of the *pretty* examples in (96) and (97) follows from the assumption that Equi is involved.[11] Thus, the failure for there to be an alternative subcategorisation as in (96a) is consistent since only Raising predicates permit this alternation. The fact that the dependency is not apparently long-distance, as demonstrated in (97a), also follows although the explanation of this is quite complex. The best way to demonstrate this is to show the sign for the MO-VP *to get John to avoid looking at* in (97):

[11] I follow Schachter in assuming that the deviance of (98a) is a consequence of the assumption that the proposition expressed by the VP complement of *pretty* is the means through which the prettiness is manifested. (98a) is odd because it is hard how to imagine how prettiness could be manifested through the *work-for* relation.

(100)




As (100) shows, though the MO-VP *look at* is able to be a complement of *avoid* and the larger MO-VP is in turn able to be the complement of *get*, the propagation of the missing object (NP $\boxed{3}$) through the two VPs headed by *avoid* and *get* leaves no trace in terms of role-assignment in the higher predicates. Thus, while the missing object occurs in the SUBJ list of *get*, it is not role-assigned with respect to it and therefore it cannot be an Equi controllee. This means that the VP is unable to be a complement of *pretty* though it is fine as a complement of *tough* adjectives since with *tough* the control relation is Raising and Raising controllees do not have to be role-assigned.

Notice that this discussion has provided another theory-internal justification for the assumption that the control relation for *tough* adjectives is Raising: if, as with *pretty*, it was an Equi relation, the apparently long-distance examples would be predicted to be ill-formed. Furthermore, this discussion also provides insight into a difference between *tough* and other MOC predicates.

(101) a. *These socks need trying to mend $\__{mo}$.
b. *Kim wants his socks finishing mending $\__{mo}$.

The examples in (101) are reproduced from Section 4.2.5 and they demonstrate that *need* predicates do not permit apparent long-distanceness in the same way that *tough* adjectives do. This fact follows straightforwardly if we assume that *need* predicates impose an Equi relationship between their subject and the missing object.

## 5.4 Cross-Linguistic Evidence

The most controversial aspect of my analysis of the English *tough* construction is the means by which it links the *tough* subject with the missing object. Instead of using the UDC mechanism, the analysis uses a lexical rule to promote the object so that it can be controlled and it treats

apparently long-distance examples in terms of sequences of local control relations. This account overcomes many of the problems which the UDC approach suffers from and I hope to have demonstrated that it provides a plausible model of the English *tough* construction. In this section I look at some other European languages and show that they provide very strong support for my analysis.

### 5.4.1 The Dutch Tough Construction

Dutch has a construction which is equivalent to the English *tough* construction, as illustrated in (102).

(102) a. Mijn fiets was moeilijk te herstellen
My bike was hard to fix
'My bike was hard to fix'

b. Dit boek is gemakkelijk te lezen
This book is easy to read
'This book is easy to read'

Although the two constructions are clearly very similar, the Dutch *tough* construction is unlike the English one in that it is very strictly bounded—the apparently long-distance examples that can occur in English have no counterpart in Dutch:

(103) a. *Mijn fiets was moeilijk te proberen te herstellen
My bike was hard to try to fix
'My bike was hard to try to fix'

b. *Dit boek is gemakkelijk te besluiten te lezen
This book is easy to decide to read
'This book is easy to decide to read'

In my analysis all that would be needed to block examples such as those in (103) would be signs for control verbs like *proberen* and *besluiten* which did not permit their complements to have a second SUBJ element. By contrast, an account which relied on a UDC mechanism would be hard put to block long-distance examples in Dutch since extractions from complements of control verbs are perfectly well formed:

(104) a. Welke fiets heb je proberen te herstellen
Which bike have you try to fix
'Which bike did you try to fix'

b. Welk boek heb je besloten te lezen
Which book have you decided to read
'Which book did you decide to read'

### 5.4.2 Restructuring Verbs in Italian and Spanish

Rizzi (1982) describes a cluster of phenomena in Italian which are all connected with a certain class of verbs, which he calls restructuring verbs. These verbs are a subset of Italian Equi and Raising verbs and they permit what are usually bounded constructions to become long-distance. Rizzi identifies three classes of restructuring verbs: the first class are modals such as *potere* ('be able'), *dovere* ('have to') and *volere* ('want'); the second class are aspectuals such as *cominciare* ('start'), *finire* ('finish') and *continuare* ('continue'); and the third class are motion verbs such as *venire* ('come'), *andare* ('go') and *tornare* ('come back'). There are several constructions where these verbs act as a class, in particular these verbs permit the Italian *tough* construction to appear to be long-distance. The following are Rizzi's examples:

(105) a. Questa canzone è facile da cominciare a cantare
This song is easy to begin to sing
'This song is easy to begin to sing'

b. Maria è difficile da andare a chiamare
Maria is difficult to go to call for
'Maria is difficult to go and call for'

Verbs which are not restructuring verbs cannot behave in this way. Again, these are Rizzi's examples:

(106) a. *Questo libro è difficile da convincere Mario a finire primo di lundi
This book is difficult to convince Mario to finish before Monday
'This book is hard to convince Mario to finish before Monday'

b. *Questo lavoro è facile da promettere di finire per domani
This work is easy to promise to finish by tomorrow
'This work is easy to promise to finish by tomorrow'

Restructuring verbs also permit apparent long-distanceness with clitic placement. Unstressed pronouns in Italian cliticise to a verb and generally they cliticise to the verb which subcategorises them. However, in control structures a clitic may sometimes escape from the complement to attach to the higher verb. This process is known as clitic climbing and its occurrence is dependent on the control verb—clitic climbing is permitted if the verb is a restructuring verb but it is forbidden with other control verbs. The following examples demonstrate:

(107) a. Piero verrà a parlarti di parapsicologia
Piero will come to speak + CL about parapsychology
'Piero will come to speak to you about parapsychology'

b. Piero ti verrà a parlare di parapsicologia
Piero CL will come to speak about parapsychology
'Piero will come to speak to you about parapsychology'

(108) a. Piero deciderà di parlarti di parapsicologia
Piero will decide to speak + CL about parapsychology
'Piero will decide to speak to you about parapsychology'

b. *Piero ti deciderà di parlare di parapsicologia
Piero CL will decide to speak about parapsychology
'Piero will decide to speak to you about parapsychology'

A further case of sensitivity to the class of restructuring verbs occurs with what Rizzi calls 'impersonal *si* sentences'. Rizzi's term covers both the examples I will be concerned with where an object is promoted to subject position and intransitive examples where there can be no subject:[12]

(109) Si dorme troppo poco
SI sleep too little
'People sleep too little'

The subset of these sentences that are of direct relevance here are passive-like examples that involve a promoted object which behaves like a subject and triggers verb agreement. This is not the standard passive construction and the clitic *si* must also occur:

(110) Troppe case si costruiscono in questa città
Too many houses SI build in this town
'Too many houses are built in this town.'

An intermediate step in this construction is one where the subject is absent and SI is cliticised to the verb but where the object has not been promoted, as illustrated by (111). Rizzi observes that in some dialects the promotion of the object is obligatory and (111) is ill-formed but in other dialects the promotion is optional and (111) is perfectly acceptable.

(111) Si costruisce troppe case in questa città
SI build too many houses in this town
'Too many houses are built in this town.'

In certain examples a promoted object may occur as the subject of a higher verb. This may only happen when the higher verb is a restructuring verb:

(112) a. Queste case si vogliono vendere a caro prezzo
These houses SI want to sell at a high price
'They want to sell these houses at a high price'

b. *Le nuove case popolari si sono promesse di costruire entro un anno
The new council houses SI are promise to build in a year
'They promise to build the new council houses in a year'

[12]Monachesi (1993) uses the term 'long NP-movement' for long distance examples of the promoted object variant. Aissen and Perlmutter (1983) use the term 'reflexive passive' to describe the Spanish equivalent of the object promotion examples.

In summary, Italian restructuring verbs may occur in the *tough* construction, in sentences with object clitics and in *si* sentences and, when they do, they permit promoted object elements to escape further away from the clauses to which they belong than would otherwise be possible. If my analysis of English MOCs was adapted to Italian then the treatment of the *tough* construction would be much the same except that for English all Raising and Equi verbs may inherit a second SUBJ member from their complement but for Italian only the restructuring verbs can inherit a second SUBJ member. However, the Italian data does more than simply lend itself to the same analysis as English: the fact that the Italian *tough* construction patterns with other constructions which are clearly not UDCs supports my hypothesis that the *tough* relation really is a local dependency, not an unbounded one. Moreover, the mechanism that I have suggested for English and Italian MOCs would seem to be appropriate for describing both clitic climbing and object promotion *si* sentences as well.

Monachesi (1993) suggests an HPSG analysis of Italian clitic climbing and long NP movement (object promotion *si* sentences) which is broadly compatible with my analysis of MOCs, although she does not treat MOCs themselves in her work. An earlier paper (Monachesi 1992) attempted to use HPSG's UDC apparatus, i.e. nonlocal features and the Nonlocal Feature Principle, to account for clitic climbing but in Monachesi (1993) she shows that a nonlocal feature account is not really adequate. In particular, the nonlocal approach cannot easily handle the fact that only restructuring verbs permit long-distanceness. In place of the nonlocal analysis, Monachesi suggests that while Raising and Equi verbs usually subcategorise for VPs with empty COMPS lists, restructuring verbs may be input to a lexical rule (LRCL2) which yields outputs where the controlled complement has a non-empty COMPS list and where the verb has had the COMPS members of the complement added to its own COMPS list. The following is Monachesi's lexical rule:

(113) LRCL2

$$\left[\begin{array}{ll}\text{HEAD} & \text{V}\\ \text{VCLASS} & \textit{modal} \vee \textit{aspectual} \vee \textit{motion}\\ \text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle\\ \text{COMPS} & \left\langle \boxed{2}\text{VP}\left[\begin{array}{ll}\text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle\\ \text{COMPS} & L\end{array}\right] \right\rangle\end{array}\right] \Rightarrow$$

$$\left[\begin{array}{ll}\text{HEAD} & \text{V}\\ \text{VCLASS} & \textit{modal} \vee \textit{aspectual} \vee \textit{motion}\\ \text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle\\ \text{COMPS} & \left\langle \boxed{2}\text{VP}\left[\begin{array}{ll}\text{CL} & \textit{minus}\\ \text{SUBJ} & \left\langle \text{NP}\ \boxed{1} \right\rangle\\ \text{COMPS} & L\end{array}\right] (+)L \right\rangle\end{array}\right]$$

If the basic entry for a restructuring verb is used then any complements of the lower verb must remain in the lower clause (i.e. the COMPS list of the controlled complement must be empty). If the output of the LRCL2 is used, however, then anything in the COMPS list of the complement is inherited by the restructuring verb. A further lexical rule (LRCL1) removes COMPS elements from a verbal sign and places them in a clitics set so that they can be realised morphologically as verb inflection:

(114) LRCL1

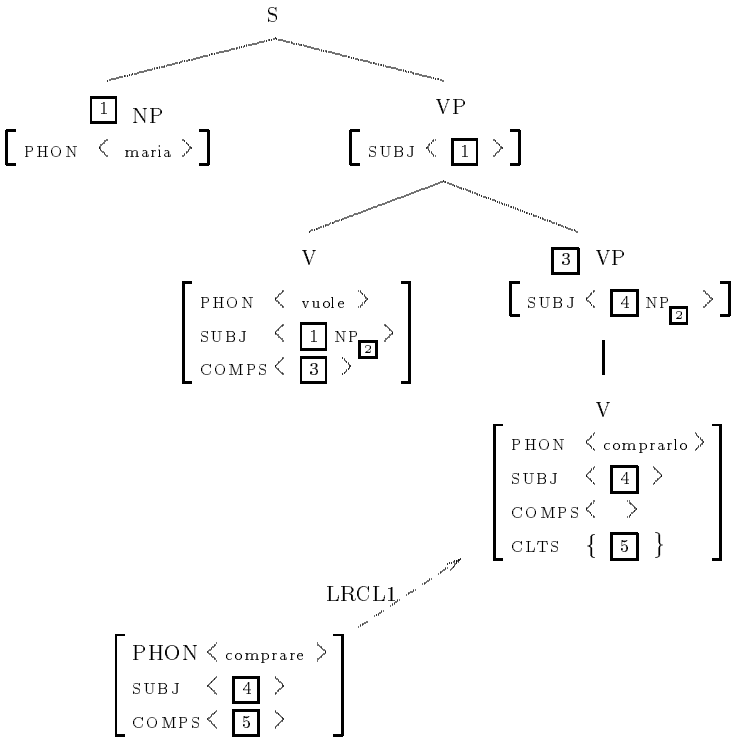
$$\left[\begin{array}{ll}\text{HEAD} & \text{V}\\ \text{COMPS} & \langle ..., X, ... \rangle\\ \text{CLTS} & W\end{array}\right] \Rightarrow \left[\begin{array}{ll}\text{HEAD} & \text{V}\\ \text{COMPS} & \langle ... \rangle\\ \text{CLTS} & W \cup \{X\}\end{array}\right]$$

This rule will apply to the sign for the embedded verb if LRCL2 is not used and to the output of LRCL2 if it is used. Clitic climbing is obligatory with auxiliaries so Monachesi proposes that the entries for auxiliaries look like the output of the LRCL2 but because they are basic entries rather than derived ones, the inheritance of the controlled complement's COMPS members is obligatory. The [CL *minus* ] specification on the complement VP in the output of the LRCL2 ensures that the complement verb does not have any other clitics attached to it: either all clitics attach to the lower verb or they all climb. The trees in (116) and (117) demonstrate Monachesi's analysis of the examples in (115). (The dotted lines indicate lexical rule application.)

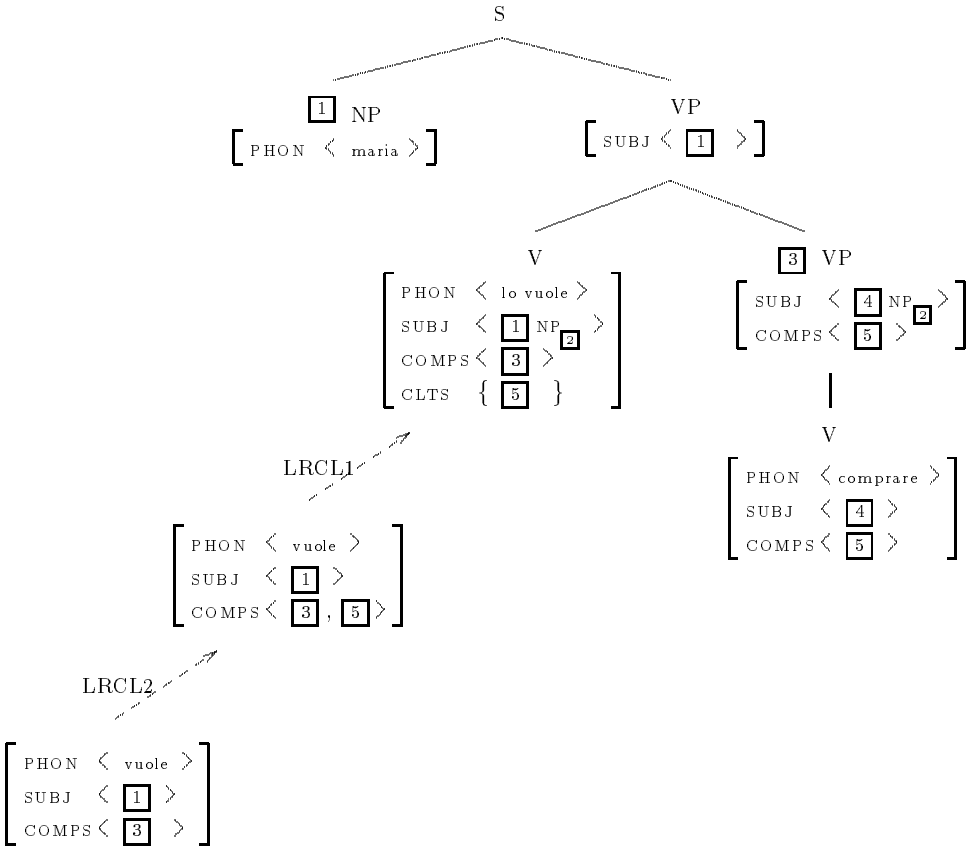
(115) a. Maria vuole comprarlo
Maria wants buy + CL
'Maria wants to buy it'

b. Maria lo vuole comprare
Maria CL wants buy
'Maria wants to buy it'

(116)




(117)




Monachesi's description of the long NP movement examples is somewhat sketchy but she proposes that LRCL2 should also be used here to allow restructuring verbs to acquire the complements of their complement. It is clear that the Monachesi method of promoting objects

out of the VP to which they belong is broadly similar to my use of the MOLR. The major difference between the two is that Monachesi allows elements to remain on the COMPS list while I propose that they move from the COMPS to the SUBJ list. The major drawback to Monachesi's approach is that it invalidates the usual definition of a VP as a non-lexical verbal category whose COMPS list is empty. She notes in a footnote that the new type of VP means that Schema 2, which defines head-complement structures, must be modified to permit this kind of VP to be built and this may lead to problems of spurious ambiguity. Given that this problem exists, I propose that my analysis of English *tough* constructions can be carried over to Italian *tough* constructions and that the clitic climbing phenomenon and the long NP movement examples can be accounted for by adapting parts of Monachesi's analysis. Specifically I propose that her cliticisation lexical rule LRCL1 should be retained but that the work of her other lexical rule, LRCL2 should be done instead by the Italian version of the MOLR in combination with signs for restructuring verbs which cause them to inherit extra SUBJ members from their complements. These signs would be much the same as the signs I provided for English Equi and Raising verbs but in Italian only a subset of these verbs can inherit in this way. The sign I propose for a restructuring verb like *cominciare* is shown in (118). (Compare this to the to the sign for *try* in (19) in Section 5.1.3.) I follow Monachesi in assigning an Equi pattern of coindexation for the control of the complement's subject.

(118)
$$\left[\begin{array}{ll} \text{PHON} & \langle \textit{cominciare} \rangle \\ \text{CAT} & \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}_{\boxed{1}}, \boxed{2}\textit{list} \right\rangle \\ \text{COMPS} & \left\langle \left[\begin{array}{ll} \text{SUBJ} & \left\langle \text{NP}_{\boxed{1}}, \boxed{2} \right\rangle \\ \text{CONT} & \boxed{3} \end{array}\right]_{\text{VP}} \right\rangle \end{array}\right] \end{array}\right]$$

If we assume that Italian has a missing object lexical rule similar to the English MOLR and that Italian *tough* adjectives such as *facile* and *difficile* have signs which are much the same as those of their English counterparts, then the analysis of Italian *tough* constructions will parallel the English analysis in all relevant details.

For clitic climbing, I propose a modification of Monachesi's LRCL1 so that elements that are placed in the CLTS set are moved not from the COMPS list but from the SUBJ list. Specifically, I propose that when a verb has a SUBJ list with a non-empty tail the elements from that tail can be moved to the CLTS set. The revised version of LRCL1 is as follows.[13]

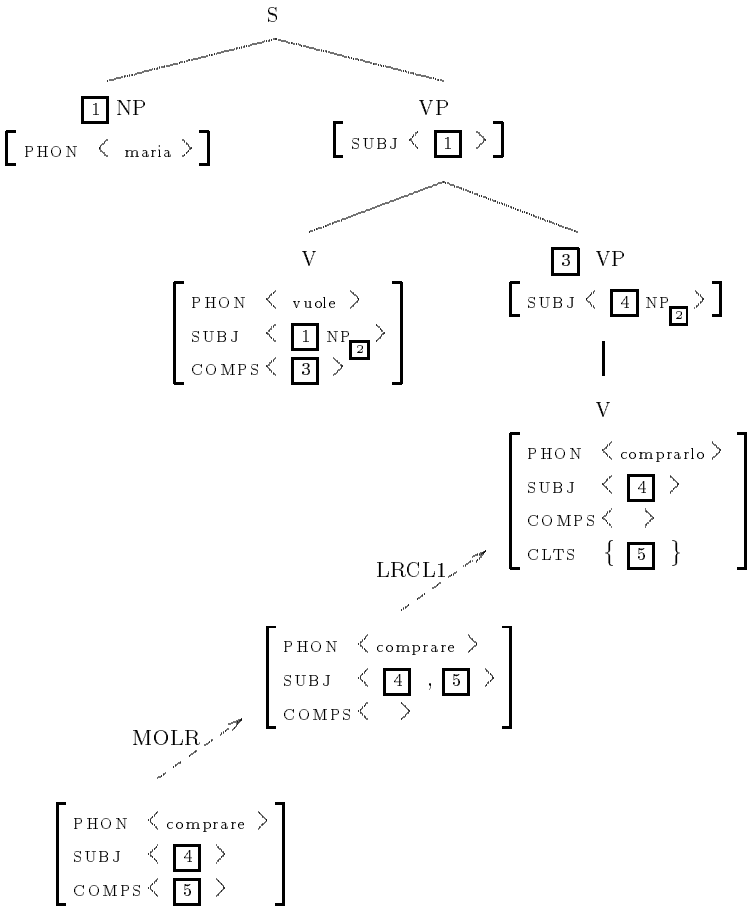
[13]Since CLTS is set-valued and SUBJ is list-valued, the operation *list_to_set* is used to convert the tail of SUBJ to a set.

(119) LRCL1 (revised version)

$$\begin{bmatrix} \text{HEAD} & \text{V} \\ \text{SUBJ} & \langle \boxed{1}, \boxed{2}\, ne\_list \rangle \\ \text{CLTS} & W \end{bmatrix} \quad \Rightarrow \quad \begin{bmatrix} \text{HEAD} & \text{V} \\ \text{SUBJ} & \langle \boxed{1} \rangle \\ \text{CLTS} & W \cup list\_to\_set(\boxed{2}) \end{bmatrix}$$

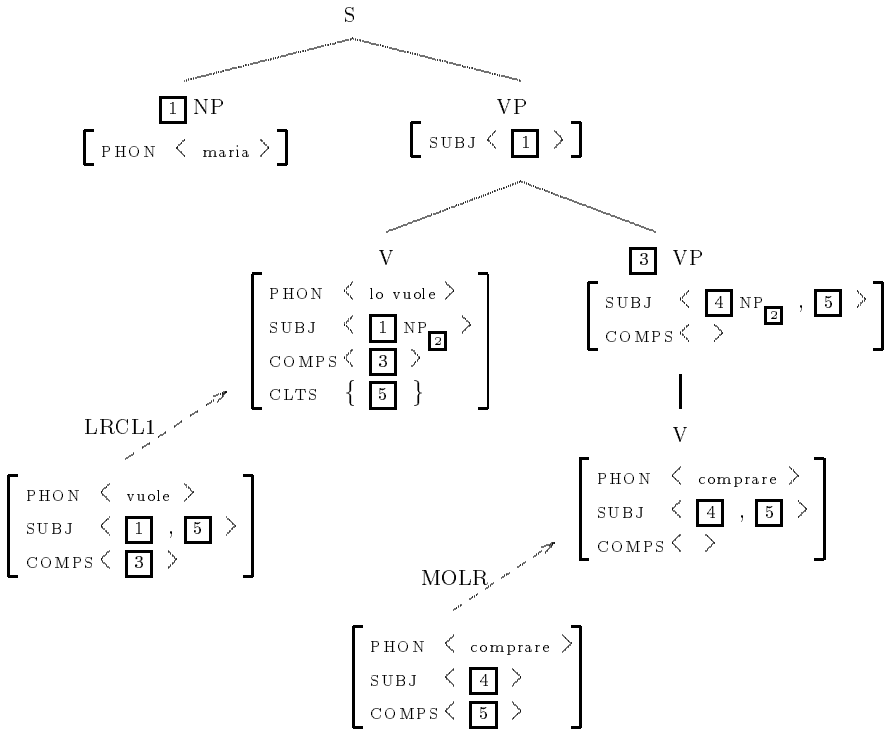
For the clitic climbing examples, then, I propose that the Italian MOLR moves objects from a verb's COMPS list to its SUBJ list.[14] The output of the MOLR may then be directly input to LRCL1 and this will result in the clitics attaching to the verb that subcategorises them, as in (115a). If the output of the MOLR is not input to the LRCL1 then a higher verb must be able to inherit the extra SUBJ members–restructuring verbs and auxiliaries are verbs which can do this. Since the signs for these verbs permit extra SUBJ members, these can be input to LRCL1 and this will cause the clitics to attach to these verbs, as in (115b). The following trees illustrate my proposed analysis of (115a&b).

(120)




[14] As more than one clitic may occur, this implies that Italian SUBJ lists may have more than two members.

(121)




To deal with the long NP movement examples (Rizzi's 'impersonal *si* sentences'), I propose a second lexical rule which suppresses the subject and cliticises the pronoun *si* to the verb. Opinion seems to be divided as to which argument of the verb *si* refers to. Rizzi treats it as an impersonal subject in both intransitive cases like (109) and in the object promotion cases like (110). Aissen and Perlmutter (1983) treat the Spanish equivalent, *se*, as being coreferential with the object. I will take the view that *si* and *se* refer neither to the subject nor the object but that their sole purpose is to signal that the subject has been suppressed. The lexical rule that brings this about is as follows:

(122) LRSI

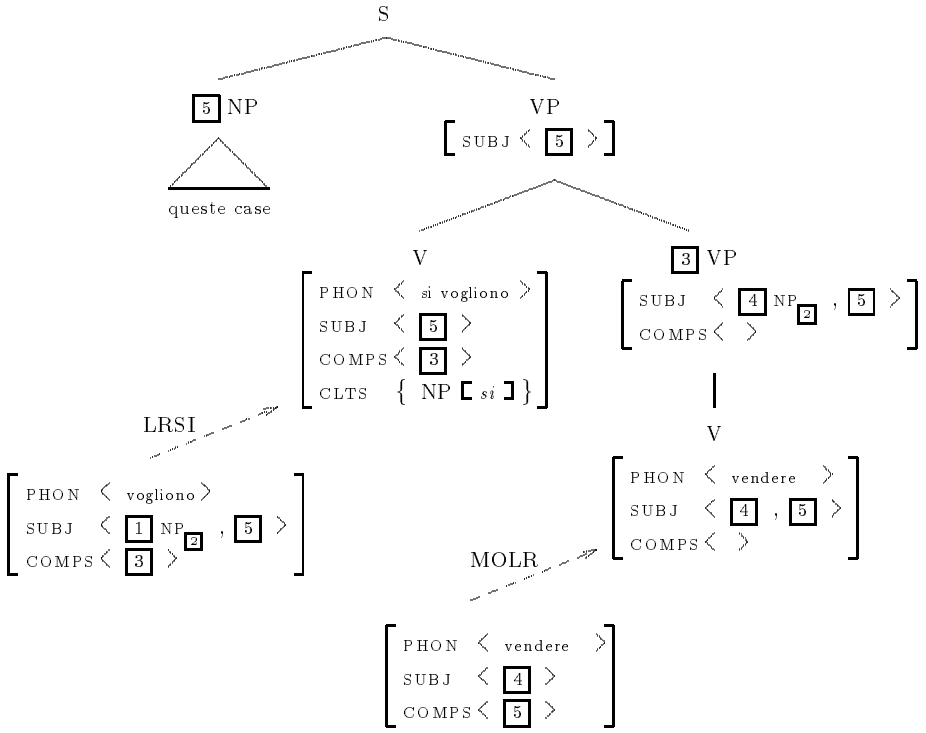
$$\begin{bmatrix} \text{HEAD} & \text{V} \\ \text{SUBJ} & \langle \boxed{1}, \ldots \rangle \\ \text{CLTS} & W \end{bmatrix} \quad \Rightarrow$$

$$\begin{bmatrix} \text{HEAD} & \text{V} \\ \text{SUBJ} & \langle \ldots \rangle \\ \text{CLTS} & W \cup \{\text{NP}[si]\} \end{bmatrix}$$

On its own this lexical rule will deal with the cases which do not involve a promoted object, i.e. (109) and (111). In combination with the MOLR it will generate examples such as those in (110) and (112a). In the case of (110), the MOLR will promote the object of *costruiscono* to the SUBJ list. The LRSI will then apply to remove the first SUBJ member and to put *si* in the clitics set. This in turn causes the second SUBJ member to become the only element in SUBJ and this means it can be realised as the subject. For (112), the analysis is the same except

that the MO-VP is a complement of a restructuring verb which inherits the two members of SUBJ and which is input to the LRSI. The following tree shows the analysis:

(123)




I conclude this section with some data from Spanish which show that Spanish patterns very much like Italian with respect to object promotion phenomena. The examples below are taken from Aissen and Perlmutter (1983). The Spanish *tough* construction is usually bounded, as in (124a), but it is able to be long-distance when restructuring verbs intervene, as illustrated in (124b). (124c) shows that control verbs which are not restructuring verbs cannot intervene.

(124) a. Estas radios son difíciles de componer
These radios are difficult to fix
'These radios are difficult to fix'

b. Estas radios serán difíciles de empezar a componer
These radios will be difficult to begin to fix
These radios will be difficult to begin to fix'

c. *Estas radios son difíciles de insistir en componer
These radios are difficult to insist to fix
These radios are difficult to insist on fixing'

Spanish has a construction like the Italian 'impersonal *si* sentences' which Aissen and Perlmutter (1983) refer to as the 'reflexive passive'. As with Italian, restructuring verbs may intervene between the MO-VP and the promoted object and clitic but other control verbs may not:

(125) a. Estas canciones se cantan siempre primero
These songs SE sing always first
'These songs are always sung first'

b. Las canciones cortas se tratan de cantar siempre primero
The short songs SE try to sing always first
'The short songs are always tried to be sung first'

c. *Las canciones cortas se sueñan con cantar siempre primero
The short songs SE dream to sing always first
'The short songs are always dreamed to be sung first'

Spanish also exhibits clitic climbing, and again, restructuring verbs permit it but other control verbs do not.

(126) a. Luis las trató de comer
Luis CL tried to eat
'Luis tried to eat them'

b. *Luis las insistió en comer
Luis CL insisted to eat
'Luis insisted on eating them'

Although I have not provided a very detailed analysis of object promotion phenomena in Italian and Spanish, I hope to have shown that the combination of the mechanisms which I developed for English MOCs and variants of Monachesi's cliticisation lexical rules yields an account of the data which is both straightforward and well-motivated. Moreover, the analysis of Italian and Spanish shows that my account of English MOCs is far from being a parochial analysis which does not extend to other languages.

# Chapter 6

# Parasitic Gaps

In this chapter and the following two, I re-evaluate some assumptions about parasitic gaps in English. Although for this thesis my interest in parasitic gaps stems from the desire to find an account of them which does not entail that MOCs must be UDCs, I believe that a re-evaluation is very much in order since the HPSG analysis of parasitic gaps in Pollard and Sag (1994) is not without problems.

In Sections 6.1–6.3, I give a brief introduction to the parasitic gap data and provide an overview of the accounts of parasitic gaps from Engdahl (1983), Cinque (1990) and Pollard and Sag (1994). Of these, the first two place more emphasis on the similarities between parasitic gaps and anaphora, while the third, the feature-based theory, derives parasitic gaps as a side effect of an account of unbounded dependencies using the SLASH feature.

In Section 6.4 I discuss some problems with the Pollard and Sag (1994) treatment of parasitic gaps, thereby motivating the need for a fresh look at parasitic gaps in HPSG. In Section 6.5, I argue that there are two distinct classes of parasitic gap, which I term c-type parasitic gaps and a-type parasitic gaps (coordination-like and anaphor-like respectively), and I argue that it is not obviously the case that these two classes are instances of the same phenomenon. The divergence of opinion evident in the accounts reviewed in Sections 6.1–6.3 as to whether an anaphoric approach or an unbounded dependency approach is appropriate, might be viewed as a reflection of the lack of uniformity across the larger class of parasitic gaps. It seems that the use of SLASH in feature-based accounts is essentially an extension of the analysis of multiple gaps in coordinate structures and lends itself well to the c-type parasitic gaps. On the other hand, the parallels with anaphora are very strong for the class of a-type parasitic gaps and extensions to the binding theory would seem the natural way to account for these.

After discussing parasitic gaps in a general way in this chapter, I turn my attention in Chapter 7 to the specific question of a new HPSG analysis and in Chapter 8 to interactions between MOCs and parasitic gaps.

## 6.1 Engdahl's Account

The starting point for this investigation is Engdahl (1983). In it Engdahl defines a parasitic gap as a "gap which is dependent on the existence of another gap ... in the same sentence". The dependency is such that the filler for the real gap also controls the interpretation of the parasitic gap. Engdahl explores the data quite thoroughly but does not spell out in detail what the mechanisms involved in the generation of a parasitic gap sentence might be.

### 6.1.1 The Data

The kinds of examples Engdahl deals with are now very familiar. I group them according to my own classification below using Engdahl's examples (her numbering is indicated in square brackets on the right of each example). Where appropriate, I will indicate primary gaps in my examples by means of an underscore and parasitic gaps with an additional subscripted $p$. This marking of gaps is not meant to imply any particular analysis of the examples and is used simply for expository purposes to indicate missing or displaced material.

**Group 1:** Parasitic gaps in *without*-type adjuncts

In these examples the parasitic gap occurs to the right of the real gap. The real gap occurs in a VP and the parasitic gap is contained in a VP adjunct with propositional content (i.e. an adjunct containing a non-finite VP or a finite S). The non-finite VP examples (usually *-ing* form VPs) as in (1) are more common while examples involving finite S as in (2) are less common.

(1) Which articles did John file _ without reading $_p$? [E1]

(2) This is the kind of food you must cook _ before you eat $_p$. [E2]

**Group 2:** Parasitic gaps in other adjuncts

Adjuncts other than the *without*-type ones can also contain parasitic gaps:

(3) ?The blintzes which Sasha is gobbling _ down faster than I can reheat $\__p$ are extremely tasty, if I do say so. [E11]

(4) Here is the influential professor that John sent his book to _ in order to impress $\__p$. [E14]

The example in (3), which demonstrates a parasitic gap in a comparative adverbial, comes originally from Ross (1967) and the judgement is his. (4) shows a parasitic gap in an 'in-order-to infinitive'.

**Group 3:** Parasitic gaps in non-subject arguments

These examples are ones where each of two non-subject arguments of the same predicate contain a gap. In these cases it is not entirely obvious which is the real gap and which is the parasitic gap. In most other examples, one gap occurs in a position which is not normally available as a gap location (e.g. in an adjunct, in a subject) and it is this one which is taken to be the parasitic gap. In these examples, however, both positions are usually perfectly normal gap positions so other factors have to determine which is the real gap and which is the parasitic gap. The decisions indicated are Engdahl's except in the case of (6) where I have inferred what her decision would be.

(5) Which girl did you send a picture of _ to $\__p$? [E3,E74]

(6) Which professor did you persuade the students of $\__p$ to nominate _ for the Distinguished Teacher's Award? [E15]

(7) ?Which students did you persuade _ to invite us to come and see $\__p$? [E17]

(8) ??Who did you tell _ that we were going to vote for $\__p$? [E18]

The examples in (7) and (8) are relatively unacceptable and, indeed, Engdahl places them low in her hierarchy of acceptability.

**Group 4:** Parasitic gaps in subjects

These examples are similar to the ones in the previous group in that the two gaps occur in arguments of the same predicate. In this case, though, the parasitic gap can be identified as the one in the subject since extractions from subjects are not otherwise possible.

(9) Which boy did Mary's talking to $\__p$ bother _ most? [E4]

(10) Which student did your attempt to talk to $\__p$ scare _ to death? [E45a]

A sub-class of this group of examples are ones where the parasitic gap occurs not just inside a subject but inside a relative clause which modifies that subject:

(11) This is the type of book that no-one who has read $\__p$ would give _ to his mother. [E48]

(12) Here is the boy who everyone who has met $\__p$ thinks _ is clever. [E49]

The parasitic gap is therefore in a position which would normally be unacceptable on two counts: extractions from subjects are usually disallowed and so are extractions from relative clauses. Note that these examples are unacceptable for many people.

The four groups above are my categorisation rather than Engdahl's. Engdahl has two ways of categorising parasitic gaps: first into a hierarchy of acceptability and, second, according to whether they are optional or obligatory. The terms 'optional' and 'obligatory' reflect whether they can be replaced by a pronoun coreferential with the real gap or not: if they can, they are optional and if they cannot, they are obligatory. The parasitic gaps in the first two of my four groups seem to be optional—as the examples in (13) and (14) demonstrate. (15) deals with the third group. Here the good examples in (5) and (6) are rendered unacceptable by the insertion of a pronoun while the not so good examples in (7) and (8) are considerably improved. As (16) shows, parasitic gaps in the fourth group are obligatory except perhaps for the relative clause sub-group—(16c) does not seem entirely unacceptable.

(13) a. Which articles$_i$ did John file $\__i$ without reading them$_i$?
b. This is the kind of food$_i$ you must cook $\__i$ before you eat it$_i$.

(14) a. The blintzes$_i$ which Sasha is gobbling $\__i$ down faster than I can reheat them$_i$ are extremely tasty, if I do say so.
b. Here is the influential professor$_i$ that John sent his book to $\__i$ in order to impress him$_i$.

(15) a. *Which girl$_i$ did you send a picture of $\__i$ to her$_i$?
b. *Which professor$_i$ did you persuade the students of his$_i$ to nominate $\__i$ for the Distinguished Teacher's Award?
c. Which students$_i$ did you persuade $\__i$ to invite us to come and see them$_i$?
d. Who$_i$ did you tell $\__i$ that we were going to vote for them$_i$?

(16) a. *Which boy$_i$ did Mary's talking to him$_i$ bother $\__i$ most?
b. *Which student did your attempt to talk to him$_i$ scare $\__i$ to death?
c. ?This is a book$_i$ that no-one who has read it$_i$ would give _ to his mother$_i$.

### 6.1.2 The No C-Command Restriction

When discussing the distribution of parasitic gaps, Engdahl observes that the real gap must not c-command the parasitic gap. Because anaphoric relations are also constrained by c-command, this results in a correlation between the possibility of parasitic gaps and the possibility or non-possibility of certain types of anaphora. As I explained in Section 1.4, GB controls the coindexation of anaphoric elements by means of the three principles of the binding theory. I reproduce these principles in (17).

(17) A. An anaphor must be bound in its governing category.
B. A pronoun must be free in its governing category.
C. An R-expression must be free everywhere.

Engdahl sometimes describes the distribution of parasitic gaps as being inversely correlated with the possibility of anaphors and this follows from the fact that anaphors must be bound in their governing categories, and parasitic gaps must not. Elsewhere, Engdahl refers to a constraint on non-coreference and describes the positions where parasitic gaps are disallowed as being the positions where non-coreference for non-anaphoric, non-pronominal NPs is required. This is effectively the situation that Principle C describes. This clause ensures that ordinary NPs cannot be bound by a c-commanding category but there is nothing to prevent them being coindexed to a non-c-commanding category since this falls outside of the scope of the binding theory. The following examples illustrate this point:

(18) a. *He$_i$ annoyed Oliver$_i$.
b. Those rumours about him$_i$ annoyed Oliver$_i$.
c. *He$_i$ says that Oliver$_i$ is kind.
d. His$_i$ mother says that Oliver$_i$ is kind.

(18a) and (18c) are ill-formed with the coindexing indicated because the antecedent c-commands the R-expression. (18b) and (18d), on the other hand, are fine because the antecedent does not c-command the R-expression.

Parasitic gaps, then, are like R-expressions in that they cannot be coindexed with a c-commanding category. With the exception of (7) and (8), all of the parasitic gaps in the examples in Groups 1–4 in the previous section are not c-commanded by the real gap. The examples in (7) and (8) are more problematic because the real gap does c-command the parasitic gap and so these ought to be ill-formed. Examples such as these are a matter of some

controversy: Hukari and Levine (1987a) treat them as entirely unacceptable and go to some lengths to prevent them being generated in GPSG. By contrast, Engdahl (1984) assumes they are acceptable and finds it a virtue of the GPSG account that it generates them and a failing of the GB account that it does not. She goes to some lengths to modify the GB account so that it will not reject them. I will return to these examples in Section 7.1.

We can now turn to cases where parasitic gaps are disallowed. As (19) shows, where the real gap is a subject gap it c-commands all the positions in its VP sister and so a parasitic gap cannot occur in the VP:[1]

(19) *Who did you say _ was bothered by John's talking to $\__p$? [E58]

Similarly, the difference in acceptability between (20a) and (20b) follows from differences in c-command. In (20a) the real gap does not c-command the parasitic gap because the *while* adjunct attaches high to the VP headed by *imply*. In (20b), on the other hand, the adjunct attaches low to the VP headed by *filed* and this means that the real gap c-commands the parasitic gap—for this reason (20b) is ill-formed.

(20) a. Which Caesar did Brutus imply _ was no good while ostensibly praising $\__p$? [E60]

b. *Which articles did you say _ got filed by John without him reading $\__p$? [E57]

In (21a), the NP object of *give* c-commands the object of the preposition *to* so a parasitic gap cannot occur there. In (21b) the two objects of *give* c-command one another so neither of them can be a parasitic gap.[2]

(21) a. *Which slave did Cleopatra give _ to $\__p$? [E68]

b. *Which slave did Cleopatra give $\__p$ _? [E69]

By contrast, a reflexive can occur in similar examples:

[1] In feature-based theories like GPSG and the pre-C9 version of HPSG in Pollard and Sag (1994) there is no trace in the position of a preposed embedded subject, so the failure for there to be a parasitic gap in (19) could be attributed to this instead. However, this explanation would not be available in the C9 version of HPSG because it treats all SLASH dependencies as traceless.

[2] The indications in (21) as to which gap is the real gap and which is the parasitic one are Engdahl's. It is not at all clear to me how one can tell with examples like this but it is worth noting perhaps a slight degree of circularity with respect to (21a)—if the first gap was the parasitic gap and the second was the real gap then the real gap wouldn't c-command the parasitic gap and there would be no account of why this was ill-formed.

(22) a. Which slave did Cleopatra give _ to himself?
b. Which slave did Cleopatra give _ himself?

The data in (21) and (22) demonstrate the inverse correlation between the distribution of anaphors and parasitic gaps: if a reflexive is possible then a parasitic gap is not, and vice versa. The following data provide more examples:

(23) a. John persuaded Mary$_i$ to look after herself$_i$
b. *Who did John persuade _ to look after _$_p$?

(24) a. *John persuaded friends of Mary$_i$ to look after herself$_i$
b. Who did John persuade friends of _ to look after _$_p$?

(25) a. I talked to John$_i$ about himself$_i$ [E70]
b. *Who did you talk to _ about _$_p$? [E72]

(26) a. *I sent a picture of Mary$_i$ to herself$_i$ [E73]
b. Which girl did you send a picture of _ to _$_p$? [E74]

There are known exceptions to the c-command restriction on bound anaphora, for example, in (25a) *John* does not c-command *himself* but is still able to act as its antecedent. This configuration also turns out to be an exception to the no-c-command restriction on parasitic gaps: even though the gap in (25b) does not c-command the parasitic gap, the parasitic gap cannot occur. The fact that these exceptions pattern together provides strong evidence that the two phenomena are linked and that whatever permits the exception in (25a) also causes the exception in (25b).

### 6.1.3 Engdahl's Conclusions

Although Engdahl does not specify in detail what mechanisms underly parasitic gaps, she does reach some firm conclusions which I list to facilitate comparison with other theories. These conclusions are:

(27) a. Parasitic gaps are not coordinate gaps.
b. The real gap is always a *wh*-trace.
c. The distribution of parasitic gaps can be characterised using the same notions as are relevant to anaphora, i.e. c-command and binding domains.
d. No conclusion about what kind of a gap a parasitic gap is.

Engdahl dismisses the idea that multiple gaps in parasitic gap constructions are the same as the multiple gaps which arise from across-the-board (ATB) extractions from coordinations.[3] Her conclusion is based partly on the observation that many parasitic gaps are optional while in general the ATB condition cannot be violated. A second reason for her conclusion is the fact that coordination is generally between constituents of the same category while in parasitic gap constructions the gap-containing constituents are frequently not of the same category.

Engdahl's conclusion that the real gap is always a *wh*-trace stems from the observation that NP-traces cannot licence parasitic gaps—as demonstrated with the passive construction in (28).[4]

(28) *John had the paper filed <*np-trace*> without reading $\__p$.

(29) The paper was easy to file _ without reading $\__p$.

As (29) demonstrates, MOCs such as the *tough*-construction behave differently from standard NP-movement constructions such as passive since they do licence parasitic gaps. This difference in behaviour seems to reinforce the standard assumption that *wh*-movement is what underlies MOCs and, indeed, Engdahl suggests quite strongly that the ability to licence parasitic gaps is a reliable diagnostic of *wh*-movement. In this thesis I seek to deny that *wh*-movement underlies MOCs and I therefore reject the claim that the real gap must always be a *wh*-trace. I discuss the means by which parasitic gaps are able to co-occur with MOCs in Chapter 8.

As already discussed in the previous section, Engdahl's third conclusion follows from an examination of the relationship between the position of the real gap and the position of the

[3]The term 'across-the-board' comes from Ross (1967). Ross proposed the Coordinate Structure Constraint (CSC) which forbids the extraction of a conjunct or any part of a conjunct from a coordinate structure. He went on to show that this constraint can be violated if the extraction happens in an across-the-board fashion, i.e. if an element is extracted from all of the conjuncts. This accounts for the following contrast.

(i) CSC violation:
*Which book did you either buy _ or borrow a magazine from Lee?

(ii) ATB exception to CSC:
Which book did you either buy _ or borrow _ from Lee?

[4]Bennis and Hoekstra (1985) and Huybregts and van Riemsdijk (1985) discuss Dutch examples such as (i) where it is far from clear that the real gap is a *wh*-trace.

(i) Hij heeft deze artikelen zonder $\__p$ te lezen _ opgeborgen.
He has these articles without $\__p$ to read _ filed.

Further discussion of data such as this can be found in Section 7.2.2.

parasitic gap. parasitic gaps seem to pattern with R-expressions in that they must not be c-commanded by the real gap.

The item in (27d) is really a non-conclusion but I have included it as a point of comparison with other theories. It concerns the question about what kind of a gap a parasitic gap is. On the assumption that the real gap is always a *wh*-trace, it has seemed natural to many linguists to conclude that the parasitic gap is also a *wh*-trace. However, Engdahl does not commit herself to this conclusion and indeed her emphasis on the parallels between anaphora and parasitic gaps might in fact discourage such a view.

In Section 6.5 and in Chapter 7, I question the accuracy of the first two of Engdahl's conclusions and pursue the third conclusion to examine whether a binding theory account of at least a subset of parasitic gaps would be possible. With respect to the fourth point, a demonstration that at least some parasitic gaps can be treated as anaphors rather than as *wh*-traces will remove the pressure to assume that the real gap must always be a *wh*-trace. A side effect of the new account, therefore, is that in Chapter 8 I can show that parasitic gap formation does not disprove the analysis of MOCs in Chapter 5.

## 6.2 Cinque's Analysis

Chomsky (1986) describes parasitic gaps in terms of movement of an empty operator, as shown in (30):

(30) What$_i$ did you file $t_i$ [ before [ $O_i$ [ reading $t_i$ ]]]?

The chain of the parasitic gap and the chain of the real gap form a composed chain and the distribution of parasitic gaps is controlled by the conditions under which chain composition is permitted. On this account, a parasitic gap is a *wh*-trace.

Cinque (1990) questions Chomsky's account and proposes that the traditional class of *wh*-traces is divided into two distinct subclasses of differing category.[5] Cinque proposes that while most gaps are *wh*-traces (i.e. those arising from topicalisation, relativisation, cleft formation and *wh*-question formation), there are other gaps which are [–anaphor, +pronominal] empty

[5]Another GB account of parasitic gaps which departs radically from standard assumptions can be found in Williams (1990). Williams' account is also radically different from Cinque's in that it seeks to treat all parasitic gaps as instances of ATB extractions from coordinate structures. I discuss Williams' account in Section 7.2.2.

categories (pro).[6] In addition, Cinque claims that *wh*-traces arise as a result of movement but pro is base-generated and bound to the empty operator rather than directly to either the filler or the gap. According to Cinque's classification, the gaps subscripted with *pro* in the following examples are pros not *wh*-traces:

(31) a. The article that we filed _ without reading $\__{pro}$
b. The article that we went to England without reading $\__{pro}$
c. The article was too long for us to read $\__{pro}$.

(31a) is a standard example of a parasitic gap. (31b) is an example with a gap in a *without*-adjunct which has no real gap to licence it—Engdahl finds such examples ill-formed but Cinque and Pollard and Sag (1994) find them acceptable. (31c) is an MOC (a purpose infinitive).

Cinque's conclusions with respect to the issues raised in (27) are summarised in (32)

(32) a. Parasitic gaps are not coordinate gaps.
b. The real gap is always a *wh*-trace.
c. The distribution of parasitic gaps follows from an analysis where they are base-generated and $\overline{\text{A}}$-bound to an empty operator at S-Structure. Because they are $\overline{\text{A}}$-bound their coindexation is not determined by the binding theory.
d. A parasitic gap is a base-generated pronominal—a sort of empty resumptive pronoun. Its category is different from that of the real gap.

Space considerations preclude a detailed description of Cinque's approach but I have included this brief discussion to make two points: firstly Cinque challenges the standard view that the real gap and the parasitic gap are essentially the same kind of thing; and secondly he rejects the idea that the gaps in MOCs are *wh*-traces—this lends support to my claim that an MOC gap is not a *wh*-trace even though my analysis differs considerably from Cinque's.[7]

## 6.3 The HPSG Account

As briefly described in Section 1.3, Pollard and Sag (1994) propose a UDC treatment of parasitic gaps whereby a single element in the INHER|SLASH set on the mother is able to propagate to more than one daughter, thereby creating a split INHER|SLASH path.

[6] As previously mentioned, pro is the category assigned to empty subjects in pro-drop languages and it is generally believed that pro does not occur in English.

[7] It is interesting to note that while both Cinque and I question standard assumptions about both MOCs and parasitic gaps, Cinque concludes that they are instances of the same phenomenon but I treat them as considerably different from one another.

As I explained in Section 1.3, the distribution of INHER|SLASH is constrained by the Nonlocal Feature Principle. The combination of the Nonlocal Feature Principle and the Subject Condition ensures the pattern of gaps to be found in (33).[8]

(33) a. Who did enemies of the government want to discredit _?
b. Who did enemies of $\__p$ want to discredit _?
c. *Who did enemies of _ want to discredit the government?

The addition of the Subject Condition is the only addition to the theory that Pollard and Sag make so this only deals with the parasitic gaps which I classify as Group 4 in Section 6.1.1. They claim that these are the only true examples of parasitic gaps. All other examples (which I have classed in Groups 1–3) they claim simply to be the result of the Nonlocal Feature Principle which allows INHER|SLASH to propagate freely from a mother to any of its non-subject daughters. As an example from Group 3 illustrates, this predicts that both the real gap and the parasitic gap can occur independently as well as together:

(34) a. Which girl did you send a picture of _ to $\__p$?
b. Which girl did you send a picture of _ to her mother?
c. Which girl did you send a picture of yourself to _?

The parasitic gaps in Groups 1 and 2 are dealt with by Pollard and Sag in the same way but in this case they re-evaluate the usual grammaticality judgements since they predict that both the real gap and the parasitic gap can occur as the only gap site in these examples. For example, they claim that examples with a gap in an adjunct when there is no gap in the main VP are well-formed.

(35) Those boring old reports, Kim went to lunch without reading _.

A summary of the HPSG conclusions of the four points in (27) and (32) is given in (36).

[8]Subject Condition: "a lexical head's subject can be slashed only if one of its complements is".

(36)
a. Parasitic gaps are not coordinate gaps since a mechanism particular to coordination ensures the ATB pattern. The possibility of multiple gaps in parasitic gap sentences, on the other hand, simply follows from general principles constraining SLASH propagation.
b. The real gap is a *wh*-trace (i.e. one arising from the termination of the INHER|SLASH value).
c. There is no need to discuss the distribution of parasitic gaps in terms of notions such as c-command and anaphora domains since the correct distribution should fall out from the theory of SLASH propagation. However, they make some non-standard assumptions about the data and about what counts as a parasitic gap.
d. Parasitic gaps are *wh*-traces, re-entrant with the real gap.

Notice that these conclusions are such that it is impossible to question whether a parasitic gap is really a *wh*-trace without overturning the whole account.

## 6.4 Problems with the Pollard & Sag account

In this section I present some problems with the account of parasitic gaps in Pollard and Sag (1994).[9] I do this in order to demonstrate that, quite apart from my concerns with the interaction of parasitic gaps with MOCs, there is good reason to review the standard HPSG analysis. The problems can be attributed partly to Pollard and Sag's assumption that parasitic gaps are a unified phenomenon and should be treated in the same way, and partly from their claim that a parasitic gap is the same kind of gap as a standard gap and is re-entrant with it.

### 6.4.1 Distributional Differences

One of the most striking facts about parasitic gaps is that they can occur in positions that are not available to normal gaps.[10] Pollard and Sag make provision for examples such as those in Group 4 in Section 6.1.1 where the parasitic gap occurs inside a subject: they use the Subject Condition to ensure that a gap can only occur inside a subject if a second gap also occurs in the VP that that subject agrees with. This deals adequately with straightforward examples

[9]Many of the issues raised here are ones which highlight the differences between standard gaps (*wh*-traces) and parasitic gaps, and I owe several of the examples to Cinque (1990). As I explained in Section 6.2, I am not really concerned with the details of Cinque's approach to parasitic gaps, but the data which motivates his decision to treat *wh*-traces and parasitic gaps as different phenomena is of very direct interest since this brings to light several shortcomings in the Pollard and Sag analysis.

[10]Although I adopt the traceless account of extraction in the C9 version of HPSG, for expository purposes I will continue to refer to gaps as if they did exist and I will also continue to mark gap positions in the same way as before.

of parasitic gaps inside subjects but it does not quite account for why examples involving parasitic gaps inside relative clauses in subjects should be acceptable. Some relevant examples were given in (11) and (12) in Section 6.1. (37) and (38) are similar examples:

(37) Kim is the kind of person who everyone who meets $\__p$ immediately takes to _.

(38) That's a dish that anyone who has tasted $\__p$ will never forget _.

The Subject Condition enables the SLASH dependency to pass down into the subject NP but, once it is there, there is no additional means to get it into the relative clause since a normal SLASH dependency cannot enter a relative clause. The SLASH account is able to affect the point where the SLASH path splits but once each path goes its own way, each one behaves like a normal extraction. In order to generate (37) and (38) Pollard and Sag would also have to claim that the examples in (39) are grammatical:

(39) a. *The person who I like everyone who meets _?

b. *A dish that I don't know anyone who has tasted _?

For all examples not involving subjects, Pollard and Sag argue that the parasitic gap site is a possible location for a lone gap. I have already mentioned examples such as those in (35) which demonstrate the possibility of single gaps in the kind of adjuncts involved in c-type parasitic gaps, and for these examples the Pollard and Sag position is not implausible.

Parasitic gaps are sometimes not able to occur in positions which are perfectly normal positions for ordinary gaps and in these cases the Pollard and Sag theory has no means to describe the distributional differences. The most striking difference in this respect is that normal gaps can be of any major category while it is widely assumed that a parasitic gap can only be an NP gap:[11]

[11]The facts are actually more complex than this. Cinque claims that not only are parasitic gaps restricted to being NPs, they must also be NPs of a particular type. Specifically, he claims that a parasitic gap cannot be a non-referential NP and he cites the following examples as evidence:

(i) How many kilos does he weigh _?

(ii) *How many kilos did he sell _ without weighing $\__p$?

I am not sure that (ii) actually demonstrates Cinque's point since *kilos* as an object of *sell* would be referential and therefore the failure of (ii) might be attributable to the two gaps requiring opposing interpretations for the expression *how many kilos*. A more suitable example might be the following and I'm not sure whether this is well- or ill-formed:

(iii) How many kilos did the baby appear to weigh _ while not actually weighing $\__p$ because the scales were faulty?

Postal (1993) gives examples of other restrictions on the type of NP. Postal (1994) shows examples of sentential complement parasitic gaps—which he claims are not true parasitic gaps. See Section 7.2.5

(40) a. *Of which artist do friends _ speak well $\__p$. (PP gap)
b. *About which book did you tell me _ before writing $\__p$. (PP gap)
c. *How clever do you think Kim actually is _ without ever seeming $\__p$. (AP gap)

The Pollard and Sag account which treats a parasitic gap as simply a second optional realisation of a standard unbounded dependency is unable to block examples such as those in (40).

A second difference between normal gaps and parasitic gaps is that parasitic gaps cannot be embedded subject gaps even though these are possible with normal extractions. The following examples illustrate:[12]

(41) a. *Who did you say that John's claiming $\__p$ was his wife would make us believe _ was actually his girlfriend?
b. *Who did you say that John's claiming $\__p$ was his wife would make us dislike _.

(42) *Who did you believe _ would be fired while still hoping $\__p$ would get to stay on?

There would seem to be no way that the HPSG treatment could prevent embedded subject parasitic gaps since after the SLASH path has split higher up in the tree each individual path is a normal SLASH path behaving in a normal way.

Another instance of a position where a normal gap can occur but a parasitic gap cannot, can be found in the parasitic gap example which I first introduced in (25b) in Section 6.1.2:

(25) a. I talked to John$_i$ about himself$_i$ [E70]
b. *Who did you talk to _ about $\__p$? [E72]

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for discussion. Engdahl (1983) gives the following examples from Swedish which involve parasitic gaps which are not NPs.

(iv) Till himlen är det inte säkert att alla som längtar $\__p$ kommer _. [E47a]
To heaven it is not certain that everyone who longs $\__p$ get _.

(v) Fattig vill ingen som någonsin varit $\__p$ bli _ igen. [E47b]
Poor wants no-one who has ever been $\__p$ to become _ again.

[12]The pair of examples in (41) demonstrate that an embedded subject parasitic gap is impossible irrespective of whether the real gap is a subject or an object. By contrast, examples where the real gap is an embedded subject but the parasitic gap is a non-subject are often acceptable as is shown by (i):

(i) Which Caesar did Brutus imply _ was no good while ostensibly praising $\__p$? [E60]

As I discussed in Section 6.1.2, Engdahl is able to explain the failure of the parasitic gap in (25b) as contrasting with the well-formedness of (25a). The HPSG theory of parasitic gaps is unable to predict the badness of (25b) and has nothing to say about the way such examples pattern in an opposing way with the anaphora examples. Furthermore , as (43) shows, a normal gap can occur in the position after *about*, and interestingly, in the adjunct in (44), a parasitic gap is also acceptable.

(43) Who did you talk to Kim about _?

(44) Who did you betray _ by talking to Kim about $\__p$?

For the Pollard and Sag theory the pattern of data in these examples is hard to explain. In Engdahl's theory based on c-command and in my treatment described in Chapter 7, this difference in distribution is easier to account for.

Cinque gives a further example of a difference between real gaps and parasitic gaps in relation to a particular construction in French and Italian. In these languages the equivalent of English *believe* cannot occur as an object raising verb (45a) except in sentences where the raised constituent has been extracted (45b):

(45) a. *Je croyais Jean être intelligent.
I believed John to be intelligent.

b. l'homme que je croyais _ être intelligent
the man who I believed _ to be intelligent

(46) *l'homme que nous apprécions sans croire être intelligent
the man who we appreciate without believing to be intelligent

Attempts to put a parasitic gap in the position of the raised constituent fail, as shown by (46), yet an account like the Pollard and Sag one cannot model this difference in behaviour since it treats the two kinds of gap as the same kind of entity.

A final difference, also noted by Cinque, concerns dative-moved ditransitives. In a normal extraction the first object cannot be extracted but the second object can:

(47) a. *Who did Sue give _ the flowers?

b. What did Sue give Fred _?

(48) a. *Who did you quarrel with _ after giving $\__p$ the flowers?

b. *Which plant did you repot _ before giving Fred $\__p$?

As illustrated by (48), a parasitic gap can occur in neither position and, again, this would be difficult for the Pollard and Sag account to explain.

### 6.4.2 Connectivity

The examples in the previous section showed that the distribution patterns of parasitic gaps and real gaps are far from being the same but there was nothing to question the Pollard and Sag theory that the real gap and the parasitic gap are both realisations of the same SLASH dependency, i.e. that they are token identical. As explained in Section 1.3, Pollard and Sag (1994) distinguish two different classes of unbounded dependency, strong UDCs and weak UDCs. In strong UDCs the filler structure-shares its entire LOCAL value with an element in the SLASH set and this ensures connectivity between filler and gap. In weak UDCs the filler and the element in SLASH are only coindexed and so there is no connectivity between the two items. However, irrespective of the nature of the UDC, the Pollard and Sag account predicts connectivity between the real gap and the parasitic gap since they are the same object. This means that in strong UDCs both the real gap and the parasitic gap are predicted to exhibit connectivity with respect to the filler and in weak UDCs there is predicted to be connectivity between the two gaps but not between the gaps and the filler. These predictions are not borne out, as the following examples, taken from Tait (1988), demonstrate:

(49) a. ?For which crime was Bernard tried _ six months after being charged with $\__p$?
b. To whom did Mortimer faithfully continue to write _ after seeing $\__p$ only once?

These are examples of *wh*-questions (strong UDCs) where the real gap is a PP gap and the parasitic gap is an NP gap—Pollard and Sag wrongly predict these to be ill-formed.

A second problem arising from the strong connectivity prediction concerns the question of whether the real gap and the parasitic gap can differ with respect to case marking. As we saw with examples (41) and (42) in the previous section, subject parasitic gaps are not possible. However, it is possible for an object parasitic gap to co-occur with an embedded subject real gap as illustrated in (50) ((50b) is an example which I previously presented as (20a) in Section 6.1.2 and in a footnote in Section 6.4.1.).

(50) a. Who did you say John's criticism of $\__p$ (acc) would make us think _ (nom) was stupid?
b. Which Caesar did Brutus imply _ (nom) was no good while ostensibly praising $\__p$ (acc)? [E60]

There seems no doubt about the well-formedness of these examples but, on the basis of their claim of connectivity between the real gap and the parasitic gap, Pollard and Sag wrongly predict these examples to be bad.[13]

Notice that the revised treatment of case-marking proposed in Chapter 2 will not improve this situation. I motivated a treatment of elements in SLASH whereby they become case-marked as a result of the Extraction Lexical Rules and this means that a case conflict is still predicted for these examples.

## 6.5 Are Parasitic Gaps A Unified Phenomenon?

In Section 6.3 I described how Pollard and Sag (1994) have re-evaluated the parasitic gap data and have concluded that only a subset of the examples usually discussed count as true parasitic gaps and in Section 6.4 I showed that Pollard and Sag's account is nonetheless not without problems. In the new analysis which I will describe in detail in Chapters 7 and 8 I also propose a re-evaluation but the conclusions I come to differ somewhat from Pollard and Sag's. I will motivate a division of the parasitic gap examples into two classes, c-type parasitic gaps, and a-type parasitic gaps. The names I give to the two groups reflect the similarities that they bear to other phenomena: the c-type ones would seem to be describable by extending the theory of coordination while the a-type ones can best be thought of as part of a theory of anaphora. In this I am making a more radical distinction than Pollard and Sag since I am suggesting that the mechanisms underlying the two cases are fundamentally different. Pollard and Sag, on the other hand, claim that SLASH propagation is the mechanism behind both of their classes and so they are essentially similar.

I will argue that Engdahl's motivation for not treating parasitic gaps as similar to coordinate gaps stems from her decision to treat all of the data discussed in the previous sections as examples of a unified phenomenon. If we divide the data into two classes then it is possible to draw parallels with coordination for c-type parasitic gaps while acknowledging a complete dissimilarity for a-type parasitic gaps. The class of c-type parasitic gaps corresponds to the

[13] In Section 7.2 I develop an account of this kind of example which treats them in the same way as ATB extractions from coordinations. This account involves split SLASH paths and is not unlike the Pollard and Sag treatment and so conflicting case is a problem for me too. The crucial difference between the two accounts is that I treat these examples as part of an extended theory of coordination and although I am not able to explain the case conflict, observe that the same pattern occurs in true coordinations:

(i) Which Caesar did Brutus imply _ (nom) was no good and yet still praise _ (acc)?

examples I classified as Group 1 and Group 2 in Section 6.1.1. In this class the parasitic gap occurs to the right of the real gap, inside an adjunct with propositional content. The class of a-type parasitic gaps correspond to Group 3 and Group 4 from Section 6.1.1. These are ones which occur inside an argument of the same predicate as the constituent containing the real gap.

### 6.5.1 A-type Parasitic Gaps

Turning first to the non-coordination-like parasitic gaps which I call a-type parasitic gaps, this group includes all the examples that Engdahl identifies as obligatory parasitic gaps and which Pollard and Sag claim to be the only true type of parasitic gap. I also include the examples from Group 3 in Section 6.1.1 even though Engdahl classifies these as optional parasitic gaps and Pollard and Sag consider them not to be true parasitic gaps. This mismatch in classifications follows from the fact that I use the presence of a degree of parallelism between the constituents containing the two gaps to determine whether the examples are coordination-like or not. Engdahl, on the other hand, uses obligatoriness as a diagnostic and Pollard and Sag classify according to whether the parasitic gap occurs in a subject or not.

In Engdahl's account, the unifying factor behind all parasitic gaps is that their possible positions are determined by structural configurations: a parasitic gap can only appear in a position which is not c-commanded by the real gap. The non-c-command restriction has strong parallels in the domain of anaphora where c-command plays a central role in determining which kinds of anaphor can be coindexed with which antecedents. Furthermore, with obligatory parasitic gaps where a pronoun can't replace the parasitic gap, Engdahl has an explanation in terms of weak cross-over—obligatory parasitic gaps precede the real gap and they can't be replaced by pronouns because a pronoun cannot be bound by a *wh*-phrase that has crossed over it.

In my analysis of what I term a-type parasitic gaps, I will attempt to articulate an account of these parasitic gaps as a type of anaphor (in the wide sense of the term). I differ from Engdahl in that I do not assume that all parasitic gaps should be treated as part of a theory of anaphora and the examples that I classify as c-type parasitic gaps seem to need a completely separate treatment. I differ from Pollard and Sag in not using an unbounded dependency mechanism to describe a-type parasitic gaps. In using the binding theory to describe parasitic gaps, my approach has something in common with Cinque (1990) although he is working in

the GB paradigm and I am working within HPSG which has a binding theory articulated in terms of o-command rather than c-command.

I investigate a-type parasitic gaps in detail in Section 7.1 and show how an HPSG binding theory account of them might work.

### 6.5.2 C-type Parasitic Gaps

Engdahl gives several reasons why she feels that parasitic gaps must be distinguished from the ATB gaps that occur in coordinate structures. These reasons are shown in (51):

(51)
a. The 'conjuncts' would not be of the same syntactic category.
b. Semantically, the 'conjuncts' would be of different types.
c. Examples where the two gaps occur in arguments of the same predicate, i.e. the examples in Groups 3 and 4 in Section 6.1.1, cannot be analysed as conjoined structures.
d. Parasitic gaps are optional whereas the ATB restriction on extractions from coordinations ensure that it is obligatory for a gap to occur in each conjunct.

Assuming the division described above between c-type parasitic gaps and a-type parasitic gaps, Engdahl's third point about certain examples not being analysable as coordinations simply follows from the reclassification. The remaining three points, however, need to be investigated in more detail. With respect to (51a), while it is true that conjuncts tend to be categorially similar, they do not necessarily have to be identical and there are well-documented cases where cross-categorial coordination is perfectly well-formed. The examples in (52) show cross-categorial coordinations of constituents playing an adverbial function.

(52)
a. The guards treated the old man disrespectfully and without consideration for his frailty.
b. He left the house swiftly and without looking back.
c. She sang tunefully and with great pathos.

Engdahl's second assumption, that conjuncts must have the same semantic type, is also not necessarily valid. In the first place, in cases of syntactic dissimilarity, it is not always clear to what extent semantic similarity holds—precise details of the syntax/semantics mapping differ from theory to theory and it is hard to assess 'semantic type' in a pre-theoretical way. It is conceivable that we could view an example such as (53) as a coordination with two VP conjuncts and *without* as the conjunction. On this view, the conjuncts are both VPs and at some level of detail are of the same semantic type.

(53) Which book did Kim [ file _ ] without [ reading _]?

(54) Which book did Kim [ file _ ] and [ not read _]?

Of course the similarity between the two putative conjuncts in (53) is intuitively not as strong as the similarities usually found in clear cases of coordination such as (54). The major difference in these two cases is that in (54) the two verbs are both finite and, indeed, coordination between two verbal conjuncts generally does require identity of the VFORM feature. In (53) the verbs differ for VFORM: the first is finite and the second is a gerund form. However, given that the extent to which conjuncts have to be syntactically similar varies from context to context, a mismatch in VFORM values cannot be taken as a clear indication that coordination is not occurring. Semantically there is a very strong similarity between the two examples: while *without* is thought of as a subordinating conjunction it seems clear that, at least in these kinds of examples, it means the same as *and not*, and can plausibly be thought of as a coordinating conjunction.

I defer further discussion of c-type parasitic gaps until Section 7.2 where I will also deal with Engdahl's fourth point concerning the optionality of c-type parasitic gaps.

# Chapter 7

# A New Analysis of Parasitic Gaps

## 7.1 A-type Parasitic Gaps

In this section I demonstrate that a-type parasitic gaps can be treated within HPSG's binding theory. In Section 7.1.1, I examine several examples to demonstrate that this approach gives the desired results. In Section 7.1.2, I consider whether a constraint is required that makes real gap and parasitic gap mutually non-o-commanding. In Section 7.1.3, I discuss details of how HPSG would need to be revised to accommodate the new analysis.

### 7.1.1 An HPSG Binding Theory Account

In this section I show how HPSG's binding theory can accommodate an analysis of a-type parasitic gaps as a type of non-overt anaphor. The analysis I propose is one where an a-type parasitic gap is an *npro* (a non-pronominal, HPSG's equivalent of an R-expression). As an *npro*, an a-type parasitic gap is subject to Principle C of the binding theory which says that it may not be coindexed with an o-commanding antecedent. I make an additional assumption that an a-type parasitic gap is required to be coindexed, i.e. it cannot occur freely.

Before turning to the data, I should point out that at times discussion of examples is complicated by the fact that it is not always clear which of the two gaps is which, and therefore which is the antecedent and which the anaphor.[1] In these cases I have to show that, either

[1] The use of the term *antecedent* may be confusing here since a trace analysis of *wh*-gaps encourages one to think of fillers as antecedents to their traces and this then gives rise to the question of whether it is the filler or its trace which is the antecedent to the parasitic gap. In fact, in either a 'traceful' or 'traceless' account of *wh*-extractions, only one SUBCAT list element corresponds to the filler/real gap and this occurs in the SUBCAT list associated with the phrase containing the real gap since this is its canonical position. Since we are dealing with the binding theory and only elements in SUBCAT lists are potential antecedents, the SUBCAT element (which structure-shares both with the filler and the SLASH member which arises through the Extraction Lexical Rules) is the antecedent to the parasitic gap. It

way, the correct predictions are made.

## Gaps in Subjects

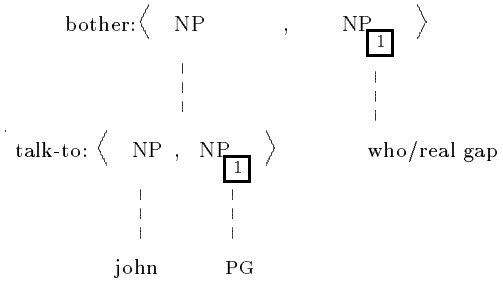
I start the discussion of the data with examples classified as Group 4 in Section 6.1.1. These are ones where the parasitic gap occurs inside a subject.

(1) a. Who did pictures of _ really annoy _?
b. Who did John's talking to _ bother _?

In the examples in (1), neither gap o-commands the other, so in principle either one could be the parasitic gap. In fact, the gap in the subject must be the parasitic gap since the SLASH mechanism will disallow any extractions from subjects.[2] Since the real gap does not o-command the parasitic gap, the coindexation is allowed and the examples in (1) are well-formed.

To see o-command relations it is often useful to draw a diagram of the kind I produced in (41) in Section 1.2 which shows the SUBCAT lists associated with the phrases in a sentence. Recall that I motivated some alterations to the binding theory as a result of Pollard and Sag's C9 changes so that the entire SUBCAT list propagates from a lexical head to its phrasal projection. This means that a sentence has a SUBCAT list which contains all the SUBCAT lists of the subparts of the sentence and it is particularly easy to access o-command information from this. For the example in (1b) the SUBCAT information can be represented diagrammatically as follows:

(2)




is convenient to think of this as the real gap even though in the traceless version of the theory there is no gap.

[2] A concomitant of my hypothesis that a-type parasitic gaps are not derived using the SLASH mechanism is that Pollard and Sag's Subject Condition is no longer needed. (The Subject Condition is designed to permit SLASH to propagate to a subject only if it also propagates to the VP.) I revert to their Slash Inheritance Principle which is a precursor to the Subject Condition and which prevents all extractions out of subjects.

Here we can see that the a-type parasitic gap in the subject NP can be coindexed to the real gap in the main clause because the real gap does not o-command the parasitic gap.

(3) is an example of an a-type parasitic gap inside a relative clause modifier of a subject. Since normal gaps cannot occur in this position, as shown in (4), there is no doubt that this is the parasitic gap. Since the antecedent does not o-command the a-type parasitic gap the example is well-formed.

(3) A man who every boy who meets $\__p$ admires _.

(4) *A man who every boy who meets _ admires Max.

I reproduce examples (41) and (50a) from Section 6.4 as (5) and (6). In each of these the parasitic gap must be the one in the subject since these are not normal gap locations. I observed before that a parasitic gap cannot be nominative and I propose that this fact can easily be modelled by setting the value for CASE to *accusative* in the lexical entry for the a-type parasitic gap. This immediately accounts for the acceptability of (6) and for the ill-formedness of (5a) and (5b).

(5) a. *Who did you say that John's claiming $\__p$ (nom) was his wife would make us believe _ (nom) was actually his girlfriend?

b. *Who did you say that John's claiming $\__p$ (nom) was his wife would make us dislike _ (acc).

(6) a. Who did you say John's criticism of $\__p$ (acc) would make us think _ (nom) was stupid?

In Section 6.1.2 we saw the example in (19) where an embedded subject real gap was unable to be an antecedent for a parasitic gap. I reproduce this as (7):

(7) *Who did you say _ was bothered by John's talking to $\__p$?

Although (6) shows that an embedded subject real gap can be an antecedent to an a-type parasitic gap, the one in (7) cannot be an antecedent since it o-commands the parasitic gap.

### Gaps in Non-subjects

I turn now to examples where the parasitic gap occurs in a non-subject argument. I reproduce (5) and (6) from Section 6.1.1) as (8) and (9). In these examples neither gap position o-commands the other and so the well-formedness of the examples is expected.

(8) Which girl did you send a picture of _ to _?

(9) Which professor did you persuade the students of _ to nominate _ for the Distinguished Teacher's Award?

Engdahl assumes that it is the second gap in (8) and the first gap in (9) which are the parasitic gaps but there is no absolute evidence that this is the case and the other gaps could equally well be the parasitic ones. In Section 7.1.3 I will suggest that it is the first gap in both of these which is the parasitic one and I will leave further discussion of these examples until then.

The other examples in this section are either ill-formed or questionable. As a preliminary to discussion of them, it is useful to consider the question of whether there is a stronger constraint on the distribution of a-type parasitic gaps. In a footnote, Engdahl (1983) claims that the correct characterisation of parasitic gap formation is that neither gap may c-command the other but that there is no need to enforce the stronger constraint because "the situation where the parasitic gap asymmetrically c-commands the real gap will not arise, since in that case the parasitic gap would presumably occur in a more accessible extraction domain than the real gap, and would, by the substitution test used above, be understood as the real gap". It is not clear to me that the same reasoning applies to this analysis and so for the moment I will entertain the possibility that a mutual no o-command restriction should be enforced and, indeed, all of the examples I discuss here seem to require such a restriction. In Section 7.1.2 I will discuss this restriction in more detail.

(10) and (11) reproduce examples (7) and (8) from Section 6.1.1:

(10) ?Which students did you persuade _ to invite us to come and see $\__p$? [E17]

(11) ??Who did you tell _ that we were going to vote for $\__p$? [E18]

As I explained before, Hukari and Levine (1987a) and Engdahl (1984) disagree about whether these examples are actually well-formed or not and I therefore assume that is a matter of speaker variation. Notice that Engdahl's assumptions (as marked) about which is the real gap and which is the parasitic gap are not necessarily valid: in my analysis I must also entertain the possibility that the first gap is the parasitic gap and the second the real gap. On Engdahl's assumptions about which gap is which, all speakers ought to find (10) and (11) ill-formed since the real gap would o-command the parasitic gap. On the assumption that the gaps are the other way round, all speakers ought to find the examples acceptable since

the real gap does not o-command the parasitic gap. However, if the mutual no o-command restriction is in force then all speakers ought to reject the examples since, whichever gap is which, one of them o-commands the other.

Many other examples of a-type parasitic gaps in non-subjects are ill-formed but it is necessary to consider them in order to demonstrate that the account does not overgenerate. Again, in these examples there is often no easy way to tell which gap is the real gap and which is the parasitic gap. One such set of examples concern ditransitive verbs. As (12a) shows, an attempt to put a gap in both objects of *give* has bad results, even though single extractions from both positions are fine:

(12) a. *Which slave did Cleopatra give _ to _? [E68]
b. Which slave did Cleopatra give _ to John?
c. Which slave did Cleopatra give the book to _?

(12a) is Engdahl's example and she marks the second gap as the parasitic one. If this is indeed the case, then the example can be claimed to be ill-formed since the first gap o-commands the second. However, the possibility exists that the first gap is the parasitic gap and since this position is not o-commanded by the other gap, at first glance there would seem to be no reason for the example to be ill-formed. The mutual no o-command constraint would explain why (12a) is ill-formed.

As illustrated in (13), examples of double object gaps with dative shift verbs are as ill-formed as the examples in (12a):

(13) a. *Who did Cleopatra give _ _?
b. What did Cleopatra give John _?
c. *Who did Cleopatra give _ a book?

Notice that the single extraction possibilities shown in (13b) and (13c) would indicate that the first gap must be the parasitic gap since this position isn't normally a possibility for a SLASH dependency. Again, this means that (13a) must be said to be ill-formed because of the mutual no o-command constraint.

Verbs which take two PP arguments do not allow gaps in both PPs:

(14) a. *Who did you talk to _ about _?
b. Who did you talk to _ about John?
c. Who did you talk to John about _?

(The example in (14a) was given as (25b) in Section 6.1.2.) As (14b) and (14c) demonstrate, single extractions from either position are fine so again we have to decide which is the parasitic gap. This configuration is one which is known to be an exception to a simple account of c- or o-command. Apparently neither gap commands the other but with the linear order PP[to] PP[about] reflexivisation is possible and this indicates that the object of *to* o-commands the object of *about*:

(15) a. I talked to Mary$_i$ about herself$_i$
b. *I talked to herself$_i$ about Mary$_i$
c. *I talked about Mary$_i$ to herself$_i$
d. *I talked about herself$_i$ to Mary$_i$

From this we have an explanation for why both orders lead to bad results: if the parasitic gap is the second gap then it is illegally o-commanded by the real gap and if it is the first gap then, because of the mutual no o-command constraint, it illegally o-commands the real gap.

The next example is one with a gap inside one of the objects of a dative shift verb:

(16) a. *Who did Mary give _ a picture of _?
b. ?Who did Mary give _ a picture of John?
c. Who did Mary give you a picture of _?

Since the first position o-commands the second position, it also o-commands any position inside it and so, because of the mutual no o-command constraint, we expect (16a) to be ill-formed. Notice that if the first gap is located inside the first object position instead of being that position, then neither gap o-commands the other and the result is much better:

(17) Who did Mary give all those friends of _ a picture of _.

In summary, in the examples in (12), (13), (14) and (16) it is not clear which gap is the real gap and which is the parasitic gap. If the real gap precedes the parasitic gap then the ill-formedness of the examples follows from the requirement that an a-type parasitic gap not be o-commanded by its antecedent. If, on the other hand, the parasitic gap precedes the real gap then the only way to block the examples is to make appeal to the mutual no o-command restriction.

### 7.1.2 The Mutual No O-command Restriction

Since the mutual no o-command constraint seems to be so crucial for many of the examples in the previous section, it is worth investigating it in more detail. In particular, I will investigate whether the mutual no o-command constraint must be explicitly encoded as a principle of the grammar or whether its effects can be attributed to some other component of the grammar. In order to ensure that a-type parasitic gaps are not o-commanded by their antecedents, I have assumed that they are of type *npro* and, at first glance, it might seem that we could achieve the effects of the mutual no o-command constraint by doing the same for real gaps and classifying them as *npro*s too. However, there are two reasons why this is not possible. Firstly, there is no obvious mechanism in HPSG for allowing anaphors to select a particular sub-type of *nom_obj* as antecedent and secondly, it is already an established part of HPSG that real gaps structure share their LOCAL value with their fillers and must therefore be of the same type as their fillers. Pollard and Sag (1994) use the following examples to illustrate this and to demonstrate a failing of the GB account which treats all traces as R-expressions (the equivalent of *npro*).

(18) a. Senator Dole$_i$ doubted that the party delegates would endorse his wife. But HIM$_i$, he$_i$ was sure they would support _$_i$.

b. [John and Mary]$_i$ are stingy with their children. But THEMSELVES$_i$/EACH OTHER$_i$, they pamper _$_i$.

GB would wrongly predict these examples to be ungrammatical because they assume that the gap is an R-expression and must therefore not be c-commanded by its antecedent. HPSG correctly predicts these examples to be well-formed because for them the gap is of the same type as the filler. In (18a) the filler/gap entity is a *ppro* which is locally o-free, as required by Principle B. In (18b) the filler/gap entity is an *ana* which is locally o-bound, as required by Principle A.[3]

[3]In perfectly acceptable examples such as (i) it might seem that because the filler is a *wh-pronoun* we should assume that it and the gap are of type *ppro*. However, I assume that, in spite of their name, *wh*-pronouns are not pronouns but are of type *npro*. My motivation stems from the fact that they seem to have exactly the same distributional properties as full *wh*-NPs such as *which person* and, in particular, the ill-formedness of (ii) follows only if *who* is an *npro*—since *John* o-commands the gap position, the gap as an *npro* cannot be coindexed with *John*.

(i) Who did Lee try to protect _?

(ii) *Who$_i$ did John$_i$ say Mary liked _$_i$?

Although it is not possible to require real gaps to be of type *npro*, it follows from the HPSG account that all of the real gaps in the examples in (12), (13), (14) and (16) actually happen to be *npro*s because all of the fillers are *npro*s. This means that for those examples the mutual no o-command effect might be thought to be a reflection of the fact that both the parasitic gap and the real gap are of type *npro*. However, before concluding that the mutual no o-command effect is always simply a reflection of the type of the filler/real gap entity, it is necessary to investigate the consequences of varying the nature of this entity. For the examples in (12), (13), (14) and (16) the only way in which the second gap could successfully be coindexed to the first would be if it was of type *ana*. To see this, consider the non-extraction forms in (19) which require a reflexive rather than a pronoun. For (19a–c) the need for a reflexive follows from the fact that the position is locally o-commanded by the antecedent. With (19d) the reflexive is an exempt anaphor (i.e. not bound by the binding theory) but while it is not clear why this has to be a reflexive, it is clear that it cannot be a pronoun.

(19) a. Cleopatra gave Max$_i$ to himself$_i$/*him$_i$.
b. Cleopatra gave Max$_i$ himself$_i$/*him$_i$.
c. I talked to Max$_i$ about himself$_i$/*him$_i$.
d. Cleopatra gave Max$_i$ a picture of himself$_i$/*him$_i$.

If only *ana* elements are permitted in the non-extraction versions then it follows that any filler-gap dependency into the second of the coindexed positions must involve fillers of type *ana*. The results of an attempt to construct relevant examples where the filler is a reflexive are shown in (20).

(20) a. *HIMSELF$_i$, Cleopatra gave $\_\_{pi}$ to $\_\_{i}$.
b. *HIMSELF$_i$, Cleopatra gave $\_\_{pi}$ $\_\_{i}$.
c. *HIMSELF$_i$, I talked to $\_\_{pi}$ about $\_\_{i}$.
d. *HIMSELF$_i$, Cleopatra gave $\_\_{pi}$ a picture of $\_\_{i}$.

Without an explicitly encoded mutual no o-command restriction, my theory predicts these examples to be acceptable, assuming as marked, that the parasitic gap precedes the real gap. This is because the filler/real gap entity is reflexive and the pattern of coindexation between the parasitic gap and real gap is appropriate for reflexives. However, as the examples in (21) show, even simple extractions of reflexives in such examples are not good and so the failure of the prediction can be attributed to whatever blocks (21) instead.[4]

[4]In the light of contrasts such as the following, perhaps there is prohibition on fronting a reflexive across a non-coreferent NP.

(21) a. *HIMSELF$_i$, Cleopatra gave Max$_i$ to _$_i$.
b. *HIMSELF$_i$, Cleopatra gave Max$_i$ _$_i$.
c. *HIMSELF$_i$, I talked to Max$_i$ about _$_i$.
d. *HIMSELF$_i$, Cleopatra gave Max$_i$ a picture of _$_i$.

So far it has been possible to deal with the ill-formedness of most of the examples in the previous section without actually having to postulate the existence of a mutual no o-command restriction. The only examples which are still not satisfactorily dealt with are the ones whose grammaticality is disputed by Hukari and Levine and Engdahl ((10) and (11) in the previous section = (7) and (8) from Group 3 in Section 6.1.1). In the previous section we saw that, if we assume the existence of the mutual no o-command restriction, these examples ought to be judged unacceptable by all speakers and, if we assume it not to exist, they ought to be accepted by all speakers. In fact, in the light of the fact that fillers and gaps are of the same type, these examples are independently predicted to be ill-formed since the filler/gap entities are *npro*s and must therefore not be o-commanded by their antecedents. The problem that remains is that some speakers apparently find these examples acceptable yet it is hard to see how such speaker variation can be accommodated. (22) shows examples which parallel (10) and (11) except that the filler/real gap entity is a *ppro*:

(22) a. ?Max$_i$ knew that the TV company had had no luck with his parents but HIM$_i$, they persuaded _$_{pi}$ to let the talk show host interview _$_i$.
b. ??Max$_i$ knew that the TV company wasn't interested in his parents but HIM$_i$, they had told _$_{pi}$ that the talk show host might want to interview _$_i$.

These examples ought to be more acceptable than (10) and (11) because the *ppro* type of the filler/real gap is consistent with the binding theory given the coindexation as marked. In fact there does not seem to be any significant difference in acceptability and so for speakers who reject all of (10), (11) and (22) this might be a small shred of evidence that the mutual no o-command restriction does indeed need to be explicitly stated. However, there is still no explanation of why there are any speakers at all who accept (10) and (11). It was Engdahl (1984) who claimed that these examples were acceptable but even she suggests that they are not fully acceptable and so I conclude that these really are marginal examples whose syntax is impeccable but whose reference relations are not. As to whether the examples in (22) really

(i) HIMSELF$_i$, Max$_i$ could rely on _$_i$.
(ii) HIMSELF$_i$, Cleopatra thought that Max$_i$ had hurt _$_i$.

do entail the existence of the mutual no o-command restriction, it is hard to be sure given the difficulty in making grammaticality judgements. I will therefore assume that there is no need to directly encode the mutual no o-command restriction but the examples in (10), (11) and (22) remain a caveat to this assumption.

### 7.1.3 Antecedents to A-type parasitic gaps

My assumptions about a-type parasitic gaps so far have been:

(i) An a-type parasitic gap is a phonologically null NP of type *npro*.

(ii) An a-type parasitic gap has accusative case.

(iii) An a-type parasitic gap must be bound, i.e. it is not allowed not to be coindexed.

(iv) The antecedent must be a gap and not a phonologically realised NP.

The current HPSG binding theory can account for the basic part of a treatment of a-type parasitic gaps as anaphors but the extra restrictions in the assumptions do not necessarily follow without additions or modifications. In this section I explore the extra restrictions in more detail and speculate about how, or indeed whether, they can be imposed.

Items (i) and (ii) are easily incorporated simply by providing an appropriate lexical entry for a-type parasitic gaps. A minimal specification for this entry will look like this:

(23)
$$\left[\begin{array}{ll} \text{PHON} & \langle\rangle \\ \text{SYNSEM} & \left[\text{LOCAL} \left[\begin{array}{ll} \text{CAT} & \left[\text{HEAD} \left[\begin{array}{l}\text{CASE}\ acc \\ noun\end{array}\right]\right] \\ \text{CONTENT} & npro \end{array}\right]\right] \end{array}\right]$$

Items (iii) and (iv) are more difficult to encode. For item (iii), the fact that an a-type parasitic gap must have a linguistically realised antecedent can perhaps be thought of as following from general principles concerning the referential properties of NPs. In general, all anaphors are required to have an antecedent but these antecedents are not constrained to be linguistically realised. When not linguistically realised, the assumption is that antecedents are contextually available: Pollard and Sag use the CONTEXT|BACKGROUND feature as the locus of this kind of information. A-type parasitic gaps are phonologically null and contain no semantic information independent of what their antecedents provide, so it is hard to

imagine how any contextual information could be inferred which could provide them with an antecedent. On this view, the reason they must have a linguistically realised antecedent follows simply from the fact that they cannot have any other kind of antecedent.[5]

This line of reasoning does not bring us any closer to articulating the mechanisms which would ensure the presence of an antecedent, but it does make the a-type parasitic gap problem part of the wider problem of requiring all anaphoric elements to have antecedents/be coindexed. Hankamer and Sag (1976) distinguish between deep anaphora where an antecedent to an anaphor has a pragmatically determined antecedent and surface anaphora where the antecedent must have a syntactically realised antecedent. They describe phonologically null surface anaphors as elliptical. It may seem odd to say that a-type parasitic gaps are elliptical but I believe that the important aspect of a-type parasitic gaps is not their similarity to other phonologically null elements but is rather their similarity to other nominal surface anaphora. Arguably, reflexives and reciprocals are also surface anaphors (it is extremely hard to create examples where they are pragmatically controlled) and, perhaps more significantly, resumptive pronouns are also instances of surface anaphora. Below, I explore the resumptive aspect of a-type parasitic gaps and, assuming that they have a resumptive role to play, it is hardly surprising that they need a syntactically realised antecedent.

Item (iv) which says that the antecedent to an a-type parasitic gap must be a gap rather than a normal NP needs to be explored in two ways. First it is necessary to be more precise about exactly what is meant by the term *gap* in this context and, second, it is necessary to develop a theory about how this restriction on the nature of the antecedent could be enforced.

Dealing first with the question of the nature of the term *gap*, as I have already pointed out, the C9 traceless approach to unbounded dependencies means that the real gap is not a gap as such. The binding theory treats coindexation as a relation between elements on SUBCAT lists (which are *local* feature structures) rather than between positions in tree structures and SUBCAT lists are not affected by extraction or by how a SLASH dependency gets terminated. Technically then, item (iv) is incorrect since the real gap is not in itself a gap but is, as far as the binding theory is concerned, a *local* feature structure element in a SUBCAT list which, through structure-sharing, is also both the local part of a filler and an element in SLASH.

[5]Engdahl (1983) discusses why a speaker might choose to use a parasitic gap rather than an overt pronoun and she suggests that, while overt pronouns may have either a pragmatically induced antecedent or a linguistically realised one, a parasitic gap can have only the latter. She continues: "By not pronouncing a pronoun, the speaker in effect makes sure that the listener does not go outside the sentence to supply a referent, hence he prevents the hearer from computing a possible but unintended interpretation for the sentence." (p.18–19)

Turning to the second question about how to ensure that only this kind of object can be an antecedent to an a-type parasitic gap, it is not immediately obvious how this should be done. One possibility is to require a form of agreement between elements which are coindexed so that phonologically null a-type parasitic gaps can only be coindexed with other phonologically null elements. However, the possibilities for agreement between anaphor and antecedent are fairly restricted in HPSG. For normal coindexation, two NPs structure share the value of the feature INDEX (inside SYNSEM|LOCAL|CONTENT) where the value of INDEX is a feature structure of type *index* which has the following form:

(24)
$$\begin{bmatrix} \text{PERSON} & \textit{person} \\ \text{NUMBER} & \textit{number} \\ \text{GENDER} & \textit{gender} \end{bmatrix}$$
*index*

In a sense then, it is just a side effect of coindexation that the coindexed items must agree for person, number and gender. In order to ensure agreement between an a-type parasitic gap and its antecedent it would be necessary either to start adding to the features which are appropriate for the type *index* or to suggest a more radical alteration to the HPSG approach to agreement between coindexed items.

There are several problems about adding a feature to *index* in order to use the existing mechanism for agreement. The new feature in *index* would have to be one which reflected a notion that we can gloss as 'I am an element which is phonologically unrealised in my canonical position'. This gives rise to a fundamental question about whether such a feature would be in the same class as PERSON, NUMBER and GENDER. Even assuming that it would be sound to add the new feature, there are implementational problems arising from the fact that normal NPs would have to be marked with a negative value for this feature but this would exclude any other anaphor also being coindexed to the coindexed filler, gap and parasitic gap. For example, the pattern of coindexation in (25) would be hard to achieve because, although the two gaps are phonologically unrealised, the reflexive isn't and so there would be contradictory requirements on the index that all three elements share.

(25) Who$_i$ did those stories about _$_i$ really cause _$_i$ to doubt himself$_i$?

This kind of problem is probably not insuperable but I hesitate to devise an intricate mechanism for ensuring just the right kind of antecedent for an a-type parasitic gap when it is not entirely clear that this would be an appropriate step to take.

An alternative approach to the problem is to assume that there is no explicit part of the grammar which prevents a-type parasitic gaps from occurring with overtly realised antecedents. Instead, the hypothesis would be that other parts of the grammar conspire to require a-type parasitic gaps to be coindexed to a phonologically null antecedent. In pursuing this approach it is useful to return to observations made by Engdahl (1983). In classifying parasitic gaps Engdahl observes that obligatory parasitic gaps are ones which precede the real gap and that their obligatoriness follows from facts about 'cross-over'. In (26a) the pronoun *him* cannot be coindexed to the filler/gap entity because of weak cross-over: fillers cannot cross over elements to which they are coindexed in their 'movement' to initial position. (See Postal (1971).)

(26) a. *Who$_i$ did that picture of him$_i$ depress _$_i$?
b. Who$_i$ did that picture of _$_{pi}$ depress _$_i$?

Whatever the causes of the cross-over phenomenon, Engdahl speculates that obligatory parasitic gaps provide a means to rescue sentences which would otherwise be excluded as cross-over violations. In this sense, parasitic gaps seem to behave like resumptive pronouns which are also used to rescue sentences from ill-formedness. This observation of Engdahl's would seem to have some bearing on the issue of the distribution of parasitic gaps, but since she treats both a-type parasitic gaps and c-type parasitic gaps as a unified phenomenon, she is unable to claim that the only function of parasitic gaps is this kind of rescue function. For Engdahl's class of optional parasitic gaps, which are the ones that follow the real gap, there is no explanation as to why they should occur or why they are able to alternate with overt pronouns. By contrast, a side-effect of my reclassification of parasitic gaps into a-type and c-type, makes it possible for me to claim that all a-type parasitic gaps are obligatory ones which precede the real gap. Consider the well-formed examples from the previous three sections:

(1) a. Who did pictures of _$_p$ really annoy _?
b. Who did John's talking to _$_p$ bother _?

(3) A man who every boy who meets _$_p$ admires _.

(8) Which girl did you send a picture of _ to _?

(9) Which professor did you persuade the students of _ to nominate _ for the Distinguished Teacher's Award?

In (1a&b) and in (3) the first gaps are unquestionably the parasitic gaps and attempts to replace them with pronouns demonstrate that they are obligatory, as shown in (27)–(28). In

(8) and (9) there is no evidence which can definitively tell us which gap is the real one and which the parasitic one. However, as the test for obligatoriness as shown in (29) and (30) demonstrates, the first gaps are obligatory and so it is not unreasonable to conclude that these are the parasitic gaps.

(27) a. *Who$_i$ did pictures of him$_i$ really annoy _$_i$?
b. *Who did John's talking to him$_i$ bother _$_i$?

(28) ?A man who every boy who meets him$_i$ admires _$_i$.

(29) *Which girl did you send a picture of her$_i$ to _$_i$?

(30) *Which professor did you persuade the students of her$_i$ to nominate _$_i$ for the Distinguished Teacher's Award?

Given my distinction between a-type and c-type parasitic gaps, and given the data considered above, it seems as if it should be possible to restrict the distribution of a-type parasitic gaps so that they only occur with null antecedents while not actually enforcing this restriction directly. It ought to be possible for the restriction to follow from a requirement that a-type parasitic gaps can only occur resumptively but unfortunately there is no straightforward definition of the notion of a resumptive role or what it is to 'rescue' a sentence from ungrammaticality. Moreover, HPSG does not seem to have a theory about the cross-over effects in (26)–(30): as far as I can tell HPSG predicts these examples to be well-formed.[6] For the moment, then, I can follow Engdahl in hypothesising that the two phenomena are linked but further research is required before I can demonstrate this. I think that this avenue will be rewarding and for this reason I have not pursued the alternative agreement option that I briefly discussed above.

In summary, I have shown that a binding theory account of a-type parasitic gaps incorporating the assumptions itemised above would seem to account for the data quite well. I have some outstanding problems when it comes to articulating the precise mechanisms involved in this account. In spite of the outstanding problems, however, this approach is fruitful and in Chapter 8 I will discuss how it can extend to interactions between a-type parasitic gaps and missing object constructions.

[6]Some cross-over effects are explained by Pollard and Sag as following from the fact that filler and gap are of the same type. For example, (i) is ruled out because the gap is an *npro* and cannot be coindexed to the o-commanding main clause subject:

(i) *John$_i$, he$_i$ said you like _$_i$.

## 7.2 C-type Parasitic Gaps

It is generally assumed that parasitic gaps are a unified phenomenon and that the same mechanism can be used to describe both a-type and c-type parasitic gaps. In making the a-type/c-type distinction I have allowed for the possibility that the two classes should be treated separately. In this section I show that there are very strong similarities between c-type parasitic gaps and coordinate structures and for this reason it is appropriate to try to treat c-type parasitic gaps with the same mechanisms as are used for ATB coordinate gaps. There is not yet a clearly articulated HPSG account of coordination so it will be impossible to be completely explicit about an analysis but it is possible to sketch some aspects of it.

In Section 6.5 I provided some general initial motivation for the division between a-type and c-type parasitic gaps. Here I elaborate on the motivation for treating c-type parasitic gaps along with coordinate gaps: in Section 7.2.1 I provide further evidence for the connection between c-type parasitic gaps and ATB extractions from coordinate structures and I show why a binding theory account like that developed for a-type parasitic gaps is not appropriate for c-type parasitic gaps. In Section 7.2.2, I discuss the evidence provided by Bennis and Hoekstra (1985) and Huybregts and van Riemsdijk (1985) which suggests that Dutch has only c-type parasitic gaps and the hypothesis in Huybregts and van Riemsdijk (1985) that Dutch parasitic gaps are the same as ATB extractions from coordinations. I also examine Williams' (1990) hypothesis that all English parasitic gaps are really ATB gaps. In Section 7.2.3 I discuss examples of coordination where the ATB pattern of extraction is violated and I briefly review the discussions of this issue in Goldsmith (1985) and Lakoff (1986). The fact that some extractions from coordinations can be non-ATB points the way to an account which brings coordination and c-type parasitic gaps together without it being a problem that c-type parasitic gaps are optional. In Section 7.2.4 I first describe Pollard and Sag's treatment of coordination and then revise it so that the mechanism that is responsible for ATB extractions from coordinations is also used for ATB extractions in c-type parasitic gap constructions. I formulate the account in such a way as to permit non-ATB patterns of extraction in both coordinations and c-type parasitic gap constructions. Finally, in Section 7.2.5, I discuss Postal's (1993) critique of Williams' (1990) hypothesis that parasitic gaps are really an ATB phenomenon and Postal's (1994) re-evaluation of parasitic gaps.

### 7.2.1 Similarities to Coordination

One of Engdahl's reasons for not treating parasitic gaps as coordinate gaps is that parasitic gaps are optional while ATB extractions from coordinate structures are obligatory. However, there are examples of coordination where a non-ATB extraction is not too bad. (31) and (32) contain examples of coordinations where only one conjunct contains a gap.

(31) a. Who did the old man die and leave money to _?
b. Who did you go to lunch and forget to invite _?

(32) a. What kind of dessert can you eat a lot of _ and not gain weight?
b. How many hours can you work _ and still have a social life?

Notice the similarity between the examples in (31) and (32) and the possibility of single gaps in the kind of structures involved in c-type parasitic gaps (the examples in (33) are from Pollard and Sag (1994)):

(33) a. Those boring old reports, Kim went to lunch without reading _.
b. That's the symphony that Schubert died without finishing _.
c. How many of the book reports did the teacher smile after reading _.

(34) a. What kind of dessert can you eat a lot of _ without gaining weight?
b. How many hours can you work _ before you've no social life?

With reference to the issue of the optionality of the parasitic rather than the real gap, I conducted a very informal survey of four speakers of various Englishes (American English, Canadian English, English English and Scottish English) and asked them to say if they found any of the following examples bad:

(35) a. Which report did Kim file without reading?
b. Which report did Kim file without reading it?

(36) a. Which report did Kim file and not read?
b. Which report did Kim file and not read it?

(37) a. Which report did Kim file rather than read?
b. Which report did Kim file rather than read it?

In theory, these speakers should have found (36b) completely unacceptable since it violates the ATB restriction on extractions from coordinate structures. They should also have found (35b) and (37b) as good as their more gappy counterparts since these are supposed to be optional parasitic gaps. In fact, all of them said that they found all of the (b) examples much worse than the (a) examples, which contain a second gap. When asked if they could say whether one (b) example was particularly bad, two said that (36b) was the worst, one said that (35b) was the worst and one said that the (b) examples were all equally bad. This suggests that the standard distinction between ATB extractions and parasitic gaps and the concomitant predictions about whether second gaps are optional or obligatory are not clearly reflected in speaker judgements.

There are some further similarities between c-type parasitic gaps and coordinations which lend support to the distinction between c-type and a-type parasitic gaps. One such similarity concerns the possibility of rightward extraction. In most parasitic gap examples, the real gap is leftward-extracted—the examples tend to involve *wh*-questions, topicalisations or relative clauses. There are, however, some examples of rightward extractions that Engdahl cites as suggested by Wasow:

(38) John offended _ by not recognising _ immediately, his favourite uncle from Cleveland. [E26]

(39) Susan always files _ without reading _ properly, all the memos from the lowlevel administration. [E27]

Interestingly these examples occur only with the c-type examples and feel very much like examples of Right Node Raising (RNR), a rightward extraction which occurs almost exclusively with coordinate structures. Attempts to produce rightward extractions with a-type parasitic gaps do not yield good results:

(40) ??I persuaded the students of _ to nominate _ for the award, that distinguished professor of physics.

(41) *I persuaded _ to invite us to visit _, those students that you've been wanting to meet.

Another way in which the c-type parasitic gaps resemble coordination is in the sharing of control/agreement properties between the two 'conjuncts'. When two VPs are coordinated they must share a subject and in the *without*-type examples that we have been looking at, this is also the case: the person who does the filing is also the person who fails to do the

reading. Even in cases where the adjunct contains a full finite sentence, if the subjects are coreferential then a parasitic gap is far more acceptable:

(42) a. This is the only report that Sue actually read _ before she filed _.
b. ??This is the only report that Sue actually read _ before John filed _.
c. This is the only report that Sue actually read _ before she/John filed it.

A final point for consideration which also seems to suggest a connection with coordination for the c-type parasitic gaps, concerns comparative constructions. It has occasionally been noted that comparative constructions share certain properties with coordinate constructions, see for example Napoli (1983). Evidence for this view comes (among other things) from the fact that gapping and RNR are possible only with coordination and comparatives. The following examples are taken from Napoli:

(43) a. Mary loves Fellini more than John, Bertolucci. (gapping)
b. I organise more than I actually run her life. (RNR)

Consider again the example of a c-type parasitic gap which I gave in (3) in Section 6.1.1 (which originated with Ross (1967) and was reproduced by Engdahl):

(3) ?The blintzes which Sasha is gobbling _ down faster than I can reheat $\__p$ are extremely tasty, if I do say so. [E11]

If we add to this a rightward-moved version as in (44), it should become apparent that if comparative formation is like coordination then the extractions in (3) and (44) are just as likely to be ATB extractions as instances of a real gap/parasitic gap pair.

(44) Sasha is gobbling _ down faster than I can reheat _, those extremely tasty blintzes.

Further to the topic of gapping, moreover, Napoli provides the following example of gapping in a *without*-adjunct.

(45) John's putting out his cigarette without Mary hers didn't help at all.

Although I find this example questionable, Napoli claims it is acceptable. The point of this example is that in order for gapping to occur, the construction has to be classified at some

level as similar to coordination and this in turn lends support to the idea that a parasitic gap in a *without*-phrase is actually an ATB gap.

An alternative way of motivating an ATB extraction approach to c-type parasitic gaps is to consider whether they can be treated in the same way as a-type parasitic gaps. If they can be straightforwardly analysed using the same binding mechanism as used for a-type parasitic gaps then this would weaken the case for the a-type/c-type distinction. In a binding approach to c-type parasitic gaps the condition that a parasitic gap must not be o-commanded by the real gap would easily be met since it is always the case that c-type parasitic gaps and the real gaps they occur with are mutually non-o-commanding. The reason for this follows from the fact that in c-type parasitic gap examples, the parasitic gap occurs inside an adjunct. Since adjuncts are not subcategorised by the elements they combine with, they never appear on a SUBCAT list and hence the elements inside them never enter into o-command relations with elements outside them. This means, however, that any coindexing of the c-type parasitic gap with an antecedent is not within the domain of the binding theory and it would possibly be more difficult to require that a c-type parasitic gap should have a syntactically realised antecedent.

There would also be a problem with a binding theory treatment stemming from the use of o-command rather than c-command. As I explained in Section 6.1.2, Engdahl treats the difference between (46a) and (46b) as following from differences in c-command.

(46) a. Which Caesar did Brutus imply _ was no good while ostensibly praising $\__p$?
b. *Which articles did you say _ got filed by John without him reading $\__p$?

For a binding theory that relies on o-command, there is no difference between (46a) and (46b) and so an attempt to treat c-type parasitic gaps as anaphors will wrongly predict (46b) to be well-formed.

There is another set of data, that throws some more doubt on a binding theory approach to c-type parasitic gaps and this relates to how normal pronouns and NPs distribute in the relevant positions. Consider the a-type parasitic gap examples in (47a) and (48a): as (47b&c) and (48b&c) show, we can replace the two gaps by a coindexed pair of referential NP and pronoun in either order. By contrast, the two gaps in the c-type parasitic gap examples in (49) and (50) can only be replaced by a similar pair if the full NP precedes the pronoun.

(47) a. Who did John's spreading rumours about $\__p$ annoy _?
b. John's spreading rumours about Max$_i$ annoyed him$_i$.
c. John's spreading rumours about him$_i$ annoyed Max$_i$.

(48) a. Which sick student did John persuade friends of $\__p$ to visit _?
b. John persuaded friends of the sick student$_i$ to visit him$_i$.
c. John persuaded friends of his$_i$ to visit the sick student$_i$.

(49) a. Which report did John file _ without reading $\__p$?
b. John filed that report$_i$ without reading it$_i$.
c. *John filed it$_i$ without reading that report$_i$.

(50) a. Who did John offend _ by not recognising $\__p$?
b. John offended Maria$_i$ by not recognising her$_i$.
c. *John offended her$_i$ by not recognising Maria$_i$.

Whatever the reasons for this difference, coordinate structures behave in the same way as the c-type parasitic gaps, as illustrated in (51) and (52):

(51) a. What did John read _ and file _?
b. John read the report$_i$ and filed it$_i$.
c. *John read it$_i$ and filed the report$_i$.

(52) a. What did John cook _ and then forget to eat _?
b. John cooked the food$_i$ and then forgot to eat it$_i$.
c. *John cooked it$_i$ then forgot to eat the food$_i$.

I hope to have shown here that there is a strong case for treating c-type parasitic gaps using the same means as for coordinate gaps and for treating them differently from a-type parasitic gaps. In the next section, I review some accounts which seek to treat parasitic gaps within a theory of coordination.

### 7.2.2 Parasitic Gaps and ATB

The distribution of parasitic gaps in Dutch is much more limited than in English. Dutch appears not to permit any parasitic gaps of the kind I have classified as a-type. Bennis and Hoekstra (1985) argue that difficulties in constructing Dutch parasitic gaps follow from the stronger restrictions that Dutch imposes on preposition stranding and extractions from sentential complements. Many of the English a-type parasitic gaps occur as objects of prepositions and, according to Bennis and Hoekstra, Dutch counterparts are impossible because

Dutch prepositions cannot be stranded in this way. Similarly, it is more difficult to extract out of sentential complements in Dutch than it is English and this limits the possibilities still further. In short, it seems that the only well-formed parasitic gaps in Dutch are ones which I would classify as c-type.[7] Bennis and Hoekstra subscribe to the prevailing view that all parasitic gaps must be treated alike and this is why they need to offer an explanation of the fact that Dutch doesn't have the same range of parasitic gaps as English. Since I propose that a-type and c-type parasitic gaps are separate phenomena, it follows that it should be possible for a language to have one or the other, or both, or neither. So for me, it is sufficient to say that Dutch does not have a-type parasitic gaps.

Many Dutch c-type parasitic gaps are quite straightforward equivalents of English examples. The following are taken from Bennis and Hoekstra (1985):

(53) a. Welke boeken heb je zonder $\__p$ te bestuderen _ weggebracht?
Which books have you without $\__p$ to study _ away brought
'Which books did you bring away without studying?'

b. Dit is die oom die ik na jaren niet $\__p$ gezien te hebben
This is the uncle that I after years not $\__p$ seen to have
gisteren _ weer ontmoette.
yesterday _ again met.

'This is the uncle that I met again yesterday after not having seen for years'

Bennis and Hoekstra (1985) and Huybregts and van Riemsdijk (1985) discuss some interesting examples where a parasitic gap appears not to be dependent on another gap:

(54) Hij heeft deze artikelen zonder $\__p$ te lezen opgeborgen.
He has these articles without $\__p$ to read filed.
'He filed these articles without reading them.'

Here the adjunct introduced by *zonder* intervenes between the verb *opgeborgen* and its direct object *deze artikelen*. Since the direct object has not been extracted it is strange that a parasitic gap should be able to occur. Bennis and Hoekstra suggest that the direct object

[7] The only evidence that a-type parasitic gaps might be able to occur in Dutch comes from Huybregts and van Riemsdijk (1985) who give two examples which they claim to be nearly acceptable:

(i) ?Dit is een boek waar ik $\__p$ van denk dat Jan _ naar verlangt.
This is a book which I $\__p$ of think that Jan _ to longs.
'This is a book about which I think that Jan longs for it.'

(ii) ?Dit zijn incomplete systemen waar ieder onderzoek $\__p$ naar _ ernstig door belemmerd wordt.
Those are incomplete systems that every investigation $\__p$ into _ seriously by impeded is.
'Those are incomplete systems that every investigation into is seriously impeded by.'

has, in fact, moved from its position immediately to the left of the verb to a position where it precedes the entire VP and this means that there is actually a real gap for the parasitic gap to depend on:

(55) Hij heeft deze artikelen zonder $\__p$ te lezen _ opgeborgen.
He has these articles without $\__p$ to read _ filed.
'He filed these articles without reading them.'

This would mean that the gap after *zonder* can be thought of as a parasitic gap but it is still not clear that the real gap is a real trace resulting from *wh*-movement and in turn this throws some doubt on Engdahl's claim that parasitic gaps can only be licensed by traces. Bennis and Hoekstra argue that the object is adjoined to the VP in a position which is an $\overline{\text{A}}$ position and that therefore the real gap is a trace. They liken this extraction to Complex NP Shift except that the NP moves to the left not to the right. Huybregts and van Riemsdijk (1985) find that there is evidence both for and against the claim that the object's position is an $\overline{\text{A}}$ position. They contrast examples like (55) with examples which are similar except that they are coordinate, as in (56). Here the presence of two gaps is best described as resulting from an ATB extraction.

(56) Hij heeft deze artikelen zowel $\__p$ gelezen als _ opgeborgen.
He has these articles both $\__p$ read and _ filed.
'He both read and filed these articles.'

Given the similarity of the examples, Huybregts and van Riemsdijk hypothesise that Dutch parasitic gaps are in fact not parasitic gaps but are really the result of ATB extractions from coordinate structures. They term the process by which the NP in examples like (55) and (56) moves leftwards out of both conjuncts Left Node Raising, which they claim to be the mirror image of Right Node Raising.

Huybregts and van Riemsdijk provide further evidence for the coordination account of Dutch parasitic gaps which is specific to Dutch and which I need not reproduce here. The point I would like to make is that Dutch only has c-type parasitic gaps and that Dutch linguists have considered that these may not be true parasitic gaps but coordinate gaps instead. I consider that this lends weight to my treatment of c-type parasitic gaps in English.

In their analysis of Dutch parasitic gaps, Huybregts and van Riemsdijk have to reconcile the fact that ATB extractions are generally obligatory with the fact that parasitic gaps are optional and can be replaced by pronouns. They do this by hypothesising that conjunctions

like *zonder* are fundamentally subordinating conjunctions but that they can be forced into a coordinating role. In (57) the presence of the pronoun in the adjunct indicates that *zonder* is behaving as a subordinating conjunction while in (53) the presence of the parasitic gap indicates that it is behaving as a coordinating conjunction.

(57) Welke boeken heb je zonder ze te bestuderen _ weggebracht?
Which books have you without them to study _ away brought?
'Which books did you bring away without studying them?'

This seems like a plausible analysis for examples involving extraction as in (53) and (55) but it is not clear how Huybregts and van Riemsdijk would deal with examples like (58) and (59) where there are no gaps:

(58) Je hebt zonder ze te bestuderen deze boeken weggebracht.
You have without them to study these books away brought.
'You brought these books away without studying them.'

(59) Je hebt deze boeken weggebracht zonder ze te bestuderen.
You have these books away brought without them to study.
'You brought these books away without studying them.'

Here the problem is that these examples would be ambiguous between an analysis where *zonder* was a subordinating conjunction and one where it was a coordinating conjunction. I assume that Huybregts and van Riemsdijk intend that *zonder* should only be a coordinating conjunction in cases where the ATB pattern of extraction requires this analysis but it is hard to see how this can be built into a grammar.

Edwin Williams works within the GB paradigm but in Williams (1990) he presents an account of English parasitic gaps which is very unconventional by GB standards. His account is very like the Huybregts and van Riemsdijk approach in that he attempts to reclassify parasitic gaps as ATB gaps in coordinate structures. The major difference between the two approaches is that Williams has to account for a far wider range of data than Huybregts and van Riemsdijk because English has a-type as well as c-type parasitic gaps. In order to treat all parasitic gaps as ATB gaps Williams has to loosen the definition of coordination quite considerably so as to achieve the kinds of analyses indicated in (60):

(60) a. Who would you [ warn _ ] COORD [ before striking $_p$ ]?
b. Which stars do [ pictures of $_p$ ] COORD [ annoy _ ]?
c. Who did you promise [ friends of $_p$ ] COORD [ to try to find _ ]?

A general feature of coordinate structures is that the conjuncts are identical (with the usual provisos) and that the element combining them is a conjunction. (60a) can plausibly be fitted into this model because the two conjuncts are at least analysable as being of the same syntactic category, and because *before* is a conjunction, albeit a subordinating one. The hypothesised conjuncts in (60b) and (60c), on the other hand, are syntactically and semantically dissimilar and there is no overt element which is obviously a conjunction. For (60b), Williams suggests that the conjunction is INFL and for (60c) he suggests it is the verb *promise*.

Williams provides a table of possible coordinations that give rise to parasitic gaps through ATB extraction and grades them in order of acceptability, as follows:

| (61) | | |
|---|---|---|
| | Who did you meet _ and dislike _ | and: S S |
| | What did you file _ before reading _ | before: S S |
| | The man who people who meet _ like _ | the: S S |
| | Who would pictures of _ upset _ | INFL: NP VP |
| | Who did you promise friends of _ to try to find _ | V: NP S |

He suggests that the acceptability ranking follows from the fact that this ranking also mirrors "COORDinatability": the less coordinate-like an example is, the less acceptable it is. Furthermore, he speculates that differences between languages may reflect the grading and that Dutch only permits the top of the list whereas English is more liberal.

Postal (1993) criticises Williams' account in both general and specific terms. On a general level he finds the relaxed notion of coordination rather unpalatable especially since Williams' description is too informal and schematic to be properly assessed. I agree with this complaint but because I make a sharp distinction between a-type and c-type parasitic gaps I can escape from the 'all or nothing' attitude that is the basis for their disagreement. Because Williams believes that parasitic gaps are a unified phenomenon, he is forced to apply to a-type parasitic gaps an analysis which is only plausible for c-type parasitic gaps. And because Postal also believes that parasitic gaps are a unified phenomenon, when he rejects Williams' analysis as being implausible for a-type parasitic gaps he is also forced to reject it for c-type parasitic gaps.[8] I am able to agree with Williams' analysis (and that of Huybregts and van Riemsdijk 1985) for the class of c-type parasitic gaps but reject it for a-type parasitic gaps. Moreover, I do not have to appeal to a notion of relative coordinatability to account for why Dutch only has a subset of the parasitic gaps that English has: in my view both have c-type parasitic

[8]In fact Postal does not believe that all apparent parasitic gaps really are parasitic gaps: in Postal (1994) he distinguishes a class of true parasitic gaps from a class of gaps which look like parasitic gaps but which are not—see below for discussion.

gaps but only English has a-type parasitic gaps.

In the remainder of this section I will look in more detail at Williams' account as it affects c-type parasitic gaps. In Section 7.2.5 I will review some of Postal's specific criticisms of Williams.

Any account of c-type parasitic gaps which attempts to explain them as resulting from an ATB pattern of extraction must deal with the fact that c-type parasitic gaps are optional. Williams considers the following set of examples:

(62) a. Which boy would you warn _ before striking _?
b. Which boy would you warn _ before striking him?
c. Which boy would you warn Mary before striking _?

(62a) exhibits an ATB pattern of extraction and must therefore involve a coordinate structure but since (62b) and (62c) involve only single gaps, Williams suggests that they are not coordinate. Presumably (62b) is straightforwardly generated as a standard extraction but (62c) needs extra explanation since extractions from adjuncts are normally disallowed. Williams solution is to suggest that an adjunct has to be demoted to a position inside the VP in order for extraction to be possible. As evidence for this analysis he offers the example in (63):

(63) *Which boy$_i$ would you warn him$_i$ before striking _$_i$?

If the adjunct was in its normal position, then there would be no reason to reject (63) since the pronoun does not c-command the gap (an R-expression) but if, as Williams has suggested, the presence of the gap implies that the adjunct has been demoted into the VP then (63) is predicted to be ill-formed because the pronoun does c-command the gap and this violates Principle C of the binding theory.

While I favour Williams's treatment of c-type parasitic gaps on a broad level, it seems to me that his account suffers from the same problem of spurious ambiguity as that of Huybregts and van Riemsdijk. When there is an extraction involved in these kinds of structures then the pattern of gaps determines whether the structure is coordinate or not, and if not, whether the adjunct has been demoted or not. However, if there is no extraction then either the examples are ambiguous between a coordinate and a non-coordinate analysis (and if non-coordinate, between a demoted and a non-demoted analysis) or Williams must require the grammar to prefer the non-coordinate, non-demoted analysis and to only look for the other kind if forced

to. This latter option seems to me to be at odds with a declarative specification of grammar and so either eventuality is undesirable. In Section 7.2.4 I will develop an HPSG analysis of c-type parasitic gaps which owes much to Williams' insights but which does not suffer from this particular defect. In Section 7.2.5 I will turn to Postal's criticisms of Williams' account in order to discover the impact they have on my own account.

### 7.2.3 Coordination and ATB

In the previous section I discussed Huybregts and van Riemsdijk (1985) and Williams (1990) and showed that for both accounts the fact that c-type parasitic gaps are optional leads to a conclusion that these constructions are thought to be coordinate only when there is an ATB pattern of extraction, and subordinate otherwise. This conclusion follows from two assumptions: (i) that the ATB pattern of extraction occurs exclusively in coordinate structures and (ii) that the ATB pattern is obligatory in coordinate structures. From (i) it follows that when ATB gaps occur in c-type structures then the structure must be coordinate and from (ii) it follows that when the ATB pattern does not occur then the structure cannot be coordinate. In the case when there are no extractions it is impossible to tell whether the structure is coordinate or subordinate. As I have already suggested, I find it rather unsatisfactory to claim that this type of construction is sometimes subordinate and sometimes coordinate and in what follows I will seek to provide an account where the structures in which c-type parasitic gaps occur are unequivocally subordinate irrespective of extractions. At the same time I do wish to claim that c-type parasitic gaps result from an ATB method of extraction and in order to do this I must give up both of the assumptions in (i) and (ii) above.

In giving up the second assumption, that the ATB pattern of extraction is obligatory in coordinate structures, I am assisted by the fact that the assumption is simply not true and by the fact that this has been discussed in the literature. In (31) and (32) above, I gave examples of single extractions from the rightmost conjunct and the leftmost conjunct respectively. Examples such as (32) are discussed by Goldsmith (1985) and the following are further examples taken from that paper.

(64) a. How many courses can we expect our graduate students to teach _ and (still) finish a dissertation on time?

b. How much can you drink _ and not end up with a hangover the next morning?

c. How many counterexamples can the Coordinate Structure Constraint sustain _ and still be considered empirically correct?

Goldsmith observes that in examples such as these, the meaning of the conjunction *and* can be paraphrased as *and nonetheless* and that this meaning is distinct from its more standard meaning. He identifies four distinct kinds of relationship that can hold between coordinated VPs as illustrated by the four examples in (65).

(65) a. Our first contestant likes to play the piano and (to) learn exotic languages.
b. Harry is the only one who can hear a song once and play it perfectly on the piano.
c. The child heard the news and broke down in tears.
d. Jones went over the rapids and lived to tell the tale of it.

Goldsmith describes these in turn as truth-conditional *and*, temporal *and*, causal *and* and the *despite* or *nonetheless* use of *and*. It is only in the fourth type of example that it is possible to extract out of the first conjunct only. From this it is clear that the precondition for the violation of the ATB pattern of extraction is a semantic one rather than a syntactic one but nevertheless it is necessary to describe how a semantic difference affects syntactic behaviour. Goldsmith's solution to the problem is to suggest that in its *despite* usage *and* is syntactically a subordinator rather than a coordinator. He suggests that the structure involved in the examples in (64) and (65d) is one where the *and* constituent attaches as a VP adjunct. Thus, in spite of the fact that his examples appear to be exceptions to the ATB condition, Goldsmith manages to retain assumptions (i) and (ii) above, by reanalysing the problematic examples as subordination rather than coordination. If his examples are not coordinations then the ATB pattern is not to be expected and has not been violated and Ross's (1967) original formulation of the Coordinate Structure Constraint can be retained.

I criticised Huybregts and van Riemsdijk's and Williams' reanalysis of subordination as coordination in the previous section and similarly Goldsmith's reanalysis of coordination as subordination is not without problems. Lakoff (1986) discusses Goldsmith's data and the other kind of example of non-ATB extraction where it is the final conjunct that contains the gap. (31) contains some examples and the following are taken from Lakoff:

(66) a. What did Harry go to the store and buy _?
b. Sam is not the sort of guy you can just sit there and listen to _.

Lakoff discusses Goldsmith's reanalysis and he also discusses the possibility of reanalysing the *and* conjunct in (31) and (66) as a kind of purpose adjunct. In both cases, however, he

rejects reanalysis since he shows that syntactically these constructions must be coordinations. He demonstrates this with the examples in (67) which show first that multiple conjuncts are possible and second that a variable number of conjuncts can be extracted from.

(67) a. What did he go to the store, buy _, load _ in his car, drive home, and unload _?

b. How many courses can you take _ for credit, still remain sane, and get all A's in _.

Lakoff argues that examples such as these can only be coordinations since multiple gaps of this kind can only occur in coordinate structures. Furthermore, since the extraction is not from all conjuncts, Lakoff concludes that the Coordinate Structure Constraint is not a purely syntactic constraint. Lakoff proposes that any analysis of extractions from coordinations must be one where patterns of extraction are dependent on semantic properties of the conjuncts and of the relationship that holds between them. He characterises the examples in (66) and (67a) as involving a "Type A scenario" where a sequence of events fits normal conventionalised expectations. In these cases the final conjunct must contain a gap but the other conjuncts need not. Goldsmith's examples in (64) and the example in (67b) are ones involving a "Type B scenario" where the course of events is counter to conventionalised expectations. In these cases the final conjunct need not contain a gap. A third scenario type which also allows non-ATB extraction is "Type C" where there is a causative relation between the conjuncts, as illustrated in (68).

(68) a. That's the stuff that the guys in the Caucasus drink _ and live to be a hundred.

b. That's the kind of firecracker that I set off _ and scared the neighbours.

Details of the semantic side of Lakoff's analysis need not concern us here, but it is instructive to consider his paper since his basic points do seem to be correct. In particular, I agree with Lakoff that the structures in his and Goldsmith's examples are truly coordinate not subordinate and I agree that it follows that patterns of extraction should be made to be dependent on semantic factors. In the next section I propose a revised version of Pollard and Sag's treatment of coordination which permits non-ATB patterns of extraction in non-symmetric coordinate structures. The possibility of ATB extraction is described as pertaining not just to coordinate structures but also to the wider class of conjunctive structures. In this way I am able to use the same mechanism to describe extraction in both coordinate structures and the subordinate structures in which c-type parasitic gaps occur. Moreover the mechanism

can be made sensitive to semantic properties of the construction and non-ATB extraction may occur depending on certain semantic conditions.

### 7.2.4 ATB Extraction in HPSG

Pollard and Sag (1994) do not treat coordination in any great detail but the general shape of their analysis has its roots in the GPSG account of coordination, as described in Gazdar et al. (1985) and Sag et al. (1985). One of the strengths of the GPSG analysis was its account of the Coordinate Structure Constraint which forbids extractions out of coordinate structures, whether of an entire conjunct or a subpart of one:

(69) a. *Who did you meet [ Kim and _ ] ?
b. *Who did you meet [ a friend of _ and Kim ] ?

The Coordinate Structure Constraint can be violated but usually only if extraction happens in an ATB fashion:

(70) Who did you meet [[ both friends of _ ] [ and enemies of _ ]] ?

GPSG was able to ensure the ATB pattern of extraction because coordinate structures were multiply-headed (i.e. each conjunct was marked as a head) and because SLASH was both a FOOT feature and a HEAD feature. From the Foot Feature Principle it followed that any SLASH value on a daughter was also on the mother and from the Head Feature Convention it followed that any SLASH value on the mother was also on all the conjuncts. For GPSG, parasitic gaps arose in much the same way except that the structures in which they occurred had a single head and while the mother could share a SLASH value with more than one daughter, it was only required to share it with the head. As a result the following patterns were predicted (where H indicates the head):

(71) a. What did you [ H[ file _ ] H[ and read _ ]] ?
b. *What did you [ H[ file _ ] H[ and read it ]] ?
c. *What did you [ H[ file it ] H[ and read _ ]] ?

(72) a. What did you [ H[ file _ ] [ without reading _ ]] ?
b. What did you [ H[ file _ ] [ without reading it ]] ?
c. *What did you [ H[ file it ] [ without reading _ ]] ?

In Pollard and Sag (1994), SLASH is not a head feature and coordinate structures are assumed to be unheaded, so the GPSG account is not easily incorporated. Instead, the account of how parasitic gaps arise is separated out from the account of how ATB coordinate gaps arise: the Nonlocal Feature Principle is responsible for parasitic gaps but the Coordination Principle is responsible for ATB coordinate gaps. I reproduce the Nonlocal Feature Principle in (73).

(73) NONLOCAL FEATURE PRINCIPLE

In a headed phrase, for each nonlocal feature F = SLASH, QUE, or REL, the value of SYNSEM|NONLOCAL|INHERITED|F is the set difference of the union of the values on all the daughters and the value of SYNSEM|NONLOCAL|TO-BIND|F on the HEAD-DAUGHTER.

This definition permits an element in a mother's SLASH set to propagate to more than one daughter and, when the SLASH path splits in this way, we get parasitic gaps.

Pollard and Sag do not attempt to describe coordinate structures in any detail. In their Chapter 9 they provide a classification of headed structures but no description of the class of unheaded structures. It is not possible for me to articulate a precise theory of coordination in this thesis but I will assume that the structures that GPSG assigns to coordinations are essentially correct, modulo their assumption that conjuncts are heads. In particular, I follow the GPSG treatment of conjunctions whereby they form constituents with the conjuncts to their right. Since coordinate structures are unheaded, the Nonlocal Feature Principle does not apply and a Coordination Principle is required to permit split SLASH paths in coordinate structures. Pollard and Sag define the Coordination Principle as follows:[9]

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[9] Pollard and Sag also consider and reject a stronger version of the principle as follows:

COORDINATION PRINCIPLE (strong version)
In a coordinate structure, the CATEGORY and NONLOCAL value of each conjunct daughter is identical to that of the mother.

Both the weak and the strong version ensure an ATB pattern of extraction but the strong version is overly restrictive—in forcing identity between the mother and the conjuncts it fails to capture an insight which was a significant part of the GPSG approach, namely that the conjuncts have to share with their mother only as much information as the context imposes on the mother. Some contexts place relatively few constraints on particular categories and in these contexts the mother is underspecified and the conjuncts may differ quite radically. For example, (i) shows a coordination of an NP and an AP which is well-formed because *be* can take predicative complements of any syntactic category.

(i) Francis is a doctor but not happy in his choice of career.

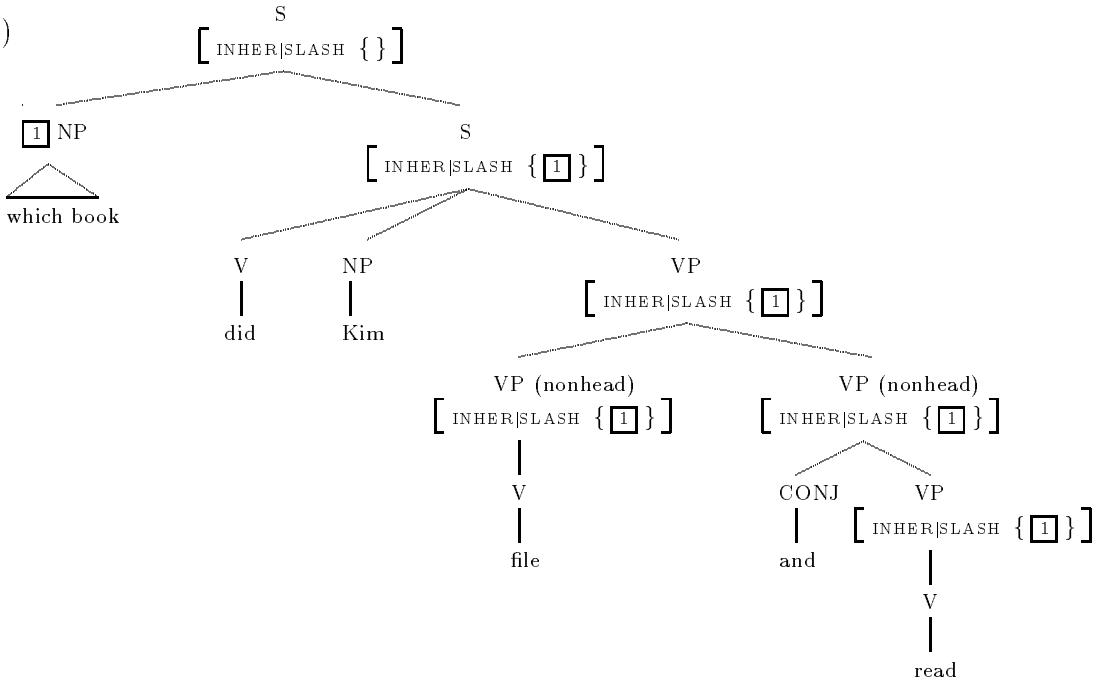
In examples like these the mother node is a partially specified category and, as Pollard and Sag note, this raises questions of a foundational nature for HPSG: elsewhere in the theory linguistic objects are taken to be completely specified objects in the sense that every feature appropriate for a particular entity is specified but with the weak version of the Coordination Principle, the mother node of a coordination is a partially specified entity. This raises the question of whether linguistic entities can be inherently partial. Pollard and Sag leave this as an unresolved issue and I follow their lead.

(74) COORDINATION PRINCIPLE (weak version)

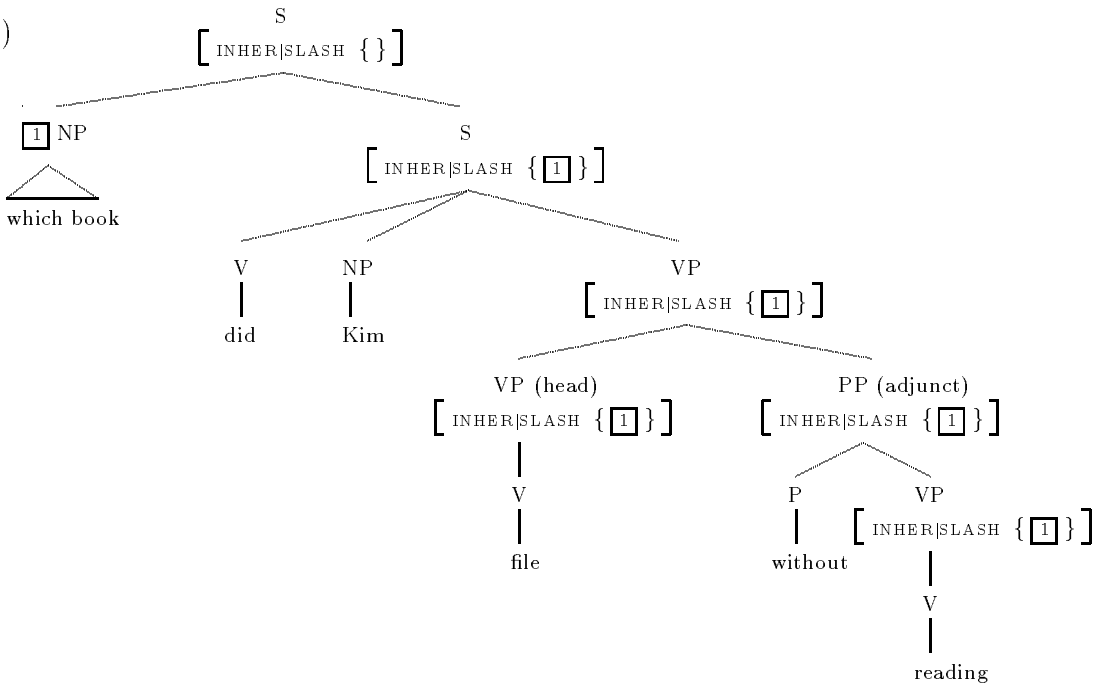
In a coordinate structure, the CATEGORY and NONLOCAL value of each conjunct daughter is subsumed by (is an extension of) that of the mother.

The Coordination Principle ensures that only an ATB pattern of extraction is possible in coordinate structures. The HPSG treatment of the differences between c-type parasitic gaps and ATB extractions from coordinate structures can be seen in the following two trees.[10]

(75)




(76)




[10]For simplicity, I have omitted the TO-BIND|SLASH values.

Both trees contain a larger VP: in (75) this is a coordinate VP and in (76) it is a head-adjunct structure. I will refer to this second kind of larger VP as a c-type VP in what follows. In both of the trees the SLASH path splits at the top node of the larger VP and propagates to both daughters. In (75) this split is licensed by the Coordination Principle and in (76) it is licensed by the Nonlocal Feature Principle.

In my analysis of parasitic gaps I have argued that a-type parasitic gaps are anaphors, not gaps, and I have argued that c-type parasitic gaps arise from the same mechanism that underlies extractions from coordinations. In this view of the world, ATB patterns of extraction arising from split SLASH paths are only permitted in coordinate structures and in c-type VPs. In order to formalise my analysis, I must revise Pollard and Sag's account.[11] The first step in this revision is to ensure that split SLASH paths cannot ordinarily occur. The second step is to widen the usual assumptions about the structures in which split SLASH paths can occur—I will define a class of conjunctive structures which includes coordinate and subordinate structures. The third step is to replace Pollard and Sag's Coordination Principle with a Conjunction Principle which will not only permit ATB extractions in conjunctive structures but will also allow non-ATB extractions under certain semantically determined conditions.

To achieve the first step of preventing split SLASH paths from arising in non-coordinate structures, I modify the Nonlocal Feature Principle as follows:

(77) NONLOCAL FEATURE PRINCIPLE (revised)

In a non-conjunctive headed phrase, for each nonlocal feature F = SLASH, QUE or REL, the value of SYNSEM|NONLOCAL|INHERITED|F is the set difference of the disjoint union of the values on all the daughters and the value of SYNSEM|NONLOCAL|TO-BIND|F on the HEAD-DAUGHTER.

The major difference between this and Pollard and Sag's version is the use of disjoint union ($\uplus$) instead of set union ($\cup$).[12] Disjoint union is just like set union except that its arguments must be disjoint sets.[13] The following table illustrates the behaviour of the two operations.

(78)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $\{\}$ | $\cup$ | $\{\}$ | = | $\{\}$ | | $\{\}$ | $\uplus$ | $\{\}$ | = | $\{\}$ |
| $\{\boxed{1}\}$ | $\cup$ | $\{\}$ | = | $\{\boxed{1}\}$ | | $\{\boxed{1}\}$ | $\uplus$ | $\{\}$ | = | $\{\boxed{1}\}$ |
| $\{\boxed{1}\}$ | $\cup$ | $\{\boxed{1}\}$ | = | $\{\boxed{1}\}$ | | $\{\boxed{1}\}$ | $\uplus$ | $\{\boxed{1}\}$ | = | *inconsistent* |
| $\{\boxed{1}\}$ | $\cup$ | $\{\boxed{2}\}$ | = | $\{\boxed{1},\boxed{2}\}$ | | $\{\boxed{1}\}$ | $\uplus$ | $\{\boxed{2}\}$ | = | $\{\boxed{1},\boxed{2}\}$ |
| $\{\boxed{1},\boxed{2}\}$ | $\cup$ | $\{\}$ | = | $\{\boxed{1},\boxed{2}\}$ | | $\{\boxed{1},\boxed{2}\}$ | $\uplus$ | $\{\}$ | = | $\{\boxed{1},\boxed{2}\}$ |

[11] I am grateful to Suresh Manandhar for his help in formalising the revisions.

[12] The other difference is the non-conjunctive requirement. The reason for this will become apparent shortly.

[13] See Manandhar (1994) for a definition of disjoint union and for discussion of its uses.

From this it can be seen that the results of disjoint union are the same as the results of set union except for the case of split SLASH paths, which are disallowed—an element in a mother's SLASH set cannot be shared with more than one daughter.[14]

The revision to the Nonlocal Feature Principle has the effect that no parasitic gap can be generated using the SLASH mechanism. For a-type parasitic gaps this is a desirable result since otherwise they would be ambiguous between my analysis where the a-type parasitic gap is an anaphor and Pollard and Sag's analysis where they result from SLASH propagation. The result is also appropriate for c-type parasitic gaps since these will arise by virtue of the fact that c-type VPs are conjunctive.

In order to bring c-type parasitic gaps into the same domain as coordination, c-type VPs as in (79) must have some property in common with coordinate VPs. One way to bring them together is to follow the Huybregts and van Riemsdijk and Williams route and to reanalyse the subordinating conjunction (*before, by, without*) as a coordinating conjunction and to treat the head and the adjunct VPs as conjuncts.

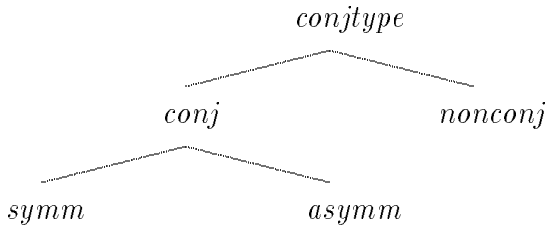
(79) a. What did you read _ before filing _?
b. Who did Kim insult _ by ignoring _?
c. Which letter did Lee burn _ without reading _?

This would mean that c-type VPs would have to be generated, not by means of the head-adjunct schema, but by the same means as true coordinate structures are generated. At the same time, a means would have to be found to permit the second 'conjunct' to differ from both the mother and the first 'conjunct' in terms of VFORM values. Although it would be possible to develop such an analysis, there is no need to make such a radical move. Instead, I propose that the VPs in (79) should continue to be classified as head-adjunct structures but that the notion of 'conjunction' which underlies both subordinate and coordinate structures should be exploited so as to permit c-type VPs to exhibit some of the behaviour that is found with true coordinate structures. Specifically, I propose that all phrasal categories should be marked with a feature, which I call CONJTYPE, which indicates whether they are conjunctive or not. The value of CONJTYPE is of type *conjtype* and it has subtypes as indicated in the following part of the type-hierarchy.

[14]Notice that the new definition does not preclude the possibility that more than one dependency may pass through a single node, as the final two lines in the table indicate. This means that examples such as (i) can still be generated:

(i) Someone that rude$_i$, I'm not sure who$_j$ to ask _$_j$ to deal with _$_i$.

(80)




All headed structures apart from head-adjunct structures are marked as [CONJTYPE *nonconj*] while true coordinate structures are marked as [CONJTYPE *conj*]. The marking of head-adjunct structures is determined by the adjunct: adjuncts not headed by a subordinating conjunction are [CONJTYPE *nonconj*] but ones headed by subordinating conjunctions such as *before*, *while*, *without* etc. are [CONJTYPE *conj*]. The types *symm* and *asymm* are subtypes of *conj* and add further refinements. The idea behind them is to express the notion of semantic symmetry. Subordinate structures are inherently asymmetric and so all [CONJTYPE *conj*] subordinate structures will be [CONJTYPE *asymm*]. Coordinate structures may be or may not be semantically symmetric and the claim behind the classification is that non-ATB patterns of extraction are only possible in asymmetric coordinations. Classification is largely a semantic matter although the presence of certain syntactic elements may provide additional clues. As illustrated in (81) and (82), the coordinating conjunction pair *both ... and* may only occur in a symmetric coordination while the use of *and then* indicates narrative progression which is asymmetric.

(81) a. Fred both cooked the supper and did the washing up.
b. *What did Fred both cook _ and do the washing up?
c. *What did Fred both cook the supper and do _?

(82) a. Fred cooked the supper and then did the washing up.
b. ?What did Fred cook _ and then do the washing up?
c. What did Fred cook the supper and then do _?

Once structures are marked with appropriate values for CONJTYPE, Pollard and Sag's Coordination Principle can be replaced by a more general Conjunction Principle which controls the distribution of gaps both in true coordinate constructions and in c-type parasitic gap constructions. The Conjunction Principle consists of three clauses which are triggered by different parts of the type hierarchy in (80). The entire definition is shown in (83).[15]

[15]Pollard and Sag's Coordination Principle deals not only with SLASH propagation in coordinations but also with the sharing of other features. The Conjunction Principle replaces the Coordination

(83) CONJUNCTION PRINCIPLE

(i) In a conjunctive structure, the SYNSEM|NONLOCAL|INHERITED value on the mother is the union of the SYNSEM|NONLOCAL|INHERITED values on the daughters.

(ii) In a symmetric structure, the SYNSEM|NONLOCAL|INHERITED value on each daughter is token identical to the SYNSEM|NONLOCAL|INHERITED value on the mother.

(iii) In an asymmetric structure, the SYNSEM|NONLOCAL|INHERITED value of the background daughter is the empty set.

Clause (i) sets up the basic pattern for SLASH propagation in conjunctive structures. It uses the set union operation which permits split SLASH paths and which I rejected for the Nonlocal Feature Principle. On its own, clause (i) would permit any pattern of extraction in conjunctive structures. However, clause (ii) requires an ATB pattern of extraction in cases where the structure is symmetric. Clause (iii) deals with asymmetric structures which may be either coordinations or subordinations. This clause requires any "background" daughters not to contain a gap. The Conjunction Principle correctly describes the distribution of gaps both in coordinations and c-type VPs but it does depend on the classification of structures as either symmetric or asymmetric and on the classification of certain daughters in asymmetric conjunctive structures as background daughters. These classifications are semantic in nature and I am not able to provide a precise characterisation of them. The question of symmetry in coordinations is one which has received some attention and it is fairly uncontroversial to assert that a non-ATB pattern of extraction may only occur in an asymmetric coordination. It is more difficult to describe which subparts of a conjunctive structure may be exempt from containing a gap and I use the term "background" as a label for these subparts although I have no formal definition of this term. However, the examples in (84)–(87) provide some illustration.

(84) a. I can drink ten pints and still stay sober.
b. How much can you drink _ and still stay sober?
c. *How sober can you drink ten pints and still stay _?

(85) a. I can drink ten pints without getting drunk.
b. How much can you drink _ without getting drunk?
c. *How drunk can you drink ten pints without getting _?

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Principle only with respect to nonlocal features and a revised version of the Coordination Principle would need to be retained to deal with other features:

COORDINATION PRINCIPLE (REVISED)

In an coordinate structure, the SYNSEM|LOCAL|CATEGORY value of each conjunct is subsumed by (is an extension of) that of the mother.

(86) a. Kim fell asleep and dreamt about goblins.
b. What did Kim fall asleep and dream about _?
c. *What did Kim do _ and dream about goblins?

(87) a. Kim woke up after dreaming about goblins
b. What did Kim wake up after dreaming about _?
c. What did Kim do _ after dreaming about goblins?

(84) shows a coordination where the semantic relationship between the conjuncts is what Goldsmith describes as a *despite* relationship (Lakoff's Type B scenario). The first conjunct may contain a gap but the second conjunct is the background constituent which may not contain a gap. As (85) demonstrates, the same type of relation may occur with a c-type VP structure and when it does, the adjunct is a background constituent and may not contain a gap. (86) shows one of Lakoff's Type A coordinations where the structure describes a natural course of events. In examples such as these, a single gap in the final conjunct is well-formed but a single gap in the initial one is not, therefore the initial conjunct must be marked as a background constituent. The c-type parasitic gap example in (87) contains the same kind of relationship but the data does not quite parallel (86): while an extraction from just the adjunct is acceptable, an extraction from just the head is also possible. From this it can be seen that while the structure is asymmetric, neither head nor adjunct is a background constituent. Asymmetric coordinations may also fail to contain a background constituent, as (88) demonstrates. It would seem that when a conjunctive structure encodes a temporal sequencing, as in (87) or (88), then neither element is a background constituent and a single extraction from either is possible.

(88) a. Fred checked into the hotel and then phoned his wife straight away.
b. Who did Fred check into the hotel and then phone _ straight away?
c. Which hotel did Fred check into _ and then phone his wife straight away?

It is beyond the scope of this thesis to investigate the precise semantic conditions which affect whether structures are symmetric or not and which determine whether subparts of them are background or not. In spite of this shortcoming, however, my analysis does accord with Lakoff's conclusion that patterns of extraction in coordinations must be sensitive to semantic distinctions. Moreover, I have been able to bring c-type parasitic gaps together with coordination and to show how the mechanism of split SLASH paths lies behind ATB extractions from both while still permitting exceptions to the ATB pattern for both.

I conclude this section with one or two final points before turning in the next section to a discussion of Postal's critique of Williams' coordination treatment of parasitic gaps.

It follows from my analysis that there might be head-adjunct structures which are non-conjunctive and which do not permit c-type parasitic gaps or extractions from the adjunct and this does indeed seem to be the case. For me, *although* adjuncts pattern in this way:

(89) a. Sandy was kind to Lee although she disliked her.
b. *Who was Sandy kind to _ although she disliked _?
c. *Who did Sandy go to lunch although she had to meet _?
d. Who was Sandy kind to _ although she disliked her?

The difference between examples with *although* and examples with *without, before* etc. can be modelled by letting the preposition determine whether the larger structure is [CONJTYPE *conj*] or [CONJTYPE *nonconj*]. Furthermore, if there are speakers for whom *although* adjuncts pattern like *without* adjuncts then this variation can be attributed to a minor lexical difference.

In Chapter 6, I divided parasitic gap examples into four groups and I classified those in Group 1 and Group 2 as c-type parasitic gaps. In this section I have only treated Group 1 examples and so I finish this section with a brief discussion of the Group 2 examples which I reproduce in (90) and (91):

(90) ?The blintzes which Sasha is gobbling _ down faster than I can reheat $\__p$ are extremely tasty, if I do say so. [E11]

(91) Here is the influential professor that John sent his book to _ in order to impress $\__p$. [E14]

The analysis of (91) would be the same as the other examples I have considered in the section. The *in-order-to* phrase is an adjunct in a head-adjunct structure and, assuming it is specified as [CONJTYPE *conj*], the following variants are predicted:

(92) a. Here is the influential professor that John wrote a book in order to impress $\__p$.
b. Here is the influential professor that John sent his book to _ in order to impress him.

A fully-specified analysis of the comparative in (90) would require that the theory of conjunction be extended to cover comparatives as well, and such a project is beyond the scope of this

thesis. However, I have already remarked on the similarities between comparatives and coordinations and a claim that the gaps in (90) are ATB gaps is probably less controversial than the same claim made for the *without*-type examples. I finish this section with some examples involving pseudo-gapping and VP-ellipsis which seem to me to provide more evidence that coordinate structures, *without*-type examples and comparatives are syntactically similar:[16]

(93) a. John ate the beans and Bill did the peas.
b. John ate the beans before Bill did the peas.
c. John ate more beans than Bill did peas.

(94) a. John ate the beans and then Bill did.
b. John ate the beans before Bill did.
c. John ate more beans than Bill did.

### 7.2.5 Postal's Account

I finish this chapter with a brief discussion of two recent papers by Postal (1993, 1994). In the first of these, Postal argues against ATB accounts of parasitic gaps, citing Williams (1990) as a specific instance of such accounts. Given my desire to treat c-type parasitic gaps as ATB gaps and given the similarities between my account and Williams', Postal's discussion is of relevance here. In the second paper, Postal examines the class of parasitic gaps to discover if they are a unified phenomenon and concludes that all parasitic gaps resulting from leftward extractions have defining properties in common and therefore belong to the class of true parasitic gaps. Examples of parasitic gaps resulting from rightward extractions on the other hand, differ in some respects and he classes these as pseudo-parasitic gaps. This reclassification of parasitic gaps results in two quite different classes from my two classes and so it is interesting to examine how we have reached such different conclusions.

Turning first to Postal's (1993) discussion of the Williams account, he criticises him on both a general level and a specific one. As I have already mentioned, his general criticism is that the attempt to treat all parasitic gaps as ATB gaps causes the most unlikely constructions to be labelled as coordinate. As I also mentioned above, I agree with this aspect of Postal's critique but the same accusation cannot be levelled at my analysis since I treat only c-type parasitic gaps as ATB gaps and since I do not reanalyse these structures as coordinate. Postal's more specific criticism is that certain properties possessed by parasitic gaps are not possessed by

[16] See Russell (1987) for a brief overview of the pseudo-gapping construction.

uncontroversial ATB gaps and since the two phenomena do not pattern alike he concludes that they are not alike.

The differences between coordinate ATB gaps and parasitic gaps that Postal documents all concern their categorial identity. In what follows I will reproduce some of his c-type parasitic gap examples but his a-type ones only when they are relevant, since the real issue here is my claim that c-type parasitic gaps are ATB gaps. The most obvious difference that Postal observes between coordinate ATB gaps and c-type parasitic gaps is that the former can be of any syntactic category but the latter may only be NPs. The following examples of Postal's illustrate:

(95) a. How sick did John look _ and say he actually felt _?
b. *How sick did John look _ without actually feeling $\__p$?

(96) a. This is a topic about which you should think _ and I should talk _.
b. *This is a topic about which you should think _ before talking $\__p$.

(97) a. Where did Elaine work _ and Gwen vacation $\__p$?
b. *Where did Elaine work _ without ever living $\__p$?

Postal also claims that c-type parasitic gaps cannot be nominative (i.e. they cannot be embedded subjects) but that uncontroversial ATB gaps can:

(98) a. It was that militant that we thought _ was carrying a gun but they believed _ was never armed.
b. *the militant who he arrested _ after learning $\__p$ was carrying a gun.

Although this claim seems to be true in many cases, and is true of a-type parasitic gaps, there are some c-type examples which do not seem to be too bad:

(99) a. ?Which Caesar did Brutus betray _ by implying $\__p$ was no good?
b. ?Which man did Bill shoot _ after claiming $\__p$ was a spy?

The remainder of Postal's data concerns rather subtle distinctions between NPs which are hard to describe or to label but which play a role in other constructions. For example, there are some NPs which cannot be promoted by passivisation and Postal shows that these NPs can also not be parasitic gaps although they can be coordinate ATB gaps. Similarly, predicate nominal positions and indefinite pronoun positions are unavailable to parasitic gaps but available to

ATB gaps. The following are some of his examples, marked with his judgements. The (a) examples are a-type parasitic gaps, the (b) examples are c-type parasitic gaps and the (c) examples are coordinate ATB gaps.

(100) a. *It was Graham that everyone who began to bother $\__p$ with their marital problems ended up offending _.
b. *It was Lucy who he insulted _ after bothering $\__p$ with his marital problems.
c. Who did Tony respect _ and (Arnold) constantly bother _ with his marital problems?

(101) a. *It was King Louis that every slave who belonged to $\__p$ later tried to seduce _.
b. *Which king did Arthur work for _ without ever belonging to $\__p$?
c. Which king did Arthur work for _ and Glen belong to _?

(102) a. *What people who want to be $\__p$ are often unable to become _ is doctors.
b. *What he became _ without wanting to become $\__p$ was a traitor.
c. What Ted was _ and Greg intended to become _ was a doctor.

(103) a. *the witness that your proposing to $\__p$ to perjure yourself failed to shock _.
b. *Who did Herbert yell at _ after proposing to $\__p$ to perjure himself?
c. Who did Herbert visit _ but only Sandra propose to _ to perjure herself?

(104) a. *It was such spiders that everyone who said there were $\__p$ in the soup refused to eat _.
b. *What kind of spiders did he praise _ before learning there were $\__p$ in the soup?
c. The kind of spiders that he found _ in the chicken soup yesterday and there will be _ in the bean soup today are hairy ones.

(105) a. *It was that book which everyone who was given $\__p$ by Ted refused to read _.
b. *It was that book which I had read _ before being given $\__p$ by Ted.
c. It was that book which Charlie was given _ by Ted but only Greg read _.

For Postal then, c-type parasitic gaps pattern with a-type parasitic gaps and not with coordinate ATB gaps. For some of his examples I agree with his judgements but there are others where I find the c-type parasitic gap either acceptable or nearly acceptable and significantly better than the a-type parasitic gap equivalent. For example I find the (b) examples in (100)–(102) at worst slightly questionable and I have found other speakers, both British and

American, who agree with my judgement rather than Postal's. I agree with Postal's judgements for the (a) and (b) examples in (103) but I also find the ATB gap in (103c) just as bad as the other two. For (104) and (105) I agree entirely with Postal's judgements. Postal presents a great many more examples which in his judgement exhibit the same pattern whereby a-type parasitic gaps and c-type parasitic gaps are both bad and uncontroversial ATB gaps are good. For some of these I agree with his judgements but for others I do not. From this I conclude that the distinctions that Postal points to are real but they are so subtle that judgements are not robust. Possible locations for c-type parasitic gaps really do appear to be more restricted than for true ATB gaps but I would question Postal's claim that c-type parasitic gaps pattern entirely with a-type parasitic gaps which for me are even more restricted.

Postal concludes his paper with a discussion of the implications of the differences he documents. He suggests that there are two possible reactions to his evidence: either one could reject the ATB hypothesis (his choice) or one could maintain the claim that parasitic gaps are ATB gaps while also claiming that they are subject to special restrictions. He argues that the second position is not tenable because the subset of ATB gaps for which the restrictions hold are precisely those ATB gaps whose analysis as ATB gaps relies on a notion of coordination which is difficult to defend. While this argument may be persuasive against Williams' attempt to treat all parasitic gaps as ATB gaps, I hope to have demonstrated that my conjunction account of c-type parasitic gaps is easy to specify and justified in many ways.

Turning now to Postal (1994), in this paper Postal deals with some data which is, in fact, counter-evidence to his claim in the previous paper that parasitic gaps are always NPs. In the (1994) paper he investigates two separate but interdependent claims about parasitic gaps, namely that parasitic gaps are always NPs and that the real gaps which license parasitic gaps are always NPs. There are certain exceptions to these claims, for example, topicalisations and MOCs involving c-type environments can leave sentential gaps. The following are Postal's examples.

(106) a. That the ruble is worthless he asserted _ without verifying $\__p$.
b. That the ruble is worthless is easy to assert _ without verifying $\__p$.

Postal argues that these are not really counter-examples to the two claims, because there is an analysis of these constructions where an invisible resumptive pronoun is left behind when the sentential complement moves and where this resumptive pronoun is also extracted. Part of the evidence for this claim comes from examples with verbs which subcategorise either for

a sentential complement or for a PP, such as the verbs in (107).[17] With both topicalisation and MOC formation, the displaced sentential complement can only occur when there is also a stranded preposition as in the (a) examples in (108) and (109). When the stranded preposition is missing as in the (b) examples, the result is ill-formed. Postal takes this evidence to indicate that the licensing gap can only occur in NP position and that the parasitic gap is also an NP.

(107) a. He convinced Bill that the ruble is worthless.
b. He convinced Bill of the fact that the ruble is worthless.

(108) a. That the ruble is worthless he convinced Bill of _.
b. *That the ruble is worthless he convinced Bill _.

(109) a. That the ruble is worthless is easy to convince Bill of _.
b. *That the ruble is worthless is easy to convince Bill _.

The other exceptions to the two claims about parasitic gaps all involve rightward extractions rather than leftward ones. Postal cites the following example from Authier (1989):

(110) We suggest _ to our employees without actually requiring $\__p$ of them that they wear a tie.

With the rightward extraction cases Postal cannot use the same explanation as he used for the leftward extraction cases because there is no evidence at all for an invisible resumptive pronoun. For example, rightward versions of examples like (107) cannot leave a stranded preposition:

(111) a. He had convinced Bill _ by the end of the discussion that the ruble is worthless.
b. *He had convinced Bill of _ by the end of the discussion that the ruble is worthless.

Furthermore, there are verbs which subcategorise for a sentential complement which do not have an alternative subcategorisation for an NP:

(112) a. Albert boasted/commented/complained that his results were fantastic.
b. *Albert boasted/commented/complained something/it.

[17] Other evidence involves NP positions in which definite pronouns cannot occur. These are not possible gap sites for topicalisations and MOCs and Postal takes this as evidence that these constructions leave behind a invisible definite pronoun:

(i) *They named their son it.

(ii) *Ethelbert, I wouldn't name anybody _.

(iii) *Ethelbert was impossible for them to name their son _.

If the invisible resumptive pronoun explanation was available for rightward extractions then it should be impossible to extract to the right the sentential complements in (112a) but it is not:[18]

(113) a. Albert boasted at the office _ after boasting at home $\__p$ that his results were fantastic.

b. Albert commented to the doctor _ without commenting to the nurse $\__p$ that his ears were swollen.

Postal examines a great deal of evidence and shows that rightward extractions really do seem to be counterexamples to the two claims about the NP status of parasitic gaps and the gaps that license them. From this he concludes that parasitic gaps arising from rightward extractions are not true parasitic gaps at all but instead they are instances of ATB extractions. Thus he finds himself denying Williams' claim that all parasitic gaps are ATB gaps but agreeing with him that some are. Similarly, Postal would disagree with my claim that all c-type parasitic gaps are ATB gaps but he would agree that the rightward extraction subset of them are. The major problem with Postal's analysis is that once he admits the possibility that some rightward examples are ATB gaps it is hard to imagine why he would want to deny that equivalent leftward ones are too. Postal has to put certain machinery in place so that some apparently non-coordinate VPs can be viewed as coordinate in order that some ATB extractions can take place. Once the machinery is there then it it will perhaps be hard to impose the restriction that these VPs are only coordinate for the purposes of rightward extraction. Furthermore, an analysis like mine which treats only c-type parasitic gaps as ATB gaps does not challenge Postal's invisible resumptive pronoun analysis of topicalisation and MOC formation which ought to hold whether there is one gap or two. It seems that Postal's reason for not adopting the ATB analysis for a larger subset of parasitic gaps is simply the desire to view parasitic gaps as a unified phenomenon.

The major issues that Postal's two papers raise for my analysis are firstly the question of why it is that rightward c-type parasitic gaps should be less restricted than leftward ones

[18] Postal does not deal with this kind of example in his discussion of topicalisation and MOCs but it seems to me that his theory would predict leftward versions of examples like those in (113) to be ill-formed since there is no possibility that the real gap can be an NP. However, I find the leftward versions not too bad:

(i) That his results were fantastic Albert boasted at the office _ after boasting at home $\__p$.

(ii) That his ears were swollen Albert commented to the doctor _ without commenting to the nurse $\__p$.

and secondly why all ATB extractions from c-type VPs should be more restricted than ATB extractions from true coordinate constructions. It would be a fairly simple matter to impose the general restrictions by putting a condition on head-adjunct structures to prevent the presence of anything other than the most simple kind of NP in the SLASH set of the adjunct. However, the fact that the restrictions are less strong for rightward ATB extractions indicates that the restrictions are not really grammaticised and that there is an explanation of them following from processing considerations. I would suggest that the asymmetry between the leftward and rightward cases follows from proximity effects: elements extracted to the left are more distanced from the gap in the c-type adjunct than elements extracted to the right and the precise nature of the connection is at risk of being forgotten. A restriction that such gaps may only be simple NPs minimises the risk that the connection between the extracted element and the gap might deteriorate irretrievably. As for the question of why ATB extractions from c-type VPs are in general more restricted than those from true coordinate VPs, this might follow from the fact that true coordinate structures are usually symmetric while c-type VPs are always asymmetric.

(114) a. I went to the post-office and gave my application to the clerk.
b. Who did you go to the post-office and give your application to _?
c. *To whom did you go to the post-office and give your application _?

Examples such as (114c) seem to demonstrate that non-NP extractions from asymmetric coordinations are not well-formed and, if this is so, then the restriction is one which applies not just to c-type VPs but to all asymmetric conjunctive structures.

# Chapter 8

# Missing Object Constructions and Parasitic Gaps

In Chapters 4 and 5 I developed a theory of MOCs whereby the object gaps do not arise in the same way as the gaps in UDCs such as topicalisation or *wh*-question formation. Instead, I treat an MOC gap as a missing argument which needs to be controlled using the same mechanism that is used to control the missing subject of Equi and Raising complements. The problem presented by parasitic gaps is that it has been widely assumed that the real gaps that license parasitic gaps must be UDC gaps. Since parasitic gaps can co-occur with MOC gaps as in (2) and (3) this assumption, if correct, would entail that MOCs are UDCs and would falsify my theory that they are not.

(1) The general will be hard to defeat $\__{mo}$.

(2) The general will be hard for opponents of $\__{p}$ to defeat $\__{mo}$.

(3) The general will be hard to defeat $\__{mo}$ without directly attacking $\__{p}$.

In this chapter I bring together my analyses of MOCs and parasitic gaps and show that the two are compatible.

## 8.1 A-type Parasitic Gaps

(2) is an example of an a-type parasitic gap occurring in an MOC.[1] On standard assumptions about parasitic gaps such examples are troublesome for my theory of MOCs because the

[1] Judgements tend to vary even for straightforward cases of a-type parasitic gaps and I have found that several speakers reject examples with MOCs such as (2). I will discuss this variation in more detail in Section 8.1.2.

antecedent of the parasitic gap is a missing object but according to my account, this isn't a gap but a promoted object. If antecedents to a-type parasitic gaps have to be UDC gaps then the missing object in (2) should be unable to act as an antecedent for the parasitic gap. In the previous chapter I developed an analysis of a-type parasitic gaps which treated them as anaphors and which did not entail that their antecedents must be UDC gaps. I did explain that antecedents to a-type parasitic gaps must be elements which are phonologically null in their canonical position and with appropriate formalisation this definition would include missing object gaps as well as true UDC gaps.

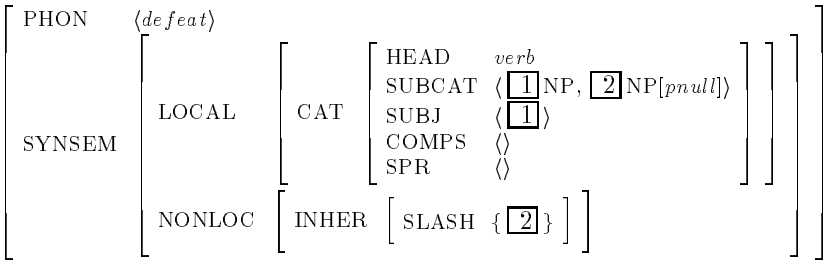
In Section 7.1.3 I investigated the means by which it could be ensured that a-type parasitic gaps occur only with phonologically null antecedents. I suggested two possible strategies for this. The first was to introduce a feature to indicate when an element was phonologically unrealised in its canonical position. The second was to relate the choice of antecedent to the resumptive function of the a-type parasitic gap. I did not formulate either of these strategies in any detail but insofar as I did articulate them, it is possible to consider whether they might extend easily to examples like (2).

### 8.1.1 The Feature PNULL

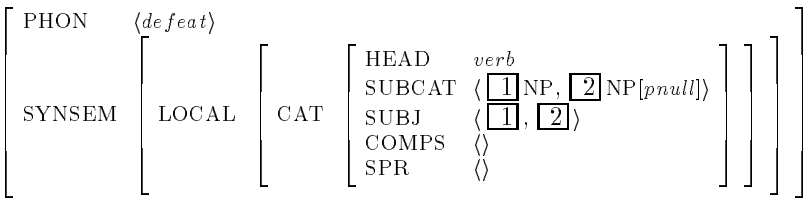
Turning first to the introduction of a new feature, I did not name this feature nor did I provide precise details about how to ensure its correct distribution and about how to ensure that only NPs with this feature could be selected as antecedents to a-type parasitic gaps. Here, for convenience I will give the feature a name, PNULL, but I will still avoid precise details since this is not critical to the discussion. The fact that the binding theory has the SUBCAT list as its domain serves to bring the UDC and the MOC cases closer together since neither the Extraction Lexical Rules nor the Missing Object Lexical Rules have any impact on the SUBCAT list. In order to identify possible a-type parasitic gap antecedents all that is required is to cause the Extraction Lexical Rules and the Missing Object Lexical Rules to mark the displaced NP as [PNULL *plus* ] and because of structure-sharing this marking will be apparent in the SUBCAT list as well. For the unbounded dependency case, an NP would be marked as [PNULL *plus* ] when it moves from SUBJ or COMPS to INHER|SLASH and for the MOC case an NP would become [PNULL *plus* ] when it moves from COMPS to SUBJ. In this way the missing object can be made available as an antecedent to an a-type parasitic gap even though the mechanism which gives rise to the missing object is quite different from the SLASH mechanism employed in true unbounded dependencies. The sign that would be output from

an application of the Complement Extraction Lexical Rule to the sign for the verb *defeat* would be (4) (where *pnull* abbreviates [PNULL *plus* ]). The output of the MOLR for the same verb would be as shown in (5).

(4)




(5)




If the Extraction Lexical Rules and the Missing Object Lexical Rules mark an element on the SUBCAT list as [PNULL *plus* ], an obvious question to ask is whether this is a general phenomenon which occurs with lexical rules that perform a similar rearrangement of elements. The lexical rule that comes to mind here is the passive one. In Section 5.2 I discussed the similarities and differences between MOCs and passive and showed that both involve the promotion of an object out of the VP. However, in the case of the MOC lexical rule there is no reordering of elements on the SUBCAT list while with the passive lexical rule we have to assume that the SUBCAT list is reordered since otherwise we would be unable to explain how the passive subject can o-command and bind the reflexive in (6).

(6) Kim$_i$ was betrayed by himself$_i$

Since the movement of an object occurs in the SUBCAT list as well as between SUBJ and COMPS, there seems to be no need to mark the promoted object as [PNULL *plus* ] and indeed, the fact that a-type parasitic gaps do not occur with passive would seem to confirm this view. It is hard to construct examples to demonstrate that an a-type parasitic gap cannot occur with a passive because the kind of mutually non-o-commanding configurations that are required do not easily arise since the passive subject o-commands everything in the passive VP. However, the following example seems to provide the required demonstration:

(7) *I told opponents of $\__p$ that the general was defeated $\_$.

Here the parasitic gap occurs in a position which does not o-command the passive subject or the position from which it was promoted and the parasitic gap is not itself o-commanded by anything in the passive clause. If an a-type parasitic gap were possible with passive then this example would provide a favourable configuration but the result is ill-formed. Therefore, the PNULL approach to identifying the antecedent of an a-type parasitic gap must ensure that the passive lexical rule does not mark the promoted object as [PNULL *plus* ].

### 8.1.2 The Resumptive Pronoun Approach

In Section 7.1.3 I suggested that an alternative to the feature marking approach to constraining antecedents to a-type parasitic gaps was to pursue Engdahl's observations about the resumptive behaviour of parasitic gaps. With simple cases of a-type parasitic gaps such as (8a) the parasitic gap seems to be playing a resumptive role to rescue a sentence which would otherwise be a weak cross-over violation, as shown in (8b).

(8) a. Which general did opponents of $\__p$ try to defeat _?
b. *Which general$_i$ did opponents of him$_i$ try to defeat _?

If we try to produce a similar explanation of examples involving MOCs the results are much the same:

(9) a. The general is hard for opponents of $\__p$ to defeat $\__{mo}$.
b. *The general$_i$ is hard for opponents of him$_i$ to defeat $\__{mo}$.

However, the results of a small survey of five English speakers indicates that the two cases are not exactly parallel. A first difference is that while some speakers reject both (8a) and (9a) there are some speakers who accept (8a) but reject (9a). This seems to suggest either that the resumptive explanation is not really appropriate or that the non-parasitic version of (9a) is less in need of rescuing than the non-parasitic version of (8a). (8b) and (9b) seem to be equally bad but there is a difference between the two cases when possessive pronouns are used instead of non-possessives:

(10) a. ?*Which general$_i$ did opponents of his$_i$ try to defeat _?
b. ?*Which general$_i$ did his$_i$ opponents try to defeat _?

(11) a. ??The general$_i$ is hard for opponents of his$_i$ to defeat $\__{mo}$.
b. ?The general$_i$ is hard for his$_i$ opponents to defeat $\__{mo}$.

As shown in (10), for the non-MOC cases the weak cross-over effect is slightly less pronounced when either a possessive determiner or a possessive pronoun is used but for MOC cases, as in (11), the effect begins to disappear and (11b) in particular is acceptable to some speakers. Interestingly, in my small sample of speakers, the ones who rejected (9a) tended to find (11a&b) acceptable and, conversely, the ones who accepted (9a) were less certain about (11a&b). Although it is not wise to base any conclusions on such a small and informal survey, it does seem that this supports the resumptive theory. However, as I pointed out in Section 7.1.3 it is not clear how to formalise the resumptive theory so as to guarantee that a-type parasitic gaps occur only in a rescue capacity.

### 8.1.3 Interactions with Raising and Equi

Missing object constructions differ from unbounded dependencies in that the missing object structure-shares with the subject of the MO predicate: in (1)–(3), *the general*, which is the subject of *hard*, must also be interpreted as the missing object of the verb *defeat*. In Section 5.3.1 I discussed the question of whether the control relationship in MOCs was Raising or Equi and it happens that the analysis of a-type parasitic gaps such as the one in (2) impinges on the Raising versus Equi debate. If the control relationship in (2) was an Equi one then the subject of *hard* would be coindexed to the missing object and the parasitic gap would find itself coindexed to that subject as well as to the missing object. Since the subject o-commands all the other positions this would violate the condition that an a-type parasitic gap may not be bound to an o-commander. So if the relationship was Equi, (2) would be predicted to be ill-formed.[2] However, in Sections 5.3.1 and 5.3.2 I argued that the control relationship for MO predicates like *hard* is a Raising relationship not an Equi one and this means that *hard*'s subject does not appear on its SUBCAT list and this in turn means that the a-type parasitic gap in (2) is coindexed only to the missing object and not to anything else. Therefore the example is predicted to be well-formed.

Interestingly there is one set of data which on the surface of it seems rather idiosyncratic but which follows from my analysis. These data are shown in (12).

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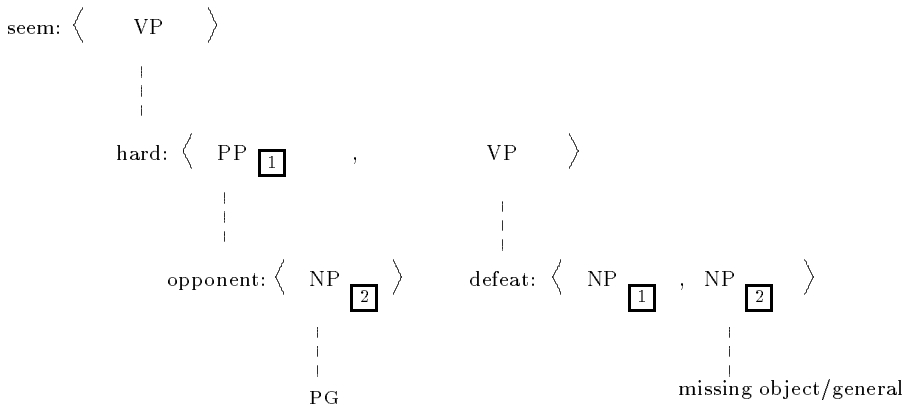
[2] As I noted in Section 5.3.1, there are some MO adjectives, for examples *pretty*, which are best analysed as involving an Equi relation. However, it turns out that it is impossible to test whether a-type parasitic gaps can occur with these: they do not subcategorise a *for*-phrase and it is impossible to insert additional material between the subject and the missing object because they are strictly bounded.

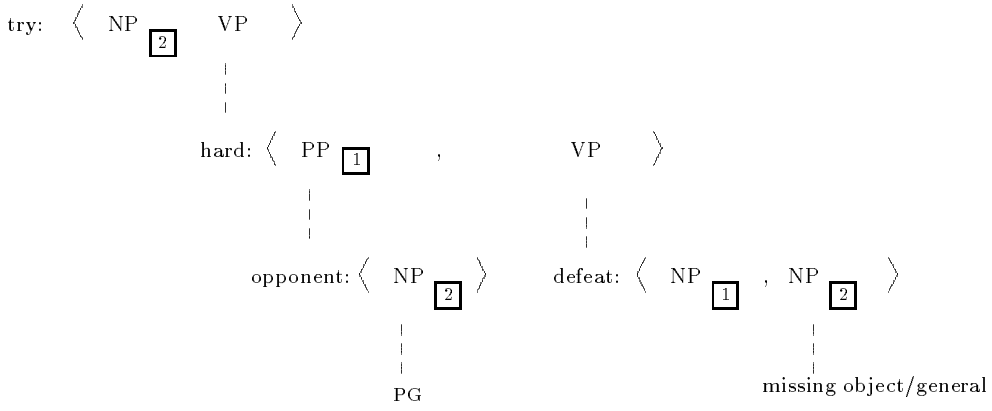
(12) a. The general seems to be hard for opponents of $\__p$ to defeat $\__{mo}$.
b. *The general tries to be hard for opponents of $\__p$ to defeat $\__{mo}$.
c. The general tries to be hard (for his opponents) to defeat $\__{mo}$.

The examples in (12) show that it is not possible to have an a-type parasitic gap in the *for*-PP if an Equi verb intervenes between the subject and the *tough* adjective even though it is possible to place a Raising verb in this position. As (12c) demonstrates there is nothing wrong with a close equivalent of (12b) which does not involve a parasitic gap.[3] This pattern of grammaticality follows from the fact that the Equi verb causes the subject of *hard* to appear on a higher SUBCAT list and to o-command the a-type parasitic gap. This can be seen when we consider the content of the SUBCAT lists involved:

(13) a.




b.




(13a) shows that in the Raising case, although the parasitic gap and the missing object are coindexed, neither one o-commands the other, therefore the sentence is well-formed. (13b),

[3] In Section 5.3.2, I showed that examples such as (12c) did not violate the role assignment constraint on Equi controllees because of the revised signs I gave for *tough* adjectives. These revised signs treat the *tough* control relationship as Raising as far as the SUBCAT list is concerned but allow the controller to be role-assigned with respect to the *enablement* predicate in the semantic part of the sign. Since the role assignment constraint on Equi controllees is not violated by (12c) this constraint cannot be used to explain the ill-formedness of (12b).

on the other hand, shows that the Equi verb *try* requires that its subject be coindexed with the subject of its VP complement. This causes the parasitic gap to be coindexed not just with the missing object but also with the NP on the SUBCAT list of *try* and, since this NP o-commands the parasitic gap, the example violates the binding theory and is ill-formed.

### 8.1.4 Certain Heroes

Pollard and Sag (1994) discuss some examples which they term the 'certain heroes' examples:[4]

(14) a. There are [ certain heroes ]$_i$ that Kim finds [ long stories about $\__i$ ]$_j$ very easy to listen to $\__j$.

b. There are [ certain heroes ]$_i$ that Kim finds [ long stories about $\__i$ ]$_j$ too boring to listen to $\__j$.

Pollard and Sag discuss these examples as if they are parasitic gaps even though the two gaps have different antecedents. To see the issue behind these examples, contrast them with a-type parasitic gaps in object raising controllers:

(15) a. *Here's the jerk that I expected my pictures of _ to bother you.

b. Here's the jerk that I expected my pictures of you to bother _.

c. Here's the jerk that I expected my pictures of $\__p$ to bother _.

Pollard and Sag predict the grammaticality pattern in (15) because of their Subject Condition. The object of *expect* ought to be a perfectly good site for a lone gap but it is not because, through the Raising relation, it is also the subject of *bother*. The Subject Condition, which permits a lexical head's subject to be slashed only if one of the complement's is also slashed, blocks (15a) because *bother* has a slashed subject but no slashed complement. (15b) is fine

[4]Such examples were originally discussed by Hukari and Levine (1991). Hukari and Levine contrast the 'certain heroes' examples with the extractions from topicalised objects in (i) and (ii):

(i) *Who$_i$ did you decide that [ pictures of $\__i$ ]$_j$ you could do without $\__j$?

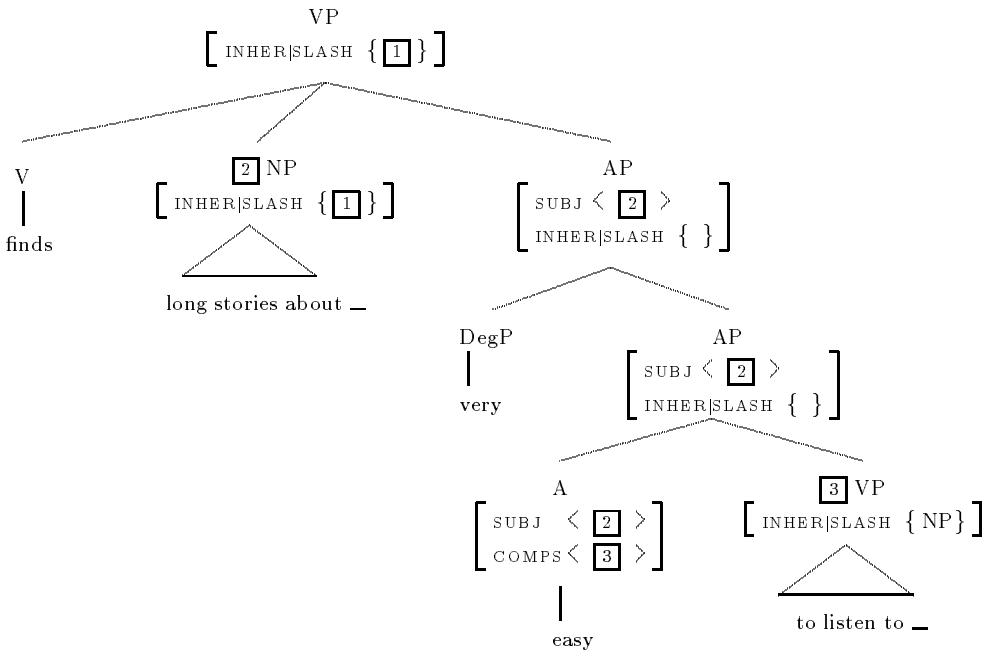
(ii) *Robin is the person who(m)$_i$ I decided that [ pictures of $\__i$ ]$_j$ I could do without $\__j$.

I believe that Pollard and Sag's theory would permit (i) and (ii) to be generated and it is also the case that my analysis would permit them. Hukari and Levine seek to explain these examples in terms of a prohibition on gaps within fillers couched in terms of an anti-recursion constraint on SLASH. (They claim the well-formedness of the 'certain heroes' examples follows from their using the feature GAP for MOCs instead of SLASH.) Since my analysis of MOCs does not involve identifying the raised missing object as a filler, I can follow Hukari and Levine's lead and block (i) and (ii) as violations of a gap within filler constraint without jeopardising the well-formedness of the 'certain heroes' examples. I would suggest that the best way to implement the constraint is to require the filler in a head-filler-structure to have an empty SLASH value. Hukari and Levine note that some speakers do not totally reject (i) and (ii) and I assume that for these speakers the extra restriction in the head-filler schema is absent.

because the subject of *bother* is unslashed and (15c) is also fine because both the subject and the complement are slashed.

The partial tree in (16) illustrates the relevant part of Pollard and Sag's analysis of (14a).[5] The verb *find* is an object raising verb and there is a gap in the element which is both the controller and the subject of the controlled complement. By analogy with the examples in (15), this gap should only be permitted if there is also a gap in a complement of the controlled complement and indeed, with their SLASH analysis of MOCs, there is a gap in its VP complement. The SLASH path which corresponds to the extracted object of *listen to* is contained within the AP and therefore never occurs in the same local tree as the SLASH path connecting *certain heroes* to the gap after *about*. Nevertheless, Pollard and Sag are able to relate the two gaps through the SUBJ and COMPS features on *easy* and therefore claim that the one gap licenses the other.

(16)



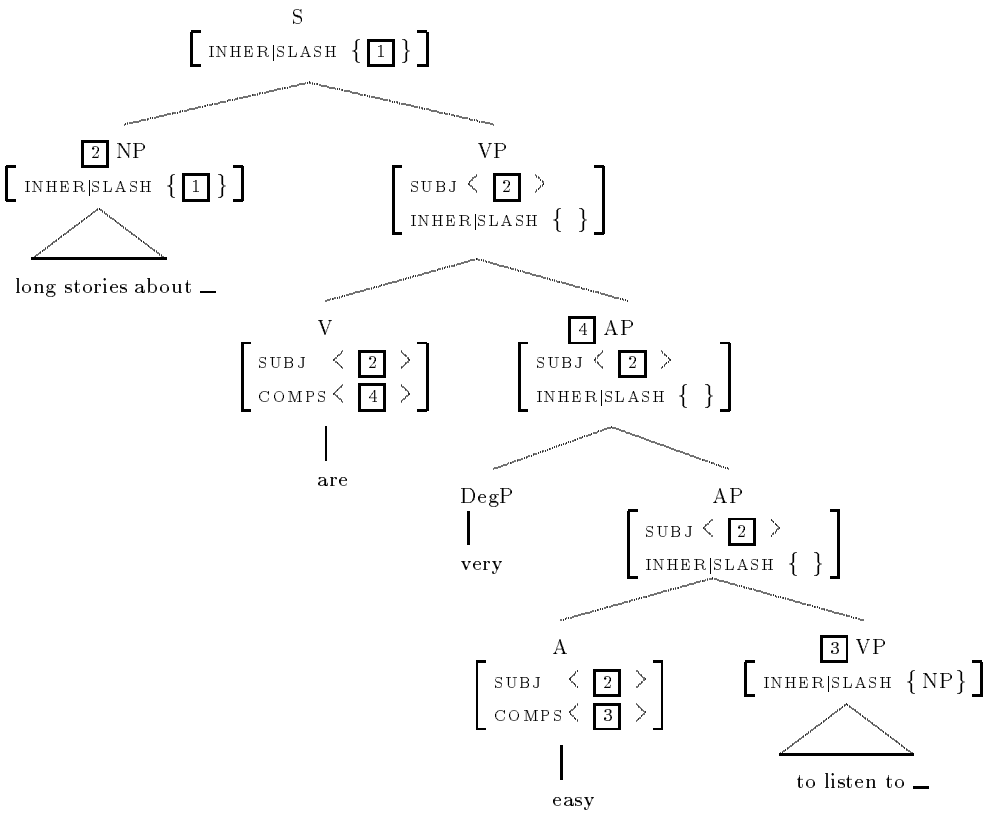

Although the Pollard and Sag account of the examples in (14) is very ingenious, there are certain problems with it. The first problem is the implicit claim that the first gap is a parasitic gap which is at odds with the usual assumption that parasitic gaps have the same referential properties as the gap that licenses them. A second problem which Pollard and Sag themselves note is that their theory cannot account for examples such as (17) where an auxiliary intervenes between the subject of the *tough* adjective and the AP containing the missing object:

[5]This tree is very similar to one produced in Pollard and Sag (1994) except I have replaced their standard version use of SUBCAT with the C9 valence features SUBJ and COMPS.

(17) a. There are [ certain heroes ]$_i$ that [ long stories about $\__i$ ]$_j$ are very easy to listen to $\__j$.

b. There are [ certain heroes ]$_i$ that [ long stories about $\__i$ ]$_j$ are too boring to listen to $\__j$.

(18)




As the tree in (18) shows, although there is no problem with respect to the SUBJ and COMPS specifications on *easy*, there is a problem with these features on *are*: *are* has a subject which has a non-empty SLASH value but a complement which is unslashed and this violates the Subject Condition. This problem suggests that it is purely an accident that (14) is rendered acceptable as a side effect of the Pollard and Sag treatment of parasitic gaps and I would suggest that a solution to the question of why (14) and (17) are acceptable should be sought elsewhere.

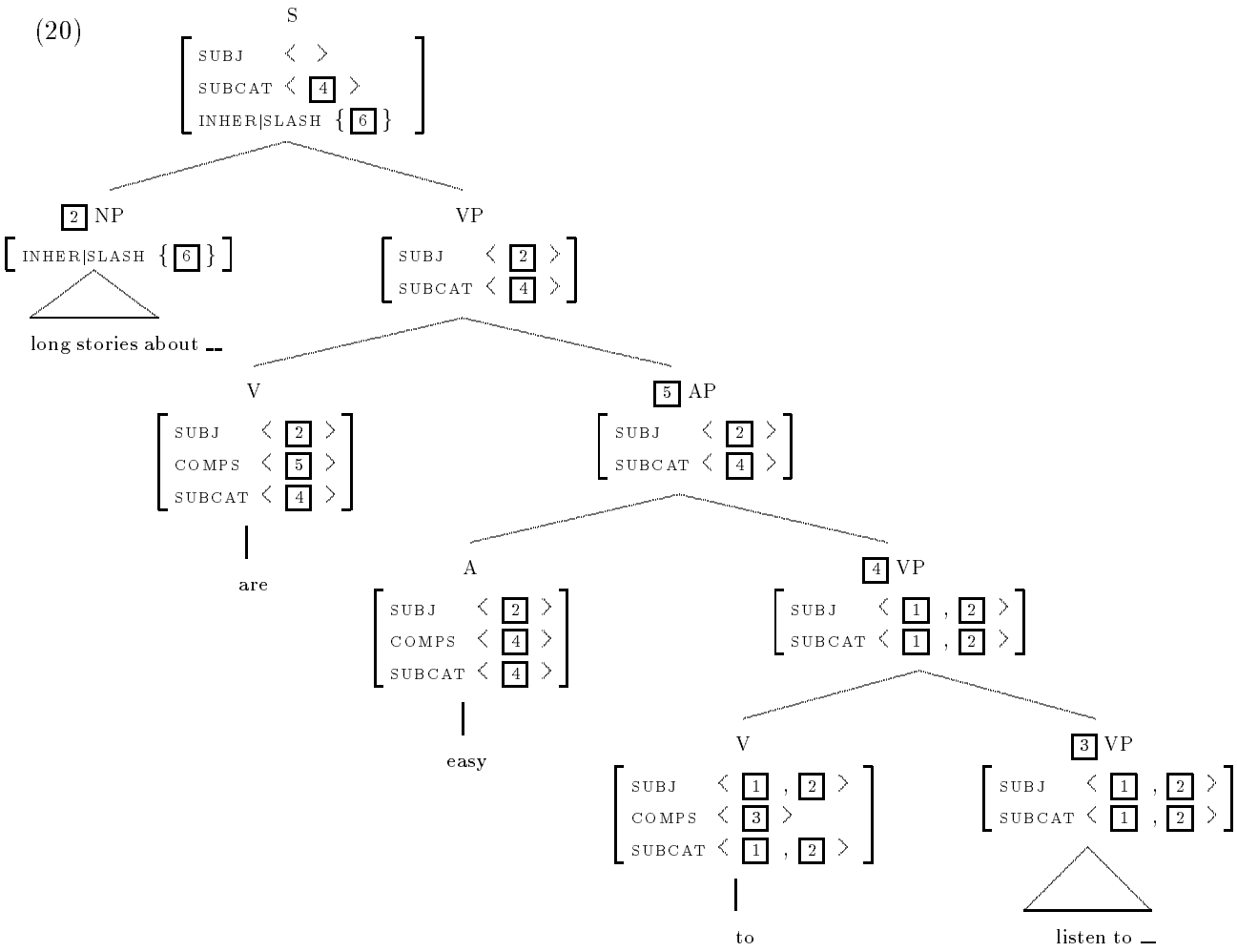
The obvious explanation for the violation of constraints blocking gaps in subjects in (14) and (17) is that these subjects are raised objects and that somehow it is their status as objects that counts for SLASH propagation. On this view the gaps in *long stories about* are no more strange than the gaps in the non-MO versions of these examples:

(19) a. There are [ certain heroes ]$_i$ that it is very easy to listen to long stories about $\__i$.

b. There are [ certain heroes ]$_i$ that it is too boring to listen to long stories about $\__i$.

With the revisions to HPSG that I have developed in this thesis, it is possible to account for the 'certain heroes' examples. The tree in (20) shows the relevant part of my analysis of (17a) with the values for SUBJ, COMPS, SUBCAT and INHER|SLASH indicated for each node, except I have omitted COMPS and INHER|SLASH where they have empty values.

(20)




Notice that the only SLASH path is the one which propagates upwards from the gap in the NP *long stories about* __ . Because this path connects up with the filler *certain heroes* (not shown in (20)) and because there is no other SLASH gap, there is no temptation to think of this gap as a parasitic gap. The structure-sharings in the SUBJ and SUBCAT lists in the tree follow from various aspects of my analyses of MOCs, Raising and binding. In Section 1.4, I argued that SUBCAT propagates unmodified from a lexical head to its phrasal projection. In my analysis of MOCs in Chapter 5, I motivated the promotion of the missing object to the SUBJ list as indicated on the VP *listen to* __ and I argued that the SUBCAT list is unaffected by this promotion which is why it has the order [1], [2] and not the reverse. In my treatment of auxiliaries in Chapter 3, I argued that an auxiliary inherits both its SUBJ list and its SUBCAT list from its complement and this explains the feature values for the auxiliaries *are* and *to*

in the tree. In Chapter 3, I also proposed that Raising controllers should not appear in the SUBCAT list of the Raising predicate and in Chapter 5, I showed that *tough* adjectives impose a Raising relationship between the missing object and the subject of the *tough* adjective which is its controller. For this reason the missing object ( 2 ) does not appear in the SUBCAT list of *easy* nor does it appear in the SUBCAT lists of any of the nodes dominating *easy*. On the other hand, it does appear in all the SUBJ lists in the tree.

In order to permit extraction from *tough* subjects while preventing extractions from true subjects, it is necessary to add a constraint to the grammar. In Chapter 7, I argued that the analysis of a-type parasitic gaps as anaphors would mean that Pollard and Sag's Subject Condition could be replaced by a much stronger condition banning all extractions from subjects. A possible candidate for this condition would be Pollard and Sag's Slash Inheritance Principle (SIP) which they propose early in their book and which they later reject in favour of the Subject Condition. The SIP is shown in (21).

(21) SLASH INHERITANCE PRINCIPLE

> Every member of the INHER|SLASH set on a headed constituent must be inherited from (i.e. belong to the INHER|SLASH set of) a daughter that is either (a) strictly subcategorised by a substantive head, or (b) the head.

This principle is formulated in the standard version of HPSG and therefore refers to the SUBCAT list rather than to the C9 valence features. (An element is *strictly subcategorised* if it is a non-initial member of SUBCAT.). Since the SUBCAT list is retained in addition to the C9 valence features there is a choice of whether to keep the original SUBCAT-based formulation of the SIP or whether to reformulate it in terms of the SUBJ list. For the case in hand, the tree in (20), the original SUBCAT-based formulation is to be preferred since only with that formulation would the extraction from the *tough* subject be possible. If the SIP was formulated so as to prevent extraction from SUBJ members then (20) would be judged ill-formed since the slashed NP marked as 2 occurs in several SUBJ lists. If, on the other hand, the SIP continues to be formulated so as to block extractions from initial members of SUBCAT then the tree in (20) is well-formed because at no point does the NP 2 occur as an initial member of a SUBCAT list.

While the unabridged version of the SIP yields the desired results for (20), there are non-MOC examples where it would make the wrong predictions given my assumptions about the type of elements which occur in SUBCAT lists. Consider the examples in (22):

(22) a. Which book was it obvious that Kim hadn't read _?
b. Which book would it be amusing to read _ to the children?

Since expletive elements are not role-assigned, I proposed in Chapter 1 that they should not appear in SUBCAT lists. This means, however, that the sentential and VP complements in (22) are initial SUBCAT members even though they are not subjects. This in turn means that the SIP wrongly predicts that extractions from them should be ill-formed. In order to ensure that both (20) and (22) are predicted to be well-formed it is necessary either to abandon the assumption that expletives do not occur in SUBCAT lists or to replace the SIP with a new constraint on extractions from subjects which does not exclude extraction from complements which happen to be initial SUBCAT members. Since I wish to preserve the intuition that the SUBCAT list is the binding theory domain and since expletives are of no relevance to the binding theory, I prefer not to reintroduce expletives to the SUBCAT list and instead I will pursue the second option and formulate a new constraint. In order to do this, it is helpful to develop the notion of a 'true' subject. In the pre-C9 version of the theory the closest approximation of true subject is the initial member of SUBCAT but, as Pollard and Sag show, this definition is inadequate and for this reason they introduce the C9 valence features. In the C9 version of the theory the single SUBJ member is the true subject but this notion is made more obscure by my changes to the theory which allow for more than one SUBJ member and which allow a mismatch between valence features and the SUBCAT list. I propose therefore that the definition of true subject should make reference to both the SUBJ list and the SUBCAT list: a true subject is an element which is both a member of the SUBJ list of a lexical head and the initial member of its SUBCAT list. By this definition, predicates with expletive subjects such as *obvious* and *amusing* in (22) do not have a true subject and nor do *tough* adjectives. With the definition of true subject in place, the new constraint can be formulated as follows:

(23) THE TRUE SUBJECT CONDITION
A true subject has an empty INHER|SLASH set.

This constraint will not block the extraction in (20) since the *tough* subject is not a true subject nor will it block extraction from the complements in (22) since these are complements and not true subjects. It will, however, block more standard examples of extraction from subjects such as (24):

(24) a. *Which country was the king of _ bald?
b. *Who were discussions about _ held in secret?

Notice that the formulation of the True Subject Condition effectively permits extractions from

non-role-assigned subjects which were formerly objects but it does not permit extractions from non-role-assigned NPs which are true subjects for some other lexical head in the sentence:

(25) a. *There are certain heroes that long stories about _ tend to be boring.
b. *Here's the jerk that I expected my pictures of _ to bother you.

In (25a), the subject of *tend* is non-role-assigned because *tend* is a raising verb and so it is not a true subject for *tend*. However, by virtue of the raising pattern of structure sharing, the subject is also the subject of *boring* and for this lexical head it is the true subject and cannot therefore be slashed. A similar explanation is available for the object raising example in (25b) (which reproduces (15a) above). Here the object of *expect* cannot count as a true subject of *expect* but it is the true subject of *bother* and cannot therefore be slashed.

It follows from my analysis that 'certain heroes' examples will only be well-formed so long as the slashed subject is not a true subject and this effectively rules out any examples involving Equi predicates. As soon as an Equi MO predicate rather than a Raising one is introduced its subject is role-assigned and occurs in the SUBCAT list. This makes it the true subject of the MO predicate and it cannot therefore be slashed:[6]

(26) a. *I have a friend that the sister of _ is very pretty to look at.
b. *There are certain heroes that long stories about _ need telling.

Similarly, an extra Raising predicate may successfully be introduced between the slashed *tough* subject and the MO AP but an Equi one may not:[7]

(27) a. There are certain heroes that long stories about _ tend to be hard to listen to.
b. *I have a friend that the sister of _ tries to be easy to talk to.

To summarise the discussion in this section, I have questioned Pollard and Sag's treatment of the 'certain heroes' examples as parasitic gap constructions and I have shown that my

[6]Notice that the contrast between (26) and (17) provides further evidence for my claim that the control relation in *tough* constructions is Raising, not Equi.

[7]As I discussed in Section 5.3.2, on a simple analysis of *tough* adjectives as Raising predicates, examples such as (27b) ought to be ruled out by the role assignment constraint on Equi controllees introduced in Chapter 3. However, I produced more complex signs for *tough* adjectives where the *tough* subject/missing object is treated syntactically as a Raising controller/controllee but where it is role assigned in a higher *enablement* predicate in the CONTENT part of the sign. This means that examples such as (i) are not rejected by the role assignment constraint on Equi controllees and it also means that the True Subject Condition must be responsible for the ill-formedness of (27b).

(i) I have a friend whose sister tries to be easy to talk to.

treatment of parasitic gaps permits the Subject Condition to be replaced by the True Subject Condition which blocks extractions from all true subjects. With my analysis of MOCs and the requirement that Raising controllers should not appear in SUBCAT lists the 'certain heroes' examples are predicted to be well-formed. Furthermore, I have shown that, as my theory predicts, the introduction of Equi predicates into these examples leads to ill-formedness.

## 8.2 C-type Parasitic Gaps

C-type parasitic gaps occur quite freely with MOCs as (3) and the examples in (28) illustrate.

(28) a. Those reports are easy to file $\__{mo}$ without reading $\__{mo}$.
b. That floor would be impossible to polish $\__{mo}$ without cleaning $\__{mo}$.
c. Kim isn't hard for you to upset $\__{mo}$ by criticising $\__{mo}$.

I take it that the second gaps in these examples are ATB gaps rather than some kind of parasitic gaps since the restrictions on MO gaps documented in Chapter 4 apply just as much to the second gap as to the first. One such restriction is that MO gaps may not occur in finite clauses and, accordingly, examples which parallel those in (28) except for having a finite adjunct are unacceptable:

(29) a. *Some stories are hard to forget $\__{mo}$ after you read _.
b. *Lions find gazelles hard to kill $\__{mo}$ before they devour _.

If the gaps in the adjuncts in (29) were not ATB MO gaps then there would be no reason to expect the finiteness restriction to apply. A further reason for supposing that the pattern in (28) is an ATB one is that MOCs are also able to interact with coordination in an ATB fashion:

(30) a. Those reports are easy to file $\__{mo}$ and not read $\__{mo}$.
b. That food was too expensive for you to cook $\__{mo}$ and then throw away $\__{mo}$.
c. That kind of toy is easy to buy $\__{mo}$ one day and break $\__{mo}$ the next.

The existence of examples such as those in (28) and (30) and the strong parallels with simpler cases of ATB extraction and c-type parasitic gap formation that I discussed in Section 7.2, might seem to suggest that if the SLASH mechanism underlies the simple cases then it must also underlie the MOC cases. However, I have argued that the missing objects in MOCs are not SLASH gaps but promoted objects and this analysis precludes the possibility that SLASH propagation is responsible for (28) and (30).

In Section 7.2.4 I argued that c-type VPs are conjunctive and that this accounts for the fact that ATB patterns of extraction are found in both coordinate structures and c-type VPs. For the MOC cases, which I analyse as involving control rather than extraction, I propose that the ATB patterns also arise as a result of the conjunctive nature of c-type VPs because the daughters in conjunctive structures share control properties. Here I am extending the usage of the term ATB so as to define a concept of across-the-board control. An ATB control analysis is simply a natural extension of the fact that conjoined controlled complements, as in (31a), are required to share the same controller and that the two daughter VPs in c-type VPs as in (31b), must also share their controller.

(31) a. Kim expected Sandy to peel the avocado and put it in the salad.
b. Kim expected Sandy to peel the avocado before putting it in the salad.

Controllable elements, whether missing subjects or missing objects, appear in the SUBJ lists of controlled complements and so an account of an ATB pattern of control must make reference to the SUBJ list. As with the non-MOC cases, if the pattern in these examples was always ATB then the phenomenon would be easily handled by a simple requirement that daughters in conjunctive structures share their SUBJ value with their mother. Such a requirement would immediately account for the data in (28), (30) and (31). The problem is that just as ATB violations are permitted for extractions, so they are permitted for MOCs. (32) and (33) show some non-ATB versions of (28b) and (30b):

(32) a. That floor would be impossible to polish $\__{mo}$ without using a machine.
b. ??That floor would be impossible to invite guests round without cleaning $\__{mo}$.

(33) a. ?That food was too expensive for you to cook $\__{mo}$ and then go out for a meal instead.
b. ?That food was too expensive for you to go out to supper and then not want $\__{mo}$.

Judgements seem to be less robust for these examples than for ATB extractions but it appears that for some speakers the missing object can occur in just one of the daughters in both c-type VP examples and true coordinate examples. The most acceptable non-ATB examples are ones where there is no missing object in a c-type adjunct, as illustrated in (32a). This is consonant with the non-symmetry between the daughters in head-adjunct structures and with the greater prominence of the head daughter. The missing object in just the adjunct in (32b) is barely acceptable and indeed, my analysis will not generate it without extra modifications.

The non-ATB patterns in the coordinations in (33), although better than (32b), are also not very acceptable. Interestingly the case where the missing object occurs in just the left conjunct is not significantly worse that the case where it appears in just the right conjunct. In general, apart from single missing objects in the heads of head-adjunct structures, non-ATB patterns seem to be worse with MOCs than they are with simple extractions. Below I discuss first an analysis of the c-type VP cases (i.e. the examples of c-type parasitic gaps), and after that I turn my attention to the coordinate cases.

The proposed account of missing objects in c-type VPs depends on the use of an operation which I call 'list union'.[8] The idea is that something similar to set union is needed except that the SUBJ feature has lists as value and so a union operation for lists must be defined. Recall that I used set union in the Conjunction Principle in order to allow, but not require, split SLASH paths in conjunctive structures. In the case of SUBJ, the missing object control relation can be optionally shared between two daughters and list union is an operation that can achieve this.[9] The effects of a requirement that the SUBJ value on the mother should be the list union of the SUBJ values of the two daughters can be illustrated according to the three possibilities for the mother: either the mother has an empty SUBJ list, or it has a one-member SUBJ list or it has a two member SUBJ list. The tables in (34)–(36) demonstrate what the possible values are for the daughters given each possibility for the mother. (34) shows that if the mother has an empty SUBJ list then the daughters must too. (35) shows that if the mother has a one-member SUBJ list then the daughters' SUBJ lists must either be the same or empty. As (36) shows, the possibilities become more numerous with a two-member SUBJ list on the mother. In this case, no element may appear on a daughter and not on the mother and each element that appears on the mother must appear on at least one daughter. Furthermore, the order of the list on the mother is maintained on the daughters.

(34) $\langle\,\rangle$ l-union $\langle\,\rangle$ = $\langle\,\rangle$

[8] I am again grateful to Suresh Manandhar for his help with the formal aspects of this analysis.

[9] A PROLOG definition of list union is as follows:

```
list_union([], [], []).

list_union([X|T], [X|R1], [X|R2]):-
       list_union(T,R1,R2).
list_union([X|T], R1, [X|R2]):-
       list_union(T,R1,R2).
list_union([X|T], [X|R1], R2):-
       list_union(T,R1,R2).
```

(35)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. | ⟨ [1] ⟩ | l-union | ⟨ [1] ⟩ | = | ⟨ [1] ⟩ |
| b. | ⟨ ⟩ | l-union | ⟨ [1] ⟩ | = | ⟨ [1] ⟩ |
| c. | ⟨ [1] ⟩ | l-union | ⟨ ⟩ | = | ⟨ [1] ⟩ |

(36)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| a. | ⟨ [1],[2] ⟩ | l-union | ⟨ [1],[2] ⟩ | = | ⟨ [1],[2] ⟩ |
| b. | ⟨ [1] ⟩ | l-union | ⟨ [1],[2] ⟩ | = | ⟨ [1],[2] ⟩ |
| c. | ⟨ [1],[2] ⟩ | l-union | ⟨ [1] ⟩ | = | ⟨ [1],[2] ⟩ |
| d. | ⟨ [2] ⟩ | l-union | ⟨ [1],[2] ⟩ | = | ⟨ [1],[2] ⟩ |
| e. | ⟨ [1],[2] ⟩ | l-union | ⟨ [2] ⟩ | = | ⟨ [1],[2] ⟩ |
| f. | ⟨ ⟩ | l-union | ⟨ [1],[2] ⟩ | = | ⟨ [1],[2] ⟩ |
| g. | ⟨ [1],[2] ⟩ | l-union | ⟨ ⟩ | = | ⟨ [1],[2] ⟩ |
| h. | ⟨ [1] ⟩ | l-union | ⟨ [2] ⟩ | = | ⟨ [1],[2] ⟩ |
| i. | ⟨ [2] ⟩ | l-union | ⟨ [1] ⟩ | = | ⟨ [1],[2] ⟩ |

The set of results given by list union is clearly too large but other independent factors also constrain the SUBJ lists of the constituents in question and these other constraints narrow down the possibilities much further. Any analysis of c-type VP head-adjunct structures would ensure that the head VP and the adjunct VP share the same subject, i.e. the first SUBJ member. I assume that this structure-sharing is encoded in the signs for prepositions like *without*. This constraint would rule out those entries in the tables in (35) and (36) where [1] does not appear in both of the daughters' lists. This means that the number of possible distributions of SUBJ members is quite drastically reduced. If the mother node is not an MO-VP and has only a one-member SUBJ list then the only possibility is the one shown in (35a) where both daughters share that subject. If the mother is an MO-VP and has a two-member SUBJ list then there are three possible specifications on the daughters corresponding to (36a,b,c). Furthermore, the Valence Principle requires the mother and head to have the same SUBJ values so (36b) is actually not a possibility either.[10] This leaves two possibilities: (36a) is the ATB case responsible for the examples in (28) and (36c) permits non-ATB examples like (32a). In order to implement the new analysis, all that is needed is an addition to the first clause of the Conjunction Principle. The revised version is shown in (37) and it is unchanged except for the requirement that the SUBJ value on the mother of a conjunctive structure should be the list union of the SUBJ values of the daughters.

[10]For those speakers who find examples like (32b) acceptable the Valence Principle would have to be relaxed in an appropriate way.

(37) CONJUNCTION PRINCIPLE (final version)

(i) In a conjunctive structure, the SYNSEM|NONLOCAL|INHERITED value on the mother is the set union of the SYNSEM|NONLOCAL|INHERITED values on the daughters and the SUBJ value on the mother is the list union of the SUBJ values on the daughters.

(ii) In a symmetric structure, the SYNSEM|NONLOCAL|INHERITED value on each daughter is token identical to the SYNSEM|NONLOCAL|INHERITED value on the mother.

(iii) In an asymmetric structure, the SYNSEM|NONLOCAL|INHERITED value of the background daughter is the empty set.

Turning now to the true coordinate cases in (30) and (33), there is a choice between a strict approach and a lenient one depending on how one views the non-ATB examples in (33). The strict approach would forbid any non-ATB MOCs in coordinative structures and it would predict that (33a&b) are ill-formed because they are not ATB. In this case an explanation of why there are some speakers who accept (33a&b) would be needed and perhaps such an explanation might be that these speakers accept them because of the analogy with the extraction examples. The lenient approach would permit all non-ATB MOCs and would find (33a&b) acceptable. In this case an explanation would be needed to explain why so many speakers reject the non-ATB cases. Since all speakers prefer the ATB cases it may be sufficient to attribute it to difficulties in processing when an expectation of symmetry is not realised.

The strict approach is already encoded in the grammar thanks to the revised Coordination Principle which I gave in footnote 15 of Section 7.2.4. Although in principle the list union requirement in the first clause allows both ATB and non-ATB missing objects in coordinations, the Coordination Principle requires the CATEGORY value of the mother to subsume the CATEGORY values of all the daughters. Since the SUBJ feature is part of the CATEGORY value, this means that a daughter cannot have a smaller SUBJ list than the mother. If the mother has two SUBJ members, so must the daughters and the ATB pattern is the only possibility. If the lenient approach is deemed more appropriate, the Coordination Principle could be modified so that the subsumption requirement holds just for the first element in the SUBJ lists of the mother and daughters. If just the first SUBJ members were required to be shared then the list union constraint in the first clause of the Conjunction Principle would ensure that any second member was shared with at least one daughter and possibly with both. This would mean that all of the examples in (30) and (33) would be grammatical.

# Chapter 9

# Concluding Remarks

In their Chapter 9, Pollard and Sag (1994) outline revisions that they believe improve the descriptive adequacy of the theory but they do not have space to work out these revisions in detail. The analysis of MOCs that I develop in this thesis could not have been expressed in the standard version of the theory and so, if I have been at all persuasive in promoting my analysis, the research reported here lends support to the C9 revisions. By retaining the SUBCAT list in addition to the new valence features, Pollard and Sag allow the two roles of the old SUBCAT feature to be firmly separated out. They themselves do not make much of the new opportunities that result, but for me it has turned out to be very productive to be able to assume that not all syntactic arguments are included in the binding domain. Pollard and Sag are keen to define a binding theory which is totally non-configurational but they also argue that a binding theory based on semantic rather than syntactic relations is not appropriate. As I see it, the new-style SUBCAT list acts as a meeting point between syntactic and semantic valency and is the basis for a binding theory which draws on information from both sources.

In the course of this thesis I have proposed a number of modifications to the HPSG grammar in Pollard and Sag (1994). Some of these are fairly minor while some of them are extensive. The minor modifications include the structural approach to case-marking, the changes to the SUBCAT list and the revisions to control theory described in Chapter 3. While these are relatively minor changes, they do have some far-reaching consequences. The shift away from lexical assignment of case means that case-marking can no longer be an issue in debates about Equi versus Raising. The changes to SUBCAT permit a much simpler definition of o-command and interact with the account of Raising. The decision to exclude Raising controllers from SUBCAT provides an explanation for the ill-formedness of sequences of Equi and Raising predicates: to my knowledge these examples have not been noticed before, much less explained. While I

did not include the word 'control' in the title of this thesis, I believe that I have made a not insignificant contribution to this part of the theory.

The control analysis of MOCs involves much larger changes to HPSG but I hope to have shown that there is much to be gained from abandoning the UDC account. As I explained in Chapter 5 quite a lot follows once the basic analysis is in place. In particular the parallels with passive are very interesting and it is encouraging that I am able to show how the objects of prepositions can be promoted both in pseudo-passives and in some MOCs. The analysis of Italian MOCs and related constructions in Section 5.4 is unfortunately rather sketchy but I believe the Italian and Spanish data to be very strong evidence in favour of the non-UDC account of MOCs. It is remarkable that the English MOC analysis works so easily for Italian and Spanish and that an account of restructuring verbs was already inherent in the signs I gave for English control verbs.

The MOC analysis has been brewing now for several years but the new account of parasitic gaps is comparatively recent. I hope to have demonstrated that interactions between parasitic gaps and MOCs do not seriously threaten the MOC analysis. I believe that the distinction between a-type and c-type parasitic gaps is a fruitful one to make. The similarities between coordinate gaps and c-type parasitic gaps are so strong that it seems inevitable that they should be analysed together. Since HPSG does not have a very detailed account of coordination it is hard to formulate a unified analysis but anyone who has studied the GPSG account of coordination is well-equipped to 'give it a go' and I believe that my treatment tends in the right direction. I am less happy with the treatment I propose for a-type parasitic gaps and in particular it is disappointing that I could not find a satisfactory way to guarantee that a-type parasitic gaps only occur with null antecedents.

There are several parts of this thesis that I feel would benefit from further research: the structural account of case-marking might be more elegantly expressed; a treatment of purpose infinitives as adjuncts should be developed; the Italian and Spanish account needs to be tested and fleshed out; the a-type parasitic gap problem is not properly resolved; and the account of gaps in conjunctive structures deserves more attention.

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