Chapter 21

Anaphoric Binding

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This chapter is an introduction into the Binding Theory assumed within HPSG. While it was inspired by work on Government & Binding in the beginning, it turned out that reference to tree structures are not necessary and that relations that are required for interpreting the reference of personal pronouns and reflexives can be established with respect to lexical properties of heads namely the argument structure list, a list containing descriptions of arguments of a head.

1 Introduction

Binding Theories deal with questions of coreference and correspondence of forms. For example, the reflexives in (1) have to refer to the referent the NP in the same clause refers to and they have to have the same gender as the NP they are coreferent with:

(1) a. Peter$_i$ thinks that Mary$_j$ likes herself$_{*i/j/*k}$.
b. * Peter$_i$ thinks that Mary$_j$ likes himself$_{*i/*j/*k}$.
c. * Mary$_i$ thinks that Peter$_j$ likes herself$_{*i/*j/*k}$.
d. Mary$_i$ thinks that Peter$_j$ likes himself$_{*i/j/*k}$.

The indices show what bindings are possible and which ones are ruled out. For example, in (1a), *herself* cannot refer to *Peter*, it can refer to *Mary* and it cannot

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refer to some discourse referent that is not mentioned in the sentence. Coreference of *himself* and *Mary* is ruled out in (1b) since *himself* has an incompatible gender.

Personal pronouns can not refer to an antecedent within the same clause:

(2) a. Peter$_i$ thinks Mary$_j$ that likes her$_{*i/*j/k}$.
b. Peter$_i$ thinks Mary$_j$ that likes him$_{i/*j/k}$.
c. Mary$_i$ thinks Peter$_j$ that likes her$_{i/*j/k}$.
d. Mary$_i$ thinks Peter$_j$ that likes him$_{*i/*j/k}$.

As the examples show, the pronouns *her* and *him* cannot be coreferent with the subject of *likes*. If a speaker wants to express coreference he or she has to use a reflexive pronoun as in (1).

Interestingly, the binding of pronouns is less restricted than the one of reflexives, but this does not mean that anything goes. For example, a pronoun cannot bind a full referential NP if the NP is embedded in a clause and the pronoun is in the matrix clause:

(3) a. He$_{*i/*j/k}$ thinks that Mary$_i$ likes Peter$_j$.
b. He$_{*i/*j/k}$ thinks that Peter$_i$ likes Mary$_j$.

The sentences discussed so far can be assigned a structure like the one in Figure 1. Chomsky (1981; 1986) suggested accounting for the facts by referring to the hierarchical structure in Figure 1. He uses the notion of c(onstituent)-command going back to work by Reinhart's (1976). c-command is a relation that holds between nodes in a tree. Accoring to one definition, a node Y is said to c-command another node Z, Y and Z are sisters or if a sister of Y dominates Z.[1]

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To take an example, the NP node of *John* c-commands all other nodes dominated by S. The V of *thinks* c-commands everything within the CP including the CP node, the C of *that* c-commands all nodes in S including also S and so on. The CP c-commands the *think*-V, and the *likes him*-VP c-commands the *Paul*-NP. Per definition, a Y binds Z just in case Y and Z are coindexed and Y c-commands Z. One precondition for being coindexed (in English) is that the person, number, and gender features of the involved items are compatible.

[1] "Node A c(onstituent)-commands node B if neither A nor B dominates the other and the first branching node which dominates A dominates B." Reinhart (1976: 32)

Chomsky (1986) uses another definition that allows one to go up to the next maximal projection dominating A. As of 25/02/2020 the English and German Wikipedia pages for c-command have two conflicting definitions of c-command. The English version follows Sportiche et al. (2013), whose definition excludes c-command between sisters: "Node X c-commands node Y if a sister of X dominates Y."

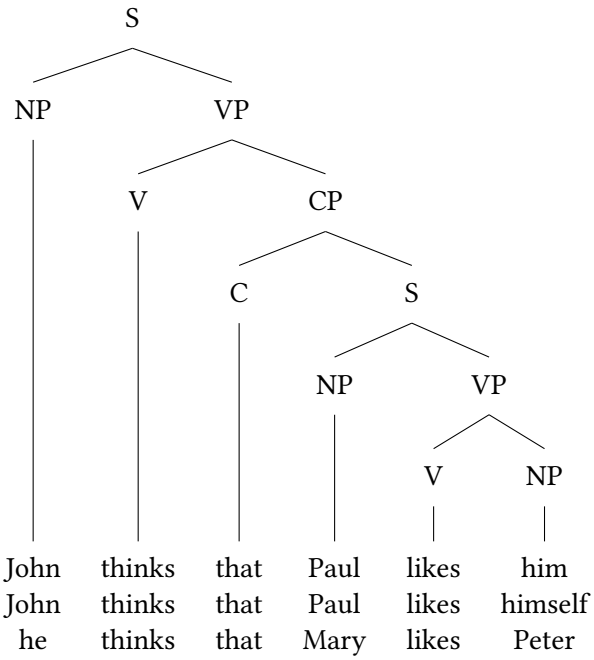

Figure 1: Tree configuration of examples for binding

Now, the goal is to find restrictions that ensure that reflexives are bound locally, personal pronouns are not bound locally and that referential expressions like proper names and full NPs do not refer to pronouns or fully referential expressions. The conditions that were developed for Binding Theory are complex. They also account for the binding of traces that are the result of moving elements by transformations. While it is elegant to subsume the filler-gap relations under a general Binding Theory, proponents of HPSG think that coreferential semantic indices and filler-gap dependencies are crucially different. The places of occurrence of gaps (if they are assumed at all) is restricted by other components of the theory. For an overview of the treatment of nonlocal dependencies in HPSG see Borsley & Crysmann (2020), Chapter 14 of this volume.

We will not go into the details of the Binding Theory in Mainstream Generative Grammar (MGG)[2], but we give a verbatim description of the ABC of

[2]We follow Culicover & Jackendoff (2005: 3) in using the term *Mainstream Generative Grammar* when referring to work in Government & Binding (Chomsky 1981) or Minimalism (Chomsky 1995).

Binding Theory for overt elements. Chomsky distinguishes between so-called R-expressions (referential expressions like proper nouns or full NPs/DPs), personal pronouns and reflexives and reciprocals. The latter two are subsumed under the term anaphor. Principle A says that an anaphor must be bound within the least maximal projection containing a subject. Principle B says that a pronoun that is governed by some element G has to be A-free in the least maximal projection M containing G and a subject. Principle C says that a referential expression Z heading its own chain has to be A-free in the domain of the head of the chain of Z.

2 A non-configural Binding Theory

HPSG's Binding Theory differs from GB's Binding Theory in referring less to tree structures but rather to the notion of obliqueness of arguments of ahead. The arguments of a head are represented in a list called the argument structure list. The list is the value of the feature ARG-ST. The ARG-ST elements are descriptions of arguments of a head containing syntactic and semantic properties of the selected arguments but not their daughters. So they are not complete signs but *synsem* objects. See Borsley & Abeillé (2020), Chapter 1 of this volume for more on the general setup of HPSG theories. The list elements are ordered with respect to their obliqueness, the least oblique element being the first element:

(4) SUBJECT > DIRECT OBJECT > INDIRECT OBJECT > OBLIQUES > GENITIVES > OBJECTS OF COMPARISON

This order was suggested by Keenan & Comrie (1977). It corresponds to the level of syntactic activity of grammatical functions. Elements higher in this hierarchy are less oblique and can participate more easily in syntactic constructions, like for instance, reductions in coordinated structures (Klein 1985: 15), topic drop (Fries 1988), non-matching free relative clauses (Bausewein 1990; Pittner 1995; Müller 1999a), passive and relativization (Keenan & Comrie 1977), and depictive predicates (Müller 2008). In addition, Pullum (1977) argued that this hierarchy plays a role in constituent order (but see Section 9.) And, of course, it was claimed to have play an important role in Binding Theory (Grewendorf, 1985: 160 1988: 60; Pollard & Sag 1994: Chapter 6).

Figure 2 shows a version of Figure 1 including ARG-ST information. The main points of HPSG's Binding Theory can be discussed with respect to this simple figure: anaphors have to be bound locally. The definition of the domain of locality

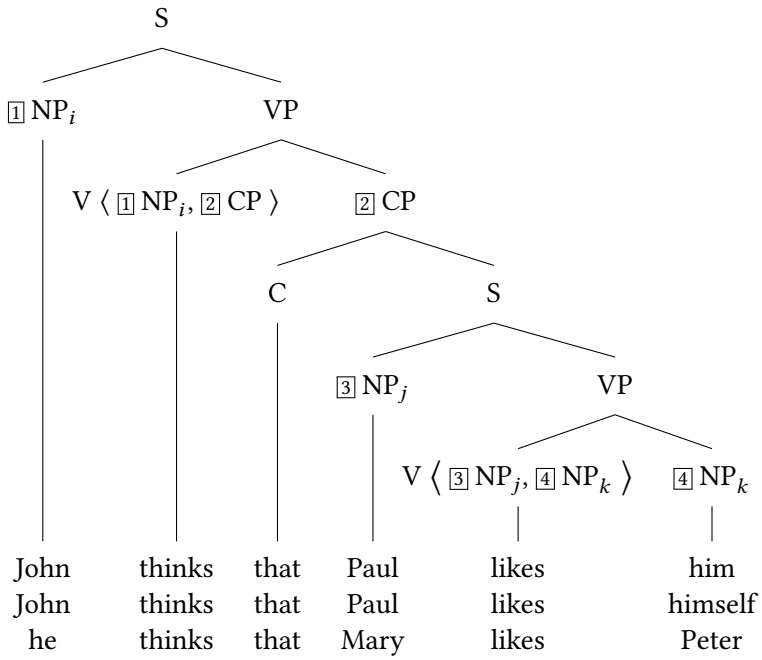

Figure 2: Tree configuration of examples for binding with ARG-ST lists

is rather simple. One does not have to refer to tree configurations since all arguments of a head are represented locally in a list. Simplifying a bit, reflexives and reciprocals may be bound to elements preceding them in the ARG-ST list and a pronoun like *him* must not be bound by a preceding element in the same ARG-ST list.

To be able to specif the conditions on binding of anaphors, pronouns and non-pronouns some further definitions are necessary. The following definitions are definitions of local *o-command*, *o-command* and *o-bind*. The terms are reminiscent of *c-command* and so on but we have an "o" rather than a "c" here, which is supposed to indicate the important role of the obliqueness hierarchy. The definitions are as follows:

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

(6) Let Y and Z be *synsem* objects with distinct LOCAL values, Y referential. Then Y *o-commands* Z just in case Y locally o-commands X dominating Z.

(7) 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*.

(5) says that an ARG-ST element locally o-commands any other ARG-ST element further to the right of it. The condition of non-identity of the two elements under consideration in (5) and (6) is necessary to deal with cases of raising, in which one element may appear in various different ARG-ST lists. See Section 8 below and Abeillé (2020), Chapter **??** of this volume for discussion of raising in HPSG. The condition that Y has to be referential excludes expletive pronouns like *it* in *it rains* from entering o-command relations. Such expletives are part of ARG-ST and valence lists but they are entirely irrelevant for Binding Theory, which is the reason for their exclusion in the definition.

The definition of o-command uses the relations of locally o-command and dominate. With respect to Figure 2, we can say that NP_i o-commands all nodes below the CP node since NP_i locally o-commands the CP and the CP node dominates everything below it. So NP_i o-commands C, NP_j, VP, V, and NP_k.

The definition of *o-bind* in (7) says that two elements have to be coindexed and there has to be a (local) o-command relation between them. The indices include person, number and gender information (in English), so that *Mary* can bind *herself* but not *themselve* or *himself*.

Principle 2 (HPSG Binding Theory)
Prinzip A *A locally o-commanded anaphor must be locally o-bound.*

Prinzip B *A personal pronoun must be locally o-free.*

Prinzip C *A nonpronoun must be o-free.*

Principle A accounts for the ungrammaticality of sentences like (8):

(8) * Mary likes himself.

Since both *Mary* and *himself* are members of the ARG-ST list of *likes*, there is an NP that locally o-commands *himself*. Therefore there should be a local o-binder. But since the indices are incompatible because of incompatible gender values, *Mary* cannot o-bind *himself*, *himslef* is locally o-free and hence in conflict to Principle A.

Similarly, the binding in (9) is excluded, since *Mary* locally o-binds the pronoun *her* and hence Principle B is violated.

(9) Mary_i likes her_{*i}.

Finally, Principle C accounts for the ungrammaticality of (10):

(10) He_i thinks that Mary likes Peter_{*i}.

Since *he* and *Peter* are coindexed and since *he* o-commands *Peter*, *he* also o-binds *Peter*. According to Principle C, this is forbidden and hence bindings like the one in (10) are ruled out.

This list-based Binding Theory seems very simple. So far we explained binding relations between coarguments of a head where the coarguments are NPs or pronouns. But there are also prepositional objects, which have an internal structure with the referential NPs embedded within a PP.

Pollard & Sag (1994: 246,255) discuss examples like (11):

(11) a. John_i depends [on him_{*i}].
b. Mary talked [to John_i] [about himself_i].

As noted by Pollard & Sag (1994: 246), the second example is a problem for the GB Binding Theory since *John* is inside the PP and does not c-command *himself*. Examples involving case-marking prepositions are no problem for HPSG how-

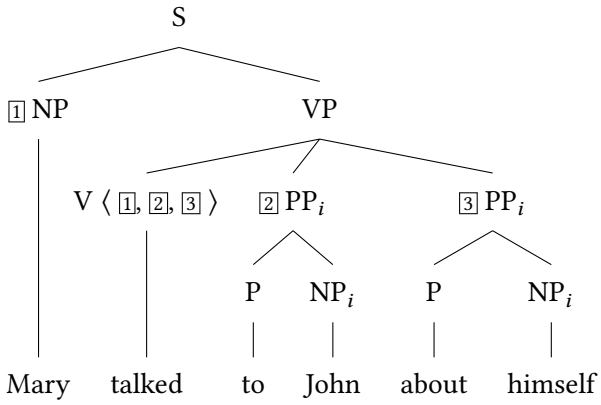

Figure 3: Binding within prepositional objects poses a challenge for GB's Binding Theory

ever, since it is assumed that the semantic content of propositions is identified with the semantic content of the NP they are selecting. Hence, the PP *to John* has the same referential index as the NP *John* and the PP *about himself* has the same index as *himself*. The ARG-ST list of *talked* is shown in (12):

(12) ⟨ NP, PP, PP ⟩

The Binding Theory applies as it would apply to ditransitive verbs. Since the first PP is less oblique than the second one, it can bind an anaphor in the second one. The same is true for the example in (11a): since the subject is less oblique than the PP object it locally o-commands it and even though the pronoun *him* is embedded in a PP and not a direct argument of the verb the pronoun cannot be bound by *him*. An anaphor would be possible within the PP object though. Of course the subject NP can bind NPs within both PPs: both *to herself* and *about herself* would be possible as well.

3 Exempt anaphors

The statement of Principle A has interesting consequences: if an anaphor is not locally o-commanded, Principle A does not say anything about requirements fro binding. This means that anaphors that are initial in an ARG-ST list may be bound outside of their local environment.

4 The i within i Condition

(13) Karl heiratet eine nur sich$_i$ selbst liebende Frau$_i$.

5 Reconstruction

Pollard & Sag (1994) point out an interesting consequence of the treatment of nonlocal dependencies in HPSG: since nonlocal dependencies are introduced by traces that are lexical elements rather then by transforming one structure into another one as is common in Transformational Grammar, there is no way to reconstruct some phrase into the position of the trace. Since traces do not have daughters, $\__j$ in (14a) has the same local properties (part of speech, case, referential index) as *which of Claire's$_i$ friends* without having its internal structure.[3]

(14) a. I wonder [which of Claire's$_i$ friends]$_j$ [we should let her$_i$ invite $\__j$ to the party]?

b. [Which picture of herself$_i$]$_j$ does Mary$_i$ think John likes $\__j$?

Since extracted elements are not reconstructed into the position where they would be usually located, (14a) is not related to (15):

[3] Some of the more recent theories of nonlocal dependencies even do without traces. See Borsley & Crysmann (2020), Chapter 14 of this volume for details.

(15) We should let her$_i$ invite which of Claire's$_i$ friends to the party.

Claire would be o-bound by *her* in (15), but since traces do not have daughters, no problem arises.

This is an interesting feature of the Binding Theory introduced so far, but as Müller (1999b:) pointed out, it makes wrong predictions as far as German (and English) are concerned. German is a V2 language and the placement of one constituent infront of the finite verb is usually accounted for by assuming a nonlocal dependency. If the fronted phrase is not reconstructed into the position of the trace, it is predicted that bindings like the following are acceptable, but they are not:

(16) [Karls$_i$ Freund]$_j$ kennt er$_{*i}$ $\_j$.
Karl's friend knows he
'He knows Karl's friend.'

The situation is similar in English:

(17) [Karl$_i$'s friend]$_j$, he$_{*i}$ knows $\_j$.

According to the definition of o-command, *he* locally o-commands the object of *knows*. This object is realized as a trace. Therefore the local properties of *Karl's friend* are in relation to *he* but since trace do not have daughters, there is no o-command relation between *he* and *Karl*, hence *Karl* is o-free and Principle C is not violated. Hence there is no explanation for the impossibility to bind *Karl* to *he*.

6 A general Binding Theory with reference to obliqueness or language-specific binding conditions

6.1 Obliqueness and constituent order

As was explained above the order of the elements in the ARG-ST list is seen as crucial for the determination of possible bindings and reflexivization. Anaphors may refer to elements further to the left on the ARG-ST list. If one assumes a nom, acc, dat order on the ARG-ST list, Grewendorf's (1988) binding examples are correctly predicted.

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(18) a. Der Arzt zeigte den Patienten$_j$ sich$_j$ / ihm$_{*j}$ im Spiegel.
the doctor showed the.ACC patient self him in.the mirror
'The doctor showed the patient himself in the mirror.'

b. Der Arzt zeigte dem Patienten$_j$ ihn$_j$ / sich$_{*j}$ im Spiegel.
the doctor showed the.DAT patient him self in.the mirror

But, as Eisenberg (1986: 184) points out, bindings like those in (19) exist as well:

(19) a. Ich empfehle ihm$_j$ sich$_j$.
b. Du ersparst ihm$_j$ sich$_j$.
c. Du verleidest ihm$_j$ sich$_j$.

The examples in (19) show that datives may bind accusatives. As (20) shows, *empfehlen* 'recommend' allows for passivization, so the accusative object is a direct object in the sense of the obliqueness hierarchy and should be seen as less oblique than the dative.

(20) Dieser Stoff wurde ihm empfohlen.
this cloth was him.DAT recommended
'This cloth was recommended to him.'

It is an open issue how this situation can be resolved. One way is to make binding principles verb (class) dependent and independent of the obliqueness hierarchy or to assume that it is verb (class) dependent and that verbs like those in (19) have a different order of elements in the ARG-ST list. Of course this could have consequences for other parts of the grammar relying on the order of elements in the ARG-ST list (see Section 9 for further discussion).

Note also that (18b) causes a Principle C violation. Since accusative (direct object) is less oblique than dative (indirect object), *ihn* 'him' (locally) o-binds *dem Patienten* 'the patient', which is prohibited by Principle C. This seems to indicate that linear order play a role in binding. Since the order on the ARG-ST list determines the constituent order in English, similar problems do not arise in English. In a configurational Binding Theory involving movement and c-command, the dative would bei higher in the tree and hence c-command the accusative but due to the analysis of scrambling in HPSG (Müller 2020, Chapter 10 of this volume) this is not the case. Müller (2004) discusses various alternative analyses for constituent order. Chapter 10 of this book presents the one that is commonly assumed: there is a fixed order of element of the ARG-ST list and heads may be combined with their arguments in any order. The alternative would be to assume multiple lexical items with different ARG-ST lists, each corresponding to one possible ordering of the arguments (Uszkoreit 1986). This would fix the problem with (18b) but it would cause new problems since subjects may be ordered after objects:

(21) a. dass der Mann sich vorstellt
that the man self introduces
'that the man introduces himself'

b. dass sich der Mann vorstellt
that self the man introduces
'that the man introduces himself'

The reflexive has to be bound to the subject independent of the relative order of subject and accusative object. If constituent order were connected to the order of elements in the ARG-ST list, one would have to reverse the order of elements to be able to analyze sentences like (21b), but then *sich* would be unbound and *der Mann* would be bound (Principle C violation).

6.2 Binding and prepositional objects

We already discussed the English examples in (11b) with two prepositional objects and showed that the second PP can contain a reflexive referring to a preceding PP and that HPSG's Binding Theory explains this nicely. However, the situation in German is different, as the following data from Grewendorf (1988: 58) show:

(22) a. Ich sprach mit Maria$_i$ über sie$_i$ / *sich.
I talked with Maria about her self
'I talked with Maria about herself.'

b. Ich beklagte mich bei Maria$_i$ über sie$_i$ / *sich.
I complained myself at Maria about her self
'I complained to Maria about herself.'

The conclusion of the discussion in the previous two sections is that a Binding Theory that is entirely based on obliqueness seems to be not possible and that language-specific binding rules referring to specific situation involving case and part of speech are necessary (see Grewendorf (1988) for such rules for German in GB).

7 Coindexing vs. coreference

Pollard & Sag (1994: 75) distinguish between coindexing and coreference. They explicitly mention this possibility in the discussion of examples like the ones in

(23):[4]

(23) a. It isn't true that nobody voted for John$_i$. JOHN$_j$ voted for him$_i$. (in a context where both uses of *John* refer to the same person)

b. He$_i$ [pointing to Richard Nixon] voted for Nixon$_j$.

The definition of o-binding requires coindexing. Indices include person, number and gender information. Since the anaphors in (24) are objects and the subjects o-command them locally, Principle A requires the subject to bind the anaphor and since this is impossible in (24b) due to gender mismatches, the sentence is ungrammatical.

(24) a. John knows himself.

b. * John knows herself.

However, the inclusion of coindexing into the definition of o-binding causes a problem since nothing rules out a coreference like the one in (25):

(25) John$_{i'}$ likes her$_{*i'}$.

The apostrophes show coreference rather than coindexation. According to the definition, *John* does not o-bind *her* since the two NPs cannot be coindexed. Hence, *her* is o-free and Principle B is not violated even though the coreference in (25) is impossible. One could now stipulate that coreference is excluded in case of gender mismatches, but the problem is more general and not restricted to gender. Eisenberg (1994: 197) discusses a German example with number mismatches:

(26) Auf der Brücke stand ein Paar. Sie stritten sich heftig.
on the bridge stood a couple they argued self fiercely
'There was a couple on the bridge. They argued fiercely.'

The pronoun *sie* 'they' refers to *ein Paar* although *sie* is plural and *ein Paar* is singular. HPSG's Binding Theory does not have anything to say about coreferences in texts, but it is easy to create similar examples with pronoun binding within a single sentence:

[4] The following sentence is an attested example of a sentence in which one would expect a reflexive rather than a pronoun:

(i) I saw me but I thought I was my dad! (J. K. Rowling *Harry Potter and the Prisoner of Azbakan*, London: Bloomsbury, 1999, p. 301)

The sentence is uttered as part of a description of a time travel. Harry Potter traveled back three hours in time and could see the visitor from the future (himself).

(27) a. Das Paar$_{i'}$ behauptet, dass sie$_{i'}$ sich lieben.
the couple.SG claims that they.PL self love.PL
b. Das Paar$_{i}$ behauptet, dass es$_{i}$ sich liebt.
the couple.SG claims that it.SG self love.SG

The two NPs cannot be coindexed in (27a) since the number of the two NPs is different.[5] As in (25), *das Paar* does not o-bind *sie* in (28), since it cannot be coindexed:

(28) Das Paar$_{i'}$ kennt sie$_{*i'}$.
the couple.SG knows they.PL
'The couple knows them.'

Hence, the coindexing in (28) does not violate any binding principles but it should be excluded by something like Principle B requiring that a pronoun must not be bound by/coreferential with something local.

Similarly Principle C does not apply in (29):

(29) Sie$_{*i'}$ behaupten, dass das Paar$_{i'}$ sich liebt.
they.PL claim that the couple.SG self loves
'They claim that the couple loves each other.'

One could assume that *Paar* is underspecified with respect to number, but this would require an approach to agreement that does not refer to the index.

(30) a. Das Paar schläft.
the couple sleeps
'The couple sleeps.'
b. * Das Paar schlafen.
the couple sleeps
Intended: 'The couple sleeps.'

Similarly the match of the relative pronoun and the noun it refers to is usually established by sharing the index (Pollard & Sag 1994; Sag 1997; Müller 2007; Arnold & Godard 2020, Chapter 15 of this volume). While Müller (1999b: 417–418) has data for neuter nouns in German like *Mädchen* 'girl' and *Weib* archaic

[5] The number is also shown by the agreeing verbs. One way to model agreement is to assume that the verb selects a subject with an index with person and number features corresponding to the agreement features of the verb. See Wechsler & Zlatić (2003) and Wechsler (2020), Chapter 6 of this volume on agreement. The alternative would be to have separate purely syntactic agreement features for NPs. *das Paar* would be singular as far as agreement is concerned but could have a referential index that can be singular or plural.

for 'woman', showing that the relative pronoun may be both the neuter relative pronoun *das* and the female pronoun *die*, the plural relative pronoun with coreference to *Paar* is strictly ungrammatical:

(31) a. das Paar, das sich liebt,
the couple that.SG self loves

b. * das Paar, die sich lieben,
the couple that.PL self love

Furthermore, as pointed out by Müller (1999b), underspecifying the number feature would run into problems with sentences like (32) containing two different pronouns bound by the same NP:

(32) Das Paar$_i$ behauptet, dass es$_i$ sich liebt und dass sie$_i$ sich nie
the couple claims that it self loves and that they self never
streiten.
argue
'The couple claims that they love each other and that they never argue with each other.'

Since the number value of *Paar* is underspecified, both *es* and *sie* would be compatible with the index of *Paar*, but identifying the index of *Paar* with one pronoun makes it incompatible with the other one.

Now, HPSG developed some new and interesting techniques to cope with conflicting demands in coordinate structures (see Levine et al. 2001: 207 and Abeillé & Chaves 2020: Figure 9, Chapter 17 of this volume) and these seem to be applicable here as well: Figure 4 shows a type hierarchy that has a common subtype of *sg* and *pl*. (32) can be analyzed now since *Paar* can be specified to be of type

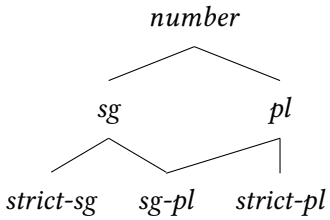

Figure 4: Type hierarchy making the types *sg* and *pl* compatible

sg and this would be compatible with *es* (*sg*) and *sie* (*pl*): the result of identifying all indices would result in an index with number value *sg-pl*.

While this general compatibility of singular and plural looks frightening at first sight, one can avoid collapsing all occurrences of singular and plural into *sg-pl* by specifying the number value of linguistic objects that are strictly singular by assigning the type *strict-sg* to them. So *Haus* 'house' would have the number value *strict-sg* and would be incompatible with *pl*.

This can also be used for the

For example the relative pronoun *die* for antecedent nouns in the plural could be *strict-pl*. Since *sg* and *strict-pl* are incompatible, (31b) would be correctly predicted to be ungrammatical.

Dieses Problem tritt auch beim Satz (??) auf: Der Index des Nomens *Weib*, des Relativpronomens *das* und des Possessivpronomens *ihr* können nicht identisch sein, da *das* ein Neutrum und *ihr* ein Femininum ist.

Man beachte, daß das hier diskutierte Problem nicht dadurch gelöst werden kann, daß man in der Definition von O-binden 'koindiziert' durch 'koreferent' ersetzt. Pollard & Sag (1994: S. 75) erlauben nämlich explizit, daß zwei verschiedene Indizes auf dasselbe Individuum referieren können.[6]

(33) a. It isn't true that nobody voted for John$_i$. JOHN$_j$ voted for him$_i$. (in a context where both uses of *John* refer to the same person)

b. He$_i$ [pointing to Richard Nixon] voted for Nixon$_j$.

Auf diese Weise wären dann auch die folgenden Sätze von Grewendorf (1985: S. 153) wegzuerklären.

(34) a. Wenn jeder Wolfgangs Mutter liebt, dann liebt auch Wolfgang$_i$ Wolfgangs$_j$ Mutter.

b. Nur Adenauer$_i$ stimmte für Adenauer$_j$.

Im Prinzip macht die Existenz solcher Beispiele und die Erklärung, die für sie angenommen wird, Prinzip B und Prinzip C überflüssig, da diese Prinzipien durch pragmatische Faktoren jederzeit wieder außer Kraft gesetzt werden können.

Eine Lösung des Problems könnte die Unterscheidung zwischen INDEX-Kongruenz und pragmatischer Kongruenz sein, die Wechsler & Zlatić (2003) vornehmen

[6] Ein echter Beleg für einen Satz, in dem man ein Reflexivum erwarten würde, ist (i).

(i) I saw me but I thought I was my dad! (J. K. Rowling *Harry Potter and the Prisoner of Azbakan*, London: Bloomsbury, 1999, S. 301)

Harry Potter äußert den Satz in einer Beschreibung einer Zeitreise. Er ist drei Stunden zurückgereist und und konnte in der Vergangenheit den Besucher aus der Zukunft (sich selbst) sehen.

INDEX-Kongruenz liegt vor, wenn das Pronomen ein Neutrum ist, und pragmatische Kongruenz liegt vor, wenn das Pronomen mit dem natürlichen Geschlecht übereinstimmt, ð, wenn ein Femininum verwendet wird.

8 Raising and o-command

A further problem has to do with predicate complex constructions in languages like German. Researcher working on SOV languages like German, Dutch or Korean assume that the verbs form a verbal complex. The arguments of the embedded verb are attracted by the governing verb. This technique was developed in the framework of Categorial Grammar and taken over to HPSG by Hinrichs & Nakazawa (1989; 1994). See also Godard & Samvelian (2020), Chapter 12 of this volume. Figure 5 shows the analysis of the following example:

(35) dass der Sheriff den Dieb sich überlassen wird
that the sheriff the thief self leave will
'The sheriff will leave the thief to himself.'

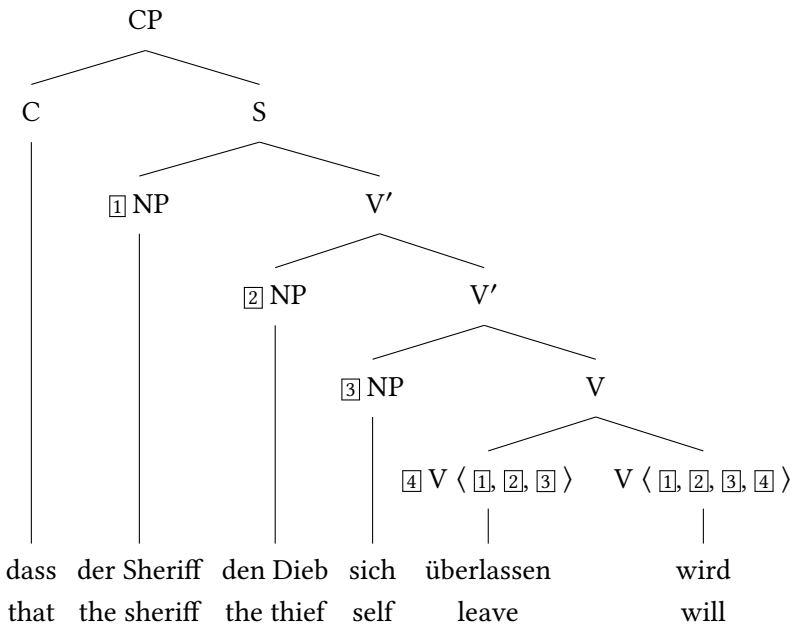

Figure 5: Analysis of a German sentence with a verbal complex

The verb *überlassen* 'to leave' is ditransitive and takes a nominative (1), a dative (2), and an accusative argument (3). A verb selecting another verb for verbal complex formation takes over the argument of the embedded verb. The auxiliary *wird* 'will' selects *überlassen* 'to leave' (4) and the arguments of *überlassen* (1, 2, 3). The ARG-ST list of *wird* contains *den Dieb* and *sich* and hence *den Dieb* locally o-binds *sich*, but *sich* also binds *den Dieb* since *sich* (3) is less-oblique than the verbal complement 4 and 4 selects for *den Dieb* (2). For the latter reason, Principle C is violated.

Kiss95a:33 Der Junge ließ das Mädchen das Boot für sich reparieren.

9 Linking, order, scope and binding

While Keenan & Comrie (1977) showed that the obliqueness hierarchy is relevant for activeness of grammatical functions crosslinguistically, it is an open question whether this hierarchy should be assumed to hold for all lexemes in all languages and if so, whether it plays a role in the same phenomena universally. As was discussed by Wechsler, Koenig & Davis (2020), Chapter 9 of this volume, the ARG-ST list plays an important role in linking theories. In an analysis of (36a), *the dog* is the direct object, while *dem Hund* bearing dative case is the indirect object in (36b):

(36) a. The elephant gave the dog a ball.

b. Der Elephant gab dem Hund einen Ball. (German)
the elephant gave the dog a ball

While Müller (1999b) ordered arguments according to the obliqueness hierarchy in (4), Müller (2015) decided to keep the ARG-ST lists and hence also the linking patterns constant across languages. Müller (2019) analyzes the Germanic languages with ARG-ST lists having the same order of elements and linking patterns, the differences resulting in a different distribution of lexical and structural case and a different mapping from ARG-ST to SPR and COMPS. See Przepiórkowski (2020), Chapter 7 of this volume for more on case assignment and ARG-ST in HPSG.

Kiss (2005) develops an account of quantifier scope determination for German arguing that cope is determined with respect to an unmarked order.[7] The unmarked order is nominative, dative, accusative for most German verbs. This does not correspond to universal tendencies, according to which the direct object

[7] See Höhle (1982) for a definition of *normal order*.

precedes the secondary object (Pullum 1977). Kiss uses the ARG-ST list to represent the unmarked constitutent order. The consequence is that German seems to require a nom, dat, acc order for (uniform) linking, constituent order, and scope and nom, acc, dat for binding. If this really is the case, one seems to need two separate ARG-ST lists to be able to represent both orders.

Abbreviations

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Part III

Other levels of description